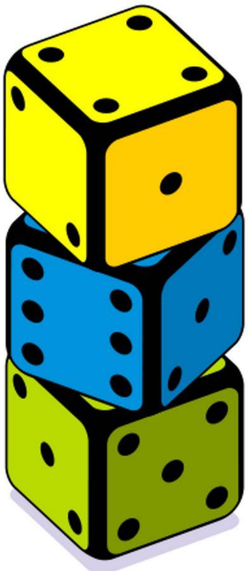
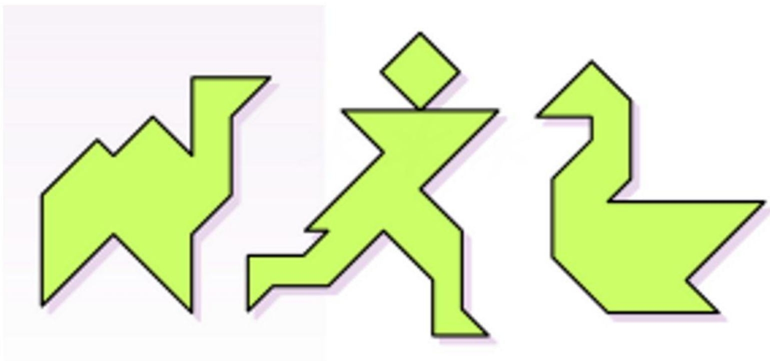
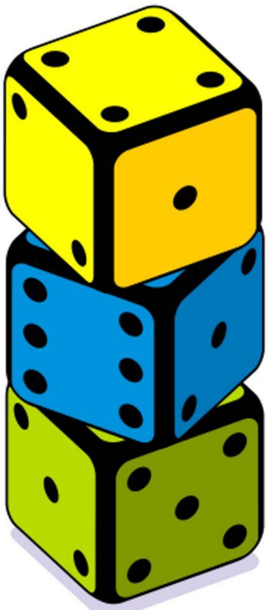
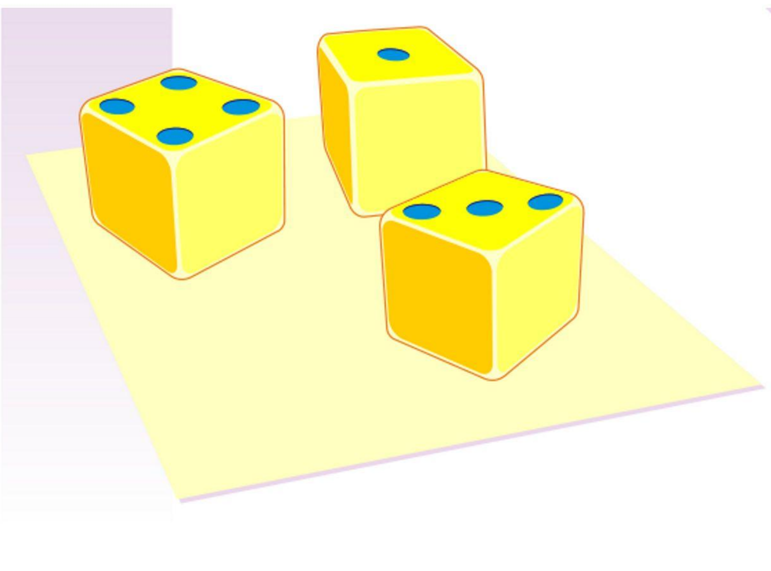
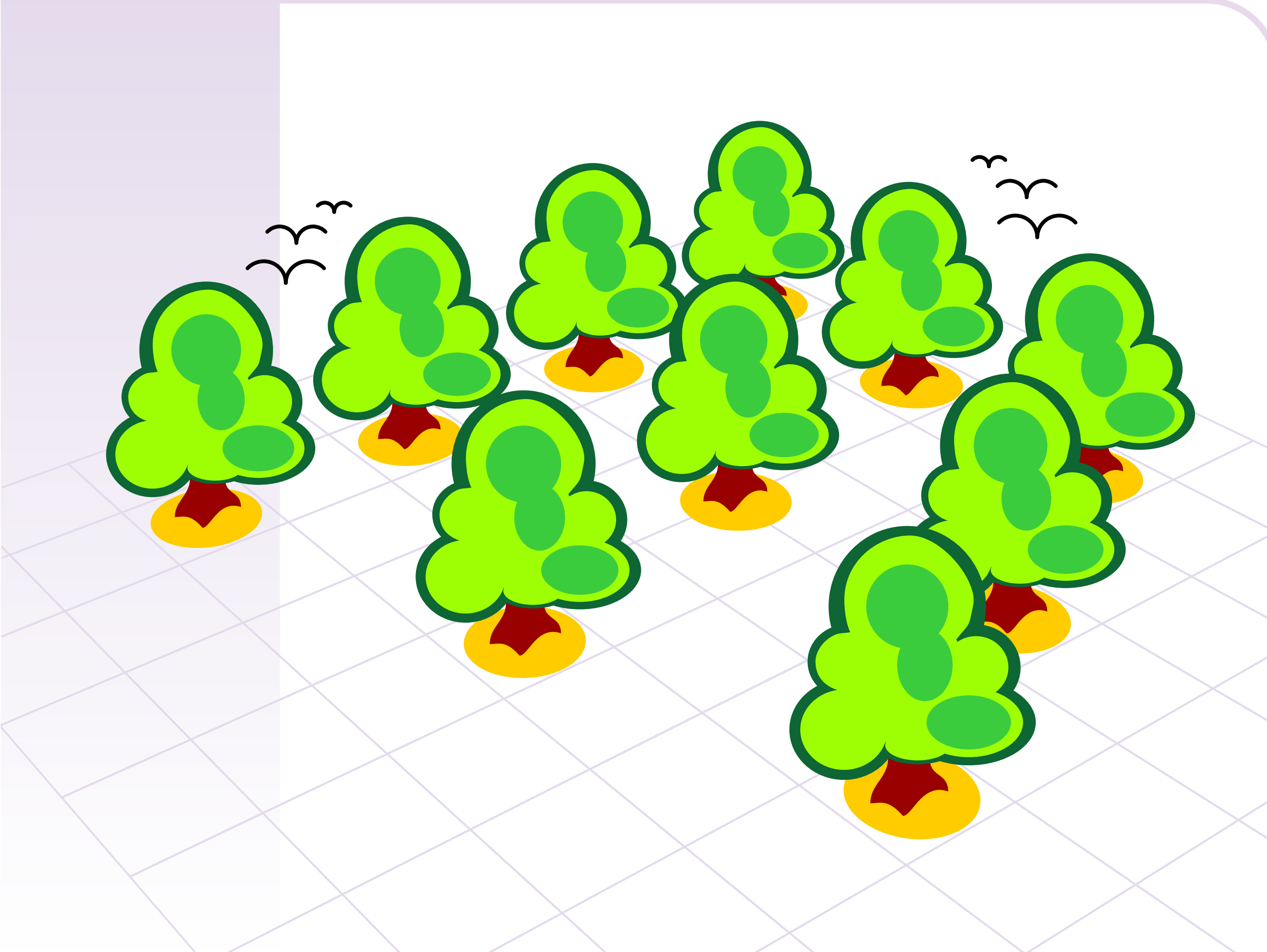
Детская площадка

Головоломки





10-in-5-Rows*

Imagine you have ten trees to plant. You have to get an orchard which must consist of five straight rows of trees and each row must contain four trees. One straight line of ten trees cannot be used. Thus the question is: what template could be used for the planting?

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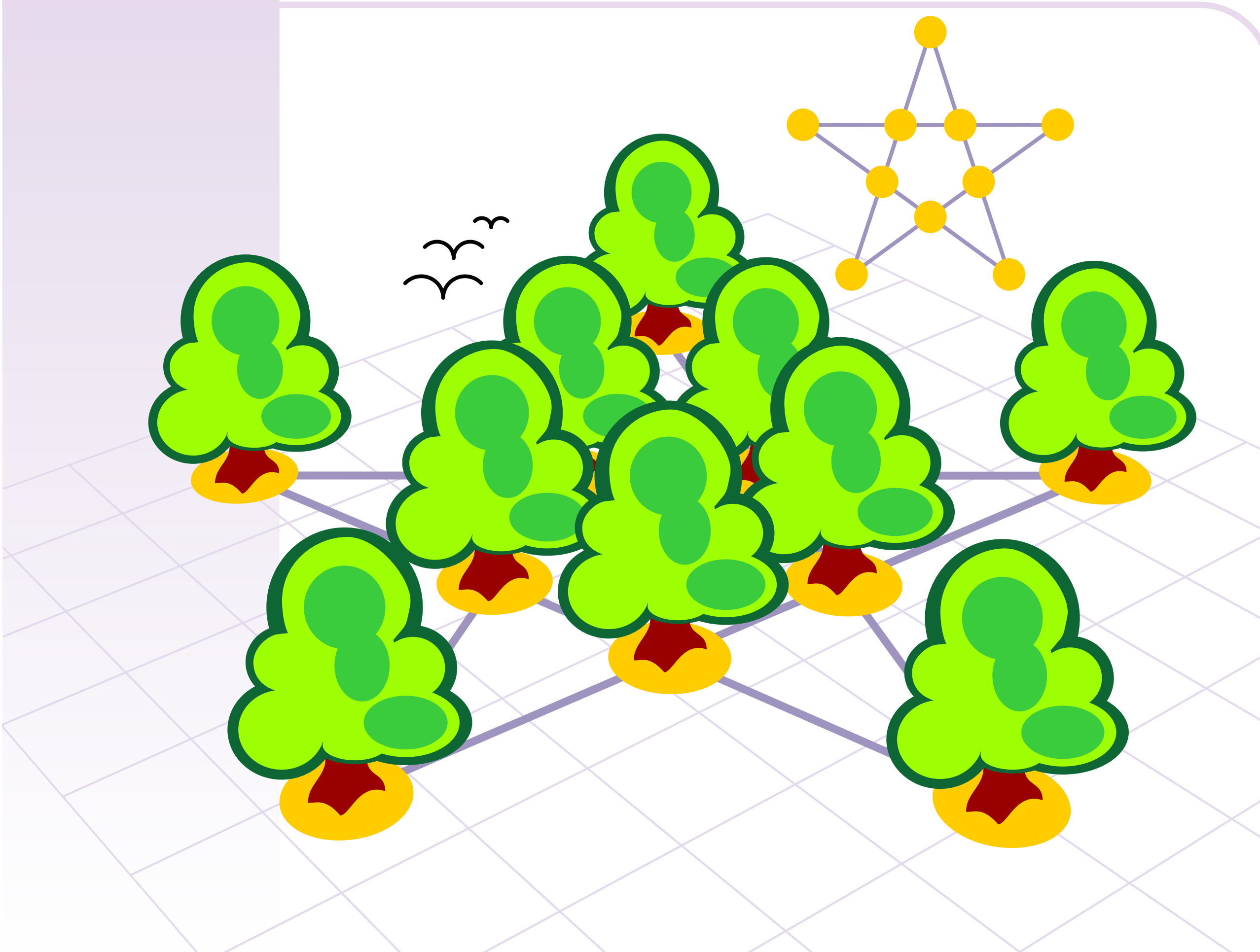
*This puzzle was inspired to the publication on our site by messages from Sundaresan.K.R and Dan E.



10-in-5-Rows (solution)

One of the solutions to this puzzle is shown in the illustration.

To plant an orchard of five rows of four trees each you could use a five-point star template as shown in the illustration.

This classic puzzle has a long story behind it. Such puzzle grands as Sam Loyd and Henry E. Dudeney contributed to the development of the puzzle.

26 - 63 = 1

The shown equation is not correct. But with changing the position of only one digit it can be improved and become correct. Can you see how?

$$2^6 - 63 = 1$$

The solution is shown in the illustration.

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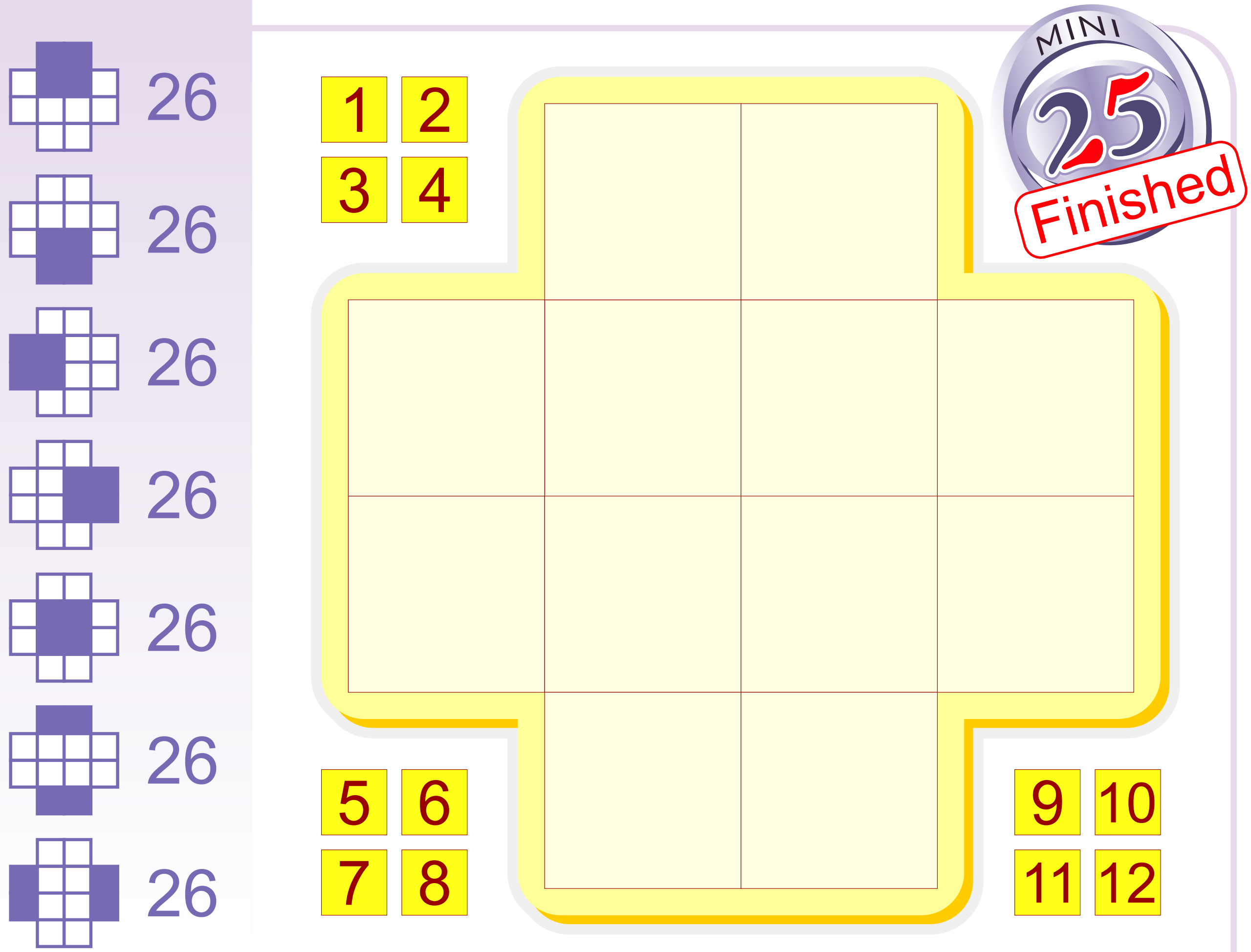
PRINT 'N' PLAY VERSION

Treasure of Classic and Modern Puzzles

Puzzles with Numbers



The 26 Puzzle Re_Solution*

based on a puzzle by Professor Louis Hoffman

The object of the puzzle is to place in the big cross on the left the numbers 1 through 12 - exactly one number per cell - so that to make the magic sum of 26 in seven areas of the cross shown on the far left. Every of such areas consists of four squares.

The puzzle is sequel to The "Twenty-Six" Puzzle which is in our PuzzlePLAYGROUND sector as well.

-----

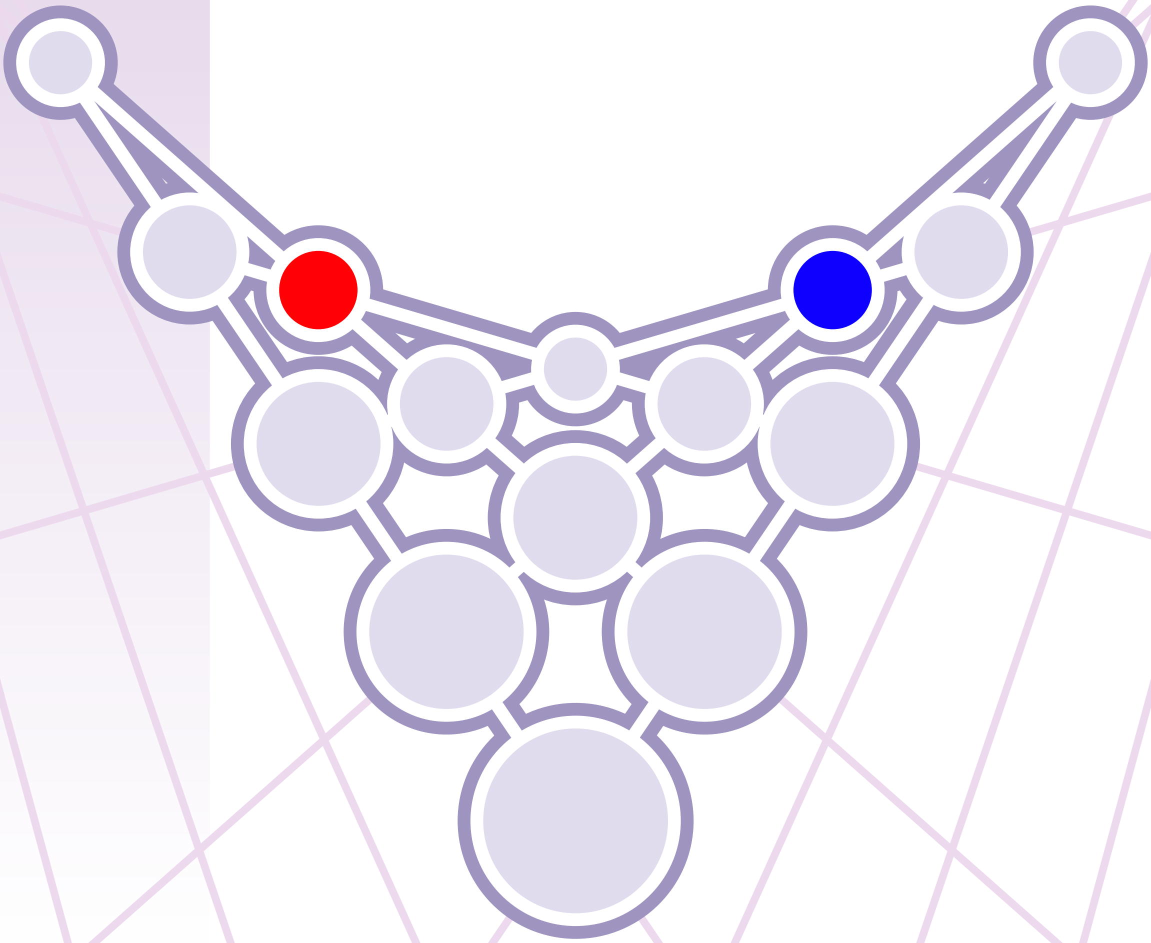
*This puzzle is based on a solution to The "Twenty-Six" Puzzle sent to us by Prasad A.

September 7, 2003 www.puzzles.com

	10	3	
11	6	7	9
4	5	8	2
	12	1	

The 26 Puzzle Re_Solution (solution)

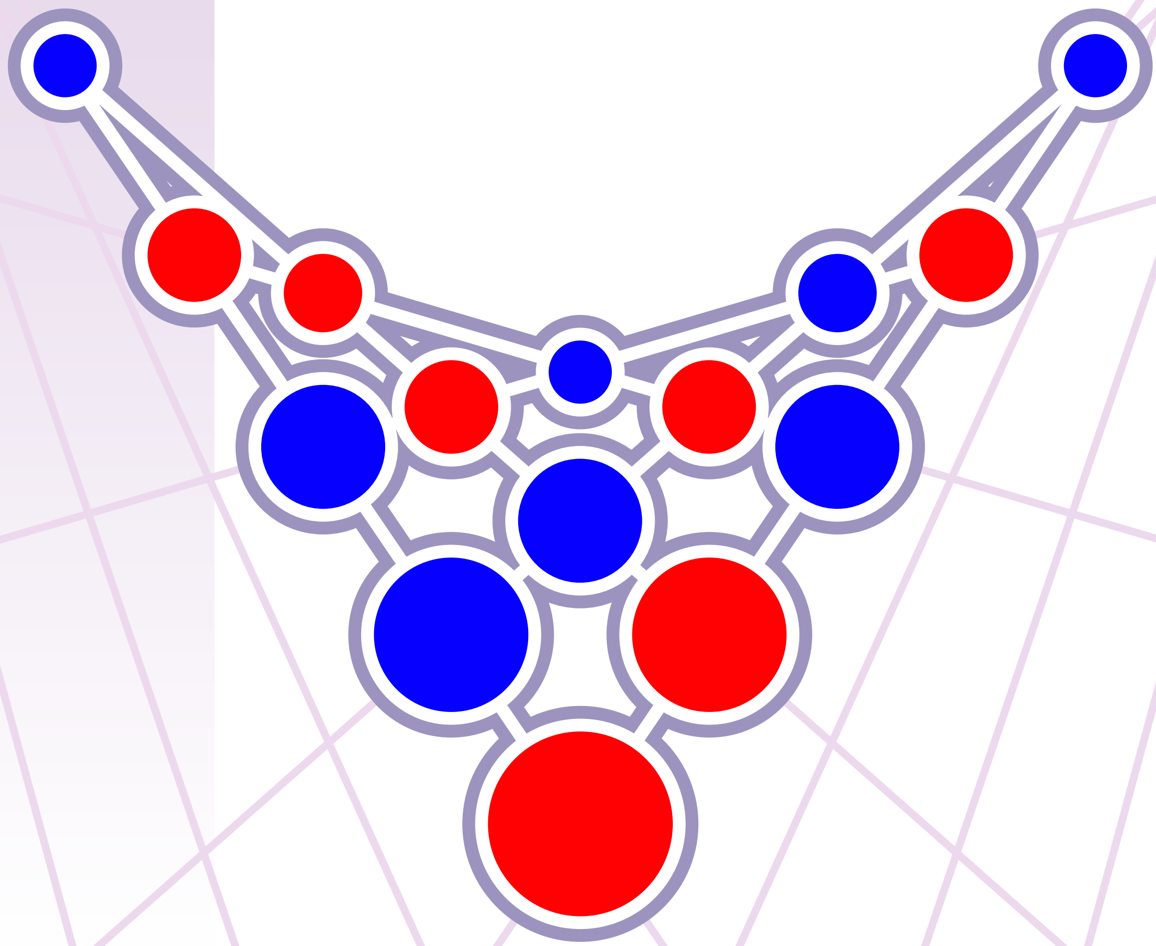
The solution shown in the illustration is one of many solutions to this puzzle. It is the original solution sent in by Prasad A. - the one who inspired us to the publishing of this puzzle.



3-vs-2-feat-1

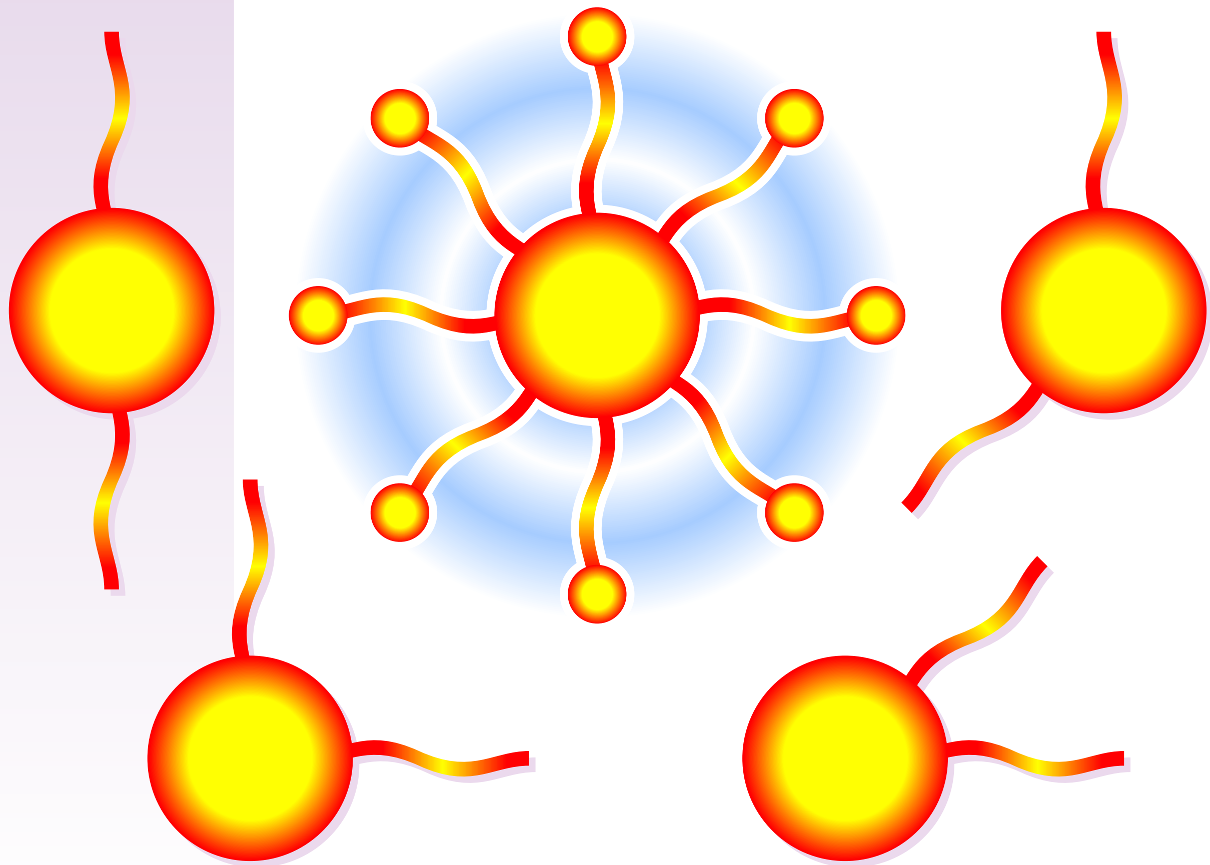
Color all the points of this "web" into red and blue in such a way that any single line shown in the illustration doesn't contain a sequence of three points of the same color. The two points are already colored.

Miscellaneous Puzzles



3-vs-2-feat-1 (solution)

One of the solutions is shown in the illustration.



The 4 Angles*

by Sean E.

Put the four pieces over the central image in such a way that to connect each of the eight small planets with the Sun in the center.

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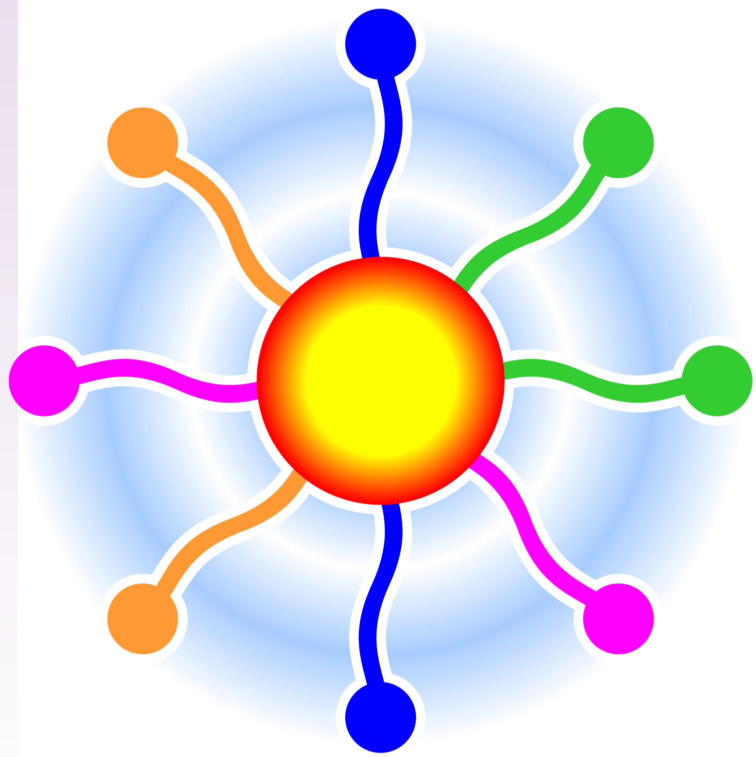
*This puzzle was sent to us by Sean E. We just added some final design touches to it.

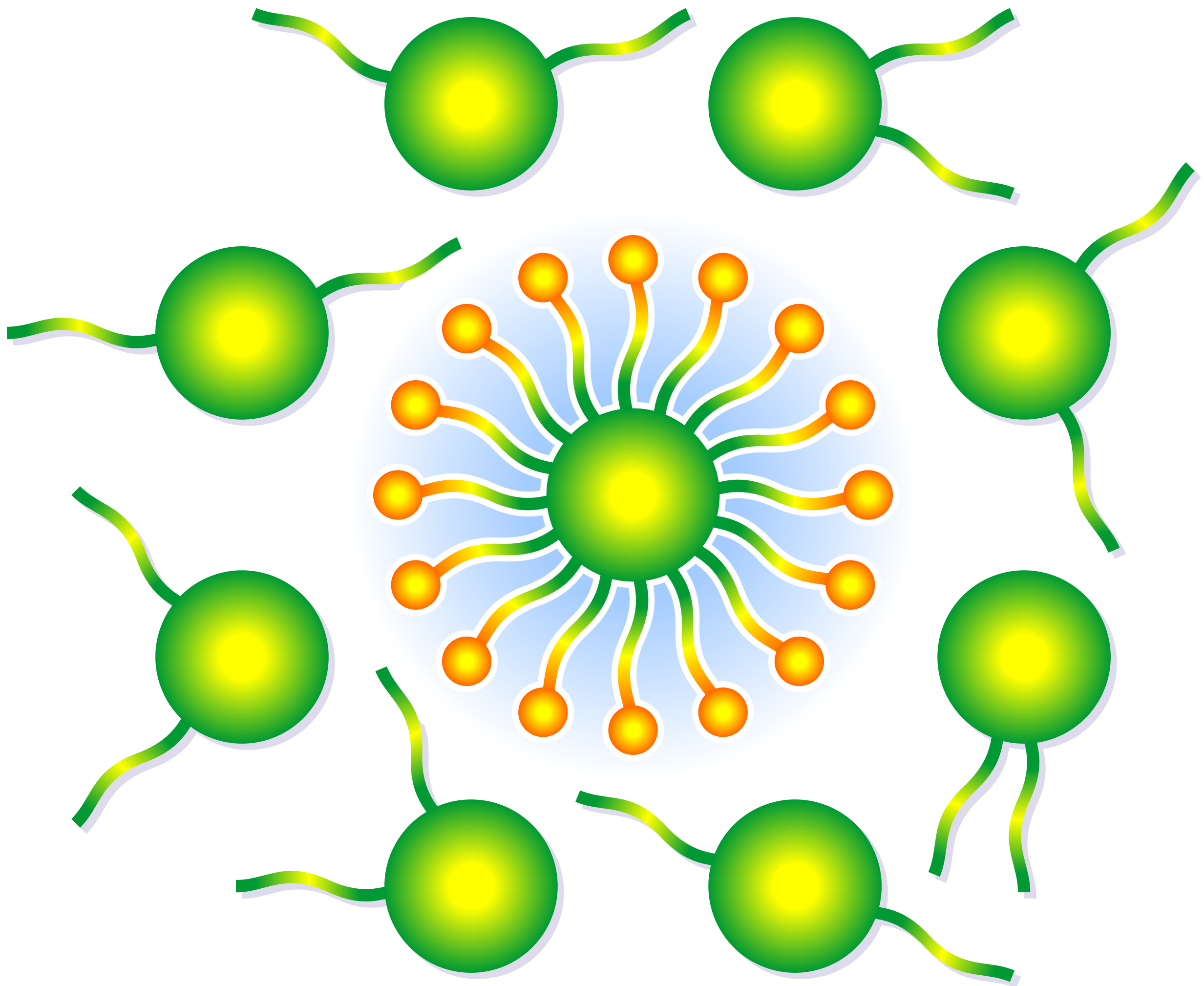


The 4 Angles (solution)

There is only one basic scheme solution to this puzzle (not counting rotations and reflections). It is shown in the illustration.

The 8 Angles
by Sean Egan*

Puzzles.COM



The green planet in the center is encircled with sixteen moons. The object is to put the eight pieces, scattered around, over the central image in such a way that to connect the green planet to each of its moons - one link per moon.

*This puzzle was sent to us by Sean Egan as the sequel to his The 4 Angles puzzle published on our site several years ago. We've just added some final design touches to it.

Last Updated: January 26, 2006

ThinkFun Everybody Plays®

One of the basic solutions is shown in the illustration. Links of the same color belong to one piece.

$$a + b = c$$
$$a \times b = c$$

$$2 + 2 = 4 \qquad \square + \square = \square$$
$$2 \times 2 = 4 \qquad \square \times \square = \square$$

The abc Arithmetics

by Sam Loyd

As it is known 2 multiplied by 2 produces the same result as 2 added to 2. It is 4 in both cases - just as shown in the lower left corner of the illustration.

Can you think of another pair of numbers (**a** and **b**) which when multiplied together give the same result when they are added together. In other words it should be such **a** and **b** numbers that the two equations shown in the illustration are true, i.e. **a + b = c** and **a x b = c**.

Note, that the number **a** may be different from the number **b** in the pair. And, of course, you are allowed to choose from the decimal numbers as well.

Actually there are many such pairs and some formula can be derived for this. Can you think of it too?

Puzzles with Numbers

$$3 + 1\tfrac{1}{2} = 4\tfrac{1}{2}$$

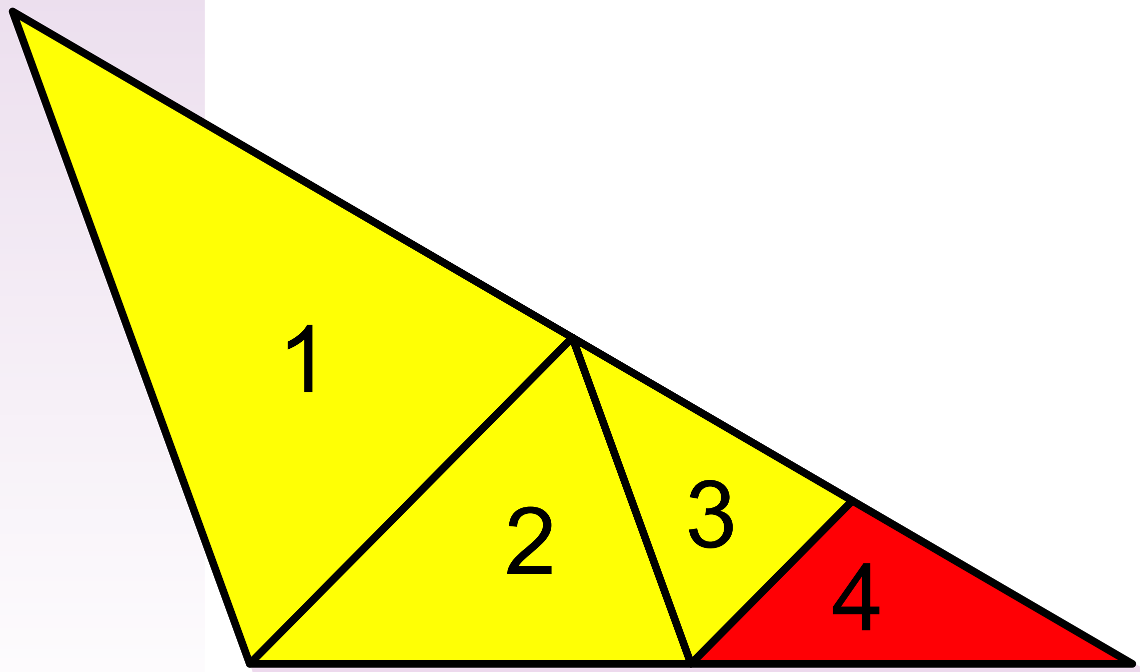
$$3 \times 1\tfrac{1}{2} = 4\tfrac{1}{2}$$

The abc Arithmetics (solution)

The formula which helps to find such pairs is derived from the simple equality that **a + b = a x b**. From this we have that **b** always equals **a/(a-1)**. The formula shows there is an infinity number of such pairs existing.

Thus if **a** is 3 then according to that formula above **b** is 1.5. When they are multiplied the result is the same as when they are added together. It is 4.5 as shown in the illustration.

Geometrical Puzzles

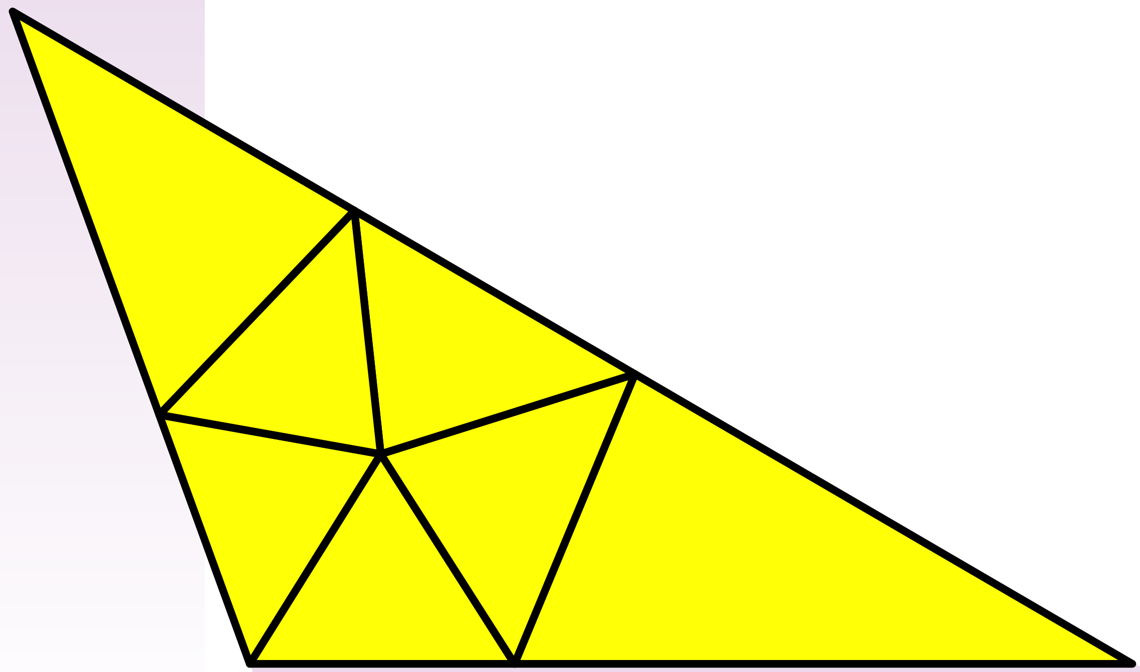


Acute Dissection

by Mel Stover

Is it possible to cut an obtuse triangle (a triangle with one obtuse angle) into smaller triangles, all of them acute? An acute triangle is a triangle with three acute angles. A right angle is neither acute nor obtuse. If such a dissection can be done, what is the smallest number of acute triangles into which any obtuse triangle can be dissected?

The illustration shows how an obtuse triangle can be divided into almost all acute triangles except one - the red one. Thus what approach should be used when it is required to cut an obtuse triangle into acute triangles *only*?



Acute Dissection (solution)

The minimal number of acute triangles is 7. The pattern for the seven triangles is shown in the illustration. An elegant proof for the seven acute triangles has been provided by Wallace Manheimer in *American Mathematical Monthly*, November 1960. The logic behind the proof is as follows.

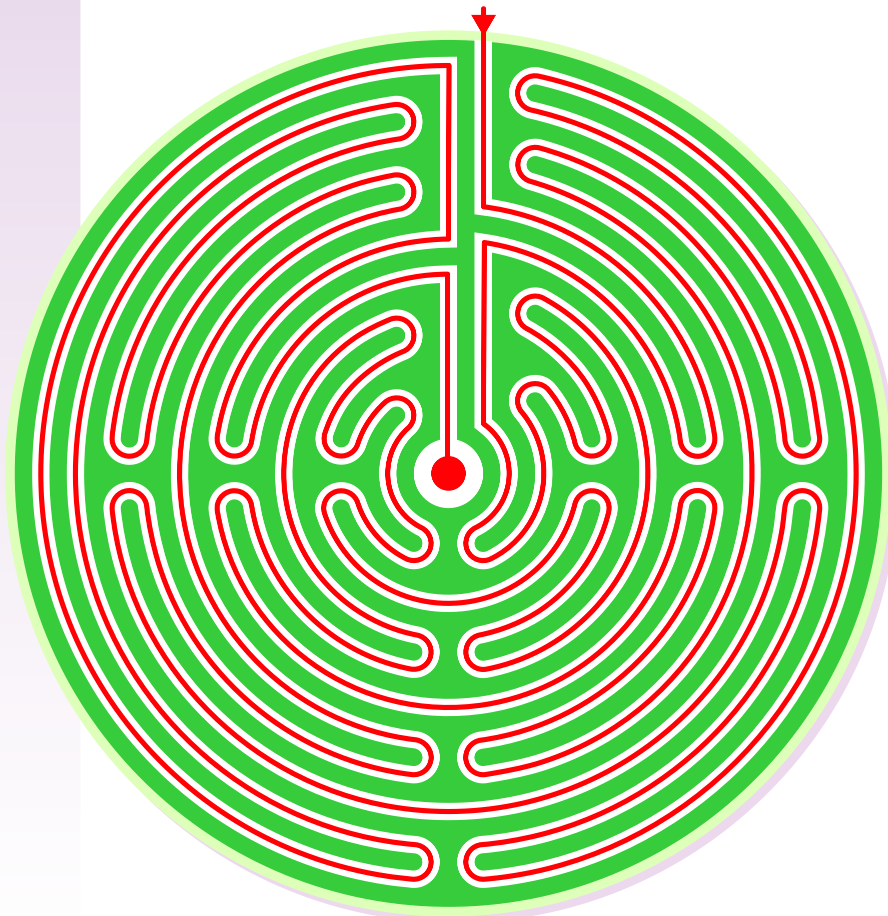
The obtuse angle must be divided by a line. This line cannot go all the way to the other side, for then it would form another obtuse triangle (or two triangles with right angles), which in turn would have to be dissected, consequently the pattern for the large triangle would not be minimal. The line dividing the obtuse angle must, therefore, terminate at a point inside the triangle. At this vertex, at least five lines must meet, otherwise the angles at this vertex would not all be acute. This creates the inner pentagon of five triangles, making a total of seven triangles as shown in the illustration.

Mazes

The Alkborough Maze

Trace your path through the maze from the entrance at its top to the white spot at its center.

The real maze is cut in the turf at Alkborough in Lincolnshire, England. The maze known as "Julian's Bower" is the unicursal maze, first mentioned in 1697 and believed to date from the medieval period. The turf maze was still used for May-eve games until about 1850.



The Alkborough Maze (solution)

Since it is a unicursal maze there is only one path through it existing - just as shown in the illustration with the red line.

Word Puzzles

E d O R N O W

An Easy One

after Professor Louis Hoffmann

Rearrange these letters in such a way that to make one word.

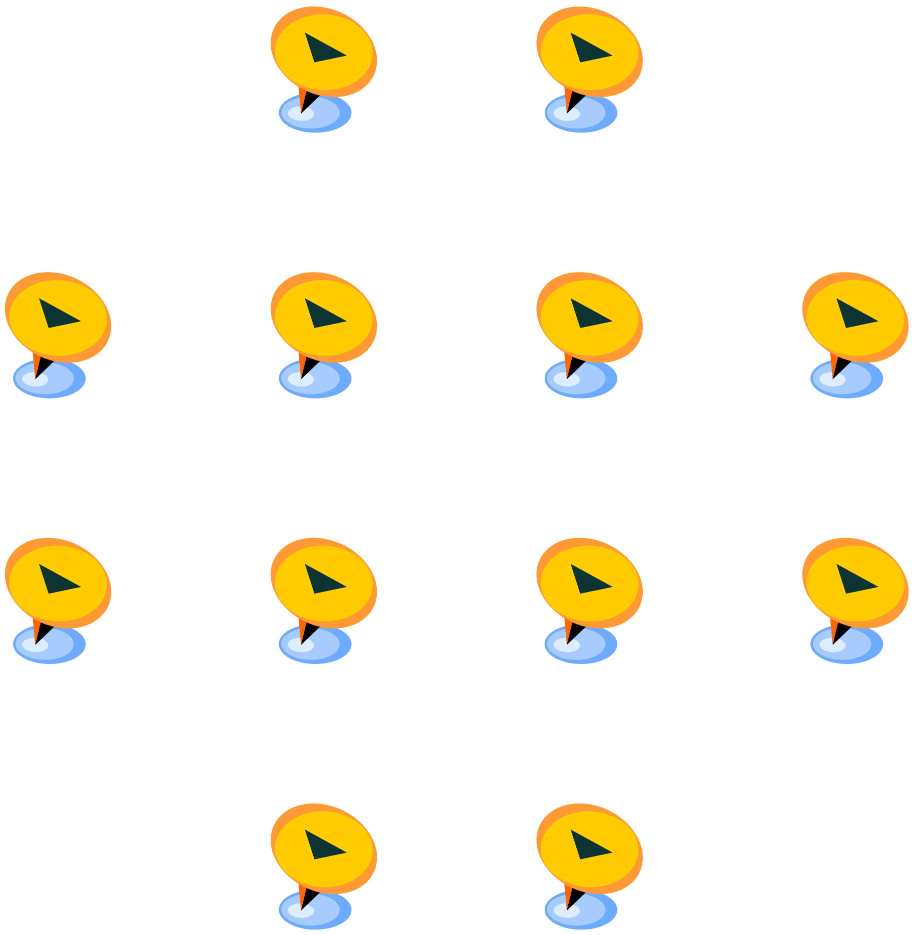
Treasure of Classic and Modern Puzzles

Word Puzzles

An Easy One (solution)

The solution is shown in the illustration.

Another Twelve Points*

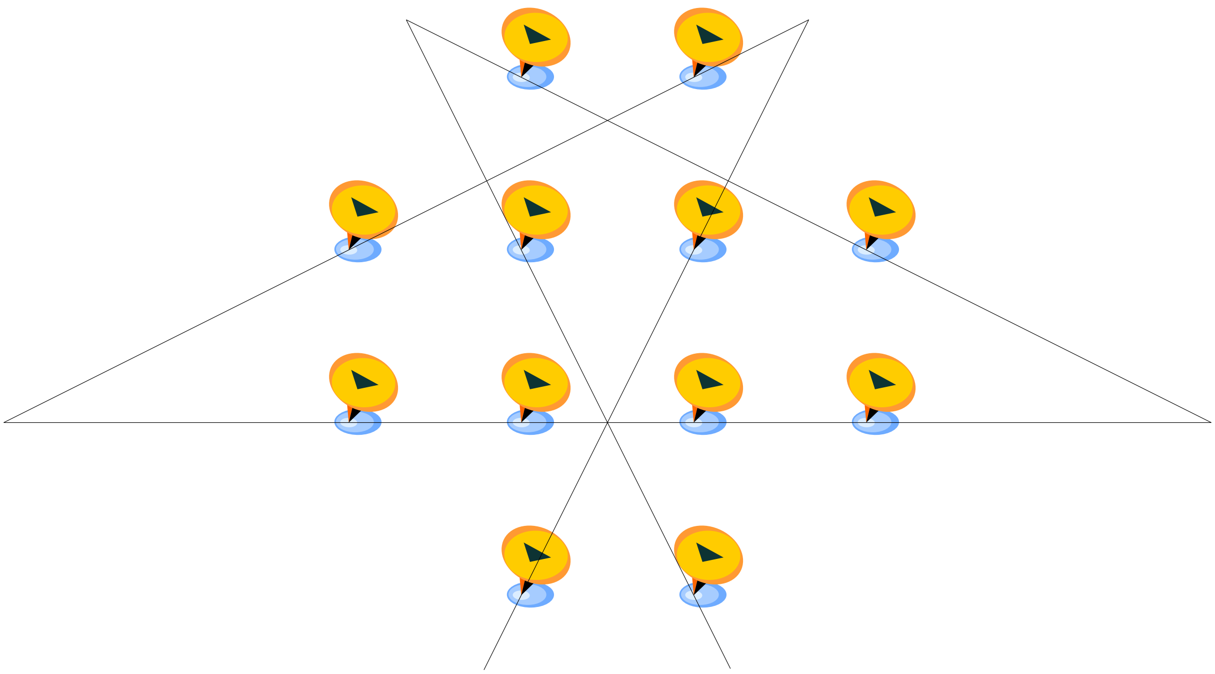


Twelve points are arranged into a cross as shown in the illustration.

The goal is to connect all the twelve points with exactly 5 straight lines without lifting your pencil off the paper.**

*This puzzle was inspired to the publication on our site by the message from Karen I.

**The puzzle is a modification of Serhiy Grabarchuk's *Stars & Spirals* challenge published in 2005 (Sterling) in his book *The New Puzzle Classics: Ingenious Twists on Timeless Favorites* (p. 46).

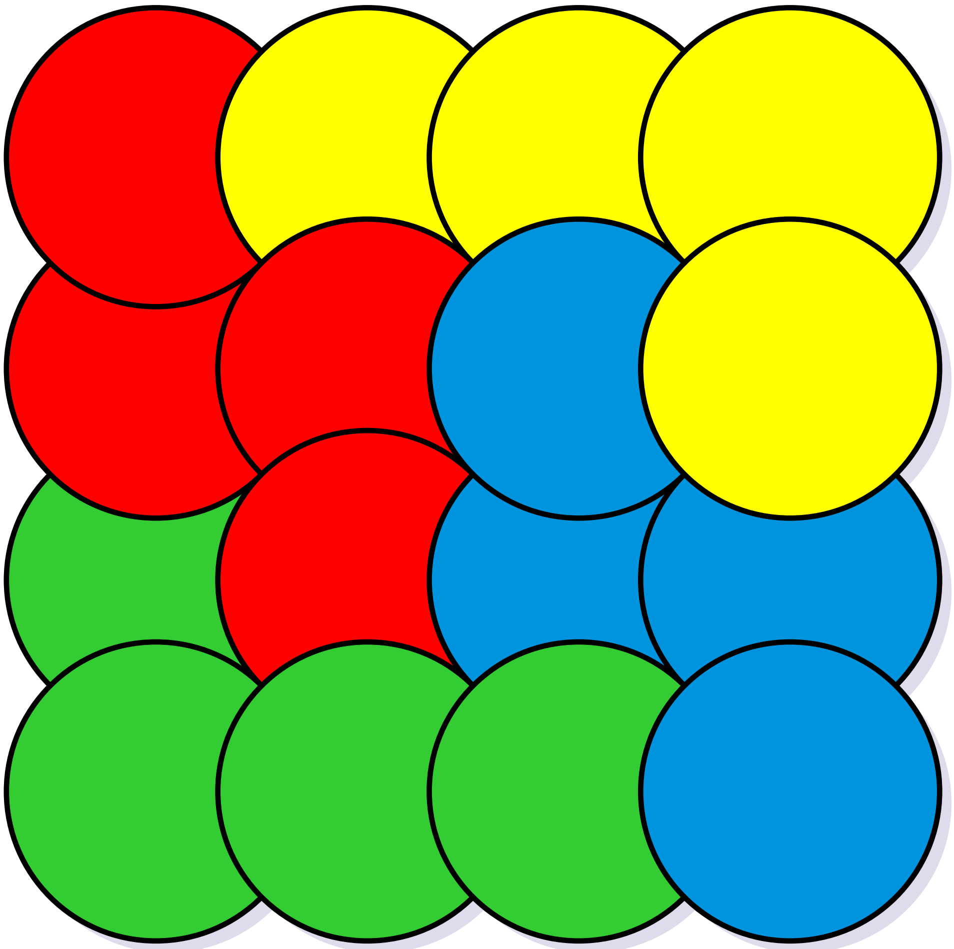


The solution is shown in the illustration.

Areas in the Big Square

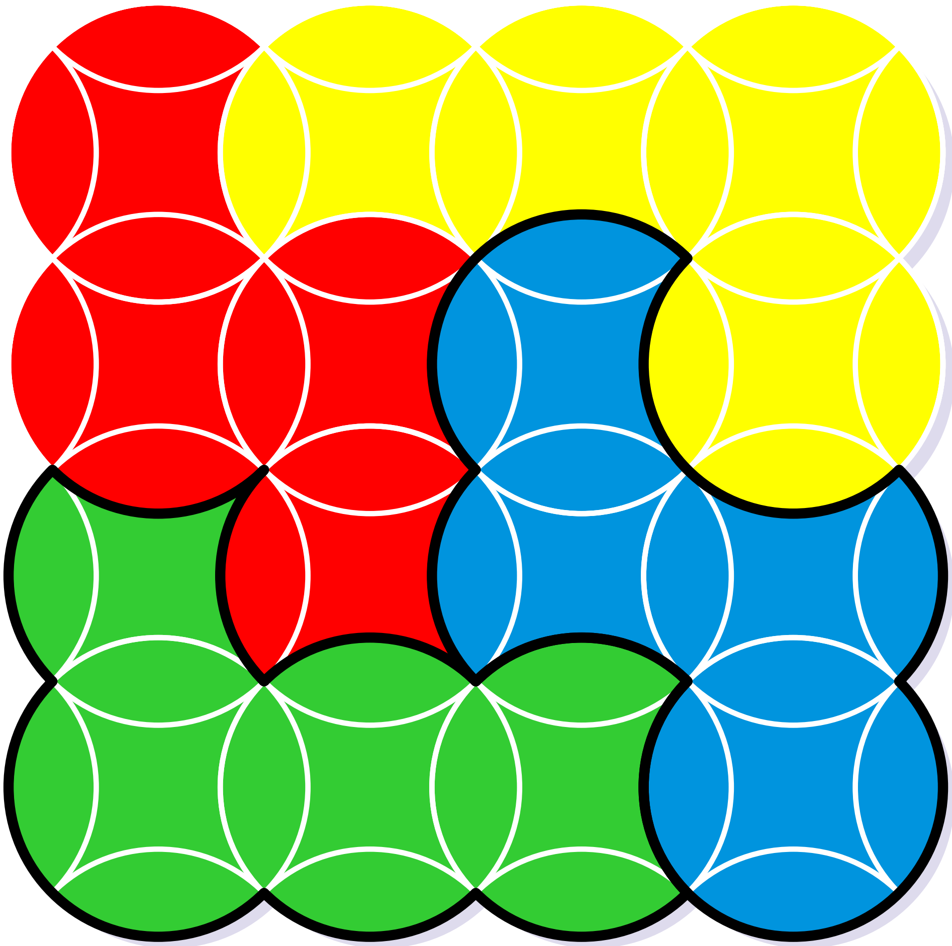
by Peter Grabarchuk

Puzzles.COM

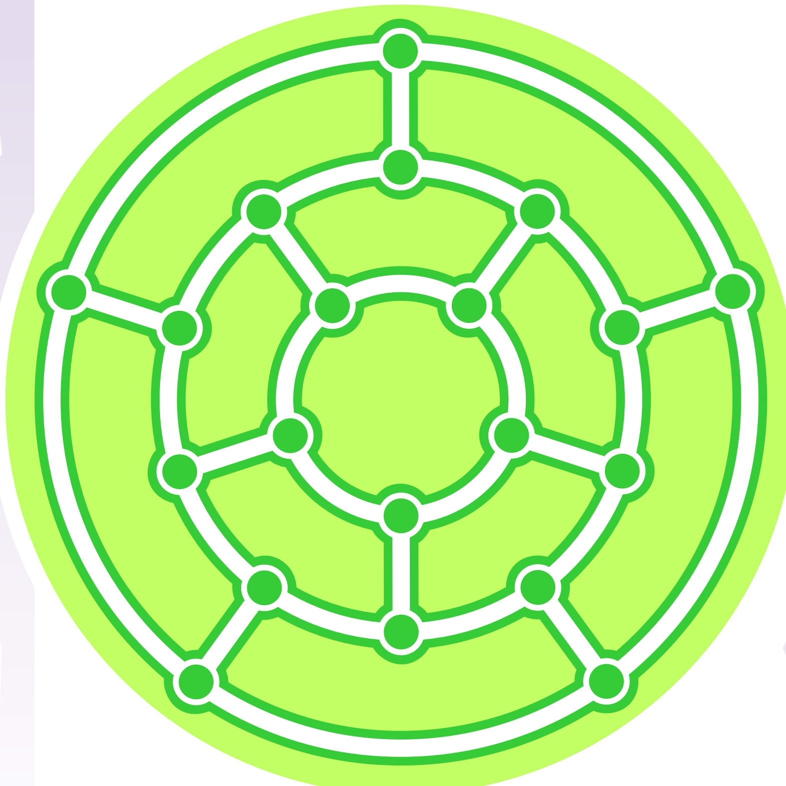


The shape consists of overlapped color circles. Which two colors have their total visible areas equal?

More from the author at PeterPuzzle.com



The green and the blue color regions are equal in their areas.



Around Dodecahedron In 20 Points

by W. R. Hamilton

The graph in the circle above is a two-dimensional projection on the plane of a dodecahedron (a three-dimensional solid with twelve pentagonal faces). Each green point on the graph represents the respective vertex of the dodecahedron, and each white line between any two points - the respective edge. Such graphs, which project some three-dimensional problems and puzzles onto the two-dimensioanl plane are called Schlegel diagrams.

The object of this puzzle is to visit all the 20 green points on the graph. You can start at any point but you may visit each point only once. Moving from point to point you have to travel along the white lines (alleys) only. You have to finish at the point where you've started your journey from.

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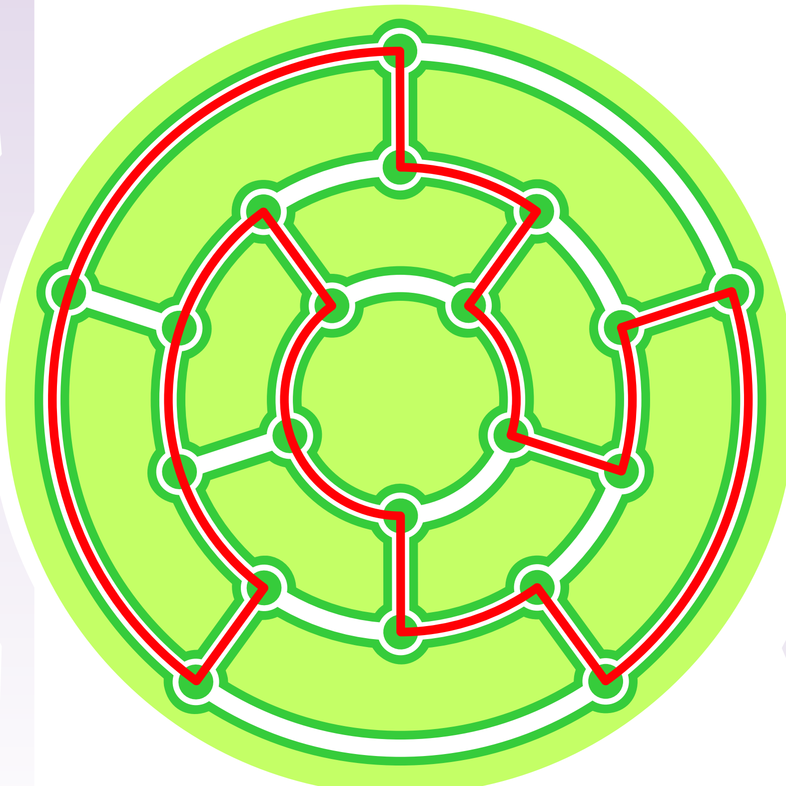
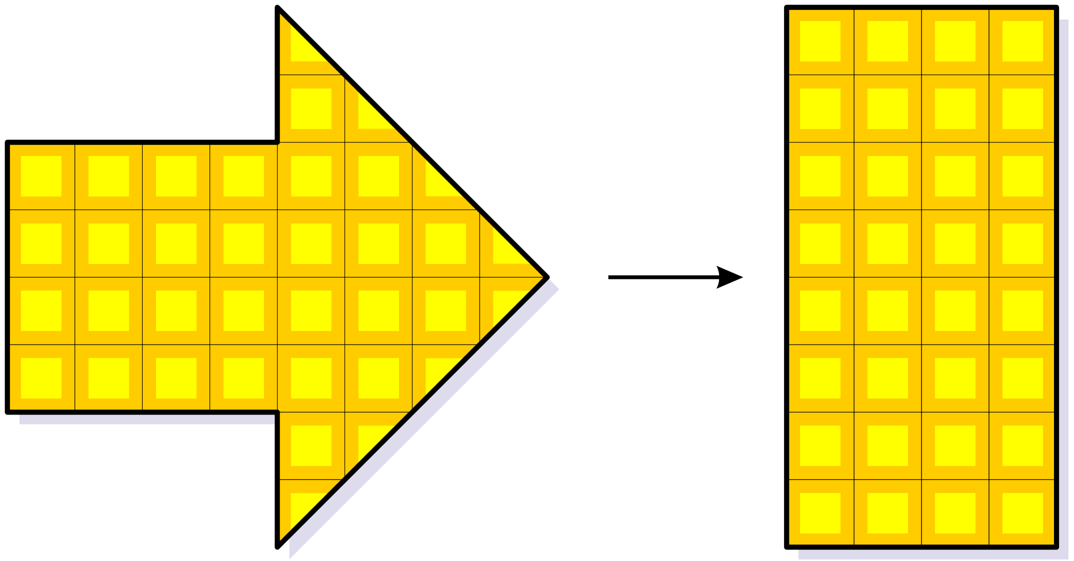
*This puzzle is an Icosian game which was invented by the mathematician W. R. Hamilton in 1859. Hamilton devised a branch of mathematics to solve similar path-tracing problems on two-dimensional solids. He called it Icosian calculus.



Around Dodecahedron In 20 Points (solution)

One of the possible paths to this puzzle is shown in the illustration.



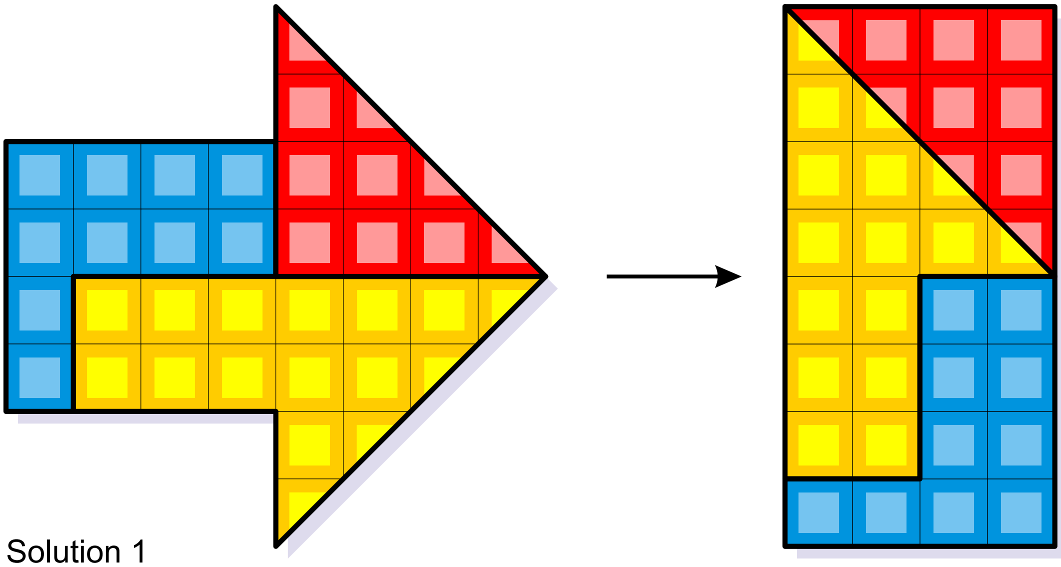
Divide the arrow at left into three pieces that could be rearranged into the rectangle at right. The pieces must be different in their shapes and areas. The cuts must go through the lines of the grid. The pieces can be rotated and/or flipped over.

More from the authors at PeterPuzzle.com

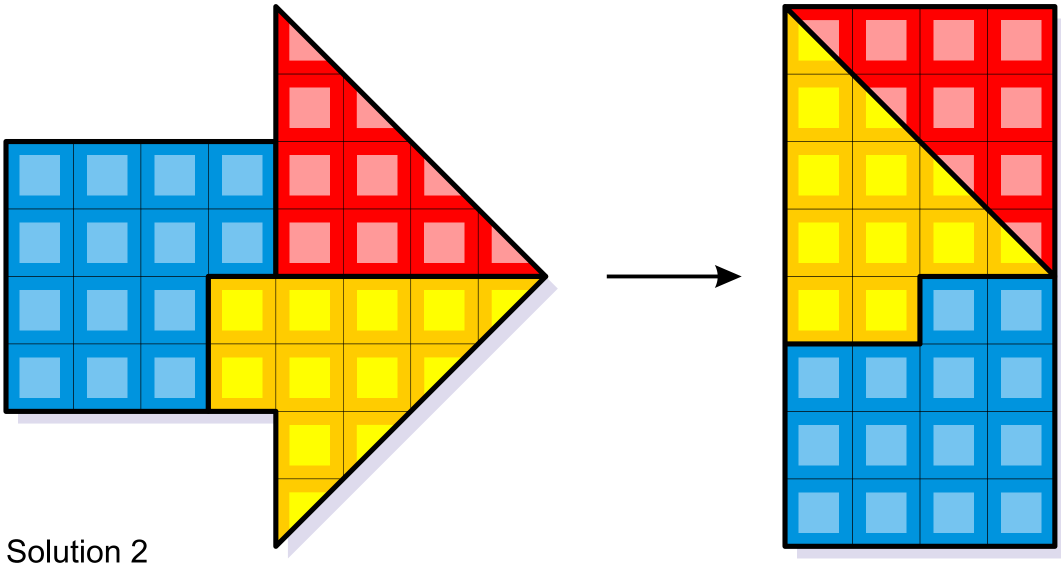
Arrow Cutting

Solution

Puzzles.COM

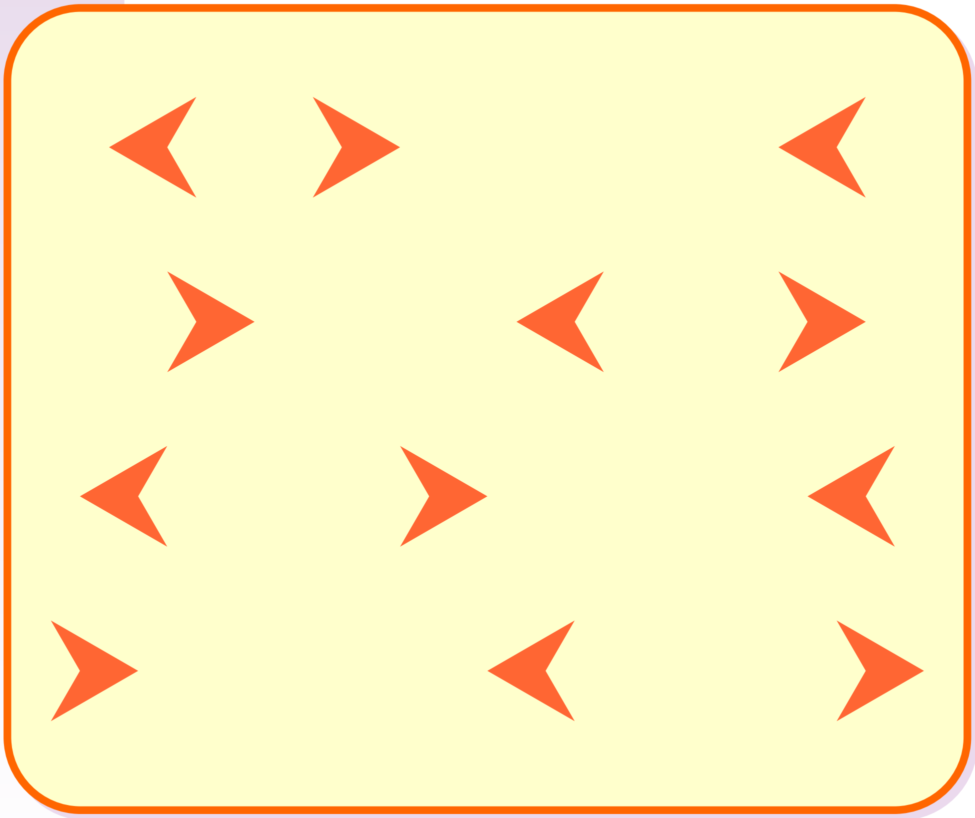


Solution 1



Solution 2

The solutions are shown in the illustration.

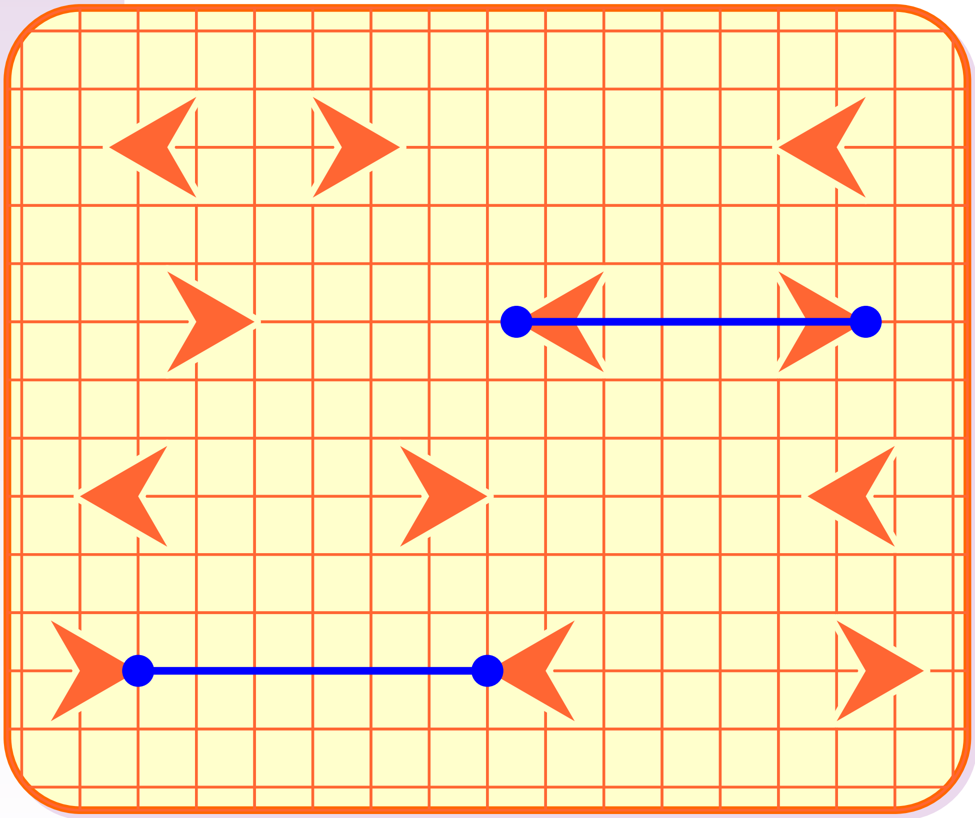


Arrows

by Serhiy Grabarchuk

Can you find two pairs of arrows the respective tips of which point two exactly identical horizontal distances between these tips?

Illusions



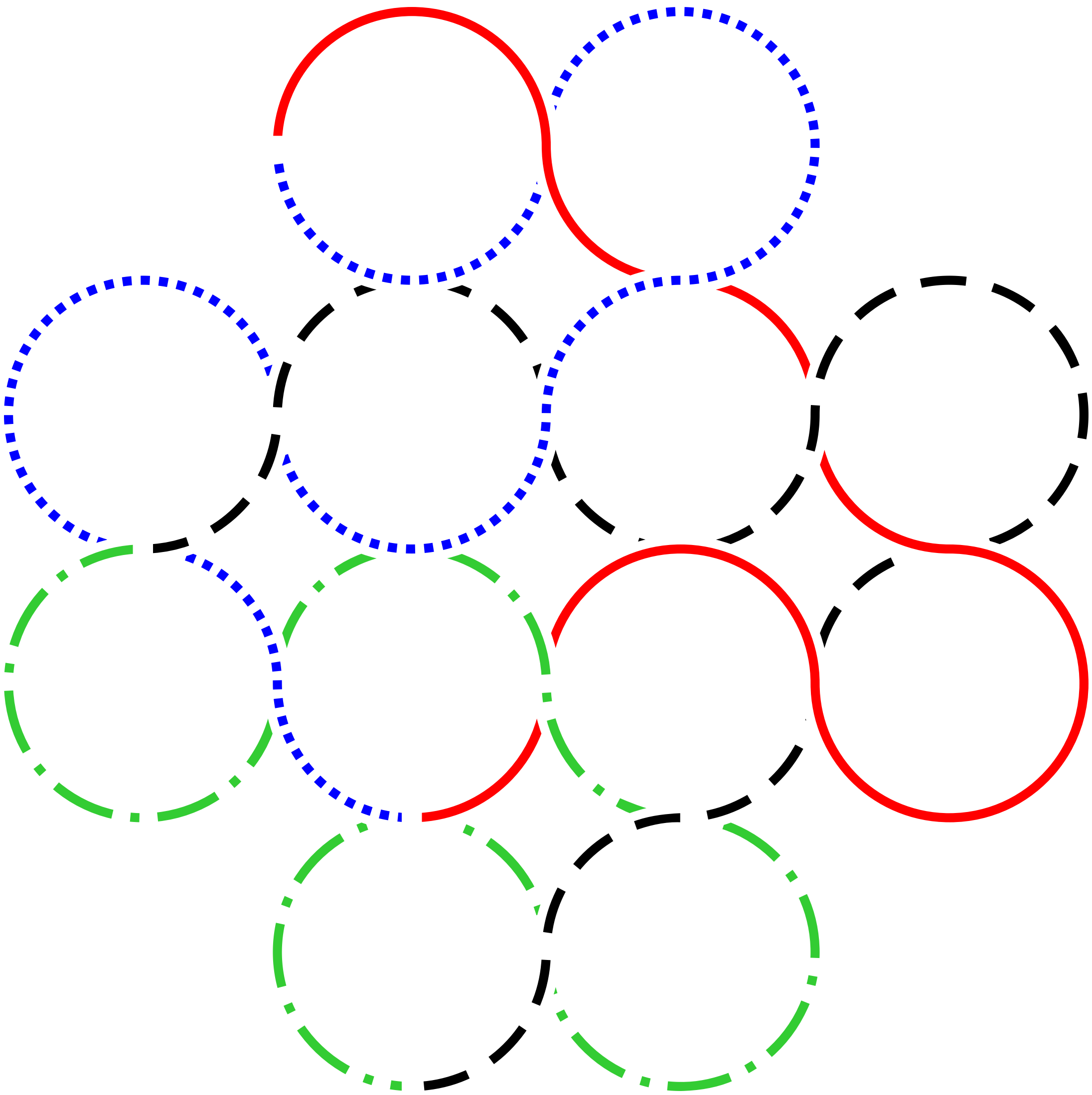
Arrows (explanation)

This illusion-puzzle is based on the famous Mueller-Lyre illusion about two identical lines with arrows differently joined to their ends. These arrows make the lines seem different in their lengths.

A grid in the diagram helps to discover two equal distances; they are shown in the illustration with the respective blue segments.

The Band Cross

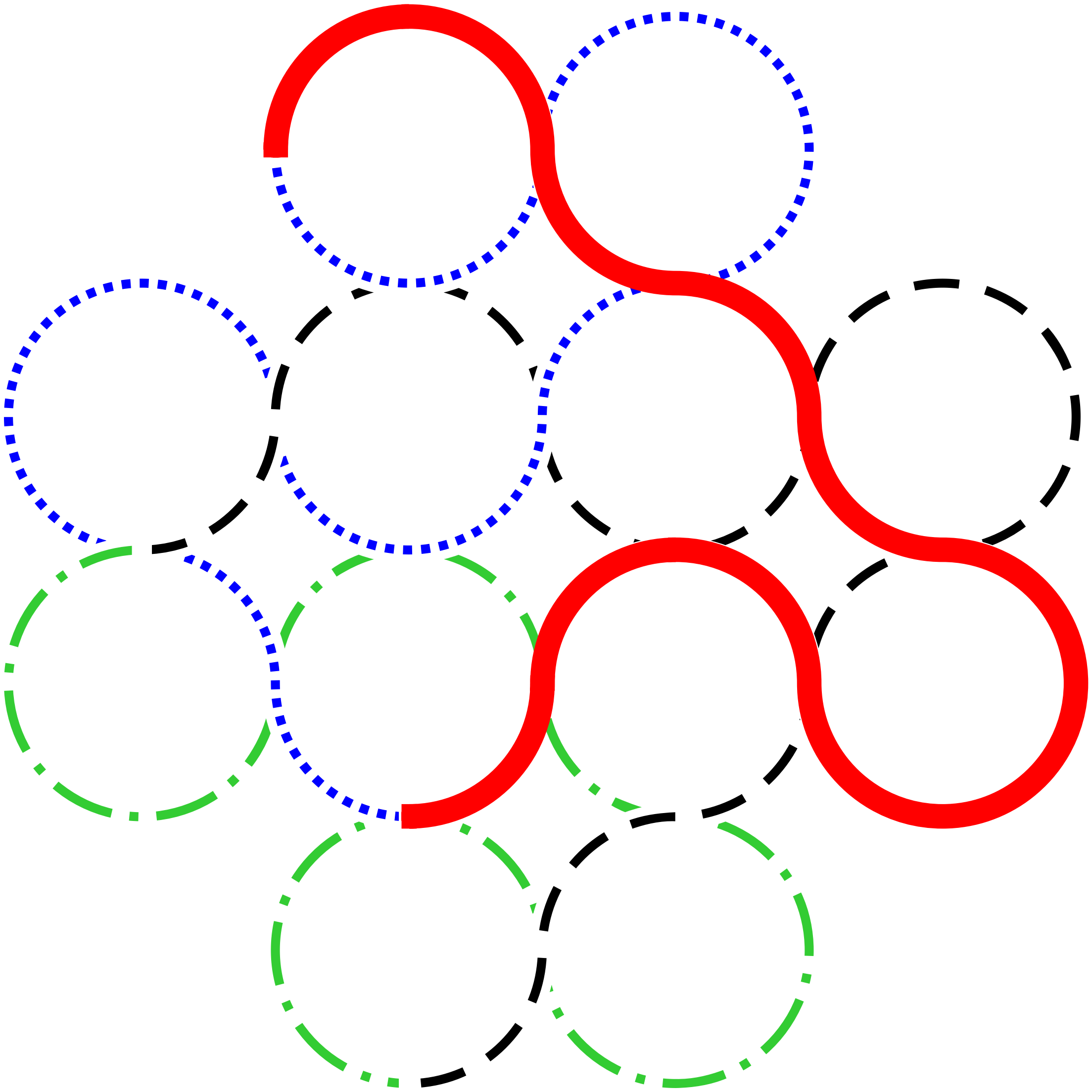
by Peter Grabarchuk



Among the four color snakes (black, blue, green, and red), can you find the shortest one?

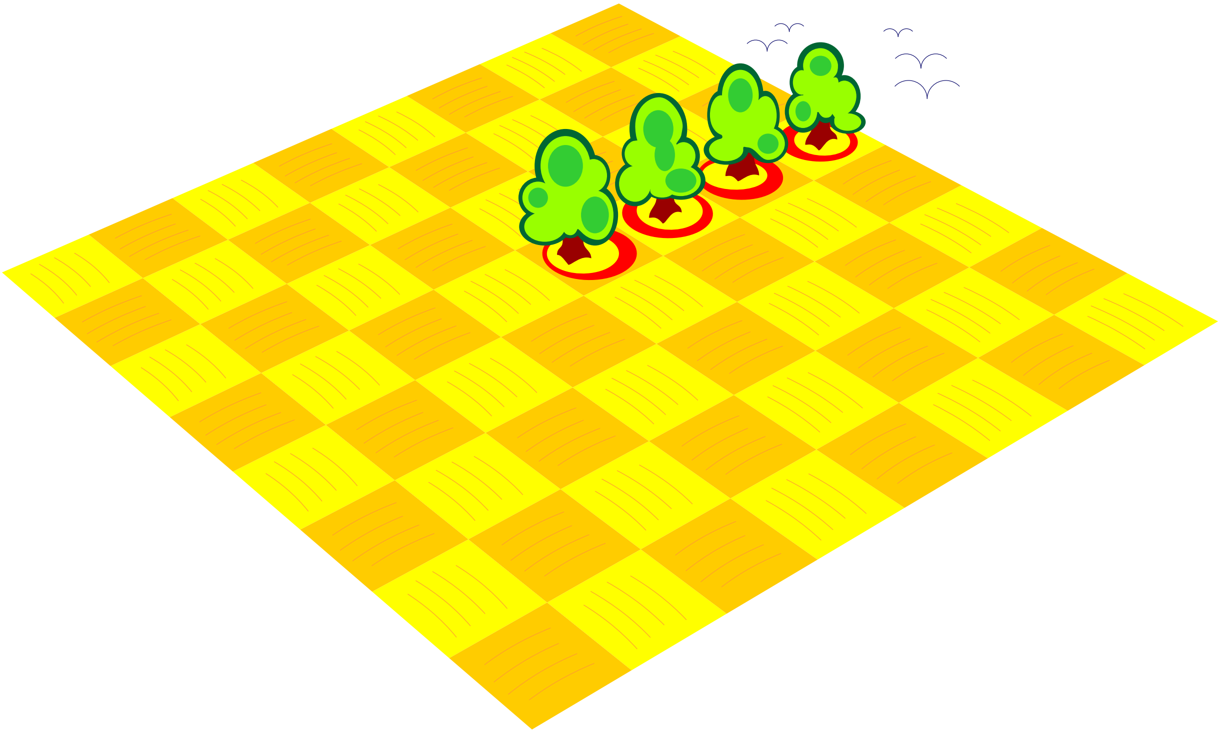
More from the author at PeterPuzzle.com

Posted: April 30, 2009



The red snake, consisting of eleven bends only, is the shortest.

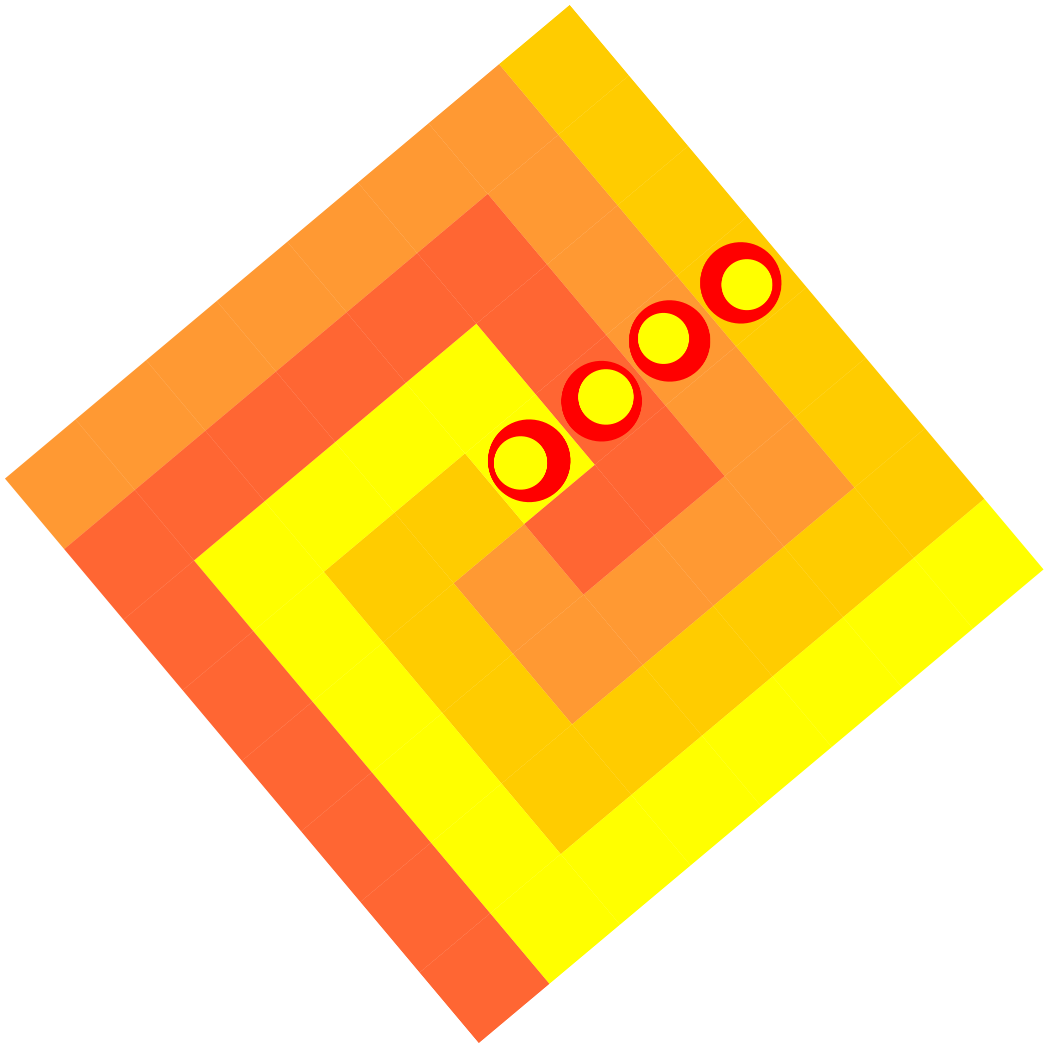
Posted: April 30, 2009



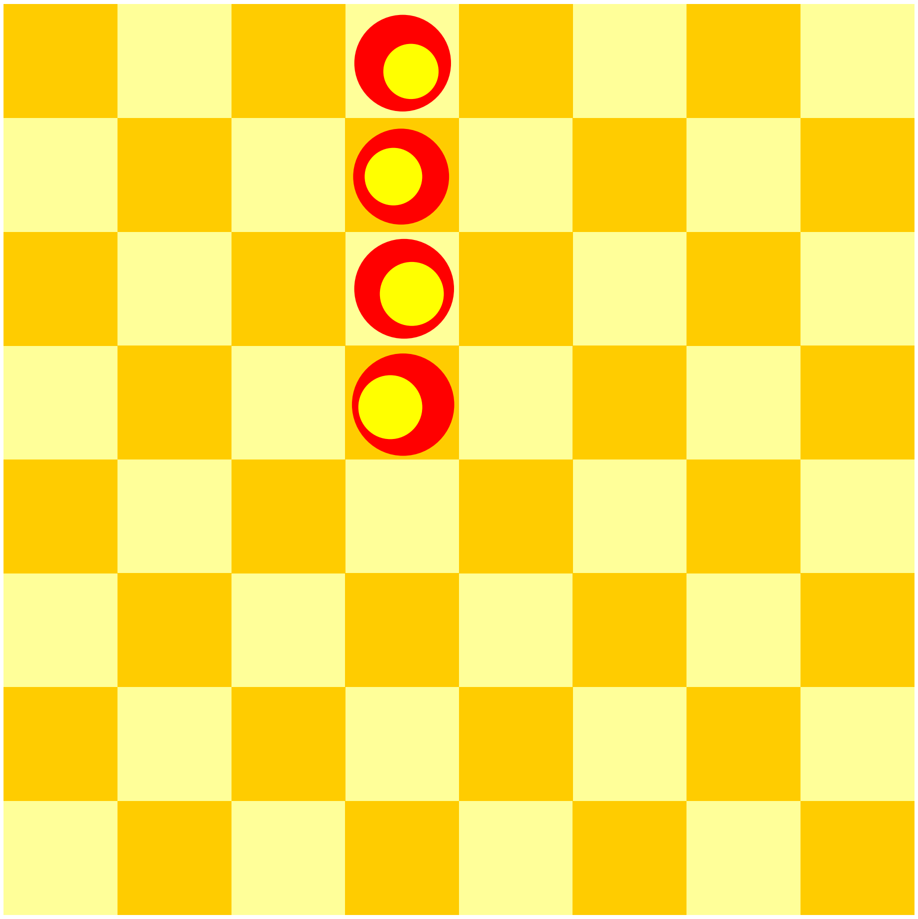
One man left to his four sons a square field with four ancient oak trees served as landmarks. This tract of land is shown in the illustration above. The sons were instructed to divide the field into four pieces of the same size and shape, and so that each piece of land contains one of the oak trees.

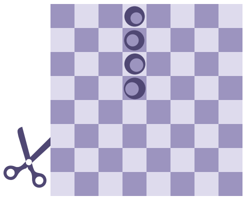
The sons were unable to divide the land properly, and finally squandered the estate. It's a very old story known as the "battle of the four oaks".

But the task still remains: how can it be done? Try to find the right solution for this classic puzzle.

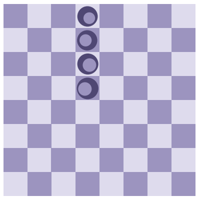


The solution is shown in the illustration.



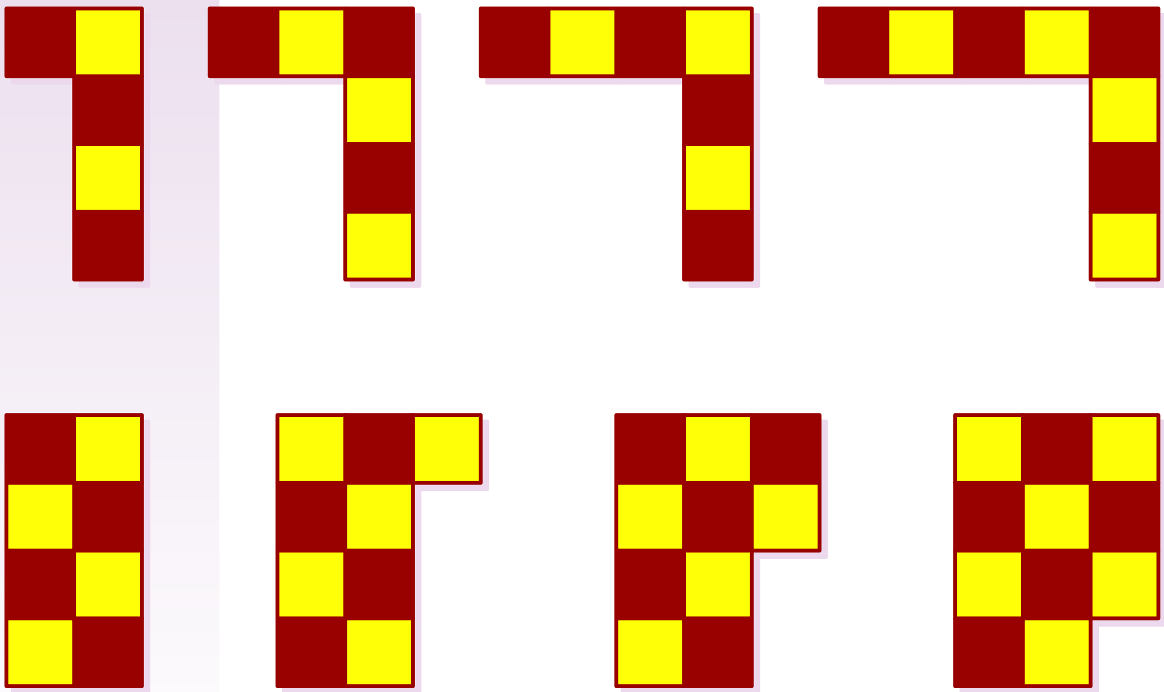


1



F

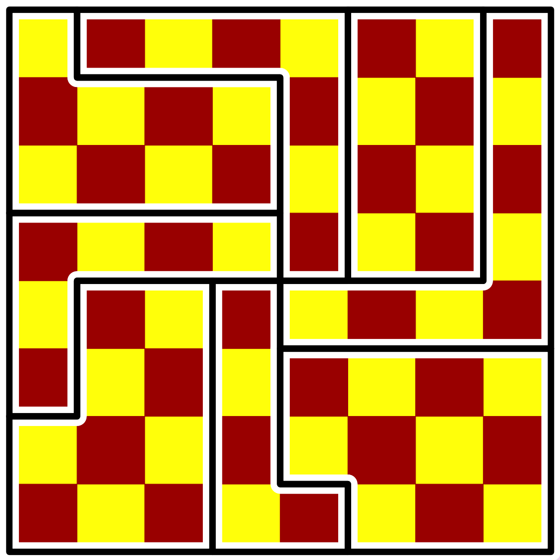
To produce the board first print it out. Then follow the diagram shown above - from step 1 to step F (finish).



A Battle Royal

by Sam Loyd

The object of this puzzle is to rearrange the pieces in such a way that to form a perfect 8x8 chess board.



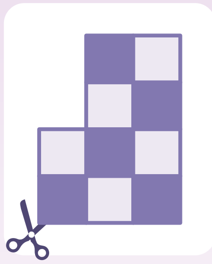
A Battle Royal (solution)

The solution is shown in the illustration.

Treasure of Classic and Modern Puzzles

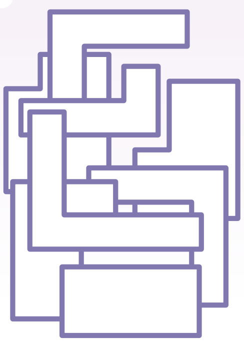
Checkerboard Puzzles

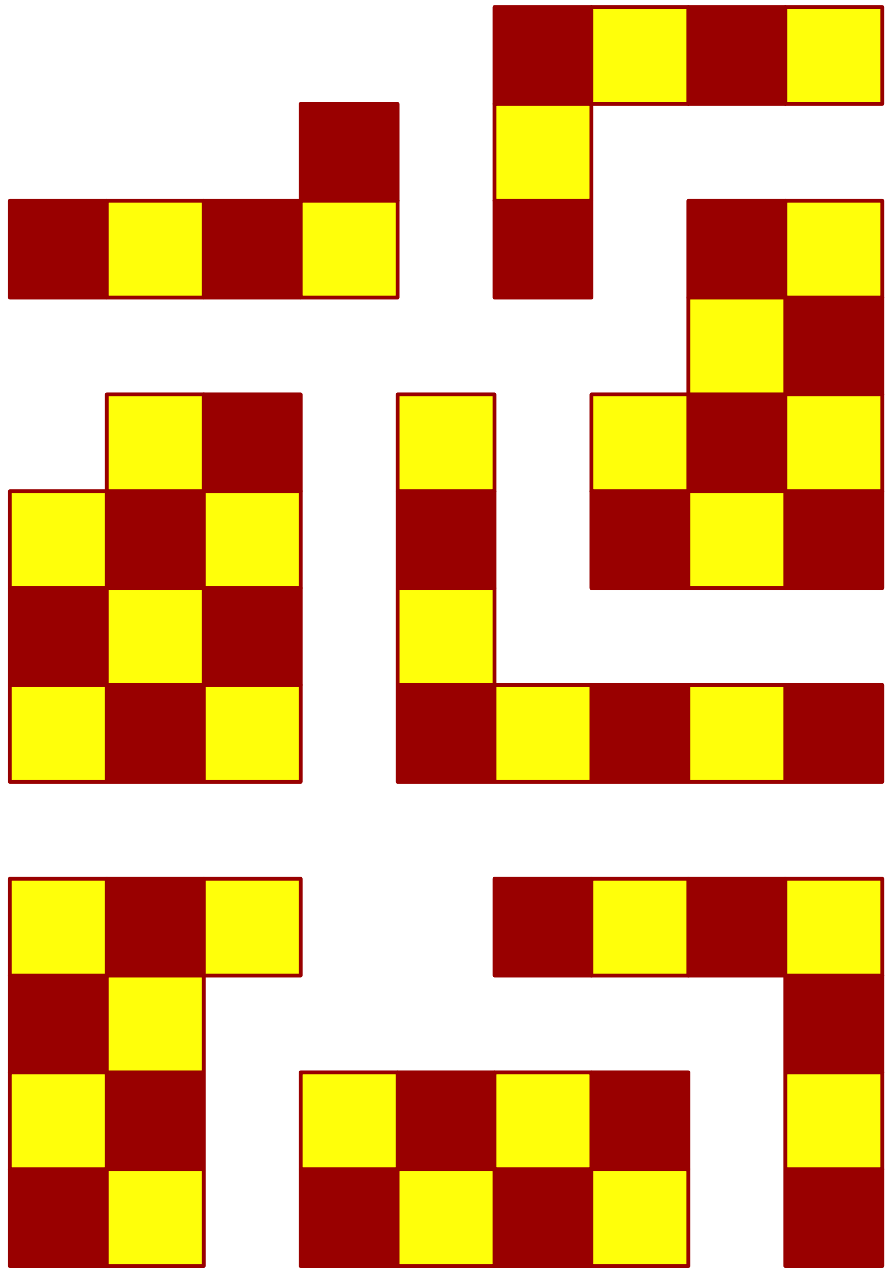
1



x 8

F

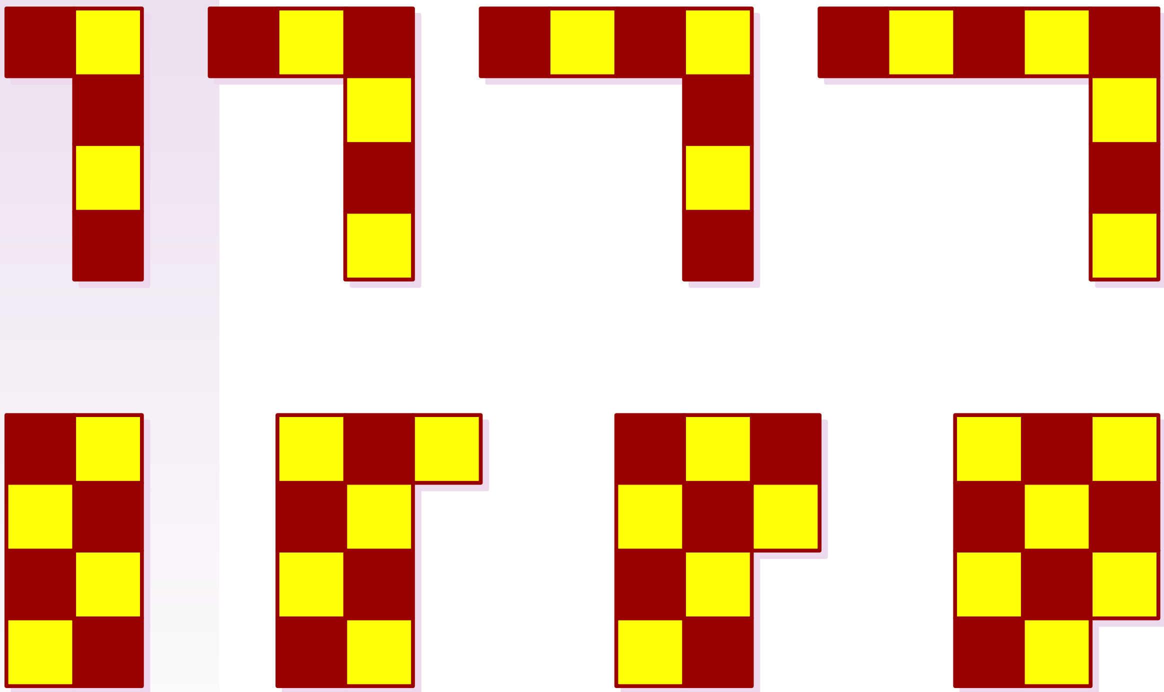




A Battle Royal (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

Checkerboard Puzzles



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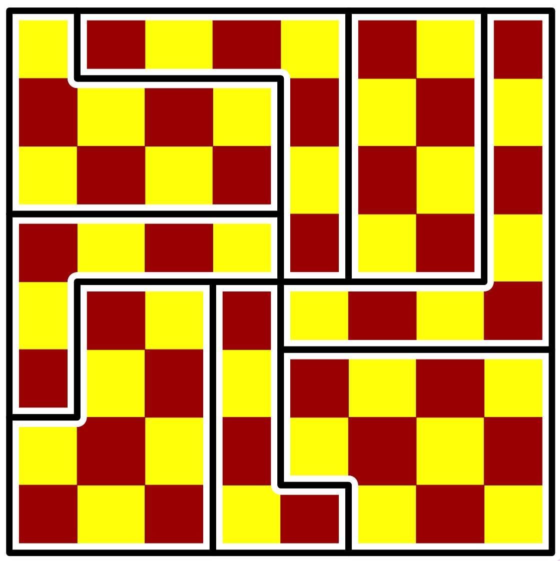


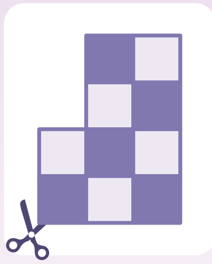
A Battle Royal (solution)

The solution is shown in the illustration.

Treasure of Classic and Modern Puzzles

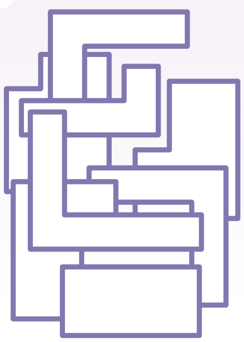
Checkerboard Puzzles

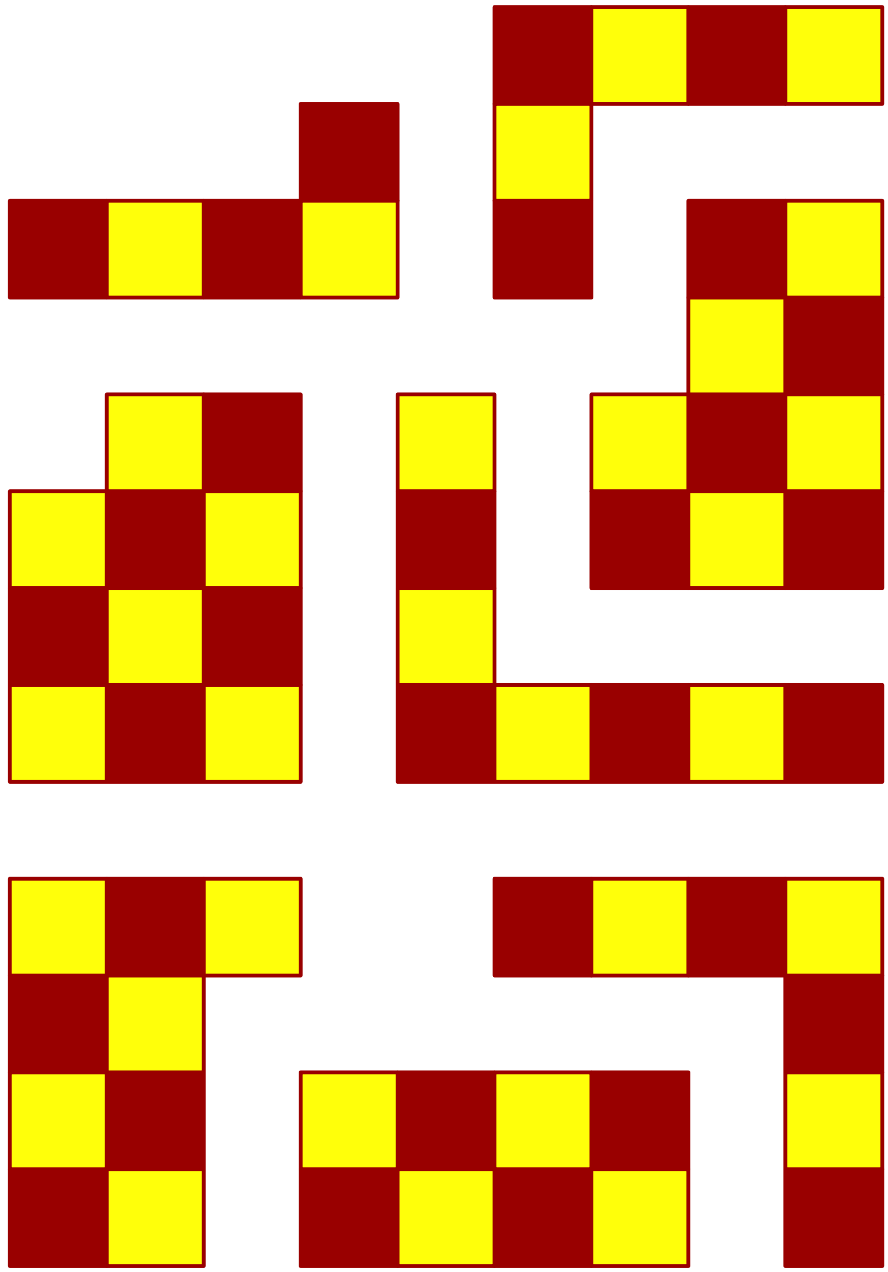
1



x 8

F



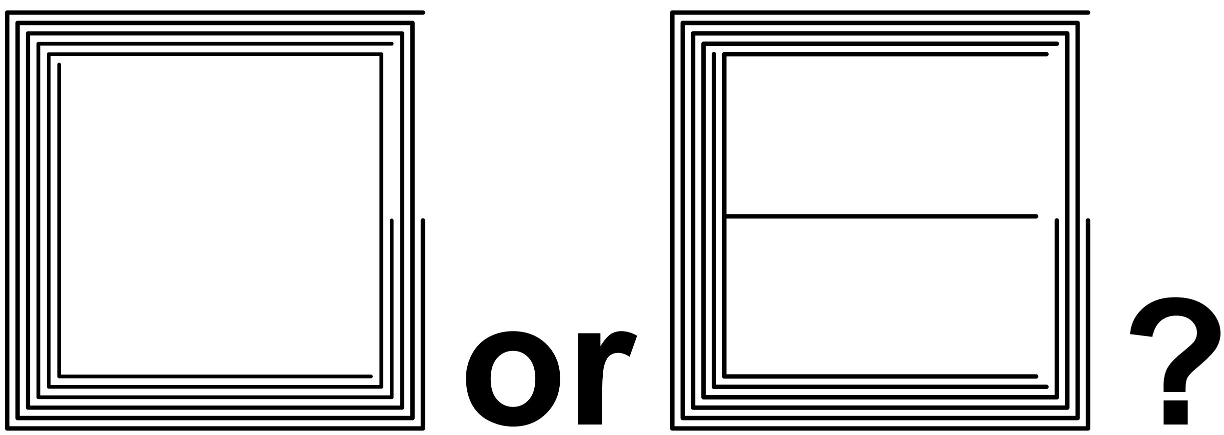


A Battle Royal (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

Between the Lines

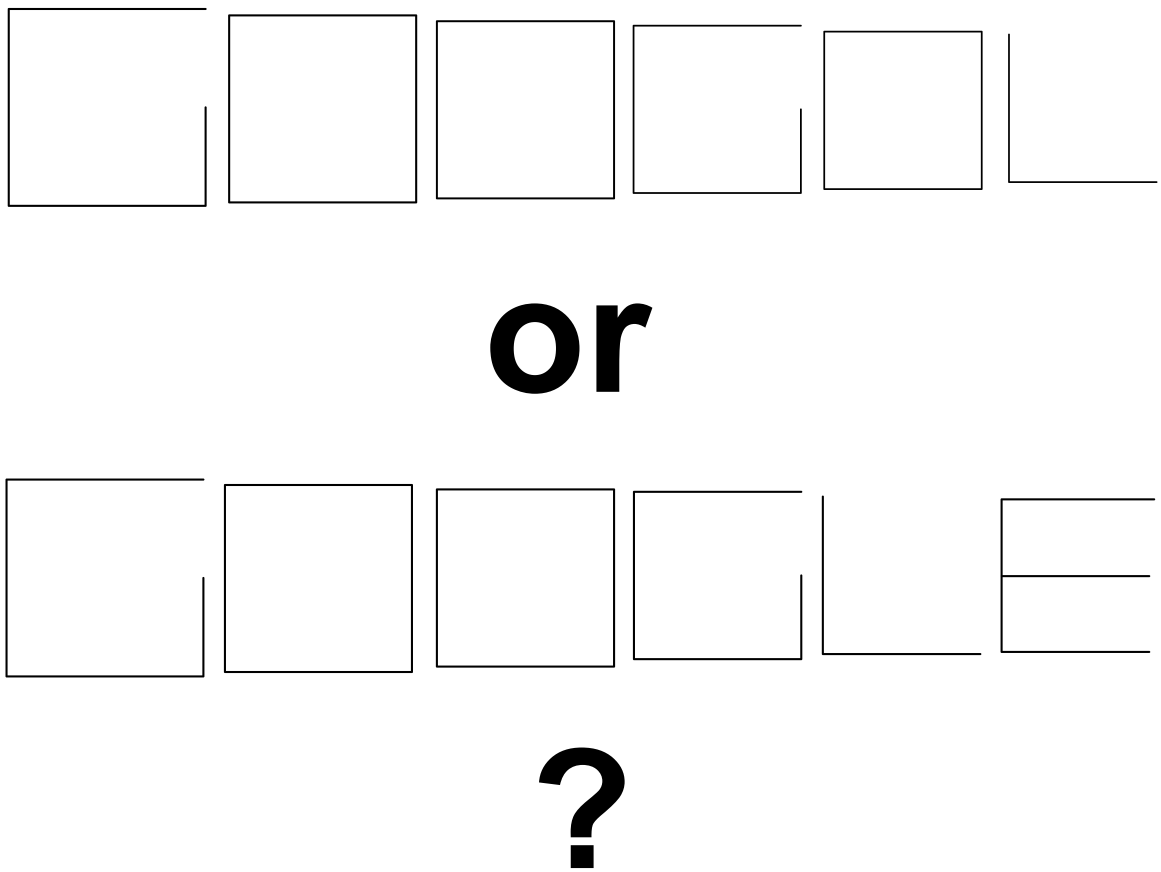
by Serhiy Grabarchuk, Jr.



What does this pattern really mean?

More from the author at UniPuzzle.com

Posted: July 1, 2009



This pattern means “GOOGOL or GOOGLE?”.

Word Puzzles

NAISNIENLGELTETWEORRSD

Big Cross-Out Swindle

after Martin Gardner

Write down the letters shown in the illustration.

The object is to cross out nine letters in such a way that the remaining letters spell a single word.

NAISNIENLGELTETWEORRSD

NAISNIENLGELTETWEORRSD

NAISNIENLGELTETWEORRSD

NINE LETTERS

A SINGLE WORD

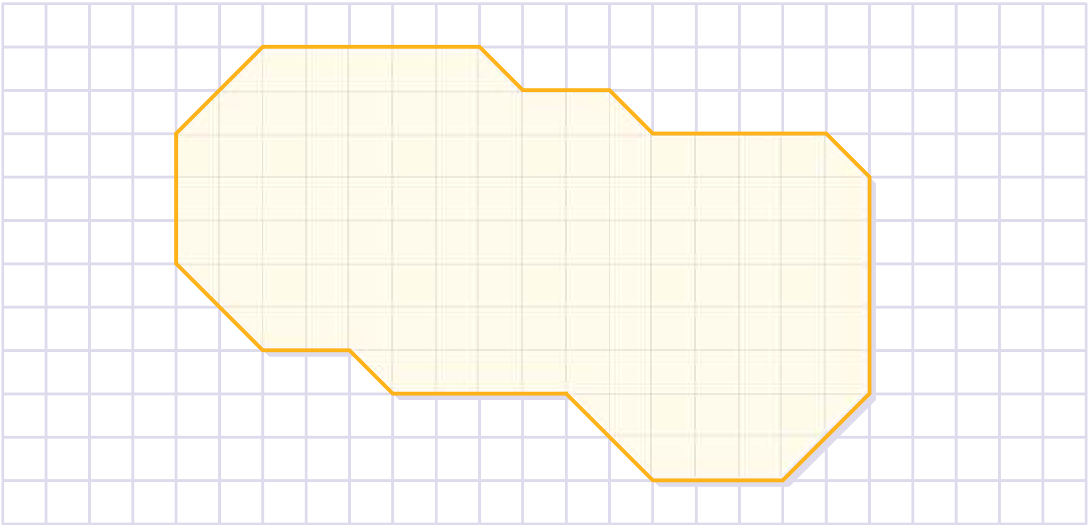
Big Cross-Out Swindle (solution)

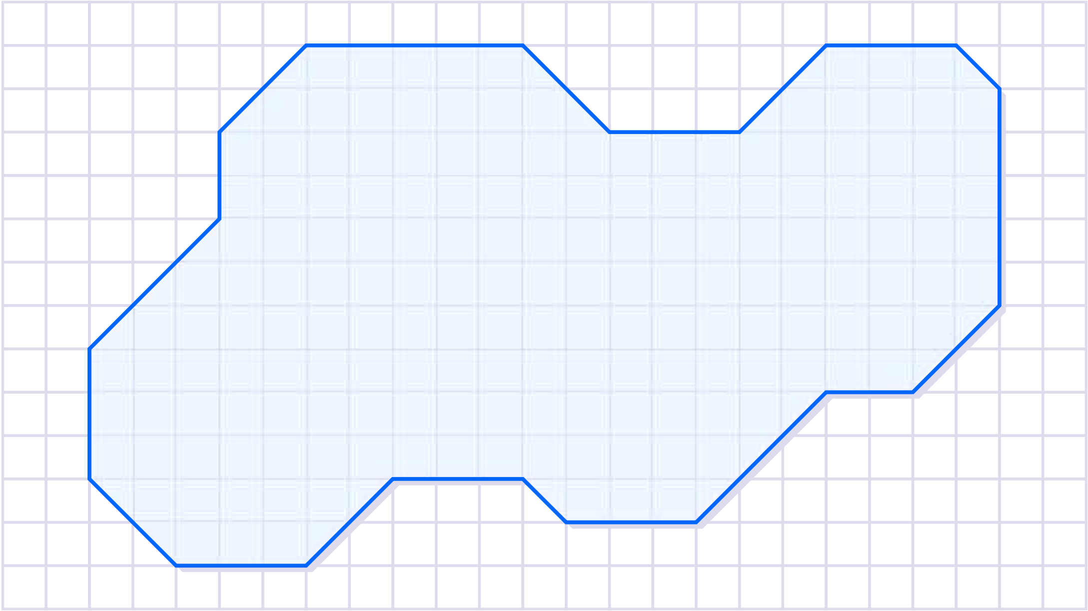
The classic solution to this puzzle is to cross out every other letter, starting with N. This eliminates NINE LETTERS, leaving A SINGLE WORD as shown in the illustration.

The other solution, found by Don Dwyer, Jr., is to cross out the nine letters AEILNRSTW every time they appear, to leave the word GOD.

Bisection

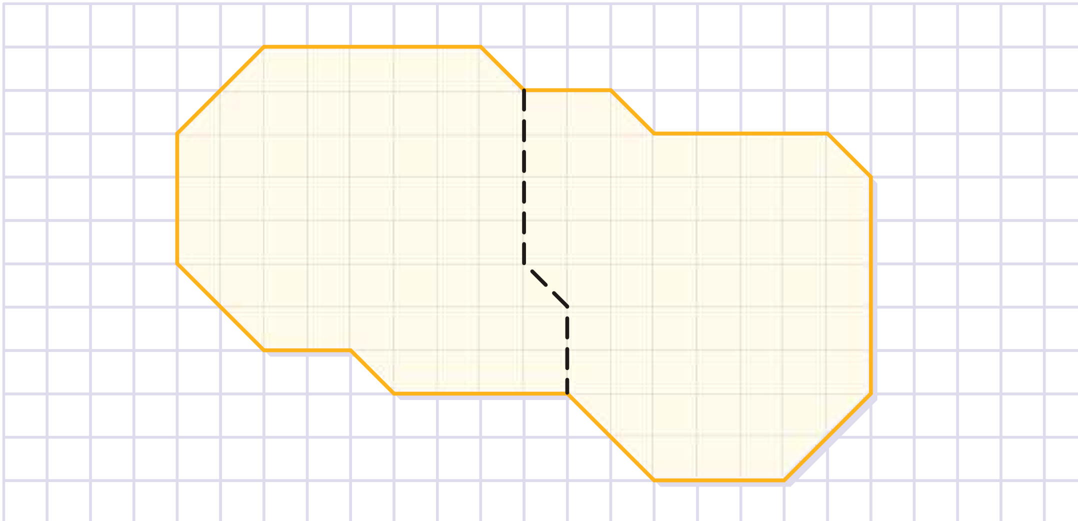
by Zsuzsa Károlyi*

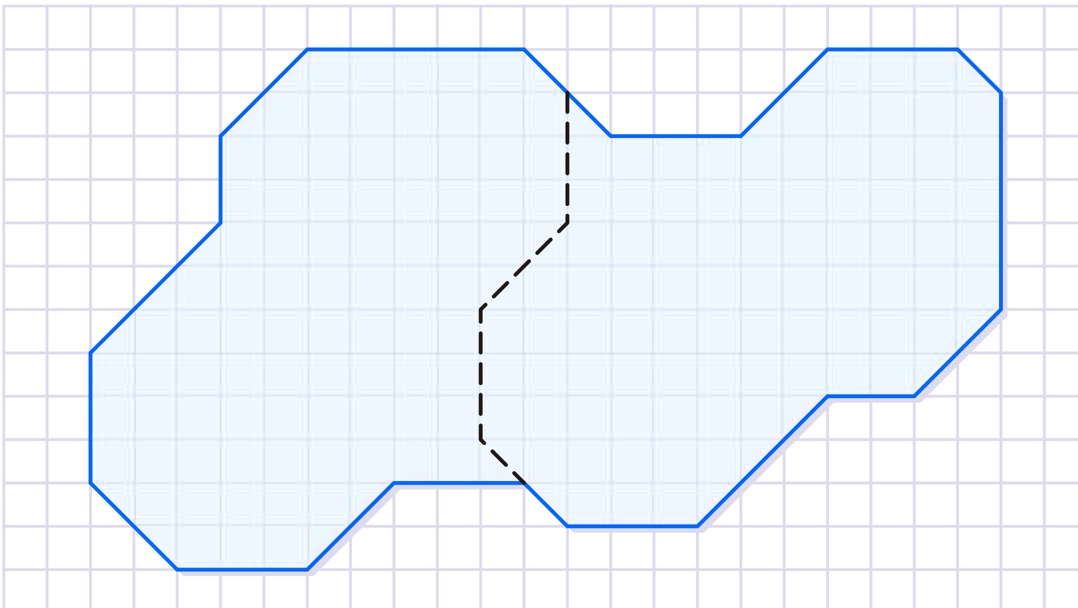




For both figures shown above the challenge is the same - divide the figure into two parts. The shape of one part must be the mirror image of the other part, rotated at 90 degrees. The dividing lines should always pass through the gridlines or the diagonal lines of the grid.

*The puzzle was presented at the 4th 24 Hours Puzzle Championship, May 24-25, 2003, Budapest, Hungary.

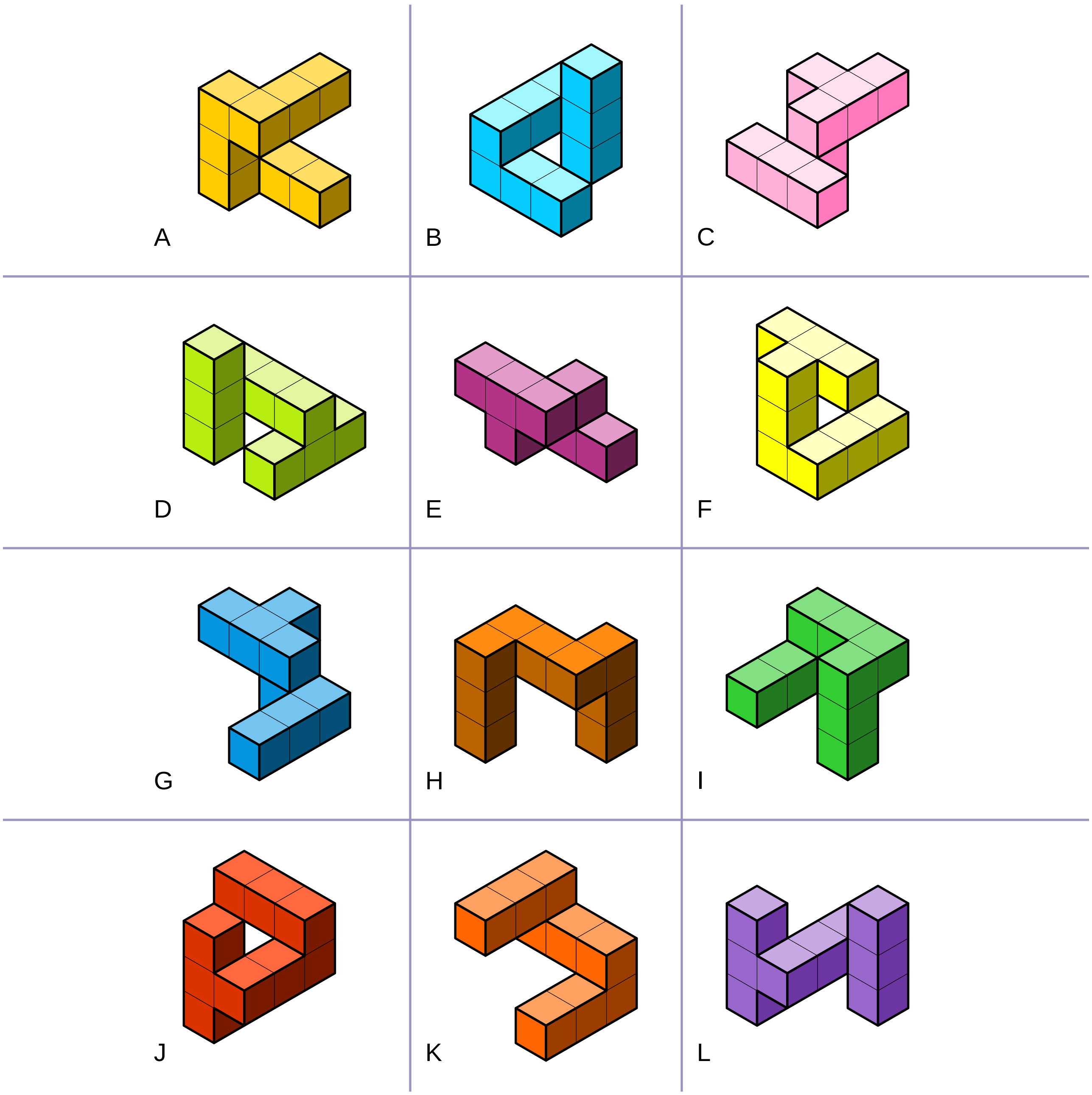




The solutions to both figures are shown above.

Block Twins

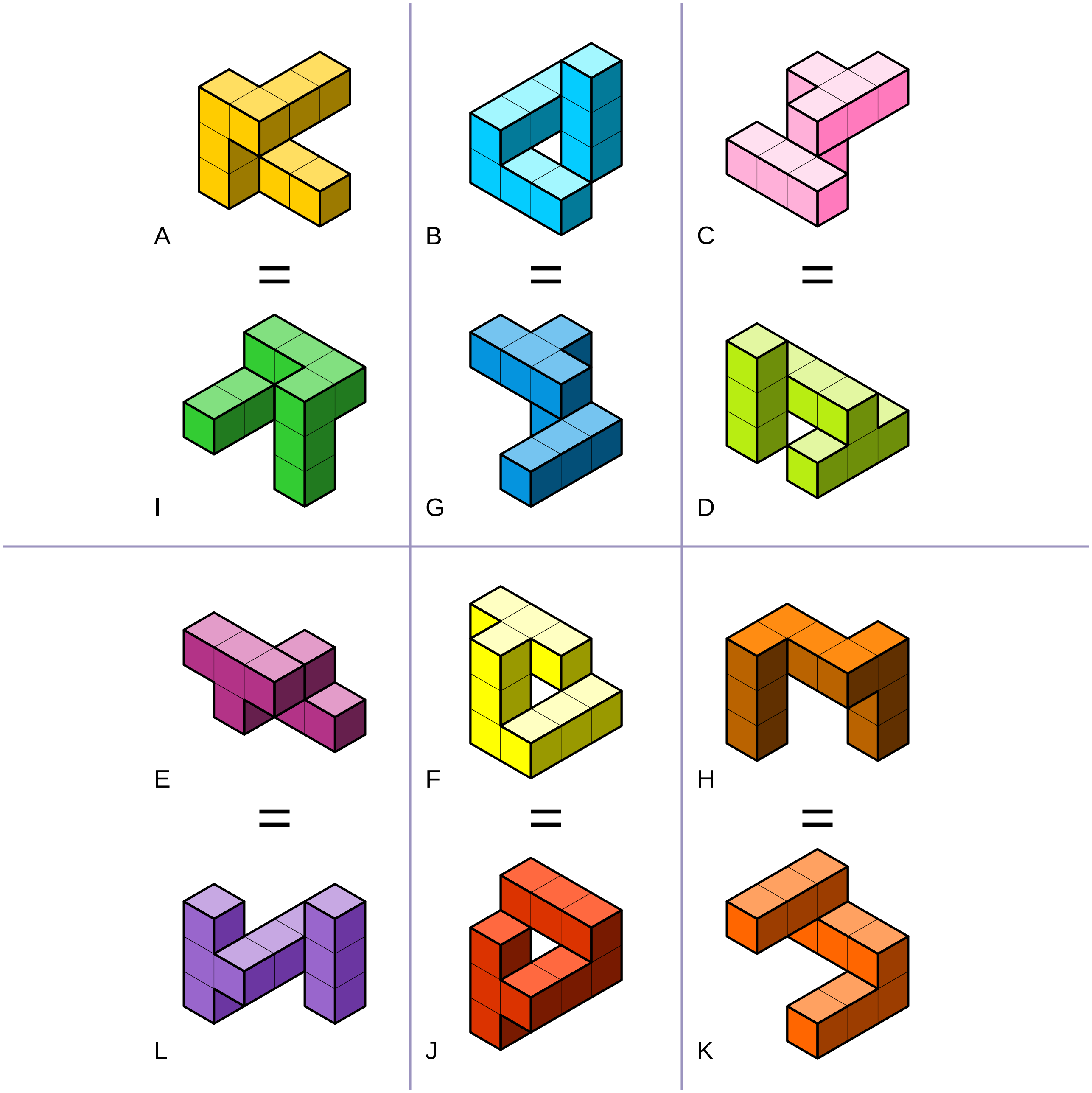
by Serhiy and Peter Grabarchuk



There are six pairs of identical shapes in this diagram. Can you find each of them? A shape from one pair doesn't appear in another.

More from the authors at GrabarchukPuzzles.com

Posted: August 2, 2009



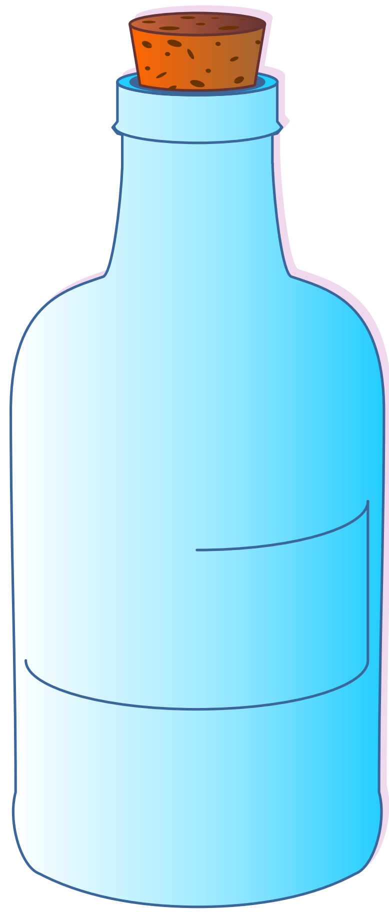
The solution is presented in the diagram.

A Bottle and a Cork

after Martin Gardner

A bottle costs a dollar more than a cork. Together they cost $1.10. How much does the bottle cost and how much does the cork cost?

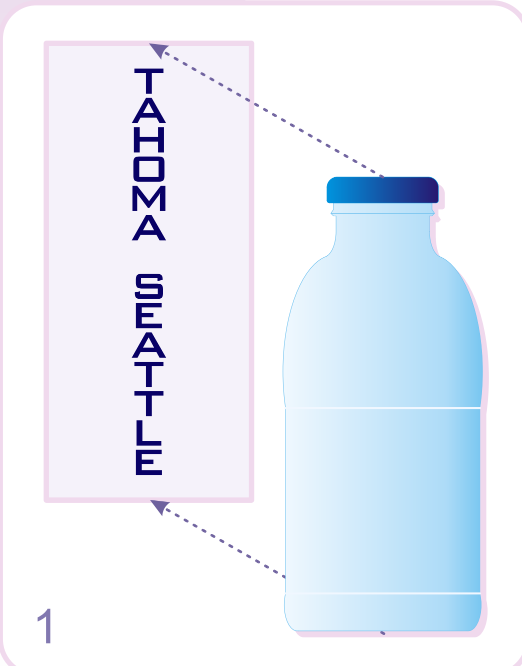
Math 'n' Logic Puzzles

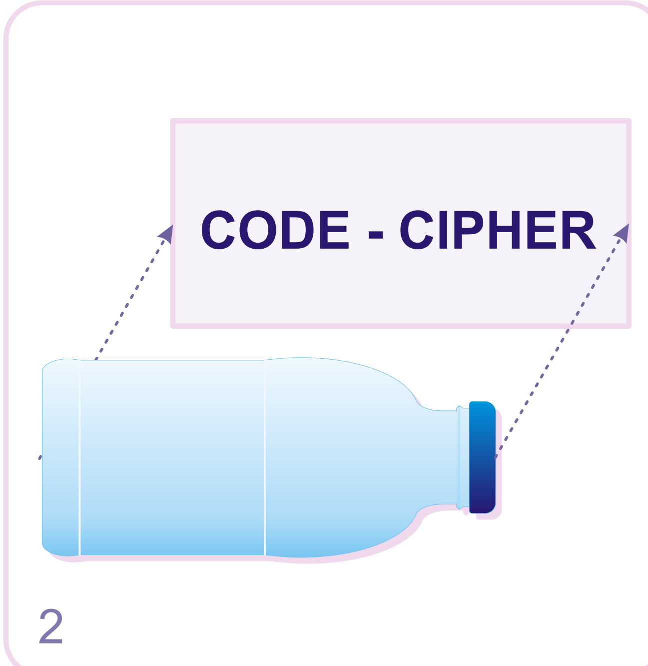


A Bottle and a Cork (solution)

Mostly people tend to say (or just think) at first that the bottle costs $1 and the cork costs 10¢. But in this case the bottle would cost only 90¢ more than the cork. The right answer is that the bottle costs $1.05 and the cork costs 5¢; now this makes exactly a dollar difference between the bottle and the cork.

Toys





Bottle Toy

Write these pairs of words on the paper - as shown above.

Take a glass bottle filled with water and hold it at a distance of 4-8 inches from the paper as shown in the figures.

Now look through the bottle at the words. Which words remain the same and which change?

How do you explain this?

1

2

Bottle Toy (explanation)

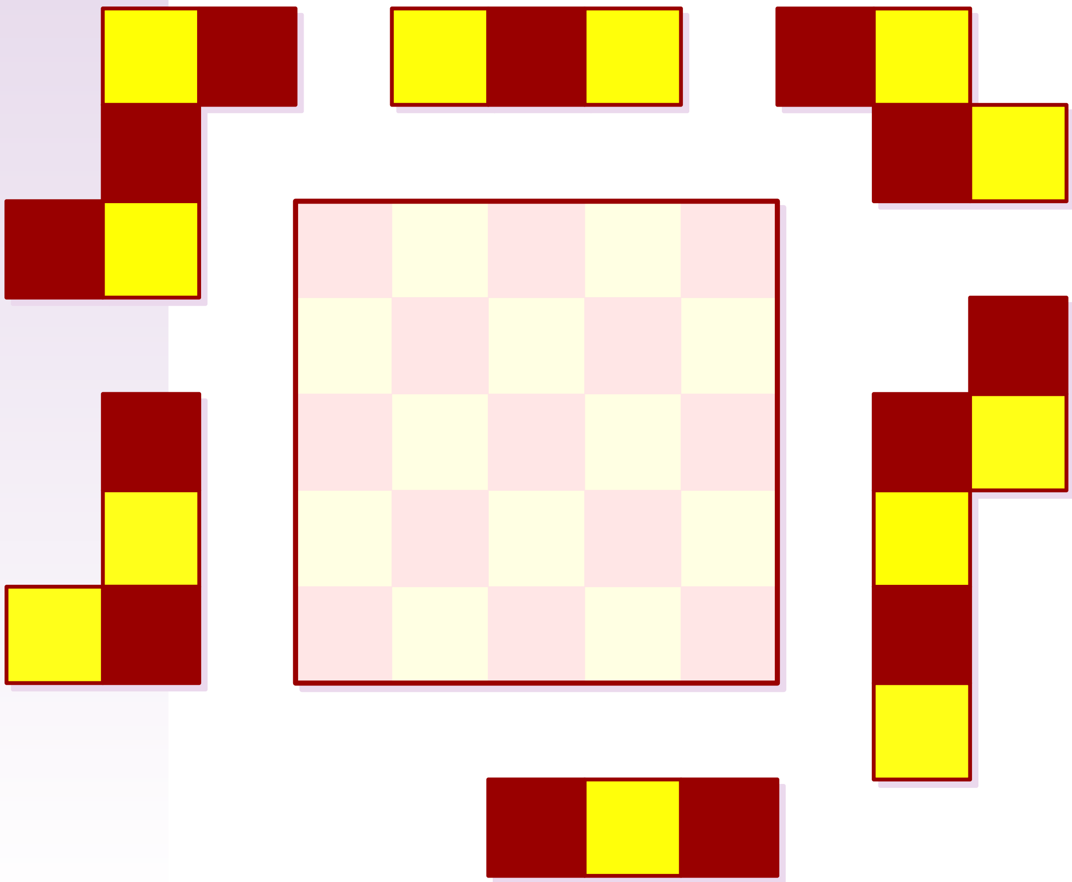
When you look through the bottle with the water on some things distanced from you, they appear upside-down.

In our examples these things are the words that are standing upside-down in the bottle. But as far as some letters in the words have vertical symmetry (as in Figure 1) or horizontal symmetry (see Figure 2) they remain the same.

In the first example only TAHOMA consists of the letters with vertical symmetry and that's why it remains the same while SEATTLE doesn't.

In the second example all the letters in the word CODE have horizontal symmetry, and that's why this word remains the same even standing upside-down. The word CIPHER does not have all its letters with horizontal symmetry and thus some of them are "really" upside-down.

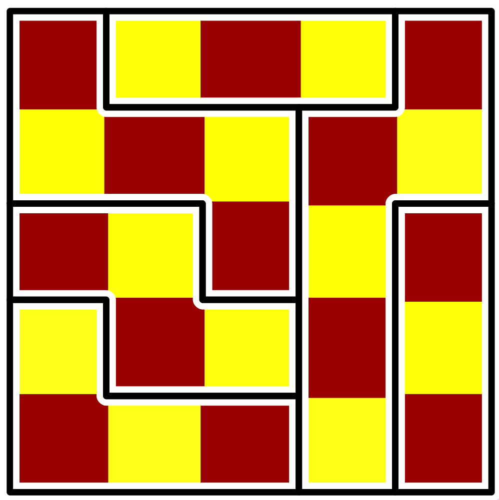
Checkerboard Puzzles



Broken Checkerboard

Rearrange the six pieces so that to form the 5x5 checkerboard shown in the center of the illustration.

Checkerboard Puzzles

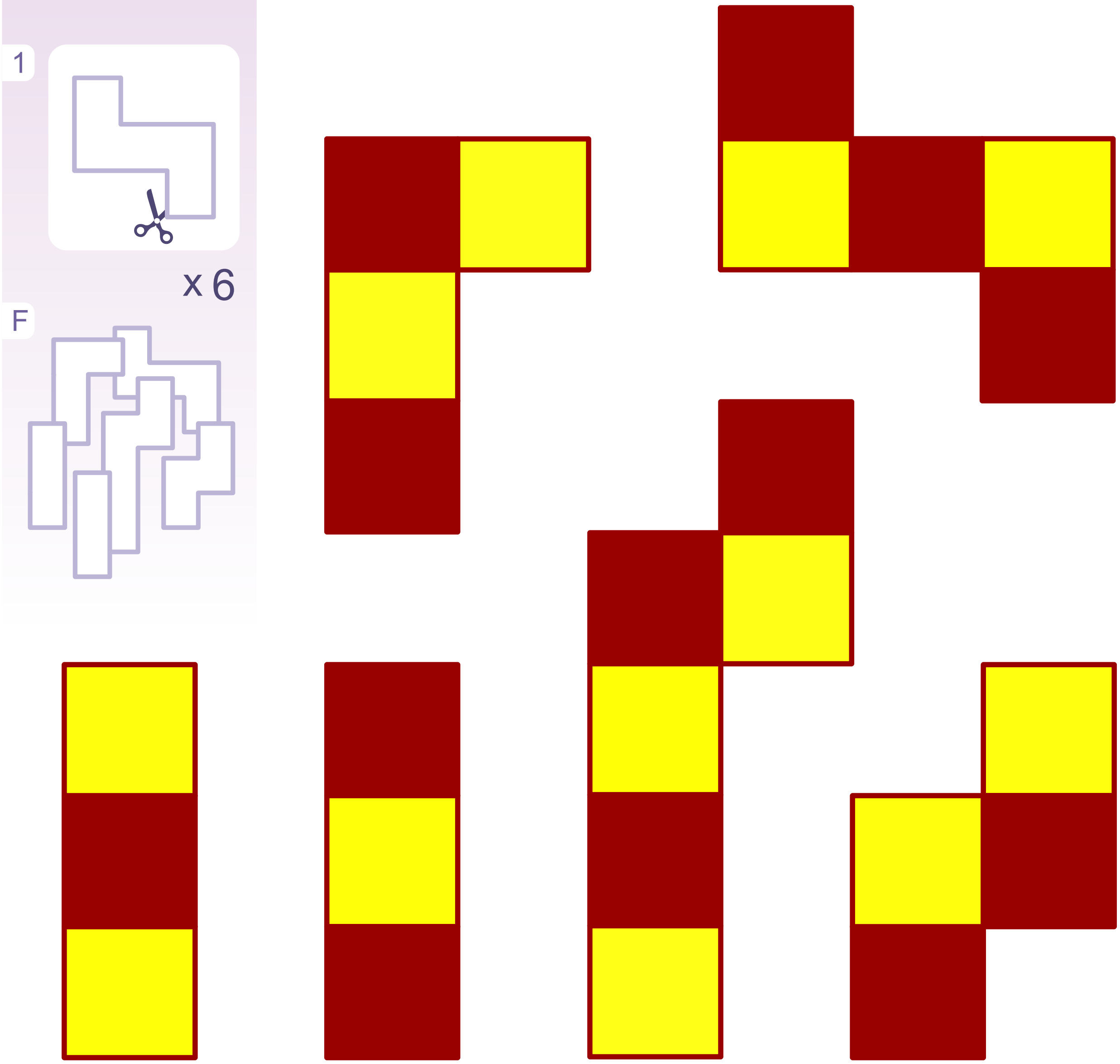


Broken Checkerboard (solution)

The solution is shown in the illustration.

Treasure of Classic and Modern Puzzles

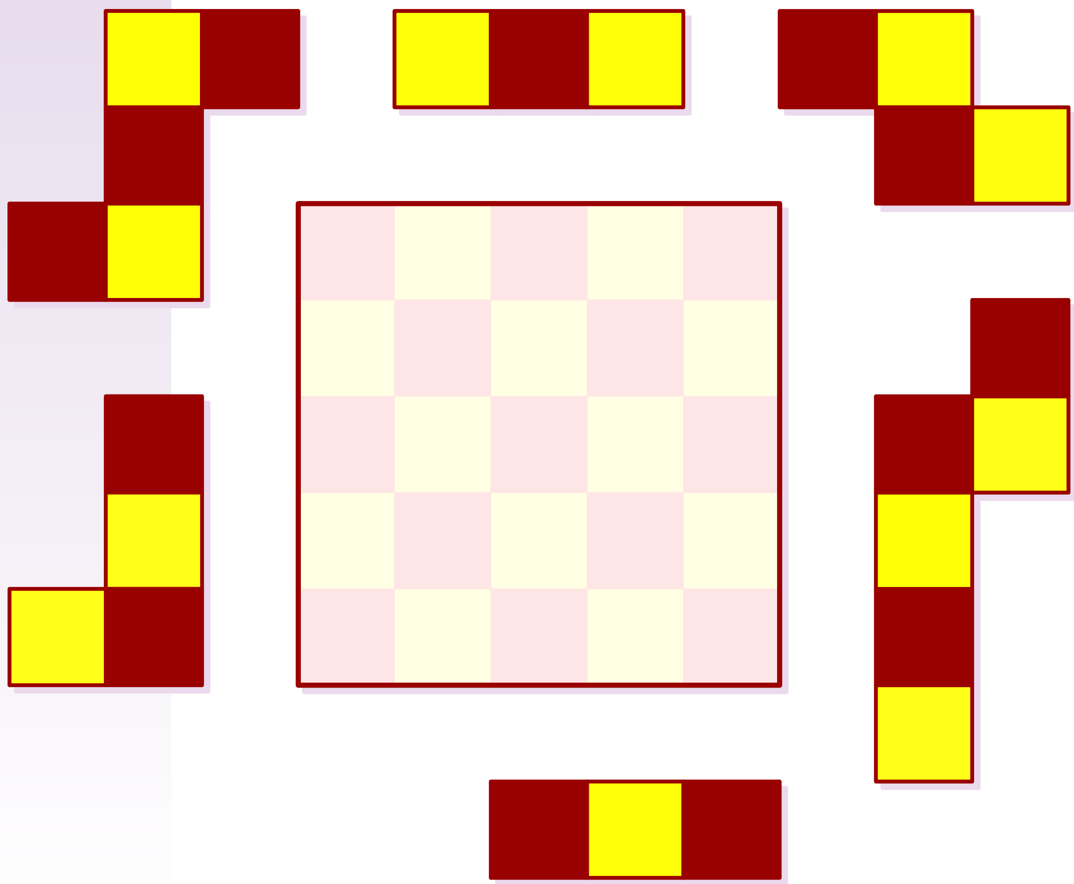
Checkerboard Puzzles



Broken Checkerboard (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

Checkerboard Puzzles



Broken Checkerboard

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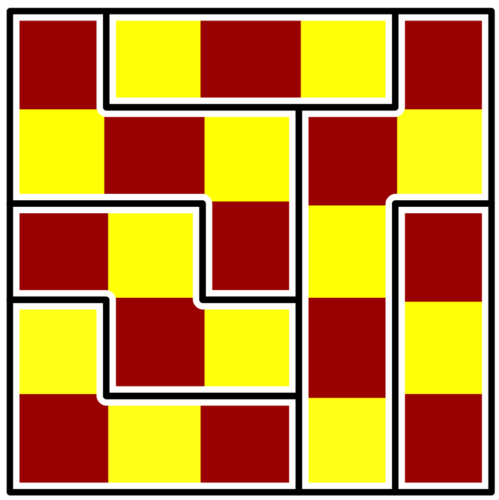
Checkerboard Puzzles



Broken Checkerboard (solution)

The solution is shown in the illustration.

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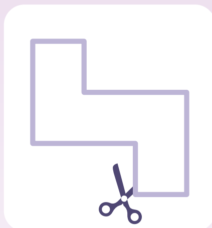
Treasure of Classic and Modern Puzzles

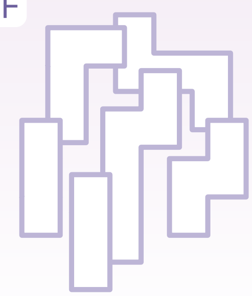
Checkerboard Puzzles

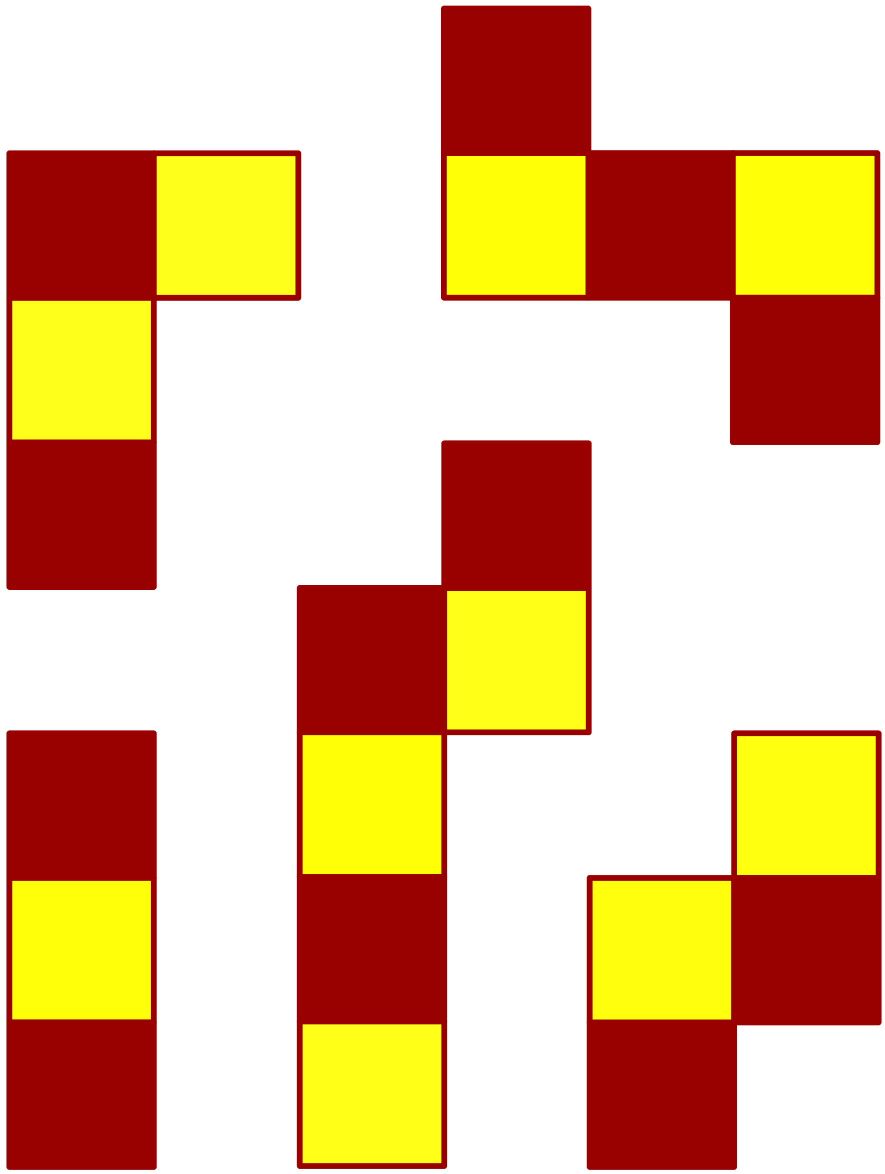
1

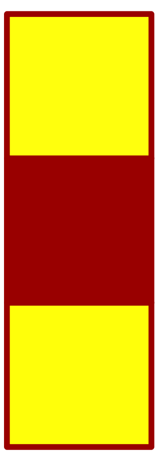


x 6

F





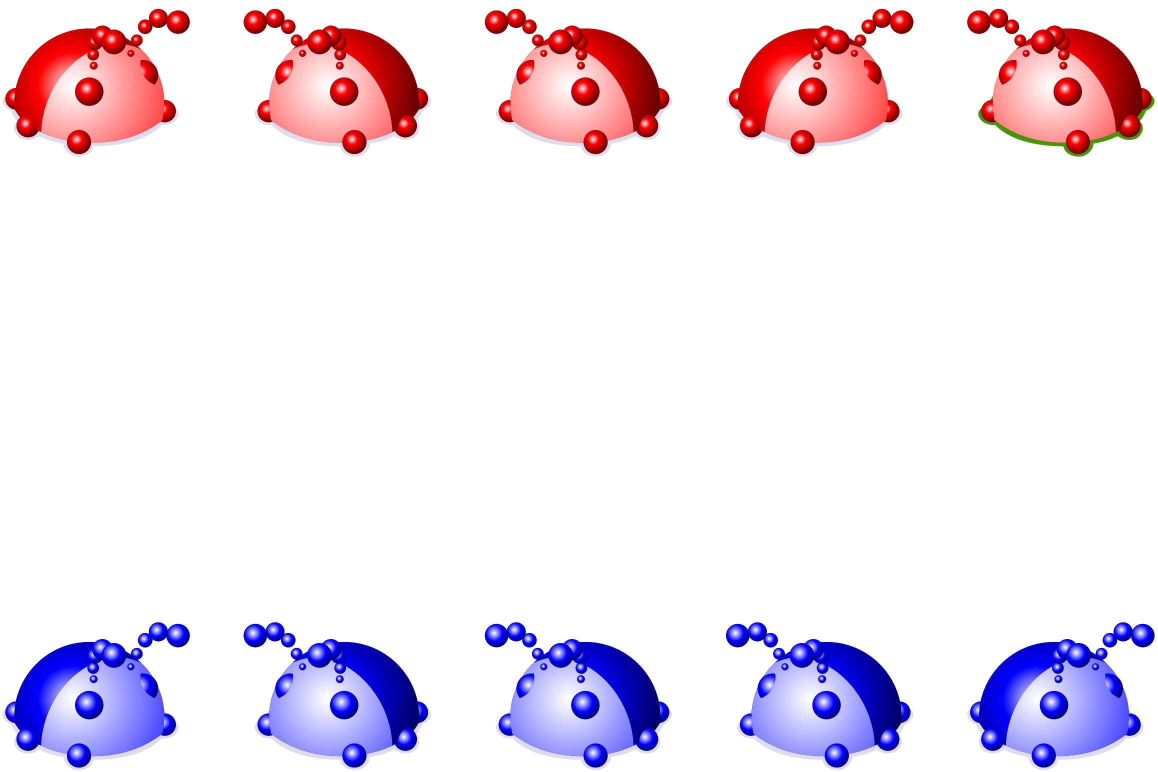


Broken Checkerboard (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

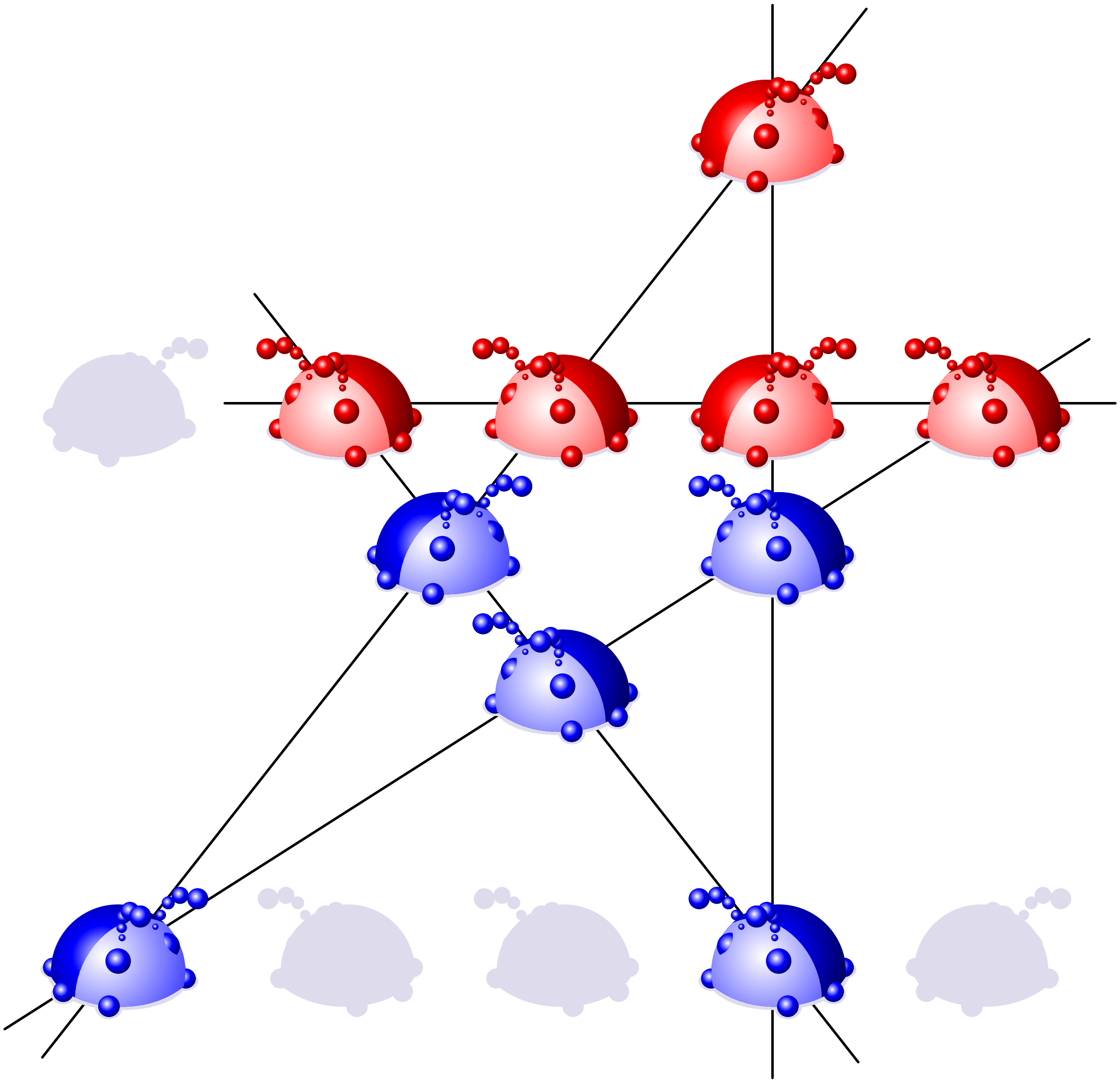
Bugs in a Row
after Lewis Carroll

Puzzles.COM

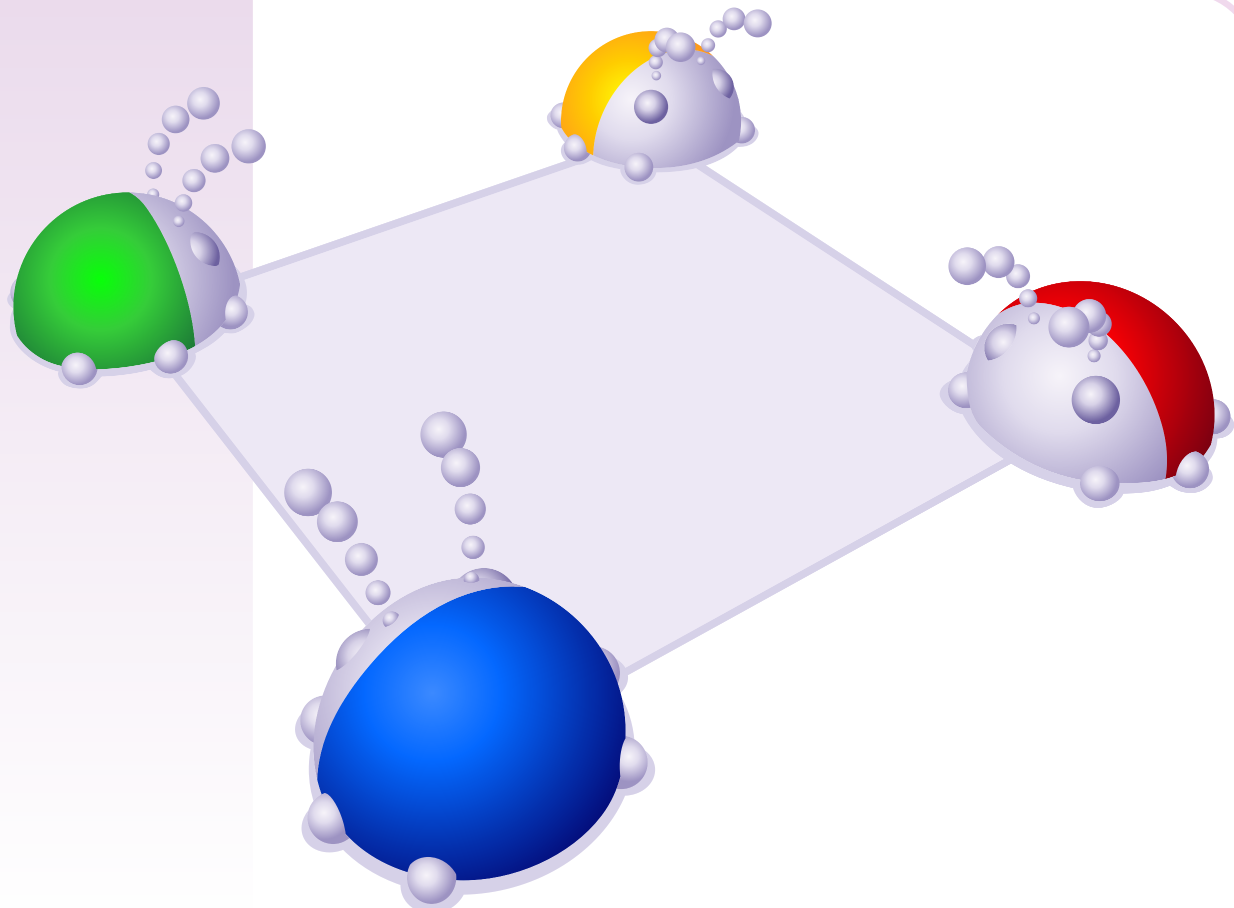


The diagram shows two rows each consisting of five bugs.

Can you rearrange the bugs to make five rows with four bugs in each row? You may only move four of the bugs from their respective position. Please, note, no two bugs can be at one spot simultaneously.



One of the possible solutions is shown in the illustration.



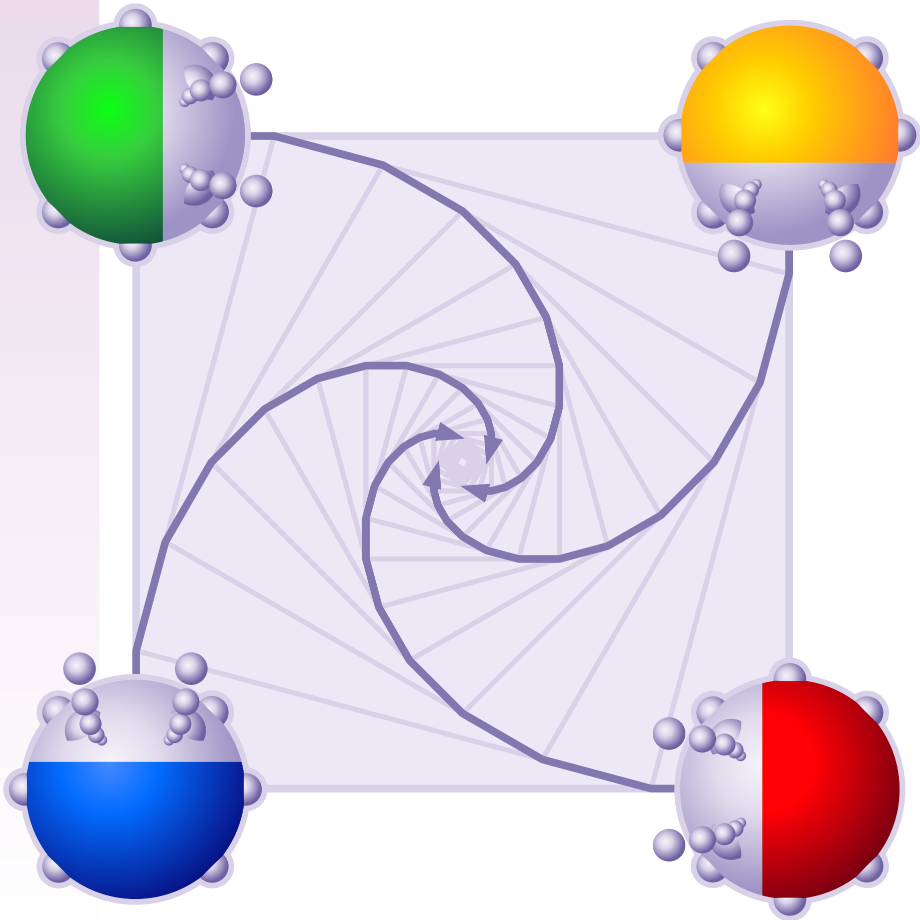
Bugs' Traffic

after Martin Gardner

Four bugs, the Green, the Yellow, the Red, and the Blue occupy the corners of a square as shown in the illustration. The side of the square is 10 units long. Simultaneously the Green bug starts to crawl directly toward the Yellow one, the Yellow toward the Red, the Red toward the Blue and the Blue toward the Green.

Since all four bugs crawl at the same constant rate, they will describe four congruent logarithmic spirals which meet at the center of the square.

Thus the question is: how far does each bug travel before they meet?



Bugs' Traffic (solution)

At any given instant the four bugs form the corners of a square which shrinks and rotates as the bugs move closer together (see the illustration). The path of each pursuer will therefore at all times be perpendicular to the path of the pursued. This tells us that as the Green bug, for example, approaches the Yellow one, there is no component in the Yellow bug's motion which carries the Yellow toward or away from the Green. Consequently the Green will capture the Yellow in the same time that it would take if the Yellow had remained stationary. The length of each spiral path will be the same as the side of the square: 10 units.

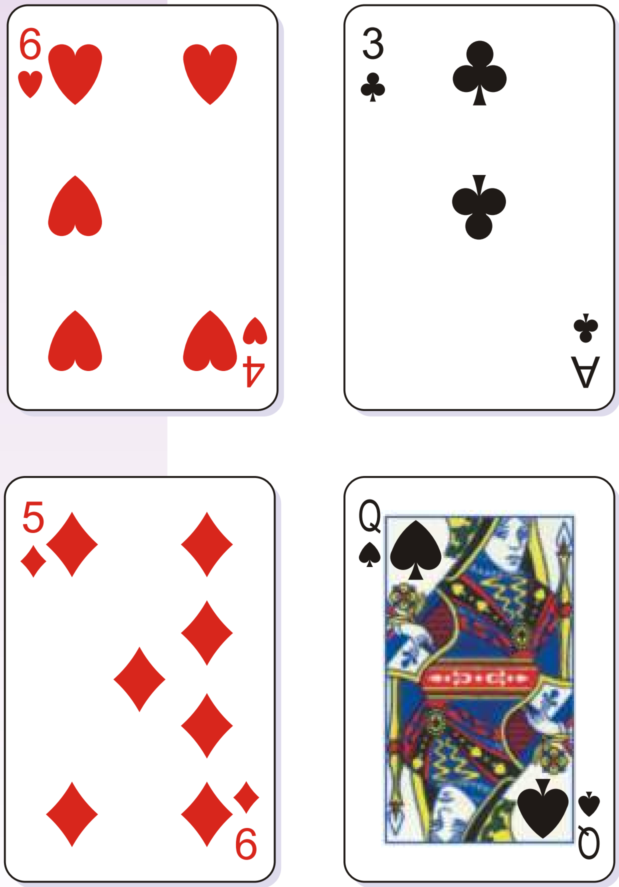
1

2

Card Fan

by Serhiy Grabarchuk

You fan a small pack of four cards before your audience (see Figure 1). Then you square the pack, and in a moment fan it out again. But now your spectators can see another cards in the fan (see Figure 2). How can you perform this simple trick?



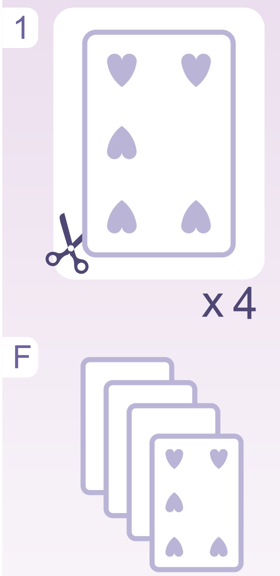
Card Fan *(secret)*

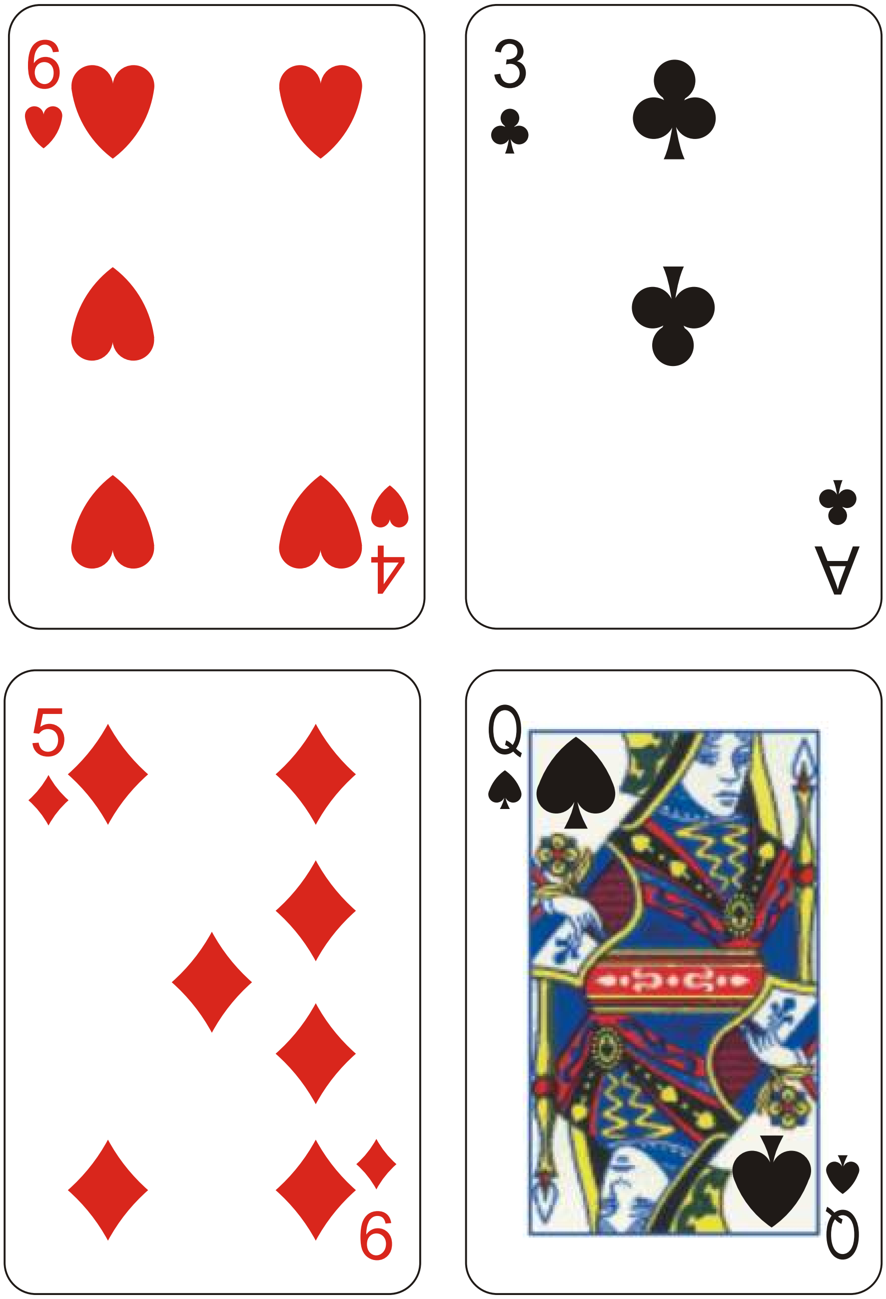
The secret of this trick is really simple. You need four cards - one normal card (the queen of spades) and three specially improved cards (see the figure). When you square the first fan insensibly turn round the pack for 180°, and after that fan it again. You will have the queen of spades on the right again, and, of course, it will look the same way as before. But the three other cards will have now the other corners with other names and different numbers of suit signs uncovered.

Be careful while you fan the pack keeping in mind that you have to expose only one half of each of the three special cards.

Treasure of Classic and Modern Puzzles

Tricks

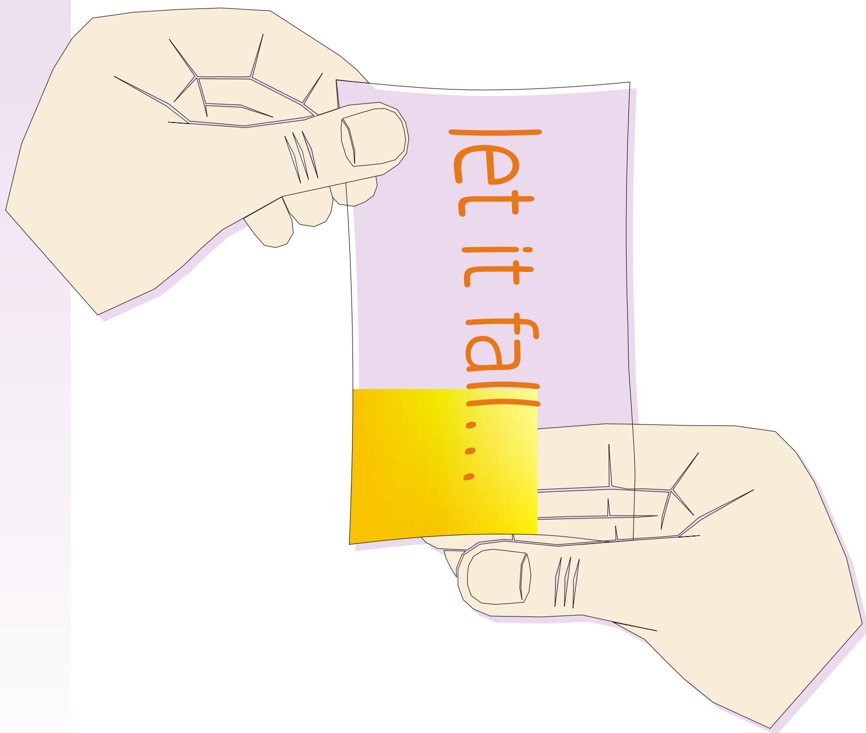




Card Fan (cards)

To produce the cards first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

August 28, 2003 www.puzzles.com



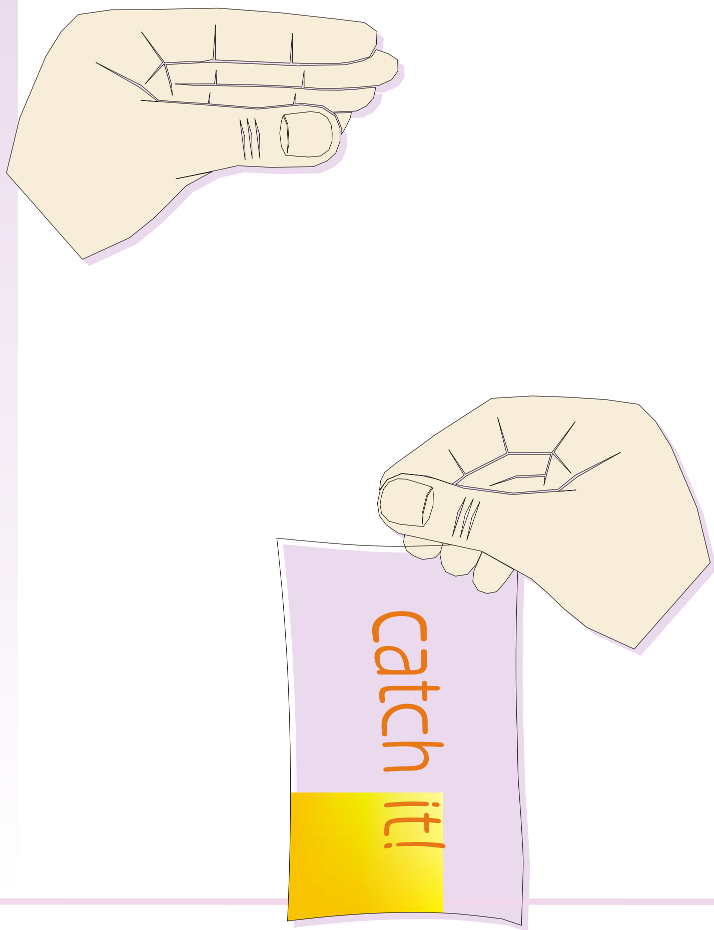
Catch or Pass

after Martin Gardner

Do you want to see if your friend can catch the postcard when you let it go? Just take a postcard in your hand and let your friend hold his/her fingers on each side of the postcard as shown in the figure on the left, but his/her fingers aren't touching the postcard.

Let the postcard go. Your friend will not catch it. You can repeat it many times. The result will be the same - the postcard will easily "flow away" between your friend's fingers.

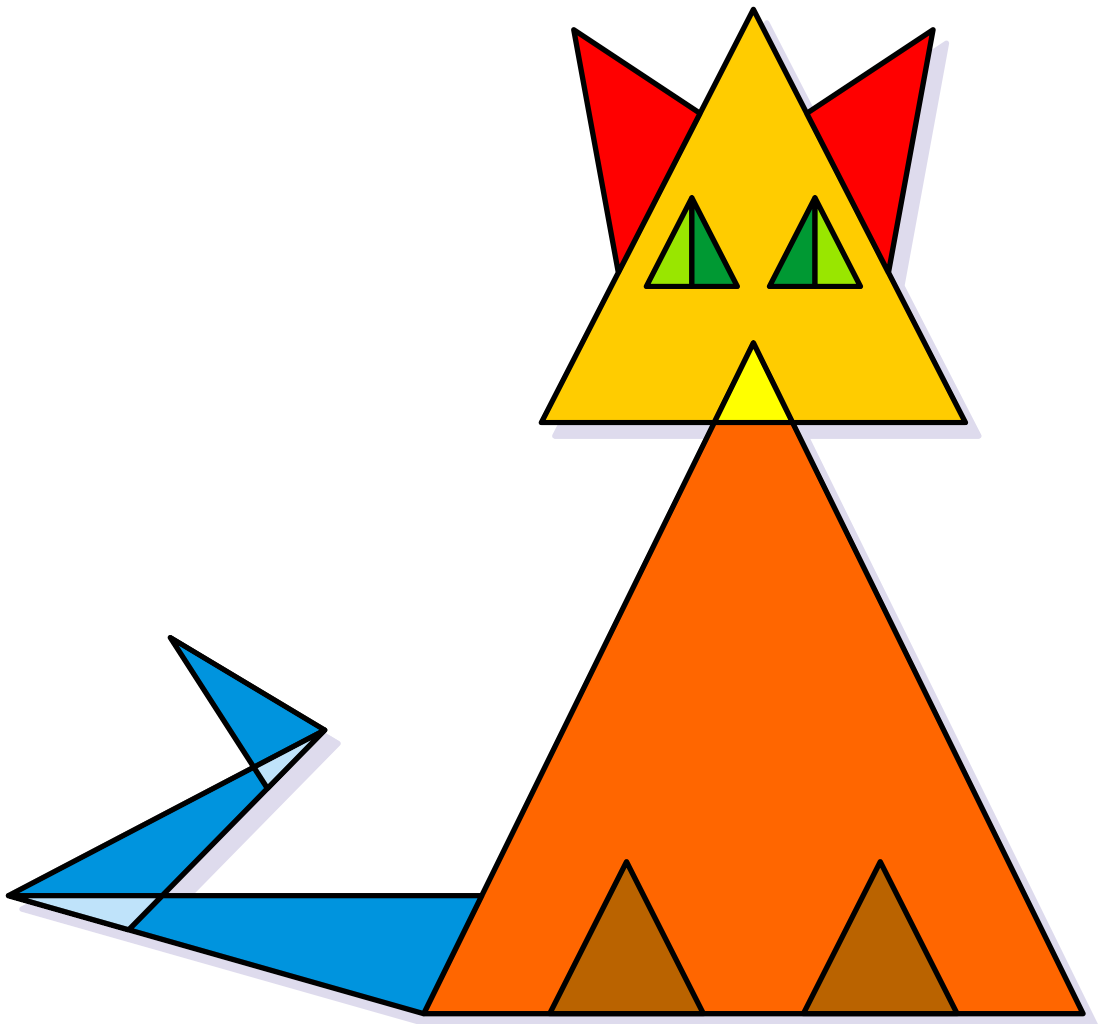
Toys



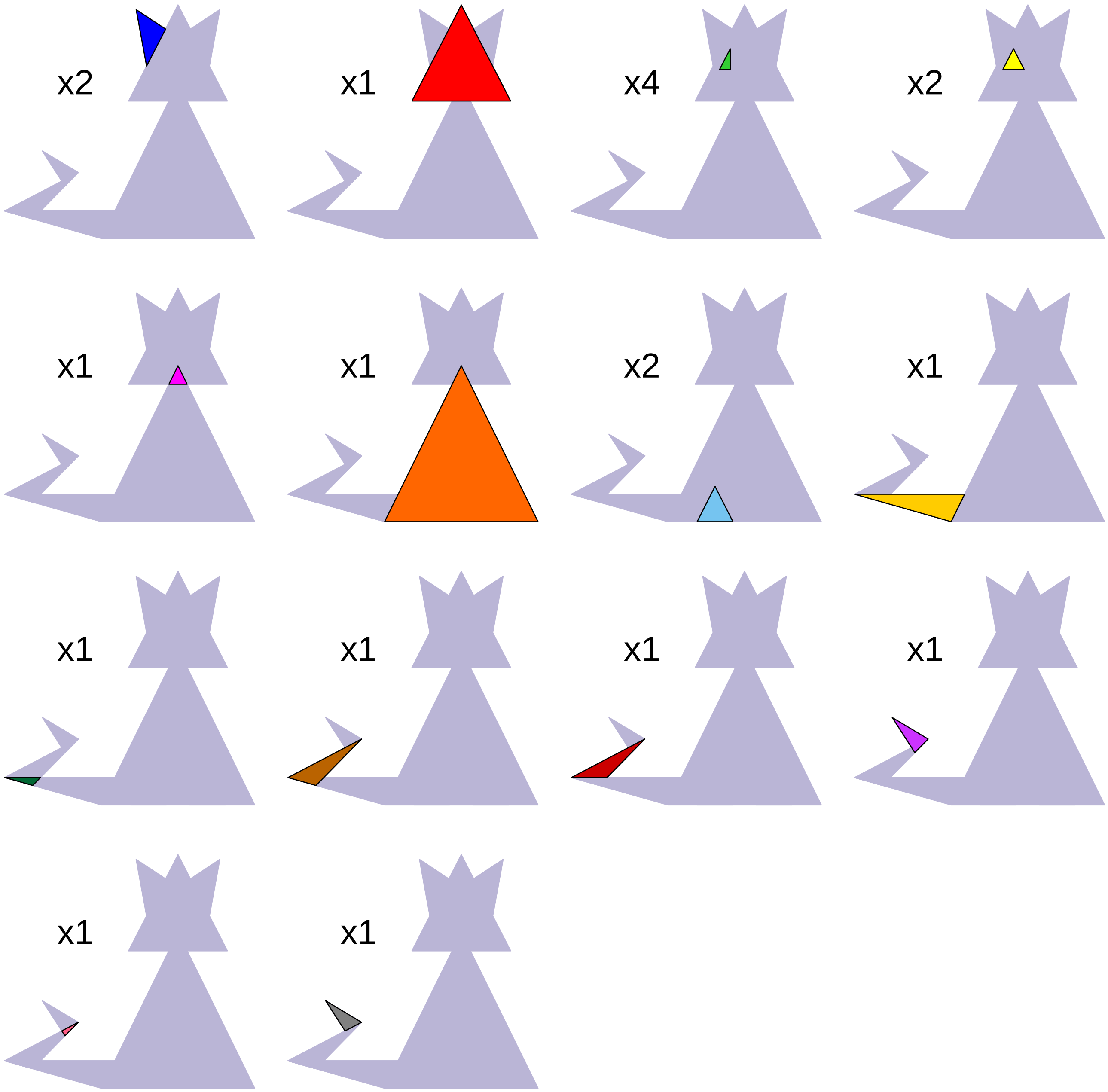
Catch or Pass (explanation)

If you try to drop and catch the postcard yourself you will find you are successful at it, because your brain can send "let it go" and "catch" signals to your two hands at the same moment.

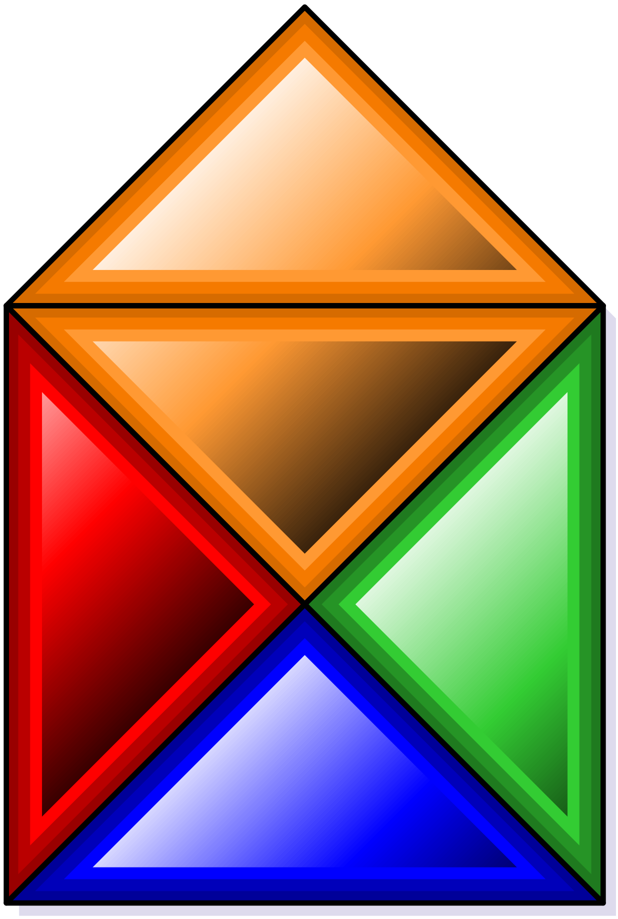
But when you hold the postcard for your friend to catch, his/her brain must first see that the postcard is falling, then send a "catch" signal to his fingers. This takes more time. That is why your friend can't catch it.



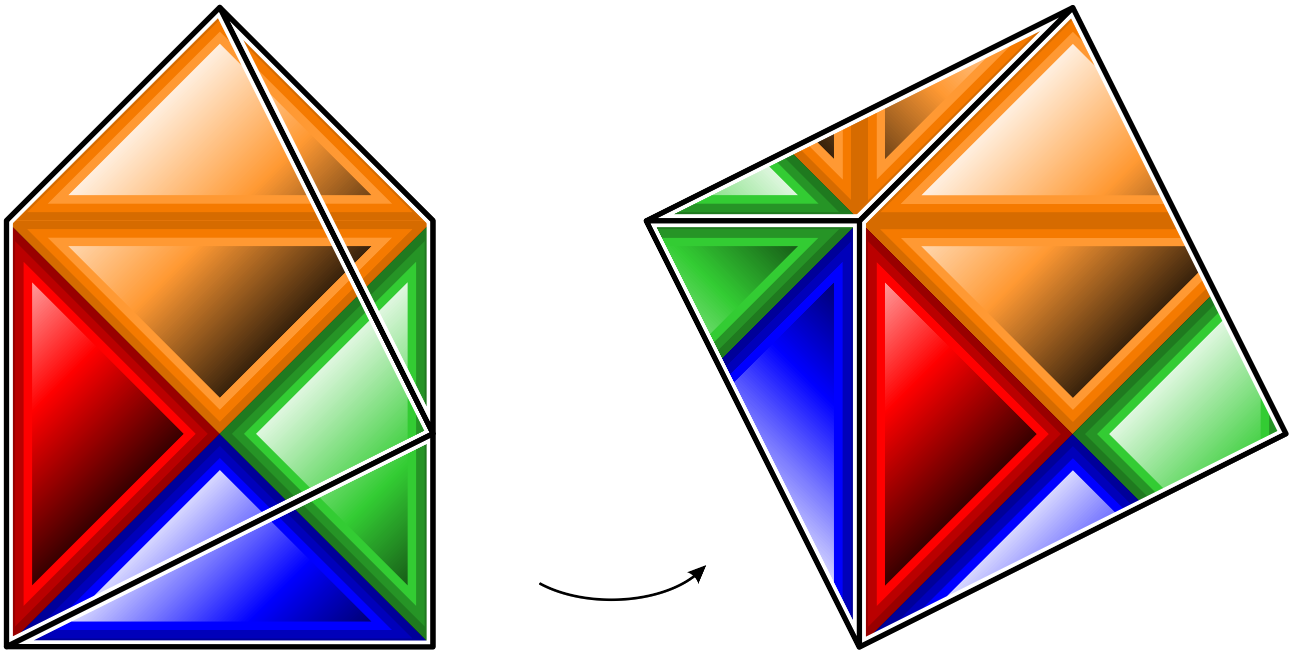
How many different triangles can you count in the picture of the cat?



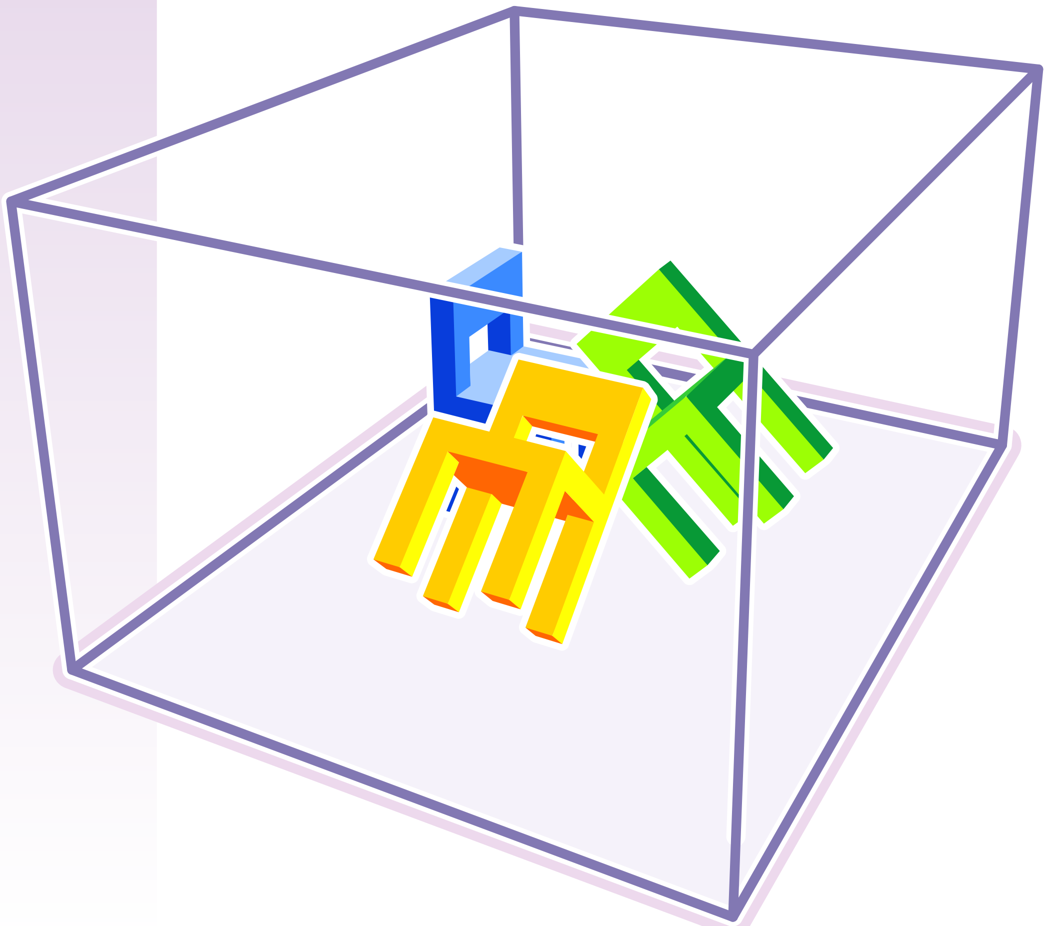
There are 20 triangles hidden in the cat - as is shown in the diagram.



Believe it or not, this house-like shape can be successfully divided into just three pieces which can be then rearranged to produce a perfect square. Can you find the solution?



The solution is shown in the illustration.

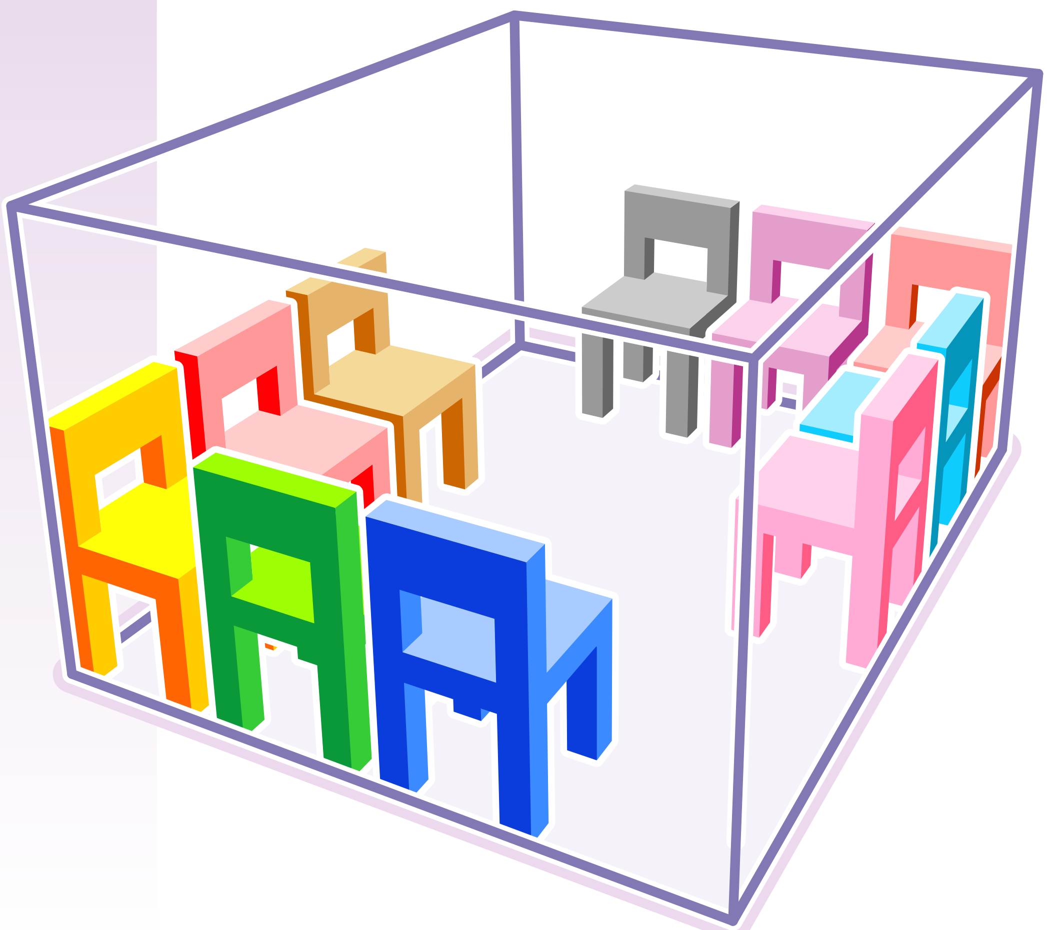


Chair Arrangement

after Boris A. Kordemsky

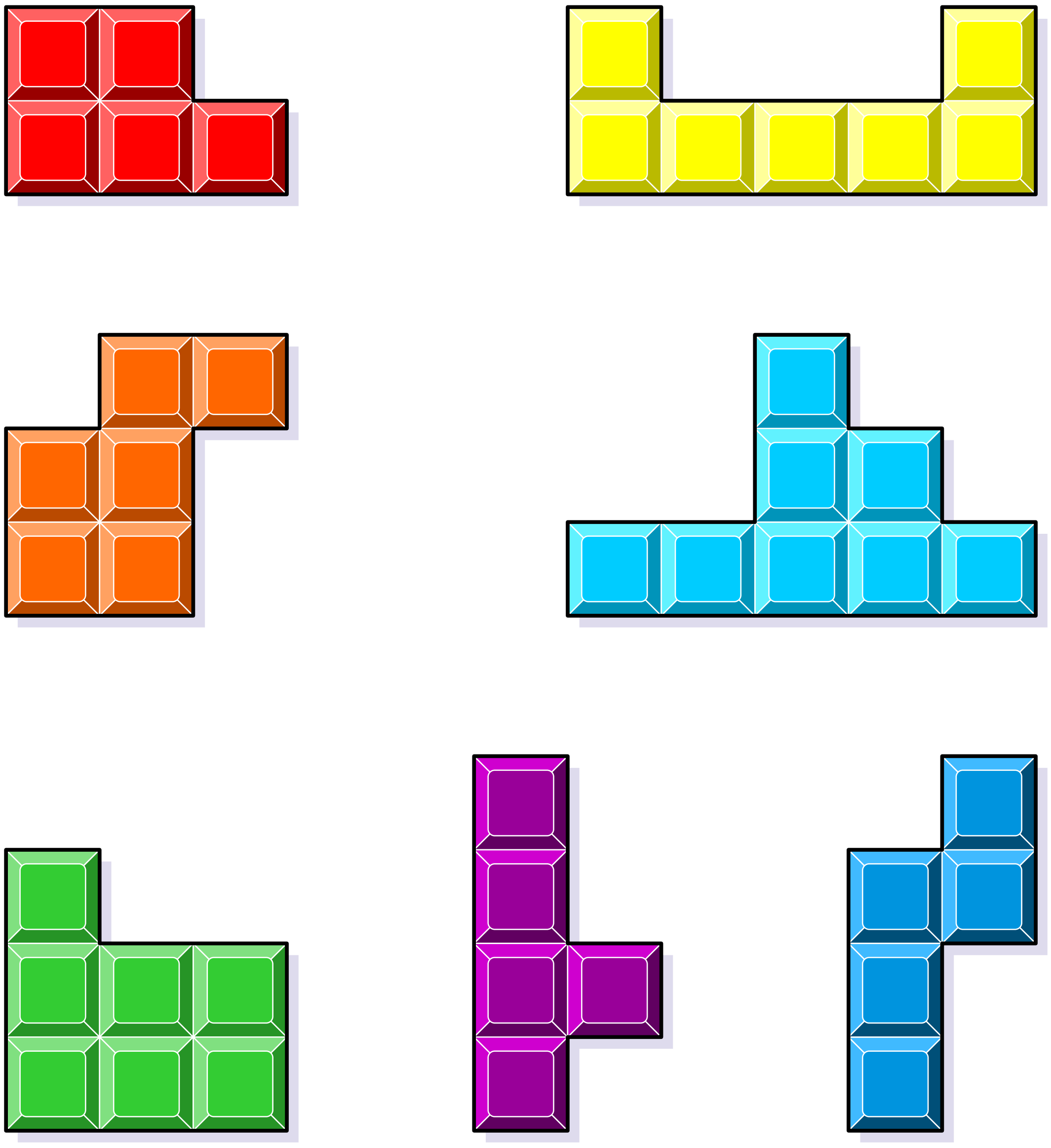
The objective of this puzzle is to place 10 chairs along the wall in a rectangular dance hall so that there are an equal number of chairs along each wall. How can it be done?

Miscellaneous Puzzles



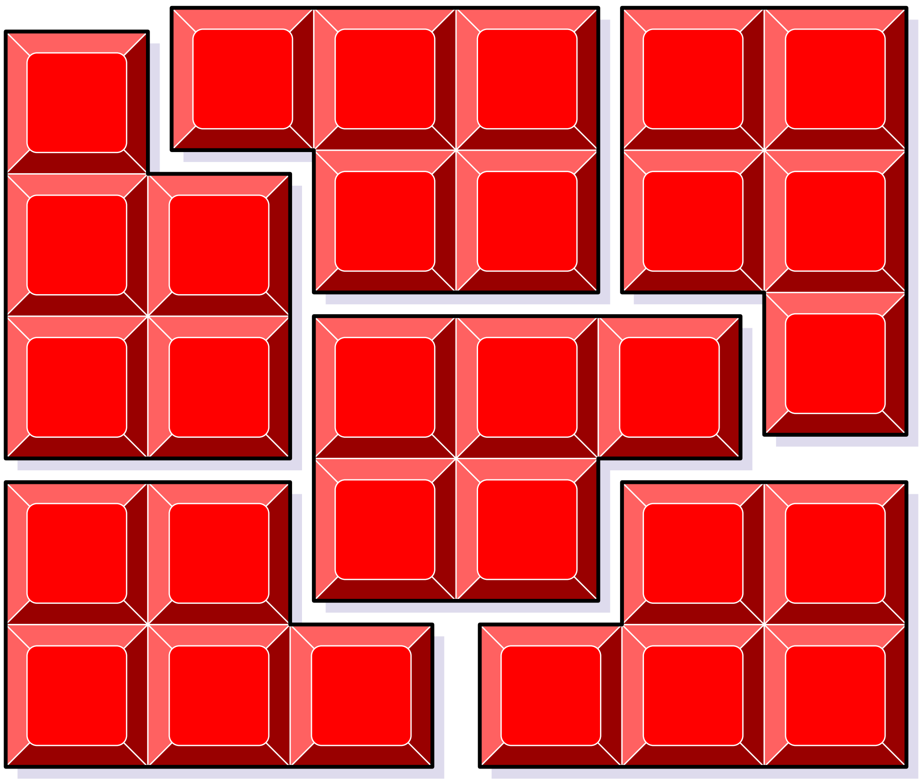
Chair Arrangement (solution)

The solution pattern for chairs is shown in the illustration.

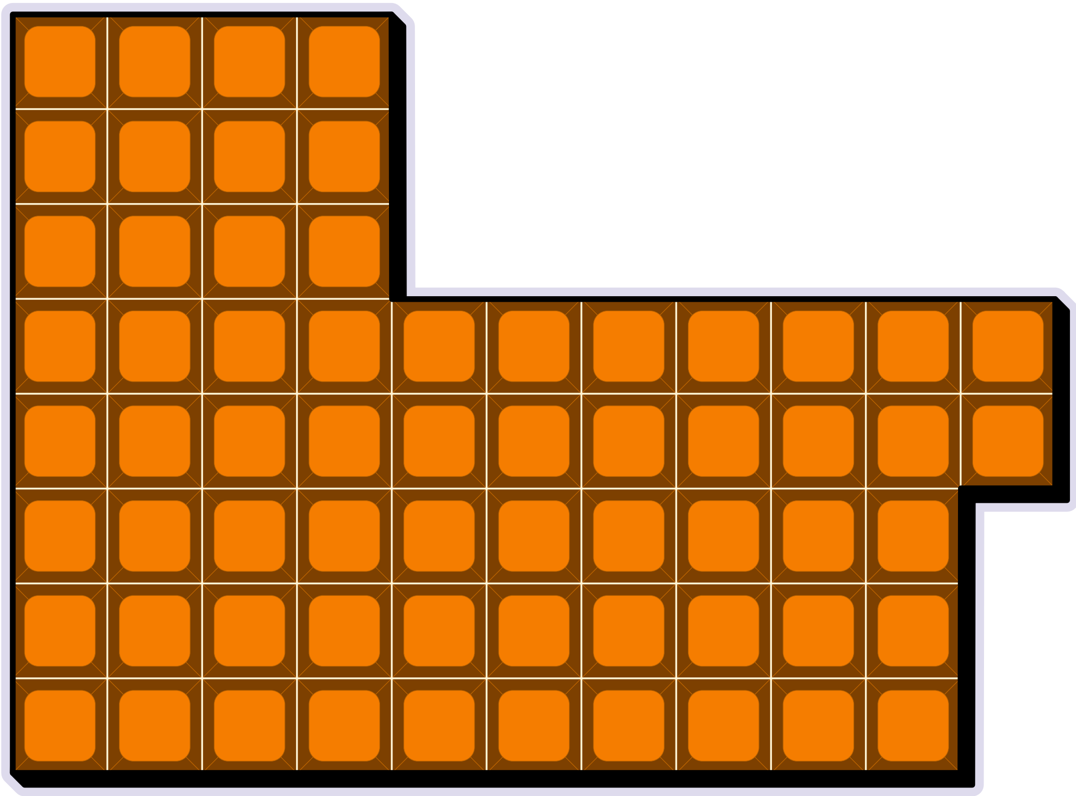


One of these seven chocolate pieces fits exactly six times in a certain chocolate bar of the rectangle shape. Which of them?

The piece can be rotated and reflected. The dimensions of the final chocolate bar are defined by the selected piece. The chocolate bar must not have any inner holes or cavities in the edges.

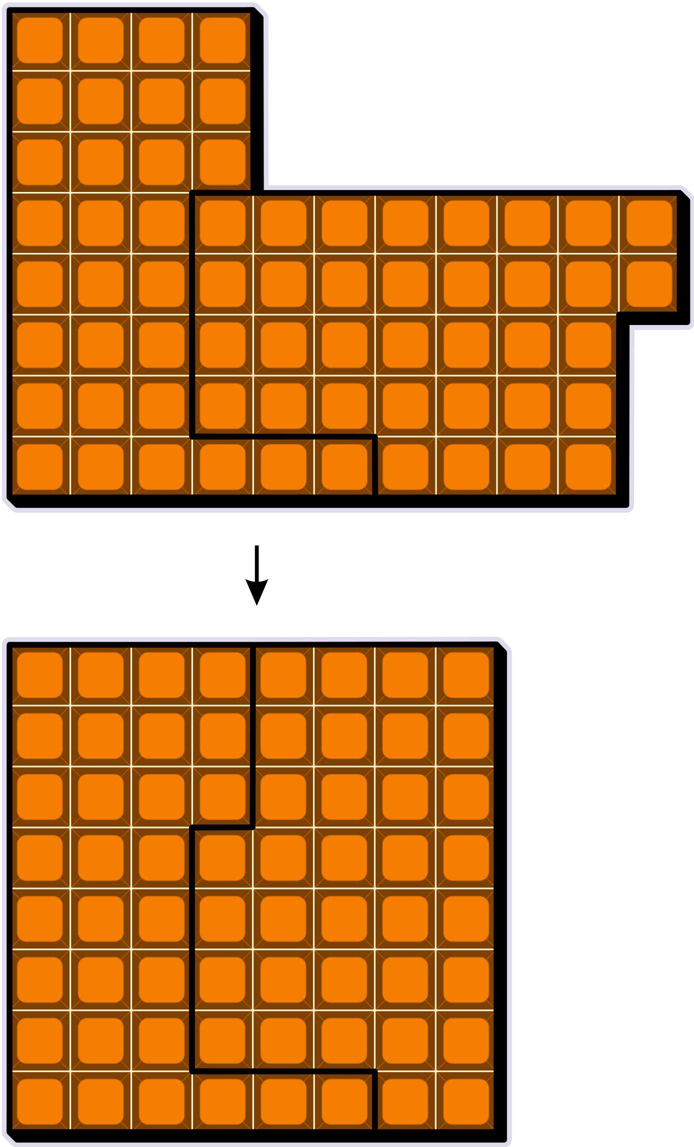


The selected piece is the red one consisting of five cells. How it can be arranged in a chocolate bar is shown in the illustration.

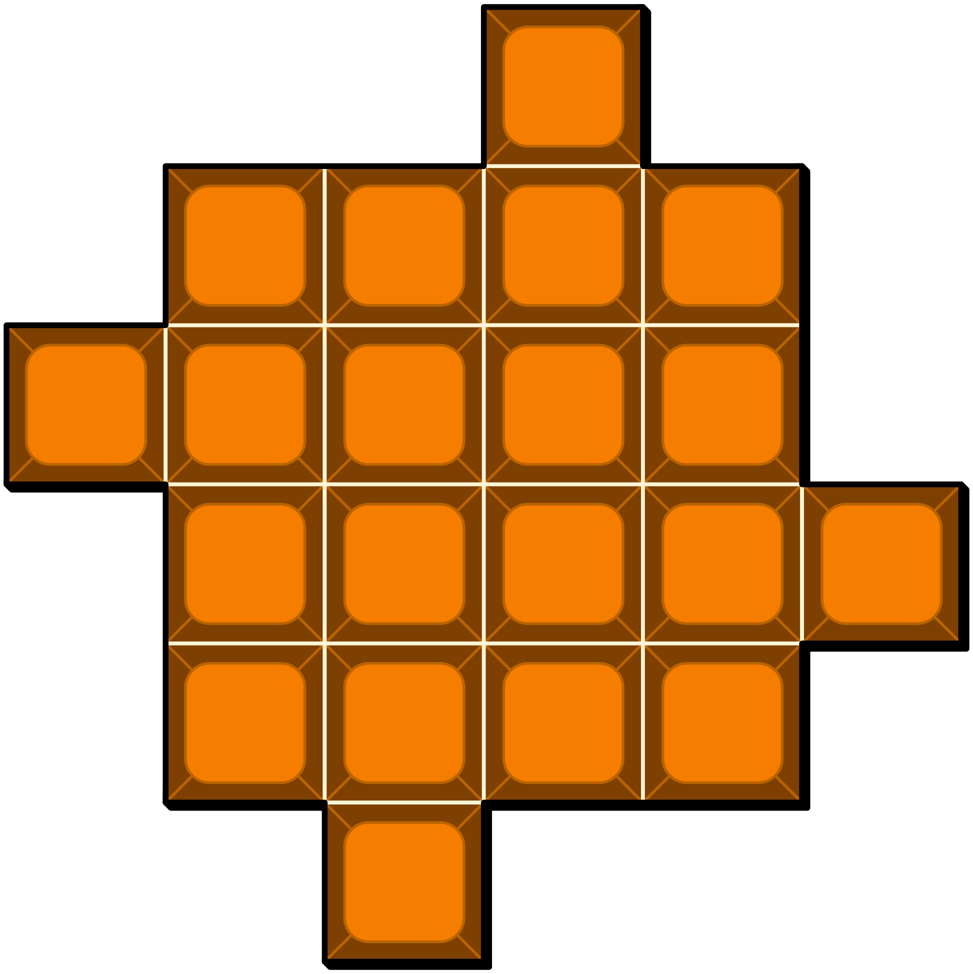


Divide this irregular chocolate bar into two pieces which, when rearranged, can form an 8x8 square. The divisions must be made along the white lines only.

Posted: March 31, 2010

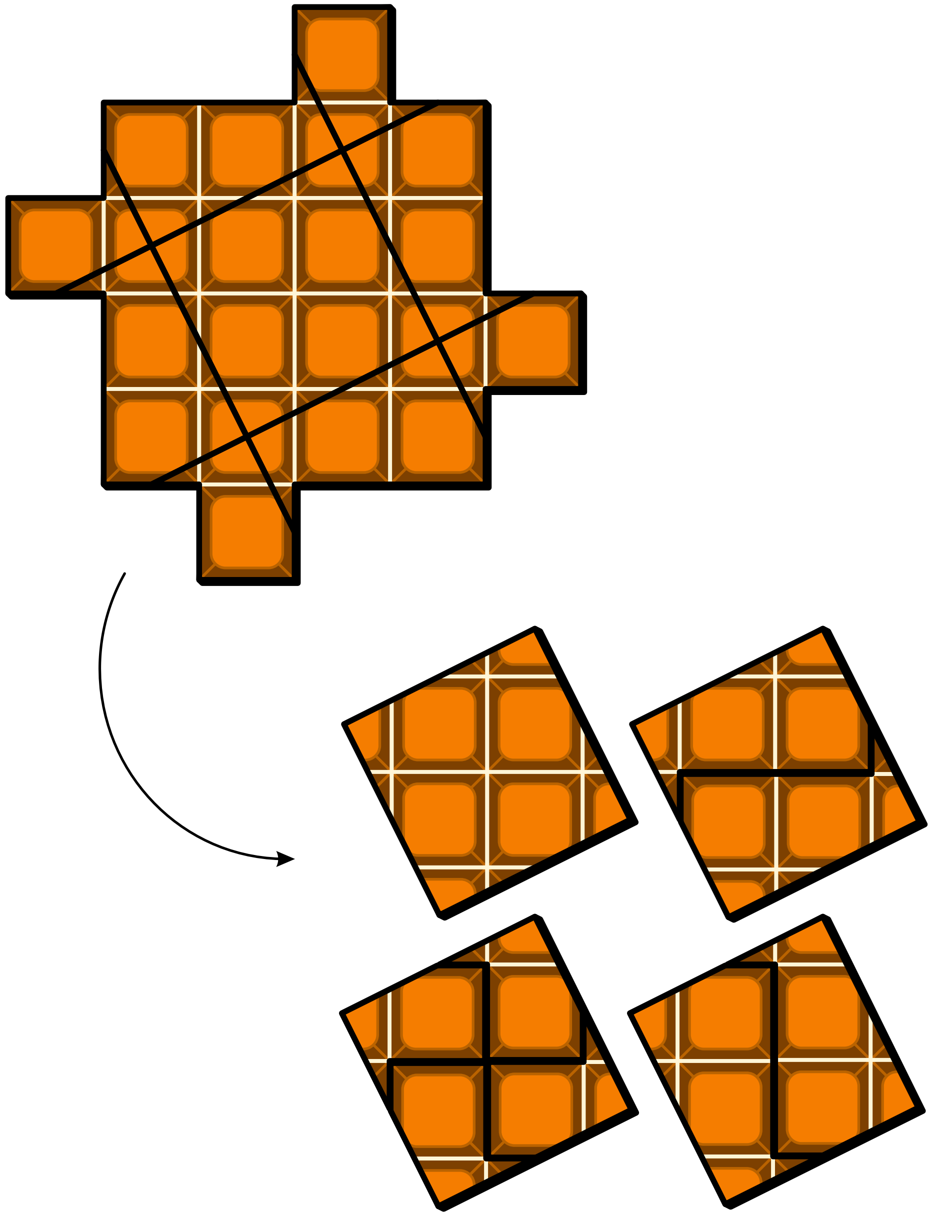


The solution is shown in the illustration.

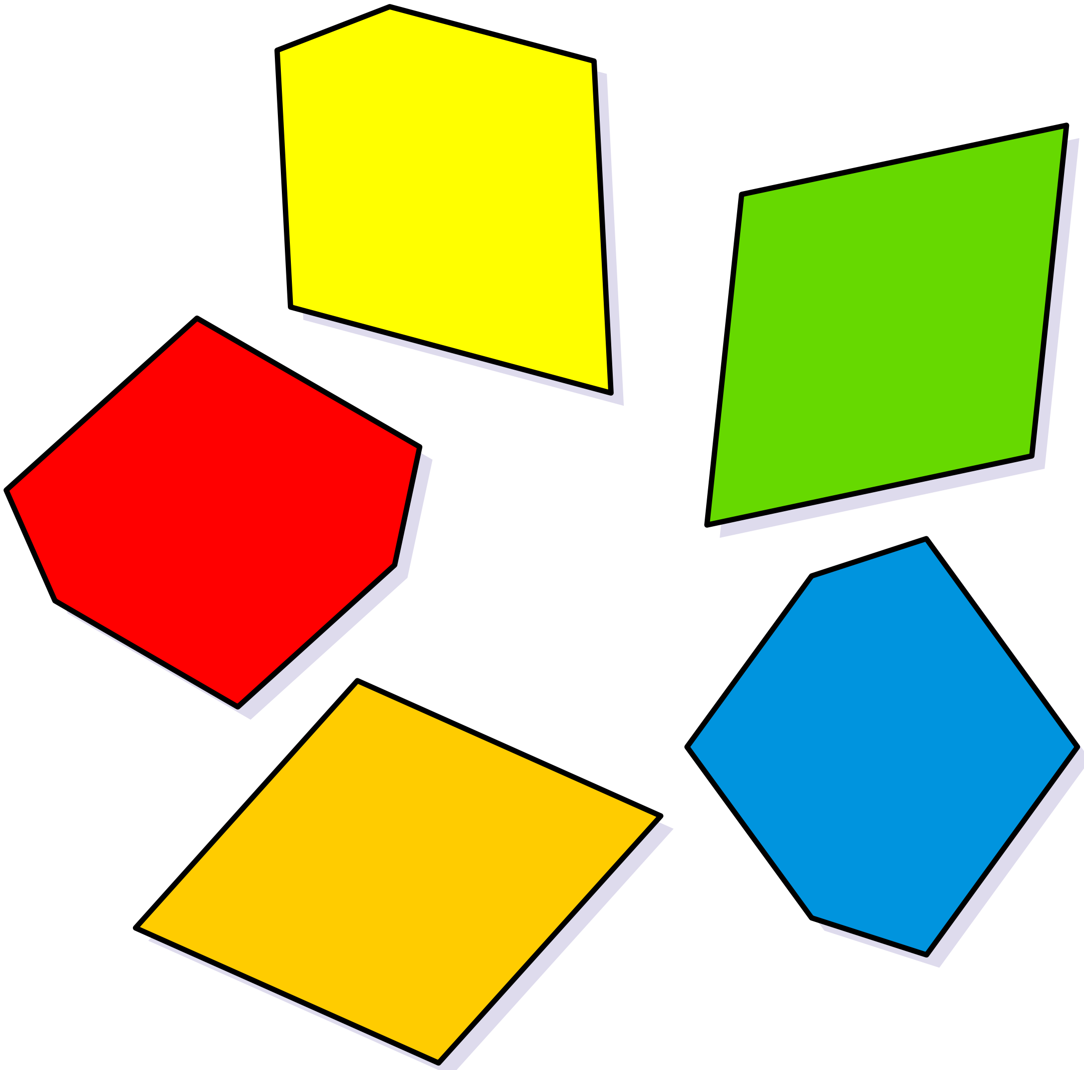


An unusual bar of chocolate shown here consists of twenty squares.

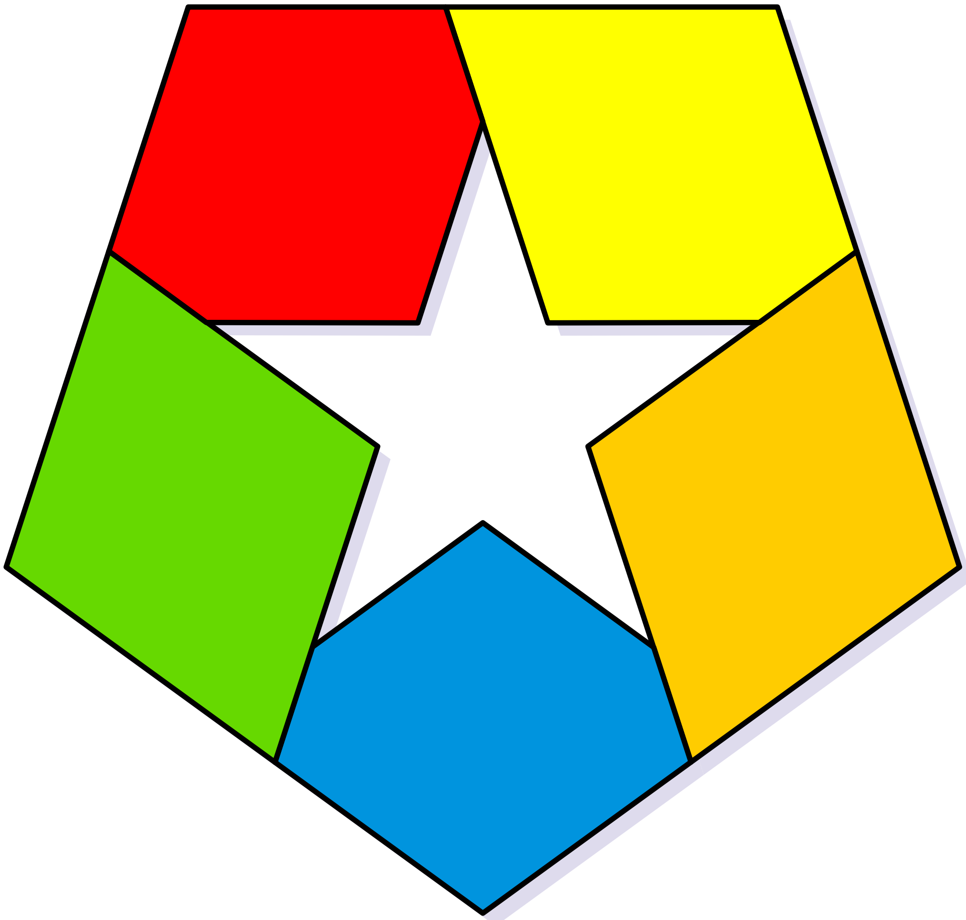
Can you make four cut so that to divide the bar into nine parts which in turn would form four perfect squares all of exactly the same size? The cuts not necessarily must be done along the provided lines.



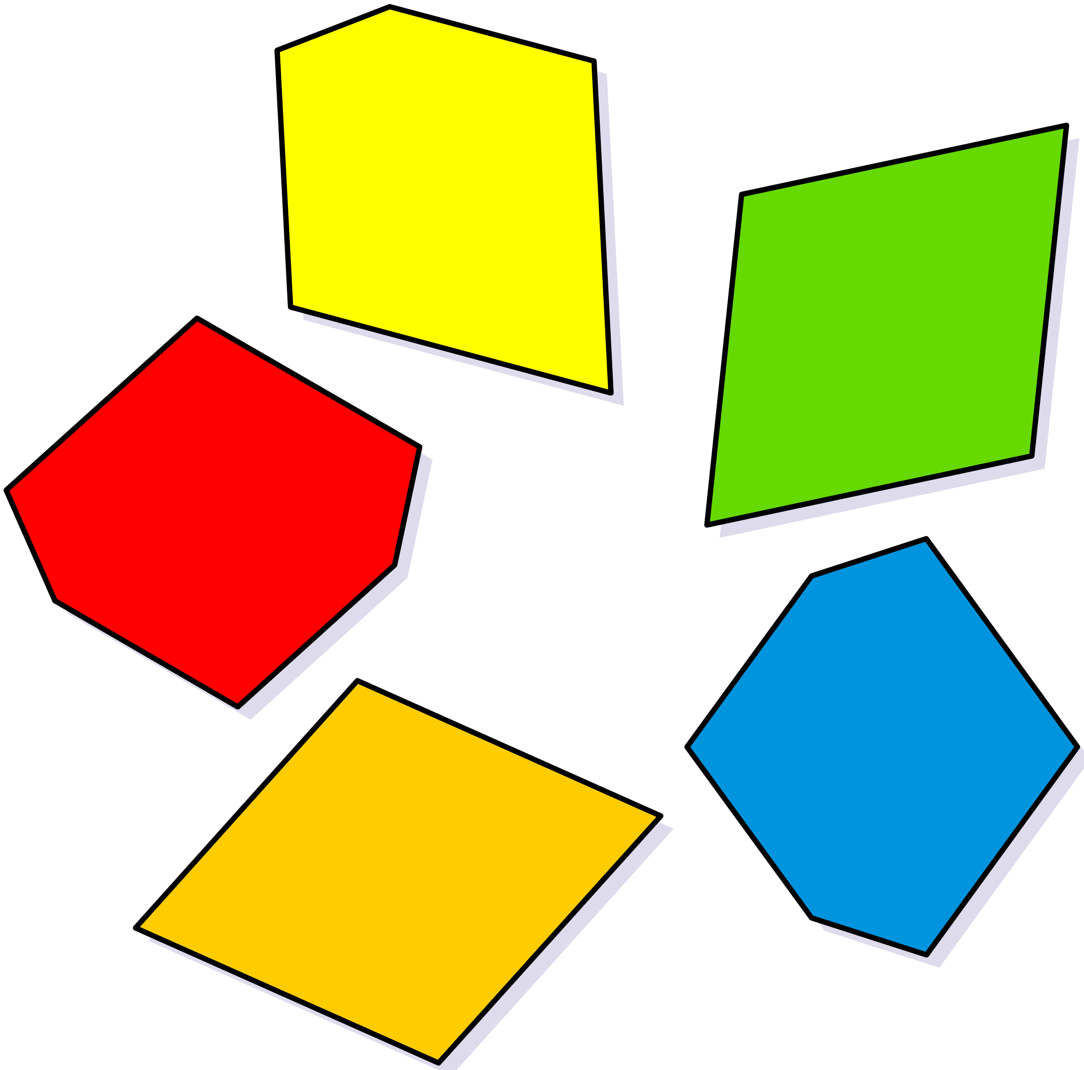
The solution is shown in the illustration.



Arrange these five pieces so that to obtain a perfect five-point star. The pieces are allowed to be rotated but not turned over or overlapped.



The solution is presented in the diagram. Please note the outer shape is a regular pentagon.



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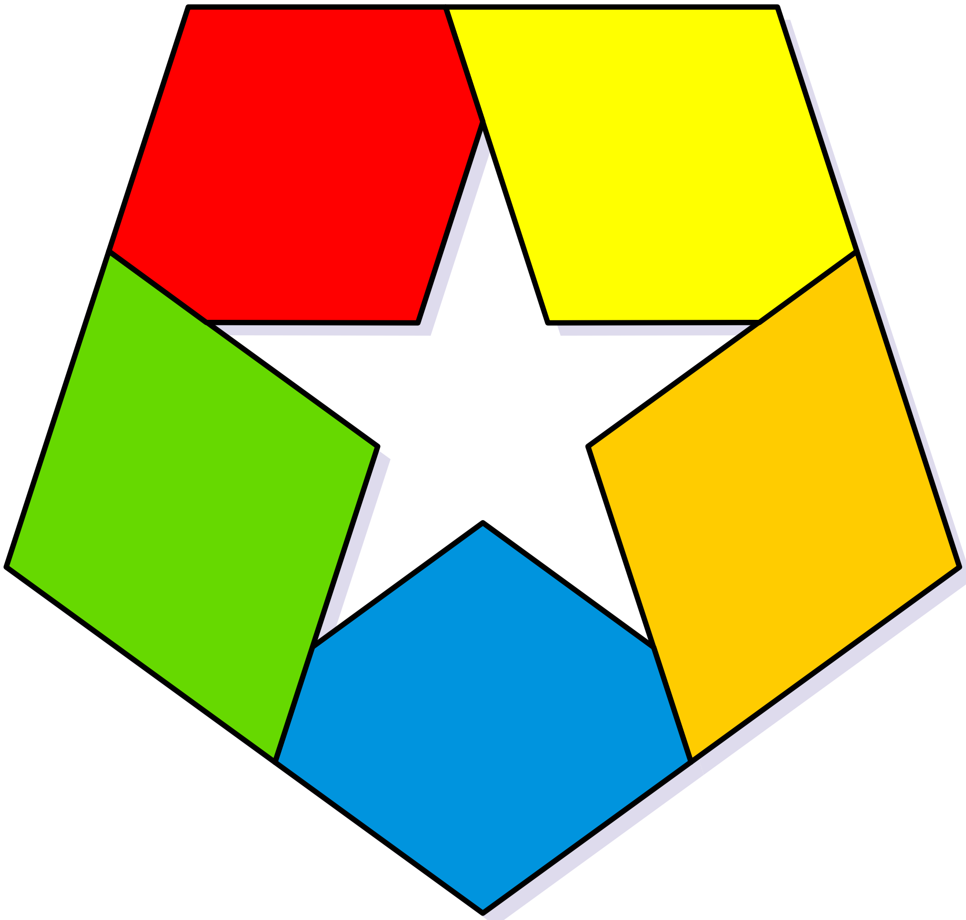

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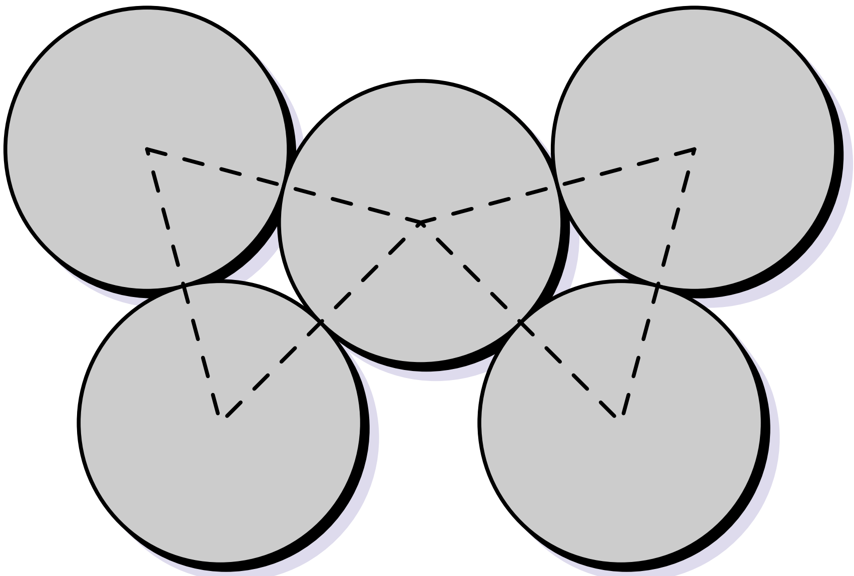
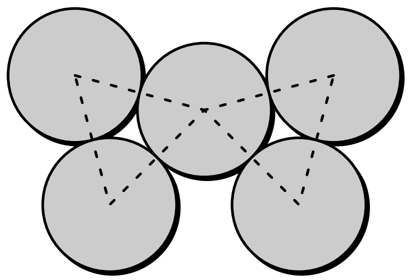


Five identical coins are arranged into the shape shown in the illustration. As it can be seen centers of the coins lie in the vertices of two identical equilateral triangles shown with the dotted lines.

Make only two single-coin moves and create two different equilateral triangles instead of these identical ones. A single-coin move consists of sliding a coin to new position where it must touch at least two other coins.

Coin Butterfly

Solution



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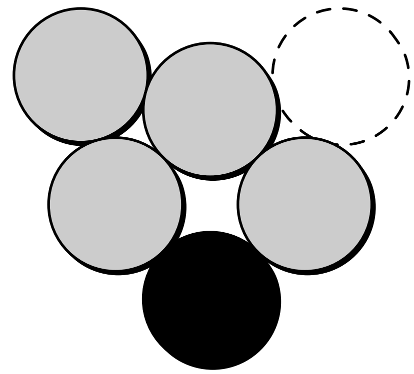
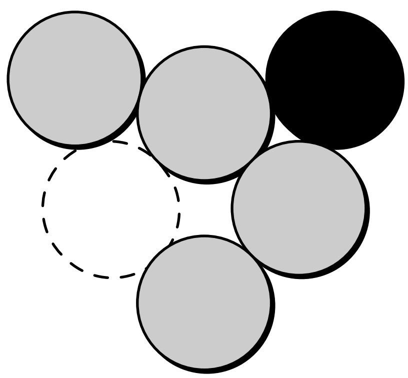


1



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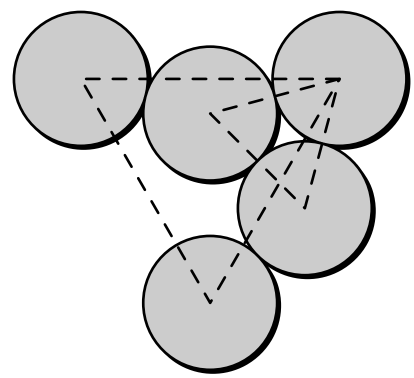
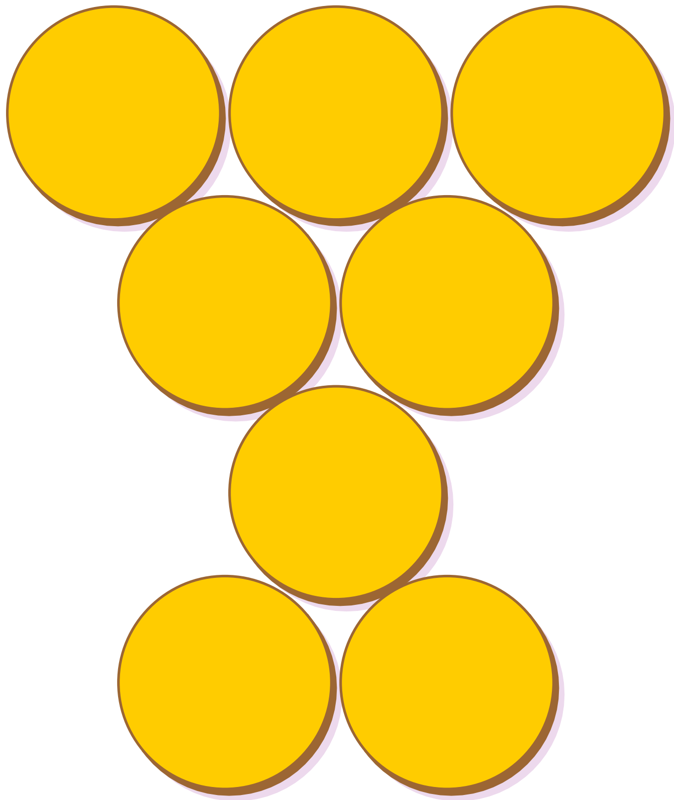


F

The solution is shown in the illustration.

Coin Puzzles



Coin Cup

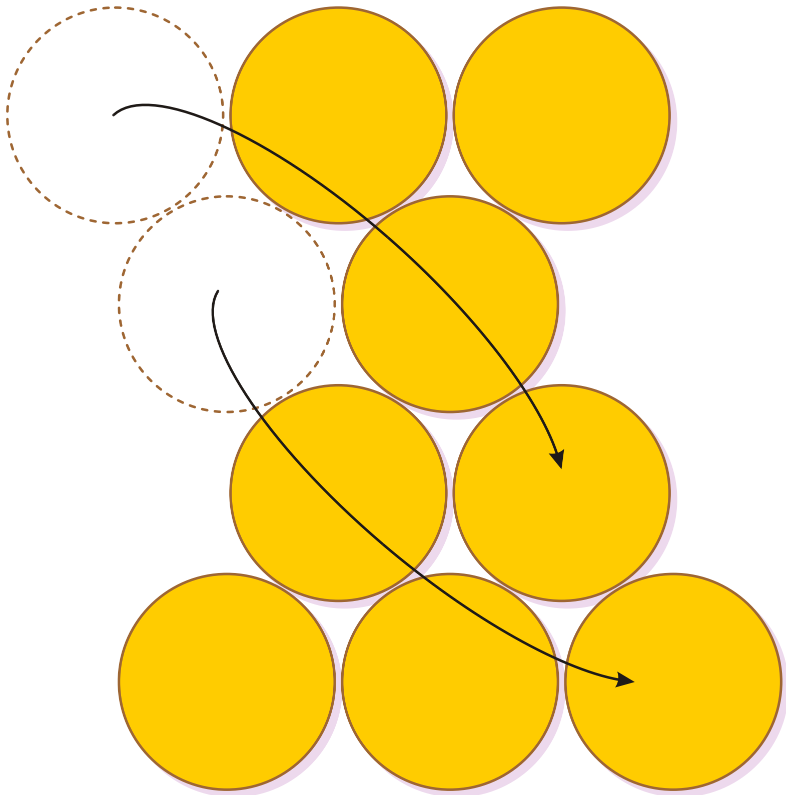
by Serhiy Grabarchuk, Jr.

Make the cup with eight coins of the same size as shown in the illustration.

The object is to move only two of them in a new position to get the cup standing upside-down.

You're allowed to move the coins as you wish but at the end the cup has to have exactly the same shape only rotated on 180 degrees from its start position.

Coin Puzzles



Coin Cup (solution)

One of the two symmetric solutions is shown in the illustration.

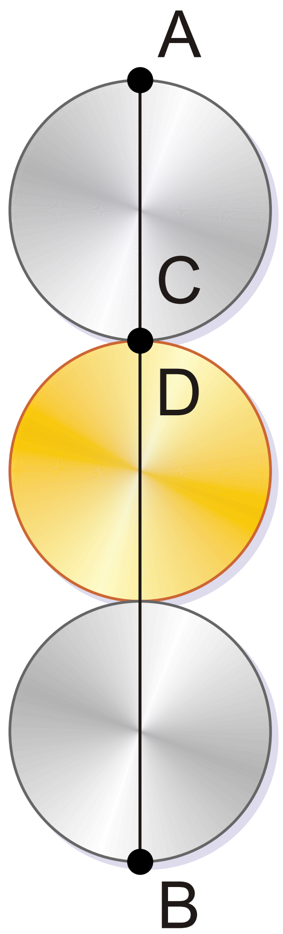


Fig. 1

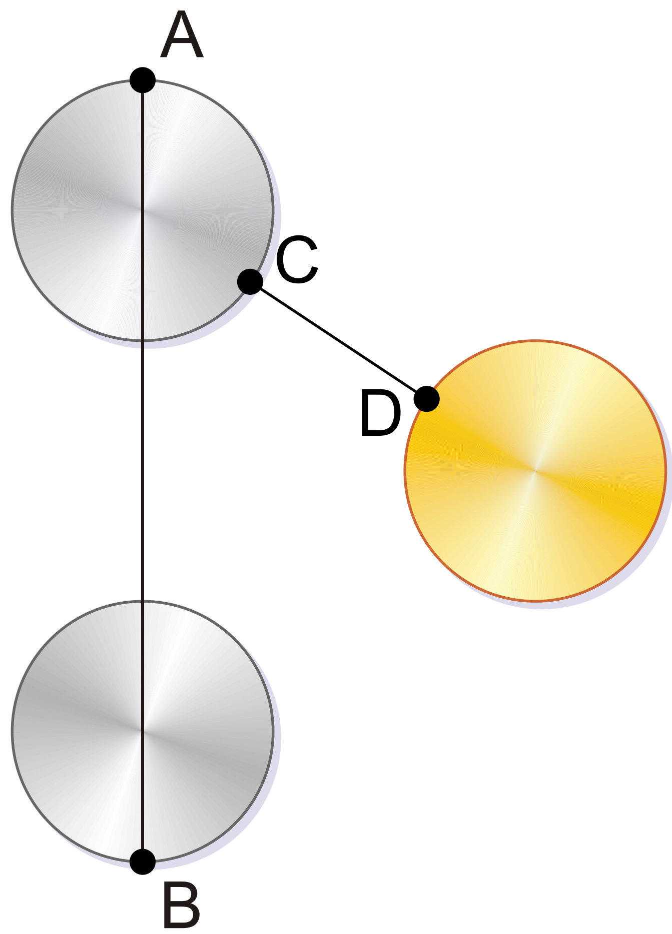
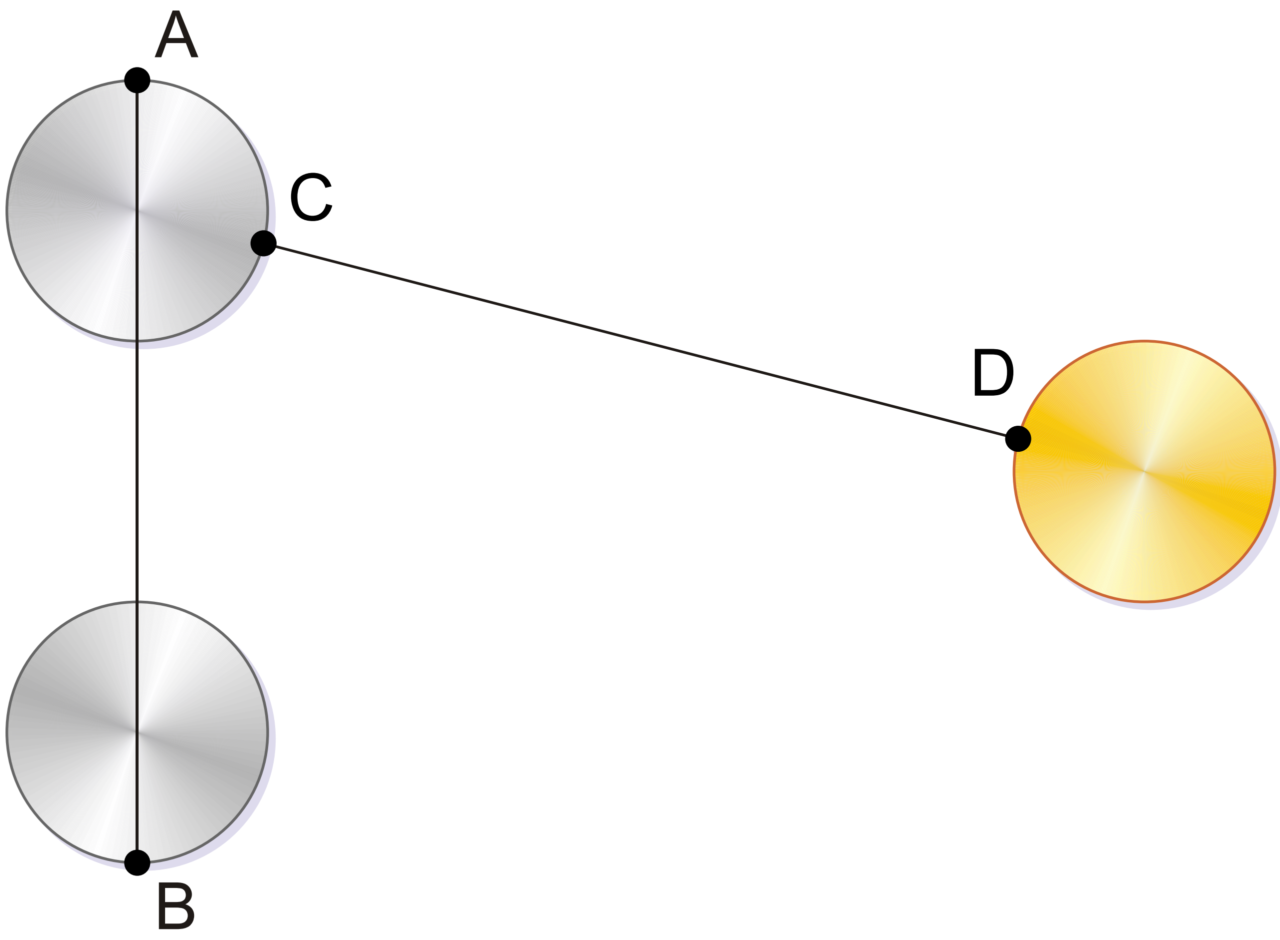


Fig. 2

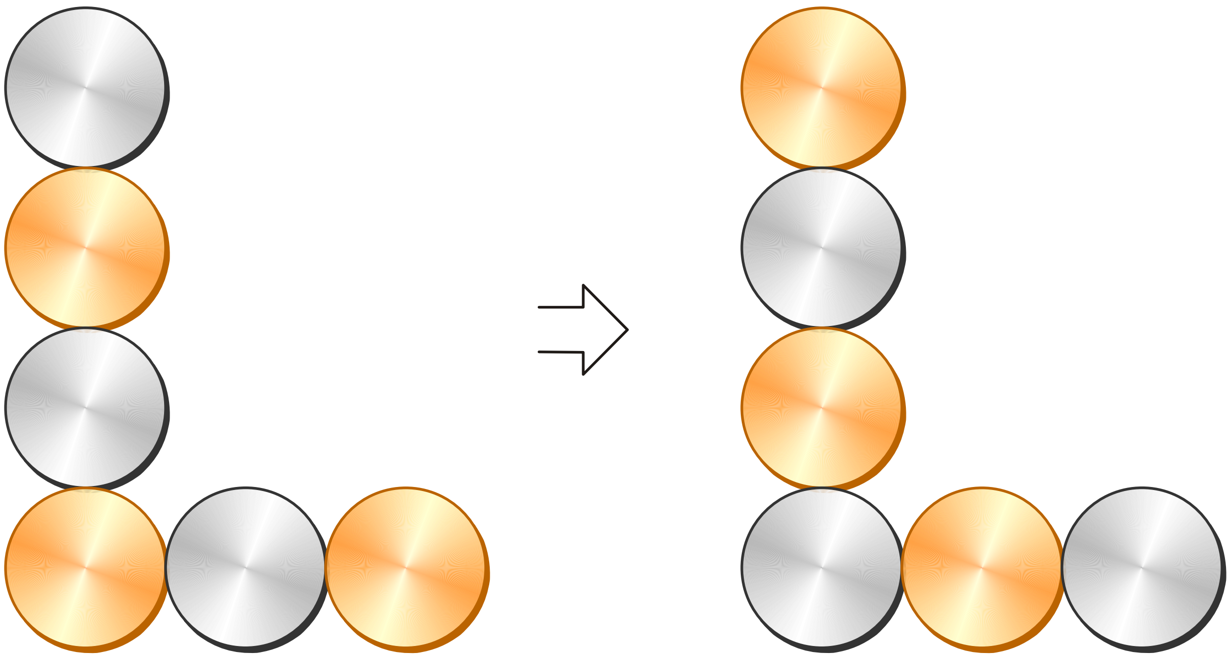
Place three identical coins side by side as shown in Figure 1.

Now, can you slide the middle coin to the right along the horizontal line until distance AB equals distance CD? As you slide the middle coin to the right distance CD is unfolded as shown in Figure 2. The object is only to guess the place where CD is unfolded enough to be equal AB.



The illusion is perhaps related to the Müller-Lyer illusion, when two lines of equal length appear different because of arrow lines that point inward at the ends of one line and outward at the ends of the other. In our illusion the coins' rims play the role of the arrows. With distance AB the rims of the respective coins lay within the length of AB. While for distance CD the rims are outside its length. As a result this makes an illusion that distance AB seems to be somewhat shorter than distance CD, though they are in fact equal.

Puzzles.COM

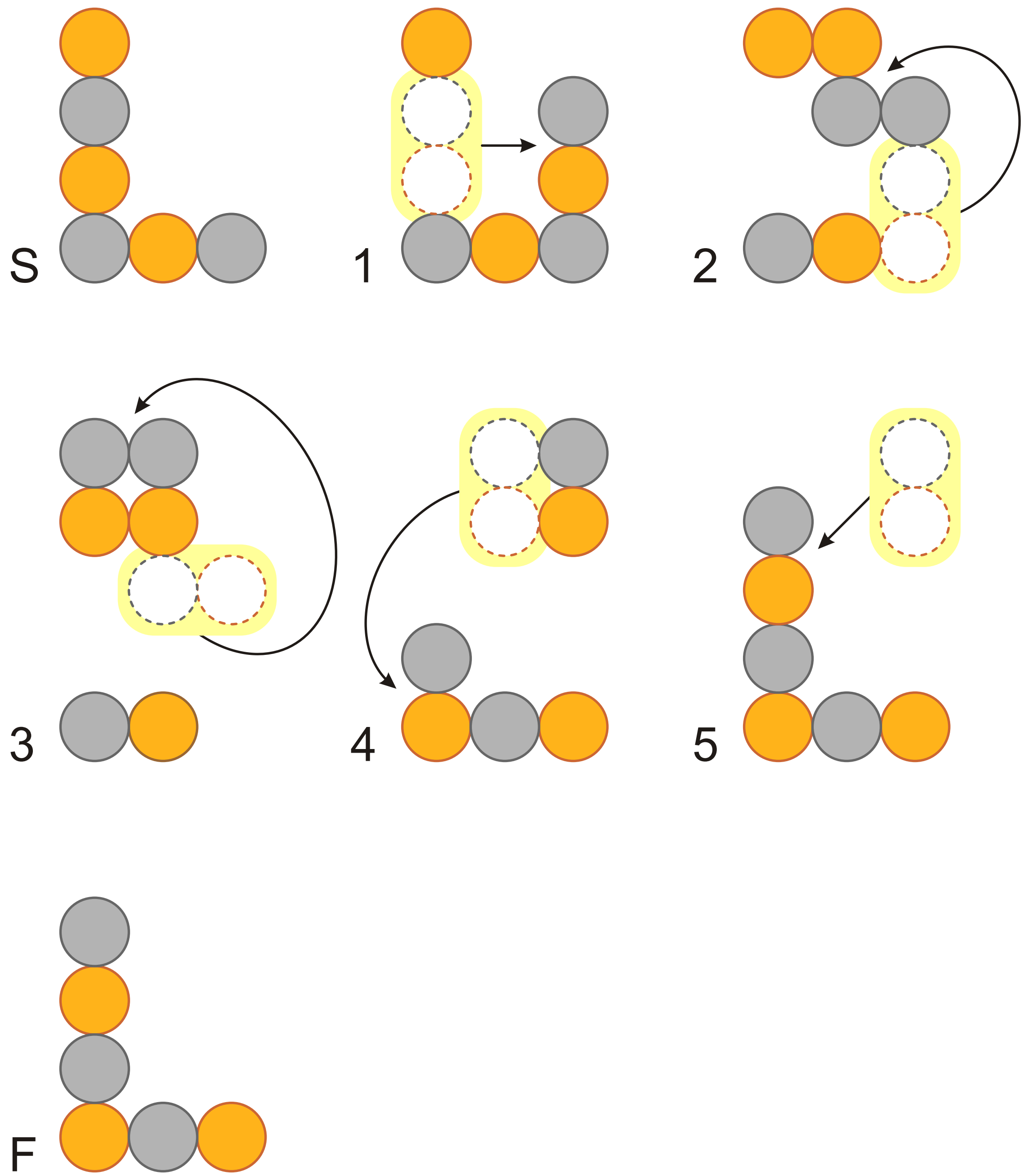


Take six coins of the same size and arrange them in the capital L altering their heads and tails as shown in the illustration - left position.

The goal is to make another L with all the coins having their heads and tails exchanged as shown in the right position of the illustration. It should be performed in the fewest possible number of moves.

A move consists of sliding a pair of the two adjoining coins to a new place. You have to slide the coins only orthogonally; it means that you are not allowed to rotate the pair of coins while you move it. The final L not necessarily has to be formed exactly at the same spot as the start L was.

ThinkFun™ Everybody plays.

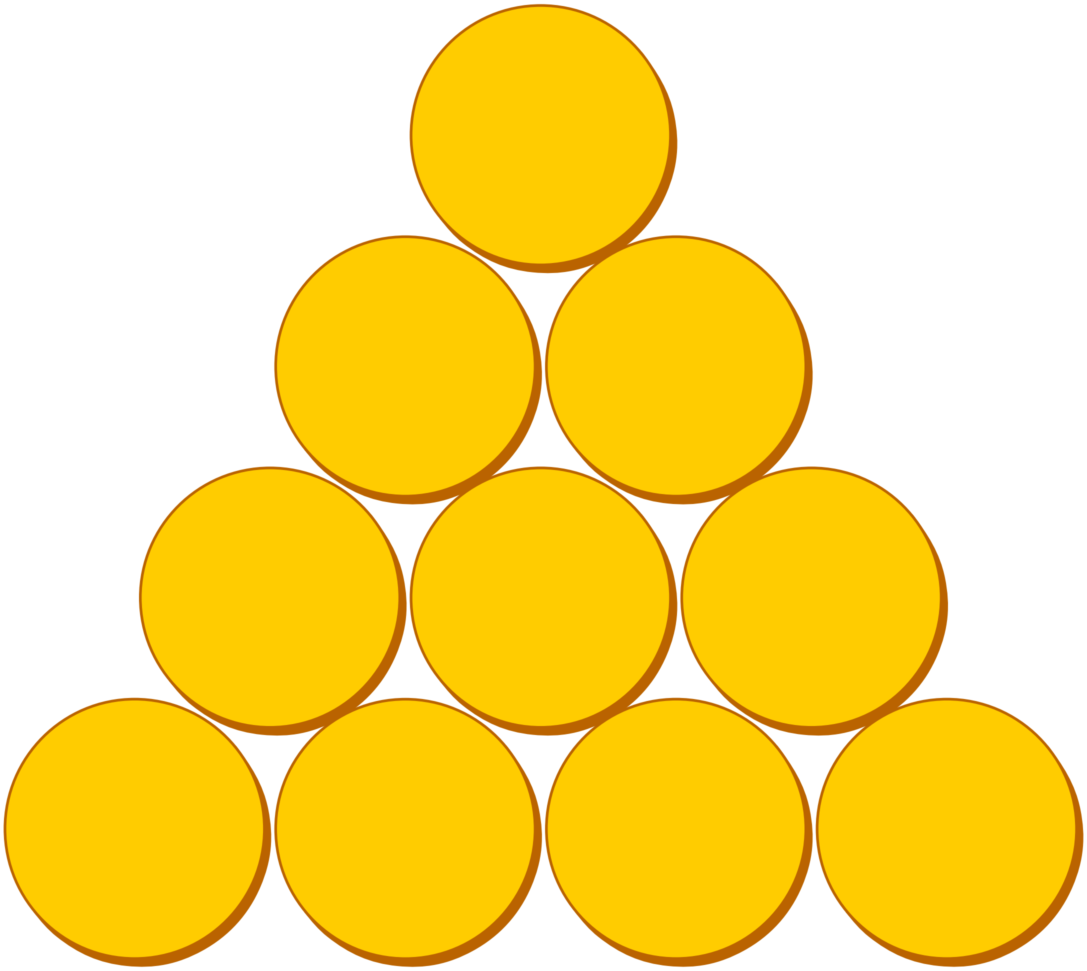


The solution to this puzzle can be performed in 5 moves as shown in the illustration.

Coins & Triangles

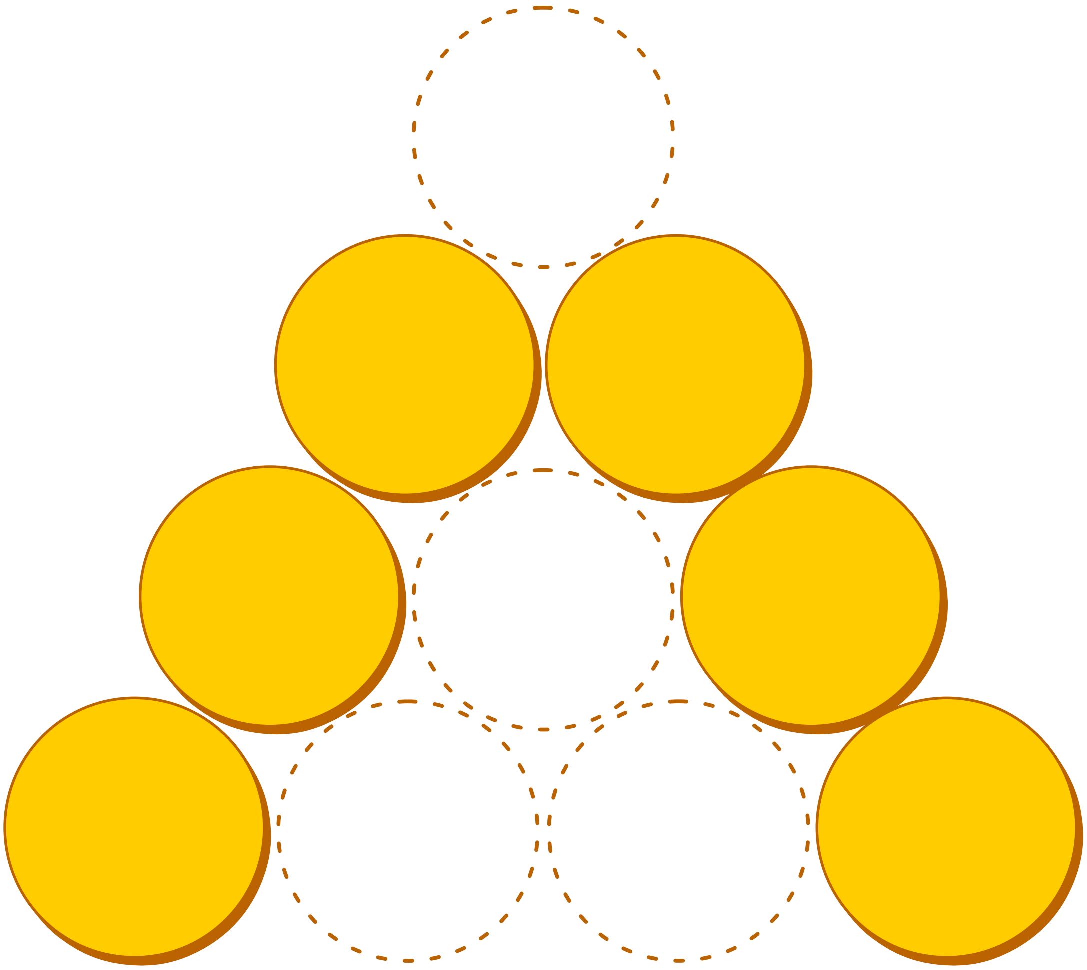
by Kobon Fujimura

Puzzles.COM



When the centers of any three coins lie in the corners of an equilateral triangle of some size, such coins form an equilateral coin triangle. How many equilateral coin triangles of different sizes can you count in the figure?

The object of the puzzle now is to remove the minimum number of coins so that no equilateral coin triangles remain. In other words, centers of any three coins among those that remained don't lie in the corners of an equilateral triangle.

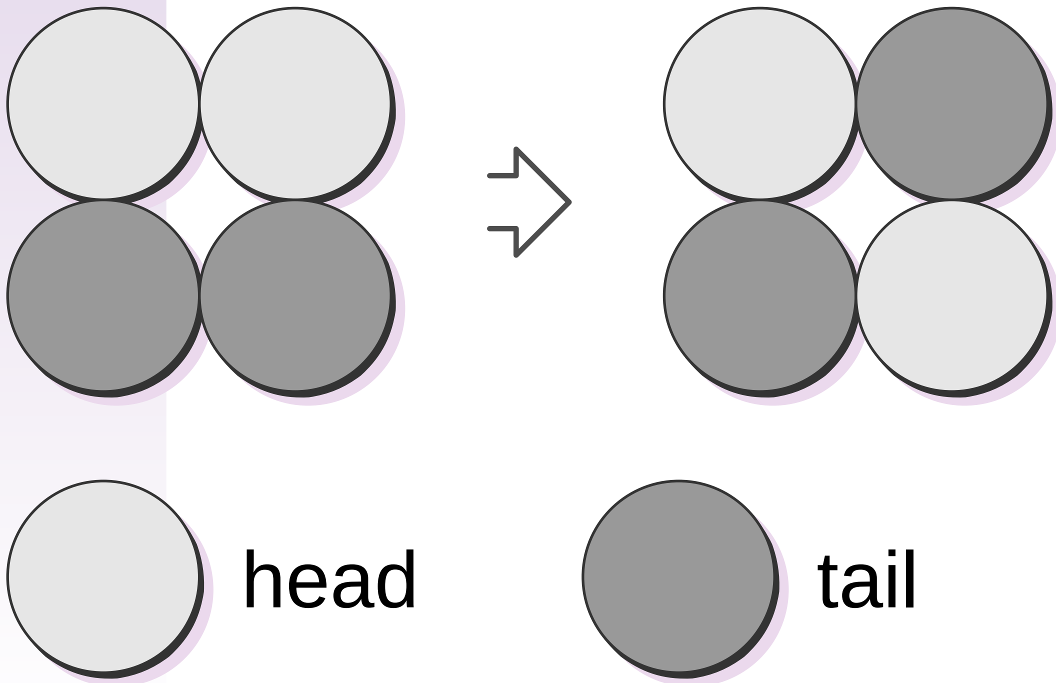


The minimum number of coins to remove is four.

The unique solution to this puzzle (except rotations and reflections) is shown in the illustration and the removed coins are shown with dotted outlines.

It can be seen that the centers of any three coins among the remaining ones don't lie in the corners of an equilateral triangle.

Coin Puzzles



Coin Squad

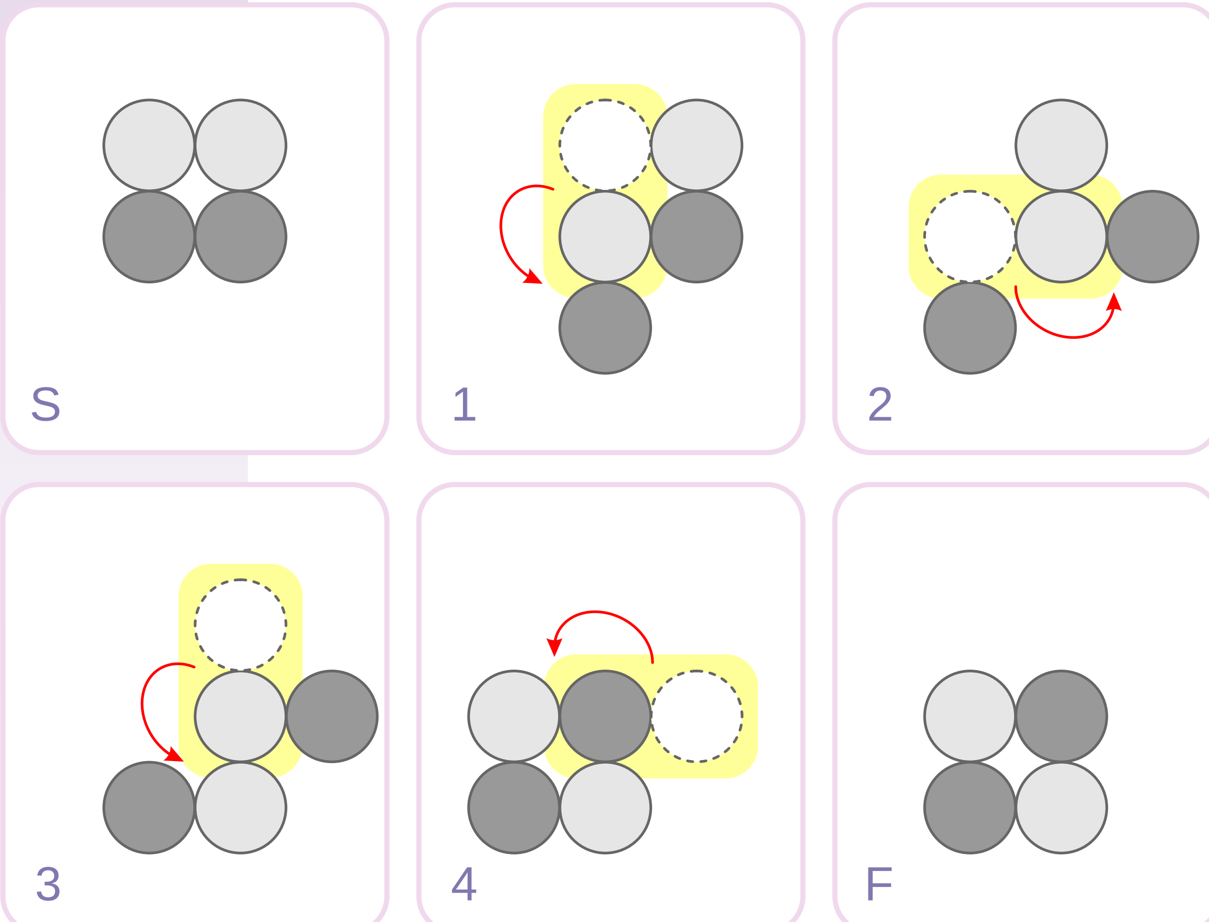
by Serhiy Grabarchuk, Jr.

Take four coins of the same size and make a square as shown in the left square in the illustration; two coins - heads up in the top row, and the other two - tails up in the bottom row.

The object is to make another square with two coins heads up on one diagonal and with two coins tails up on the other - as shown in the right square in the illustration. This should be performed in the shortest possible number of moves.

A move consists of sliding a pair of the two adjoining coins to a new place. You have to slide the coins only orthogonally; it means that you are not allowed to rotate the pair of coins while you move it. The final square not necessarily needs to be formed exactly at the same spot as the start square was.

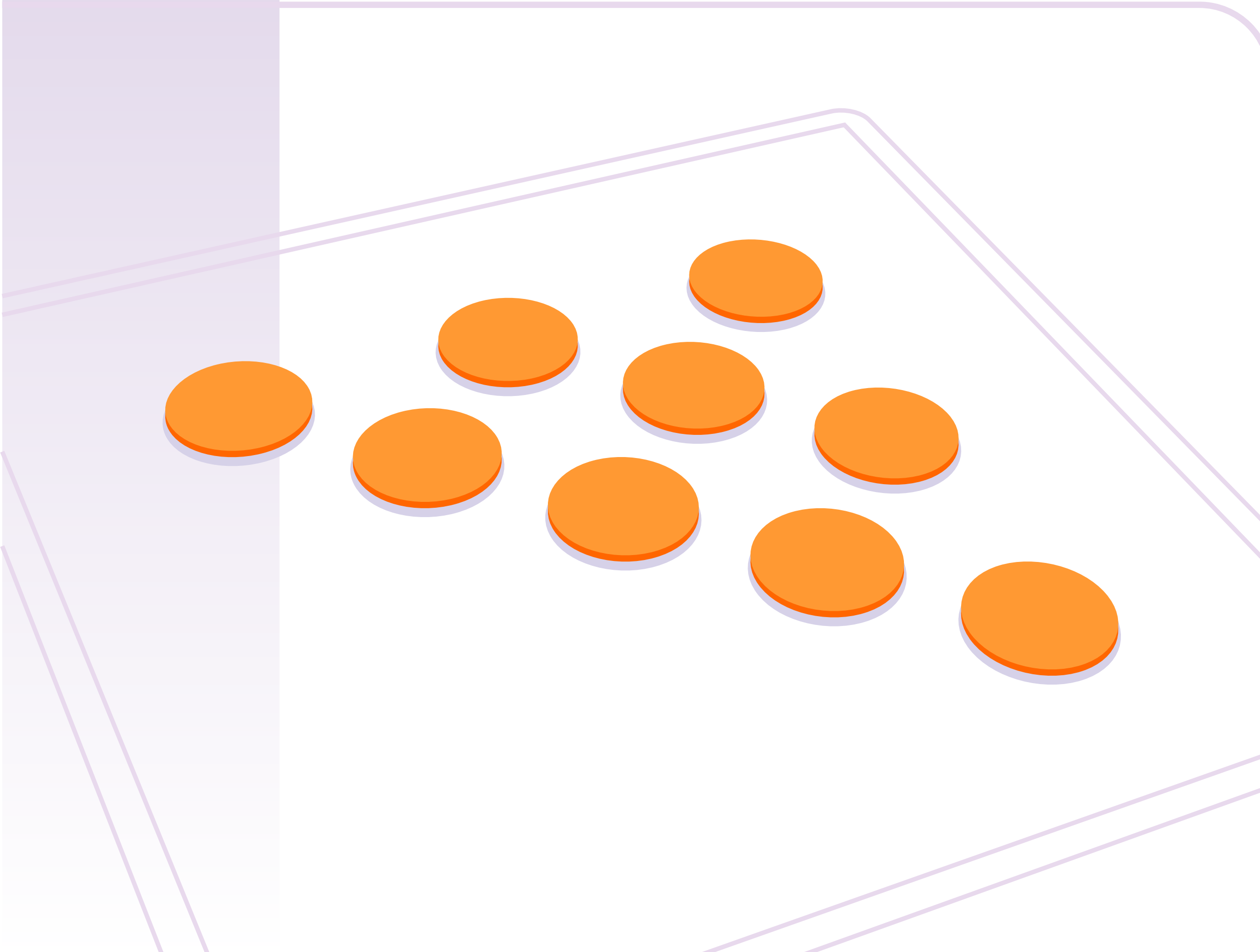
Coin Puzzles



Coin Squad (solution)

This puzzle can be solved in four moves as shown.

Coin Puzzles



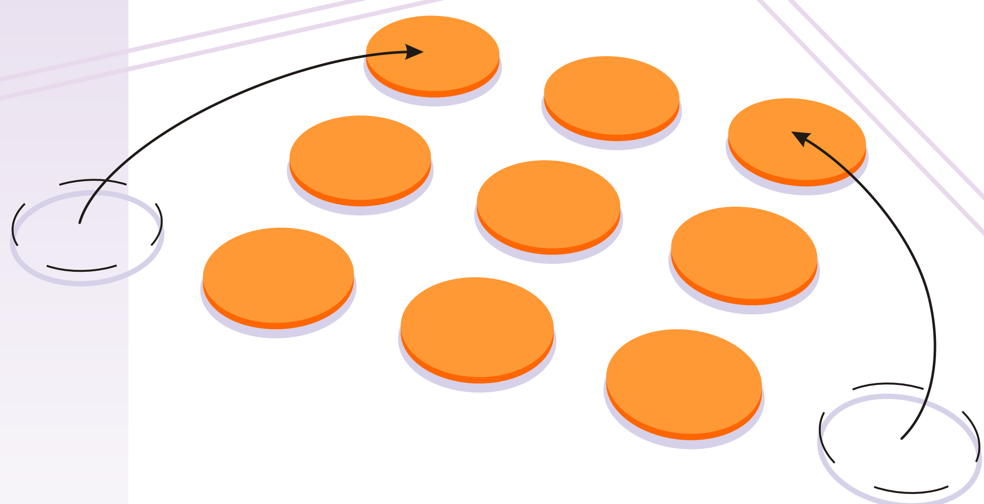
Coin Triangle

by Serhiy Grabarchuk

Change the triangle into a square by moving the minimum of the coins.

How many coins will you need to move to do this?

Coin Puzzles

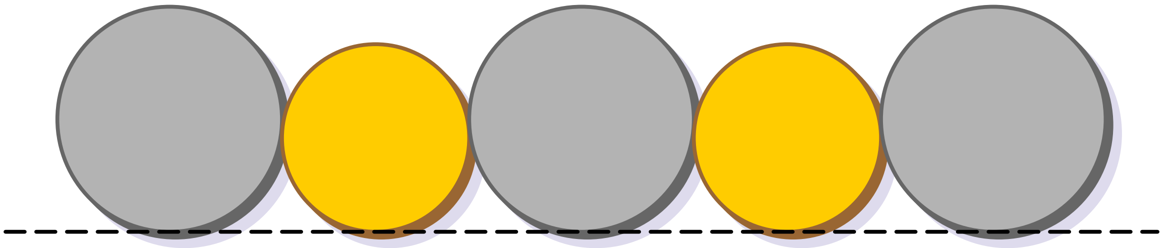


Coin Triangle (solution)

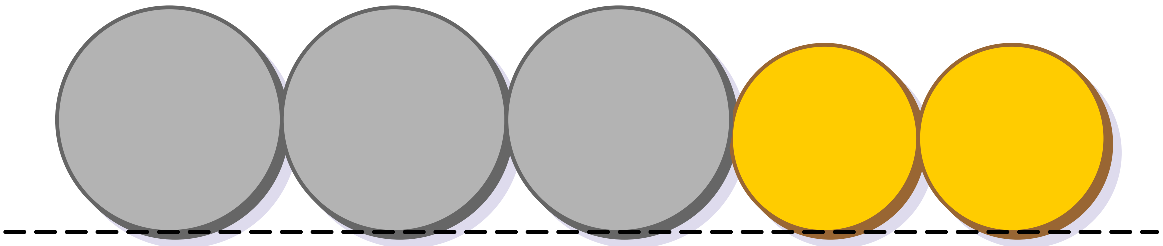
The two coin solution is shown in the figure above.

Collating the Coins

by Henry E. Dudeney



Start Position

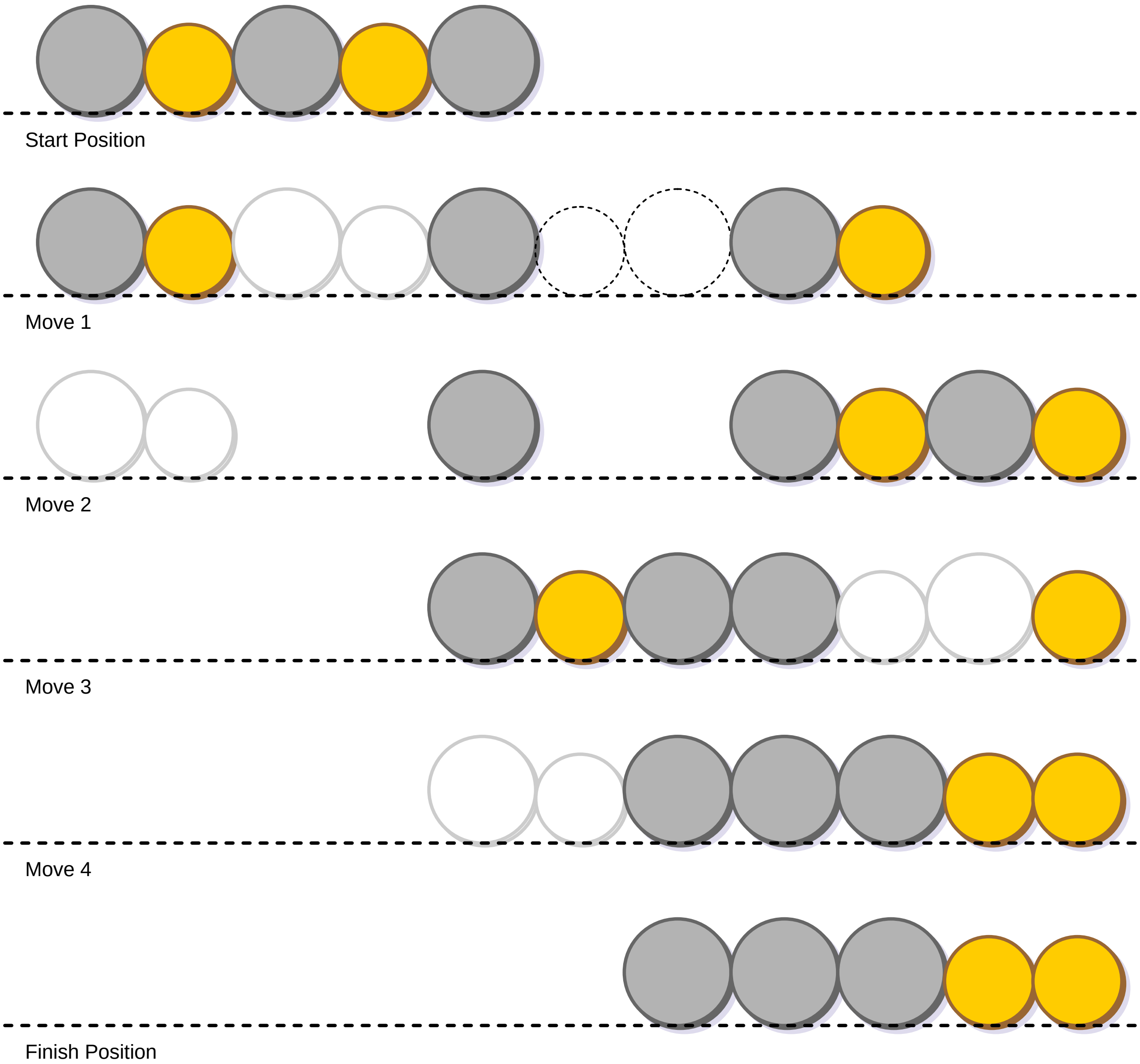


Finish Position

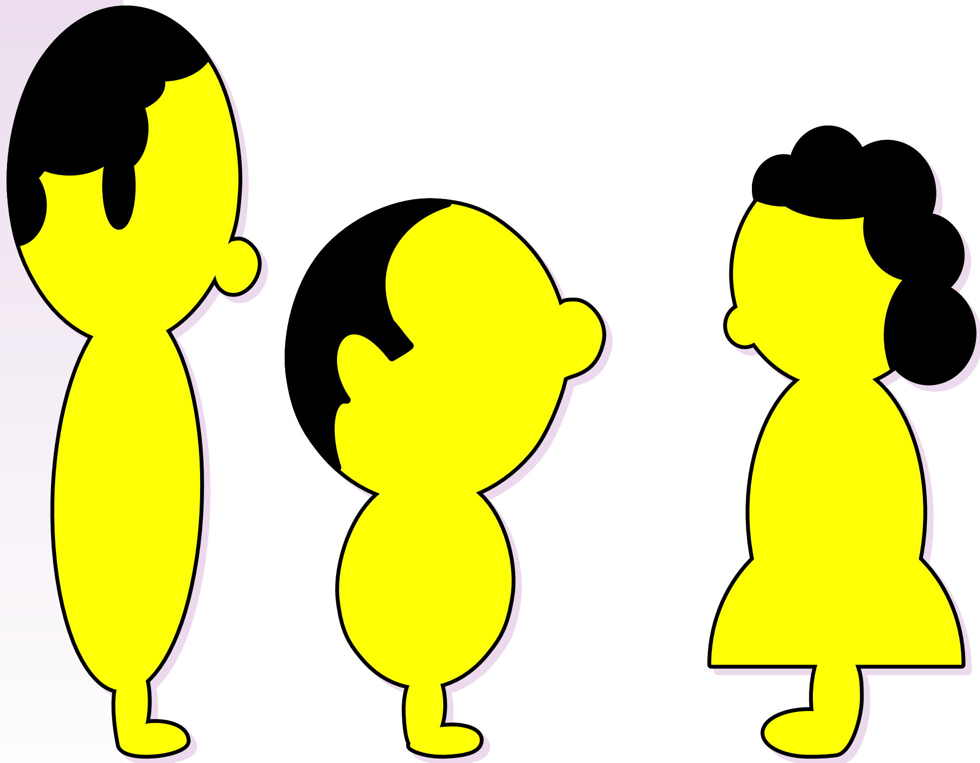
Arrange five coins (three bigger and two smaller ones) as shown above (top row).

The problem is to change their positions to those shown at the bottom of the illustration in the shortest possible number of moves.

A move consists of placing the tips of the first and second fingers on any two touching coins, always of the different sizes, then sliding the pair to another spot along the imaginary line shown in the illustration. The two coins in the pair must touch at all times. The coin at left in the pair must remain at left; the coin at right must remain at right. Gaps in the chain are allowed at the end of any move except the final one. After the last move the coins need not necessarily be at the same spot on the imaginary line that they occupied at the start.



This puzzle can be solved in four moves as shown above.



Colored Names & Hair

after Martin Gardner

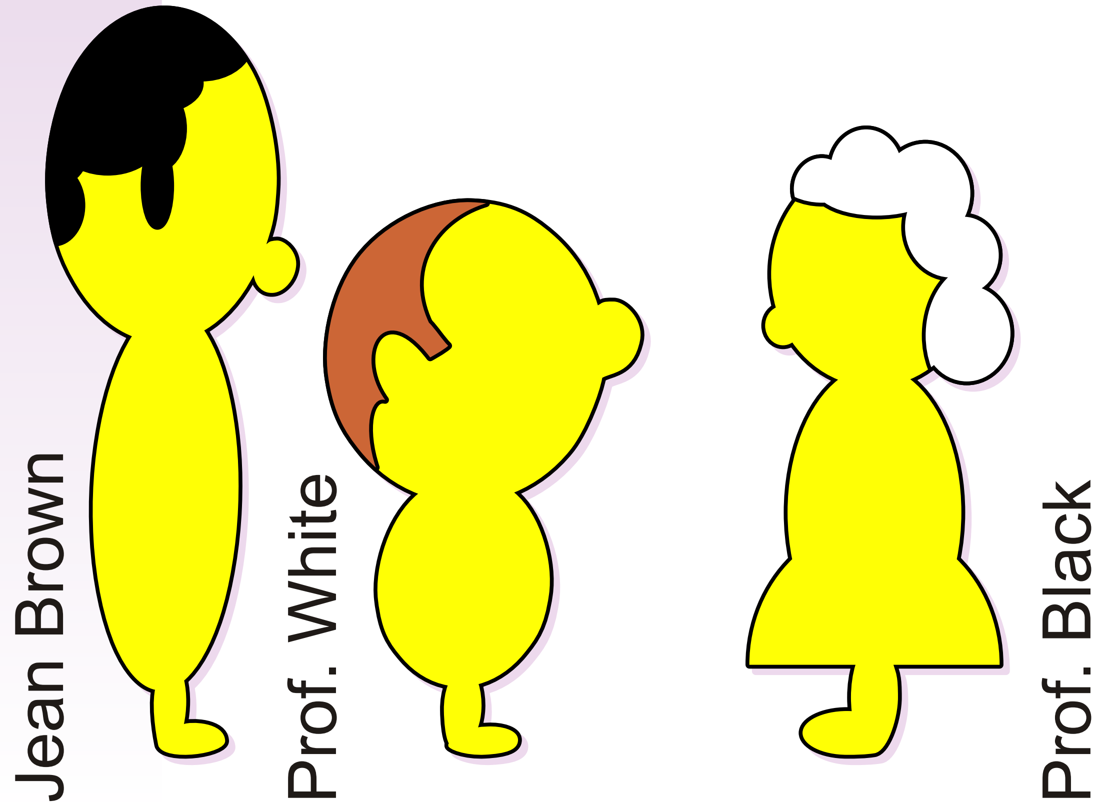
Professor Merle White of the mathematics department, Professor Leslie Black of philosophy, and Jean Brown, a young stenographer who worked in the university's office of admissions, were lunching together.

"Isn't it remarkable," observed the lady, "that our last names are Black, Brown and White and that one of us has black hair, one brown hair and one white."

"It is indeed," replied the person with black hair, "and have you noticed that not one of us has hair that matches his or her name?"

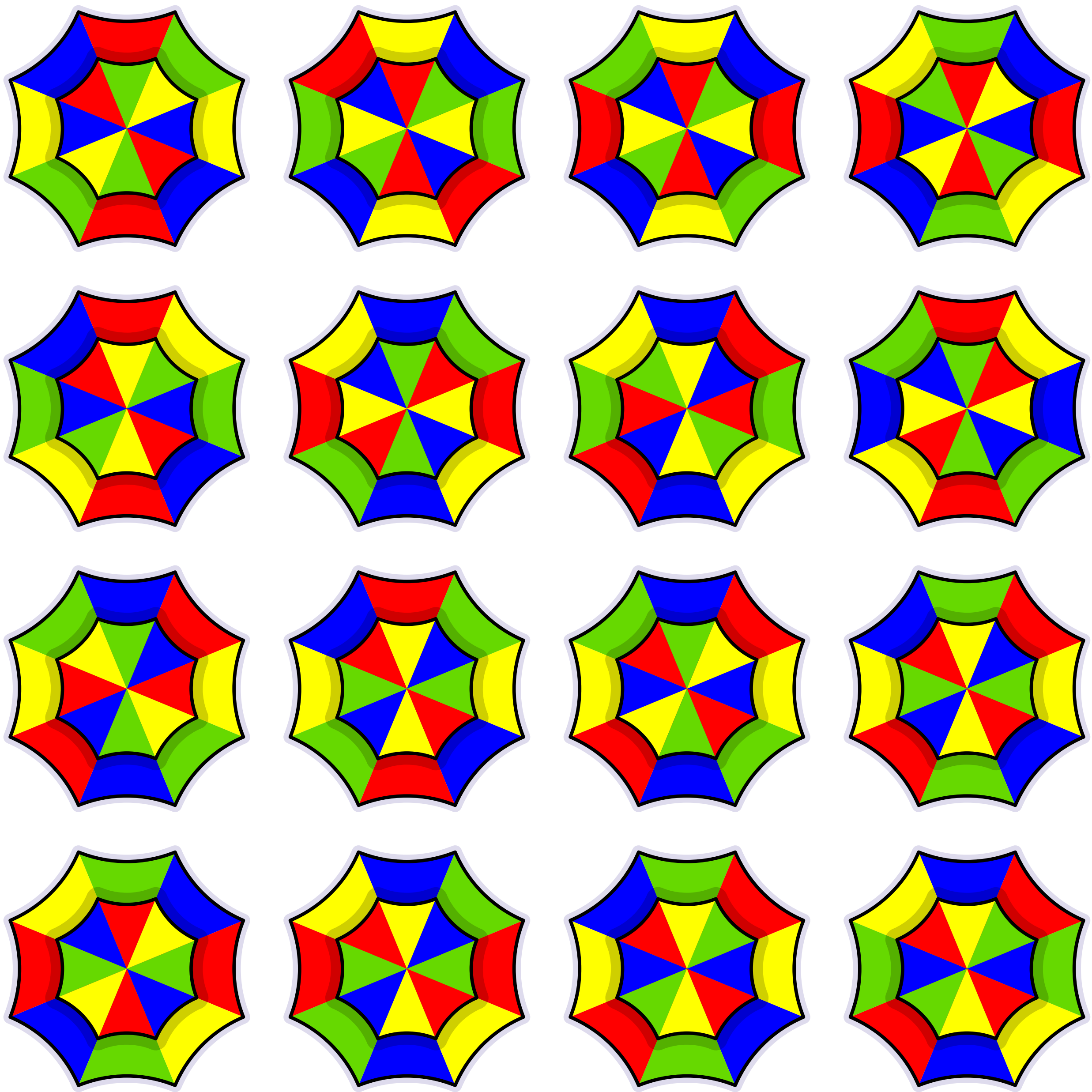
"By golly, you're right!" exclaimed Professor White.

If the lady's hair isn't brown, what is the color of Professor Black's hair?

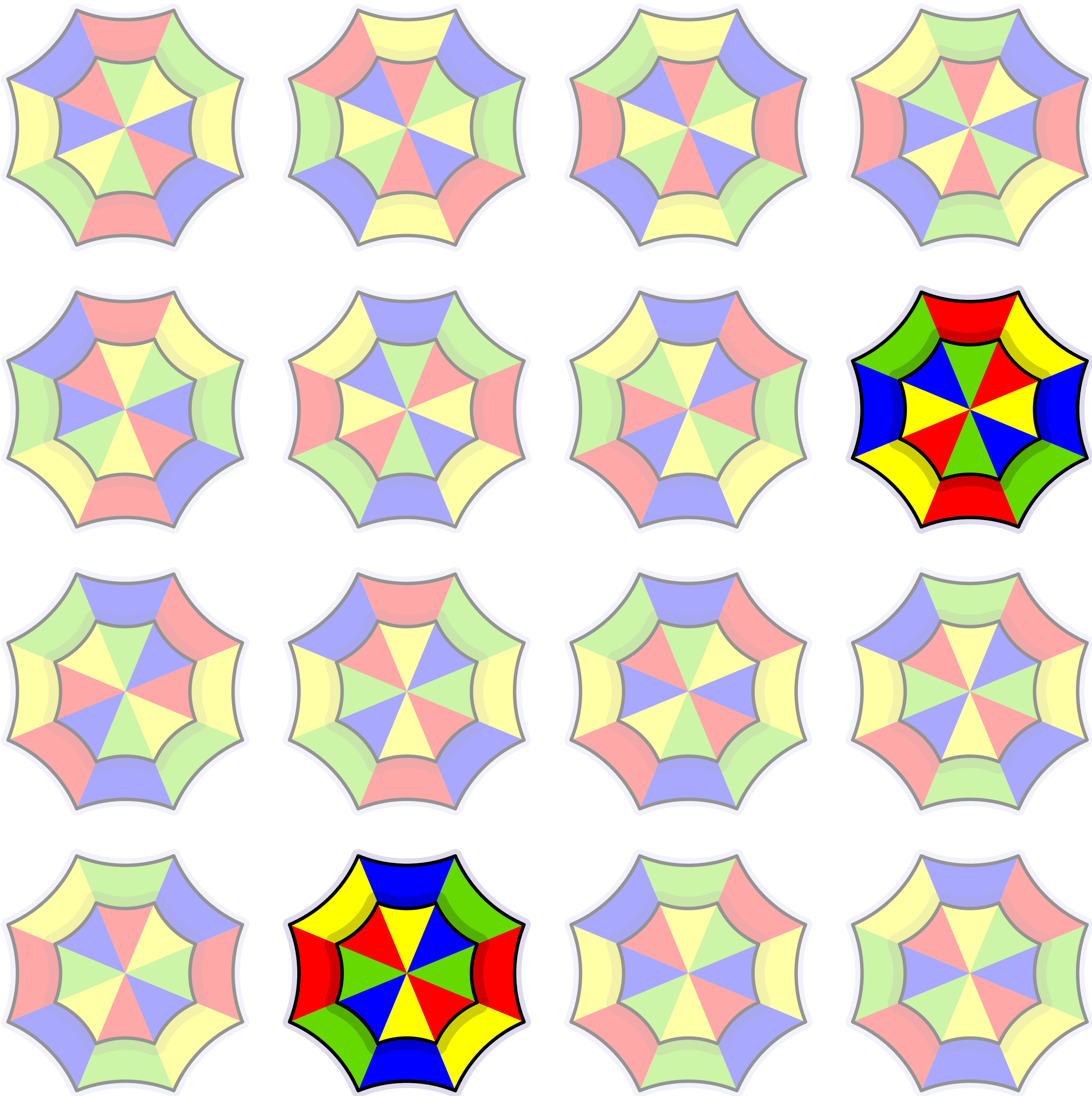


Colored Names & Hair (solution)

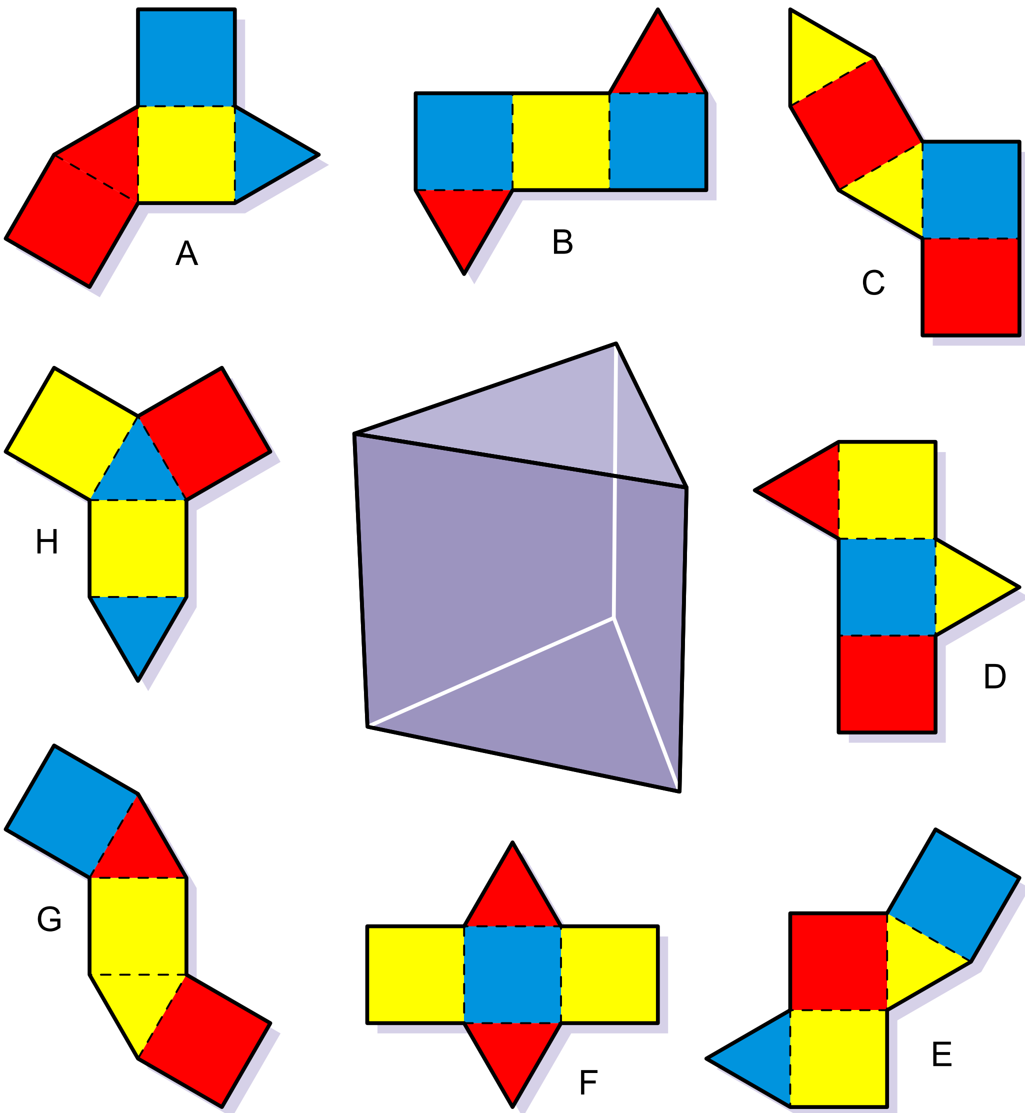
From the conversation Professor White's hair can't be white (for then it would match his or her name), nor can it be black because he (or she) replies to the black-haired person. Therefore it must be brown. If the lady's hair isn't brown, then Professor White is not a lady. The remark from the black-haired person can't be from Professor Black (for then the color of hair would match his or her name) and can't be from Professor White as well (because the remark prompts an exclamation from White). Therefore the black-haired person is Jean Brown. Based on this the first statement from the lady is made by Professor Black. Her hair can't be black or brown, so she must be blonde.



Can you find two identical umbrellas among those sixteen shown in the illustration? The umbrellas can be rotated but not mirrored.



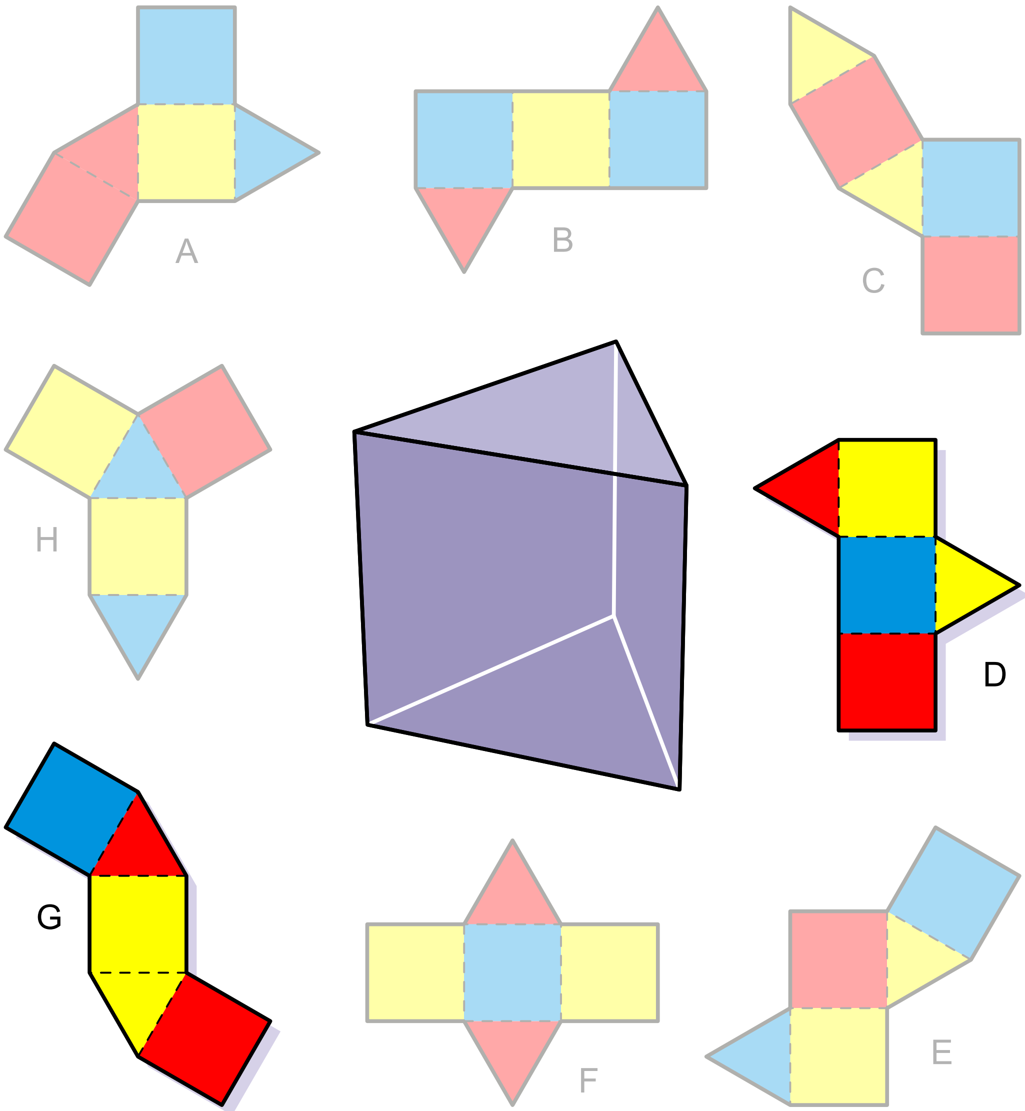
The solution is shown in the illustration.



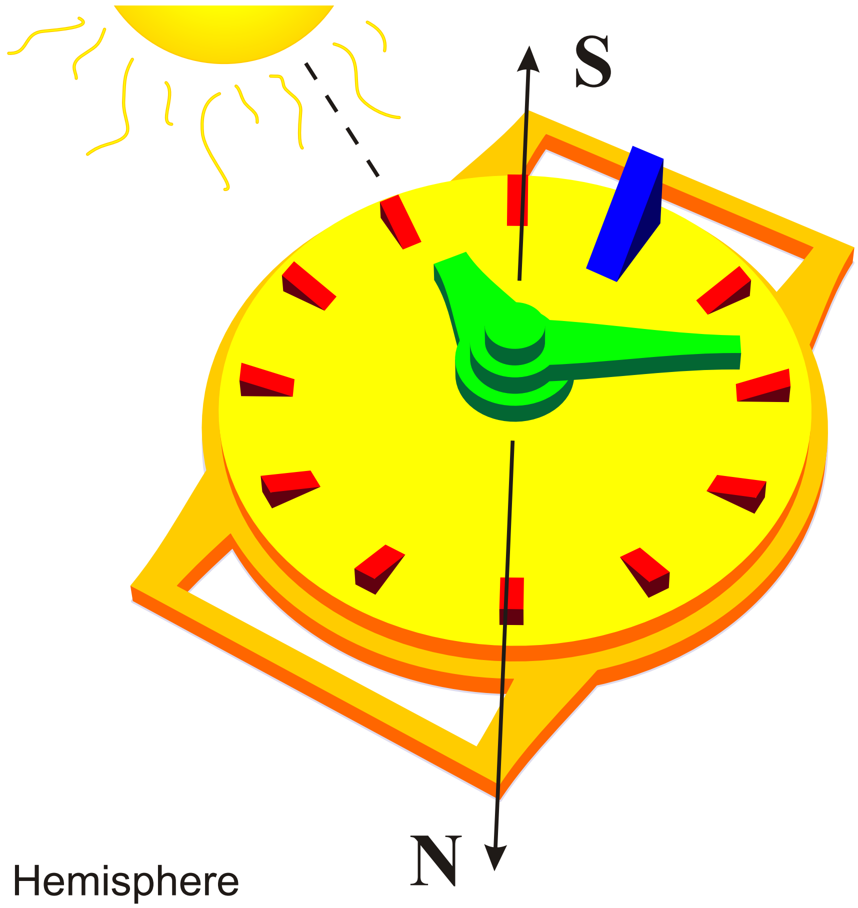
Eight folding patterns are scattered around the triangular prism as shown above.

Which two patterns when folded along the dotted lines can form two same colored prisms?

More from the author at PeterPuzzle.com



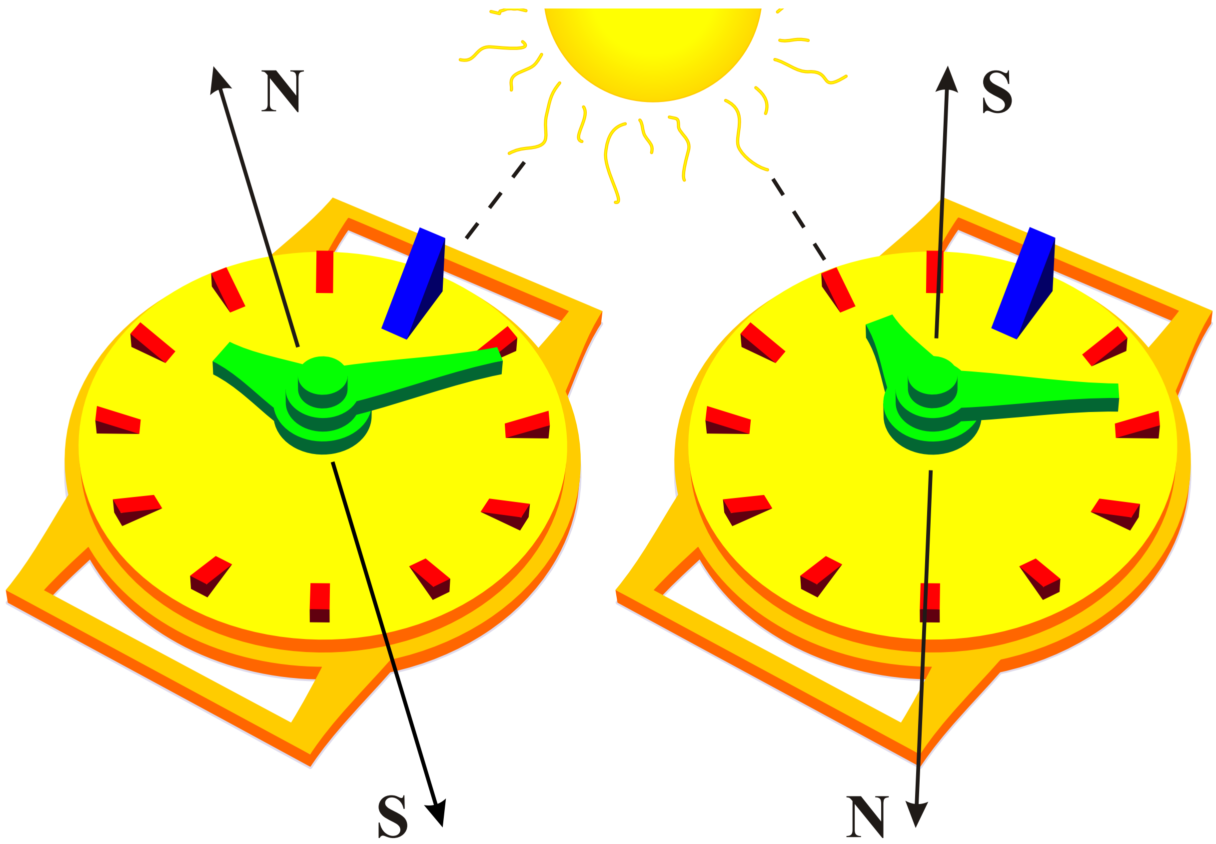
D and G patterns result in the same prisms when folded.



Northern Hemisphere

Do you know that you can use your analog watch as a compass on a sunny day? Look at your watch and point the hour-hand in the direction of the sun, as it is shown in the illustration. Imagine a line which runs from the center of the watch through a point half-way between the hour-hand and number 12. This line will point south.

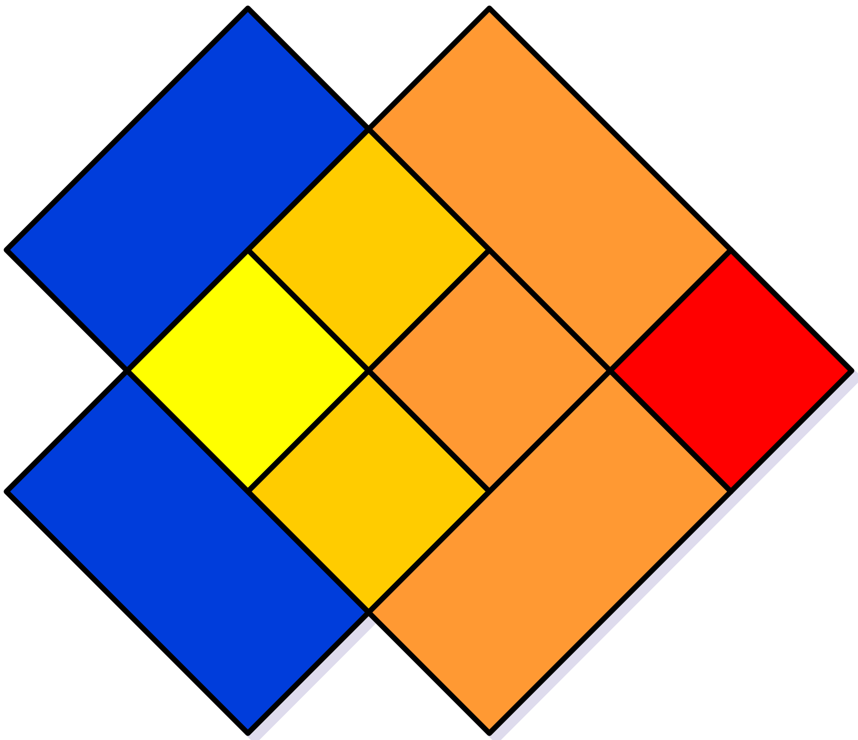
The method works for the northern hemisphere. Will it work for the southern hemisphere as well?



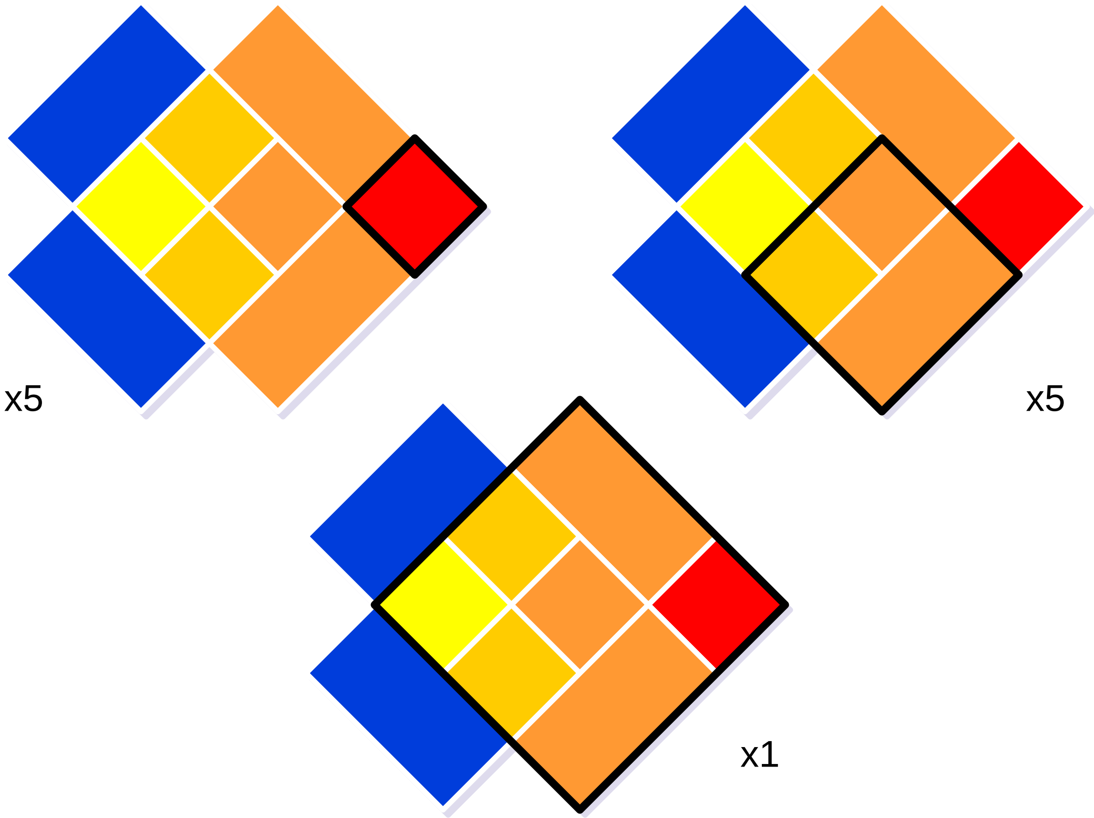
Southern Hemisphere Northern Hemisphere

The principle of this toy is based on astronomy. In the northern hemisphere the sun is in the south at noon. If at that time we point the hour-hand at the sun, the hour-hand and number 12 will point south. Before the noon the sun is more to the east, while after the noon - to the west. That's why when it is not noon, the angle between the point at which the sun is in the south (i.e. number 12), and the point at which the sun is at the moment (i.e. hour-hand) entirely shows south. In order to define the direction more precisely we have to imagine the bisecting line of the angle, or in other words the line which runs from the center of the watch through a point half-way between the hour-hand and number 12. It will point south - as shown in the right part of the illustration.

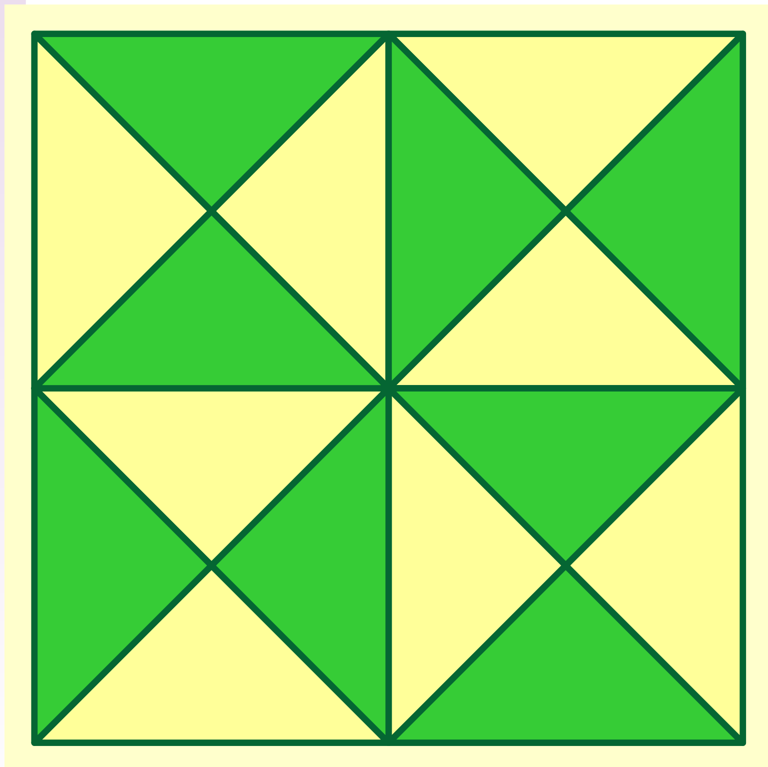
In the southern hemisphere in order to make your watch working as a compass you have to point number 12 at the sun. The angle between this number and the hour-hand, shows north, instead of south. Therefore the line which you can imagine between number 12 and the hour-hand will then show north - as shown in the left part of the illustration.



How many different squares can be found in the shape shown in the illustration?

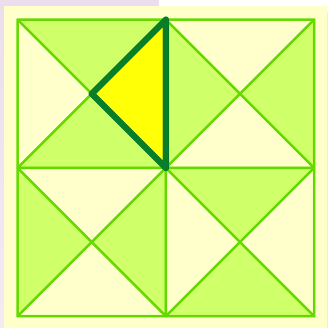


There are 11 squares of three different sizes hidden in the shape - as shown in the illustration.

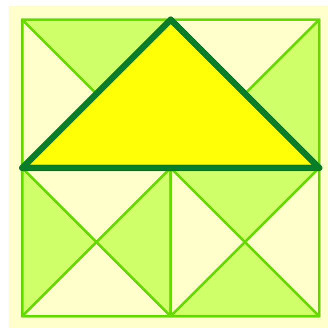


Counting the Triangles 2

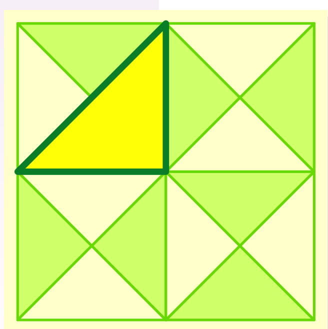
How many triangles (counting ones of all possible sizes) can you find in the illustration?



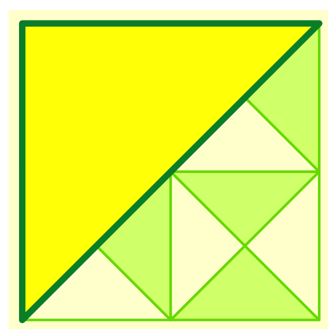
x 16



x 8



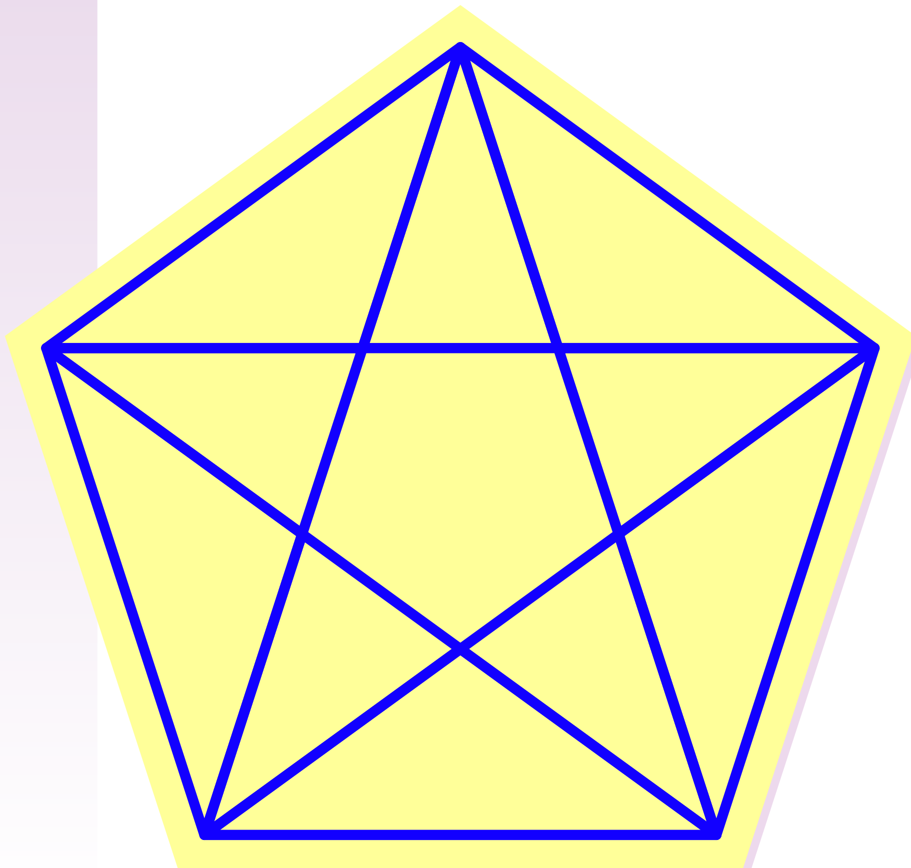
x 16



x 4

Counting the Triangles 2 (solution)

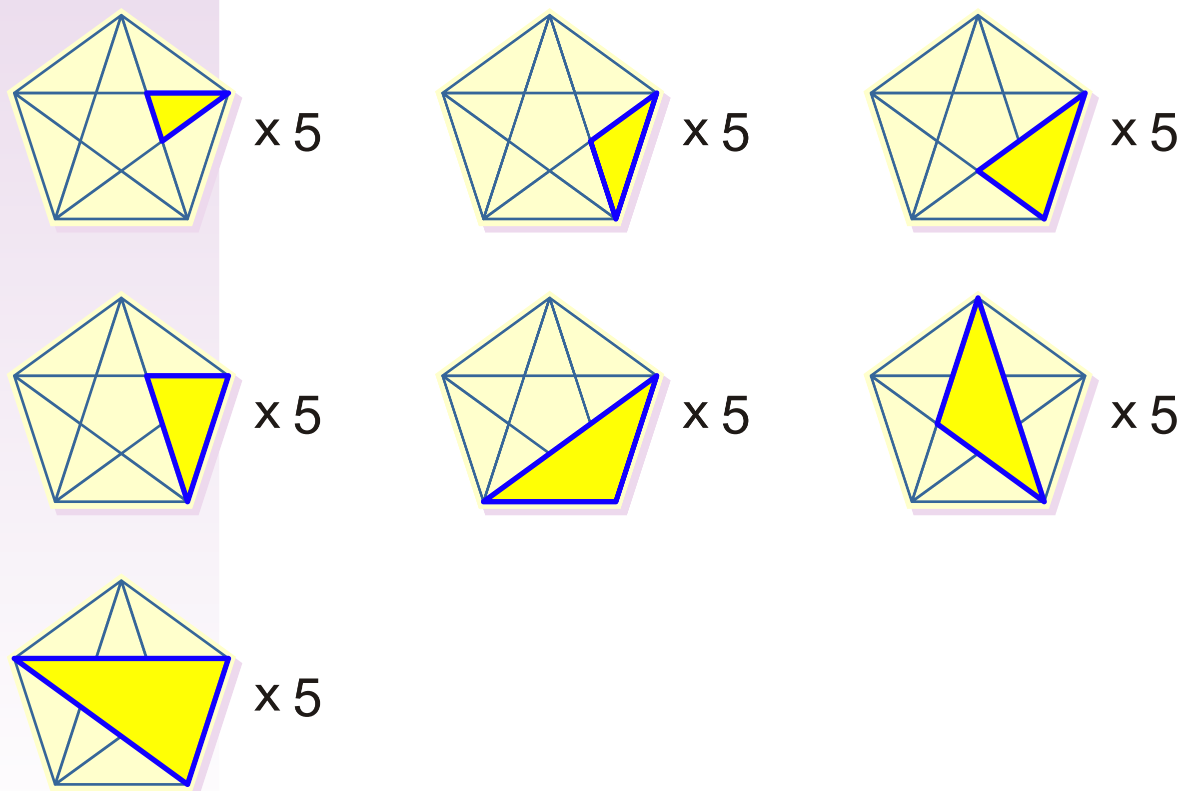
There are 44 triangles of all possible sizes in this figure. The exact numbers of the triangles of every size and shape are shown in the respective diagrams above.



Counting the Triangles

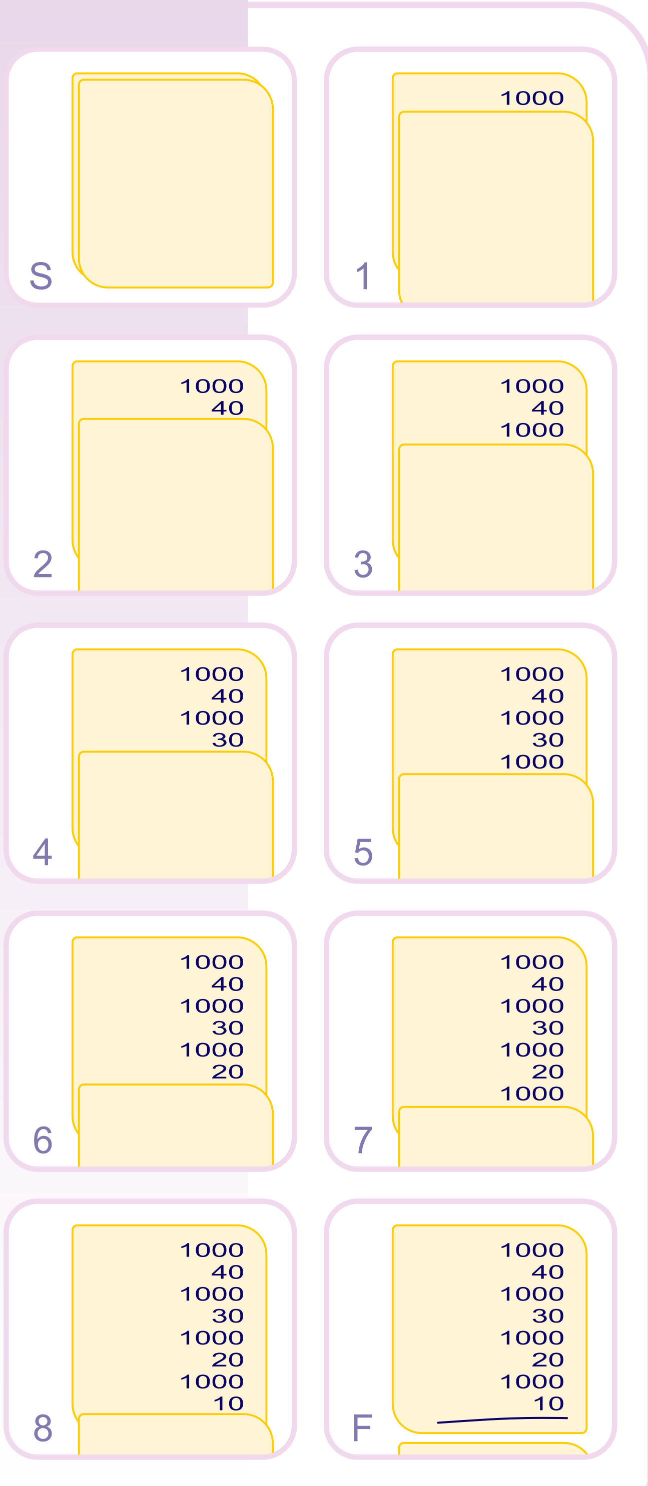
by Henry E. Dudeney

The question is how many different triangles are hidden in this figure?



Counting the Triangles (solution)

There are seven groups of triangles shown in the diagrams above. Each group consists of exactly five triangles with every triangle rotated 72 degrees around the center of the pentagon; one triangle from every group is highlighted in the respective diagram. So the total number of the triangles in the pentagon is 7x5=35.



Count Trick

after Martin Gardner

Show this trick to your friend to see his/her ability to perform quick calculations. You should demonstrate it in such a way. First print and then cut out the two rectangular pieces of paper form the last page of this file - one with the numbers on it and another - the blank one. Then put the blank piece of paper on the piece with numbers as shown at the step S (start) on the left. The trick is ready for the demonstration.

Now slide the upper piece of paper down to reveal the first top number written on the lower piece of paper. Your friend should say this number aloud, i.e. "one thousand." Slide the upper piece again to reveal the number below the 1000. It is 40. Your friend should add up this number to the previous 1000 and say the new sum aloud too. It should sound like "one thousand and forty." Slide down the upper piece of paper again and again revealing one number at a time, and ask your friend to add all the numbers as you go along, and say aloud every next sum - just as shown in steps 3-8 in the illustration.

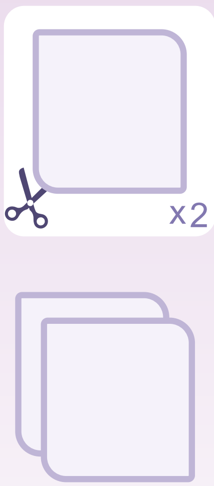
As you come to the last number in this trick would you think that the final sum pronounced by your friend would be the true one? To be sure simply allow him/her to check his/her answer adding the numbers without the upper piece of paper.

1000
40
1000
30
1000
20
1000
10

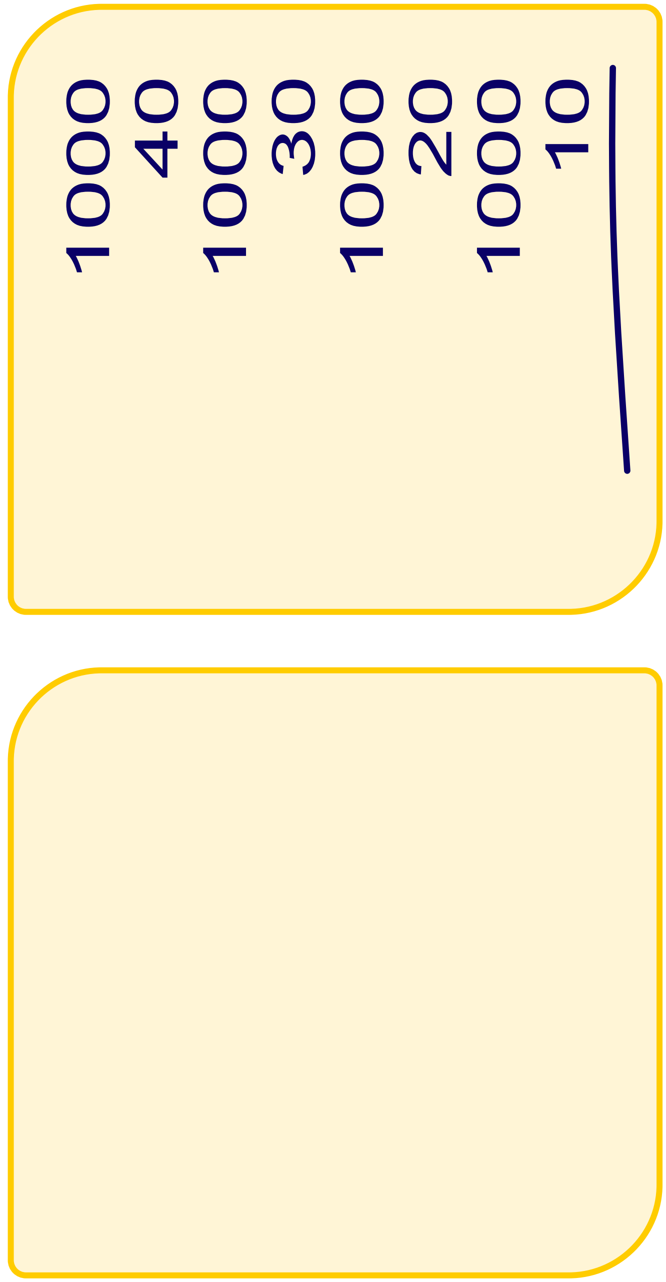
Count Trick (secret)

This incredible trick works quite automatically. Mostly people get to a wrong result and finally say - "five thousand." Just a few of them say "four thousand and one hundred." And the most amazing thing about this trick is that it perfectly works in any language.

1

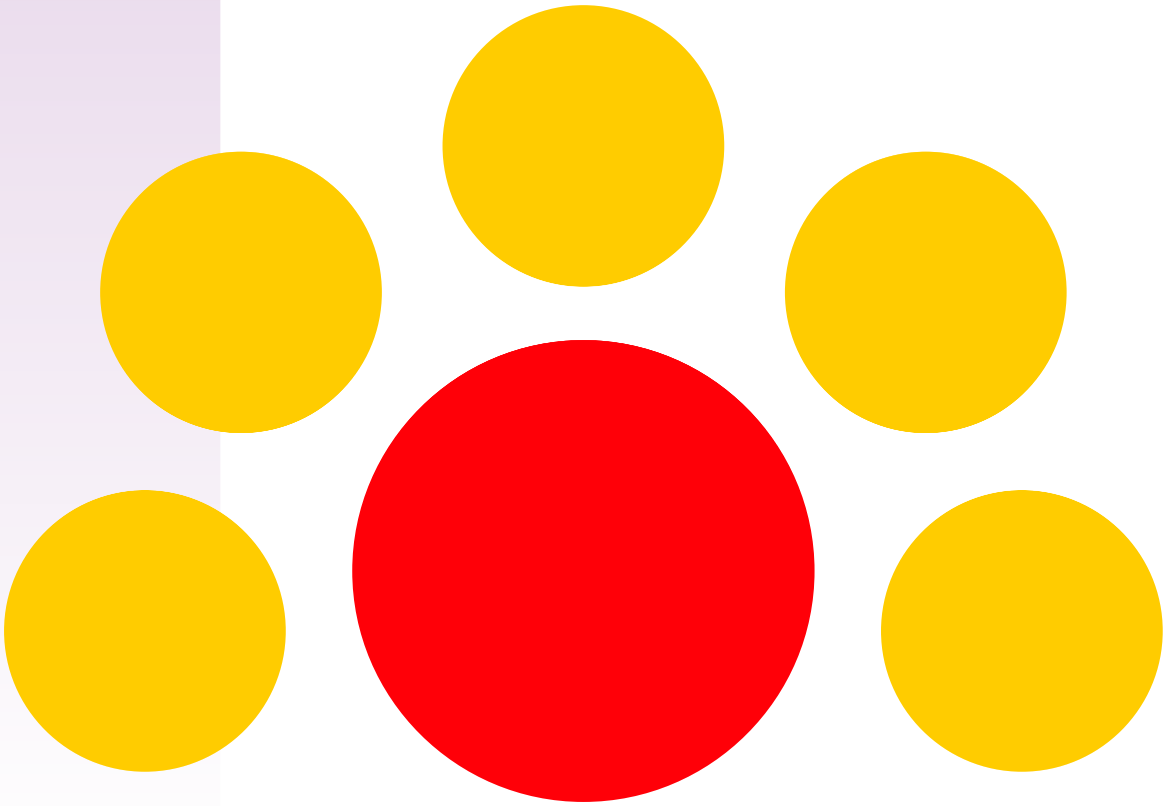


F



Count Trick (pattern)

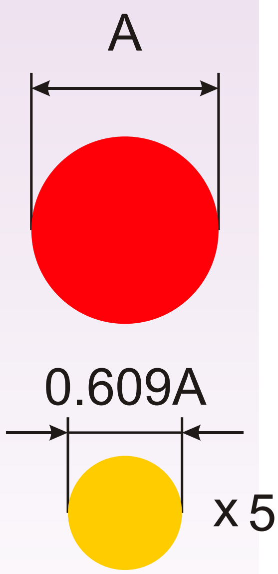
To produce the pattern first print it out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

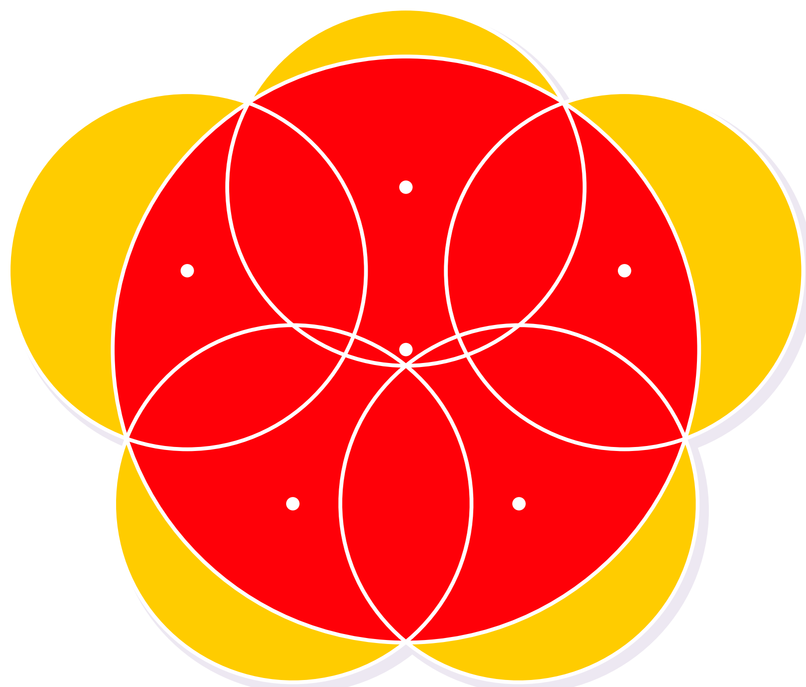


Cover the Red Circle

Your challenge is to cover the big red circle with all the five smaller yellow circles so that no part of the red circle is visible.

Note. When a smaller circle is placed on the big one you aren't allowed to move it anymore.





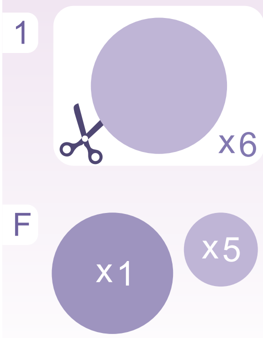
Cover the Red Circle (explanation)

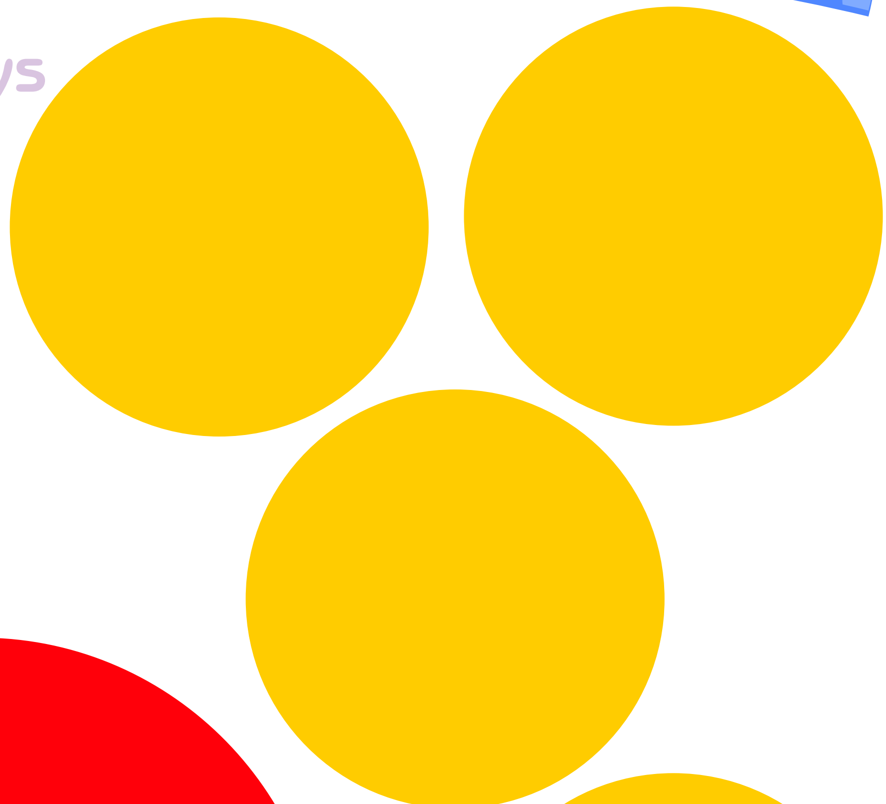
This toy is a physical model of a particular task from the general mathematical problem of covering one geometrical shape with several other.

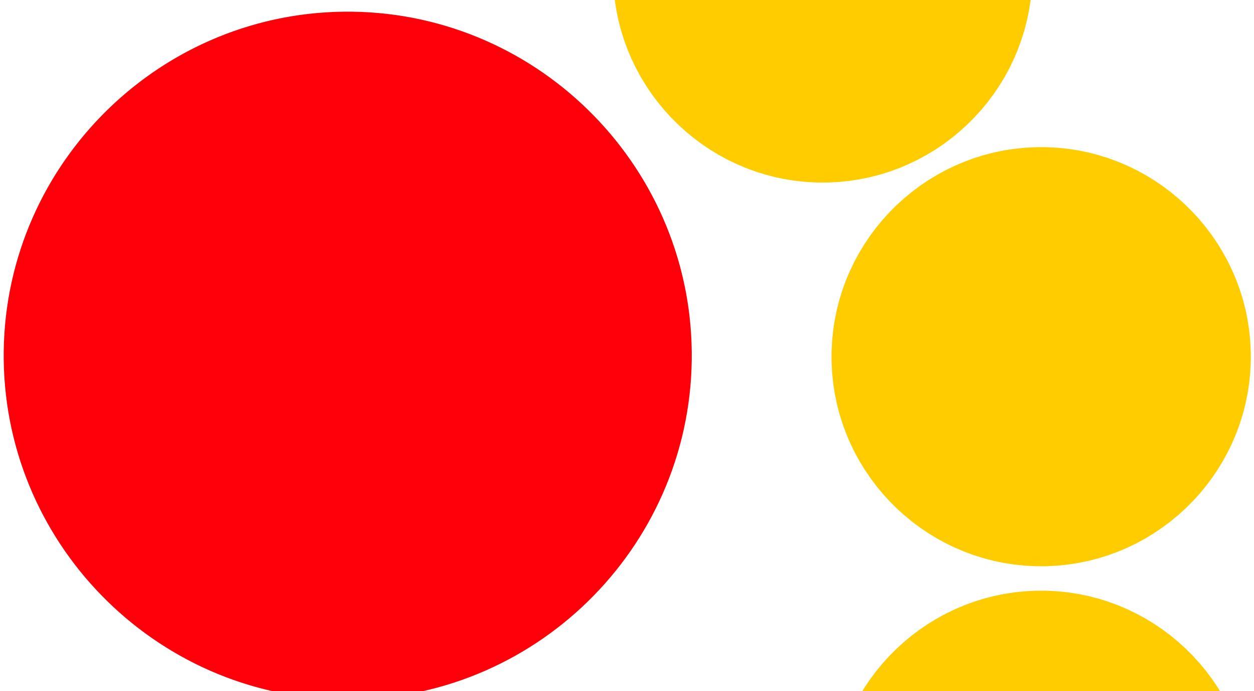
In this case the bigger circle has the diameter ***A***, while the smaller circles have the diameter of approx ***0.609A*** as shown in the left diagram above. The basic diagram how to place all the five yellow circles so that they fully cover the red one is shown in the illustration.

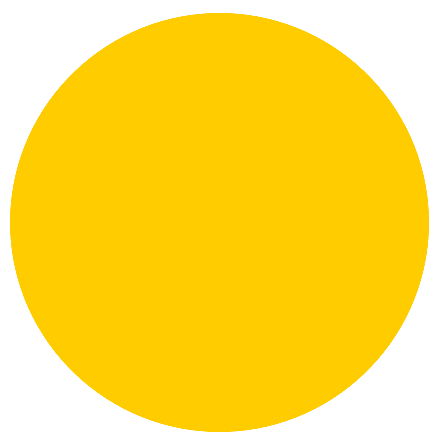
Treasure of Classic and Modern Puzzles

Toys



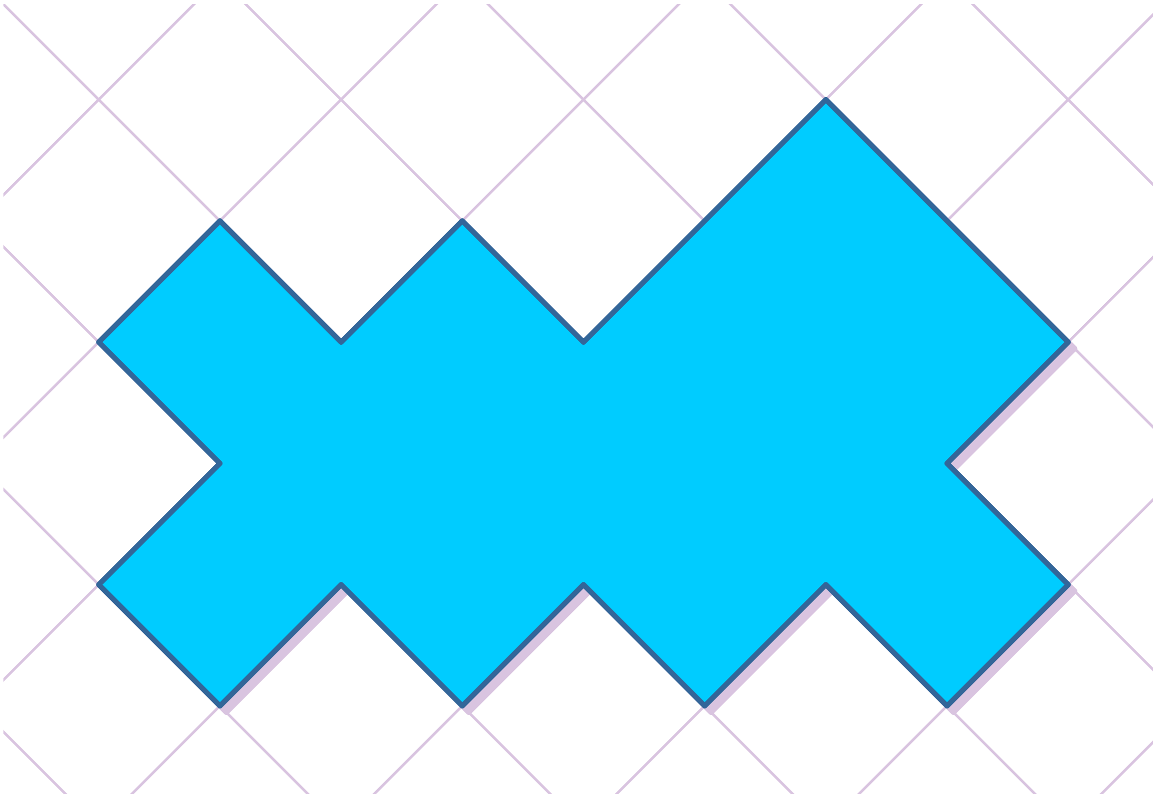






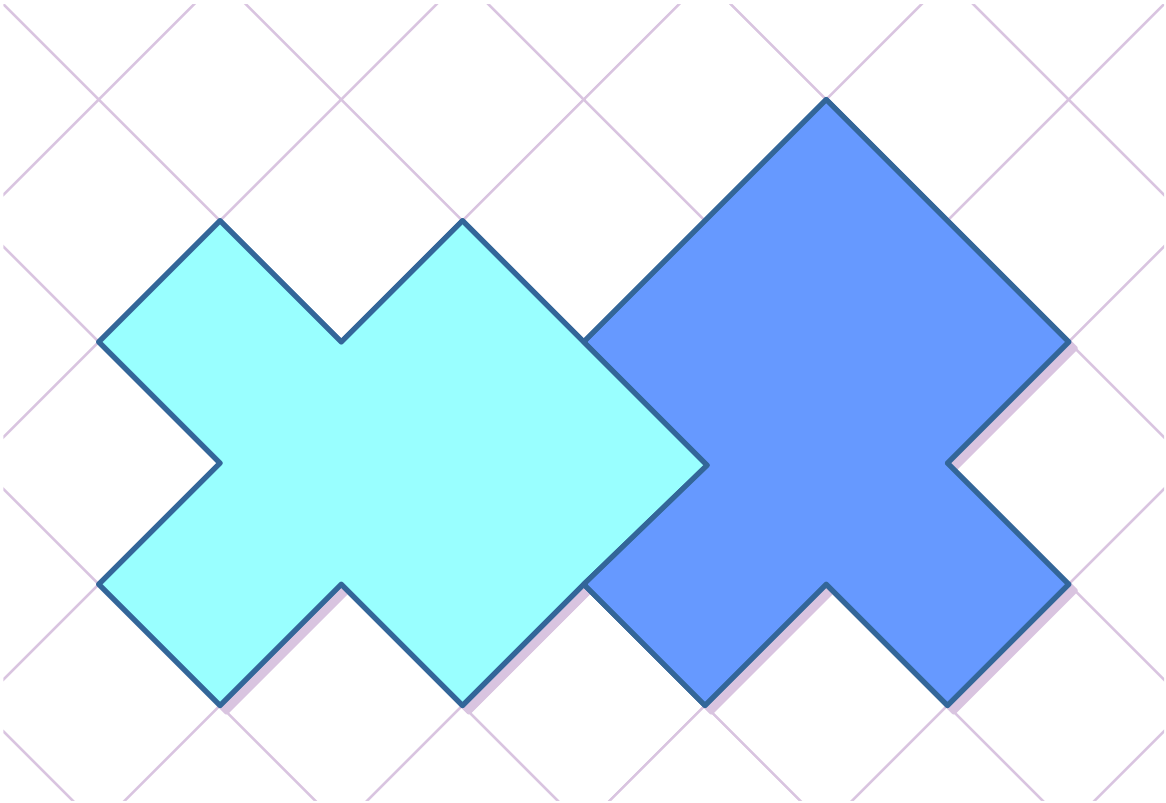
Cover the Red Circle (pieces)

To produce the pieces first print them out.
It is even better to copy this page at some several hundred percent enlargement.
After that follow the diagram shown in the left column above.

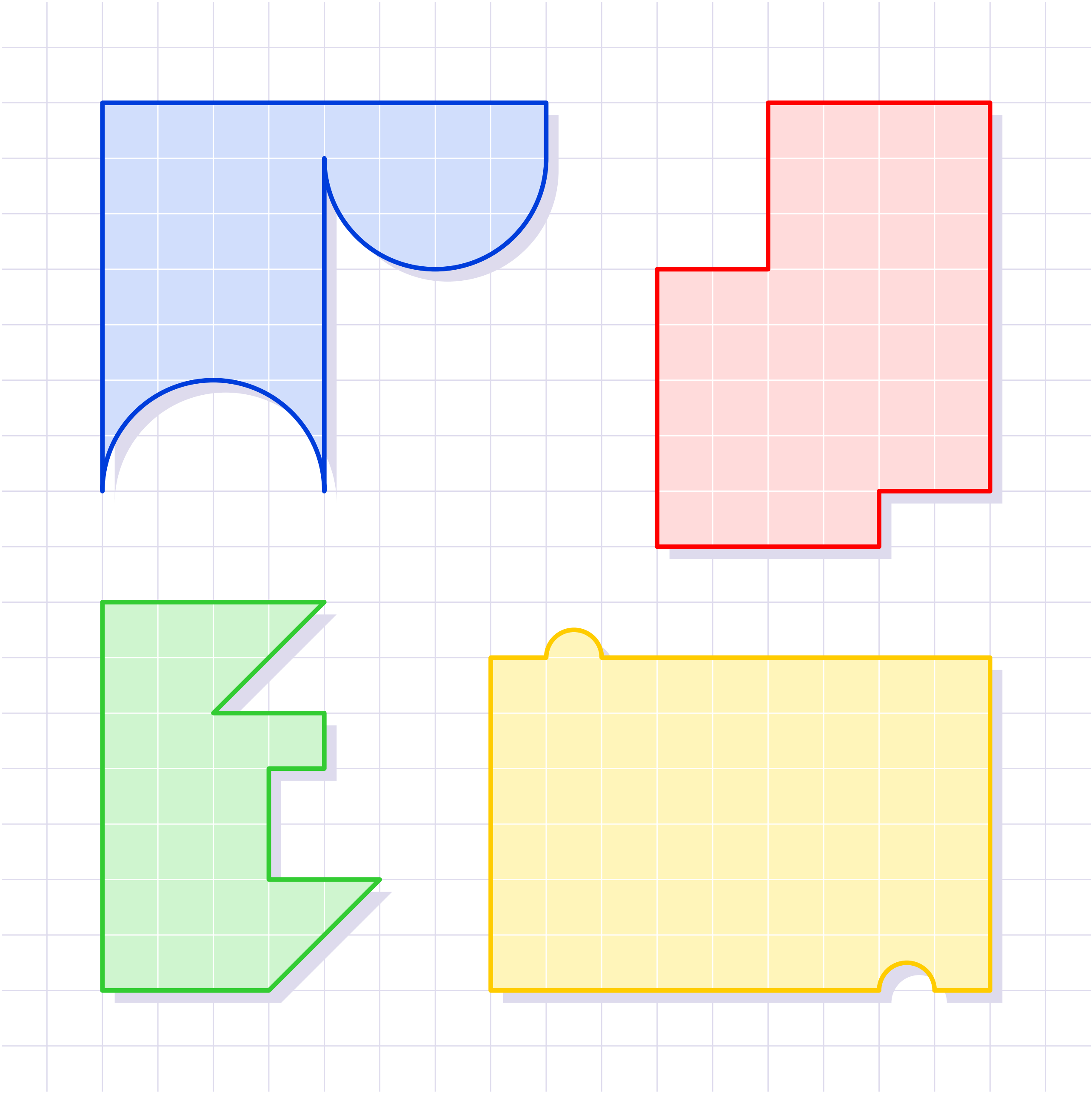


Draw the figure as shown in the illustration or just print it out.

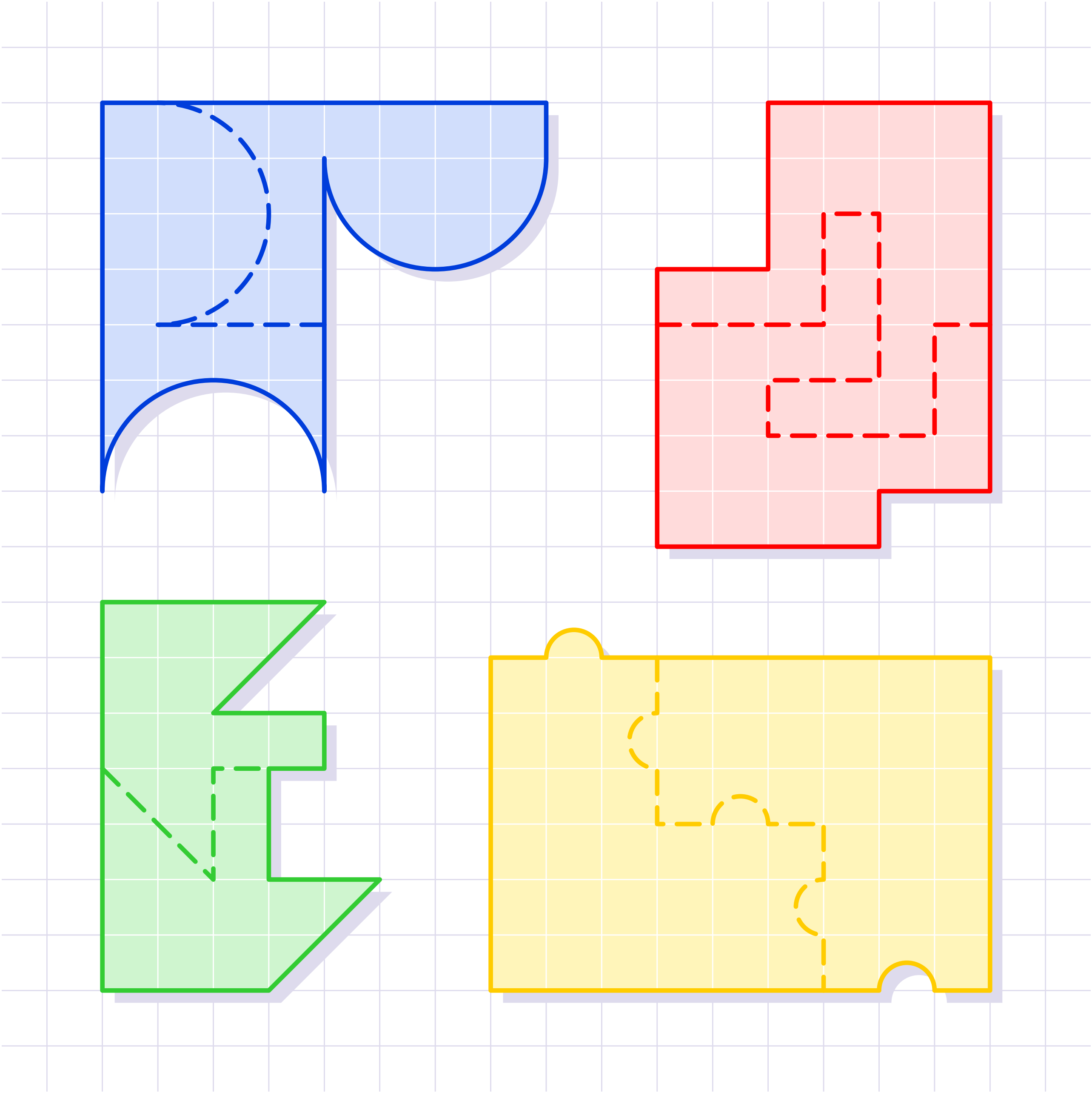
The goal is to make a cut (or draw one line) - of course it needn't be straight - that will divide the figure into two identical parts.



The solution is shown in the illustration.

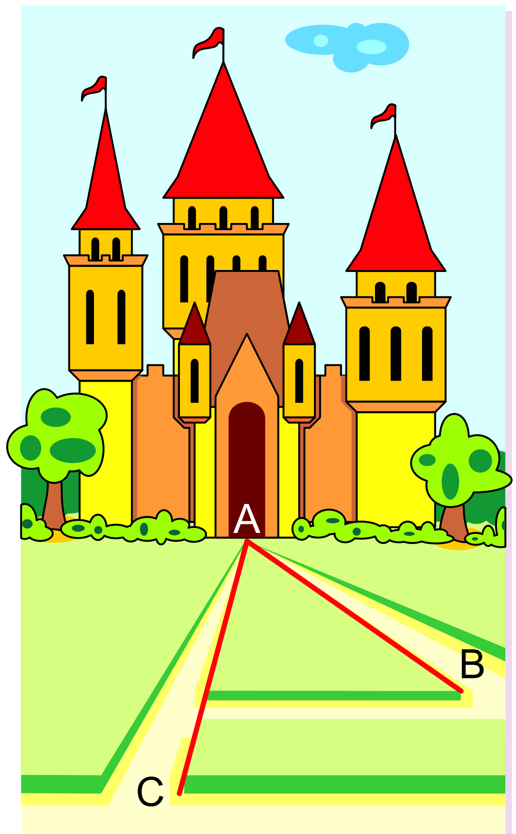


Cut each of the four shapes into two identical pieces. The pieces can be mirror images of each other.



The solutions are shown in the illustrations.

Illusions

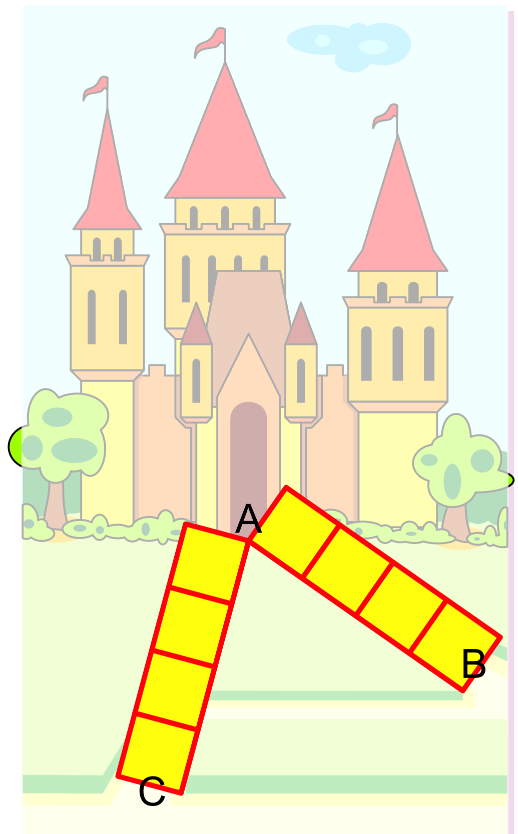


Crazy Lines

after Martin Gardner

Which line is longest: AB or AC?

Illusions

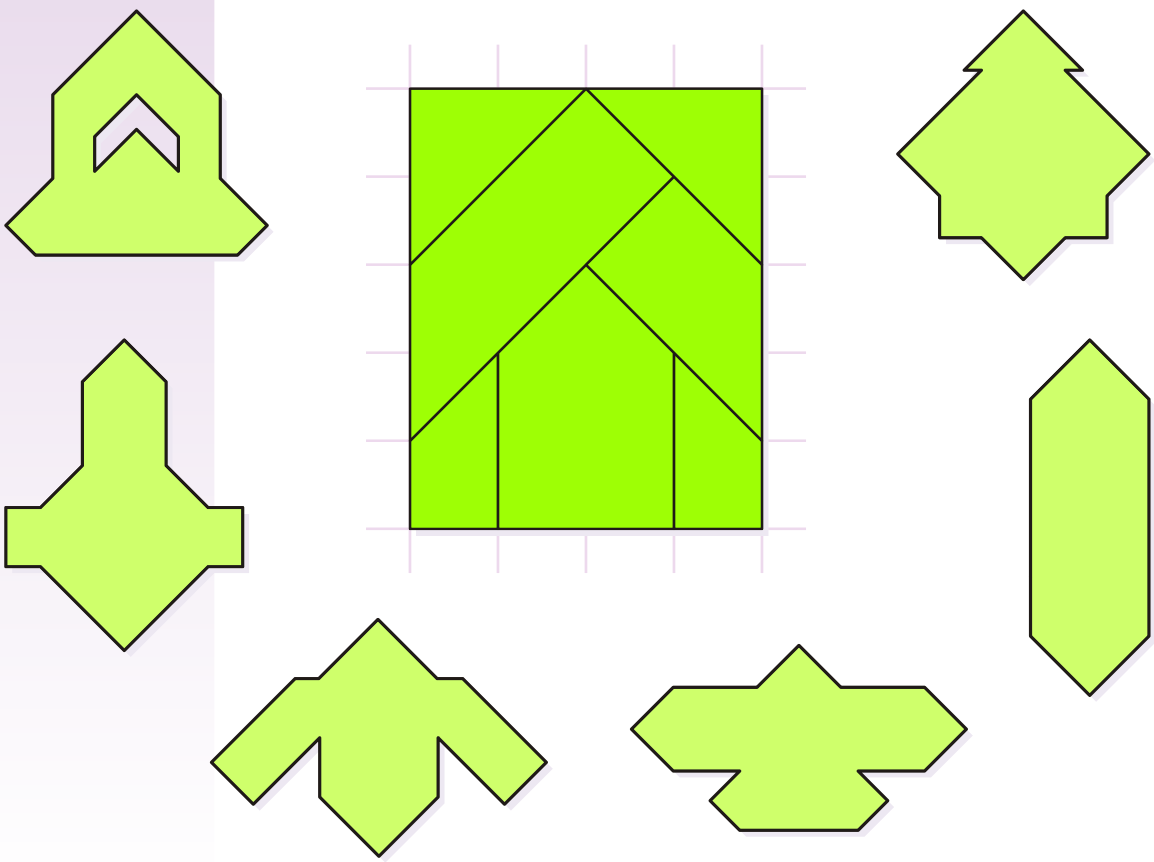


Crazy Lines (explanation)

The two lines are the same length, as shown in the illustration. The yellow squares help to see this.

Additionally you can prove this by measuring the lines in the illustration from the previous page.

Tangrams



The Cross Breaker

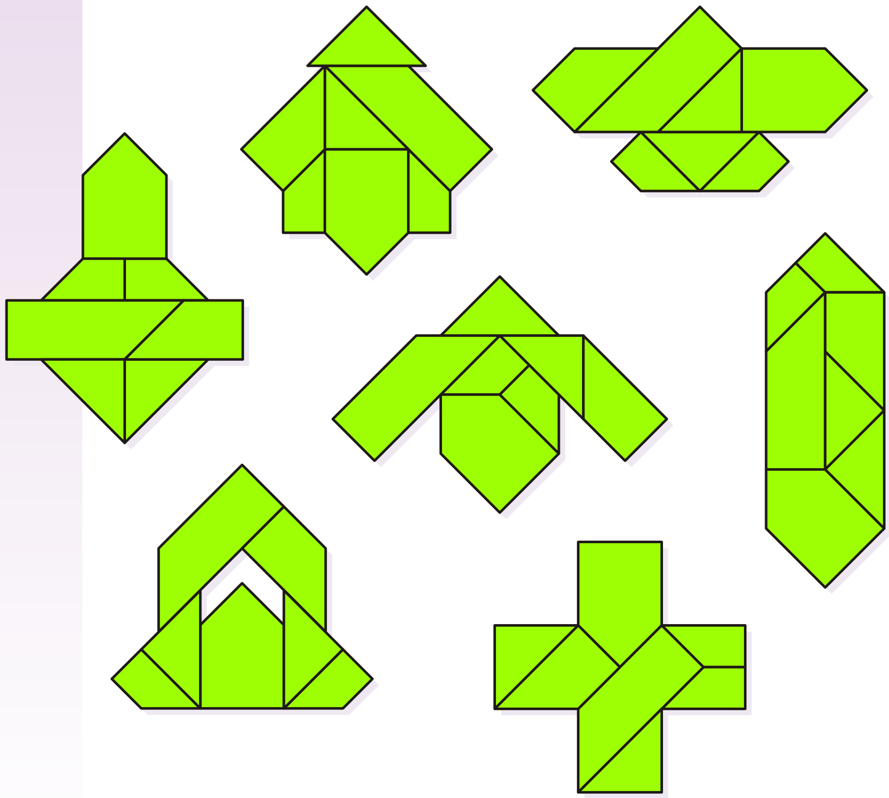
F. A. Richter and Company manufactured this puzzle at the end of the 19th century.

First produce the seven pieces that form the rectangle in the center above from the last page of this Print 'n' Play Version.

Now make the figures shown around the central rectangle using the whole set of the pieces for each of them. You're allowed to rotate the pieces as you wish, and even flip 'em over. But you can't overlap the pieces.

By the way, the story of this puzzle says these seven pieces were formed by breaking up a cross. Can you find such a cross as well?

Tangrams



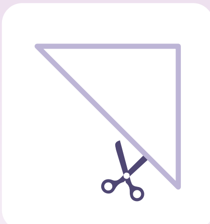
The Cross Breaker (solution)

Solutions to all the six figures plus the cross are shown in the illustration.

Treasure of Classic and Modern Puzzles

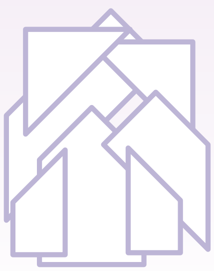
Tangrams

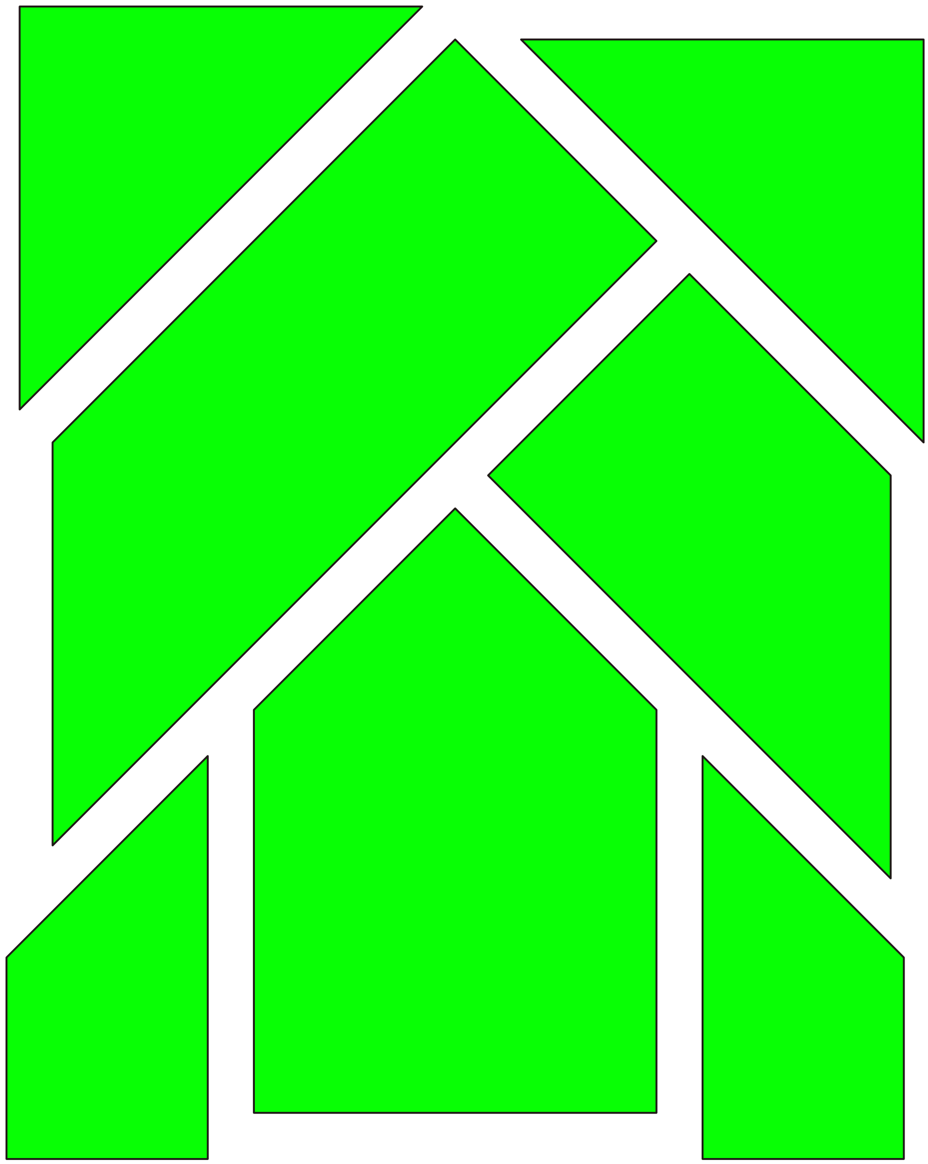
1



x 7

F

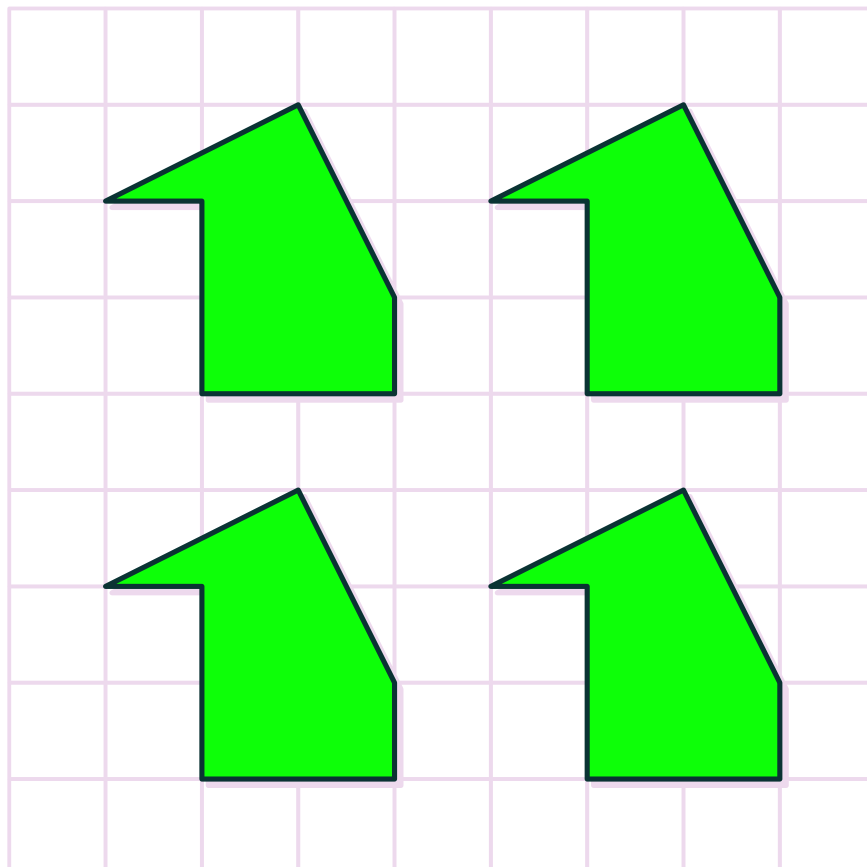




The Cross Breaker (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

Tangrams

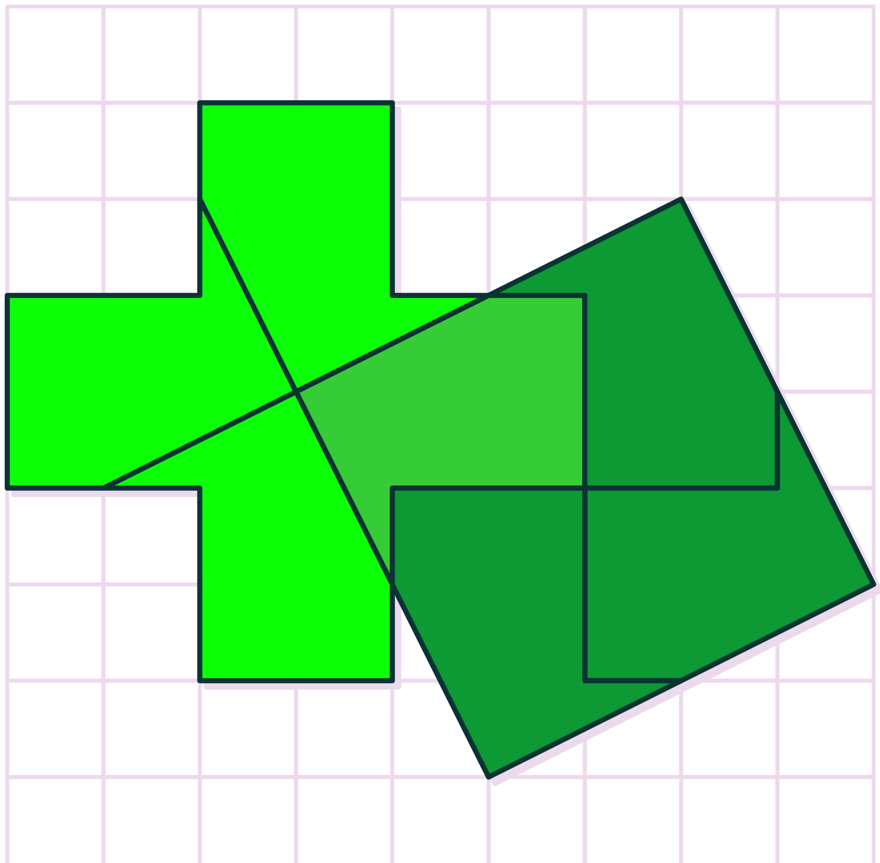


Cross vs. Square

The four identical pieces in the illustration can be used to form a Greek Cross shape as shown in the upper left corner and simultaneously to form a perfect square as shown below the Cross. Can you discover how to form both shapes using all the four pieces each time?

You are allowed to rotate the pieces but they must not overlap each other in the final shape.

Tangrams



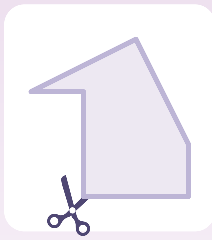
Cross vs. Square (solution)

The solutions to both shapes are shown in the illustration.

Treasure of Classic and Modern Puzzles

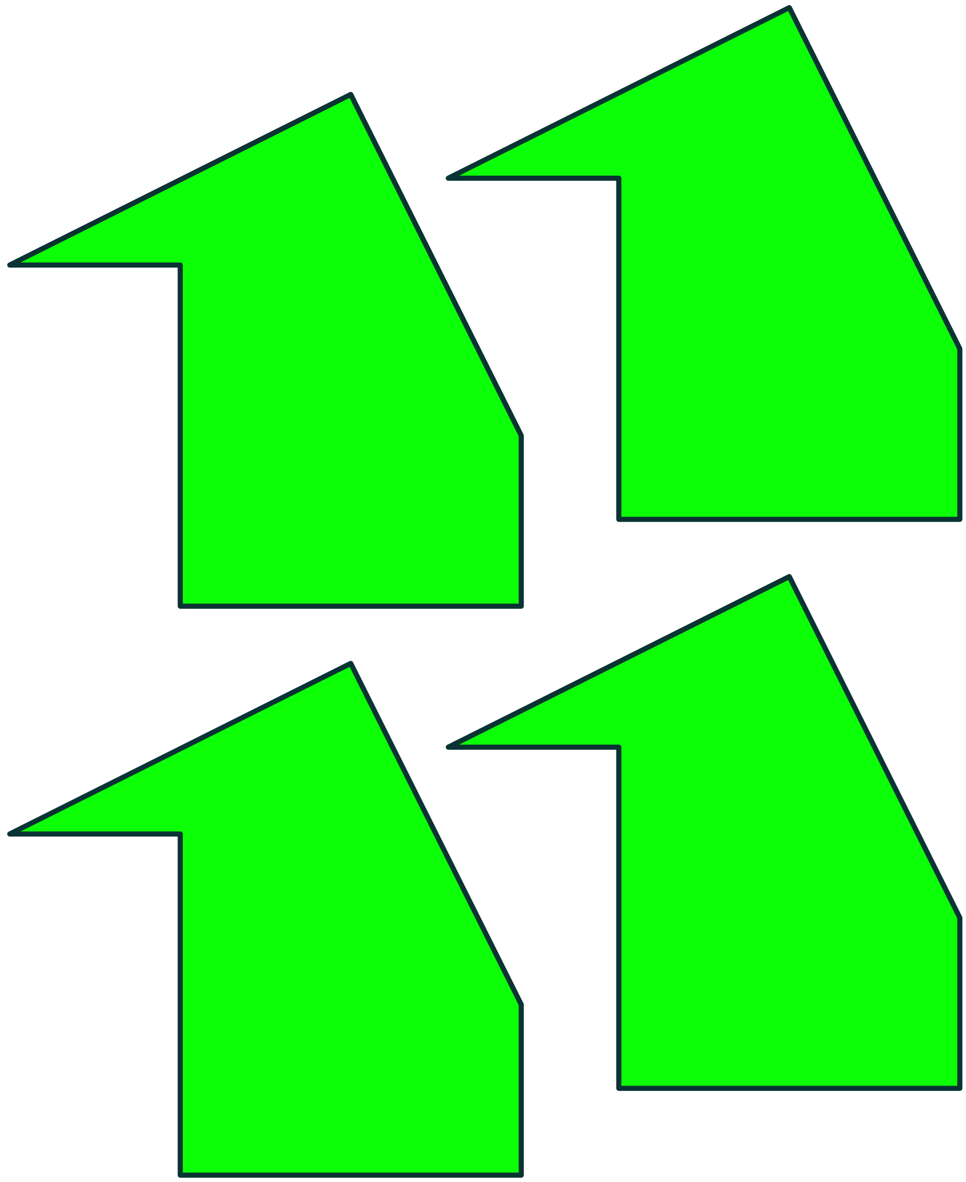
Tangrams

1



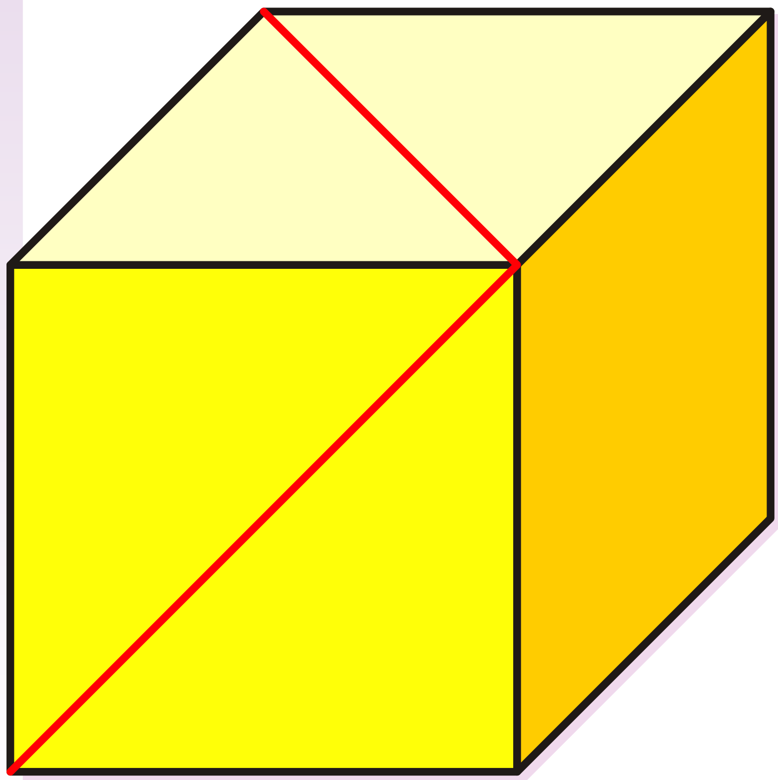
x 4

F



Cross vs. Square (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

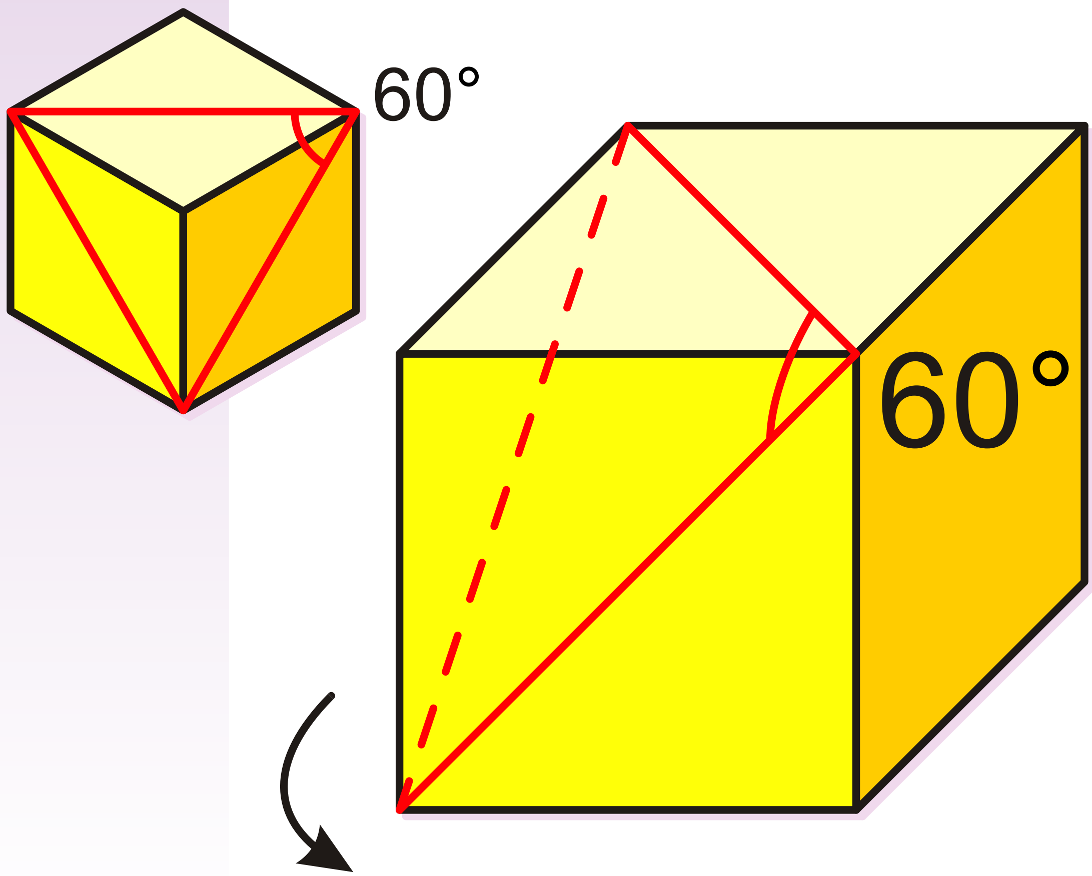


Cube Angle

after Martin Gardner

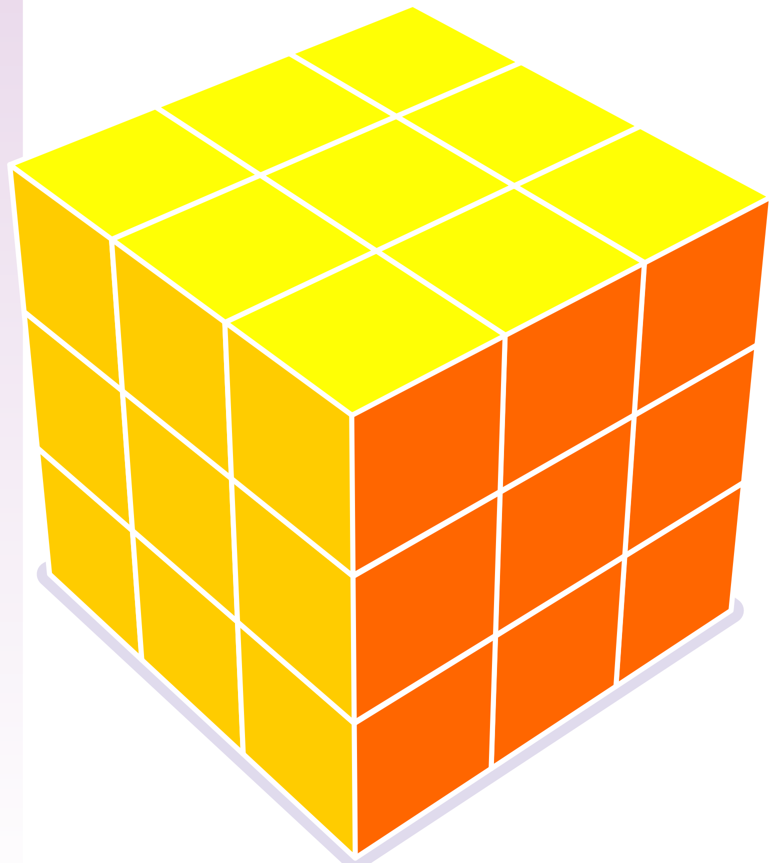
Can you say what angle is made by the two red lines drawn on the two sides of the cube as shown in the illustration?

Geometrical Puzzles



Cube Angle (solution)

The angle made by the two lines is 60 degrees. When we join the ends of the two lines with another line we get a triangle which has three its sides equal to the diagonal of the cube's side as shown in the illustration. Thus we get an equilateral triangle. As far as each angle in an equilateral triangle is equal to 60 degrees, it means the angle between the two lines is also 60 degrees.

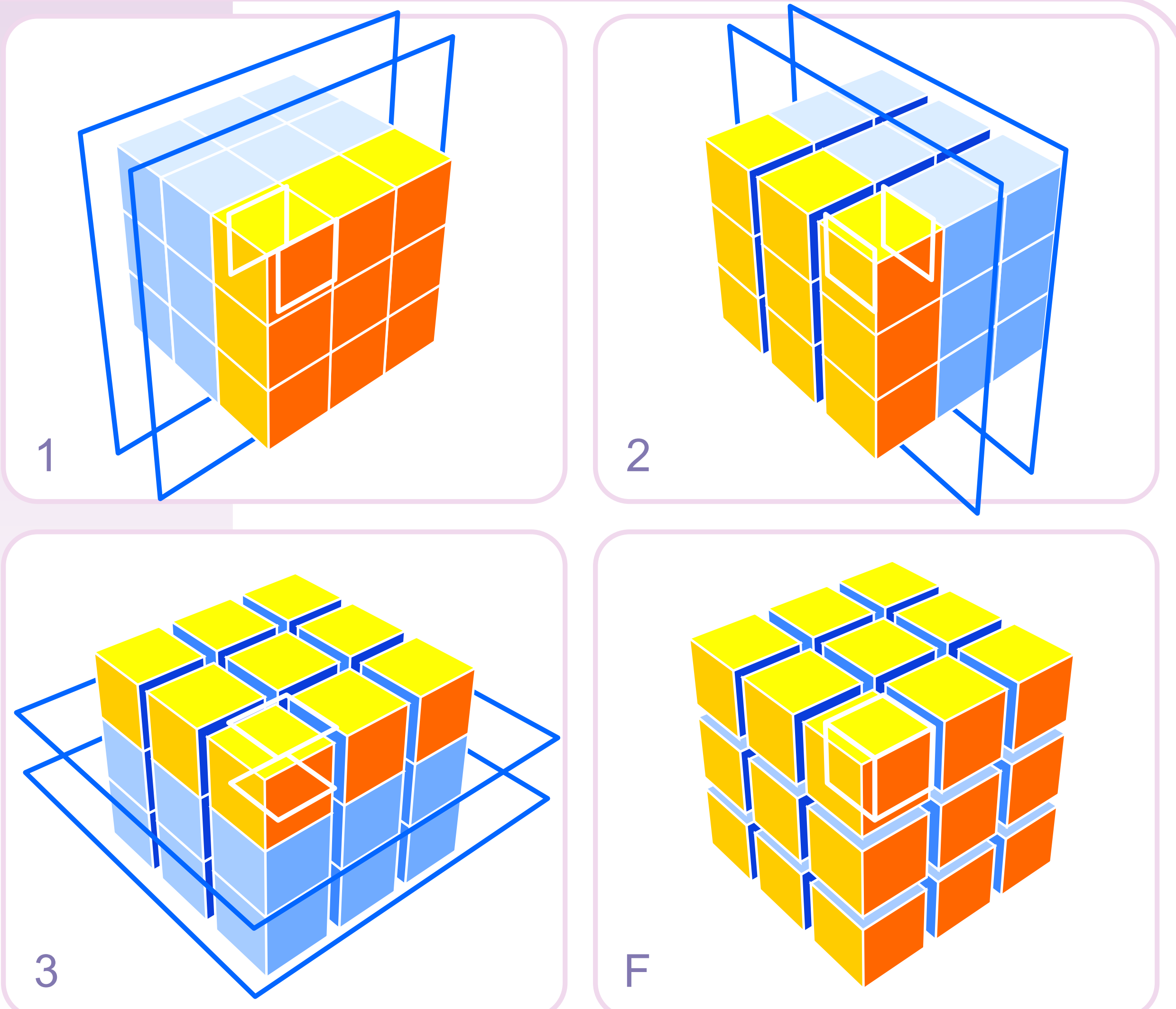


Cube Cuts

after Martin Gardner

A cube, three units on a side, has to be cut into 27 one-unit cubes. It can be done quite easily by making six cuts through the cube, keeping the pieces together in the cube shape.

The question is whether this number of necessary cuts can be reduced by arranging the pieces after each cut?



Cube Cuts (solution)

There is no way to reduce the cuts to fewer than six. It becomes quite clear when we realize the fact a cube has always six sides. Since all the cuts are straight - one side at a time - to cut the one-unite cube at the center of the bigger cube exactly six cuts have to be done.

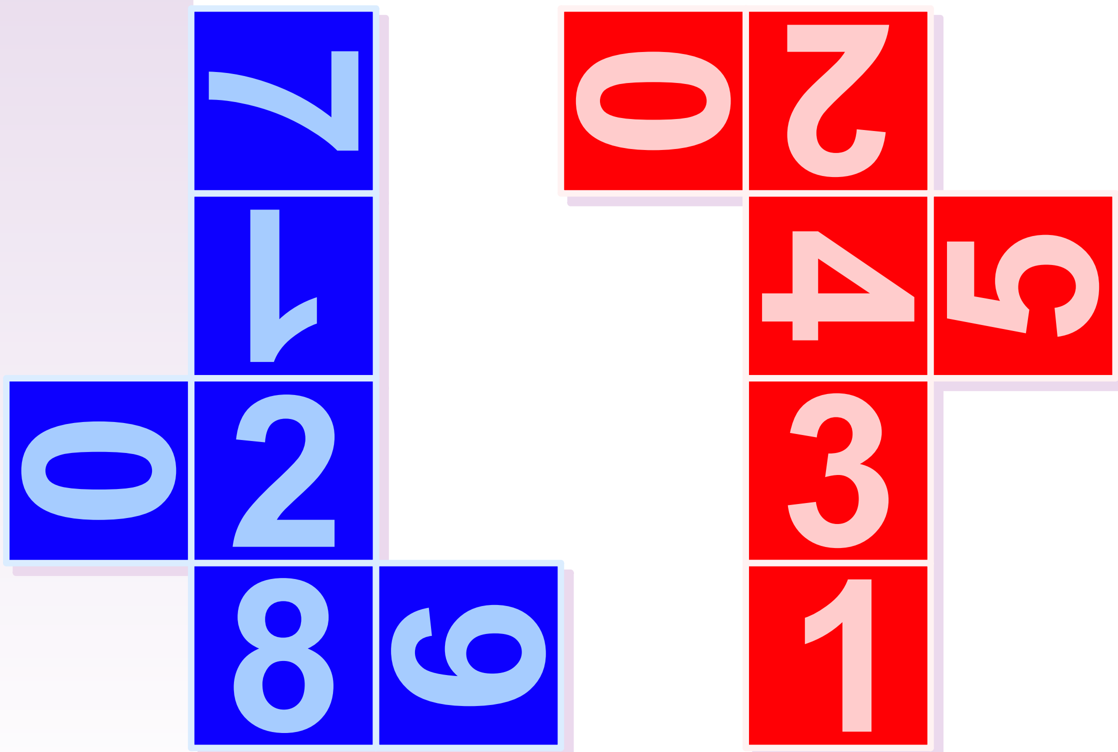
The three pairs of parallel cuts which form each time the respective opposite sides of the center cube are shown in the illustration.

Cube Dates

after Martin Gardner

On the unusual desk calendar shown in the illustration a day is indicated simply by arranging the two cubes so that their front faces give the date. The face of each cube bears a single digit, 0 through 9, and one can arrange the cubes so that their front faces indicate any date 01, 02, 03... to 31.

Can you determine the four digits that cannot be seen on the left (blue) cube and the three on the right (red) cube?



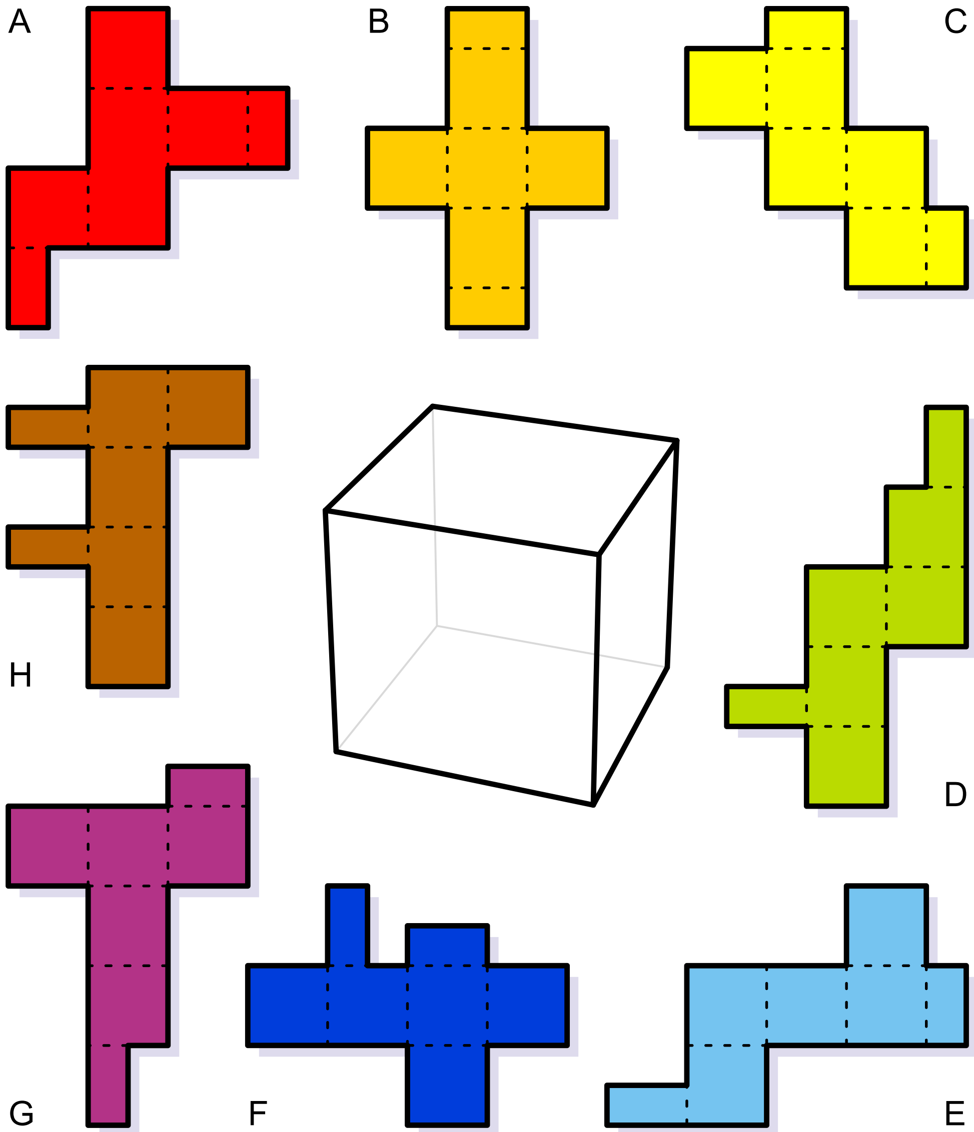
Cube Dates (solution)

Each cube must bear a 0, 1, and 2. This leaves only six faces for the remaining seven digits, but fortunately the same face can be used for 6 and 9, depending on how the cube is turned. The illustration shows 3, 4, 5 on the right (red) cube, and therefore its hidden faces must be 0, 1, and 2. On the left (blue) cube one can see 1 and 2, and so its hidden faces must be 0, 6 (or 9), 7, and 8.

John S. Singleton from England had patented the two-cube calendar in 1957/8 (British patent number 831572), but allowed the patent to lapse in 1965.

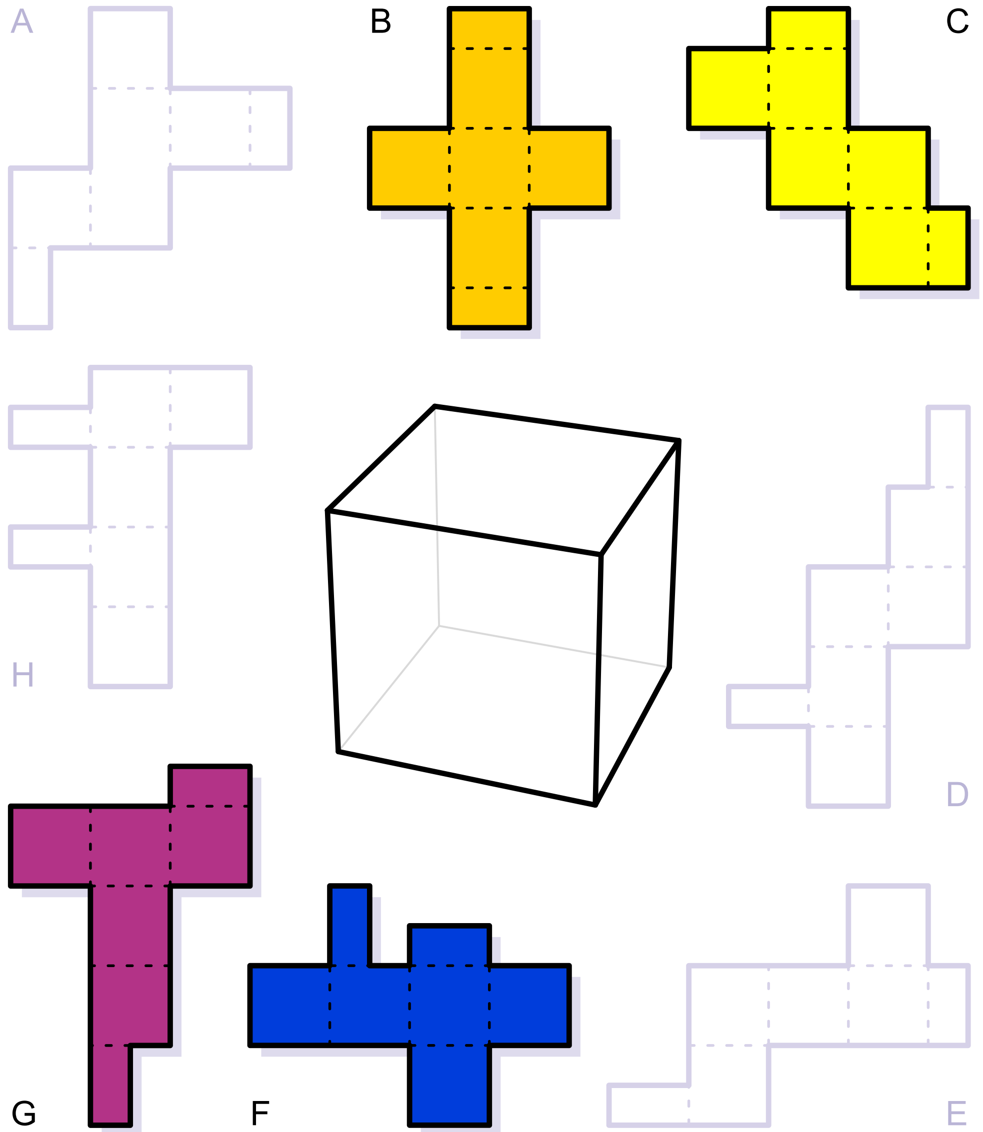
Cubed Rectangles
by Peter Grabarchuk

Puzzles.COM

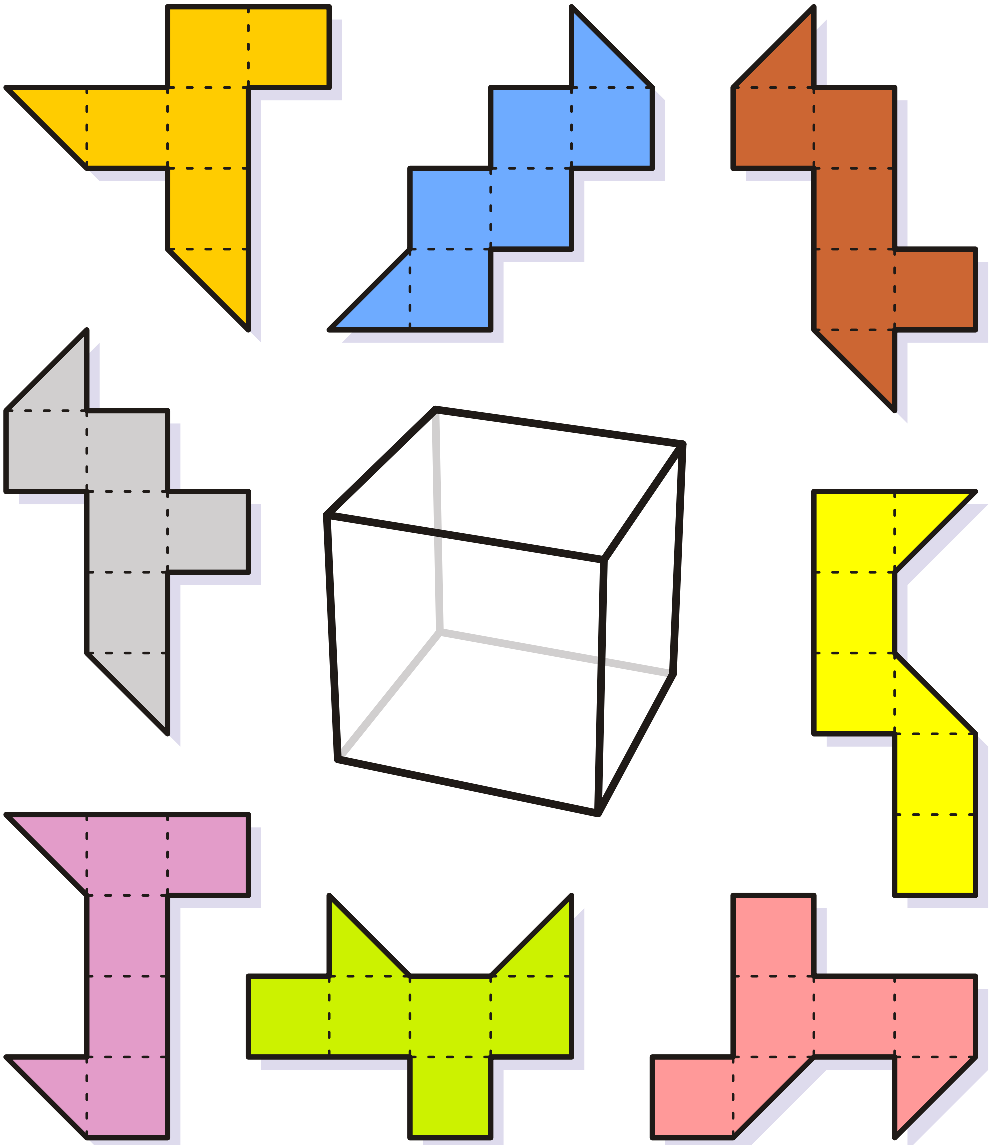


Each of the A-H shapes scattered around the cube in the illustration consists of five squares and two rectangles. Some of the shapes can be folded into a 1x1x1 cube, while others cannot. Can you figure out which of the shapes can be folded into the cube, keeping in mind that only the folds along the dotted lines are allowed?

More from the author at PeterPuzzle.com

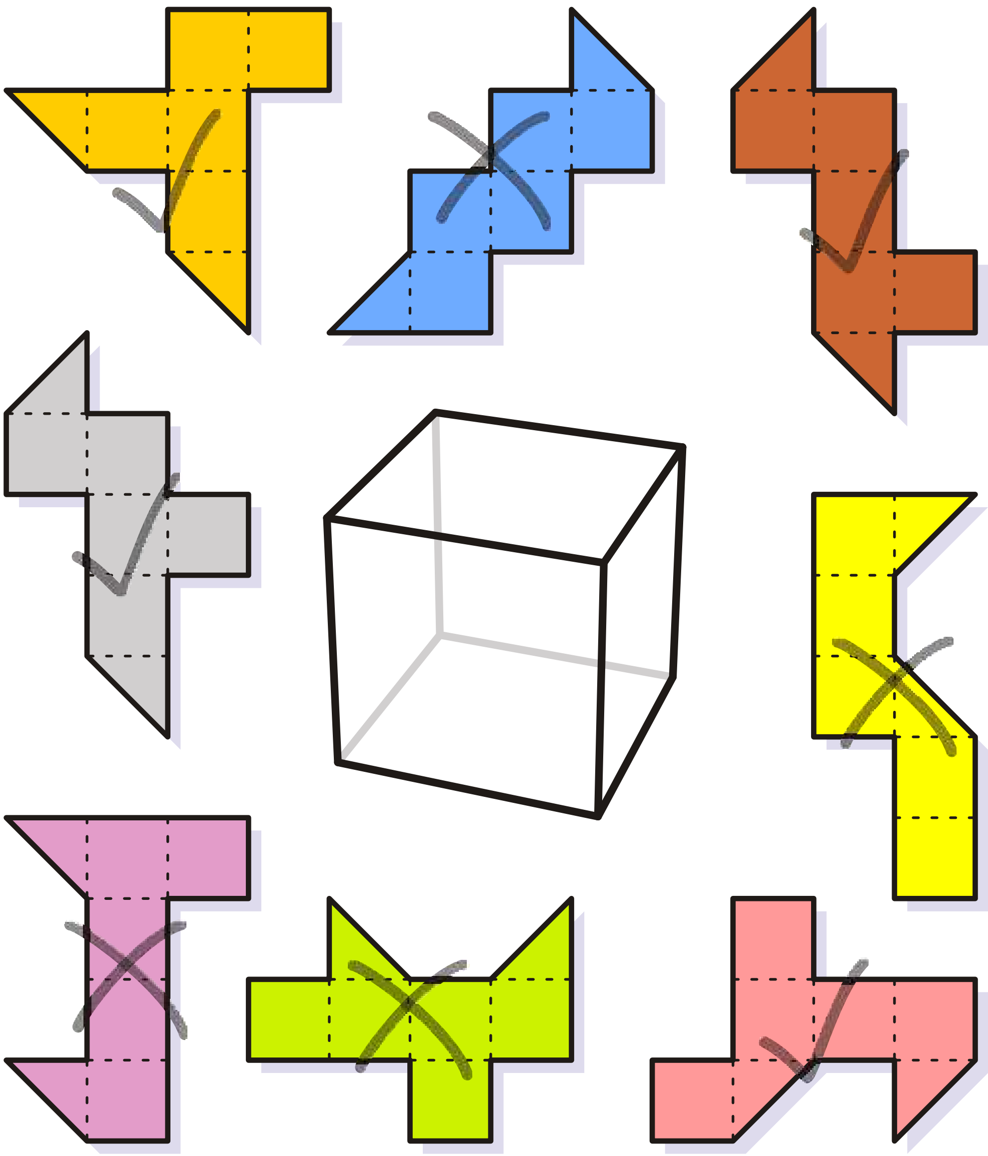


Shapes B, C, F, and G can be folded into a cube, while A, H, D, and E - cannot.

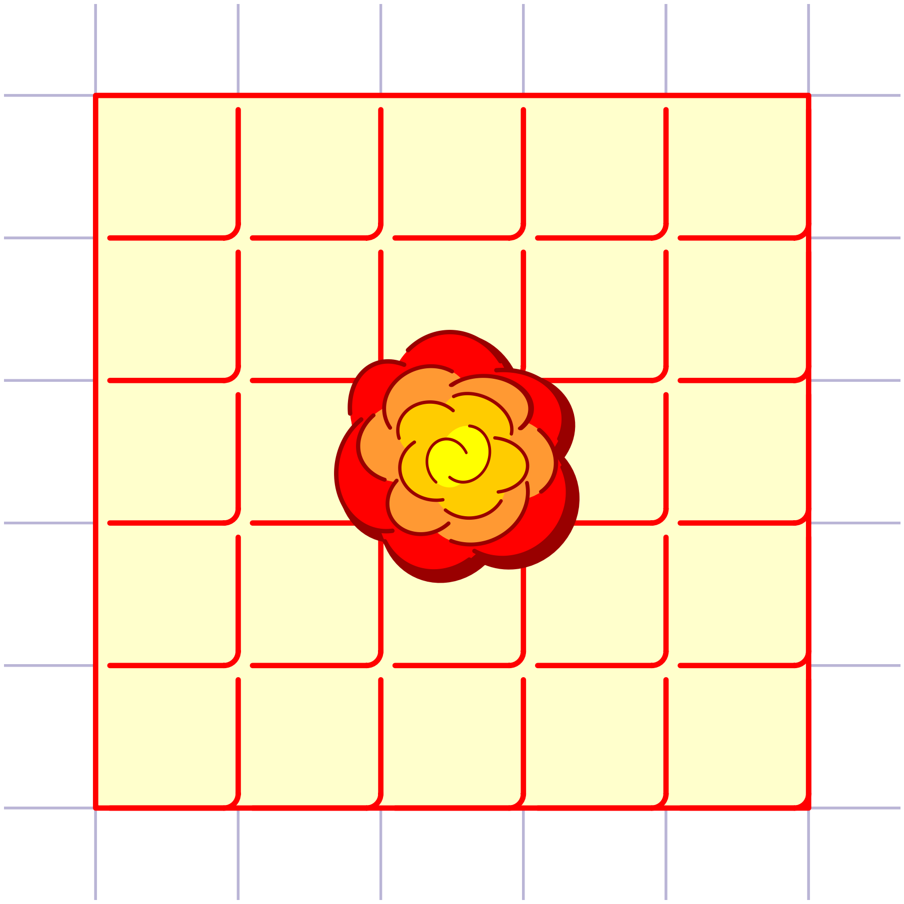


Each of the eight shapes scattered around the cube in the illustration above consists of five squares and two triangles. Some of these shapes can supposedly be folded into a 1x1x1 cube, while others can not.

Can you figure out which of the shapes can be folded into the cube, keeping in mind that only the folds along the dotted lines are allowed?



The shapes which can be folded into the cube are labeled with checkmark, the shapes which can't be are crossed out.

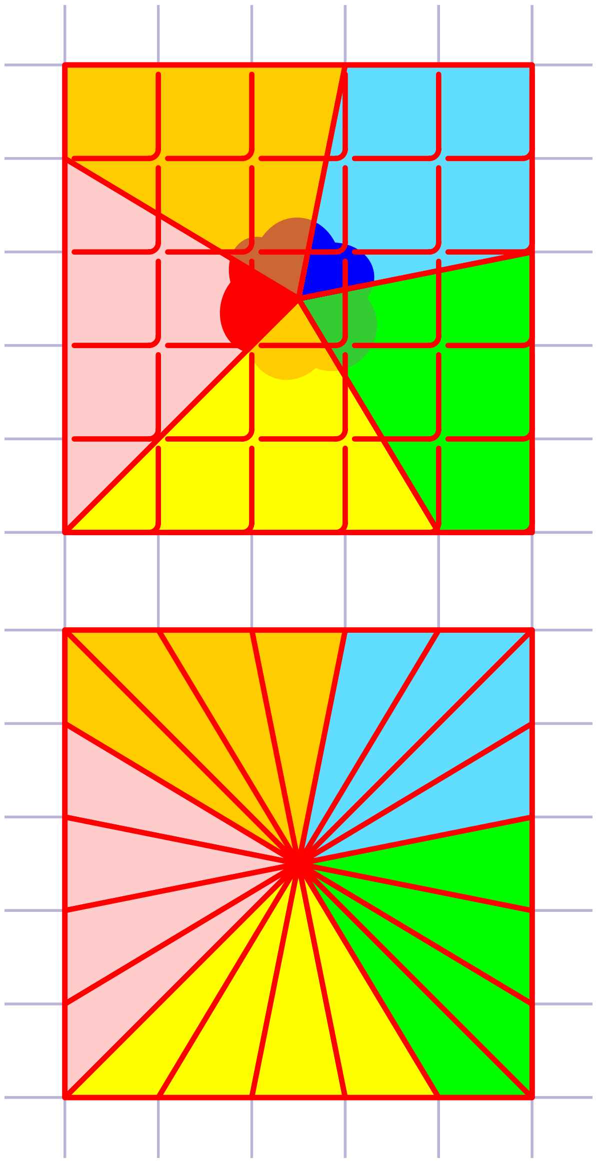


A square with a 5x5 grid on it represents a tasty cake like that shown in the illustration.

Your task is to divide this cake into five pieces in such a way that each piece has the same volume.

All the cuts must be "conventional" - each cut has to go straight exactly from the central point of the cake to its edges, and every cut's plane has to be perpendicular to the cake's base. In this case we'll consider any two pieces as being equal if their top surfaces are equal.

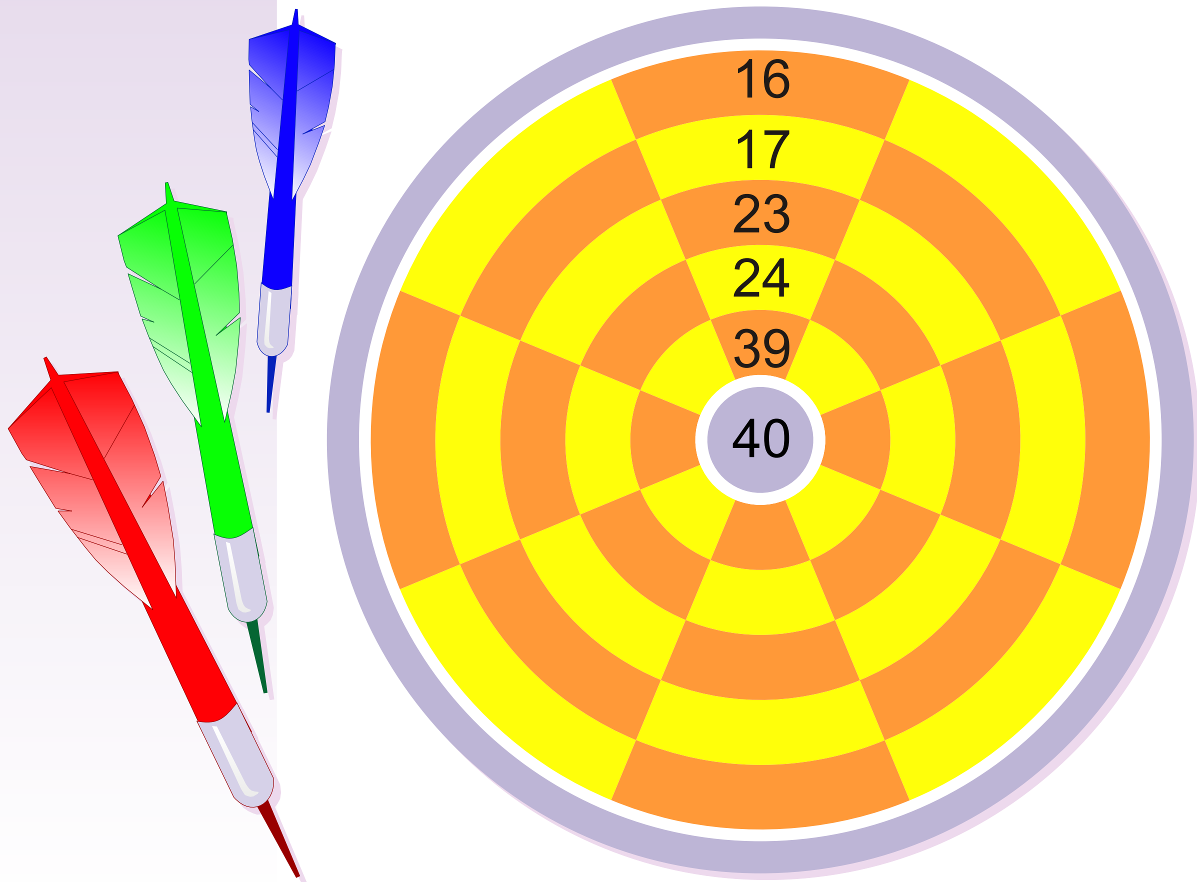
To solve the puzzle you are not allowed to use any measuring tools except the square grid itself and the central point of the cake (the center of a 5x5 square).



One of the possible solutions is shown in the upper illustration.

If we mark all straight cuts from the center of the cake to its edges, as shown in the lower illustration, we get exactly 20 triangles. All the triangles are equal in area - they have equal bases and the same altitude.

Therefore to get five equal parts of the cake we have to divide it into five pieces consisting of 4 small triangles each (20:5=4) as shown in the lower illustration.

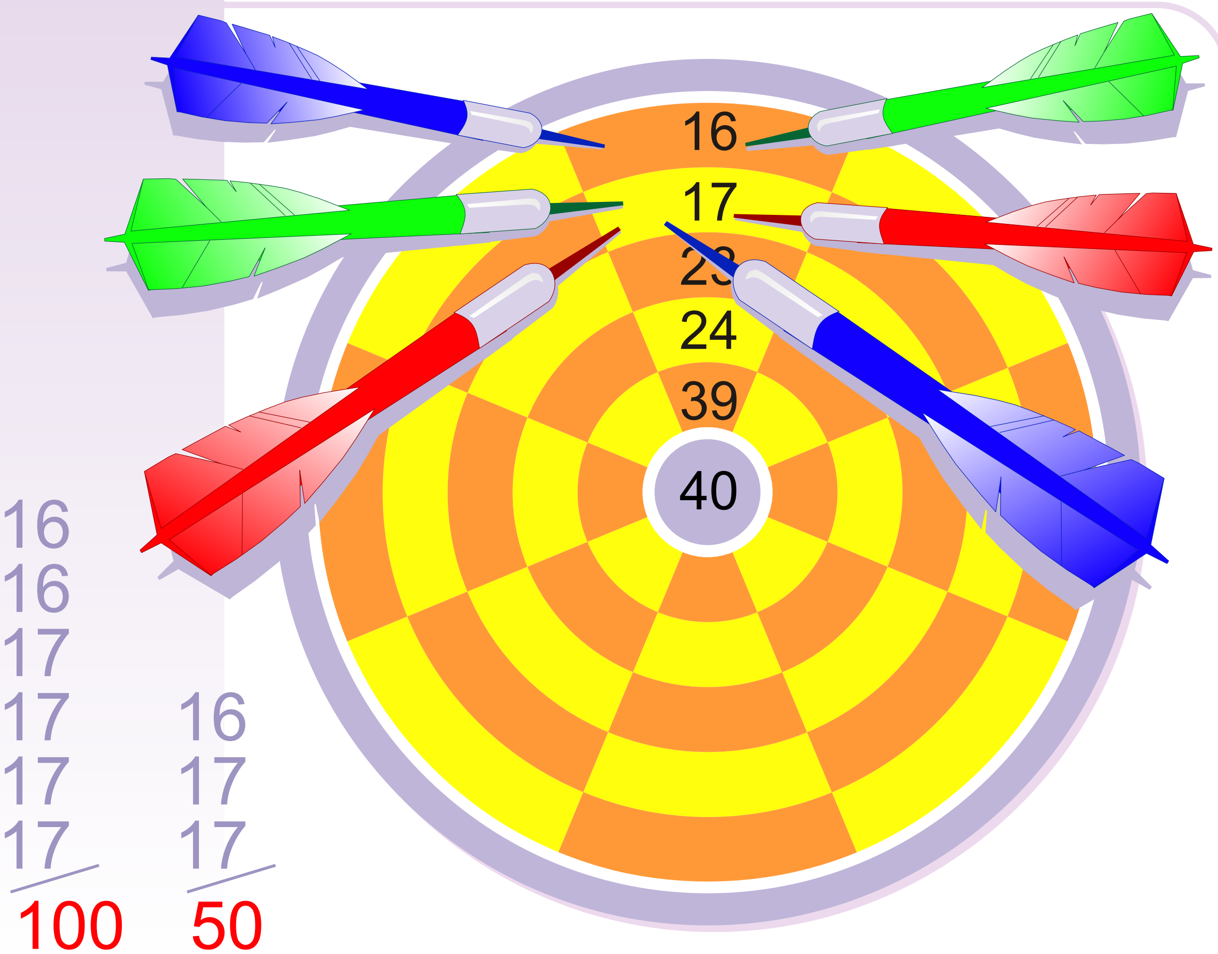


Darts Count

after Martin Gardner

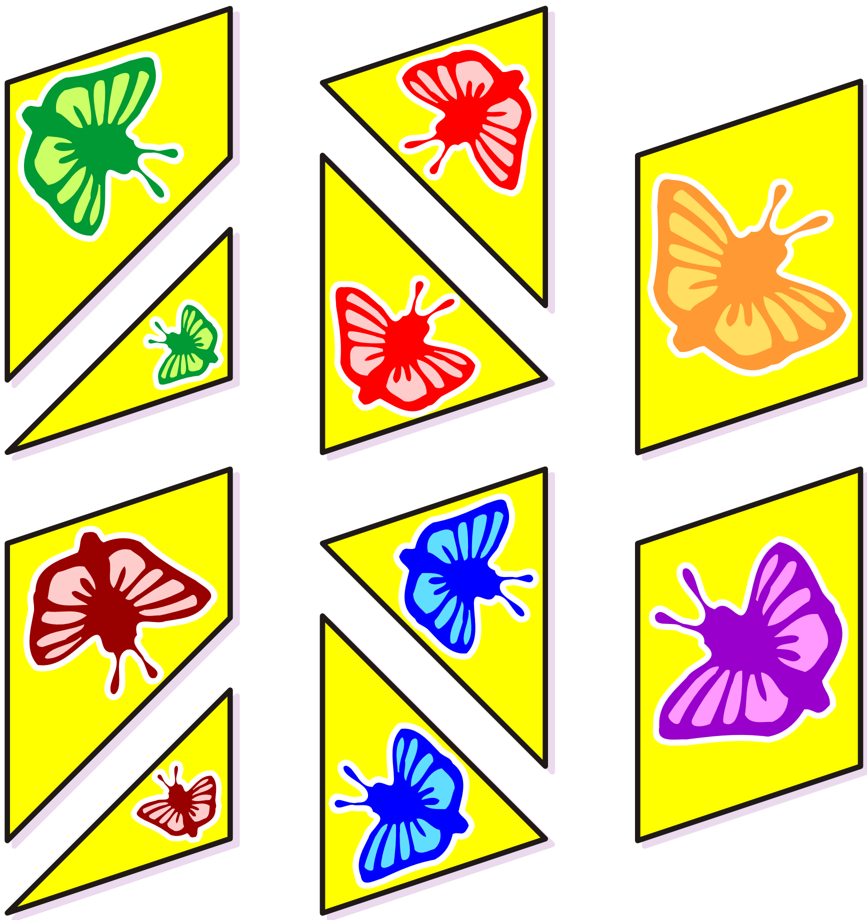
Can you find a pattern how to toss some number of darts in order to score exactly 100? You may use as many darts as you like. Hint: Try first for a score of 50.

Puzzles with Numbers



Darts Count (solution)

The only way to score 50 is to target the 17 ring twice and the 16 ring once. And the only way to score 100 is to score the 50 twice, i.e. to toss four darts on 17 and two on 16. This makes six darts in total.



An old puzzle that was used for advertising purposes by the soup and sauce manufacturer T. A. Snider Preserve Co. with pictures of their products on the puzzle pieces. We just replaced them with color butterflies, and added three more challenges.

Print out the pieces shown in the illustration and then carefully cut them out.

Note that for all the puzzles below you may rotate the pieces as you wish, but you are not allowed to flip them over, and in the final position pieces may not overlap each other.

Original Puzzle. The object is to arrange all the pieces into a perfect square.

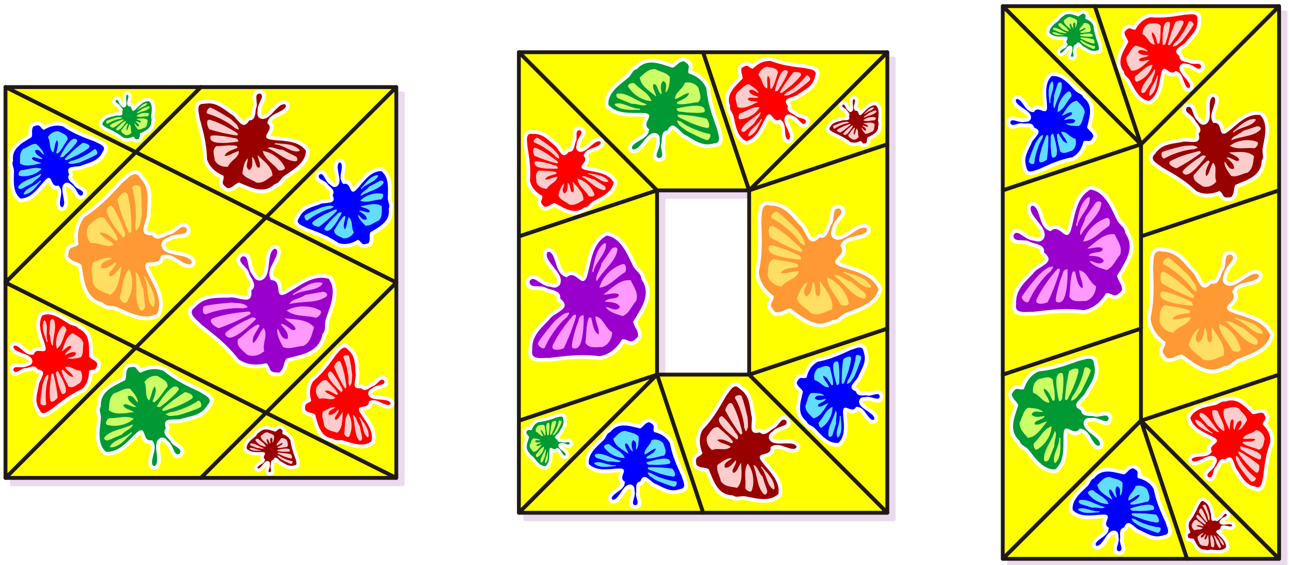
Puzzle 2. Rearrange your square so that the pieces with the butterflies of the same color will not touch each other even at their corners.

Puzzle 3. Now arrange all the pieces into a rectangle. Of course, a square is a special kind of rectangle, but the object of this challenge is to make a real rectangle with its length being longer than its width. This new shape for the Diamond puzzle was just discovered - what a nice surprise!

Puzzle 4. Then rearrange your rectangle in such a way that the pieces with the butterflies of the same color don't touch each other even at their corners.

Puzzle 5. A new shape which is possible to arrange using all the pieces of the Diamond puzzle is a rectangular frame. It's a rectangle with a rectangular hole in it. This recently discovered new shape for the Diamond puzzle is one more great surprise!

Puzzle 6. Finally rearrange your rectangular frame so that the pieces with the butterflies of the same color again don't touch each other even at their corners.

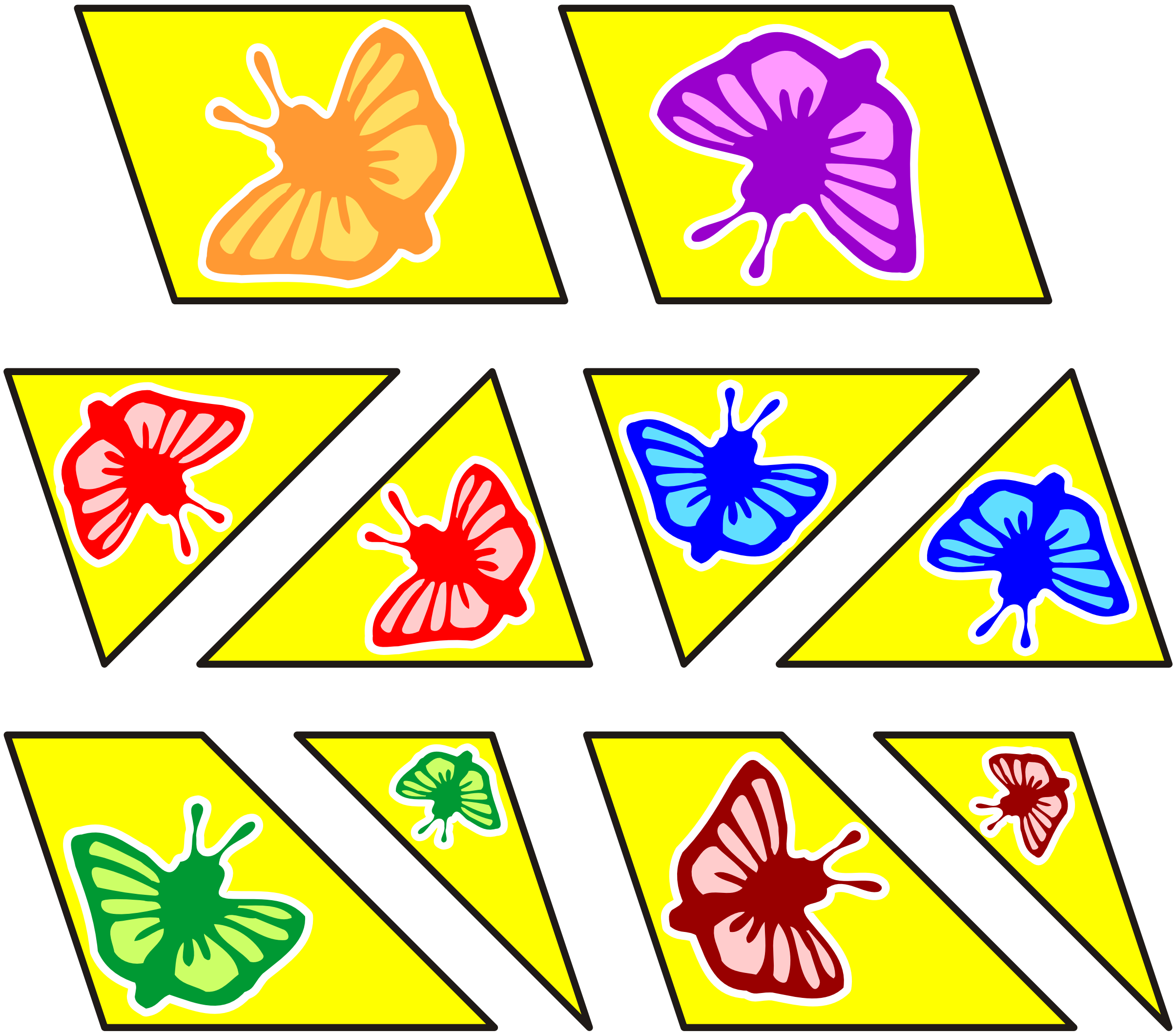


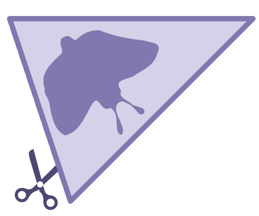
One of the solutions to the classic version of this puzzle is shown in the left illustration. At the same time this is one of the solutions to Puzzle 2.

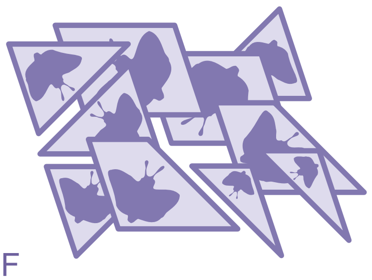
The solution to Puzzles 3&4 with the rectangle is shown in the middle illustration.

The solution to Puzzles 5&6 with the rectangular frame is shown in the right illustration.

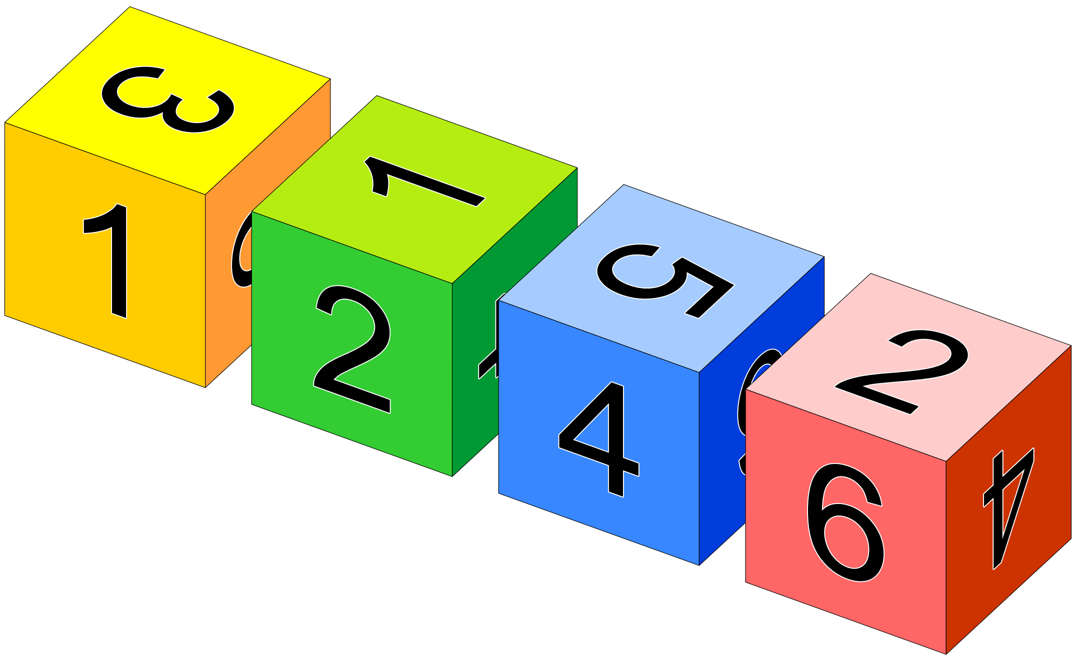
The new shapes for the Diamond puzzle - both rectangle and rectangular frame - were discovered by Serhiy Grabarchuk.







To produce the pieces first print them out. Then follow the diagram shown above - from step 1 to step F (finish).

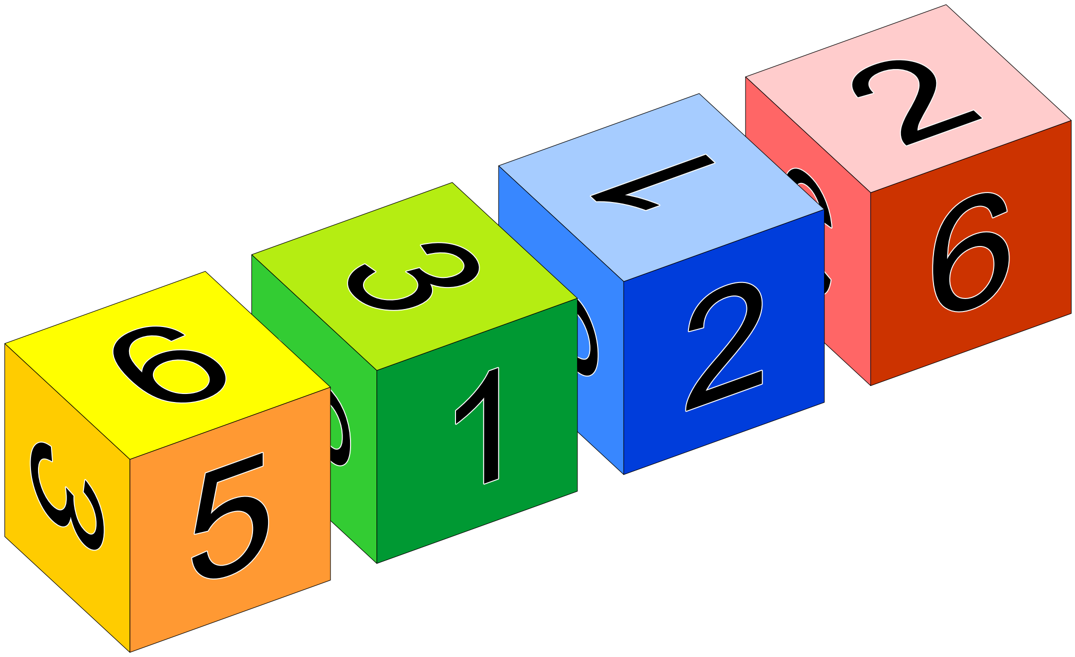


Suppose you have a set of four dice, not marked with spots in the ordinary way, but with the digits as shown in the illustration. Each die has the digits 1 to 6 on its respective faces.

When put together the four dice form plenty of different four-figure numbers. One of them - 1246 - is shown in the illustration.

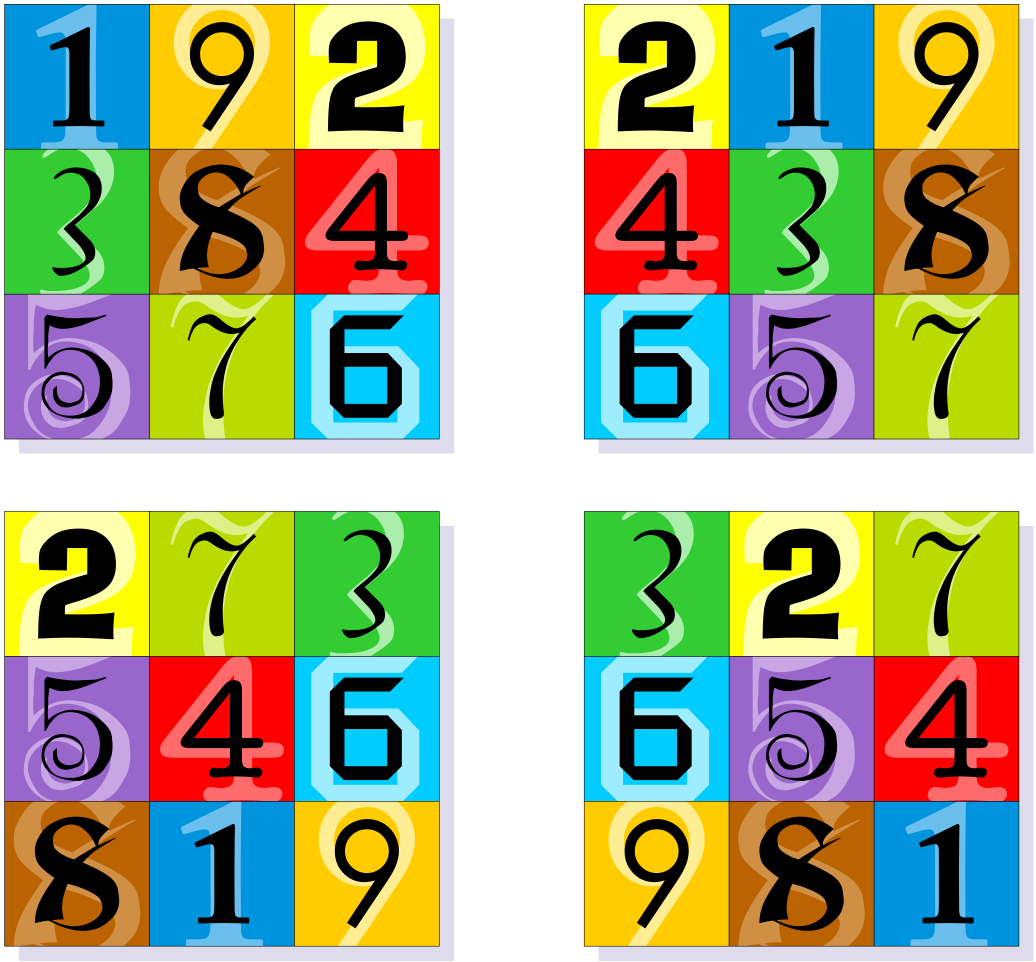
The question is if one makes all the different four-figure numbers that are possible with these dice (never putting the same figure more than once in any number), what will they all add up to? It is allowed to turn the 6 upside down, so as to represent a 9.

Seems, it should take a lot of work to go and write out the full list of numbers and then add them up. Instead, there should be at least some other way to get at the answer. Can you find it?



The sum of all the numbers that can be formed with any given set of four different figures is always 6,666 multiplied by the sum of the four figures. Thus, 1, 2, 3, 4 add up 10, and ten times 6,666 is 66,660. Now, there are thirty-five different ways of selecting four figures from the seven on the dice—remembering the 6 and 9 trick. The figures of all these thirty-five groups add up to 600. Therefore 6,666 multiplied by 600 gives us 3,999,600 as the correct answer.

Nine digits (1 through 9) are arranged in the 3x3 square in such a way that the number in the second row is twice that in the first row, and the number in the bottom row is three times that in the top row. It is know there are three other ways of arranging these digits so as to produce the same result. Can you find them?

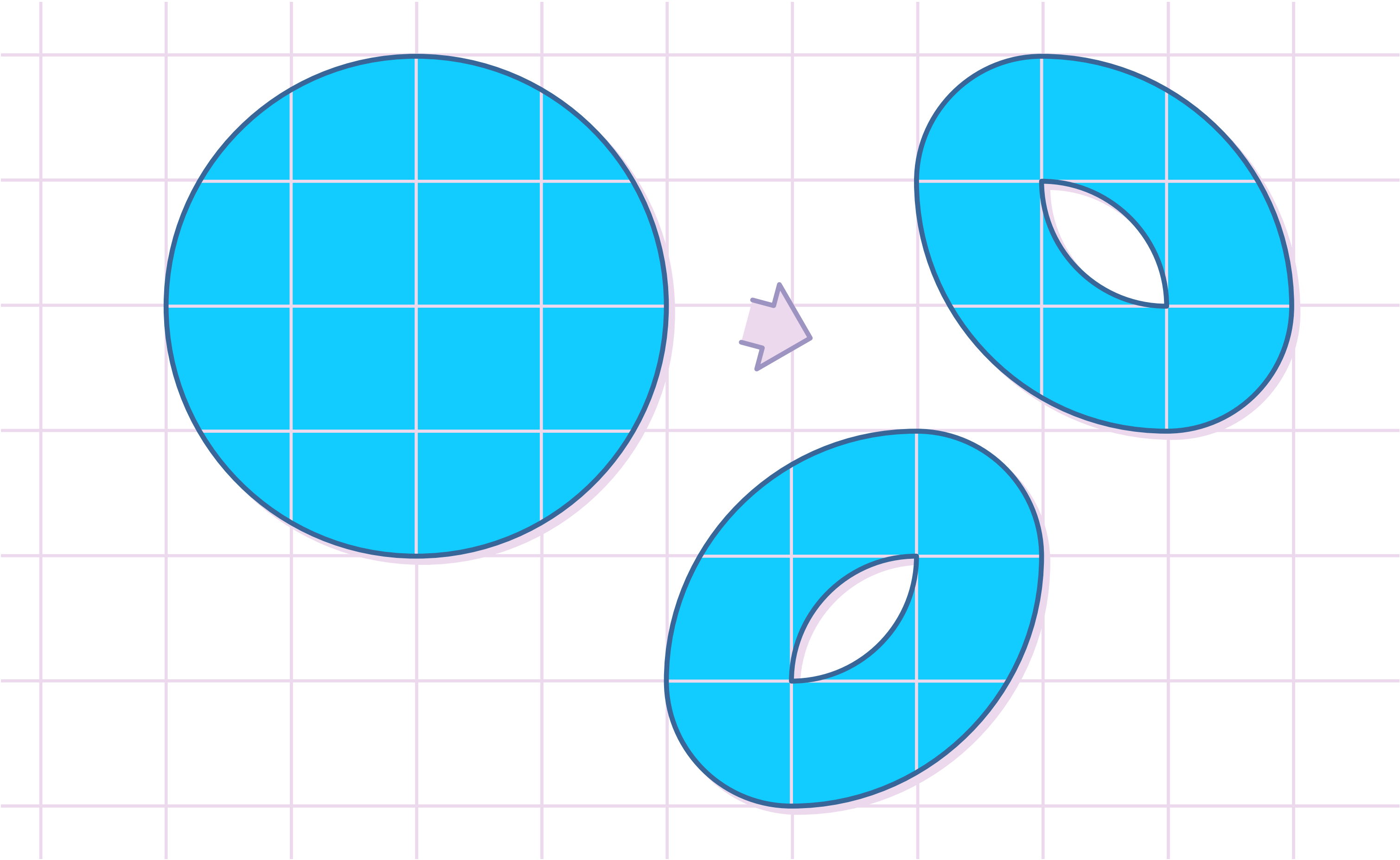


Only four solutions exist to this puzzle. These are the solutions with the top numbers 192, 219, 273 and 327. All these solutions are shown in the illustration. The first one was actually illustrated with the puzzle.

Disk in2 Ovals

by John Jackson

Puzzles.COM



The object of this puzzle is to divide the circular table top (disk) into certain number of pieces that could be rearranged into the seats of two oval stools with open handholds as shown in the illustration. What is the fewest number of pieces required to complete this task?

John Jackson proposed this puzzle in 1821 and his solution contained eight pieces. Eighty years later, in 1901, Sam Loyd demonstrated the solution which consisted of six pieces only. And recently, in 2004, more than a century later, when almost everyone thought Sam Loyd had brought the puzzle full circle, Serhiy Grabarchuk came up with an astounding solution, or even series of solutions, which consisted of five (!) pieces.

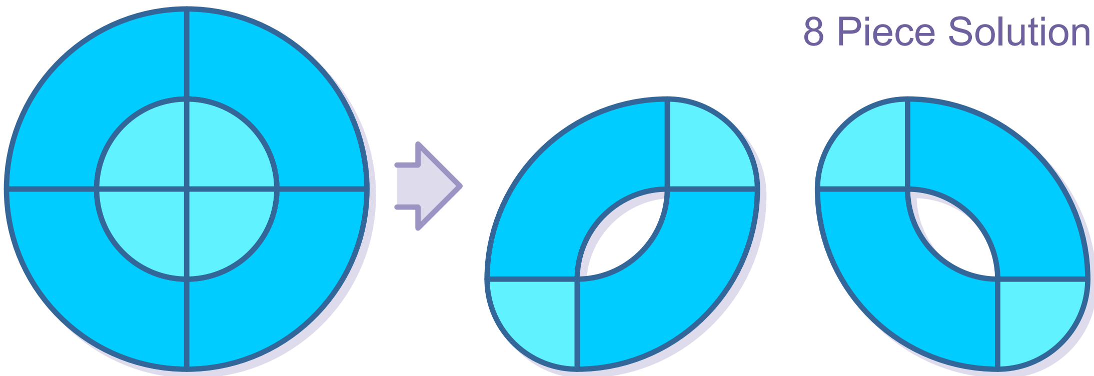
Which of these solutions can you discover?

More comprehensive research on this and similar dissection puzzles can be found in the *Dissections: Plane & Fancy* book by Greg Frederickson.

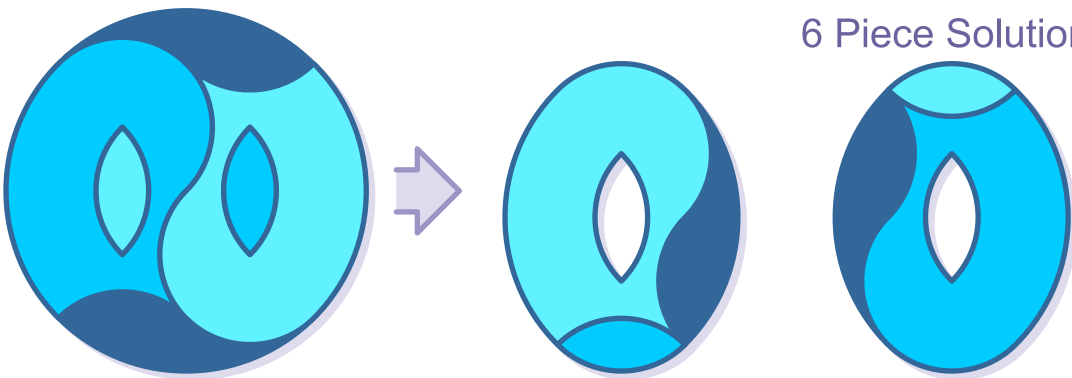
Disk in2 Ovals

Solution

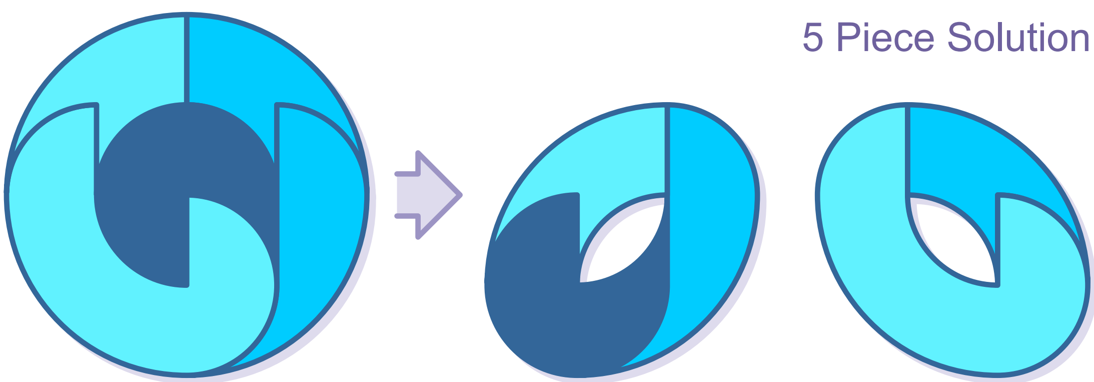
8 Piece Solution



6 Piece Solution



5 Piece Solution



The solutions of eight and six pieces are shown in the illustration.

Comprehensive presentation of the five-piece solutions can be found on the Greg Frederickson's web-site, exactly here.

Divisible By 7

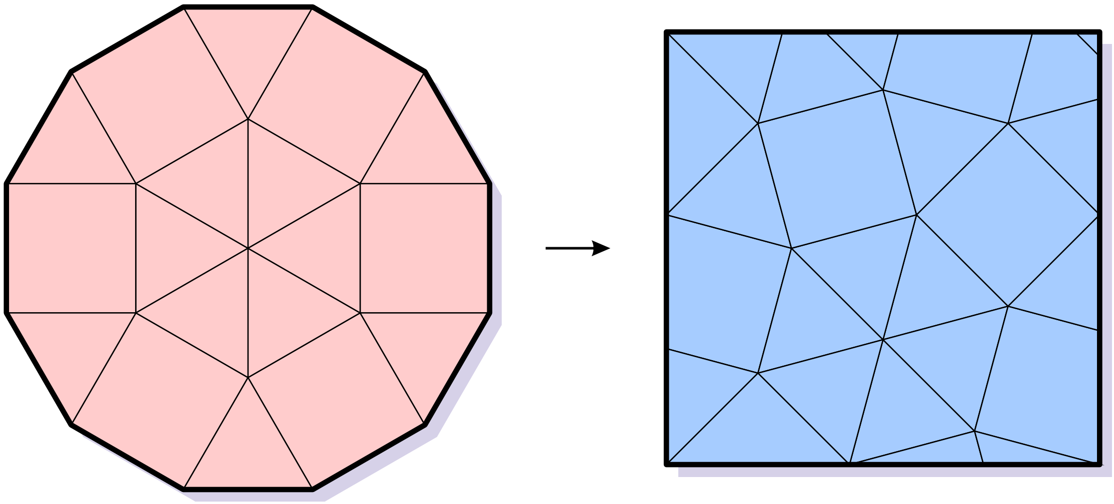
after Sam Loyd

Three numbers (6, 3 and 1) are drawn on the sides of three cubes - a number per cube, just as shown in the illustration.

Can you arrange the three cubes in a line so that to create a 3-digit number divisible by 7? Each cube must be employed.

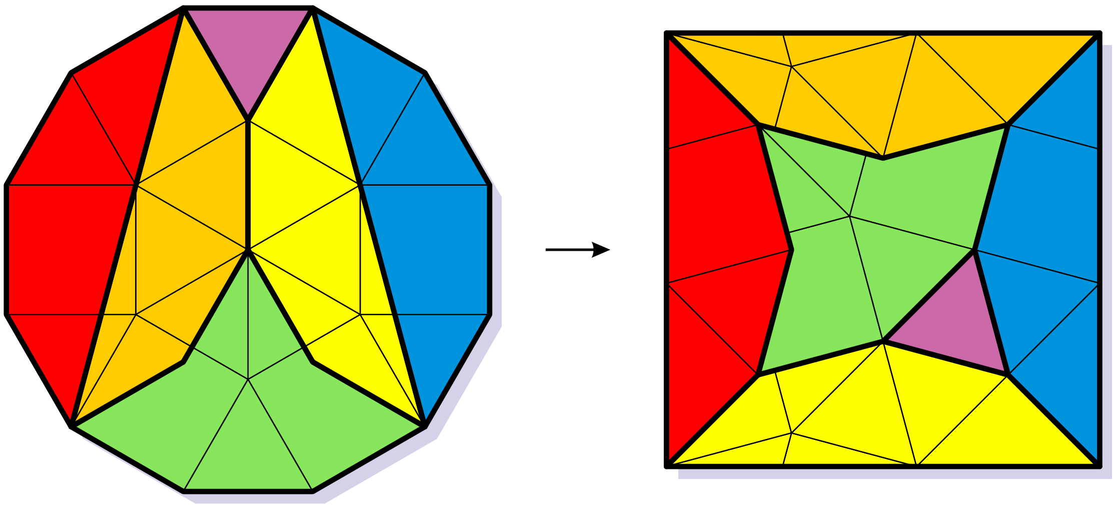
Divisible By 7 (solution)

The trick behind this puzzle is to use the cube with number 6 as a cube with number 9 instead. Thus the resulting number is 931 - as shown in the illustration.

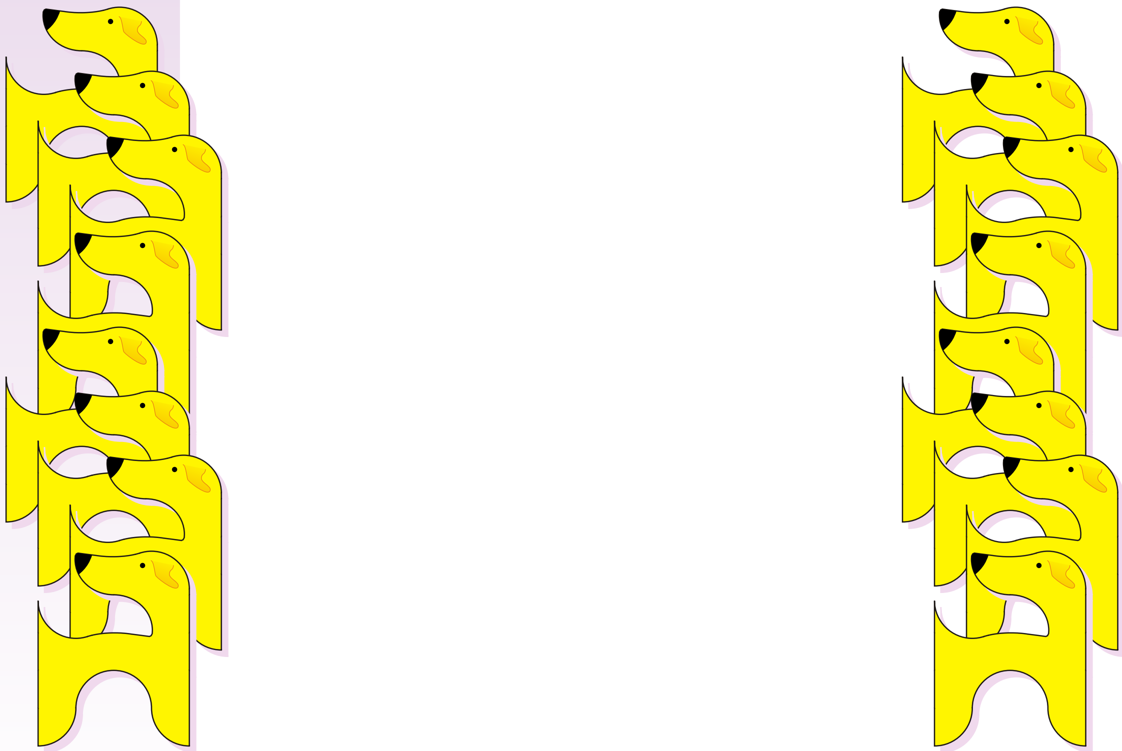


Cut the regular dodecagon shown on the left into six pieces which can be then arranged into a square shown on the right. The pieces can be rotated but it is not allowed to overlap them.

The grid is provided just for your convenience.



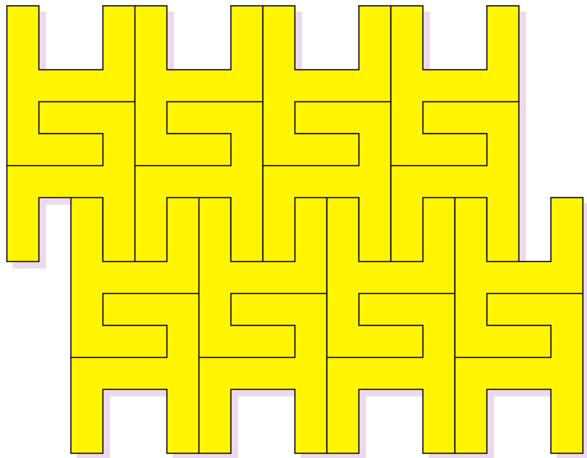
The solution is shown in the illustration.



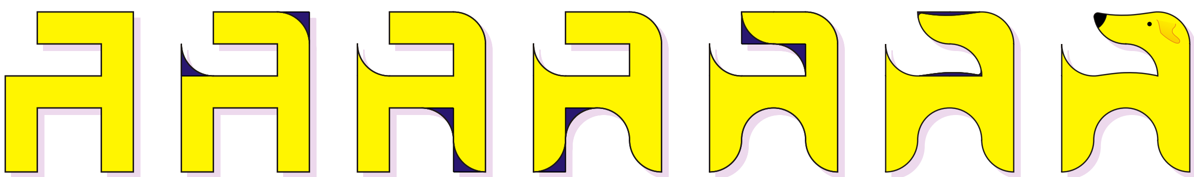
Doggy Mosaic

by Serhiy Grabarchuk, Jr.

Find the way how to pave some area with the figures of the dogs shown here with no empty spaces in it.



1



2

Doggy Mosaic (explanation)

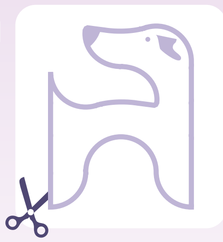
There is an infinite number of shapes that allow to pave a flat surface without omissions or overlaps. One such a shape is shown in Figure 1.

Now if you make consecutive changes of the basic shape as shown in Figure 2, you may get a funny character like our happy dog. Explore other similar shapes on your own, and enjoy your creations.

Treasure of Classic and Modern Puzzles

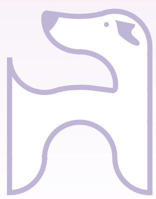
Toys

1

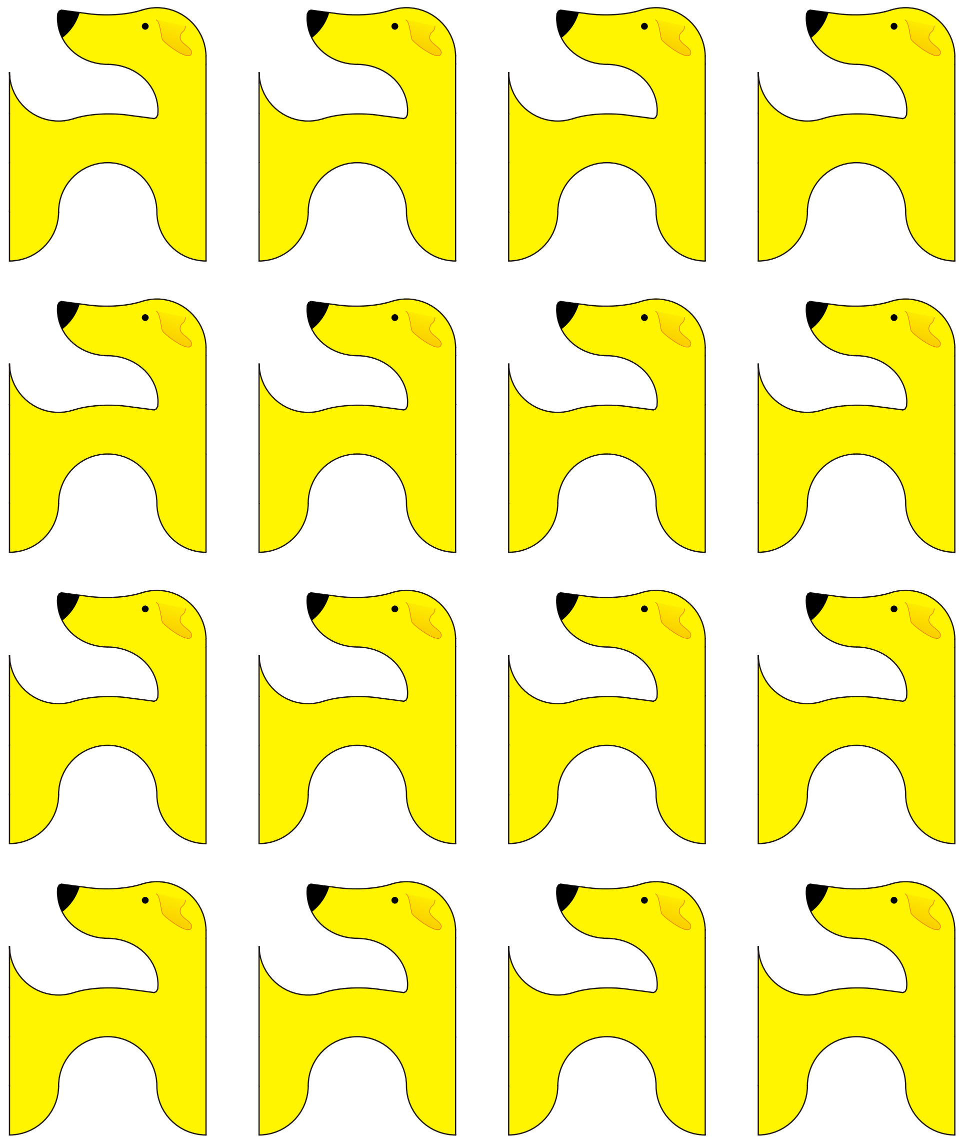


x 16

F



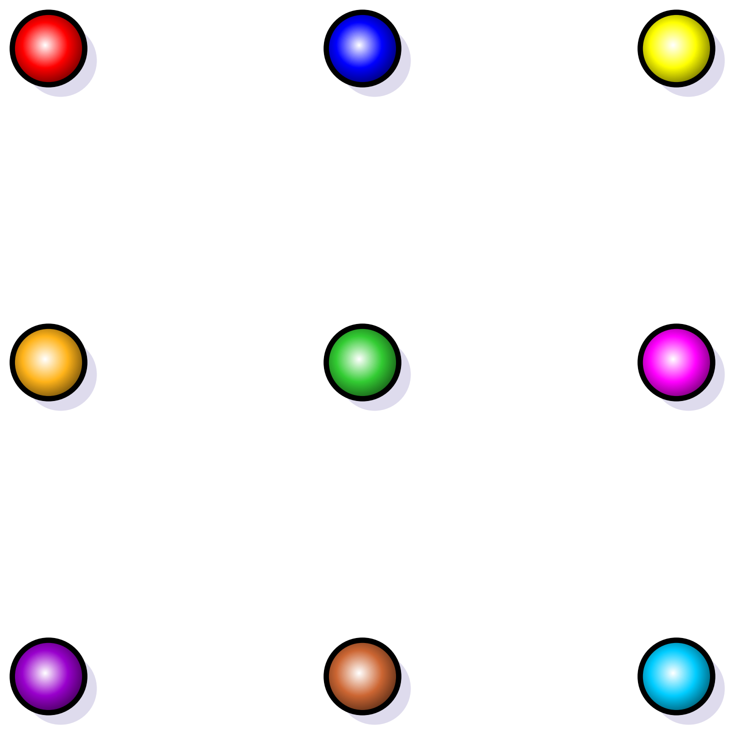
x 16



Doggy Mosaic (pieces)

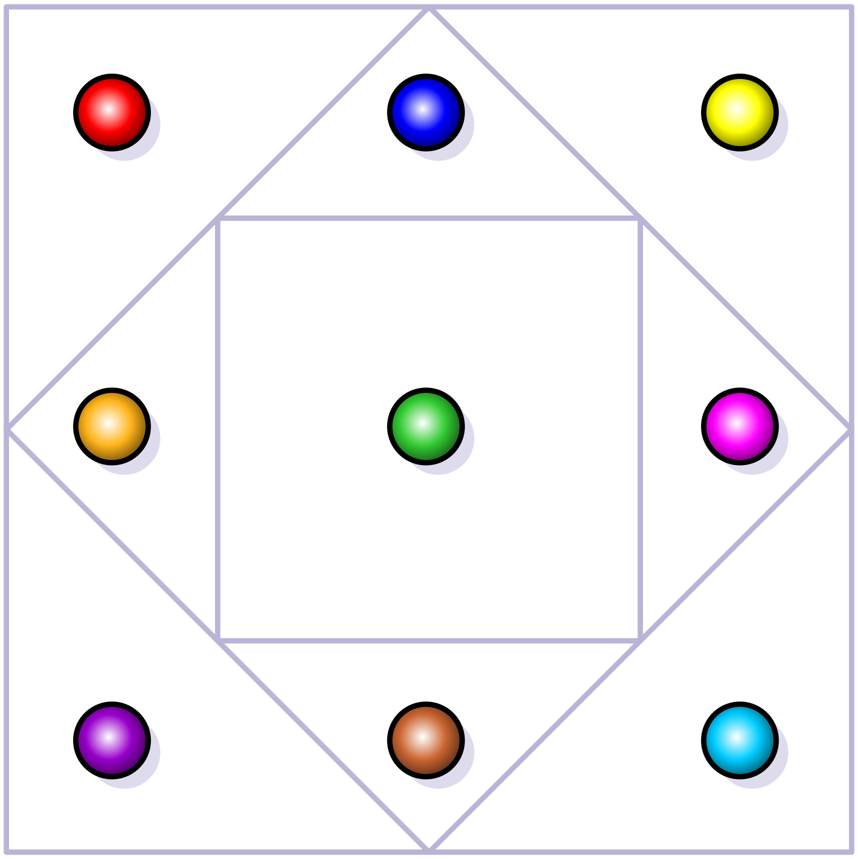
To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

Dots & Squares*



Can you draw three squares in such a way that each of the nine dots shown in the illustration is enclosed in only one region?

*This puzzle was inspired to the publication on our site by a message from our visitor K.



The solution is shown in the illustration.

Word Puzzles

tea	word
pot	golf

cold	ape
warm	
	man

hand	ship
foot	
	dock

Doublets

by Lewis Carroll

Carroll's solitaire game of Doublets is one of the most well known games with words, and without doubt everyone will know it. Lewis Carroll created the Doublets game in 1877 as a Christmas gift for two girls. Since then the game has appeared in many different languages in numerous books, magazines and newspapers all around the World. It has different names - Word-Links, Doublets, Word Golf, Transformations, Word Ladder and many other, but the idea of all these games is the same.

This idea is to take two words of the same length, and then to change one word into the other, changing one letter each time; all unchanged letters of each intermediate word keep their positions. All the words you use as intermediate must be real words common enough to be found in a standard dictionary. You aren't allowed to use proper names for the linking words though.

We've chosen six different Doublets which you may try to solve.

Word Puzzles

tea	**word**
pea	wold
pet	wolf
pot	**golf**

cold	**ape**
cord	apt
word	opt
worm	oat
warm	mat
	man

hand	**ship**
band	slip
bond	slap
fond	soap
font	soak
foot	sock
	dock

Doublets
(solution)

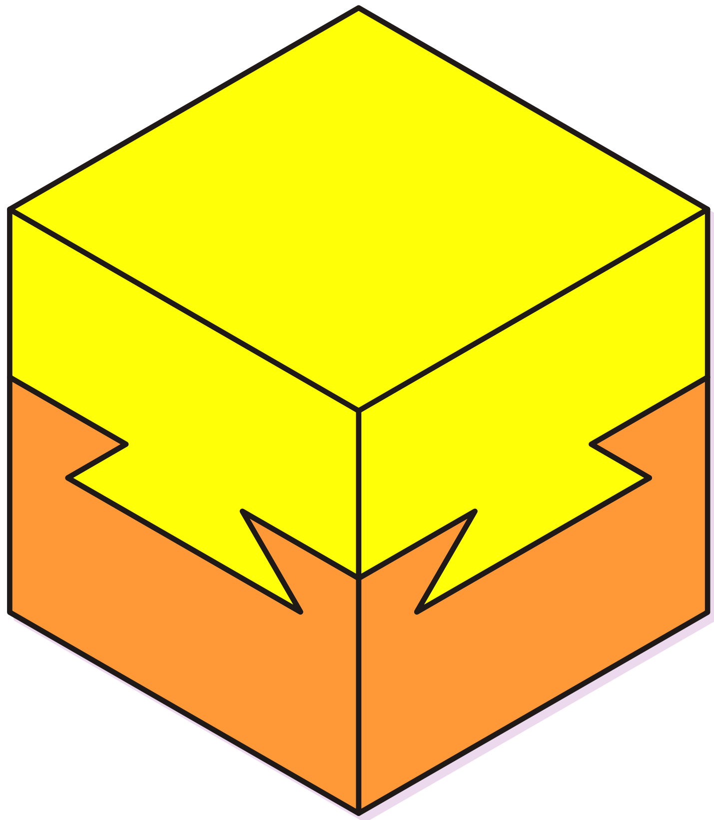
Solutions to all the six Doublets are shown on the left.

The Doublets "ape-man", "tea-pot" and "ship-dock" were created by Lewis Carroll; the last two of them were rediscovered by Edward Wakeling.

The Doublet "cold-warm" was proposed by Dmitri Borgmann.

The Doublet "word-golf" is created from the name given to the Doublets game by Vladimir Nabokov.

The Doublet "hand-foot" was found in Professor Hoffmann's book "Hoffmann's Puzzles Old & New"; he shows a six-step solution.

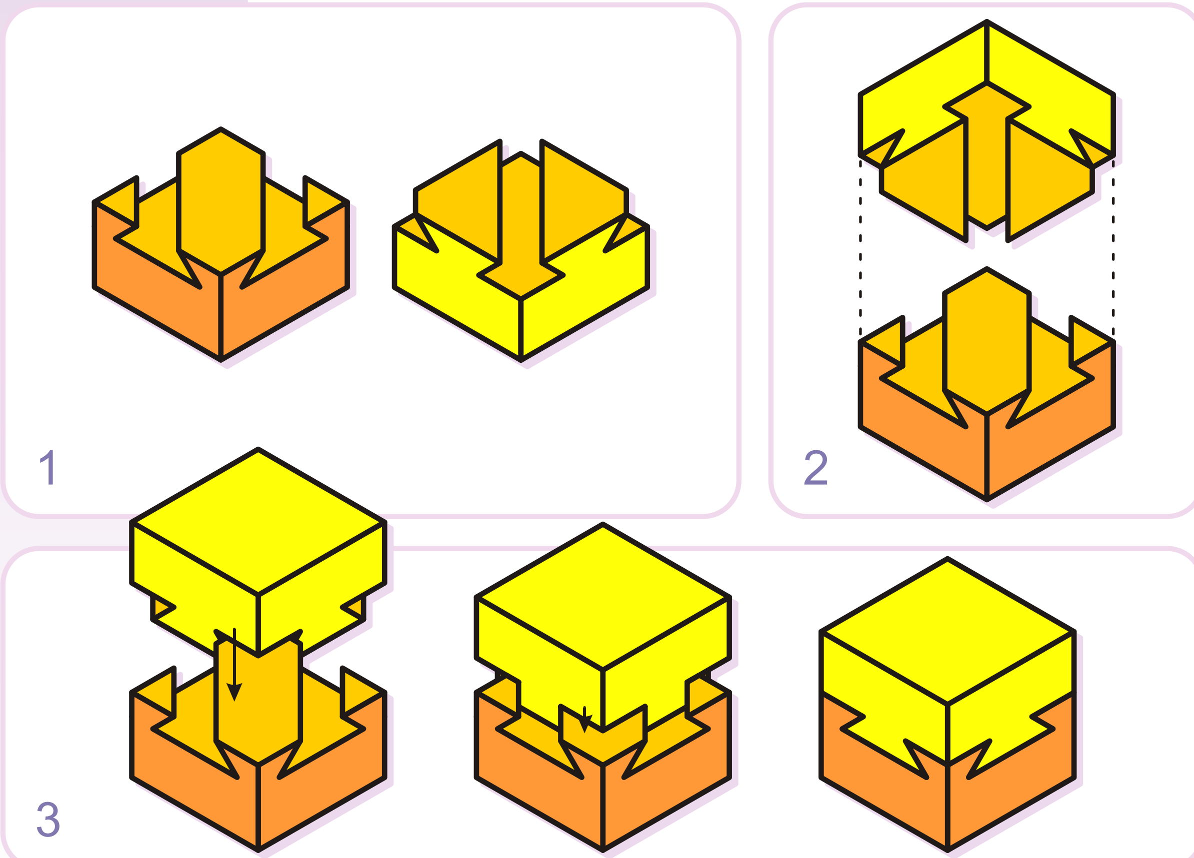


The Dovetailed Block

by Henry E. Dudeney

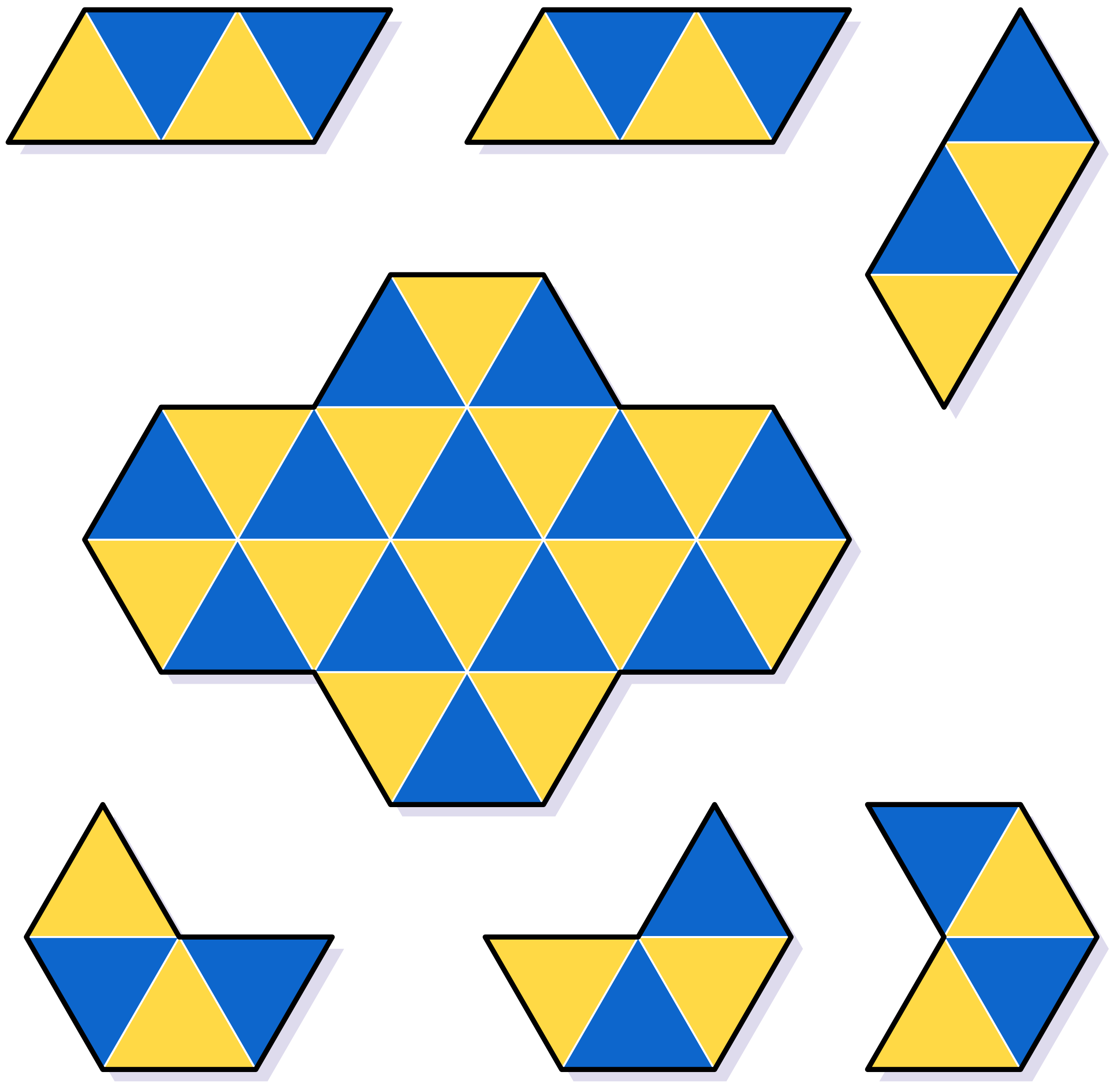
It is said that this cube consists of two solid blocks of wood securely dovetailed together. On the other two vertical sides of the cube that are not visible the pattern is exactly the same as on the the two visible vertical sides. Can you imagine two solid blocks that can be easily dovetailed together into a cube and the way how it can be done?

Toys

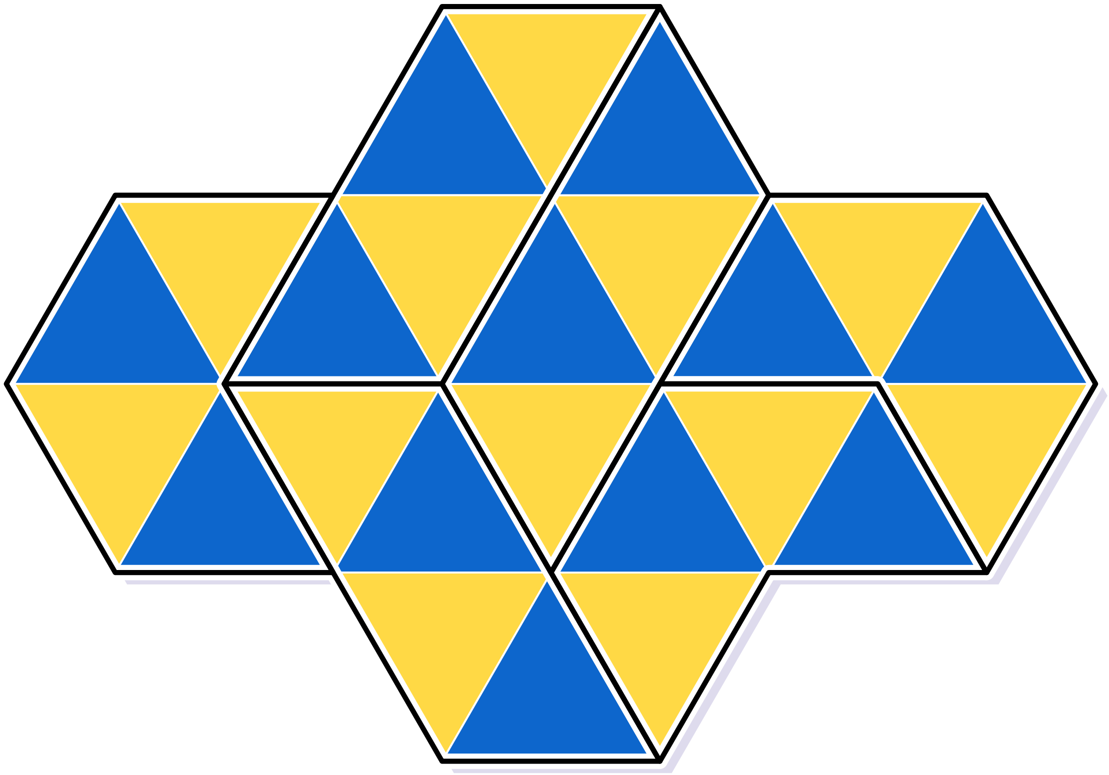


The Dovetailed Block (explanation)

The two solid blocks that can be dovetailed together into a cube are shown in the Figures 1 and 2. The Figure 3 shows how these two pieces slide into the cube.



Arrange the six checkered pieces into the checkered board shown in the middle. Pieces are two-sided and their back sides are mirror images of their face sides. You can rotate and flip the pieces but not overlap them.



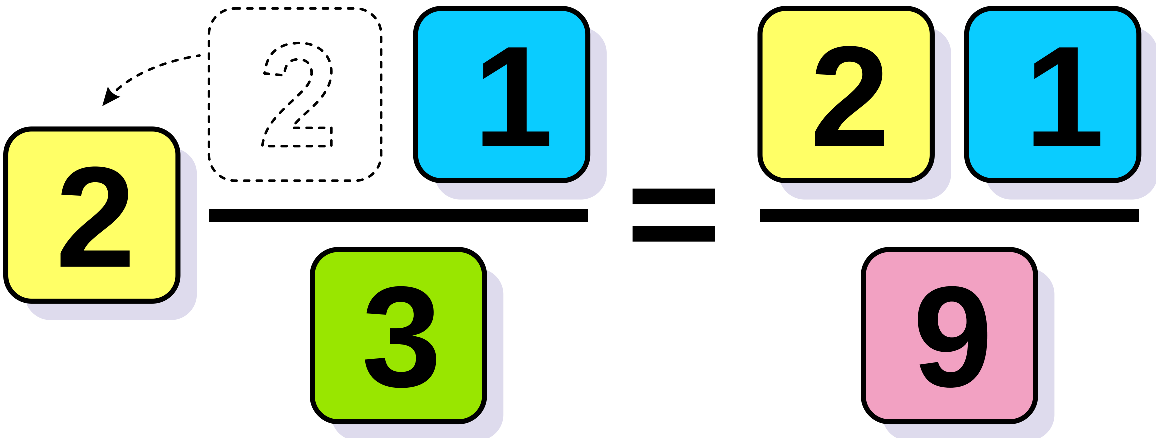
The solution is shown in the illustration.

Simple Division

by Ali Kiliç

$$\frac{2\,1}{3} = \frac{2\,1}{9}$$

Move one number to get the correct equation.



The solution is shown in the illustration: 2 1/3 = 21/9.

Puzzle 1

4	5	÷	3	=	2	8	−	9

Puzzle 2

1	×	9	3	=	6	+	5	1

Puzzle 3

7	1	÷	3	=	6	4	+	9

In each puzzle, which two tiles should be swapped to get the correct equation?

Puzzle 1

4 5 ÷ 3 = 2 8 − 9

↓

4 8 ÷ 3 = 2 5 − 9

Puzzle 2

1 × 9 3 = 6 + 5 1

↓

1 9 × 3 = 6 + 5 1

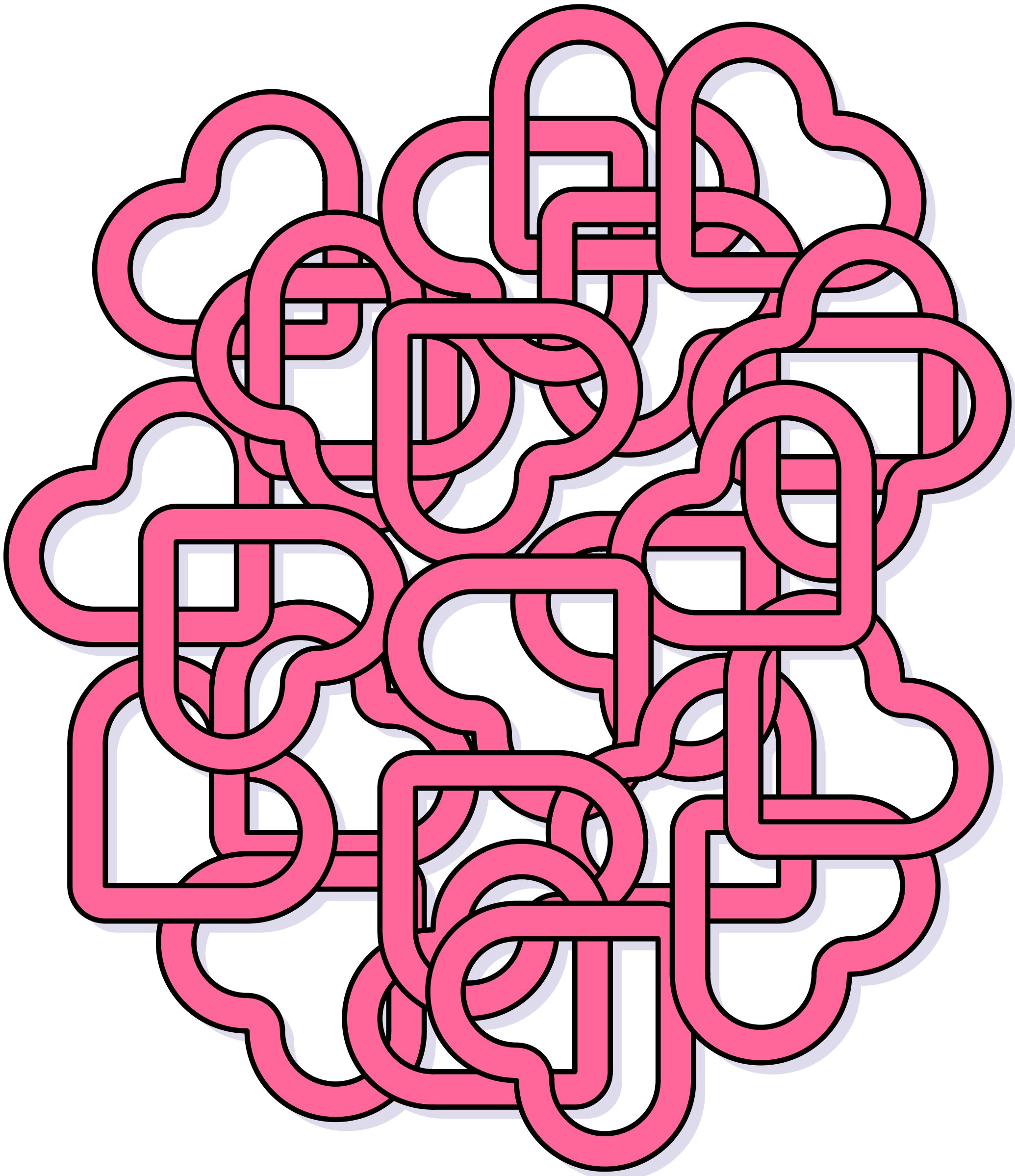
Puzzle 3

7 1 ÷ 3 = 6 4 + 9

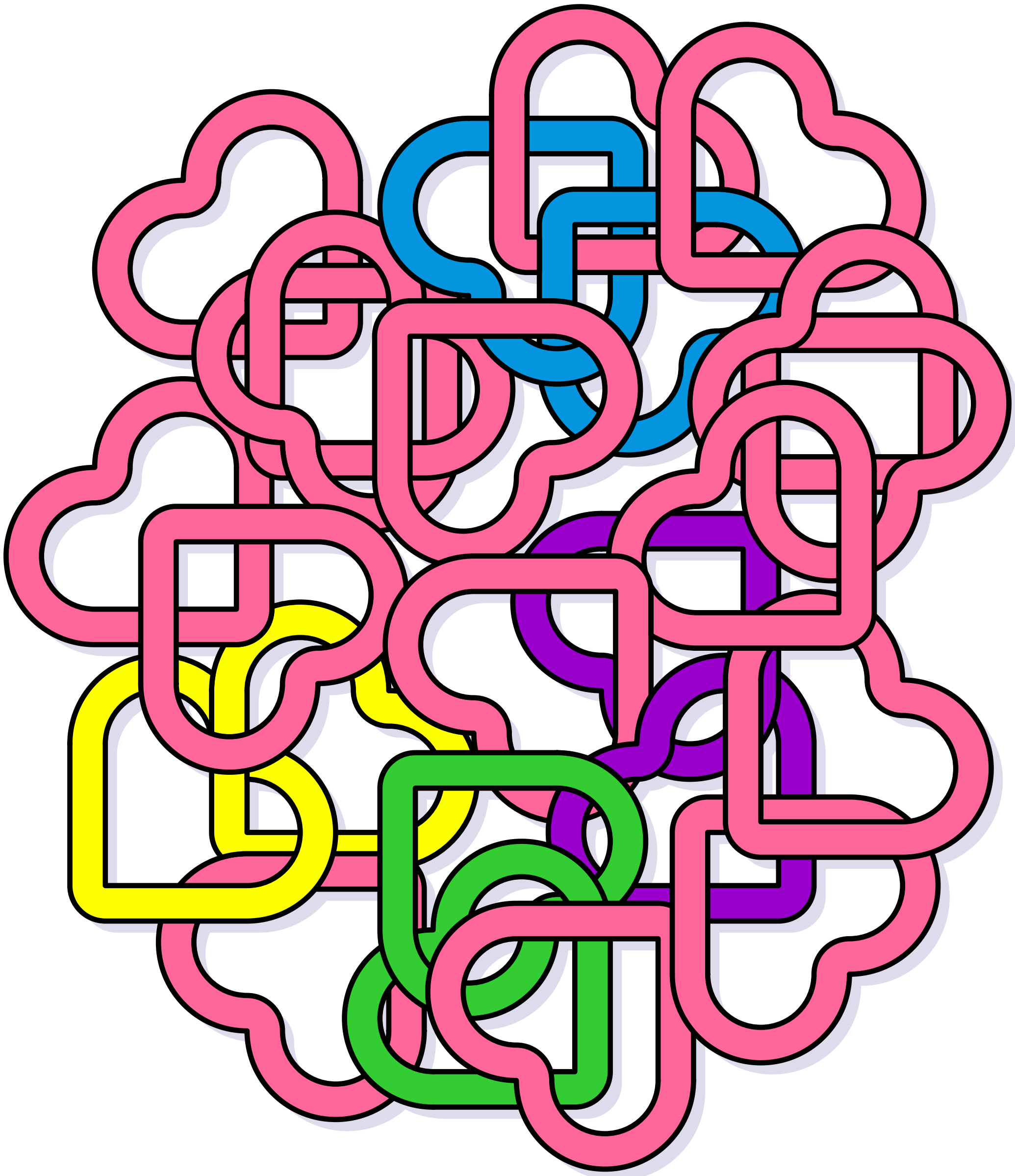
↓

7 3 ÷ 1 = 6 4 + 9

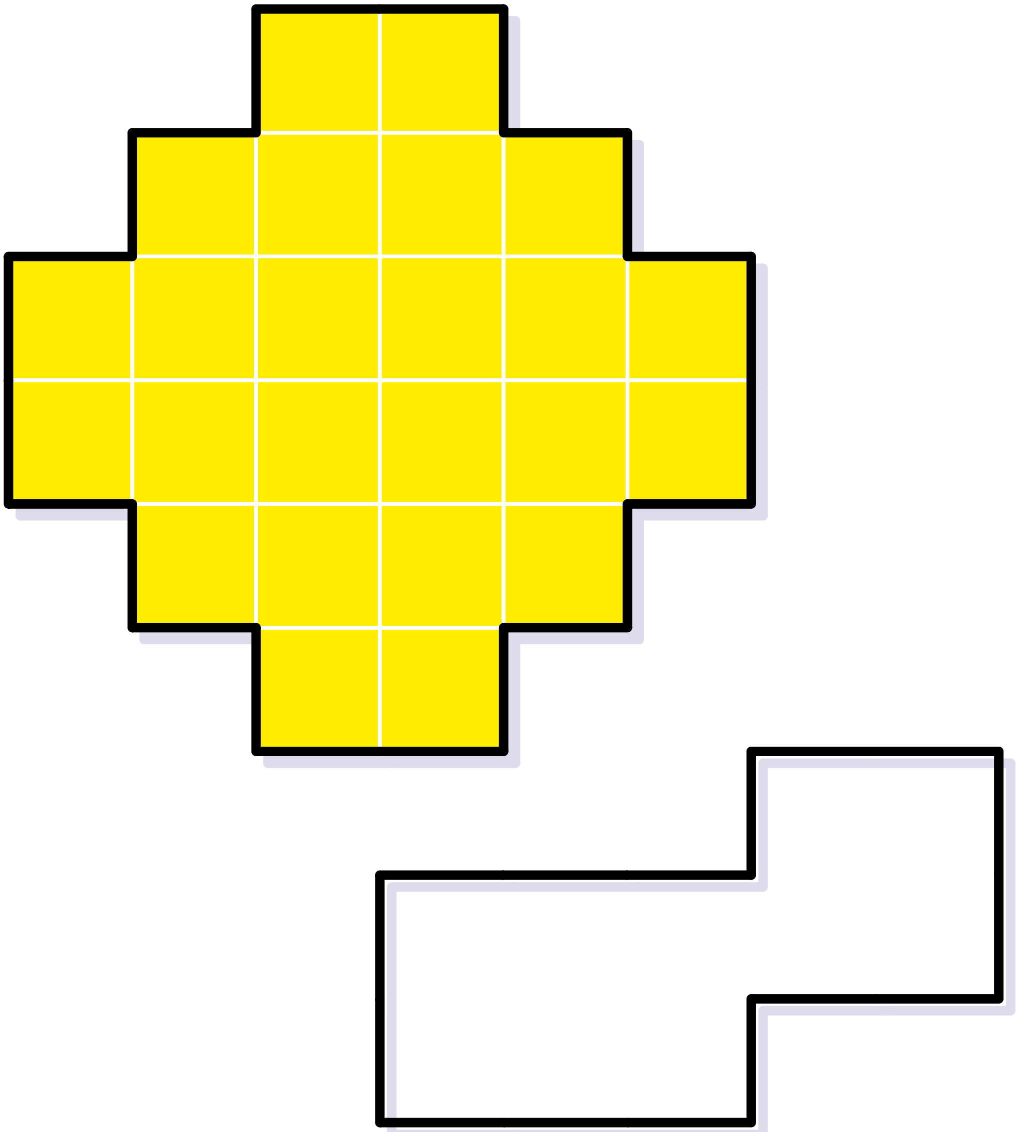
The solutions are shown in the illustration.



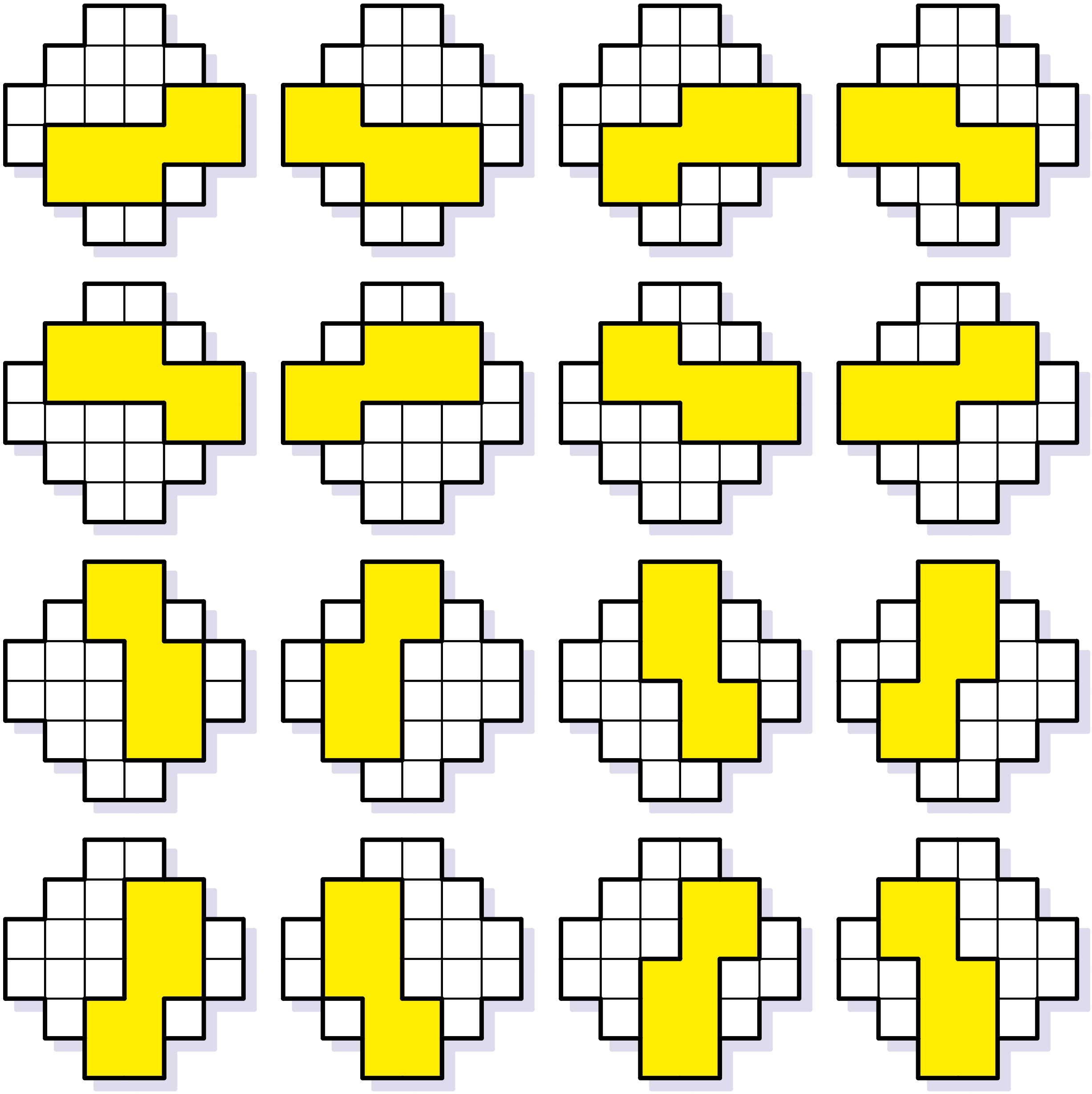
In the picture within two dozen tangled hearts, there are exactly four pairs of interlinked ones. Can you find these pairs?



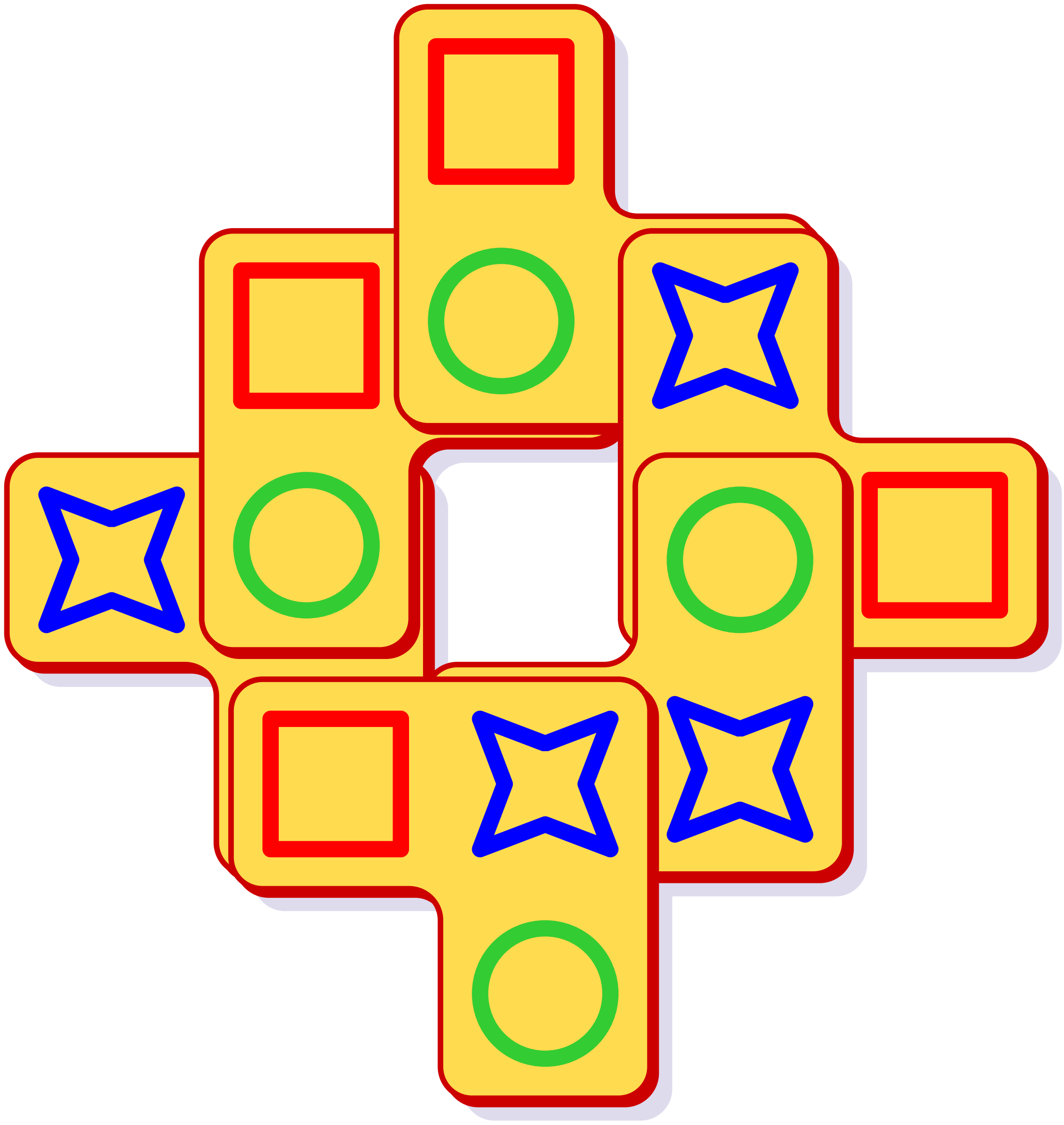
Four pairs of interlinked hearts are shown in the illustration.



How many times can the shape shown just next to the above cross-like pattern be found in it in any possible orientation (even mirrored)?

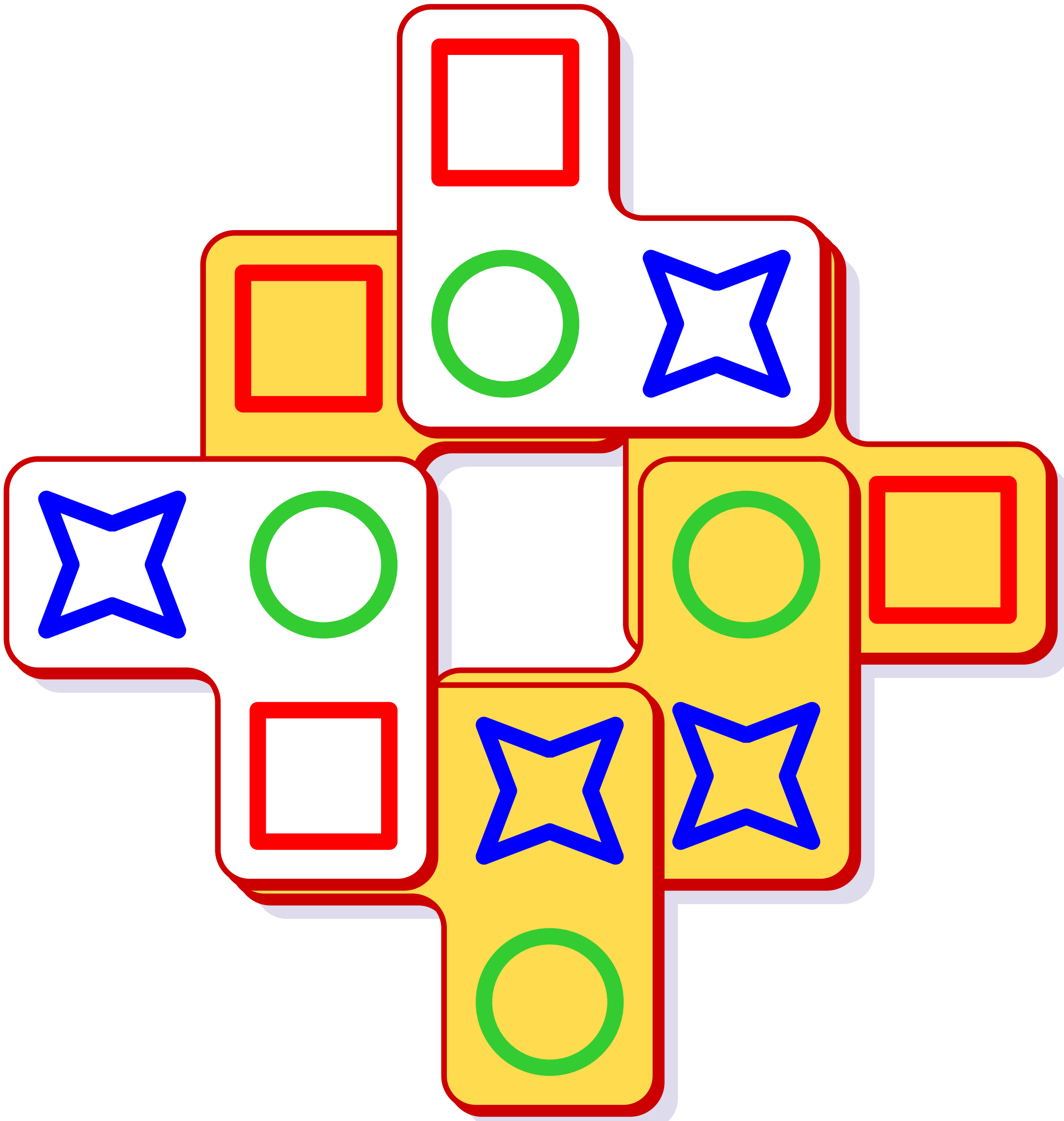


16 shapes of all possible orientations can be found in the pattern, as shown in the illustration.



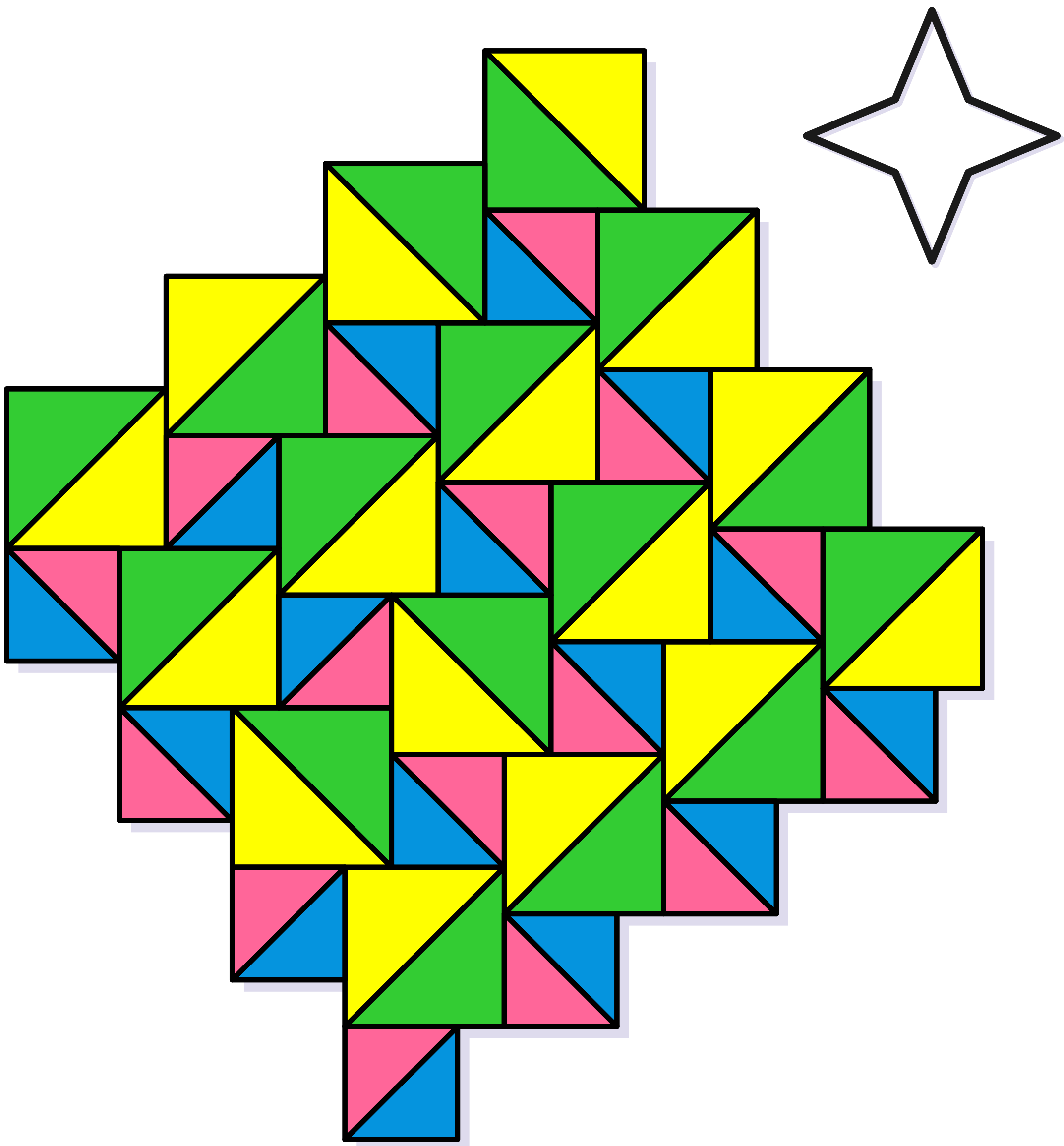
The ring consists of the six one-sided corners. Each corner has three different ornaments on it. There are two exactly identical corners which have the same set of ornaments placed identically on each of them; reflection is not allowed. Can you find these two identical corners?

* Based on The Christmas-tree Ornaments puzzle by Serhiy Grabarchuk
www.ageofpuzzles.com/Collections/TheChristmasTreeOrnaments/TheChristmasTreeOrnaments.htm



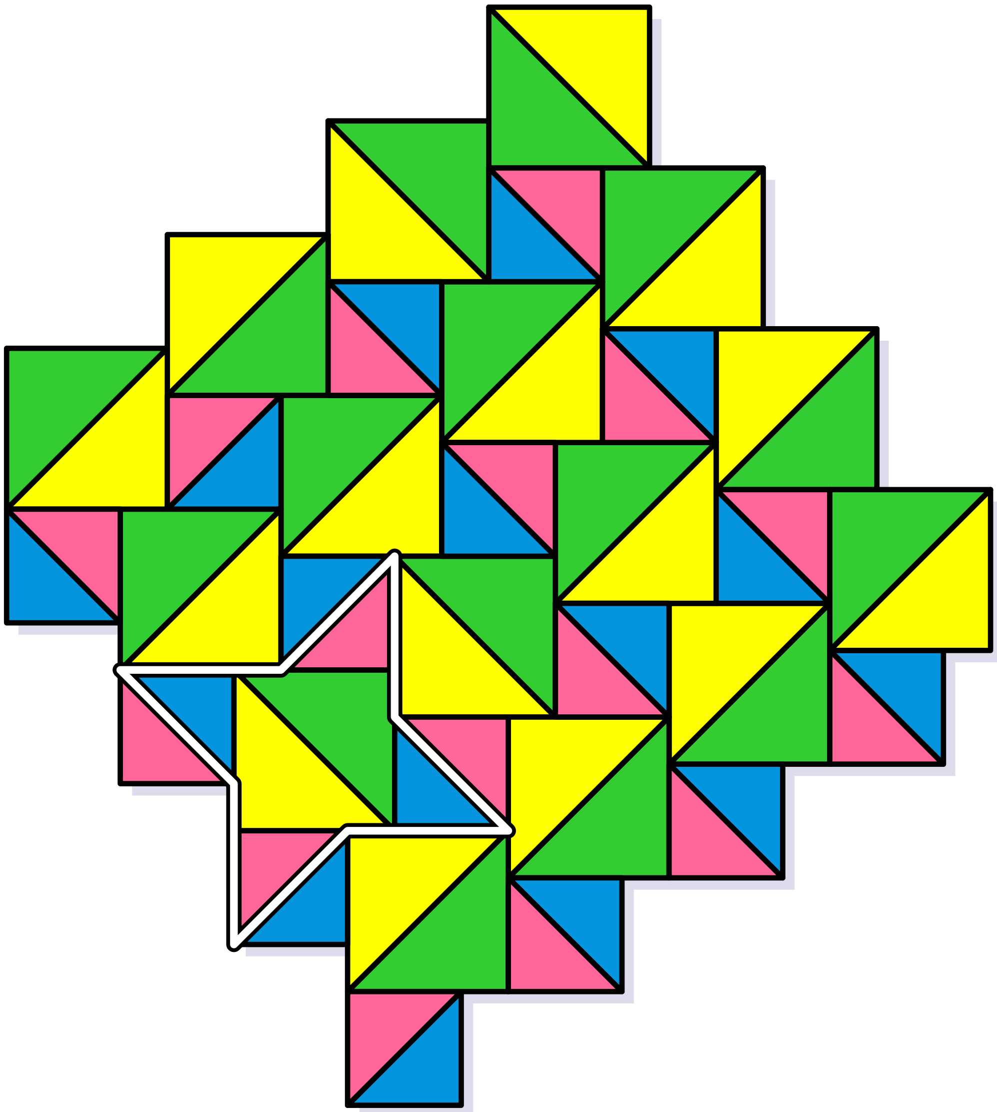
Two identical corners are highlighted and are placed over all other ones.

* Based on The Christmas-tree Ornaments puzzle by Serhiy Grabarchuk
www.ageofpuzzles.com/Collections/TheChristmasTreeOrnaments/TheChristmasTreeOrnaments.htm



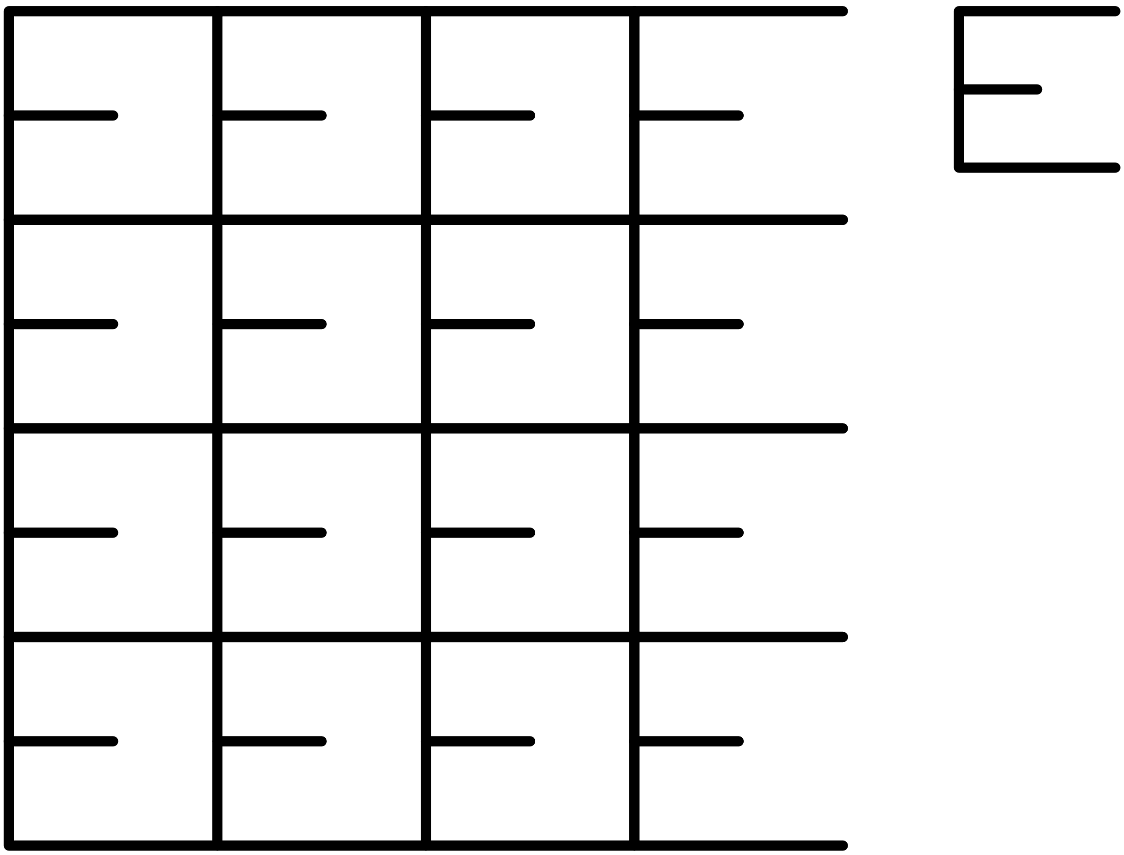
In the inlay, find a perfect, four-pointed star exactly similar to that shown just above it. The star can differ in size and orientation, but its outline must be full and uninterrupted.

* Based on The Christmas Star puzzle by Serhiy Grabarchuk
www.ageofpuzzles.com/Collections/TheChristmasStar/TheChristmasStar.htm

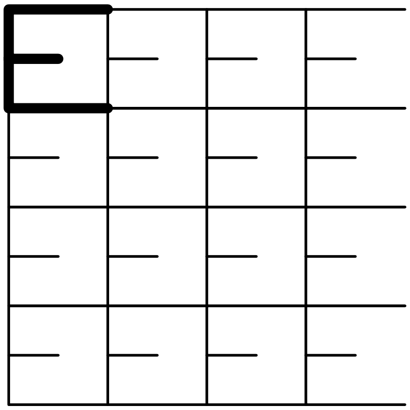


The hidden star is shown in the illustration.

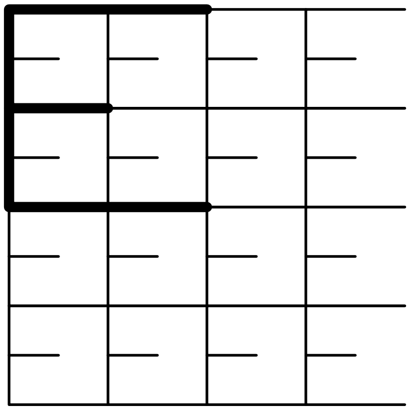
* Based on The Christmas Star puzzle by Serhiy Grabarchuk
www.ageofpuzzles.com/Collections/TheChristmasStar/TheChristmasStar.htm



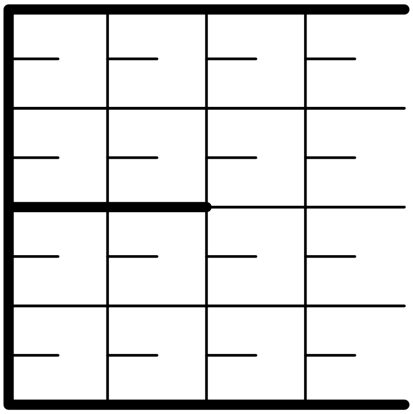
How many E's, exactly similar to the small one on the top, of any possible size and orientation, can you find in the pattern?



x16

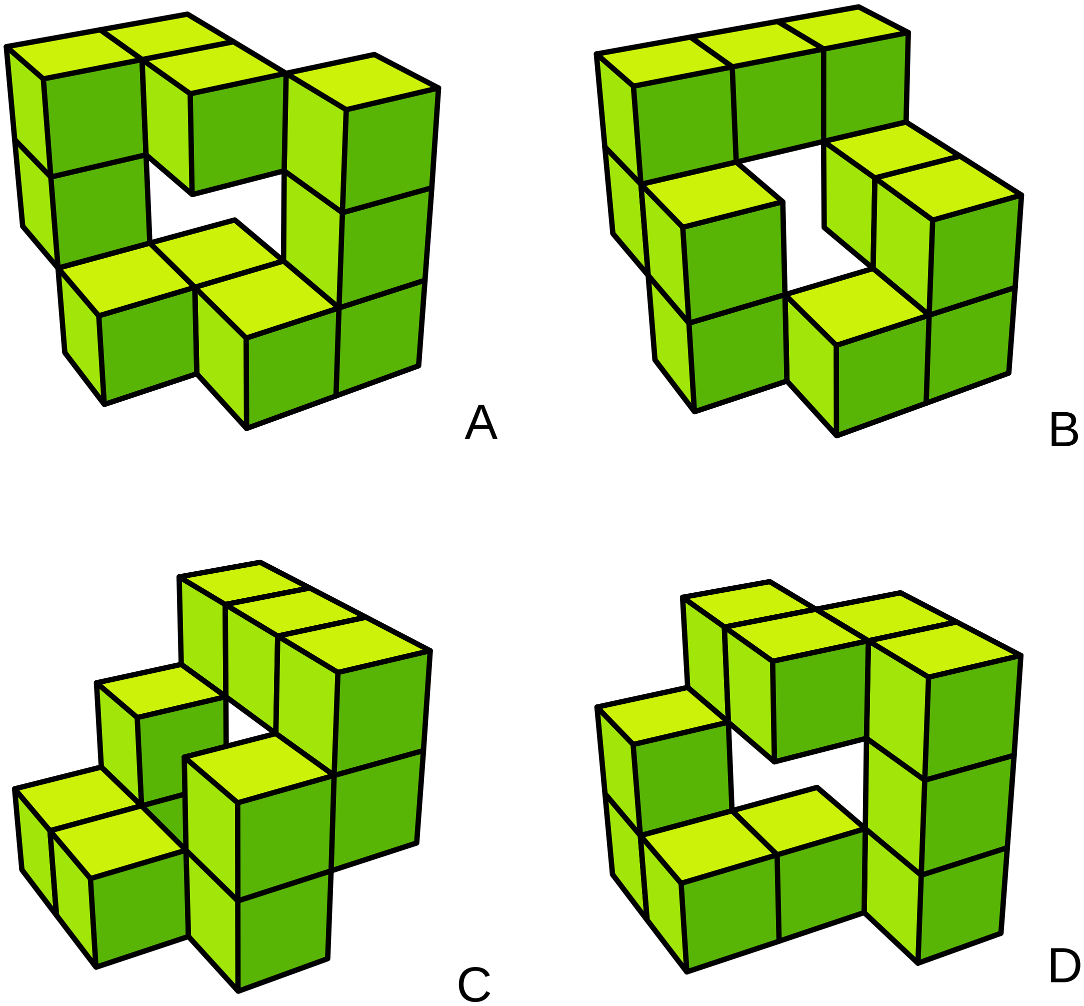


x27

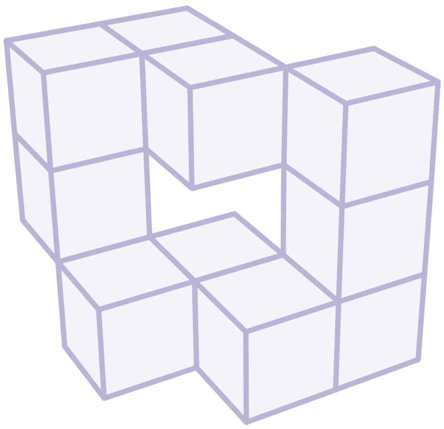


x1

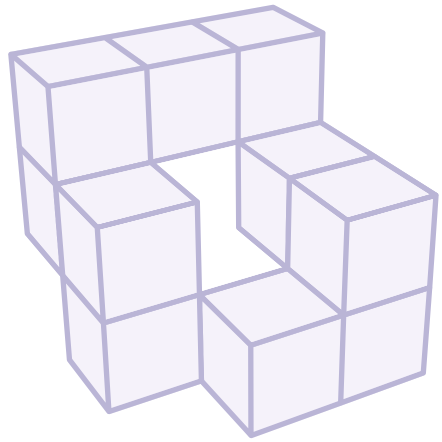
There are 44 E's of all possible sizes and orientations, as shown in the illustration.



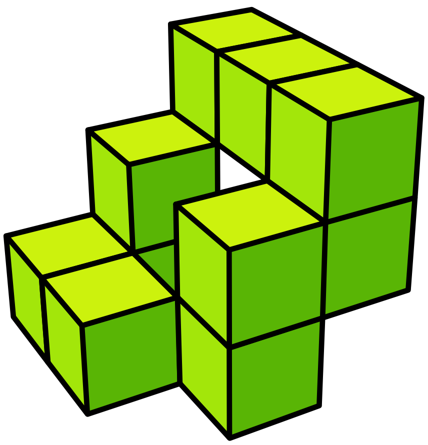
The ring consists of ten cubes. Three of the four pictures of the ring are correct. Which one is wrong?



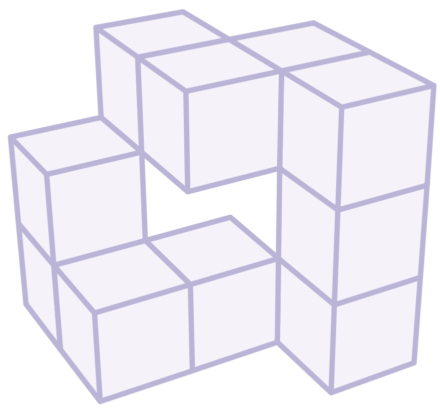
A



B



C



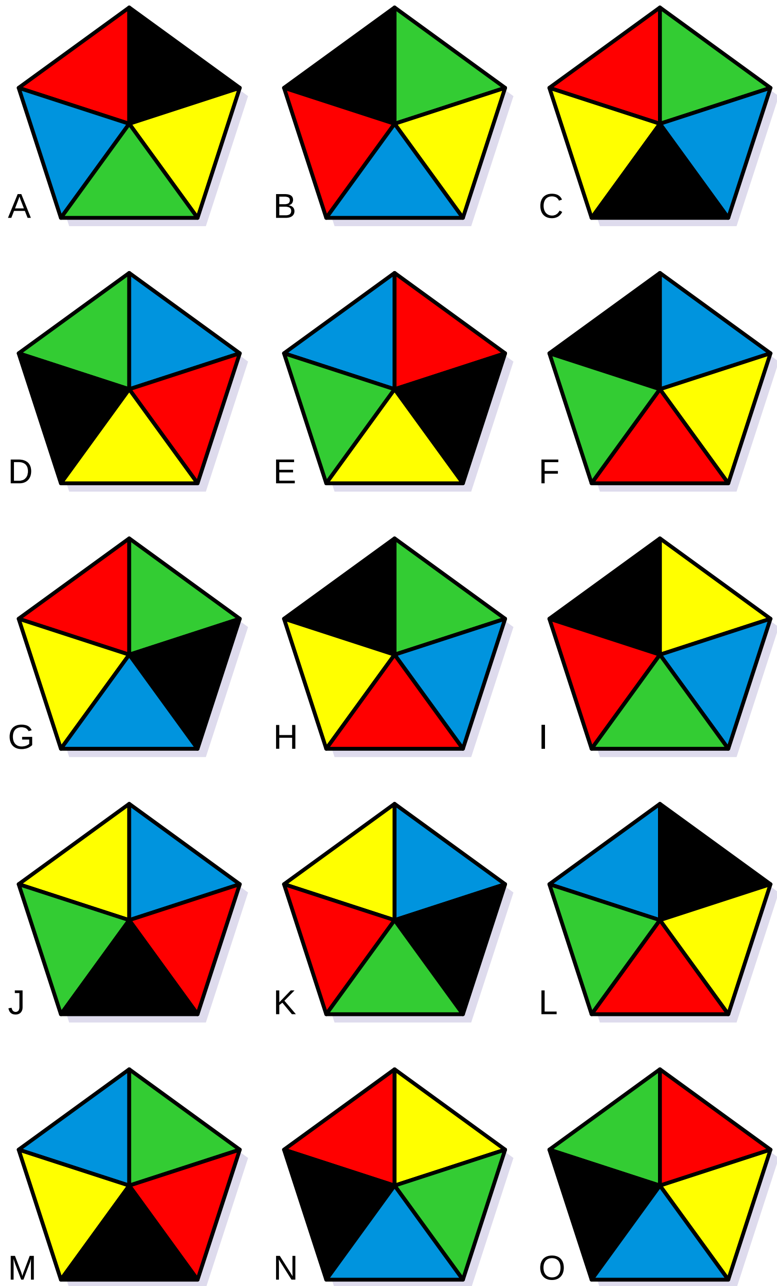
D

Picture C is wrong.

Posted: August 2012

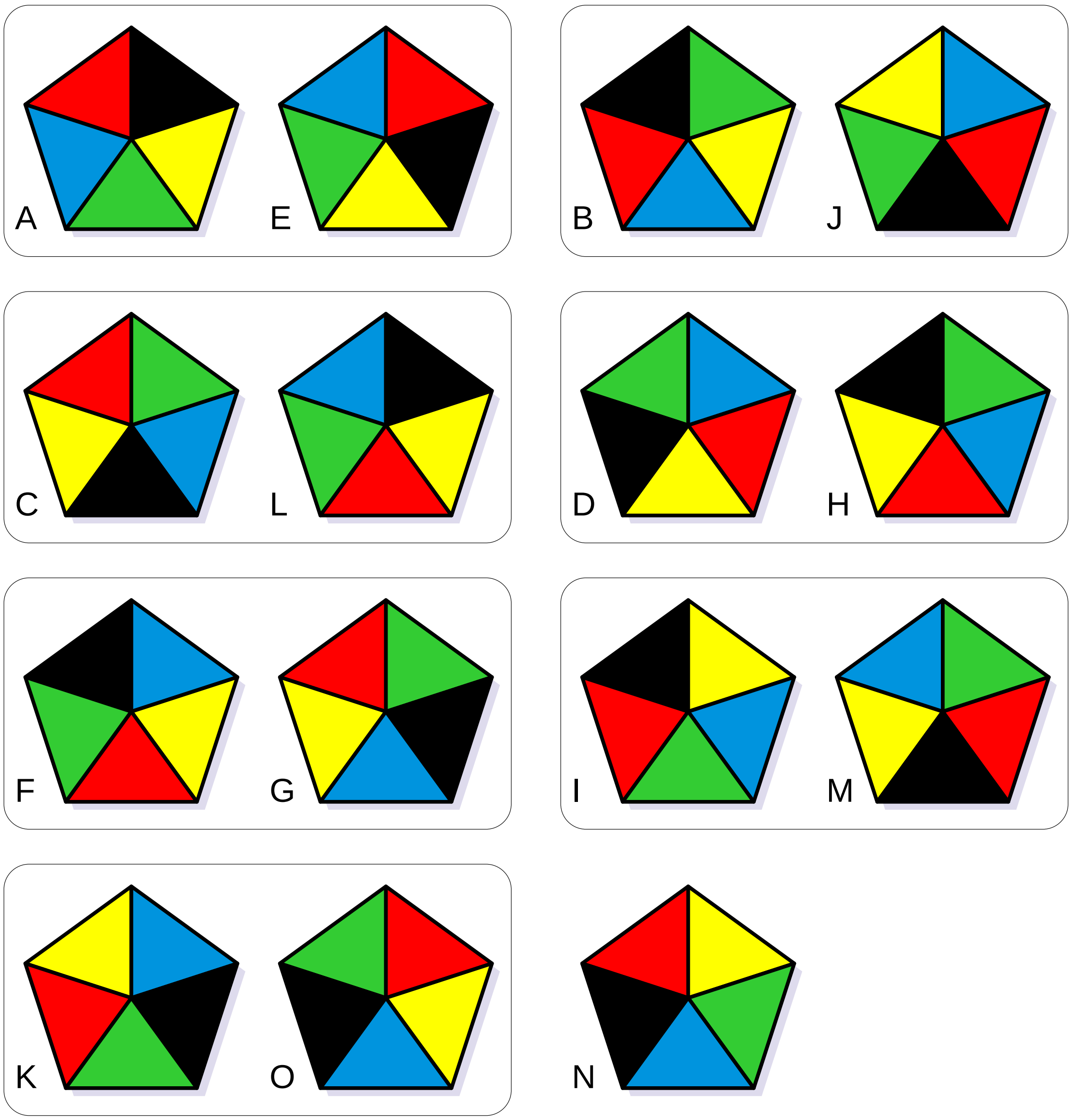
15 Pentagons

by Richard Candy

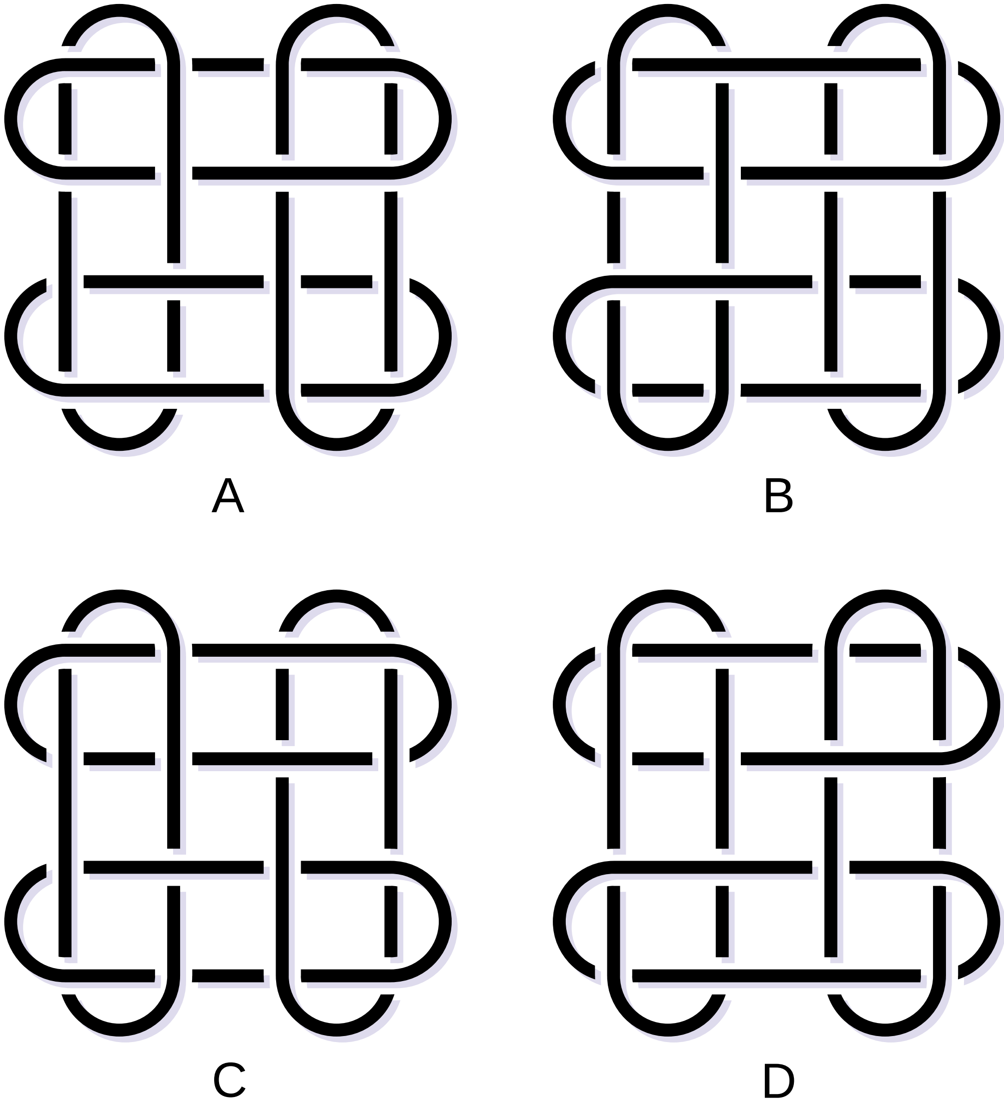


Find the pentagon which has no partner (has no its exact twin).

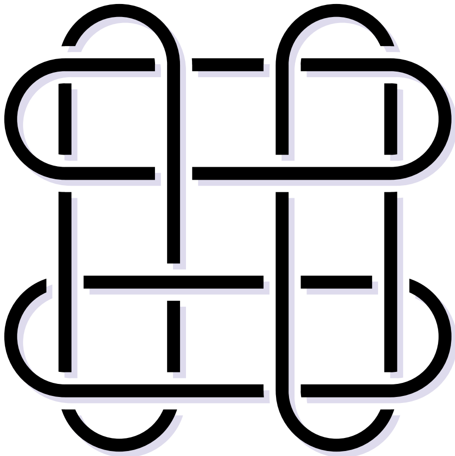
Posted: June 2012



Pentagon N has no twin, as shown.



Three of the four tangled squares are identical. Which one differs?


A

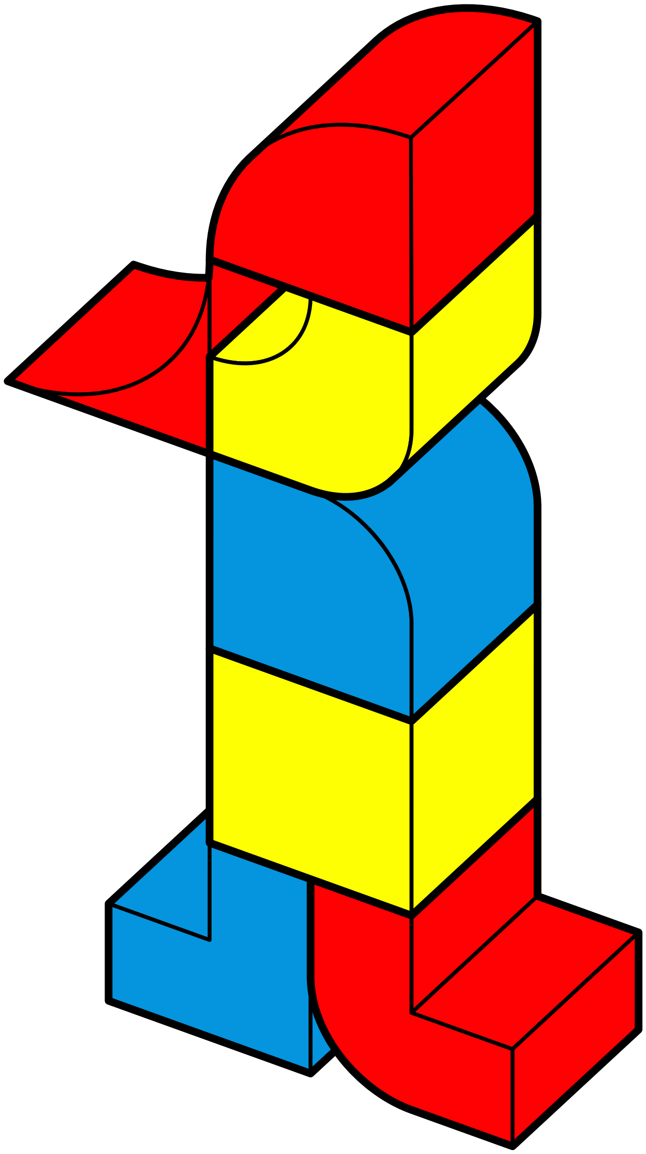
B

C

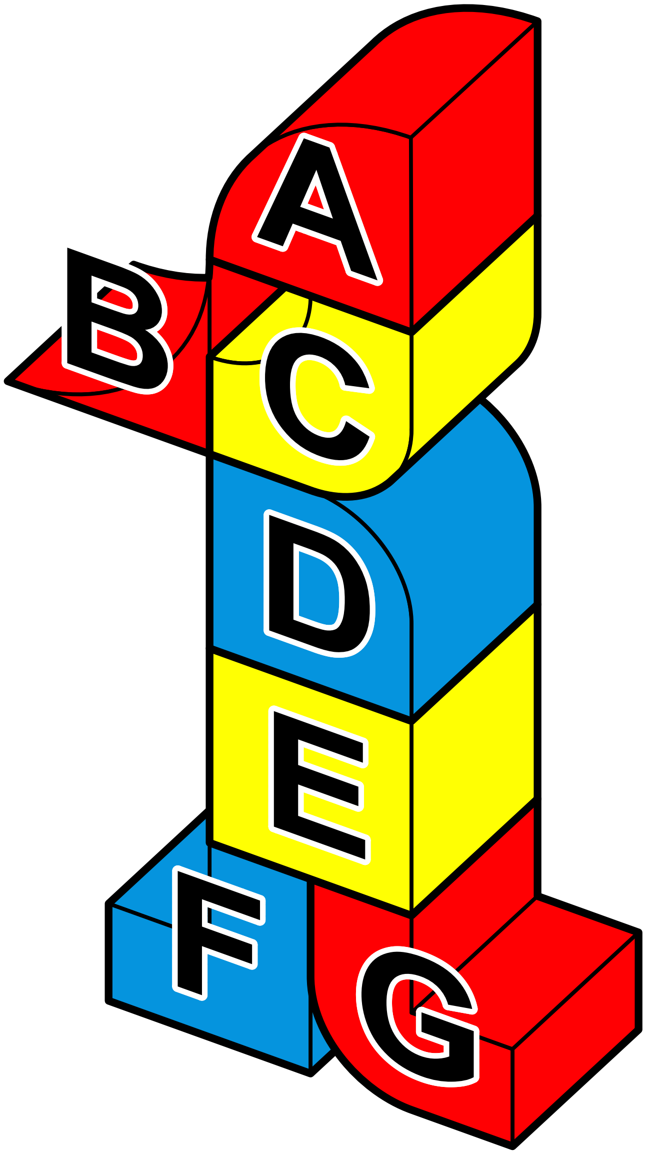
D

Tangled square A differs.

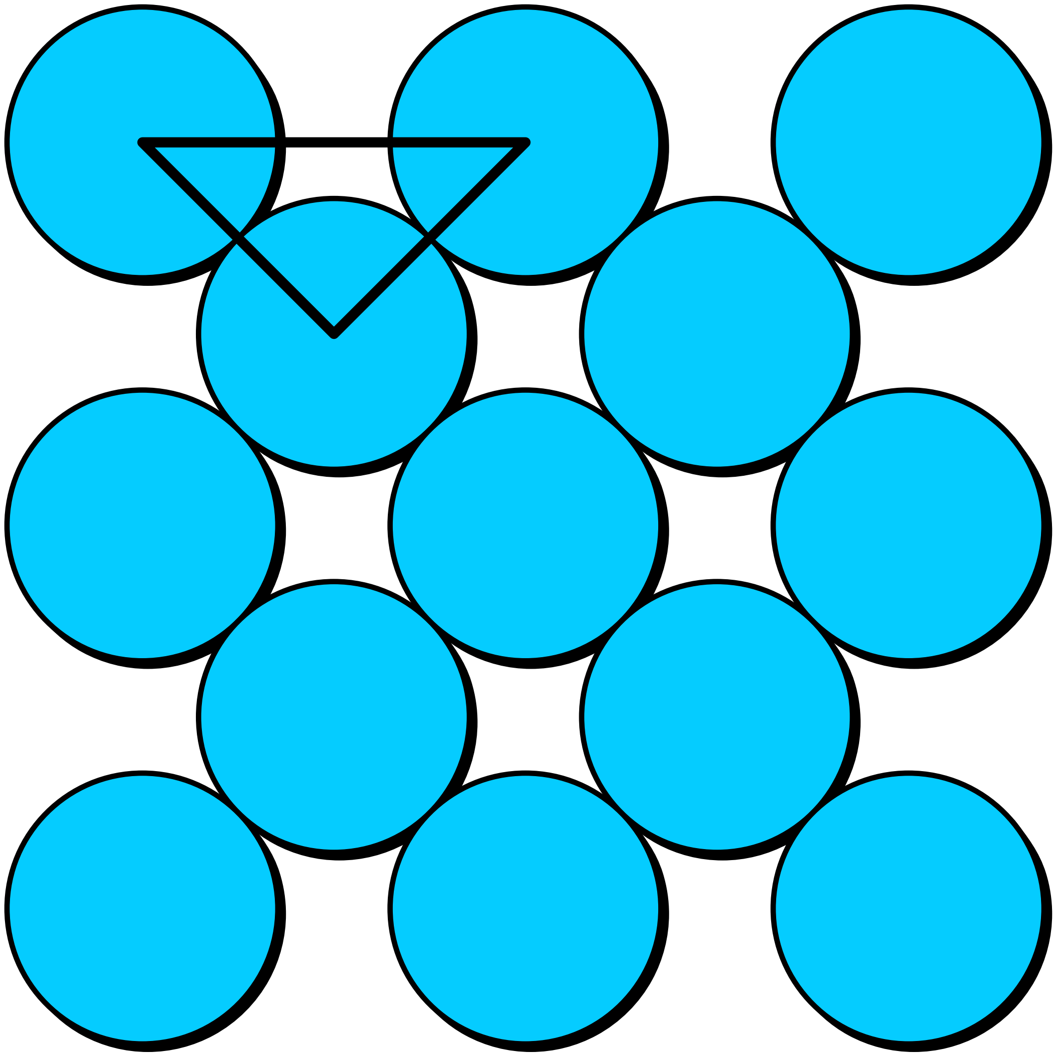
Posted: June 2012



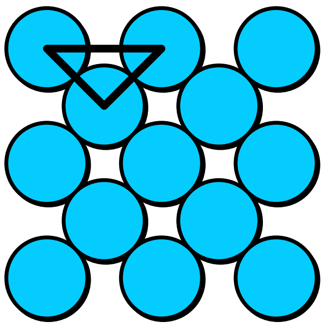
Which region is bigger - A (blue) or B (red)?



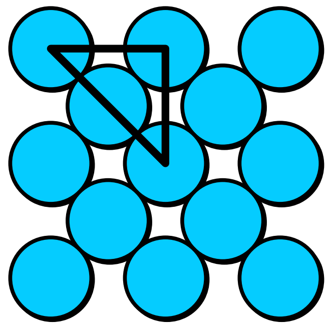
Areas of the regions: region A = $\pi*3^2 + 6^2 = 9\pi + 36$; and region B = $\pi*5^2 - \pi*4^2 + 10^2 - 8^2 = 9\pi + 36$. Thus, regions A and B have equal areas.



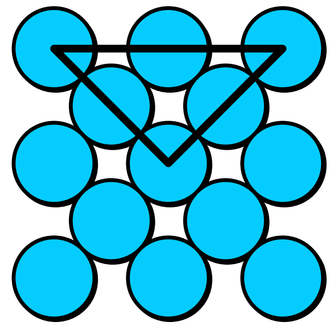
How many right isosceles triangles of any size and orientation can you find in the shape? To count, the triangle must have three coins placed exactly at its respective corners. One triangle is already shown.



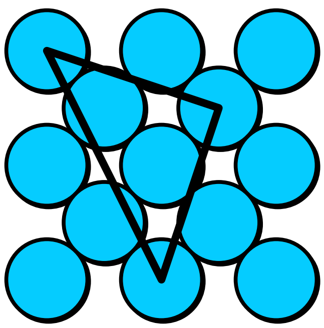
x24



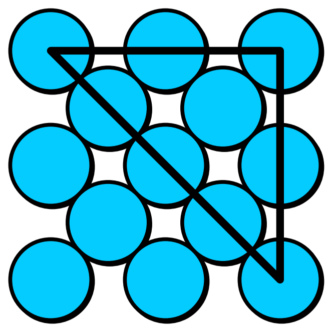
x20



x8

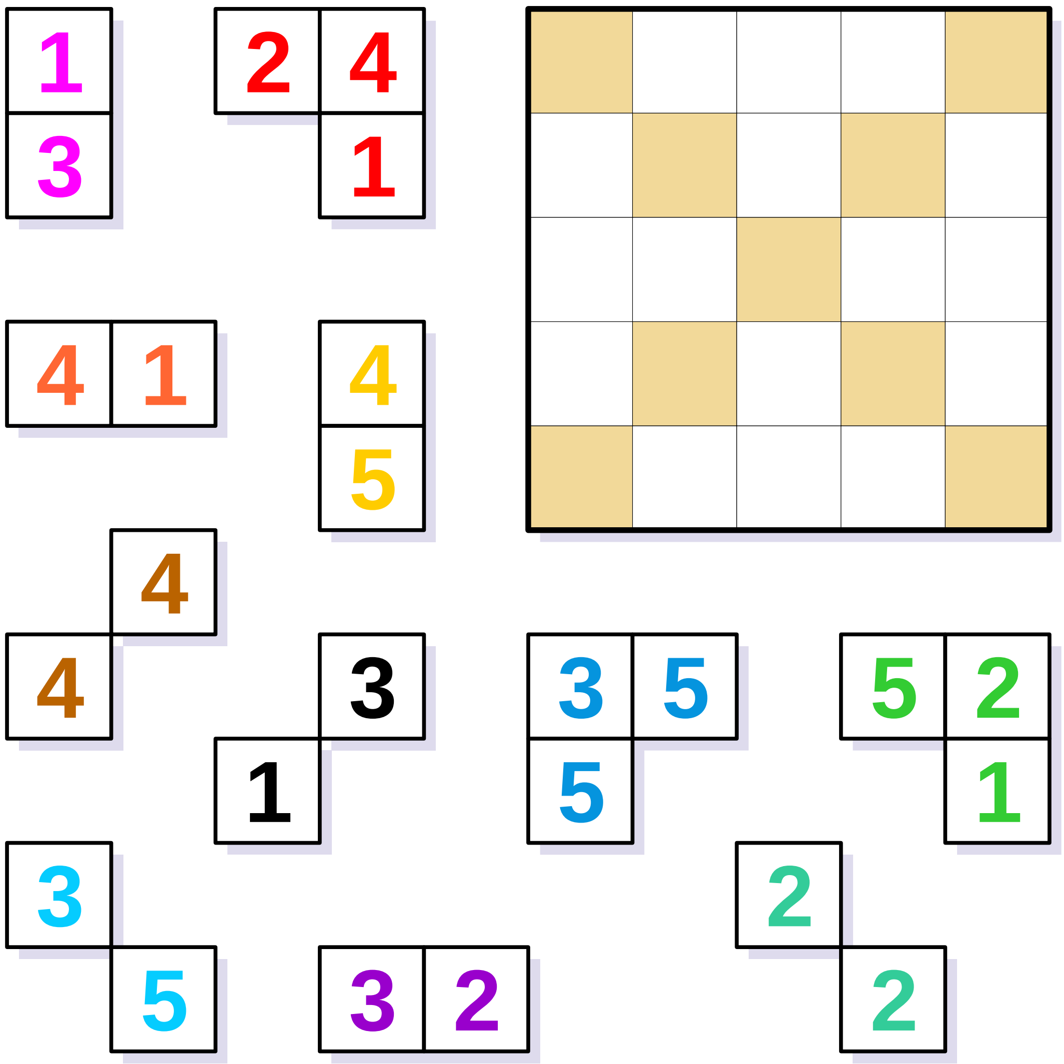


x8



x4

There are 64 coin right isosceles triangles of all sizes and orientations, as shown.



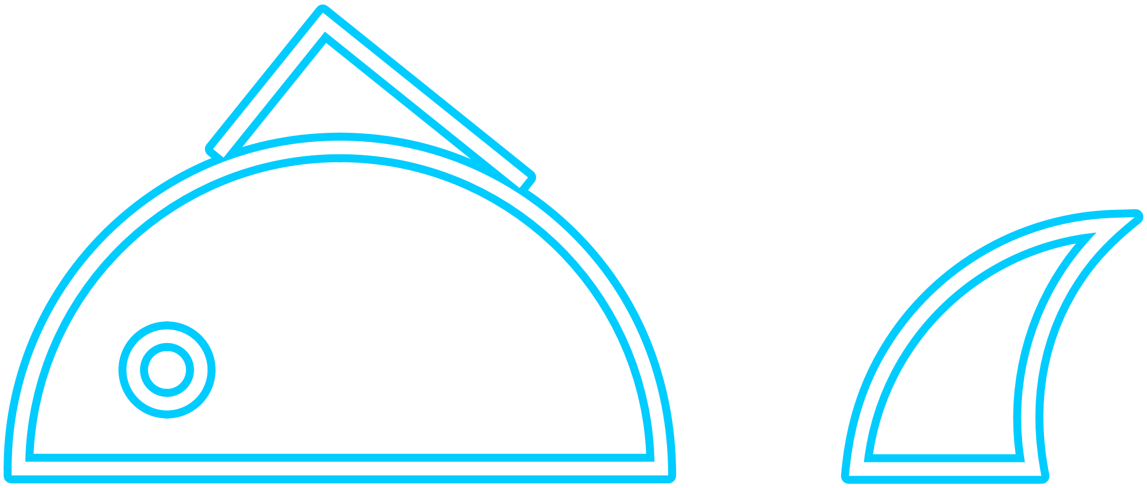
Put all the eleven pieces into the 5x5 board so that each row, column, and main diagonal (both diagonals are highlighted) contains different digits, 1 through 5. No piece is rotated or flipped, and no pieces overlap each other.

Number Fit
Solution

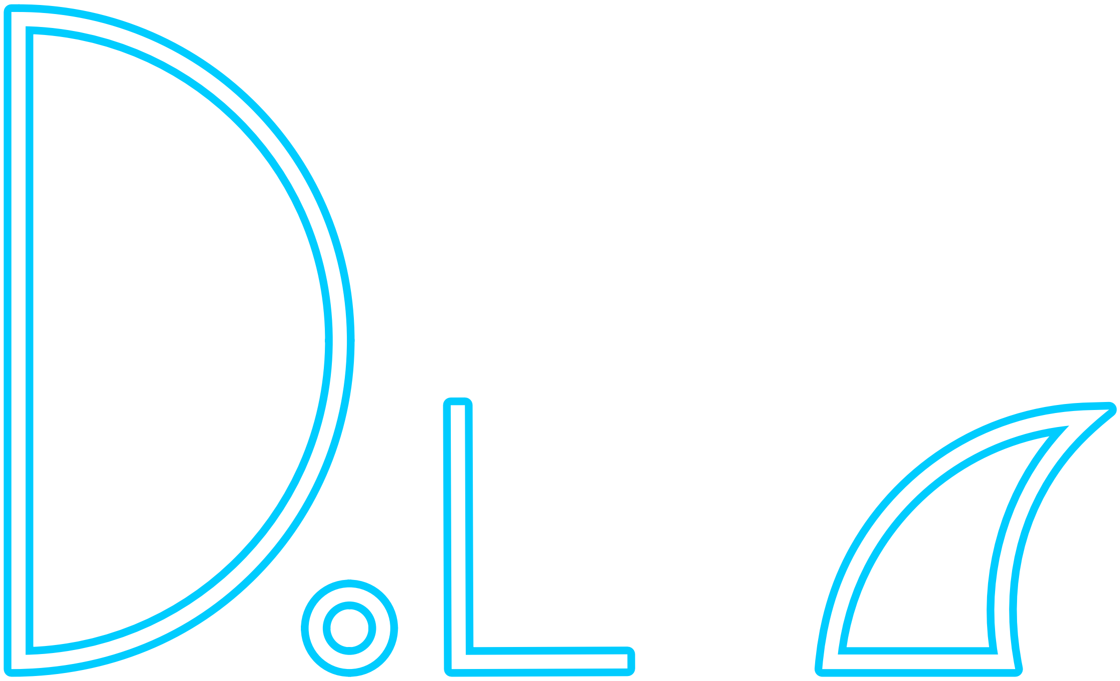
2	4	3	5	1
4	1	5	2	3
5	3	4	1	2
1	5	2	3	4
3	2	1	4	5

The solution is shown in the illustration.

Posted: November 2012



What familiar sea creature does this best represent?



DOL + FIN

Rearrange the elements of the picture into DOL and FIN and you could read DOLPHIN.

Correct Order

In the cellphone some of the keys are swapped. What is the minimum number of 2-key swaps required to restore the correct order of the keys, as shown?

Broken Program

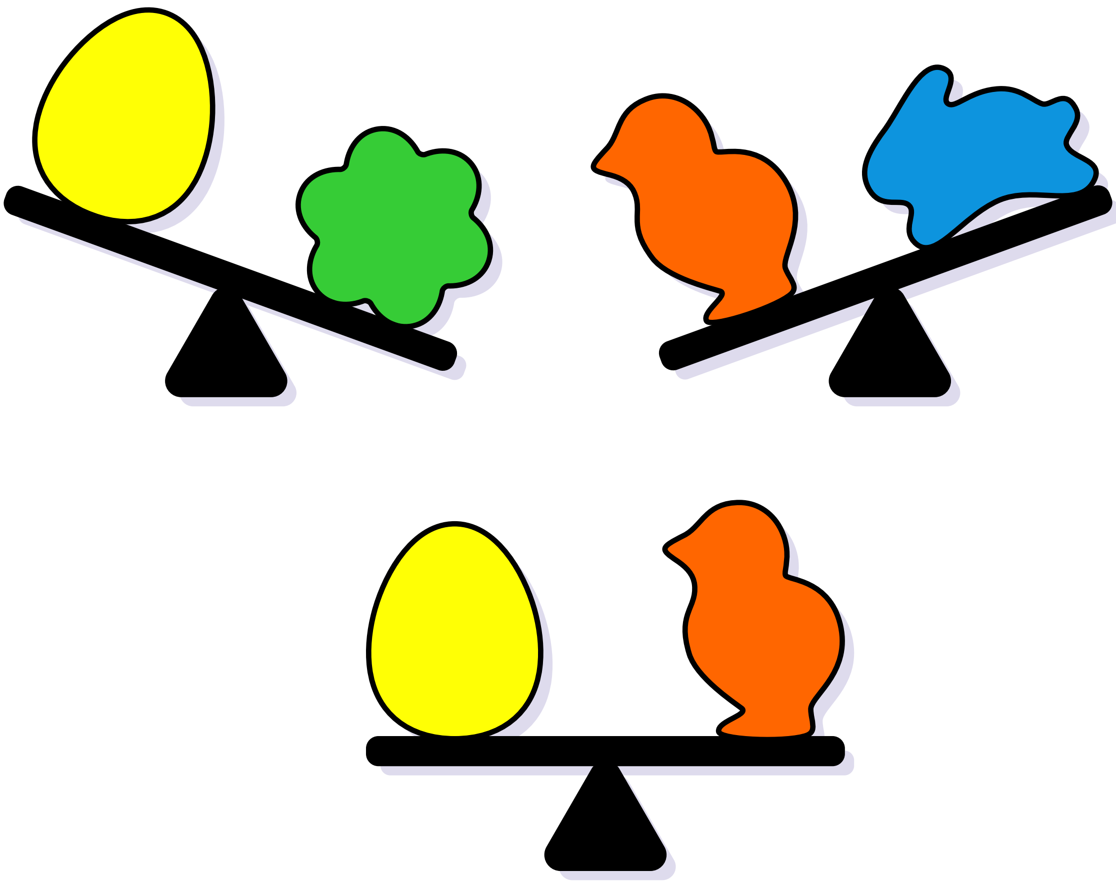
Solution

Puzzles.COM

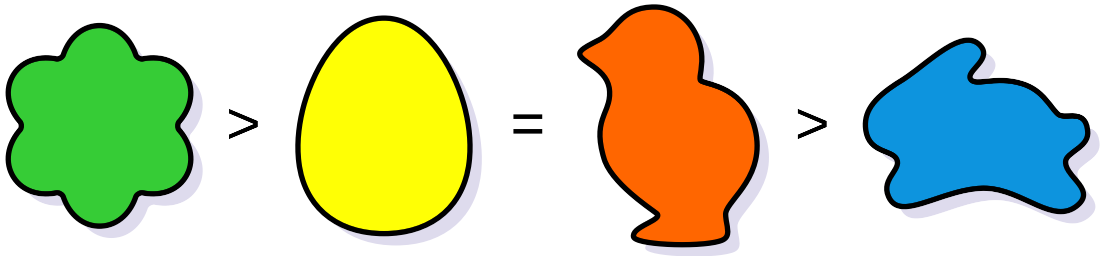
Start

Finish

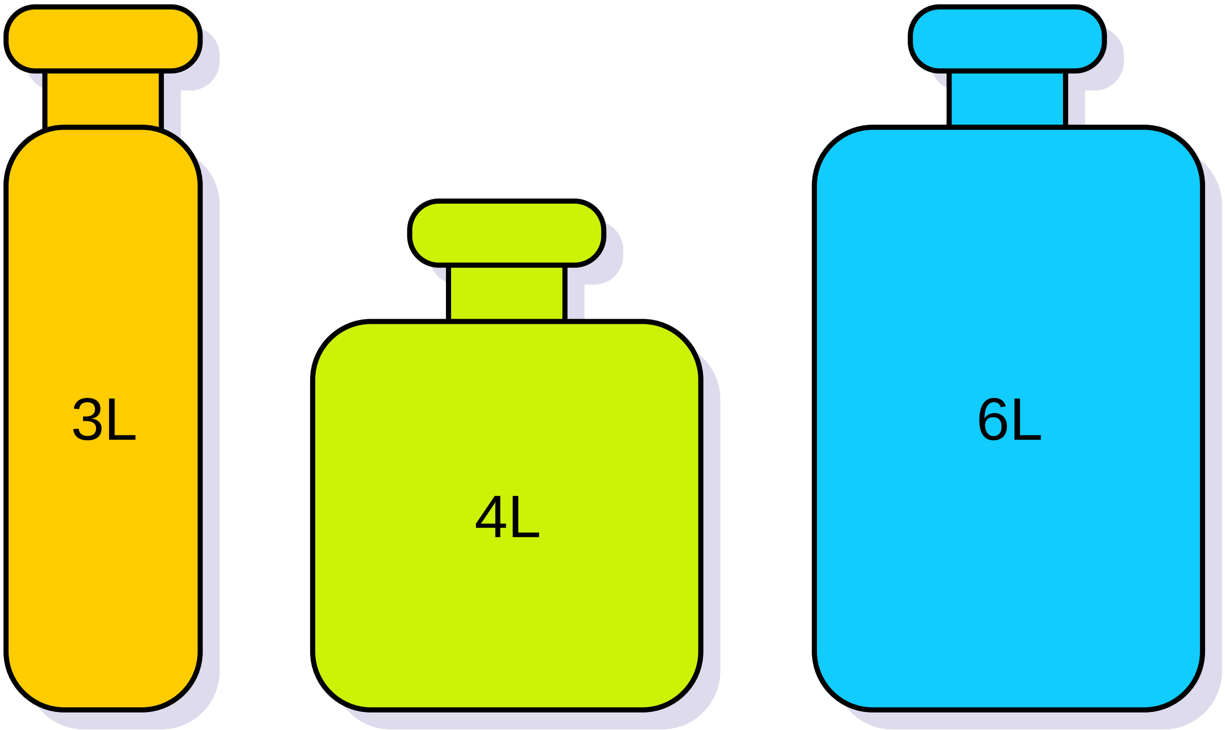
6 swaps are required to restore the correct order of keys: 7 <> 1; 7 <> 3; 7 <> 9; 2 <> 6; 6 <> 4; 6 <> 8.



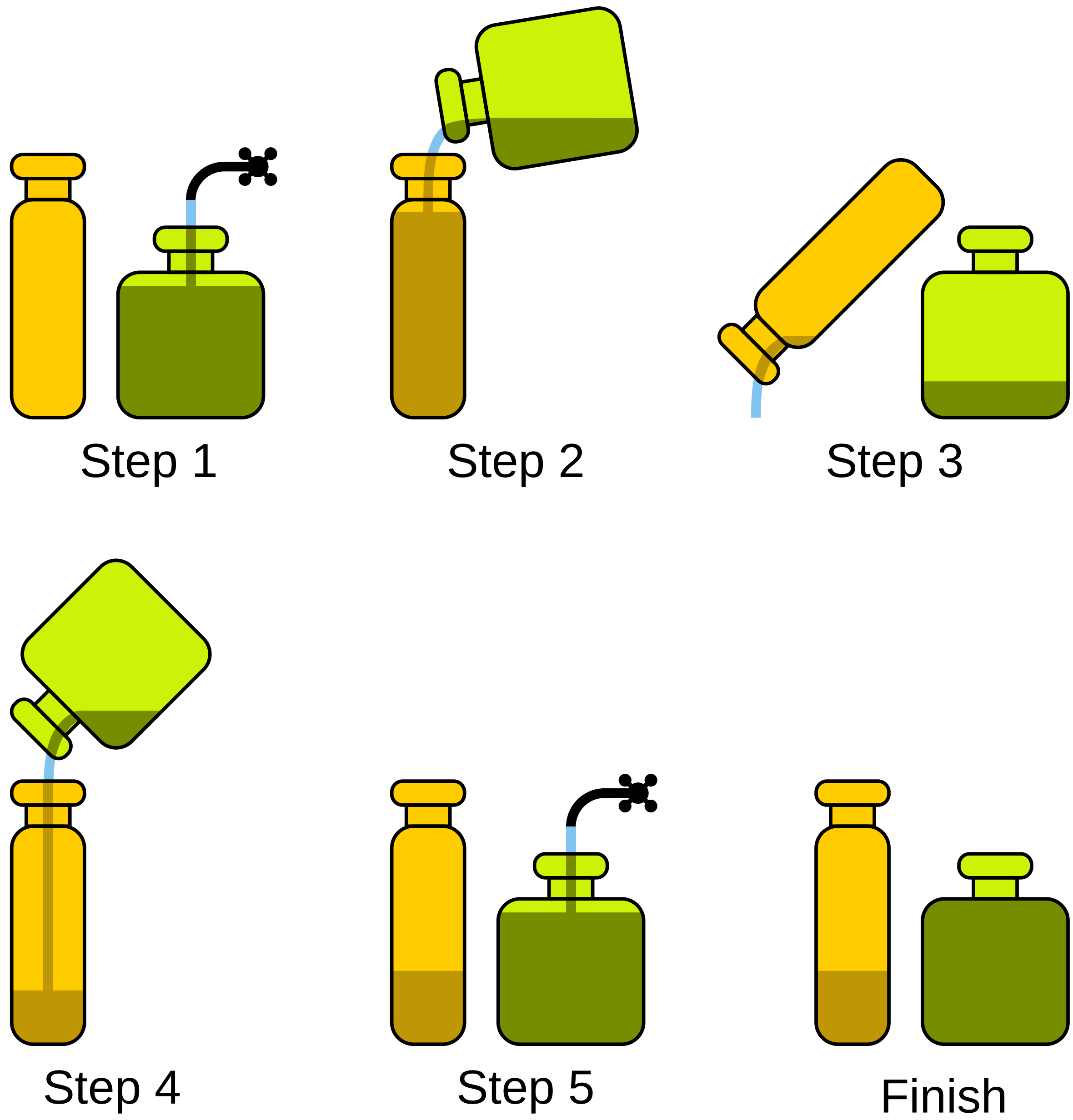
Which candy is the heaviest?



Flower > Egg; Egg = Chick; and Chick > Rabbit. Thus, Flower > Egg (Chick) > Rabbit, making Flower the heaviest candy.



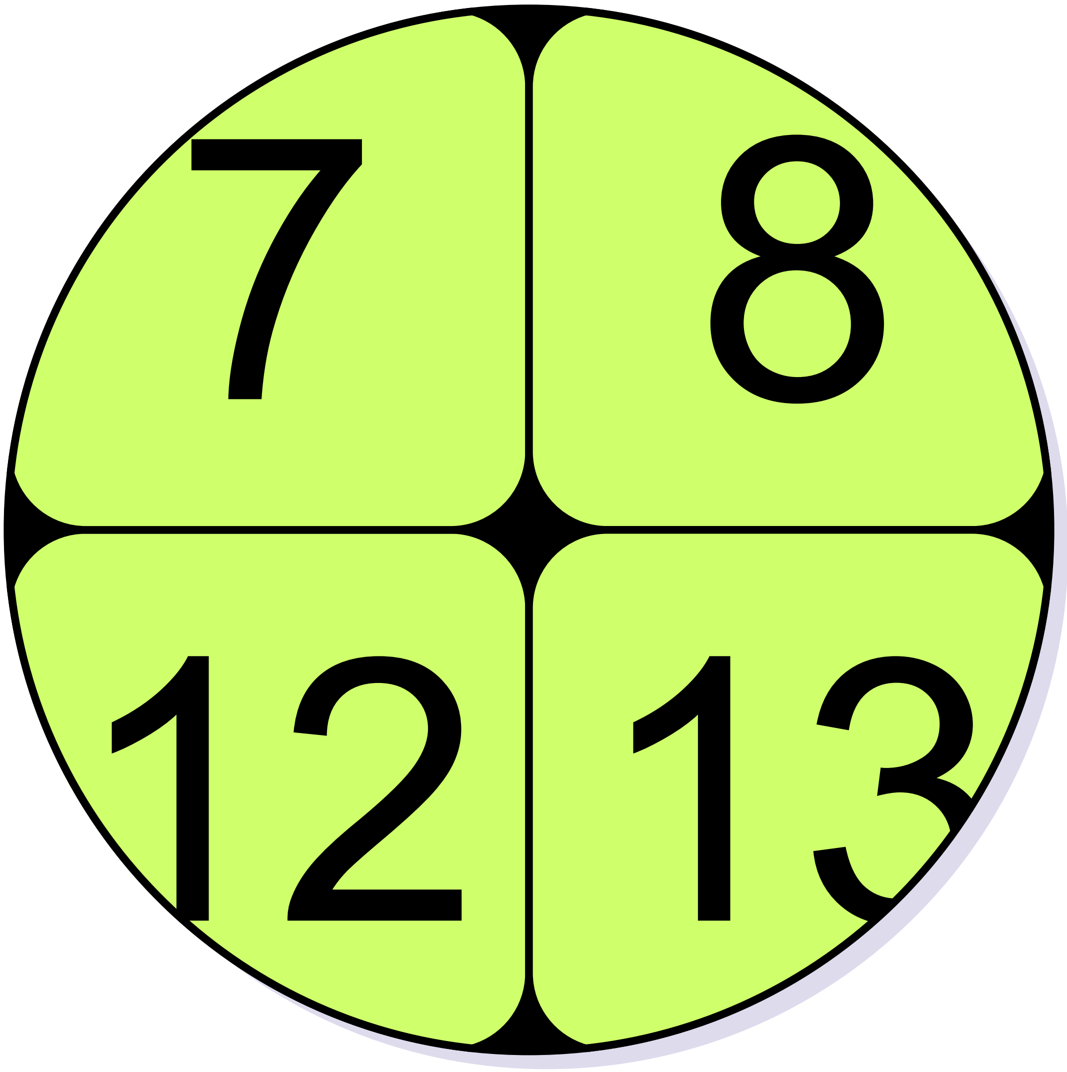
Using two of the cans, it is possible to measure exactly 5 liters of water. Which two cans must be used?



Use the [3L] and [4L] cans. 1. Fill [4L] with water. 2. Fill [3L] from [4L]. 3. Empty [3L]. 4. Pour the remaining water from [4L] into [3L]. 5. Fill [4L] with water. There are 5L of water: 1L in [3L] plus 4L in [4L].

Square Size
by The Grabarchuk Family

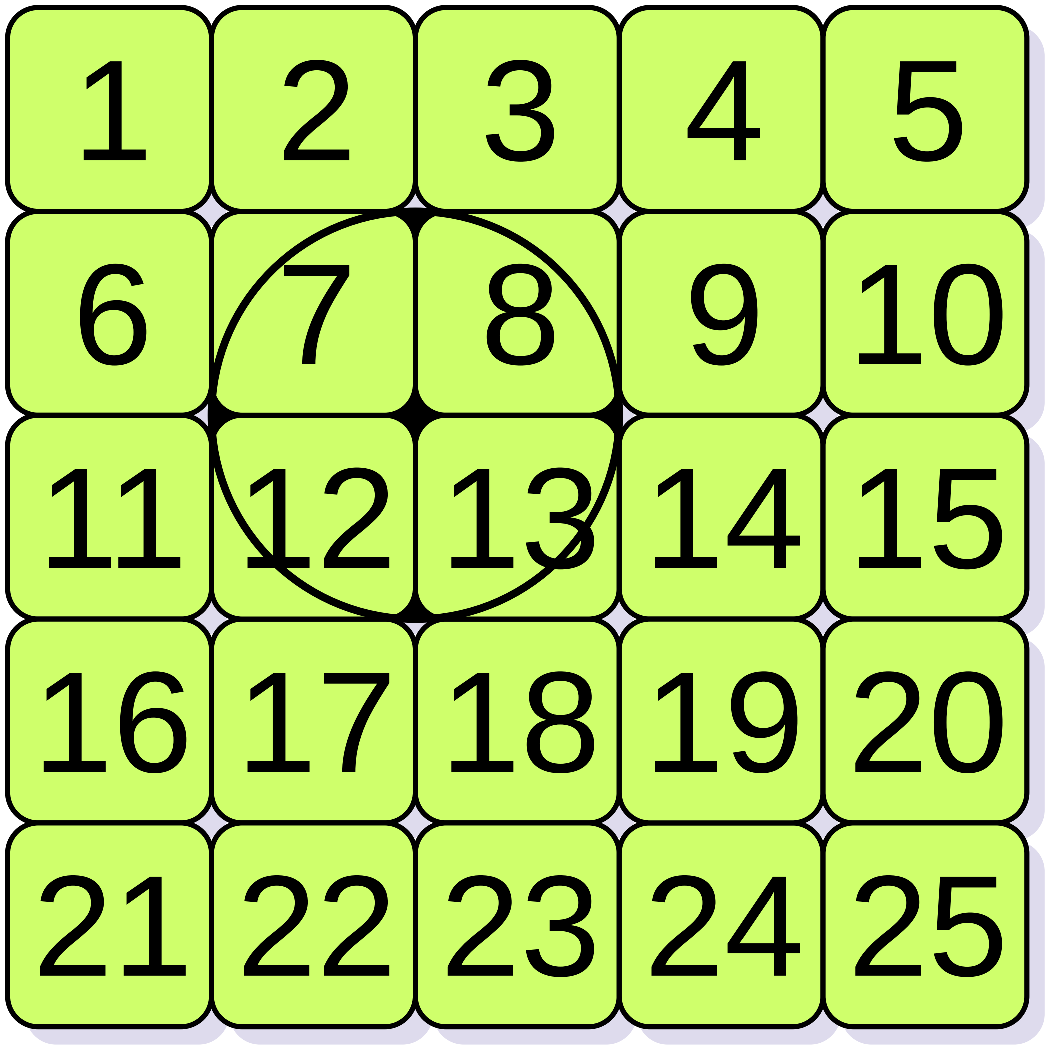
Puzzles.COM



Numbered tiles (1 through N) form a square and are placed in it line-by-line in ascending order starting from its top left corner. A fragment of the square is shown. What is the size of the square?

Square Size

Solution

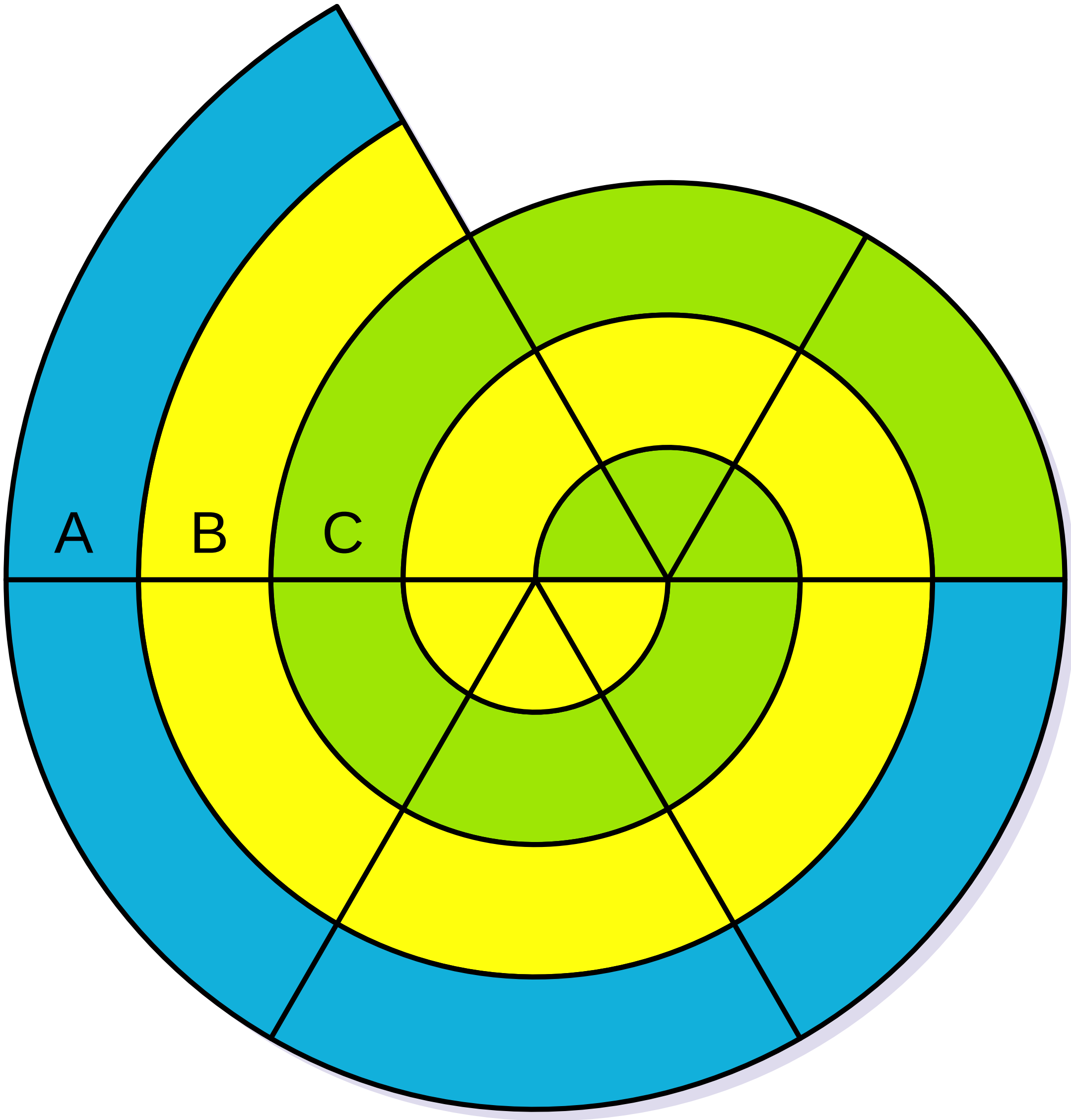


The numbered tiles form a 5 x 5 square.

Three Spirals

by The Grabarchuk Family

Puzzles.COM

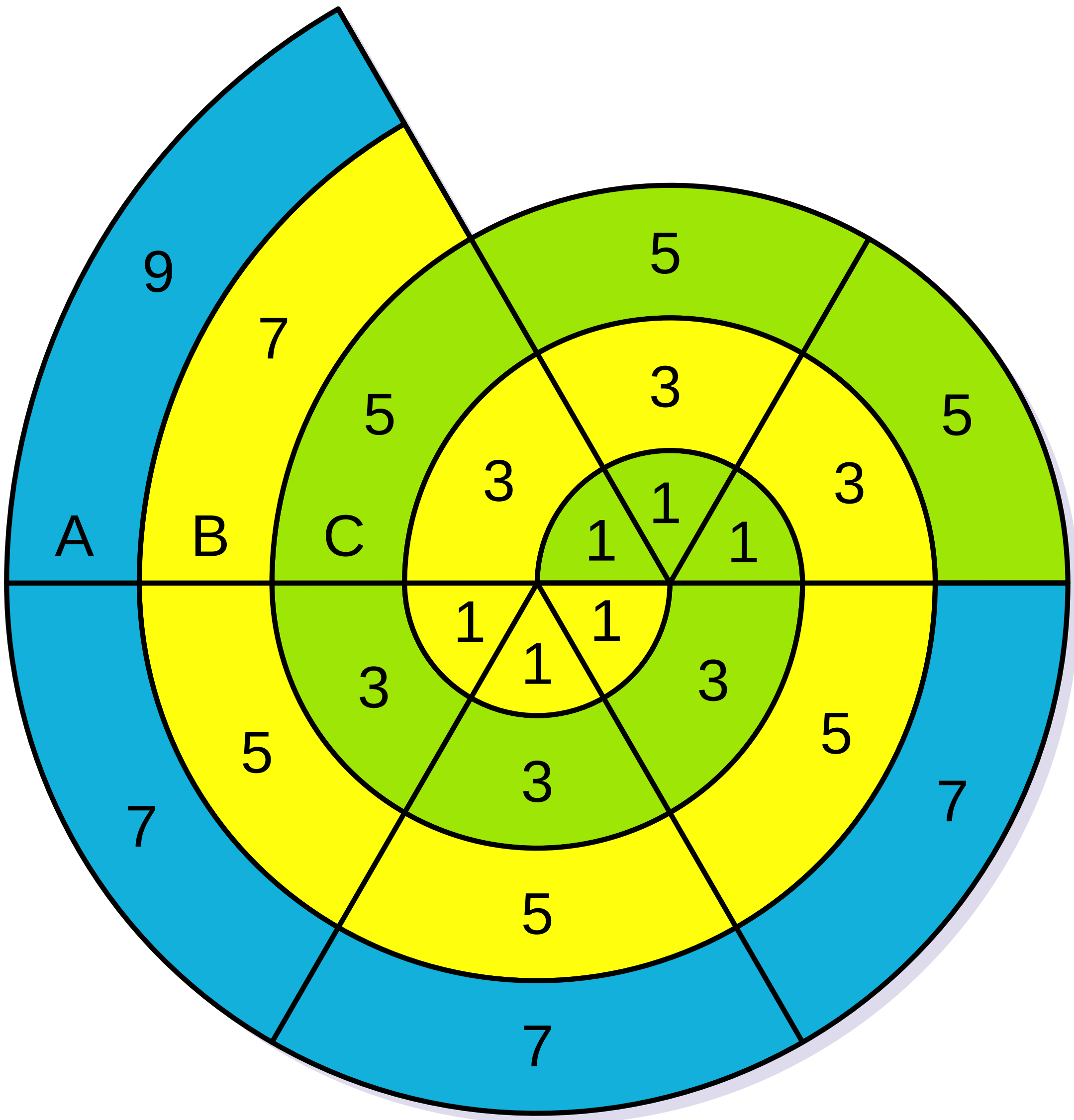


Which spiral (A, B, or C) is the biggest one?

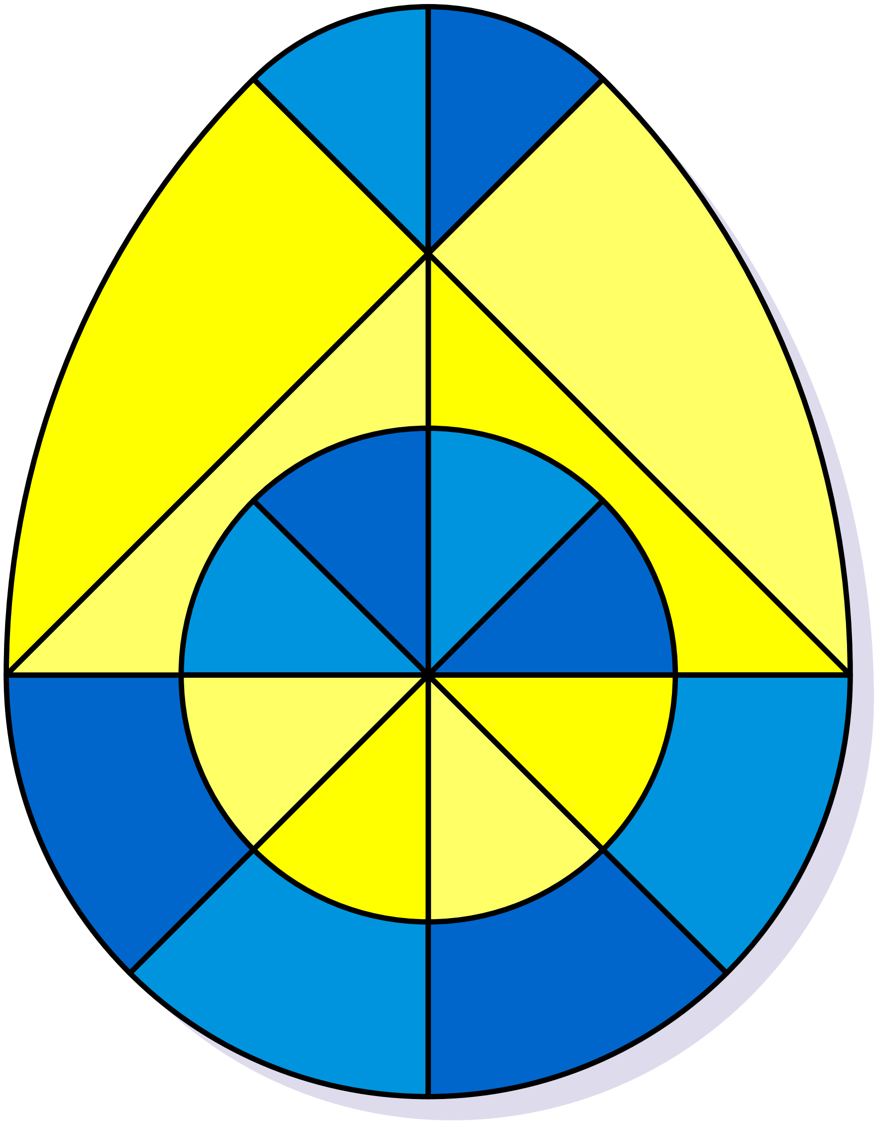
Posted: August 2012

Three Spirals

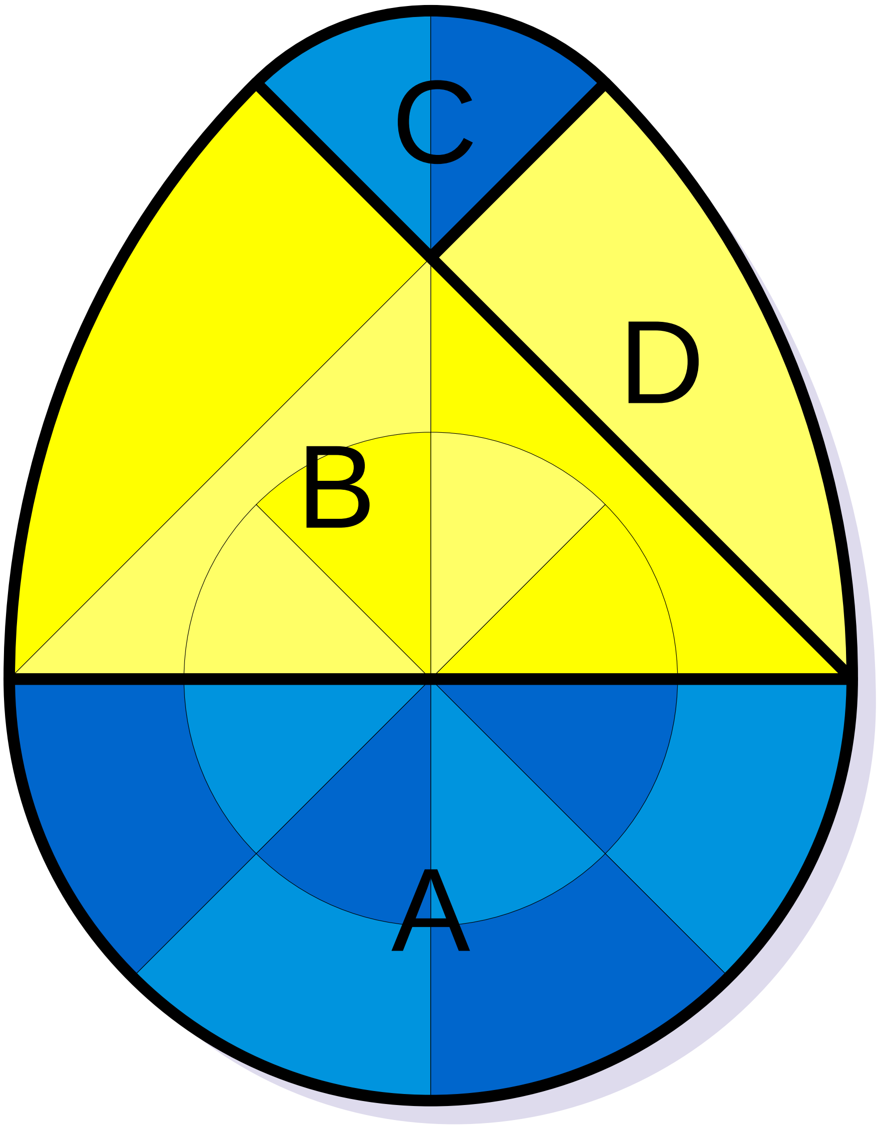
Solution



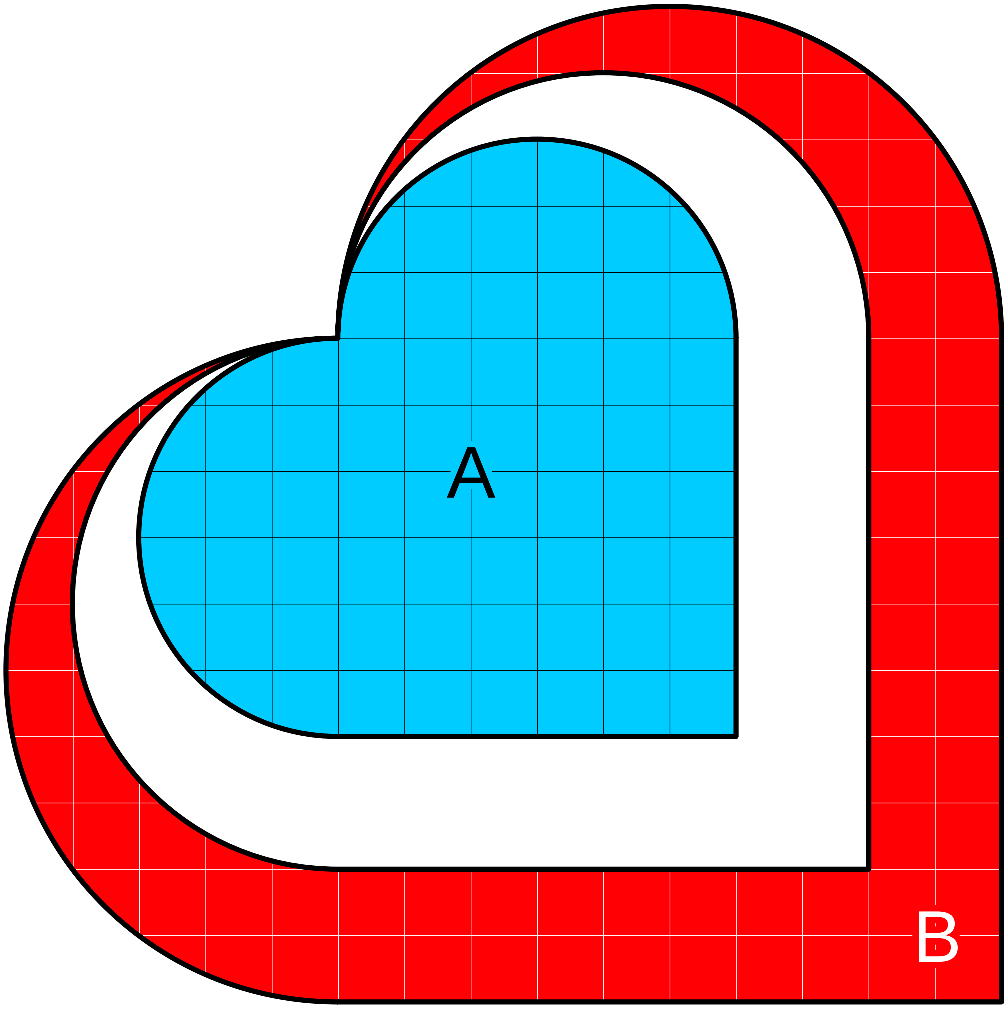
The sizes of the spirals are: A = 30, B = 34, and C = 27. Thus, spiral B is the biggest one.



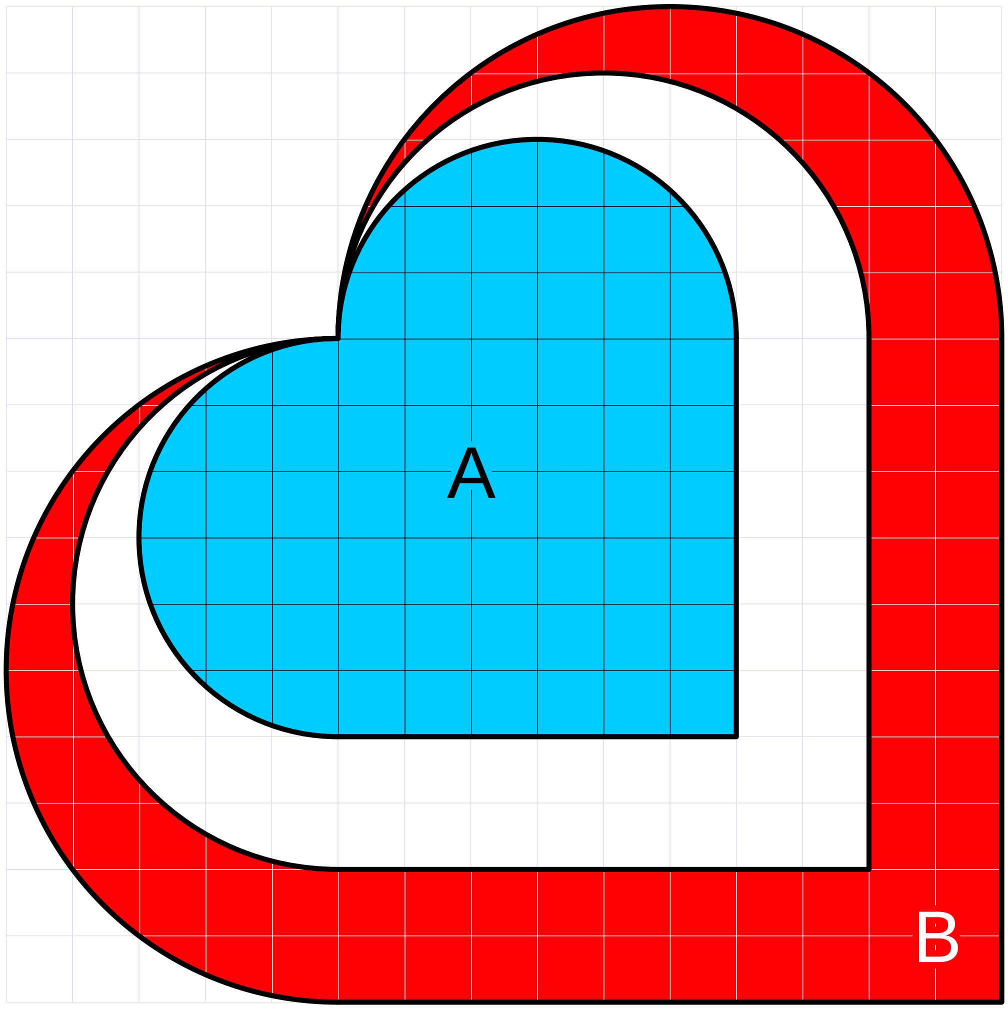
The Egg consists of differently colored parts. Which is bigger - the total area of the light parts (yellow tones) or the total area of the dark parts (blue tones)?



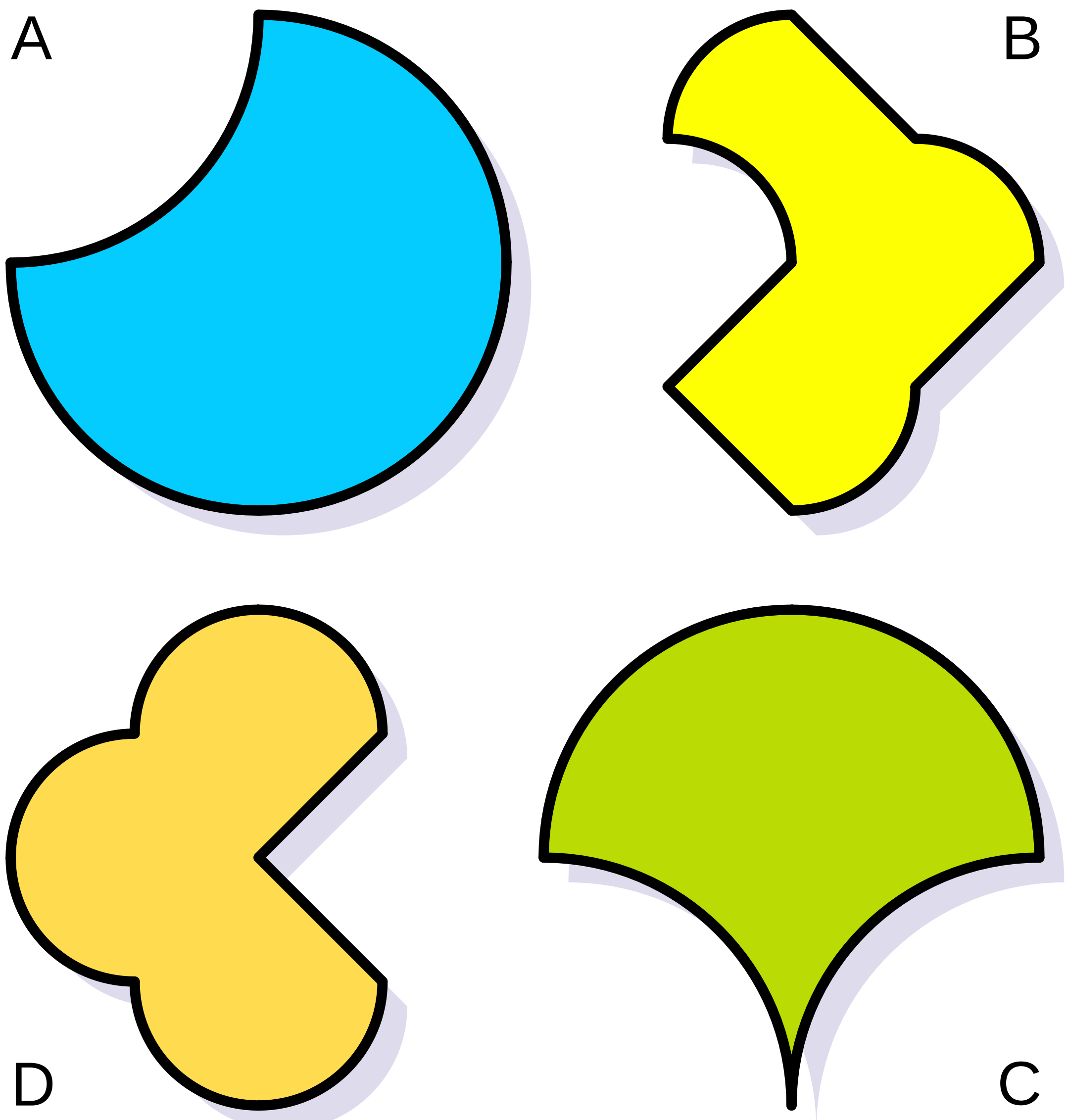
After some rearranging, we can see that areas of the parts are: Part A = $(\pi*1^2)/2 = \pi/2$; Parts B = $(\pi*2^2)/8 = \pi/2$, i.e., Part A = Part B. Part D > Part C. Thus, the total area of the light parts is greater than the total area of the dark parts.



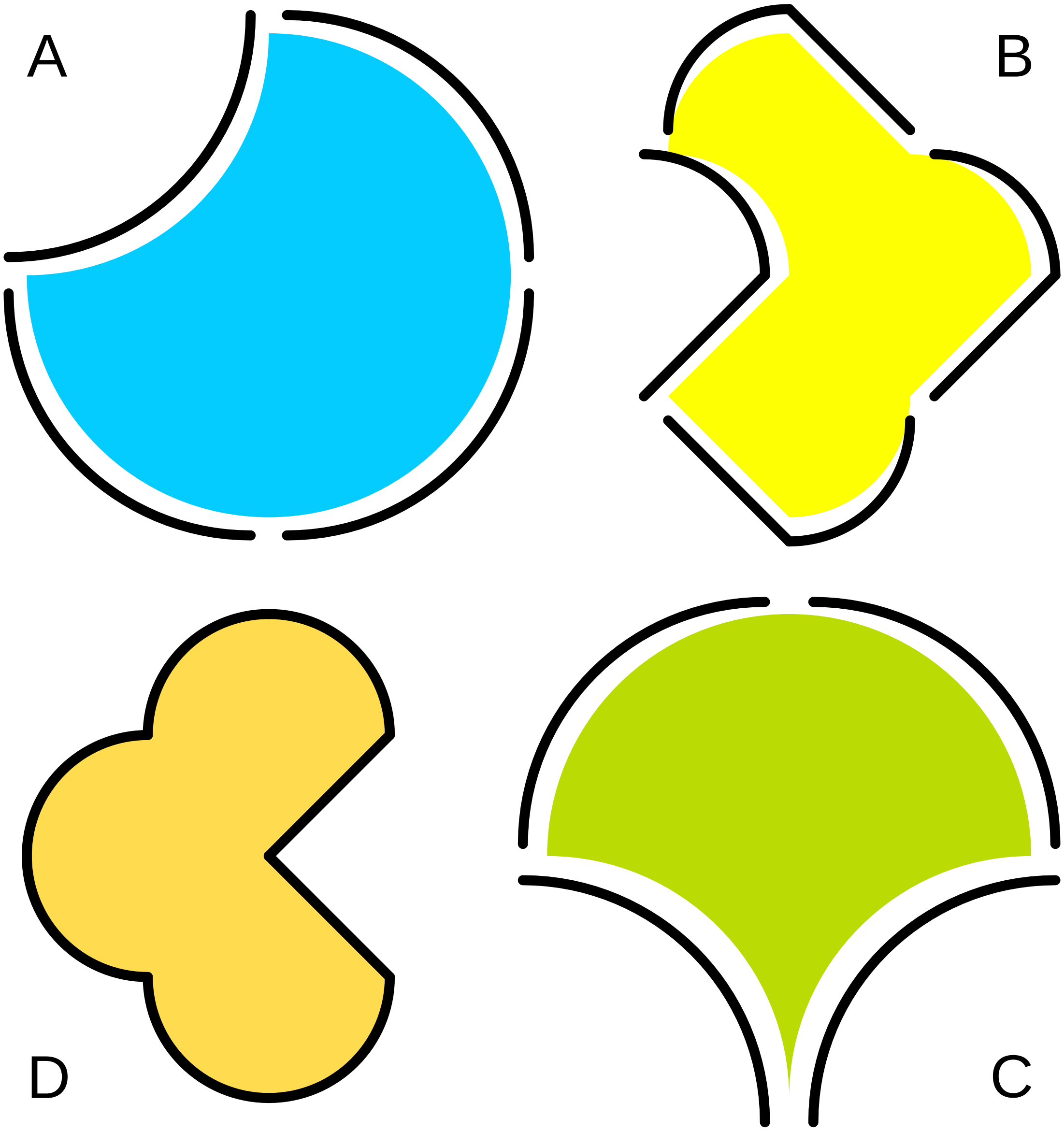
Which region is bigger - A (blue) or B (red)?



Areas of the regions: region A = $\pi*3^2 + 6^2 = 9\pi + 36$; and region B = $\pi*5^2 - \pi*4^2 + 10^2 - 8^2 = 9\pi + 36$. Thus, regions A and B have equal areas.



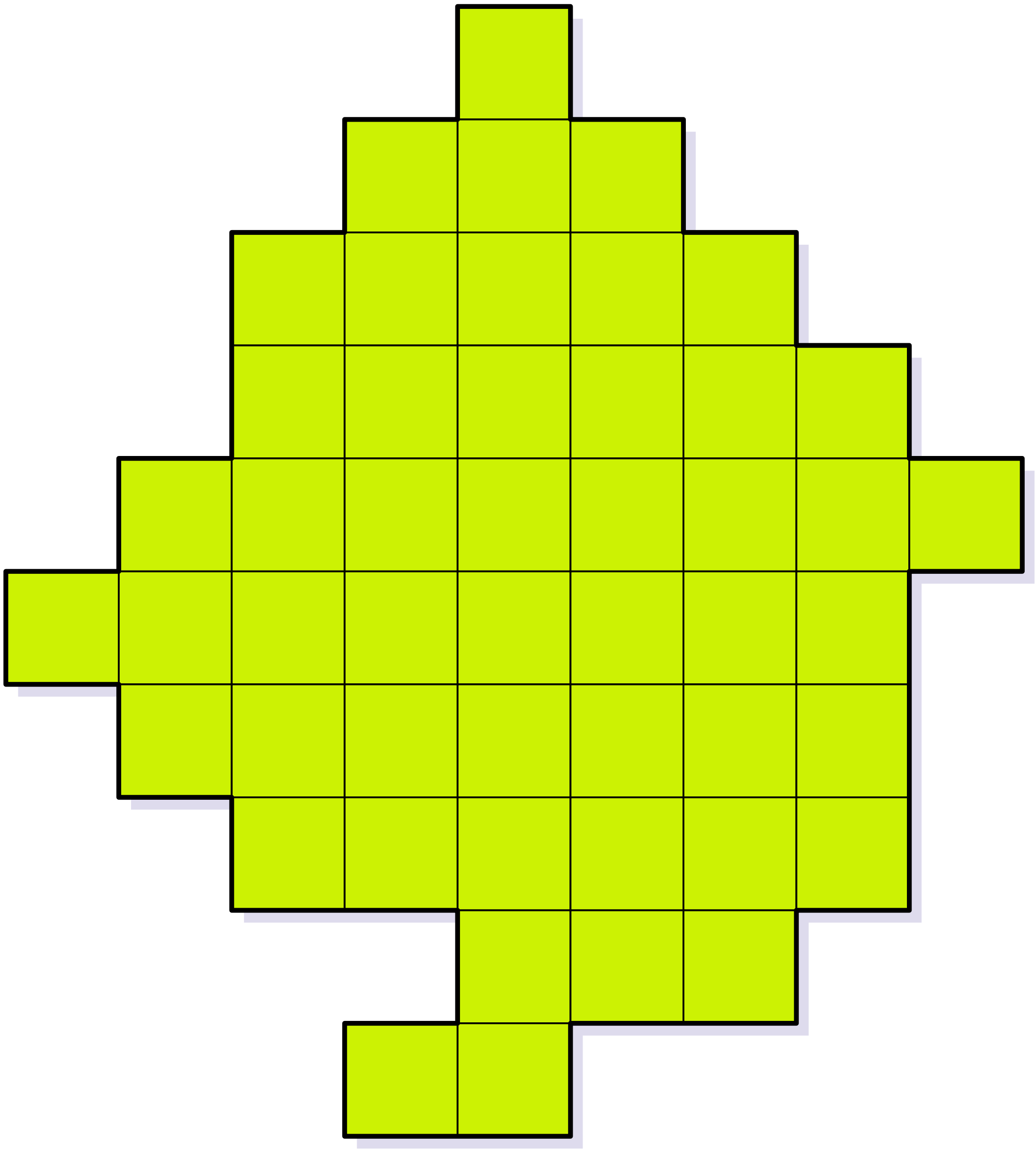
Perimeters of which shapes can be divided into four parts exactly identical in size and shape? Parts can be rotated and/or reflected.



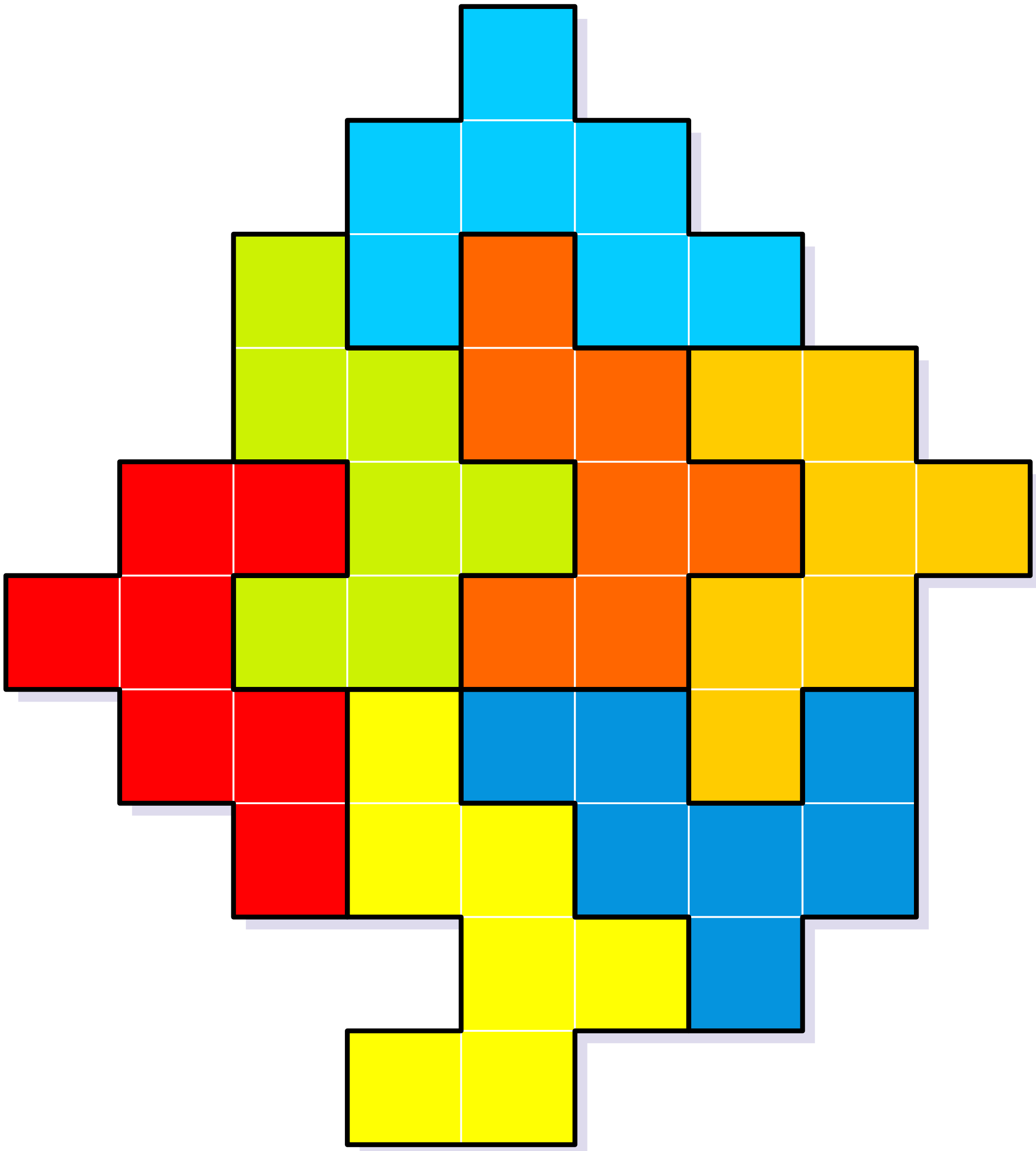
Perimeters of all shapes except D can be divided into four parts exactly identical in size and shape, as shown.

Leaf Dissection
by Richard Candy

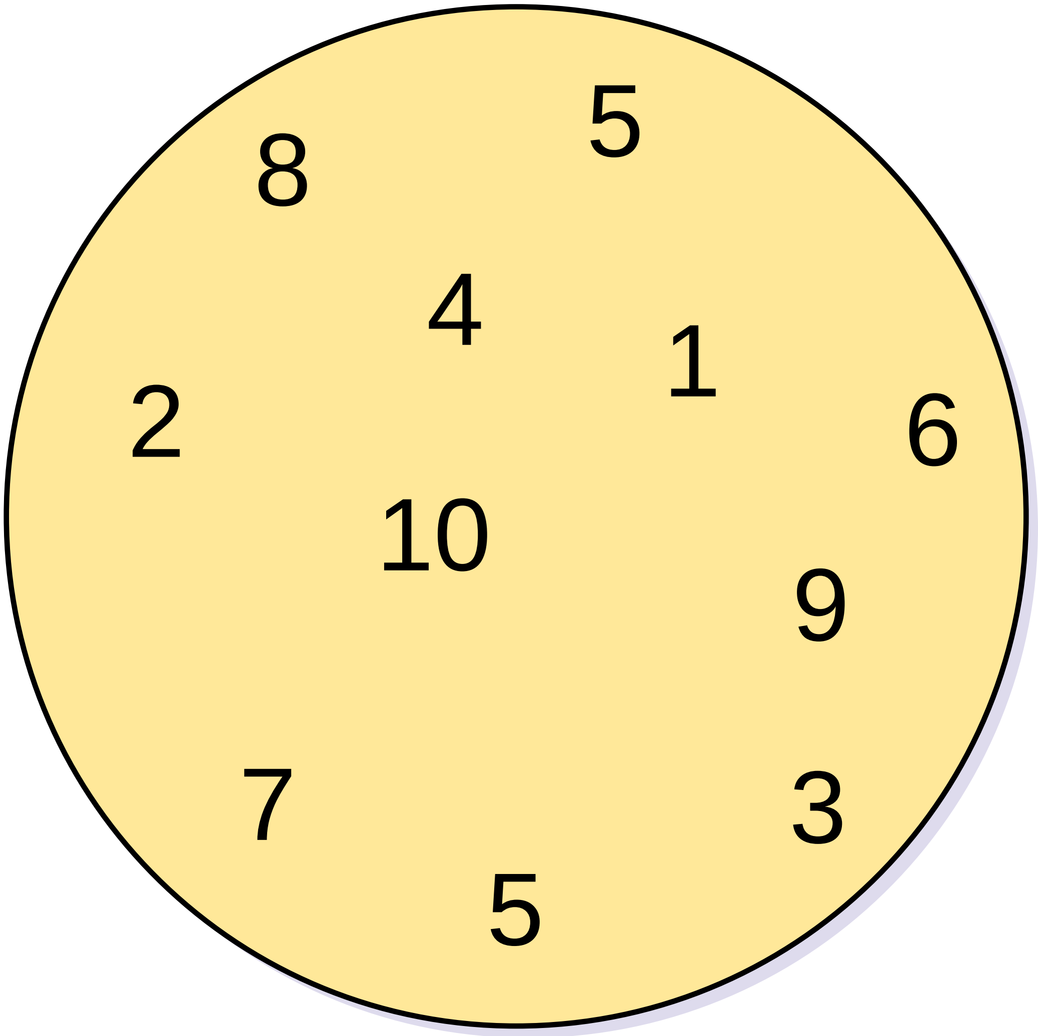
Puzzles.COM



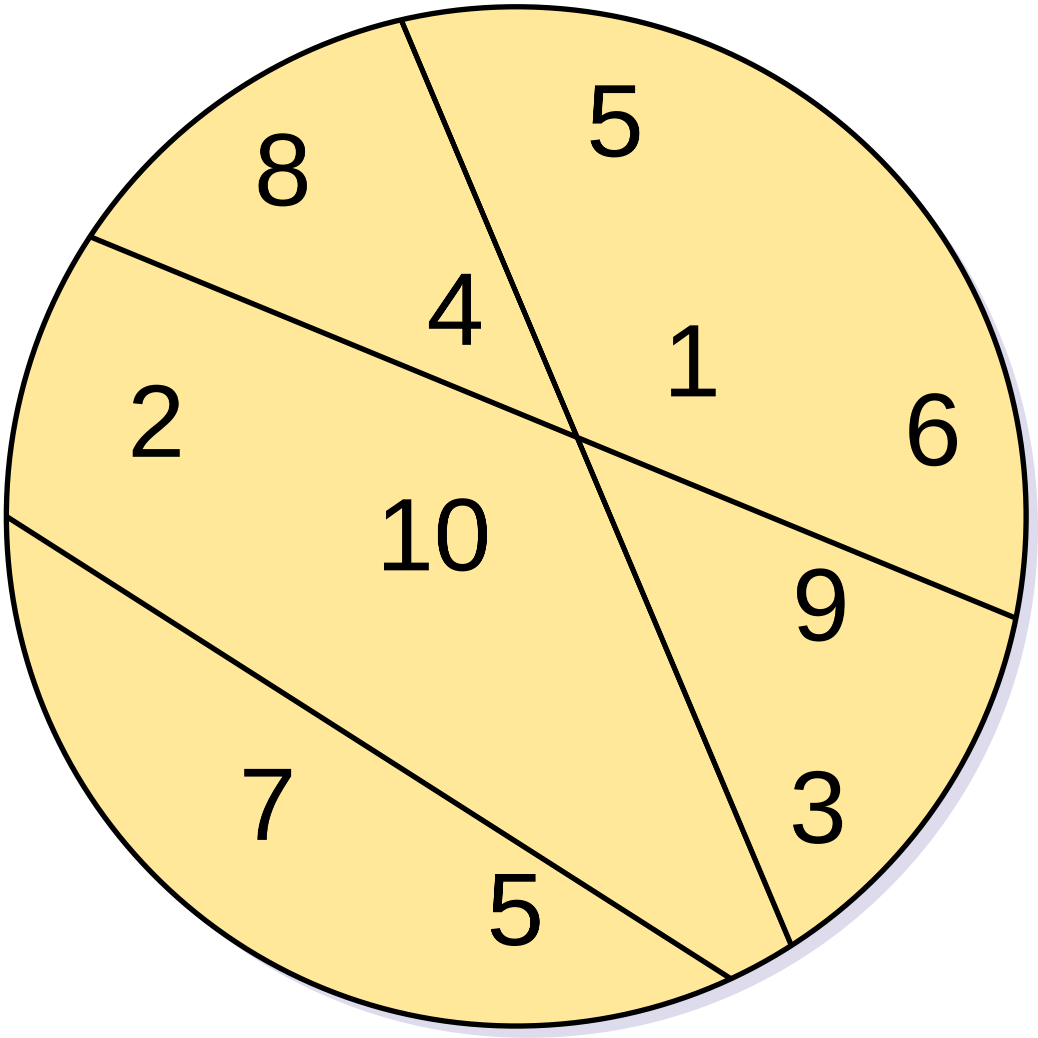
Divide this leaf-like shape into seven identical (congruent) pieces. They can be rotated or mirrored. Cuts must go along the grid's lines only.



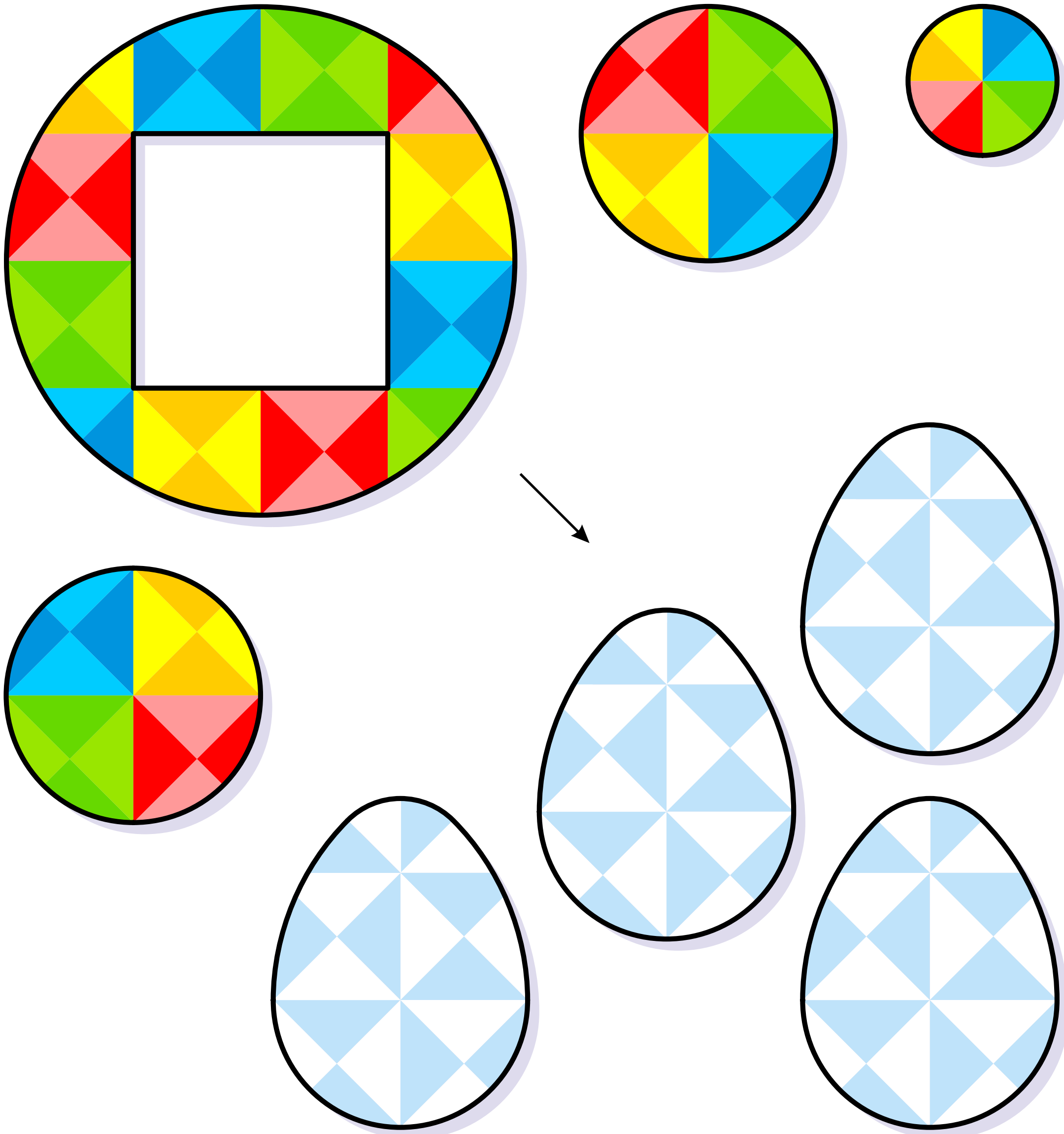
The solution is shown in the illustration.



With three straight lines divide the circle into several regions with equal sums of their numbers. Lines should begin and end on the circle's periphery. They may cross each other, but not the numbers. No empty regions are allowed.

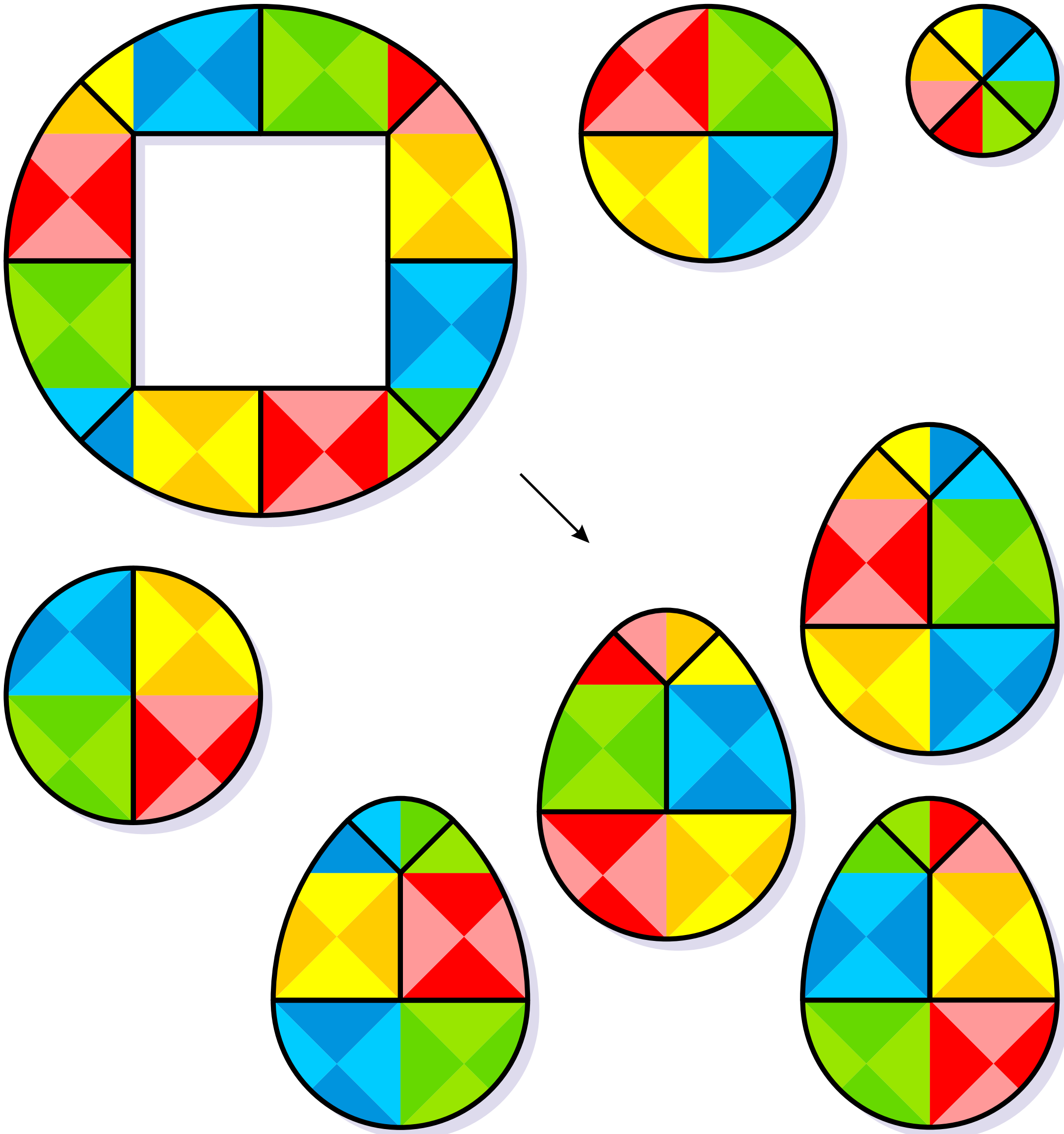


The circle is divided into five regions with equal sums (12) of their numbers, as shown in the illustration.



Divide each of the four shapes, the ring and three circles, into the minimal number of parts so that they can create four equal eggs as those shown. In the final eggs no two elements of the same color touch each other even at a corner.

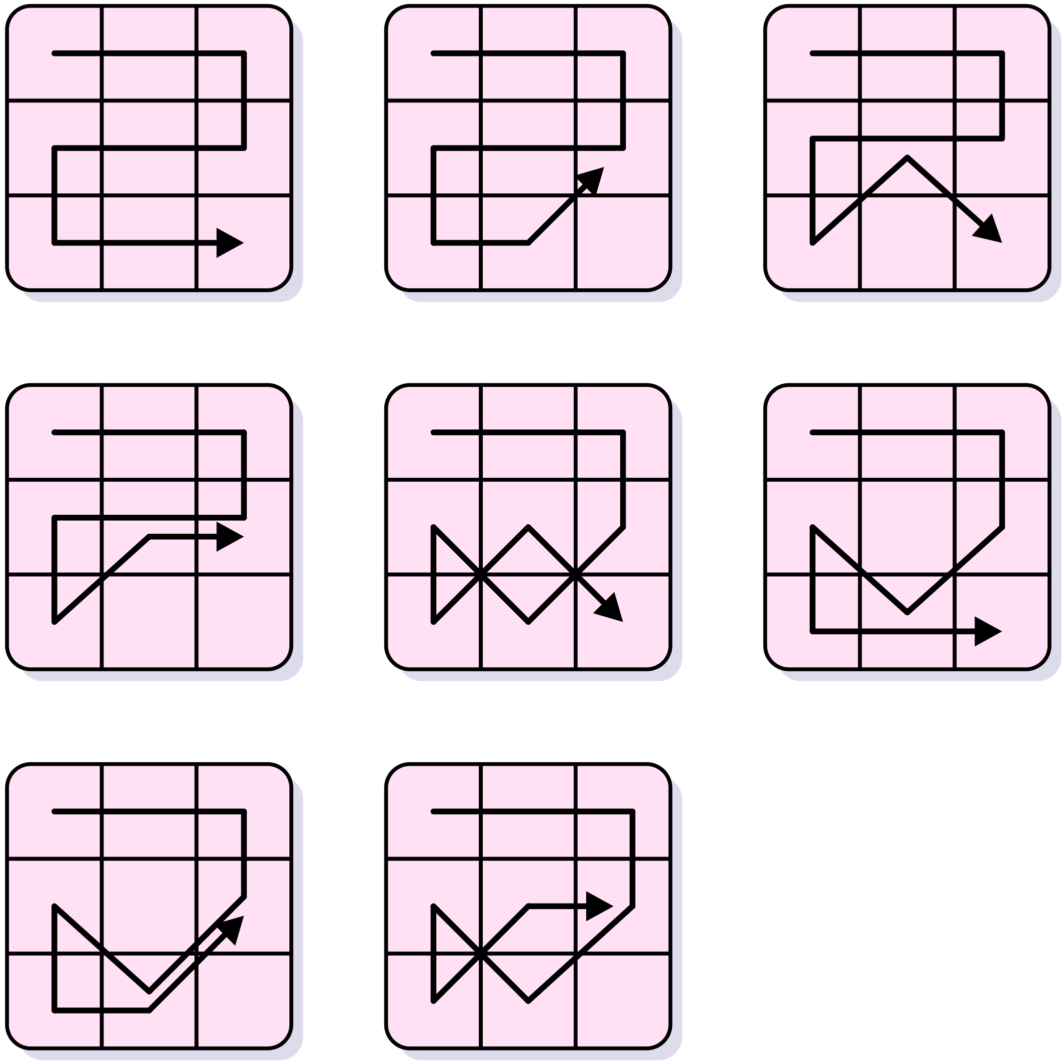
To solve the puzzle, you may print the image out and then make your dissections and paint the eggs with the respective color pencils.



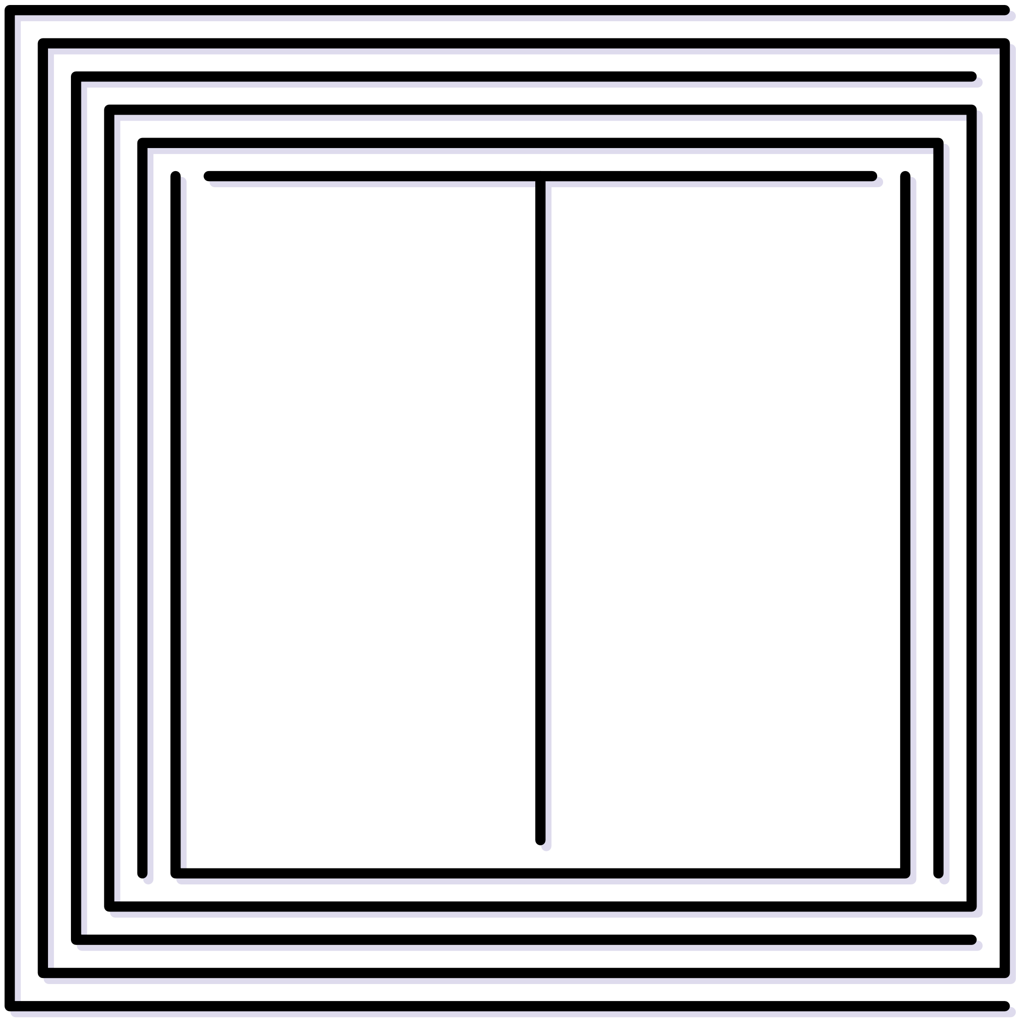
The 16-part solution is as shown.

V	A	L
T	N	E
I	N	E

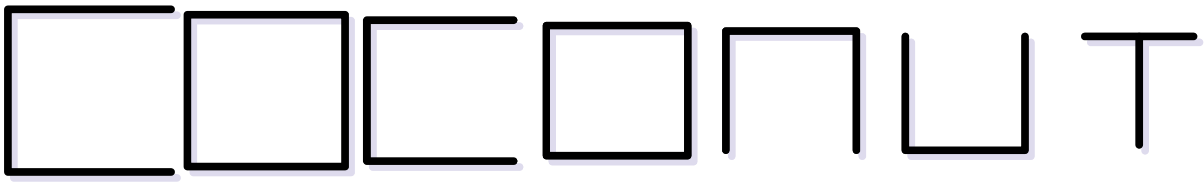
How many different ways can the word VALENTINE be read? You can move through neighboring letters vertically, horizontally, or diagonally and pass some letters more than once.



The word VALENTINE can be found in eight different ways, as shown.



The lines hide some food. Can you find it?

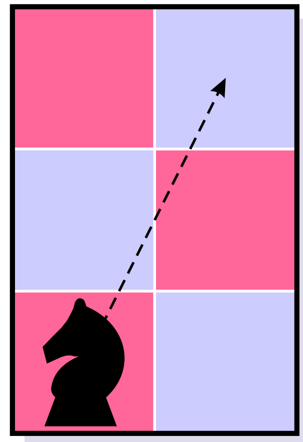


The hidden food is COCONUT.

Knight Spell

by Richard Candy

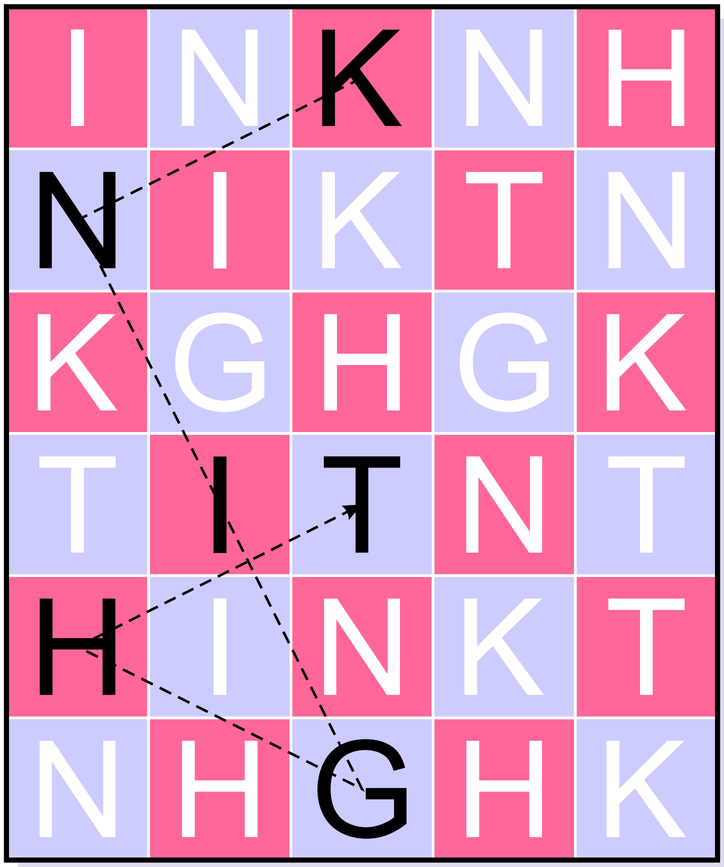
I	N	K	N	H
N	I	K	T	N
K	G	H	G	K
T	I	T	N	T
H	I	N	K	T
N	H	G	H	K



chess knight's move

Arrange the six checkered pieces into the checkered board shown in the middle. Pieces are two-sided and their back sides are mirror images of their face sides. You can rotate and flip the pieces but not overlap them.

Posted: September 2012



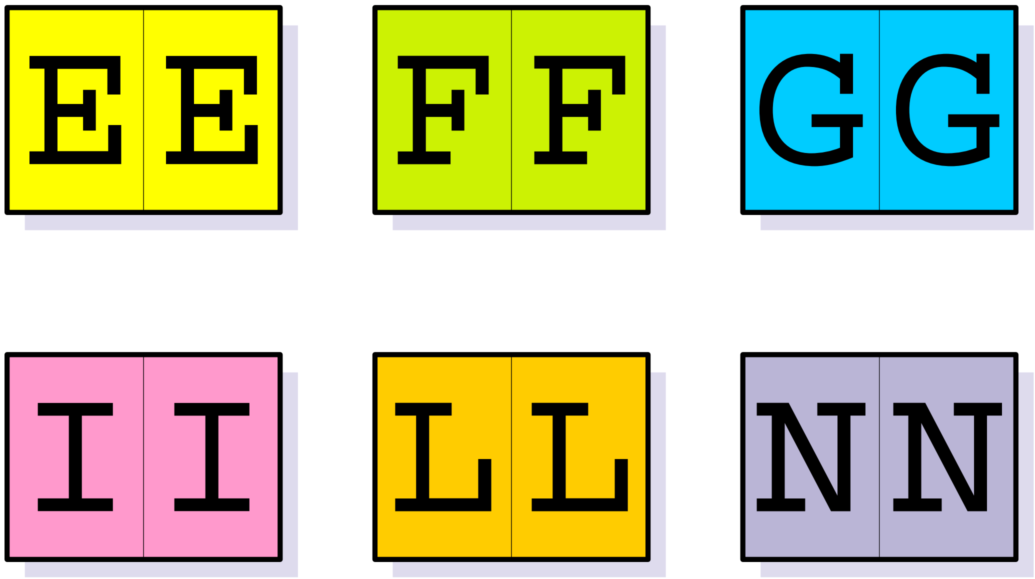
The solution is shown in the illustration.

A	B	C	D	E
F	G	H	I	J
K	L	M	N	O
P	Q	R	S	T
U	V	W	X	Y

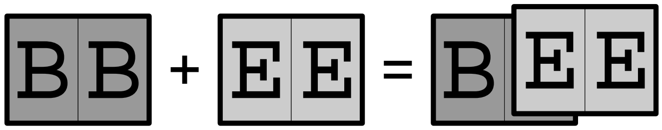
Starting from a cell of the grid and with each next step moving to a vertically, horizontally or diagonally adjacent one, you can read some word(s). Note that you can pass any letter just once. For example, you can easily find the words “HIM” or "NOT” which are not the longest possible words hidden in the grid. Can you find a 6-letter word?

A	B	C	D	E
F	G	H	I	J
K	L	M	N	O
P	Q	R	S	T
U	V	W	X	Y

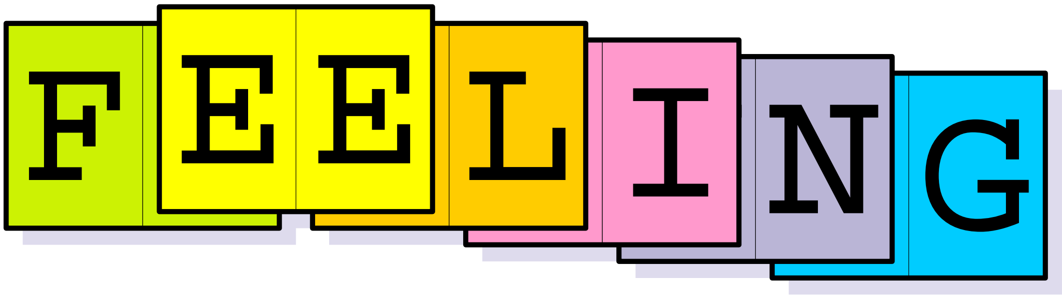
It’s possible to find CHINOS word, as shown in the illustration.



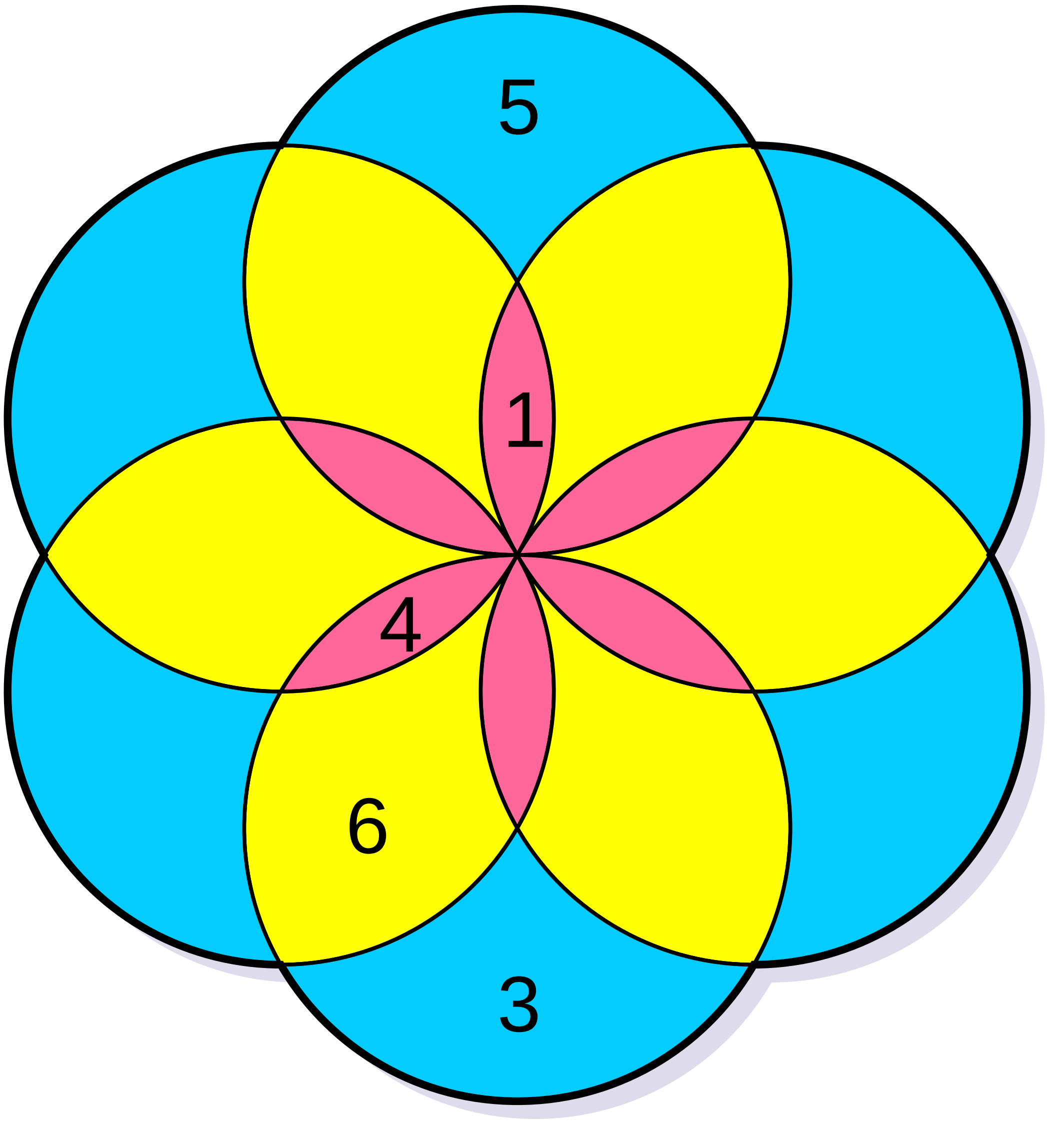
Example:



Place the cards in a line to form a real word (Hint: It's related to perception). Cards can overlap each other but no card should be fully covered or flipped over.



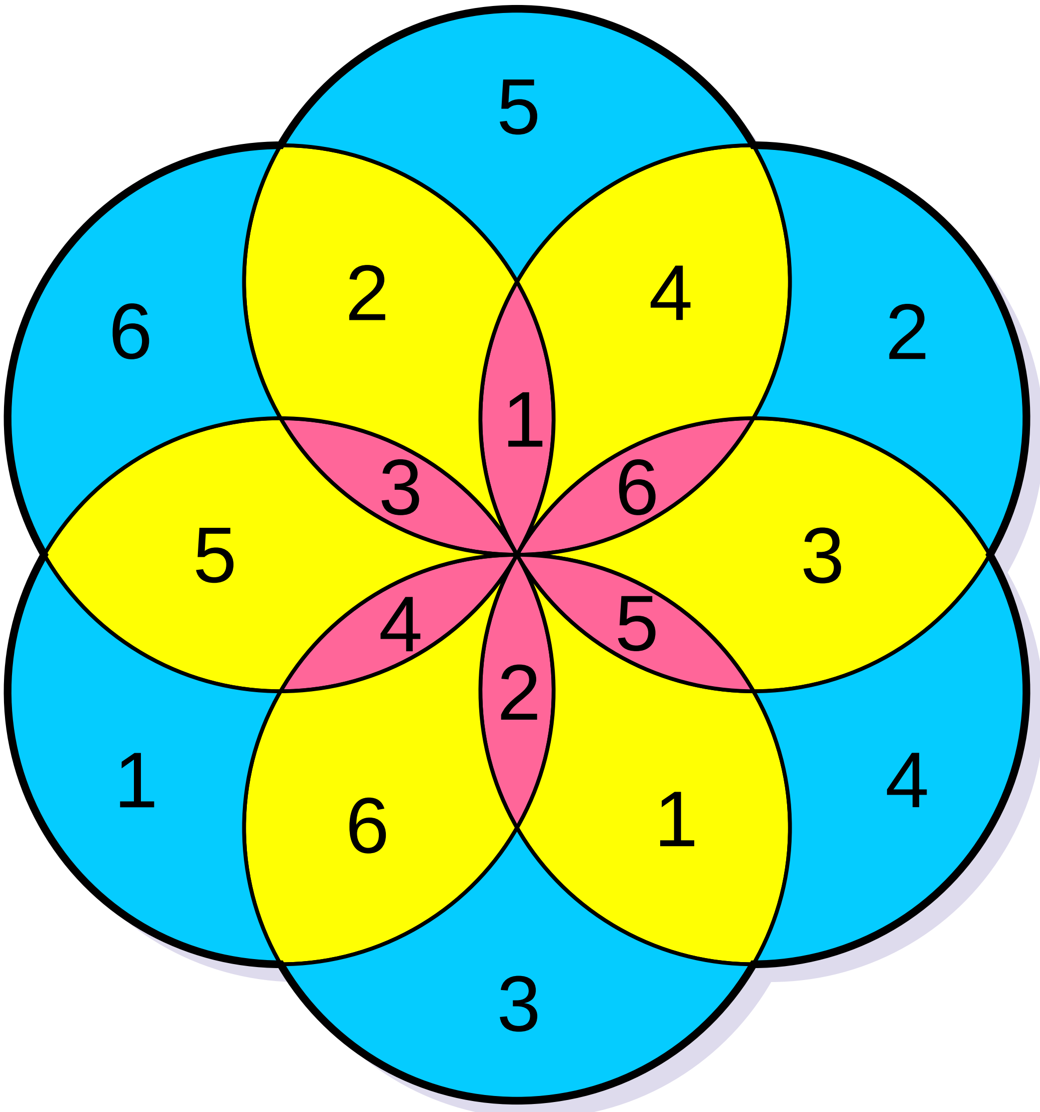
The word is FEELING as shown.



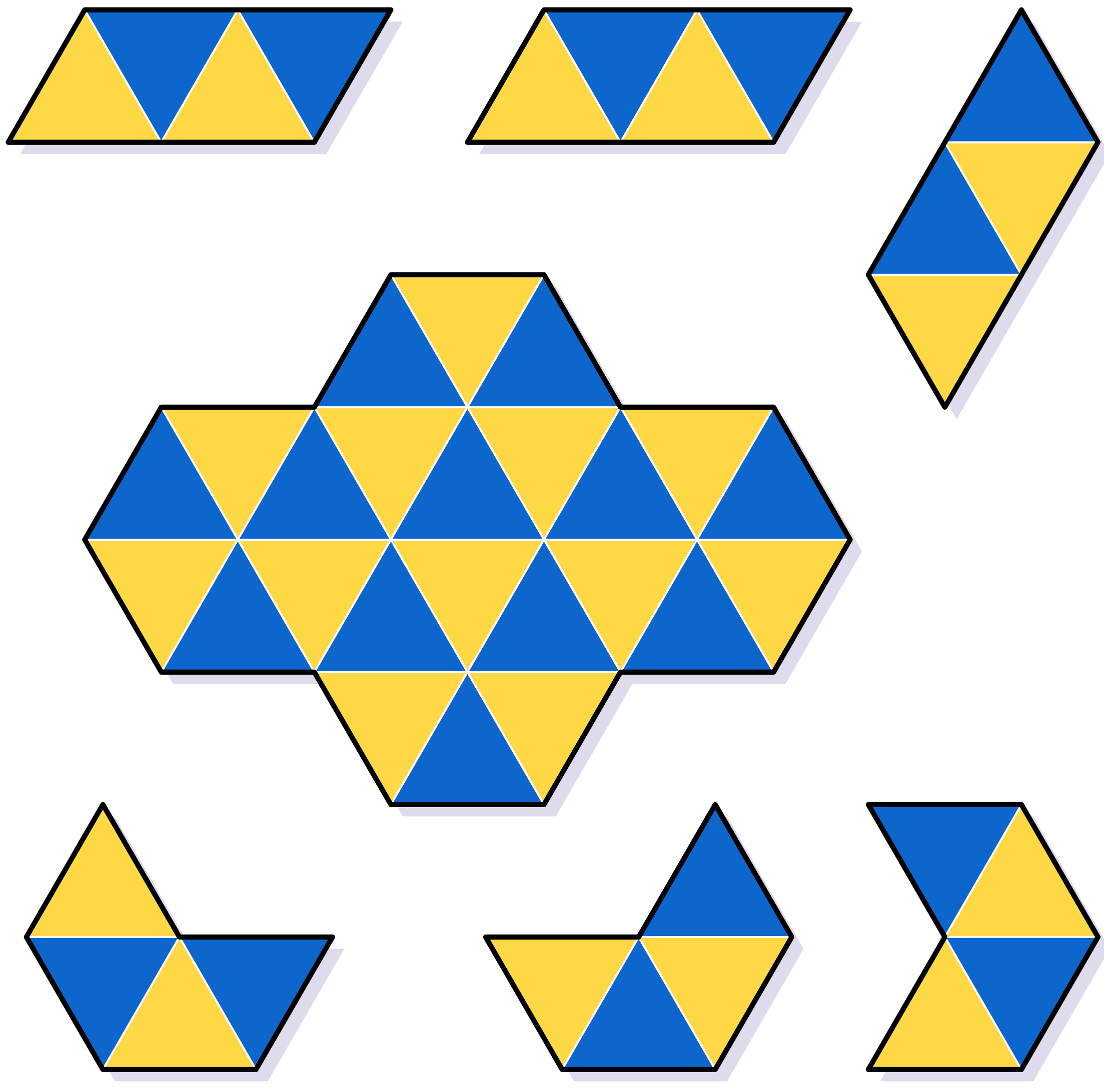
Fully fill in the flower with missing numbers observing the rules:
1) Put one number per color part.
2) Parts of the same color must contain all numbers, 1 through 6.
3) Each complete circle must contain all numbers, 1 through 6.

Posted: September 2012

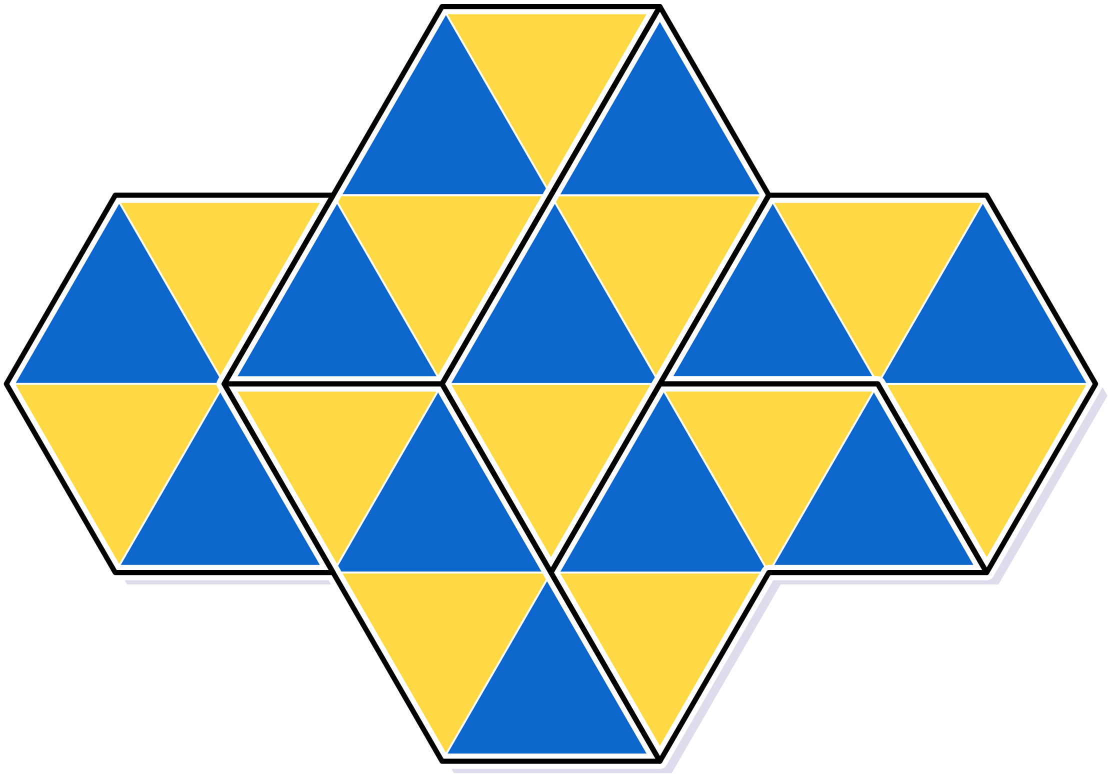
Number Flower
Solution



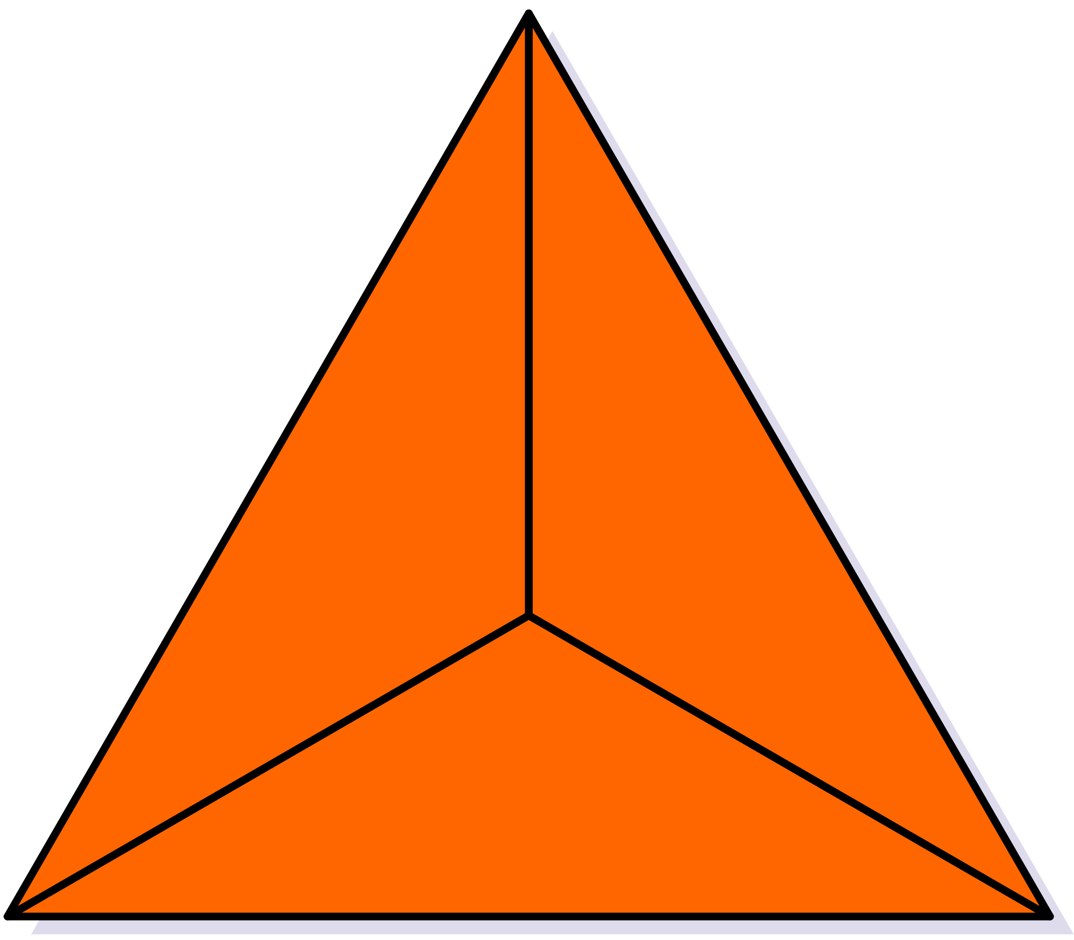
The solution is shown in the illustration.



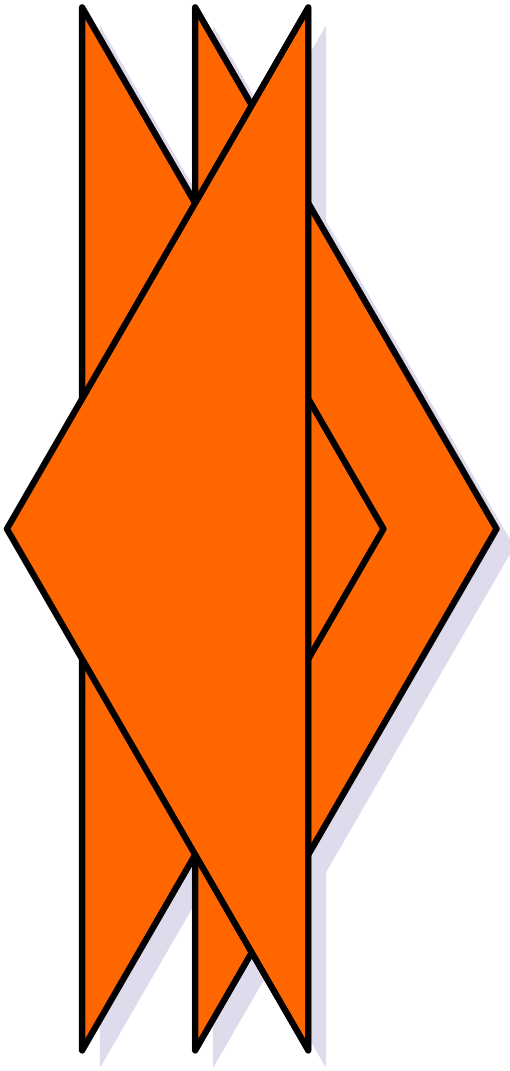
Arrange the six checkered pieces into the checkered board shown in the middle. Pieces are two-sided and their back sides are mirror images of their face sides. You can rotate and flip the pieces but not overlap them.



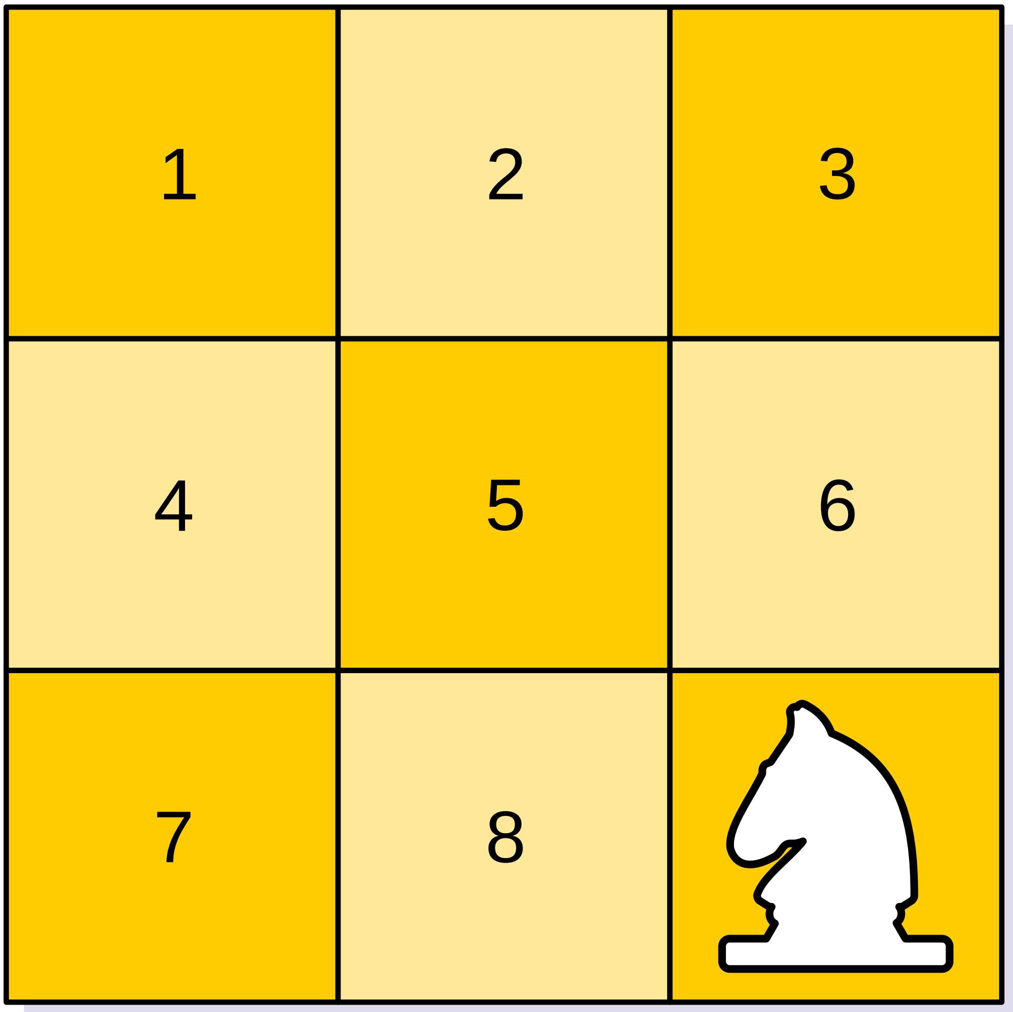
The solution is shown in the illustration.



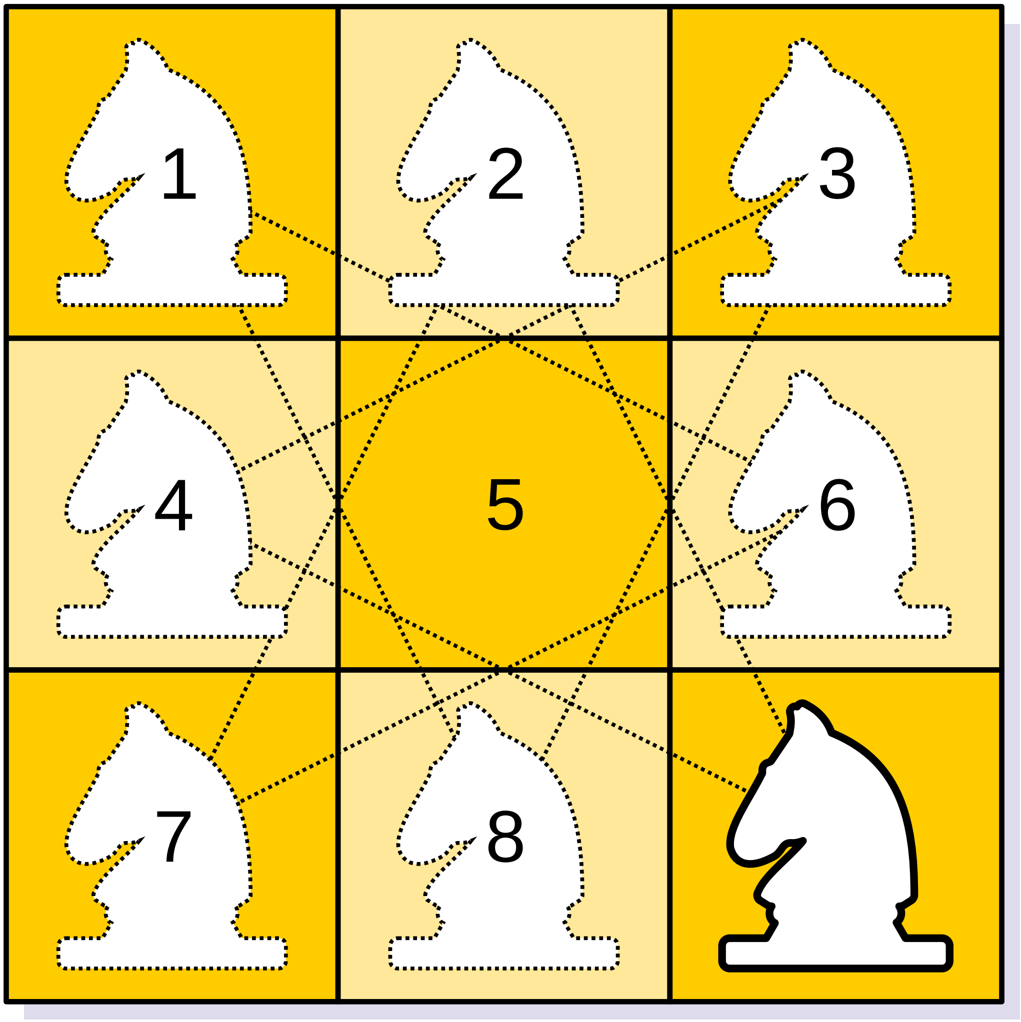
What is the biggest number of outlines of isosceles triangles you can get by rearranging the three identical isosceles triangles shown?



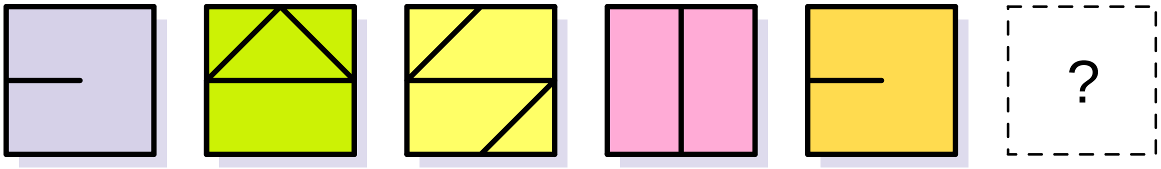
It's possible to rearrange three identical isosceles triangles to form 7 outlines of isosceles triangles.

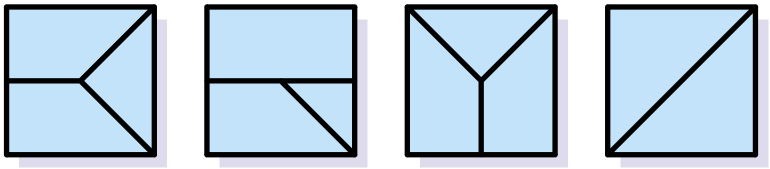


If the knight moves normally, which cell could the knight never reach? Note, in chess, a knight moves two squares in one direction and then one square in a perpendicular direction.



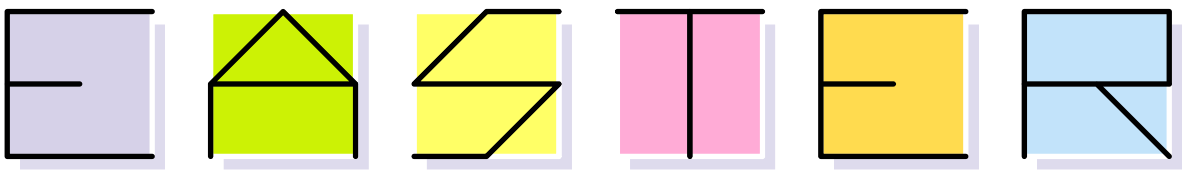
The chess knight could never reach cell 5.





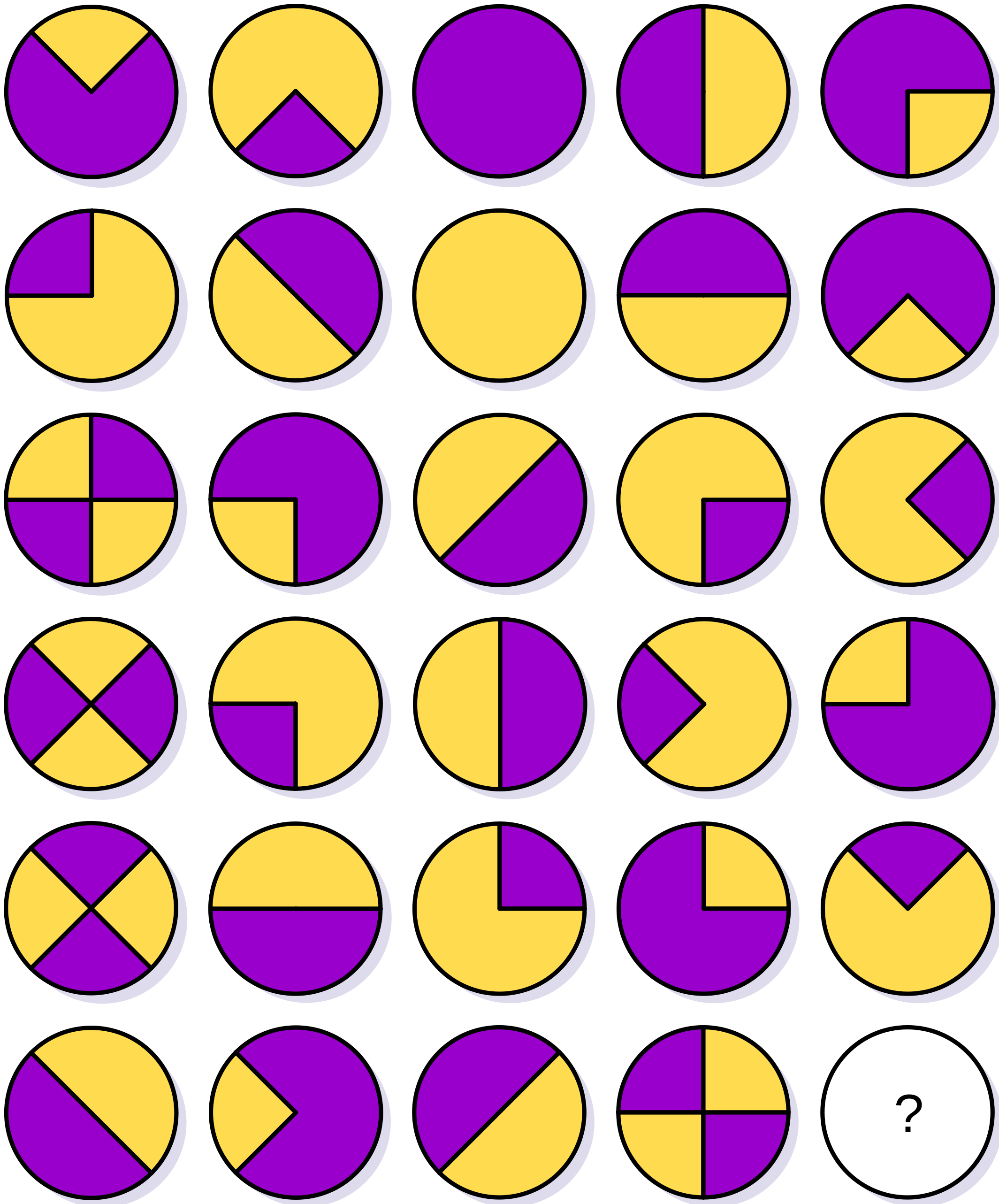
A B C D

In the sequence above, which of the signs in the bottom row should replace the question mark?

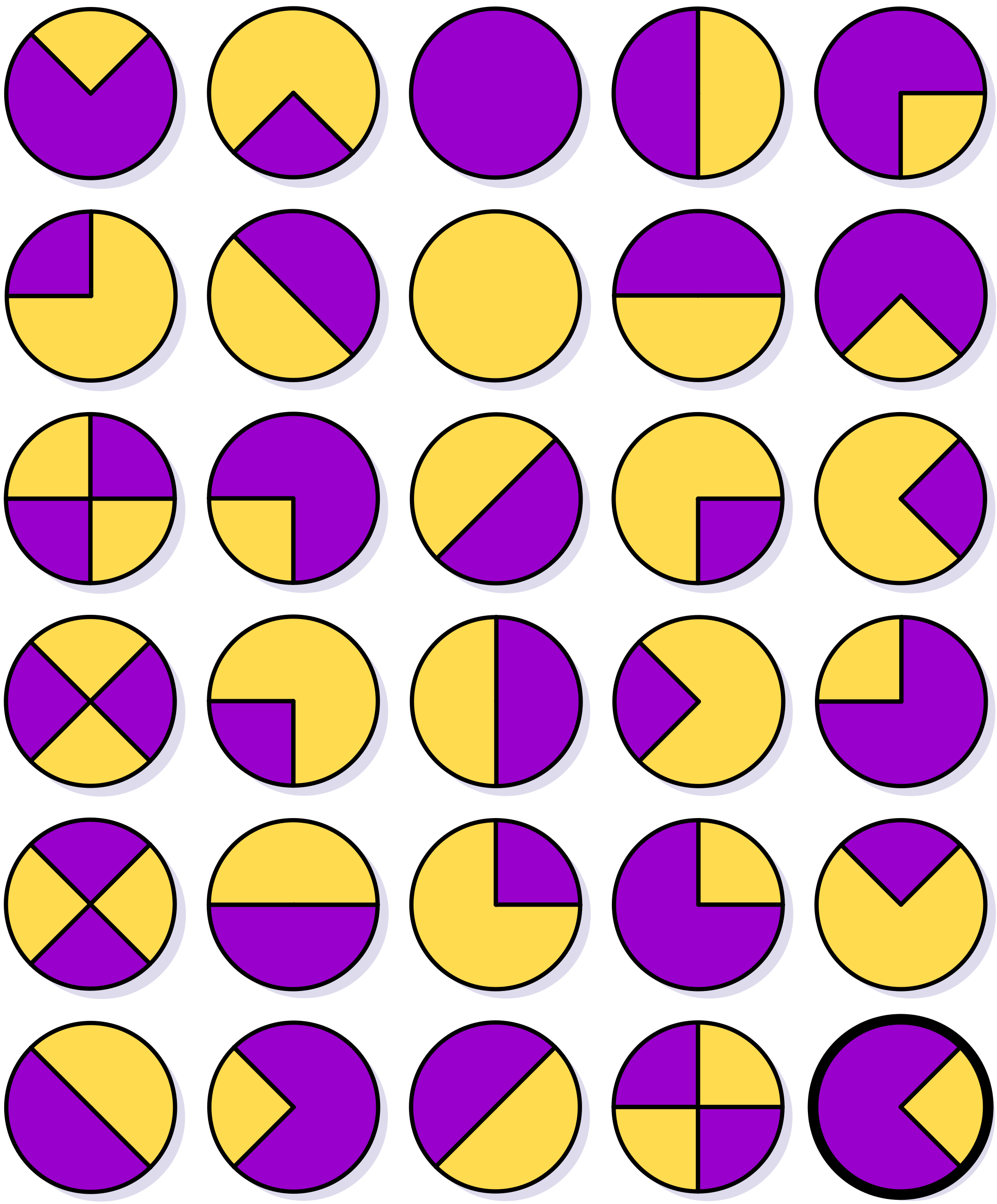


B

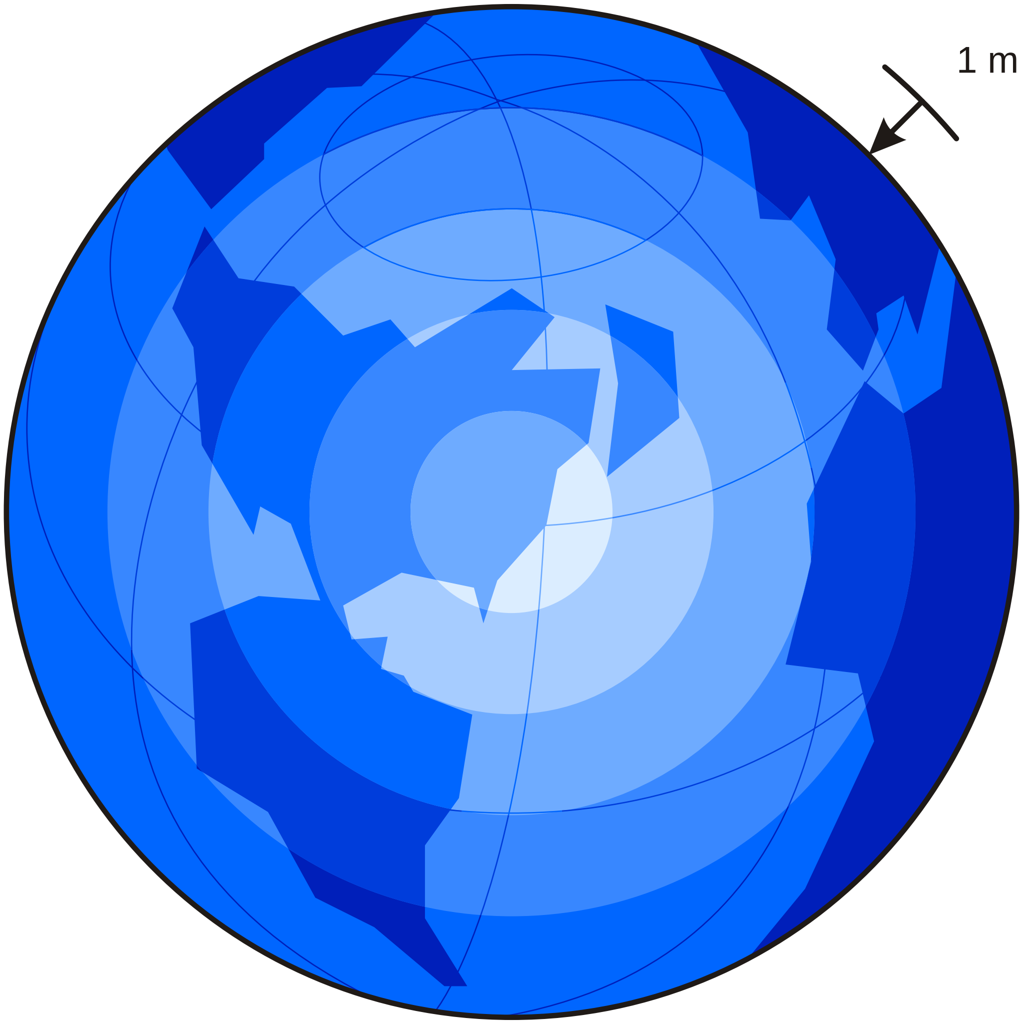
To complete the sequence and spell EASTER, pattern B has the letter R inscribed within its square and thus replaces the question mark.



What should the thirtieth disc be?



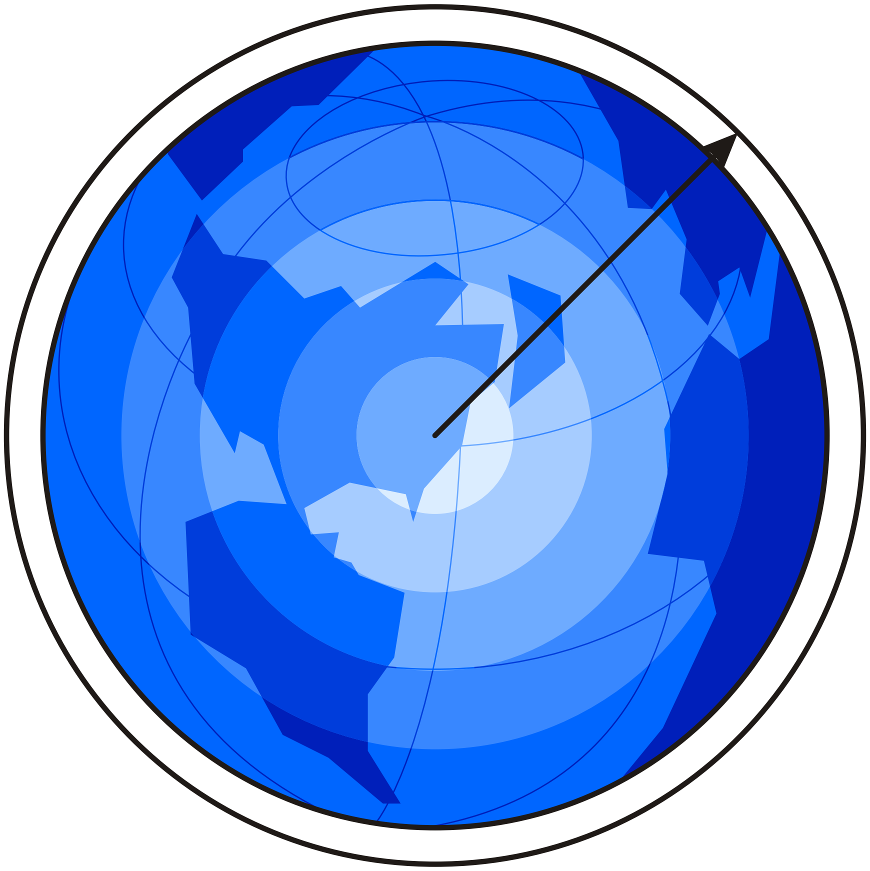
The thirtieth disc is the only missing combination of dark and light parts in the circle among 30 possible ones.



Imagine that you are on a perfectly smooth sphere as big as the earth. A steel belt is stretched tightly around one of its equators.

One meter of steel (a little bit more than a yard) is added to this belt so that it is raised off the surface of the sphere by the same distance all the way around. Will this lift the belt high enough so that you can:

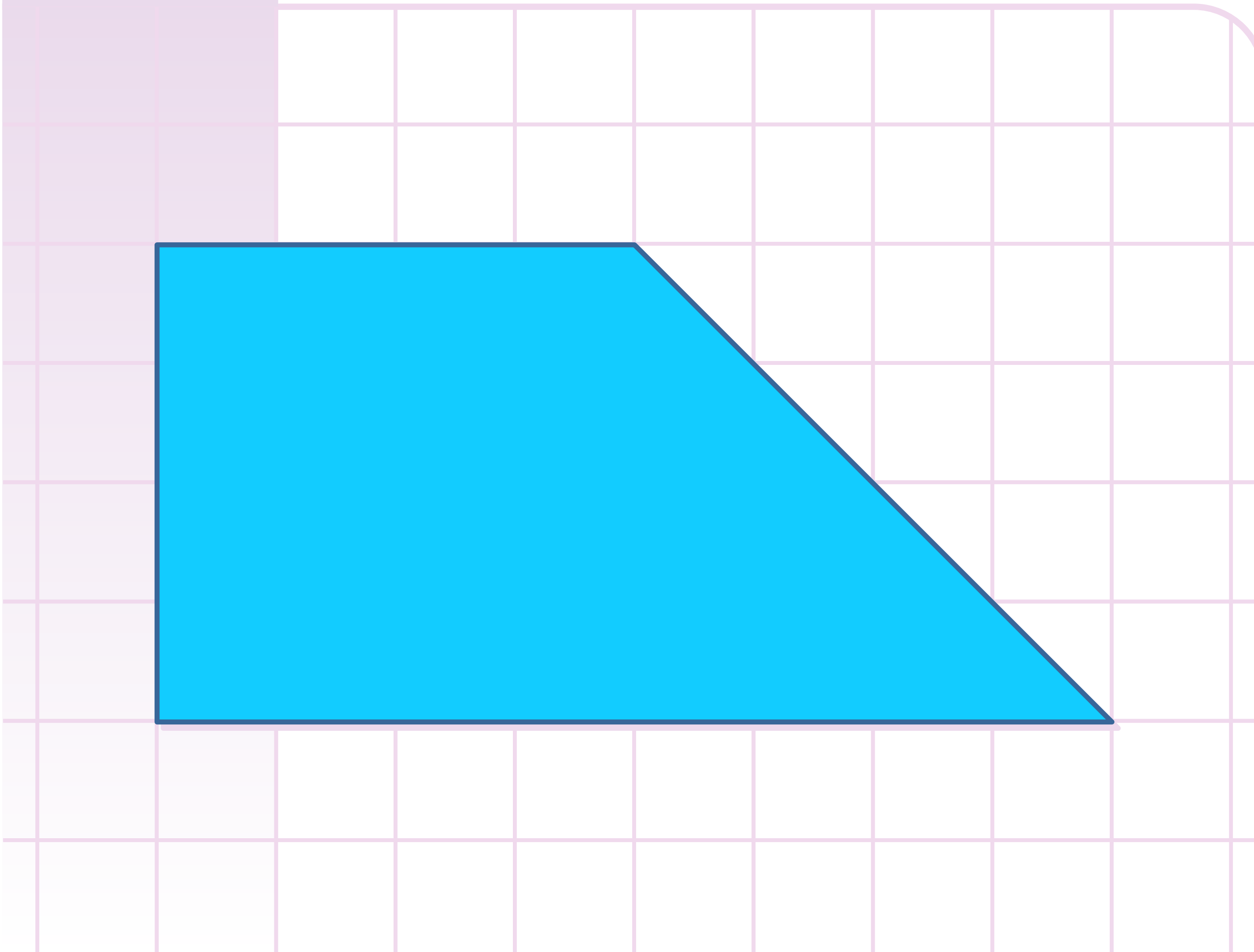
1) Slip a playing card under it?
2) Slip your hand under it?
3) Slip a baseball under it?



It seems surprising, but that steel belt, after a meter is added to it (approximately a yard and four inches), will be raised 15+ centimeters (approximately six inches) all the way around! This is certainly high enough for a baseball to pass underneath.

Actually, the height the belt is raised on, is the same regardless of how large the sphere is. It is easy to see why. When the belt is tight around the sphere, it makes the circumference of a circle with a radius that is the same as the radius of the sphere. As it is known from plane geometry the circumference of a circle is equal to its diameter (which is twice its radius) times pi. Pi is 3.14+. Therefore, if the circumference of any circle is increased by one meter, the diameter of the circle is increased by a trifle less than one-third of a meter, or 31+ centimeters (a trifle more than a foot). This means, of course, that the radius will increase by almost 15+ centimeters (approximately six inches).

As it is shown in the illustration, this increase in radius is the height that the belt will be raised from the sphere's surface. It will be exactly the same, 15+ centimeters (almost six inches), regardless of whether the sphere be the size of the sun, of the earth or of an orange!

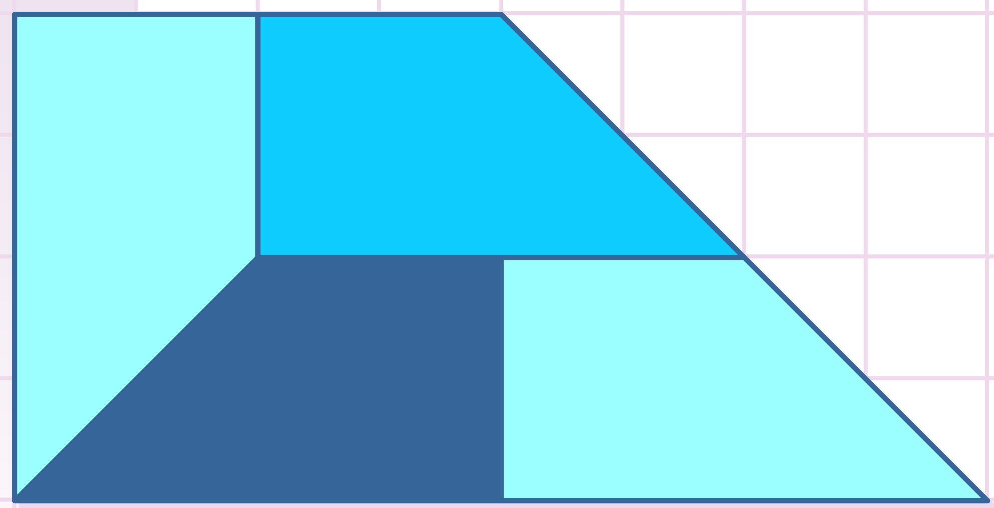


An Easy Dissection Puzzle

by Henry E. Dudeney

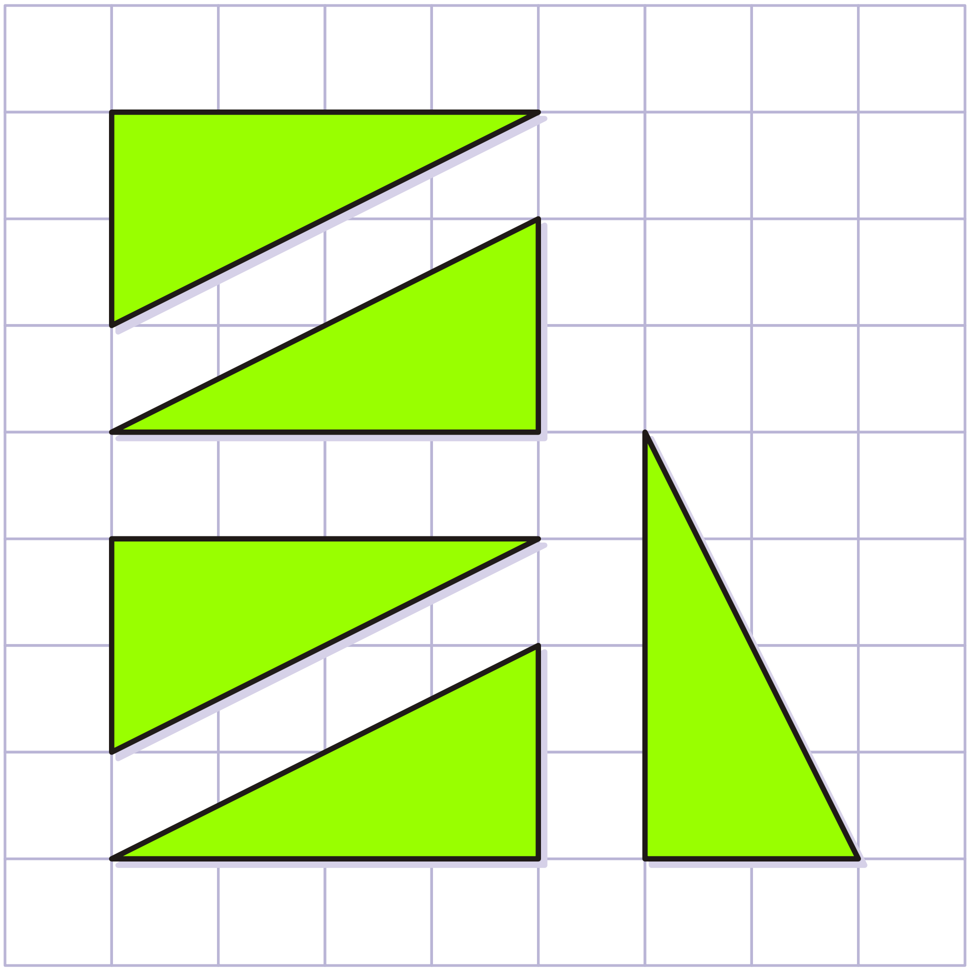
The goal of this puzzle is to divide the above figure into four pieces which would be identical in their shape and size, though some pieces can be mirror reflections of others.

Dissection Puzzles



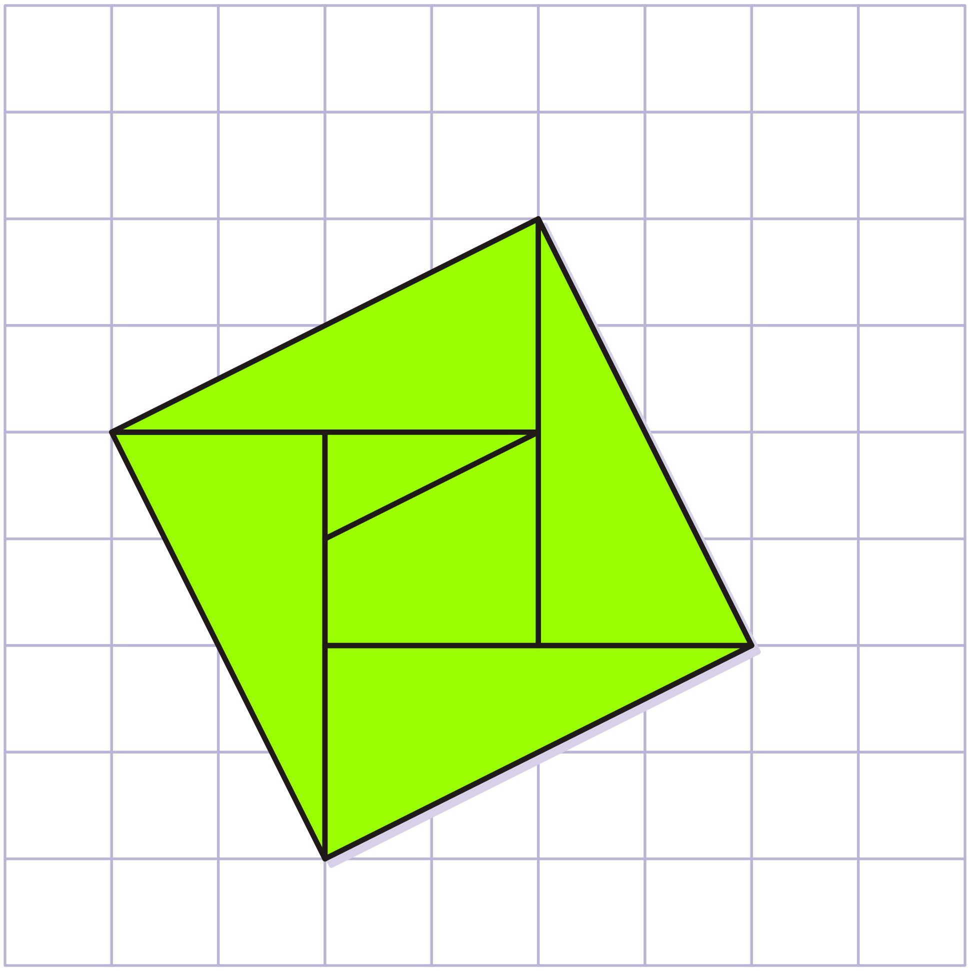
An Easy Dissection Puzzle (solution)

How to divide this figure into four identical pieces is shown in the illustration. Please note that these small pieces are exactly similar to the figure.

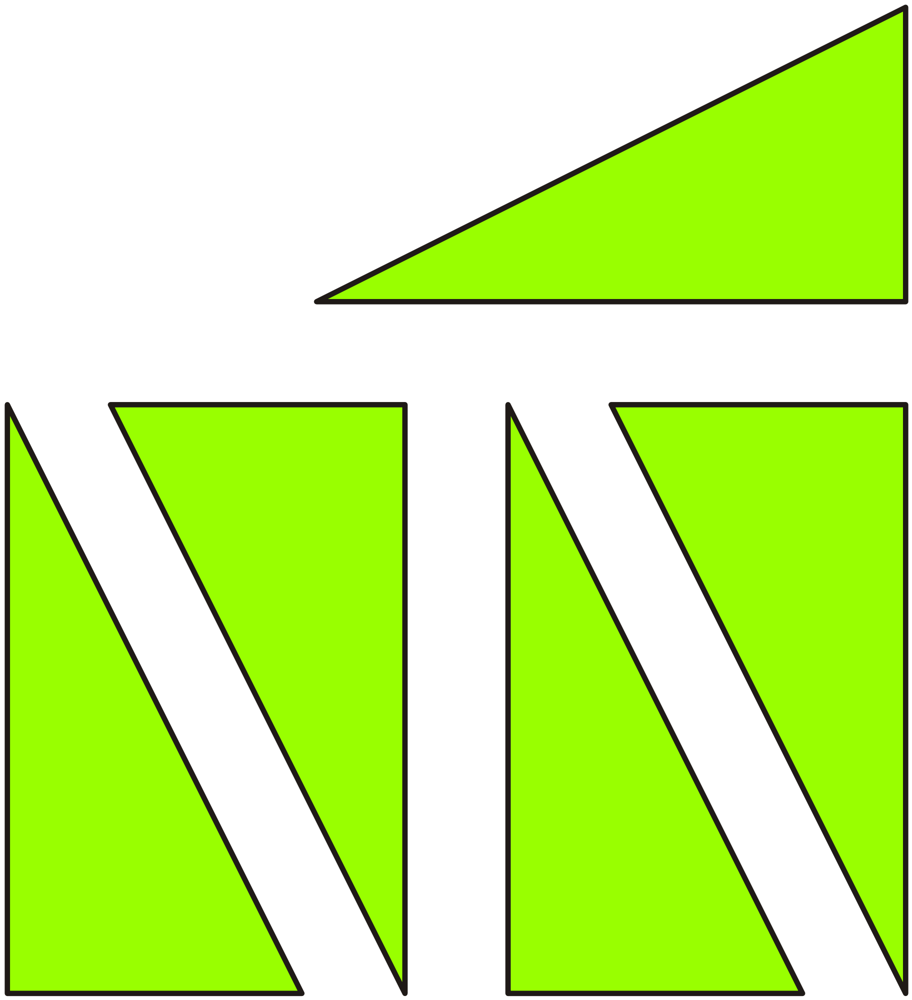


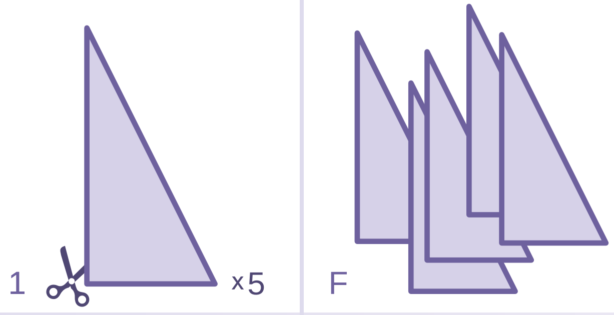
Print out the five pieces from the last page of this file and then cut them out.

The object is to make a square of these five pieces. One of the pieces may be cut in two, but the others must be used intact.



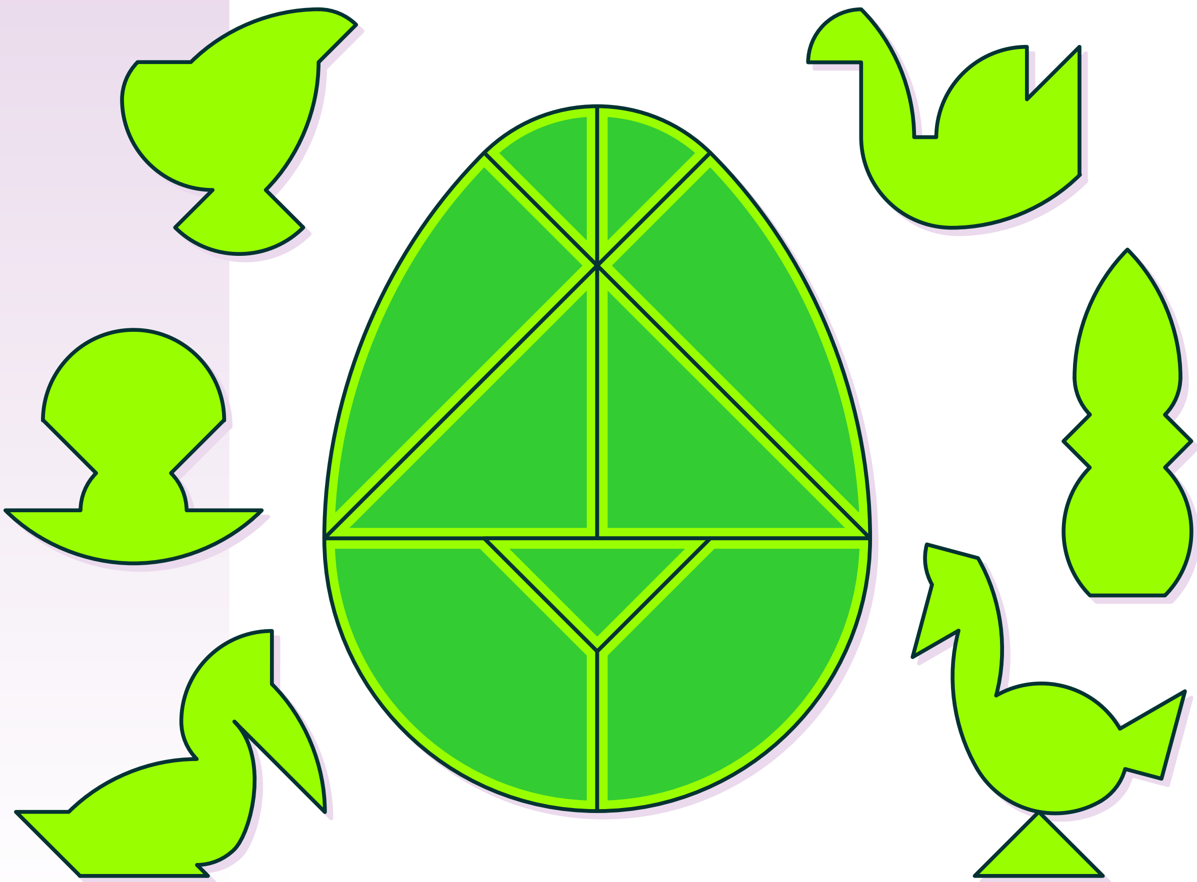
The solution is shown in the illustration.





To produce the pieces first print them out. Then follow the diagram shown above - from step 1 to step F (finish).

Tangrams

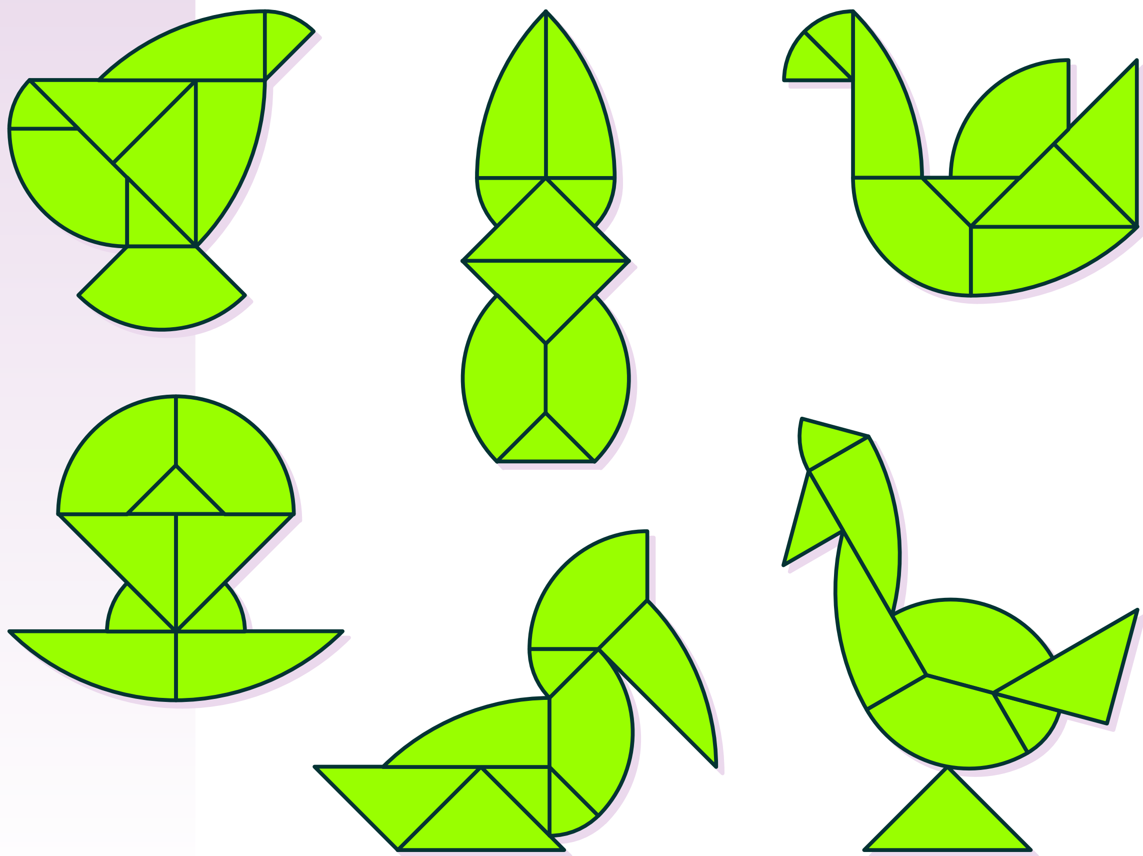


The Egg of Columbus

This classic puzzle dates back to the 19th century.

The object is to make the figures shown around the central egg using the whole set of the pieces for each of them. Try to find your own new shapes.

Tangrams

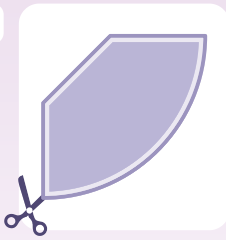


The Egg of Columbus (solution)

The solutions to all the figures are shown in the illustration.

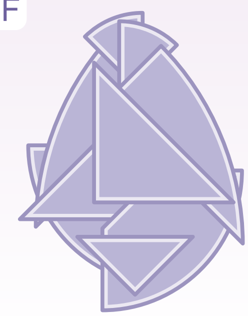
Tangrams

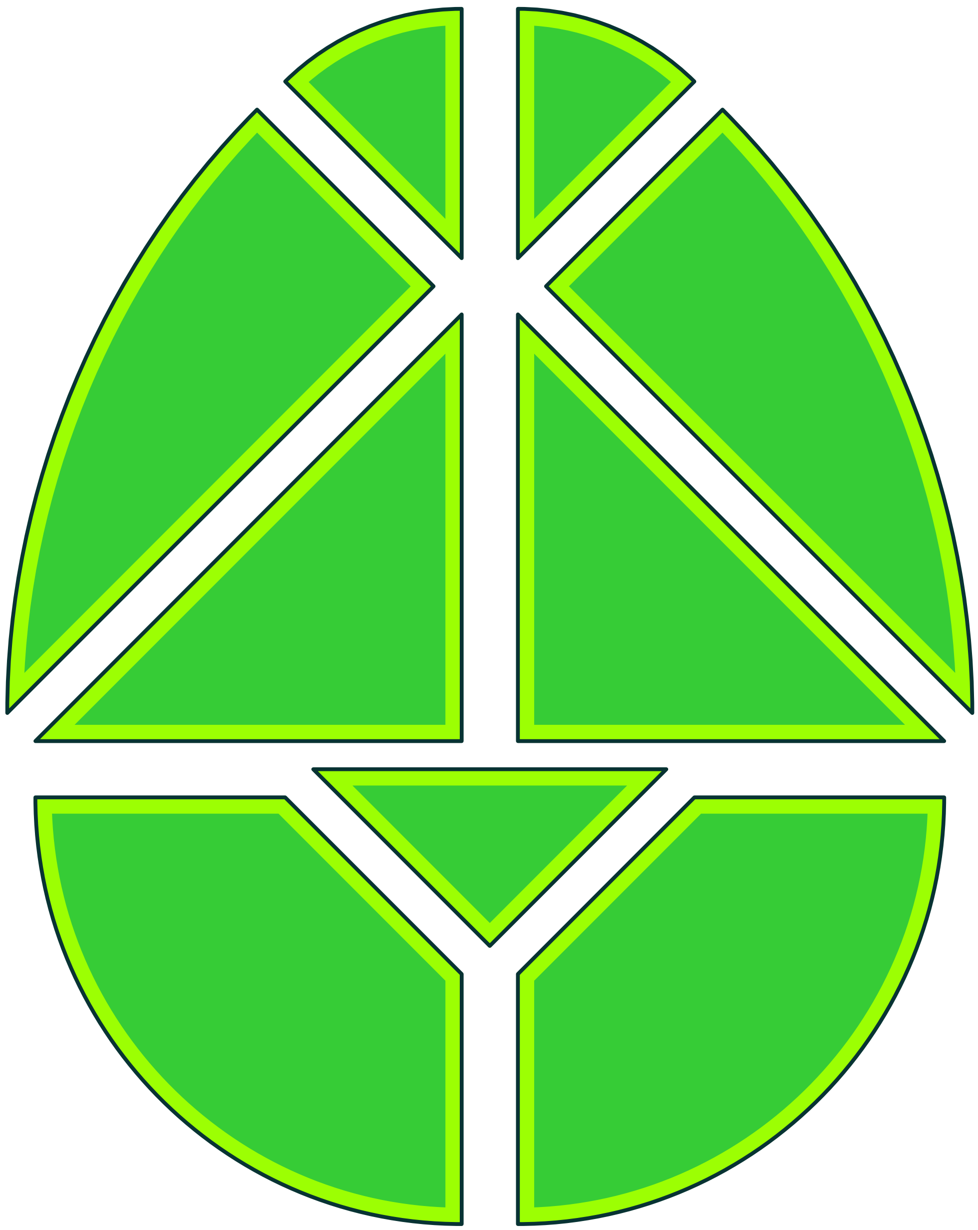
1



x 9

F

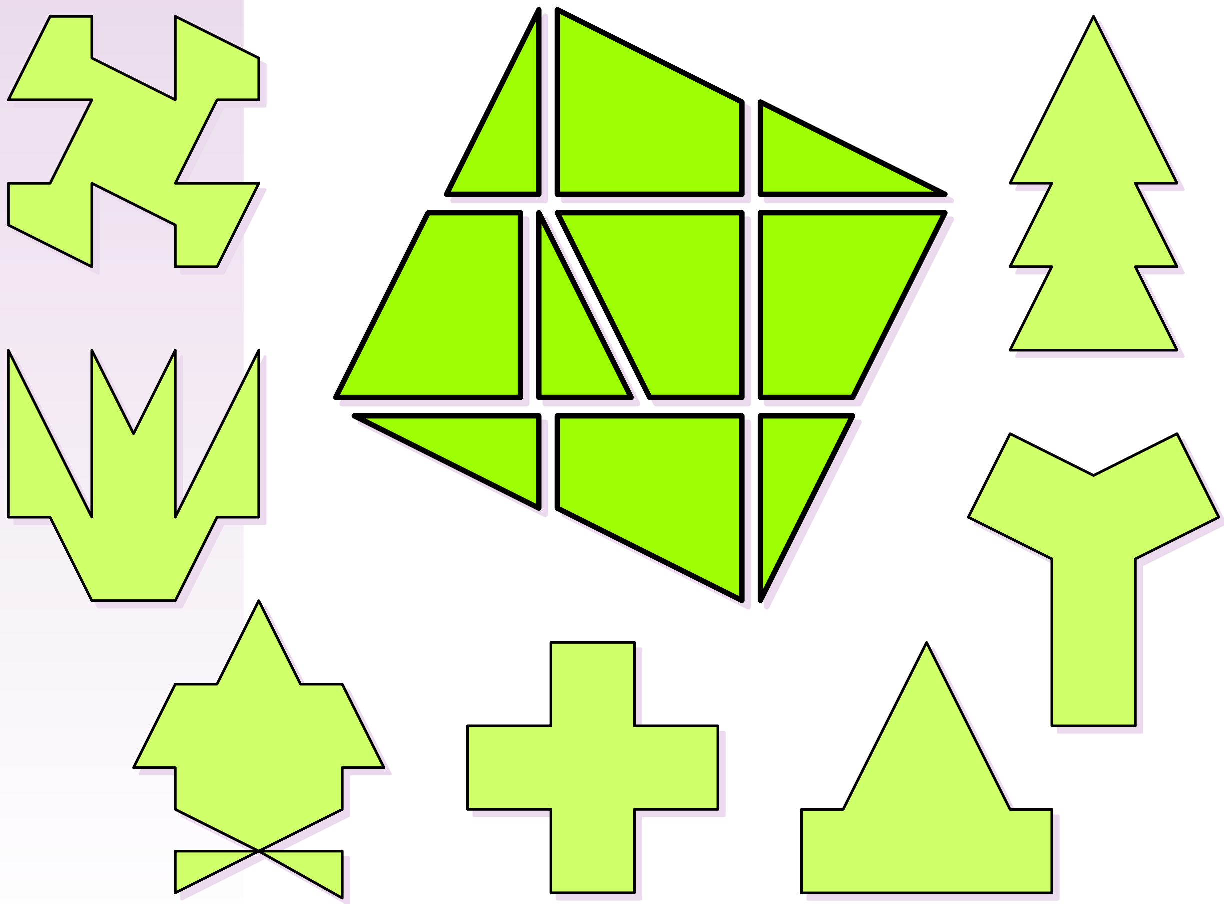




The Egg of Columbus (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

Tangrams



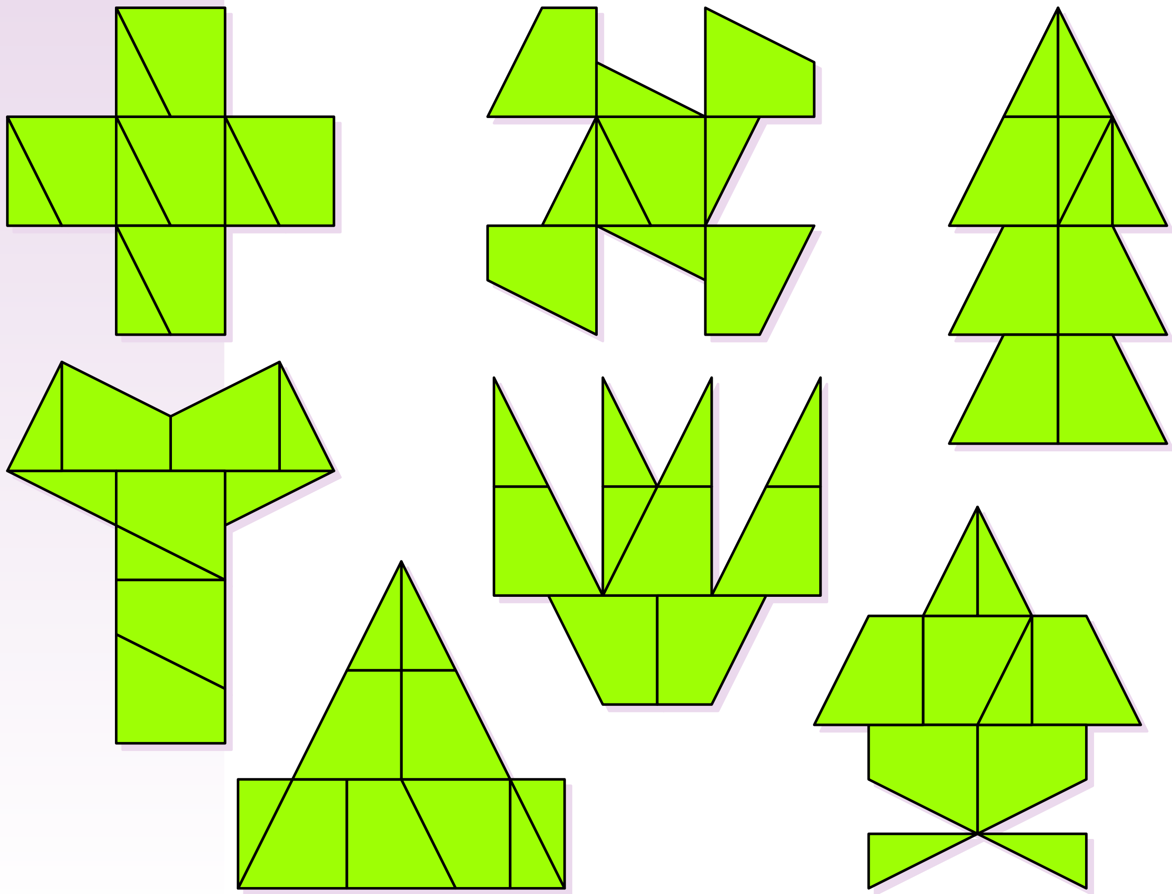
The Egyptian Puzzle

The earliest known version of this puzzle appeared more than two hundred years ago in a German toy company's catalogue of 1803.

This puzzle consists of five pairs of pieces each of which can be obtained from cutting a square from the middle point of one side to one of the two opposite corners.

The object of the puzzle is to assemble the shapes shown in the illustration, using all the eight pieces for each of them. After that try to create some other shapes on your own.

Tangrams



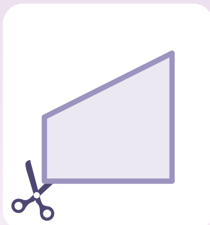
The Egyptian Puzzle (solution)

The solutions to all the shapes are shown in the illustration.

Treasure of Classic and Modern Puzzles

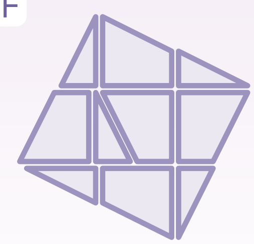
Tangrams

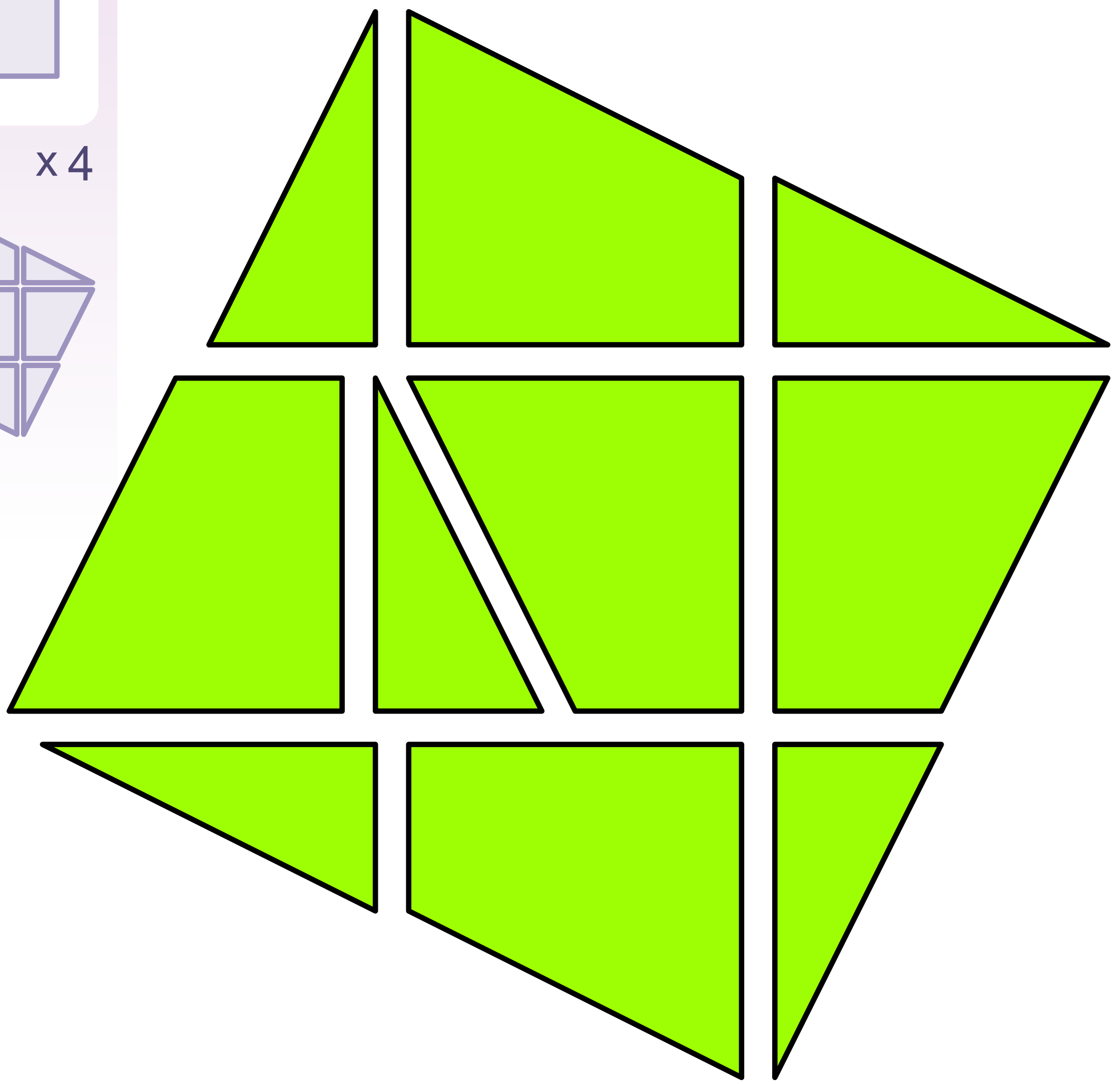
1



x 4

F

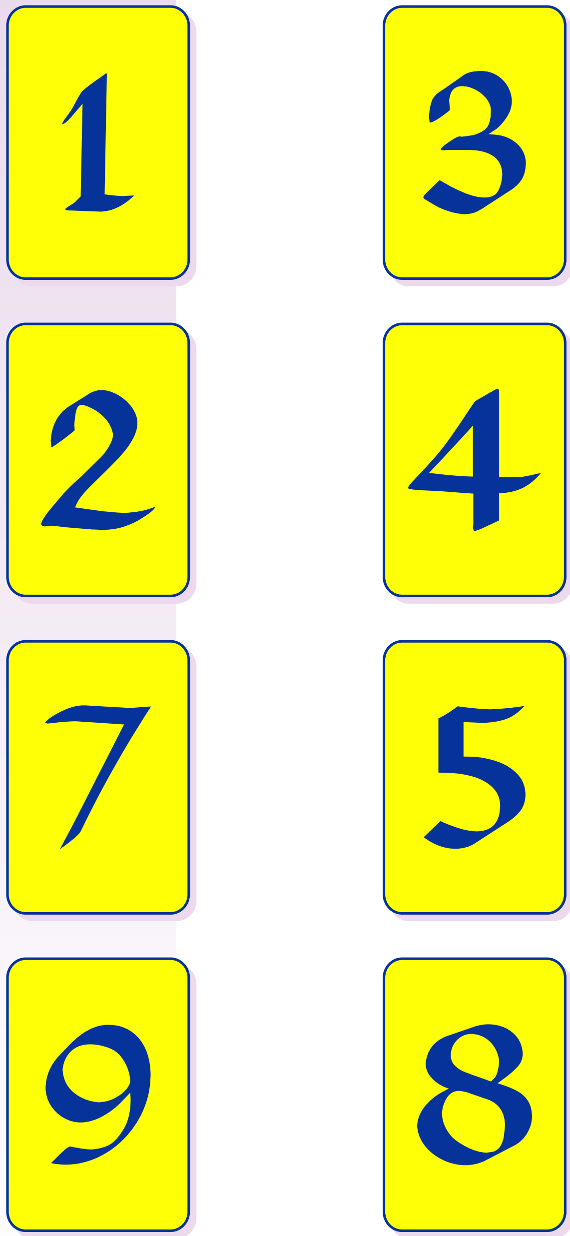




The Egyptian Puzzle (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

Matching Cards



The Eight Cards

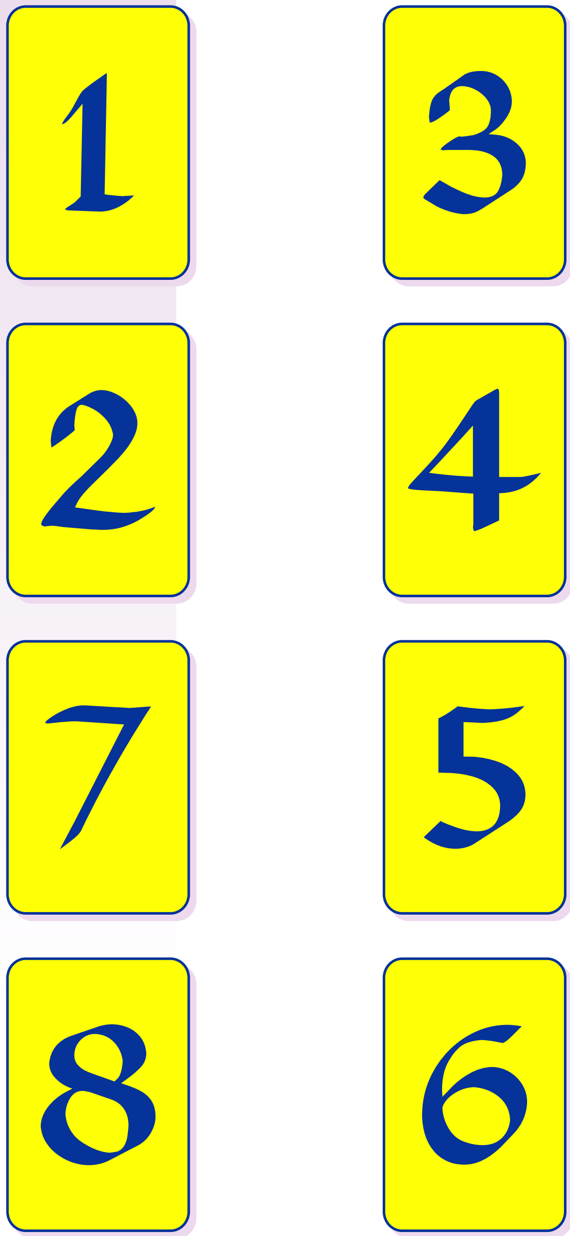
by Henry E. Dudeney

The eight numbered cards are placed in the two columns as shown in the illustration.

It can be seen that the numbers in the left and right columns add up different totals - 19 and 20, respectively.

The object of the puzzle is to rearrange these cards moving as few as possible so that each of the two columns gives the same total. How to reach it?

Matching Cards



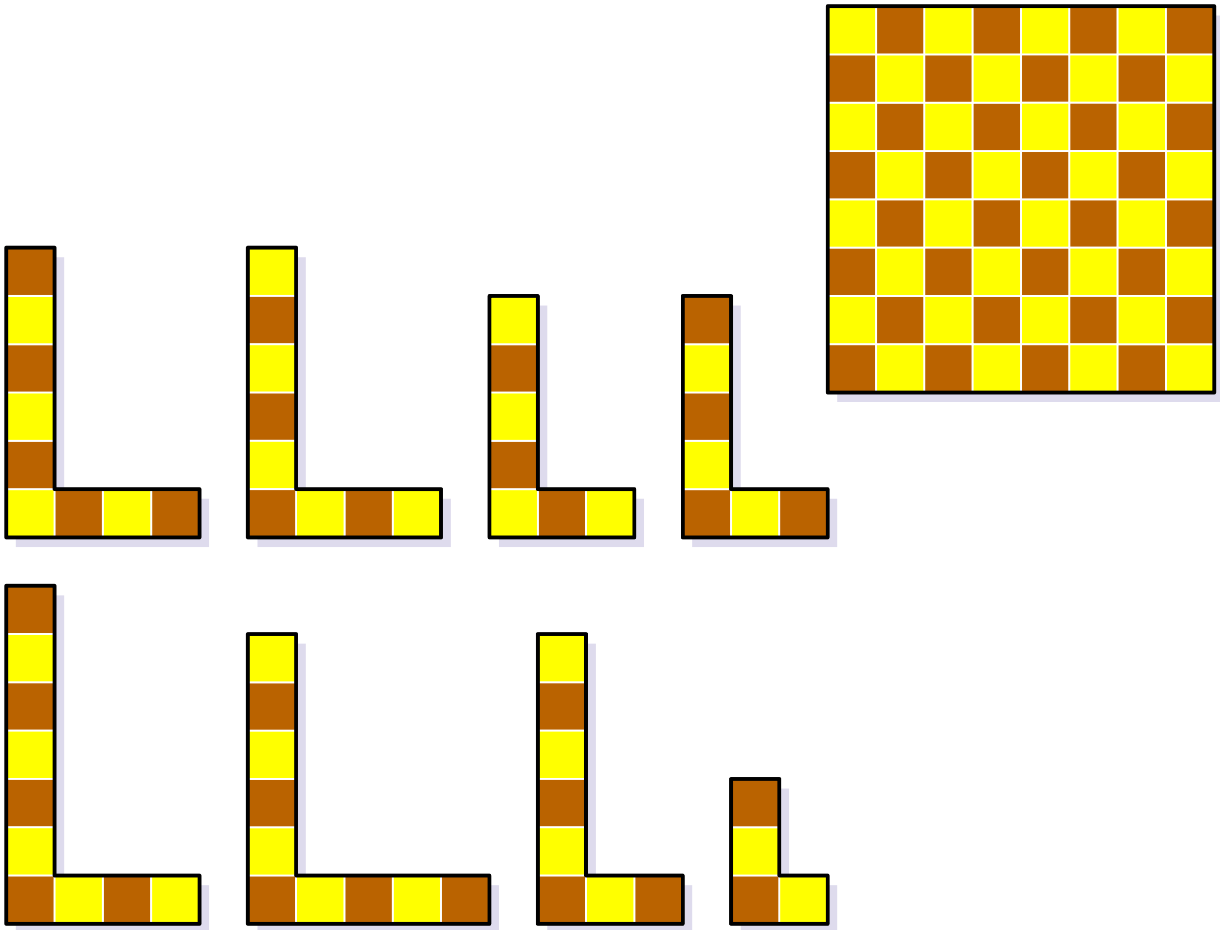
The Eight Cards *(solution)*

To solve this tricky puzzle just exchange the cards with the 8 and 9, and turn the 9 upside-down (changing it into the 6) as shown in the illustration. After this each column will add up to 18.

Eight Checkered L's

by Peter Grabarchuk

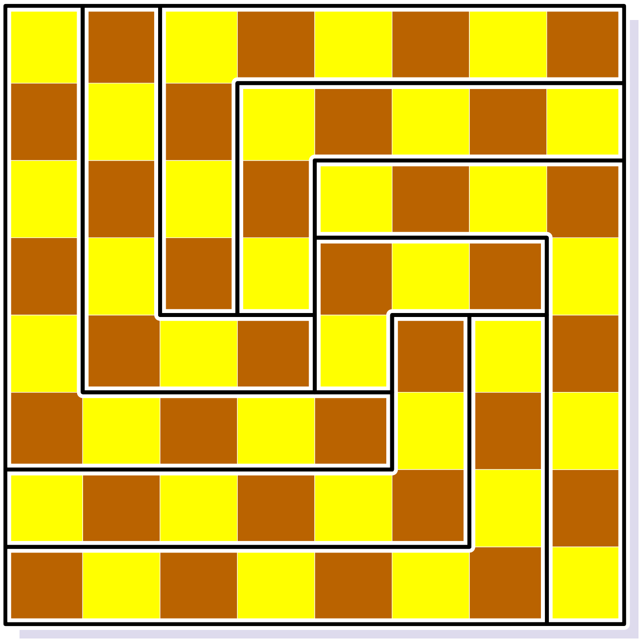
Puzzles.COM



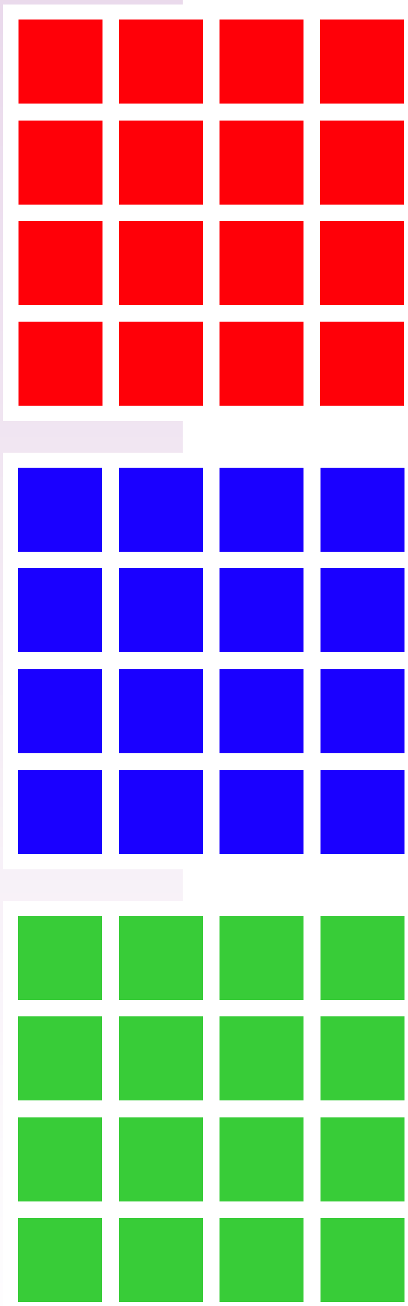
Put all the eight checkered L's into the 8x8 chessboard in order its checkered pattern is kept intact. The L's can be rotated but it is not allowed to overlap them or flip over.

More from the author at PeterPuzzle.com

Posted: May 24, 2008



The solution is shown in the illustration.

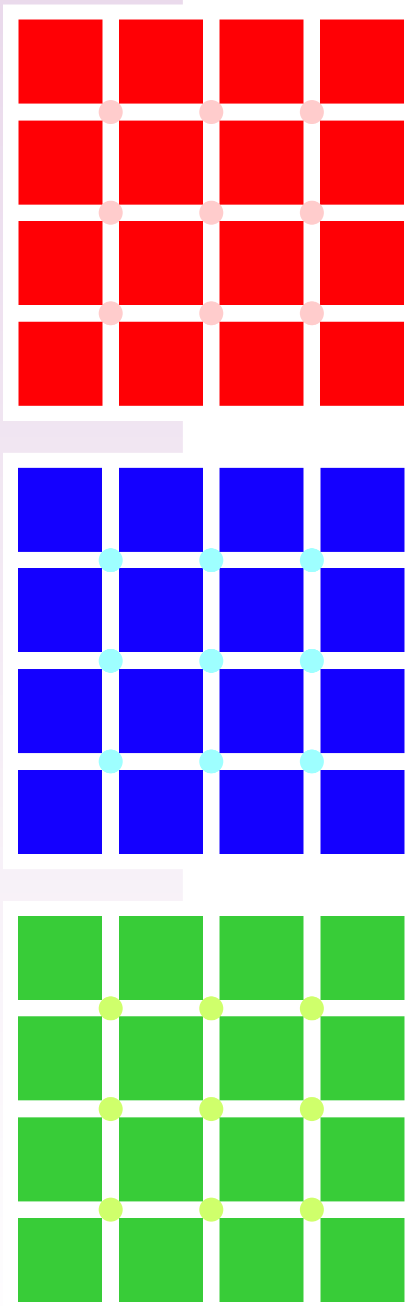


Elusive Spots

Look at the color grids on the left. Start from the red one. Do you see the light red spots at the crossroads between the red squares?

Now look at the blue grid. Do you see the light blue spots blinking like those red ones?
Finally take a look at the green grid. Can you see all those flickering light green spots?

Are there really any spots between the squares, and why do they only blink and try to disappear when you want to stare at any of them?



Elusive Spots (explanation)

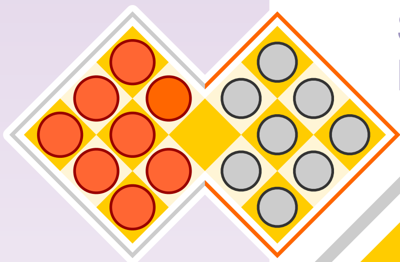
Actually, there are no color spots at the intersections. All those light color spots you may see are appearing because of different surroundings of different points at white horizontal and vertical roads going across every grid.

A bright surround causes that a point looks darker, and vice versa; this is so-called lateral inhibition. In our cases every intersection is surrounded by four bright areas what makes it darker. At the same time any other parts of the roads are mostly surrounded by dark squares what makes these parts lighter. This effect is different depending on whether you stare at any intersection, or see it by your peripheral vision.

The three grids on the left are very similar to the previous ones, but they have REAL light color spots at every intersection. In this case the lateral inhibition effect is weak.

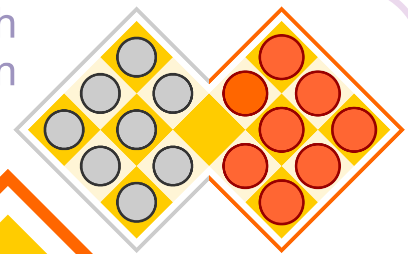
Puzzling is Good for You

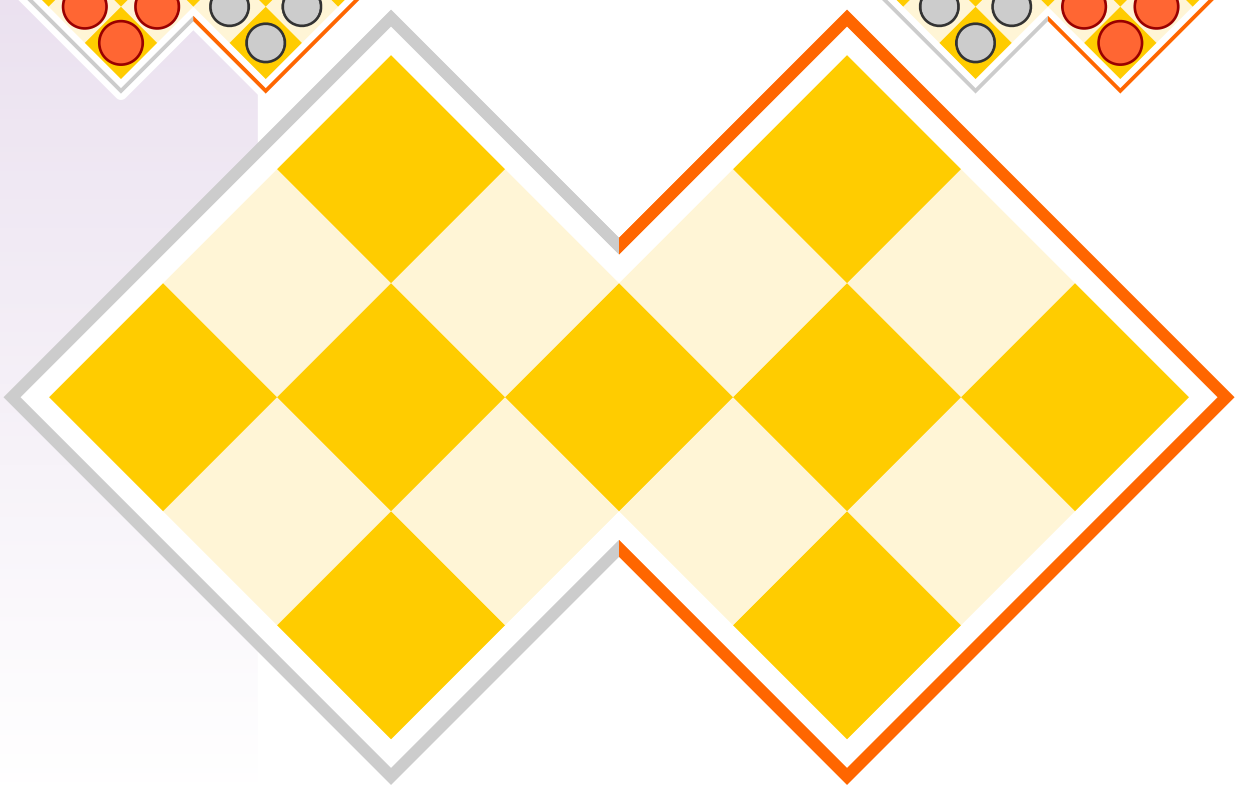
Our Collection



Start Position

Finish Position





English 16*

Grab 16 coins - 8 of one type and 8 of another. Say, it could be nickels and dimes. Then place them on the big board in the illustration as shown in the Start Position above: 8 coins of one type on the left half of the board, 8 of another type - on the right.

The object of the puzzle is to transpose the positions of the coins as shown in the Finish Position in the fewest number of moves. The best solution consists of 46 moves. Can you find it?

A coin may either be moved to an adjacent vacant square, or jumped over an adjacent coin (of either type) to a vacant square. No diagonal moves or jumps are permitted.

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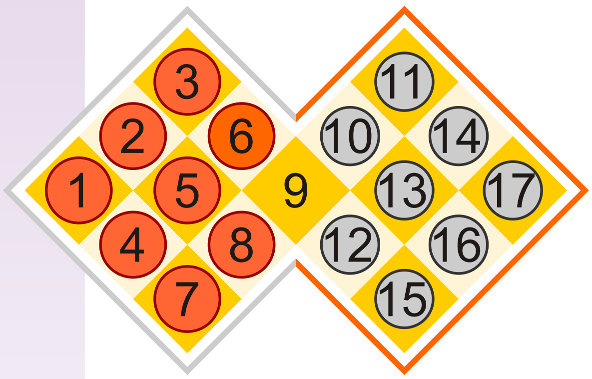
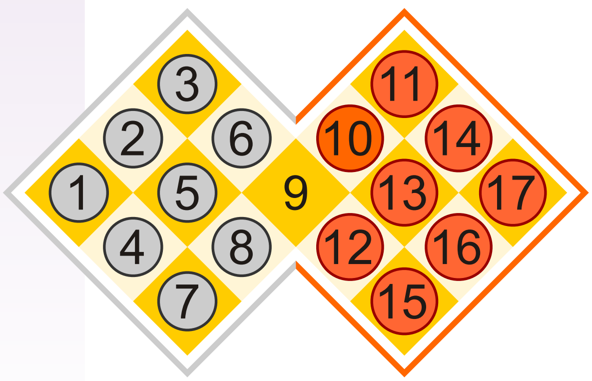
*The English 16 puzzle was very popular in Victorian England and Europe.

Puzzling is Good for You

Our Collection



Start Position



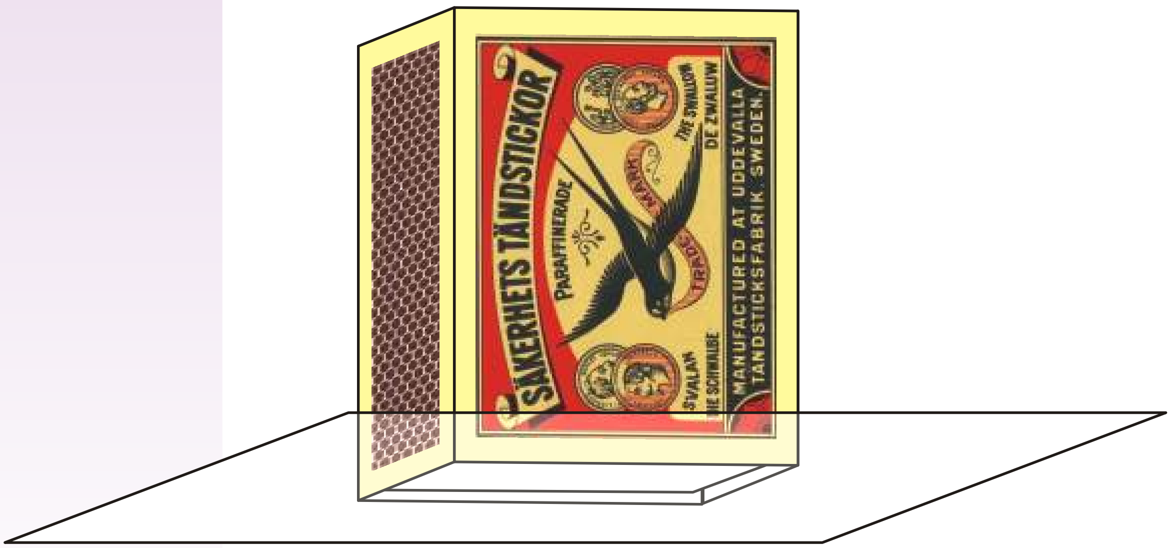
Finish Position

10, 8, 7, 9,
12, 6, 3, 9,
15, 16, 10,
8, 9, 11,
14, 12, 6,
5, 8, 2, 1,
7, 9, 11,
17, 16, 10,
13, 12, 6,
4, 7, 9, 10,
8, 2, 3, 9,
15, 12, 6,
9, 11, 10,
8, 9.

46 moves

English 16 (solution)

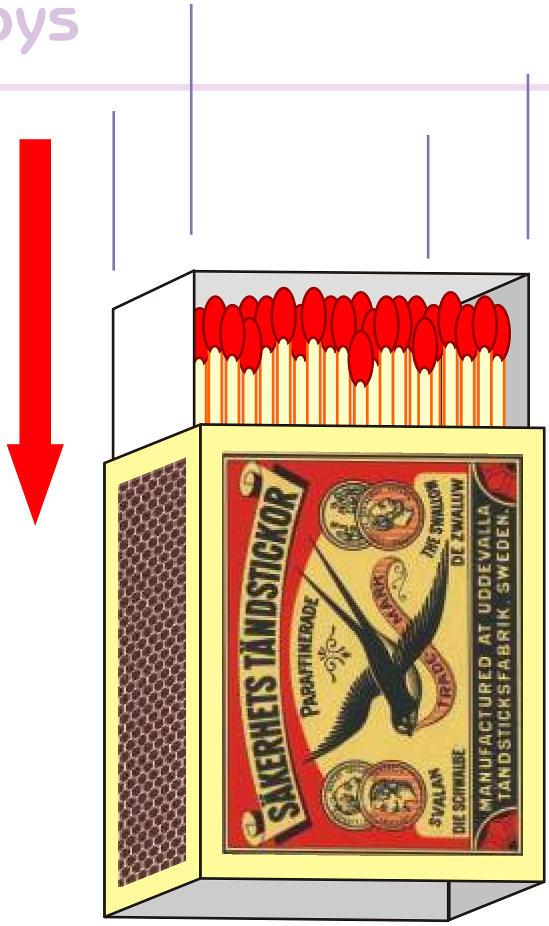
The solution in 46 moves is shown above. After 23 moves the coins form the symmetrical pattern on the board. After that the second half of the solution is just the "mirror reflection" of its first half.



Falling Box

after Martin Gardner

Ask someone to hold a box of matches about 8 inches (approximately 20 cm) over the table, then drop it so that it falls on one end and stands. When he/she tries it, the box will fall on its side. How to make it fly just right as you want?



Falling Box (explanation)

Use the stabilizing power of friction. Just open the box of matches about 1 inch (about 2,5 cm) as shown, and then drop it. The box will stand on its end, it will not fall on its side.

Word Puzzles

Fill-in-Words

after Martin Gardner

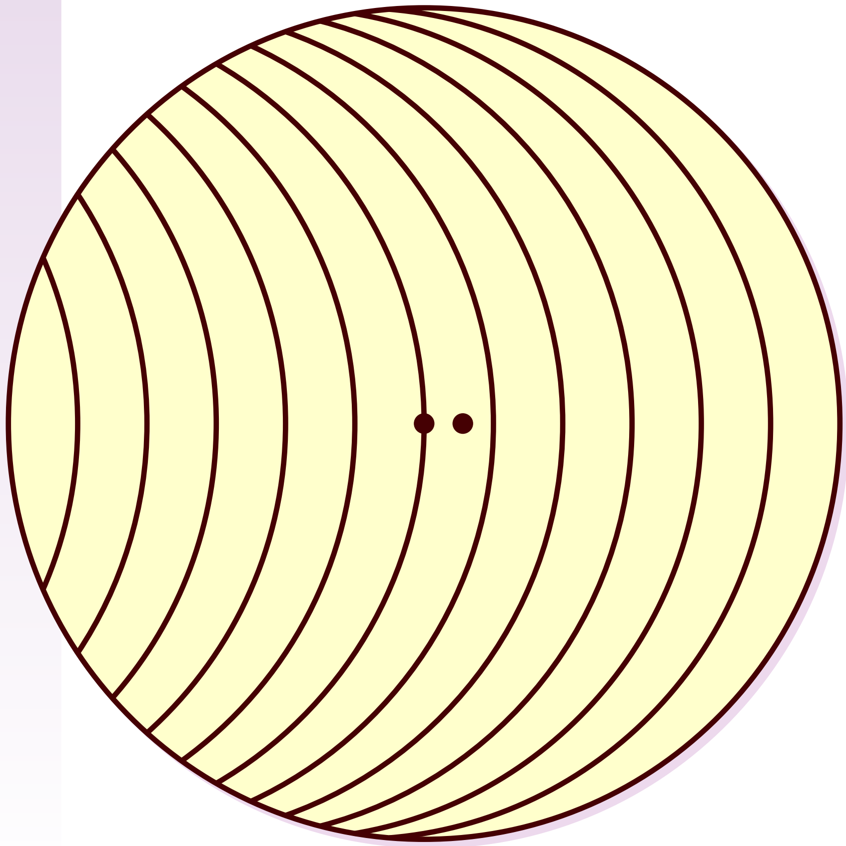
Put the right letters on the green cubes in the illustration so that each vertical column is a three-letter word, and the center horizontal row spells the name of a familiar sea animal.

Word Puzzles

Fill-in-Words (solution)

The sea animal is OYSTER.

Illusions

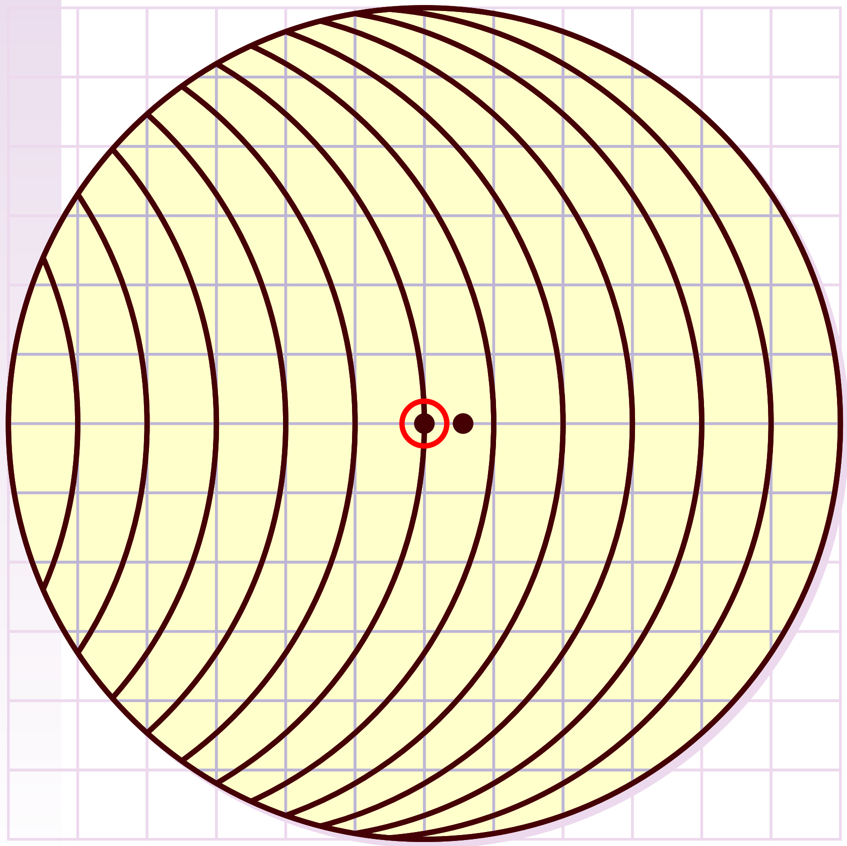


Find the Center

by Martin Gardner

Which one of the two dots in the illustration is the true center of the circle?

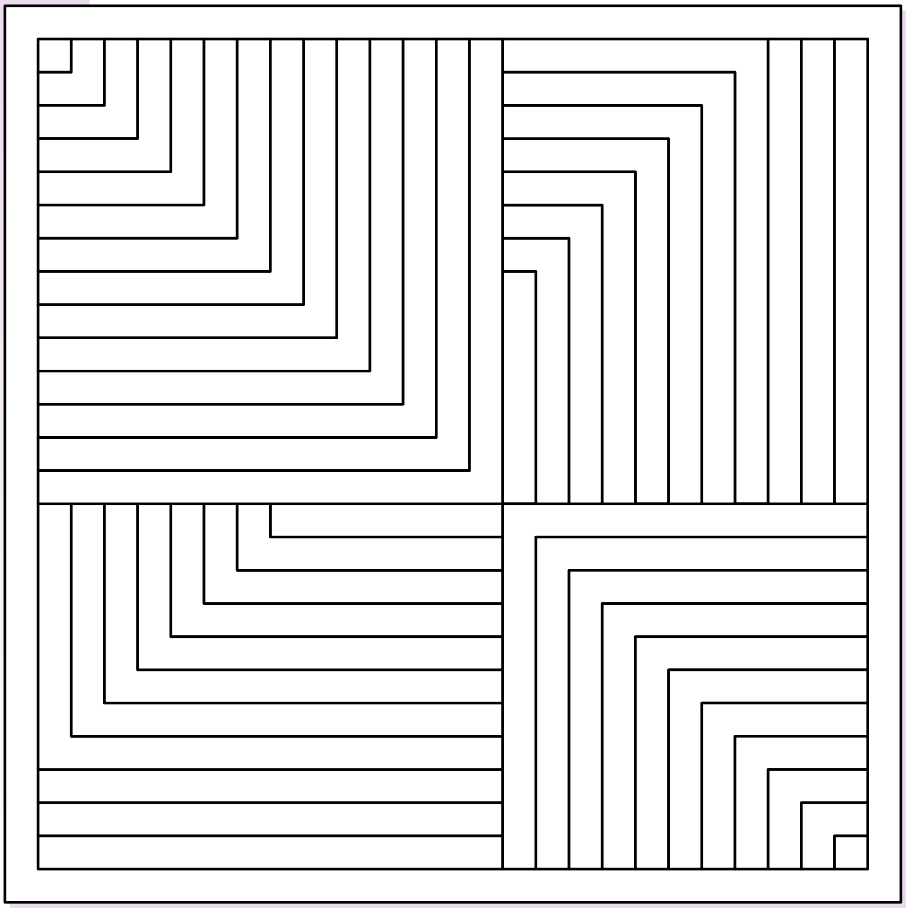
Illusions



Find the Center (explanation)

Though it could seem visually the right dot lies in the center, the square grid behind the circle shows the left dot is in the center actually.

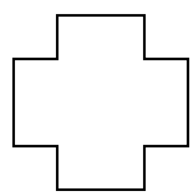
Visual Puzzles

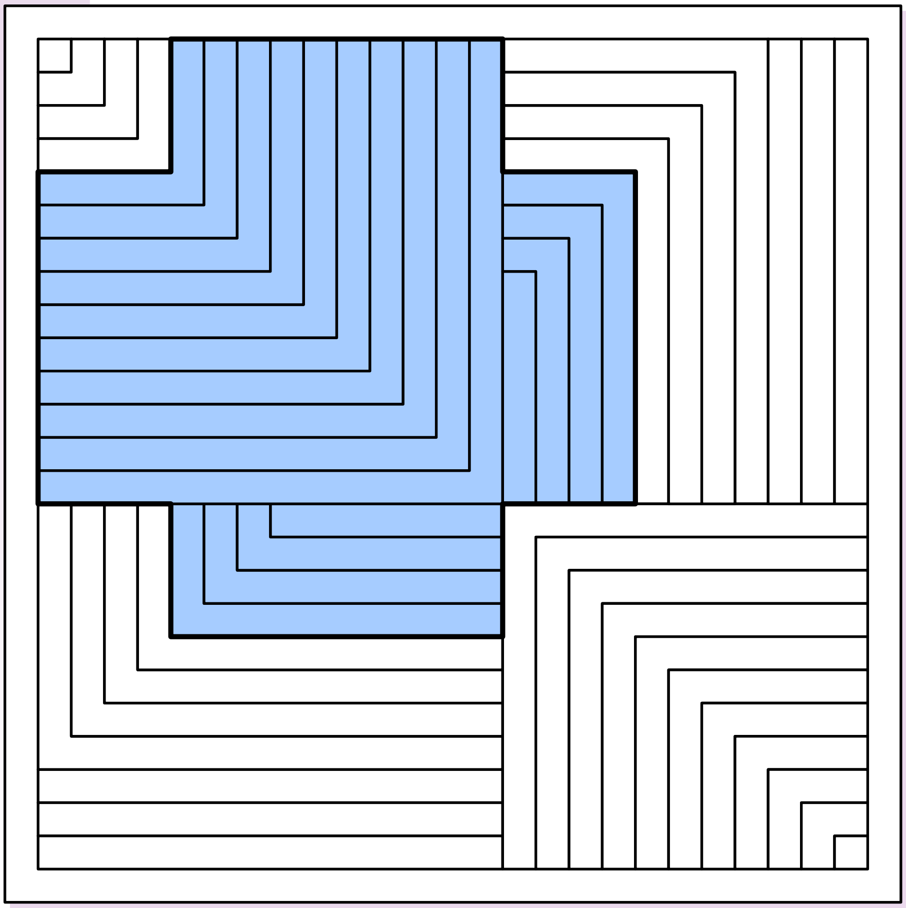


Find the Cross

after Charles H. Paraquin

The object of the puzzle is to trace in the big figure above a shape geometrically similar to the smaller one shown on the right.



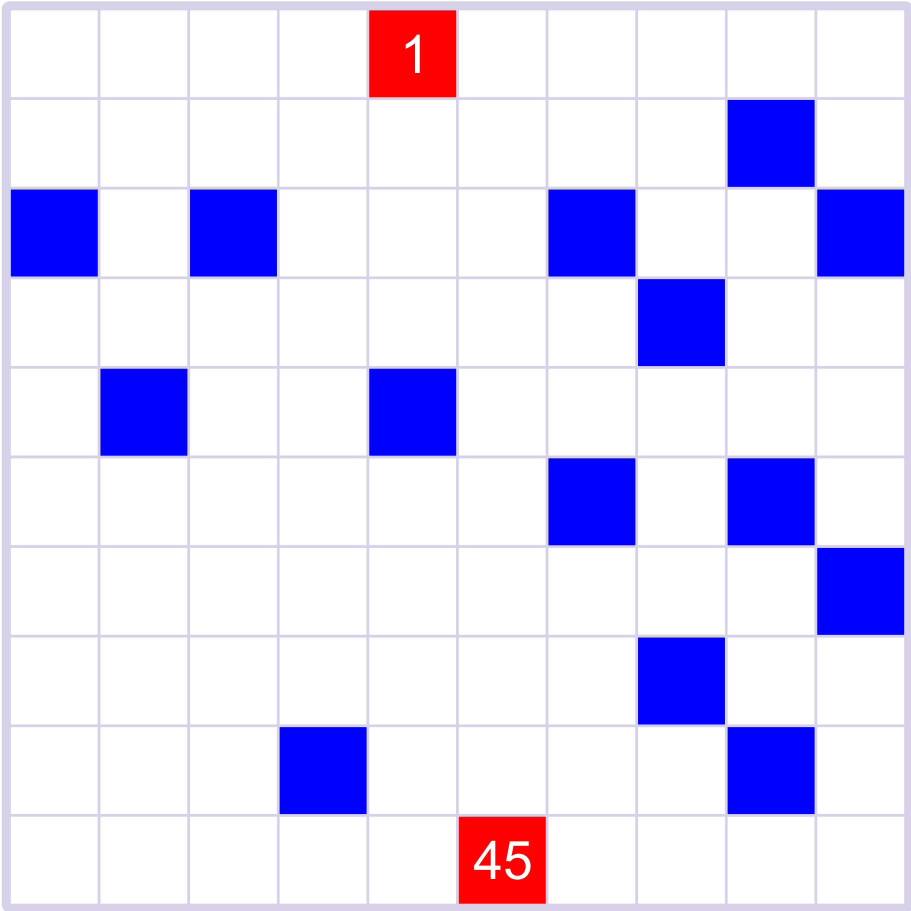


Find the Cross (solution)

The hidden cross is shown in the pattern in the illustration.

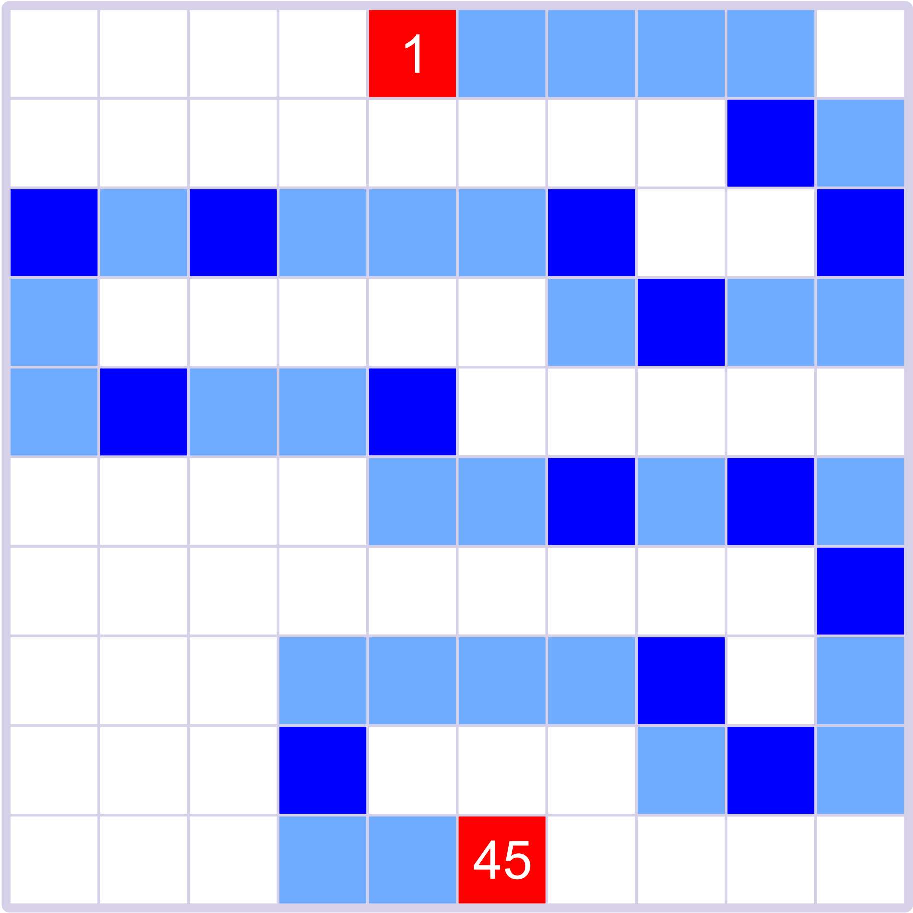
Finnish Snake

by László G. Nagy*



A sea serpent, 45 meters long lies hidden under the surface of the water. The animal is bent horizontally and vertically, but doesn't touch itself anywhere, even diagonally. Its head (the top red square), tail (the bottom red square) and a few other parts (the blue squares) are visible. Can you figure out the snake's exact position?

*The puzzle was presented at the 4th 24 Hours Puzzle Championship, May 24-25, 2003, Budapest, Hungary.



The solution is shown in the illustration.

Fish's Weight

after Martin Gardner

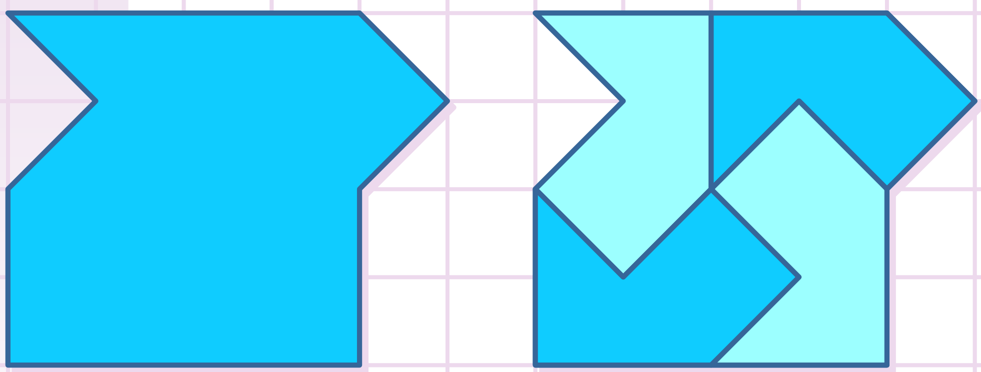
How much does a fish weigh if it weighs 1 pound plus half its own weight?

Puzzles with Weighings

Fish's Weight (solution)

The fish weighs 2 pounds. Two halves make a whole, so if the fish's total weight is the sum of 1 pound and half the total weight, the other half must also be 1.

Dissection Puzzles



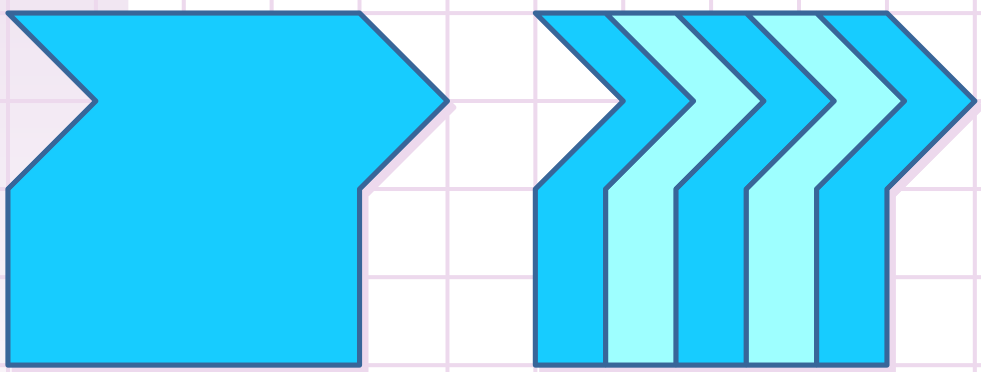
The Five Congruent Polygons

by L. Vosburg Lyons

The polygon shown in the illustration above (the shape at the left) can be dissected into four congruent polygons as shown in the right shape.

Can you find the only way how to dissect this polygon into five congruent polygons?

Dissection Puzzles



The Five Congruent Polygons (solution)

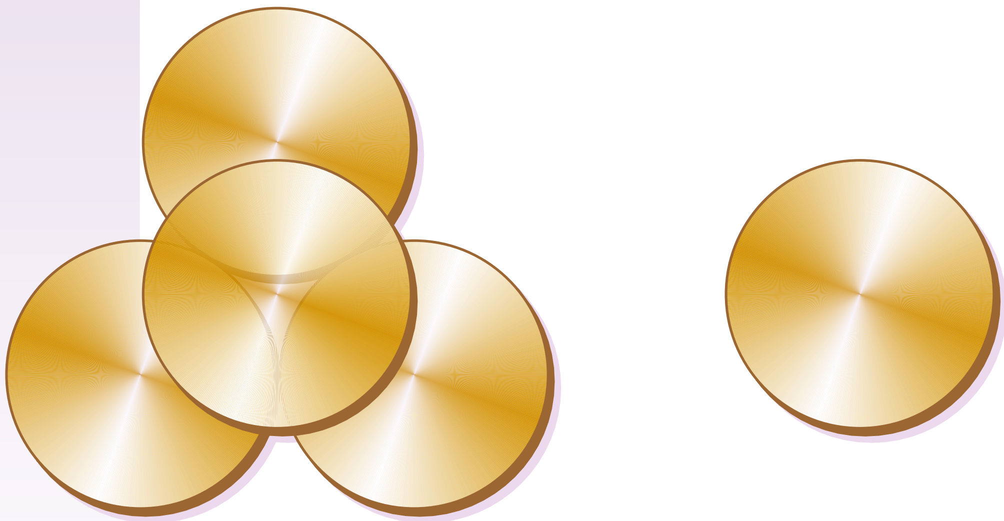
The solution how to dissect this polygon into five congruent polygons is shown in the illustration.

L. Vosburg Lyons first published this tricky dissection puzzle in 1969.

Martin Gardner described it in his book - Wheels, Life and Other Mathematical Amusements.

Treasure of Classic and Modern Puzzles

Coin Puzzles



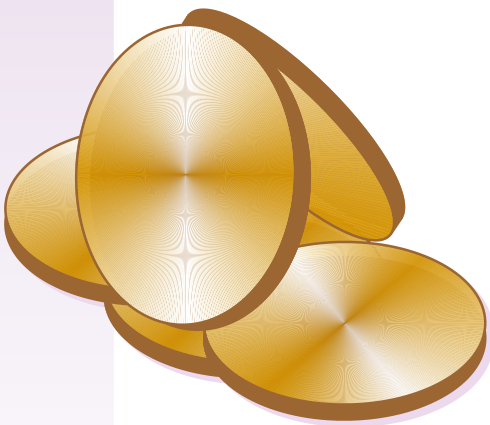
The Five Pennies

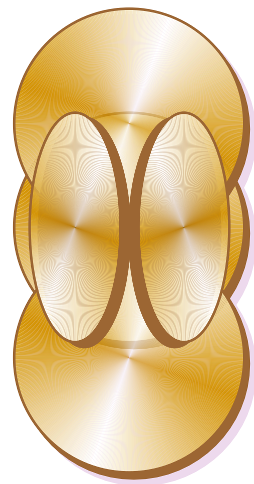
by Henry E. Dudeney

It is quite easy to place four pennies in such a way that each penny touches every other one. Just place three of them on the table in the form of a triangle so that they touch one another, and then lay the fourth penny on top of this triangle - as shown in the illustration.

Now add one more penny and try to do the same thing with five pennies - again every penny has to touch every other penny.

Coin Puzzles

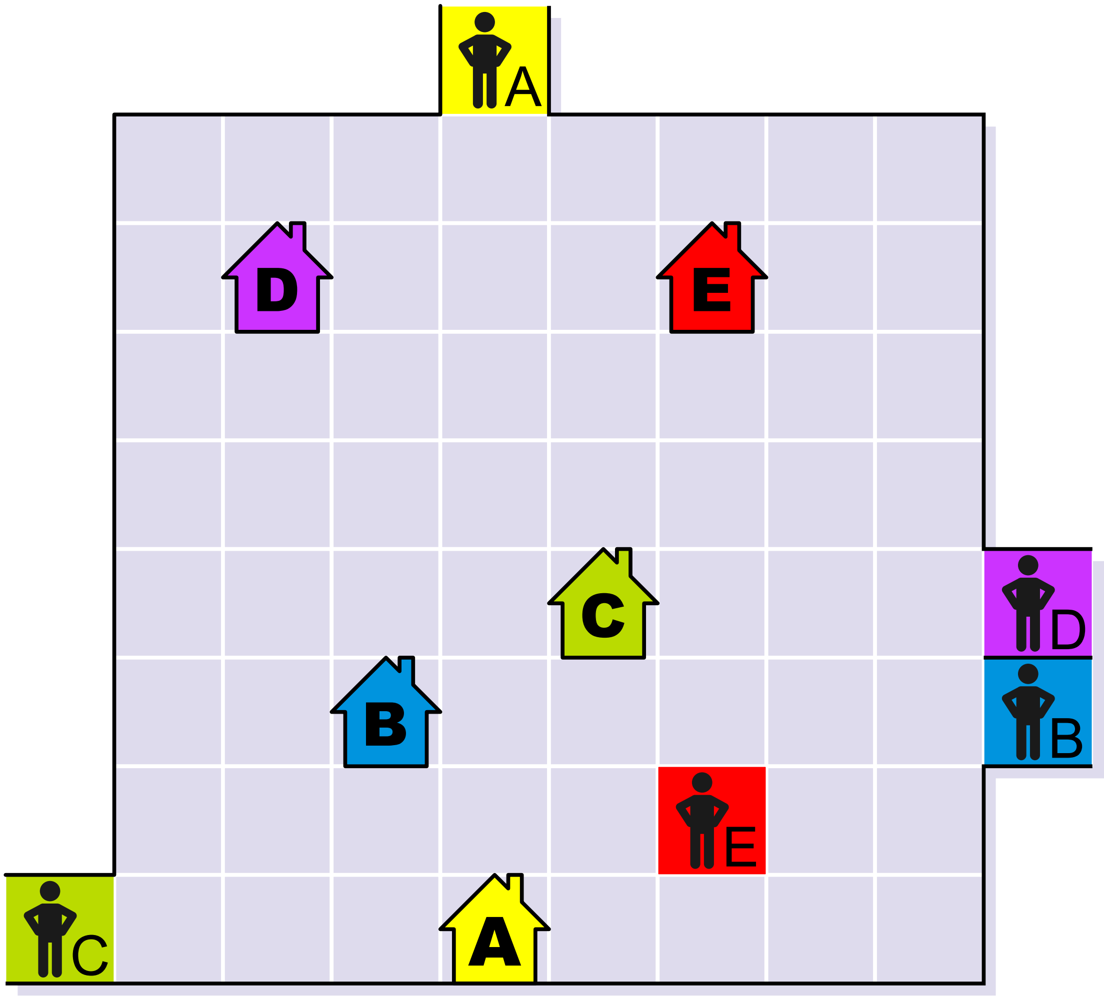




top view

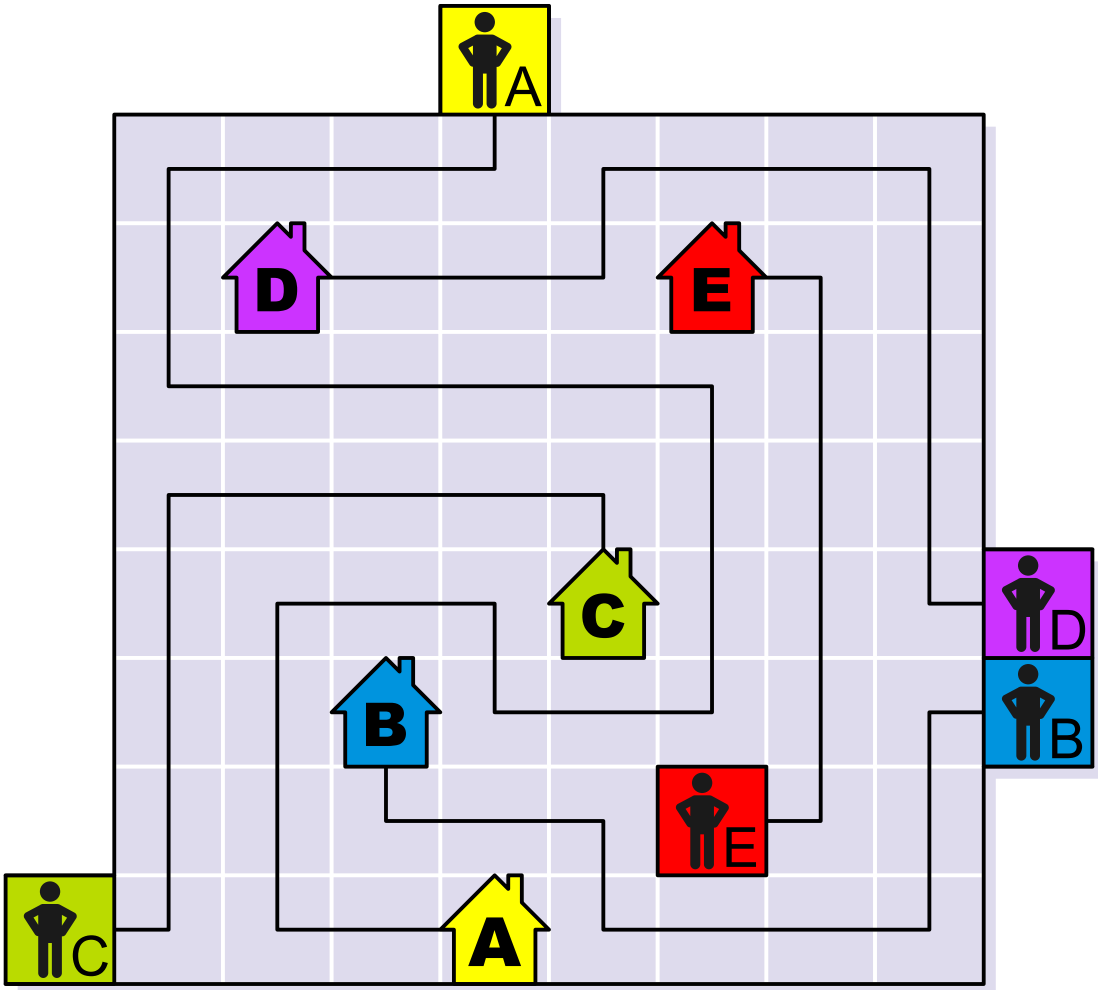
The Five Pennies (solution)

The solution is shown in the illustration.



Each of the five men (A-E) needs to get to the respective house (marked with the respective letter and color).

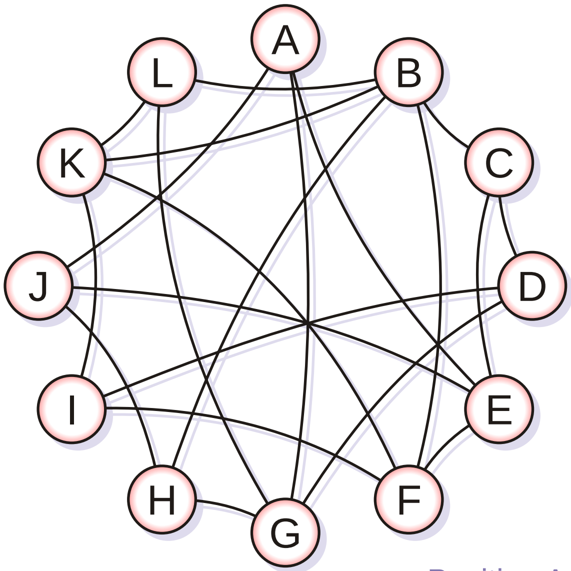
The problem is to discover how these five men can make these five routes without anyone crossing the route of another. In other words no more than one route is permitted through any cell. Men are allowed to move from cell to cell only vertically or horizontally, but never diagonally. Can you solve this challenge?



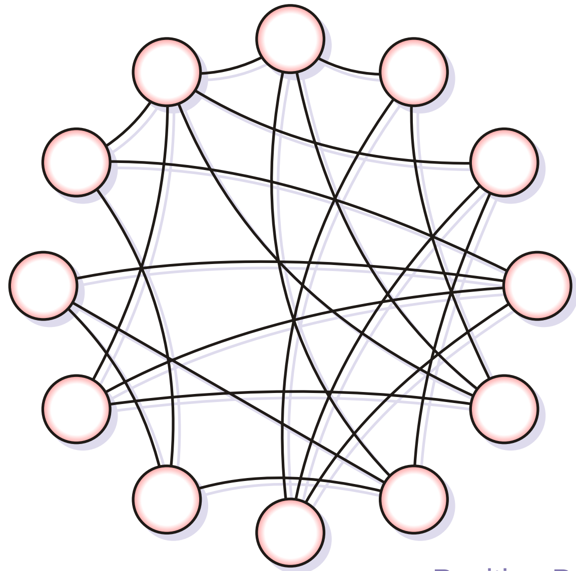
The solution is shown in the illustration.

FlexiNet

by László Osvalt*



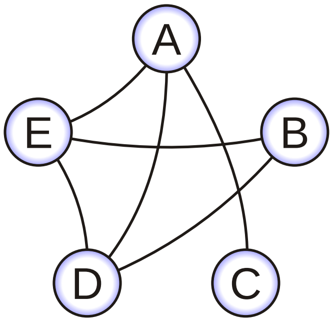
Position A



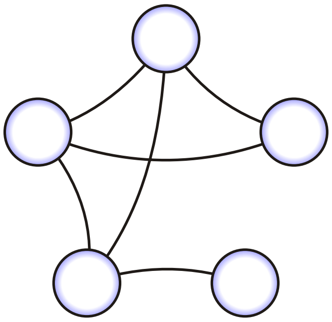
Position B

Write down the letters from A through L into the empty circles in Position B above (a letter per circle) in such a way that each letter in this position is connected to the letters it is connected with in Position A above.

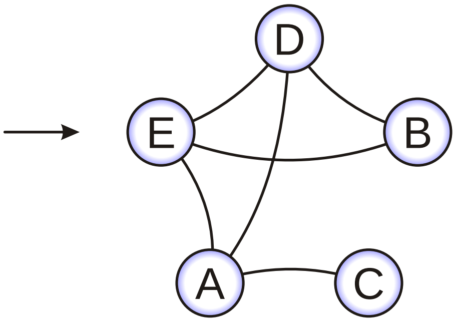
Example. In Position A for the simple grid shown below the letter B is connected with letters E and D, but not with A and C. Thus, in Position B it must be connected again with letters E and D, but not with A and C. The same connections must remain for each letter in the grid - as it is shown in Example solution below.



Position A

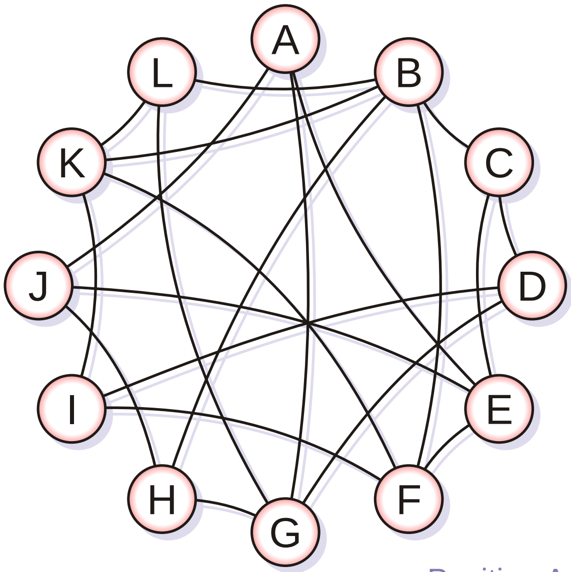


Position B

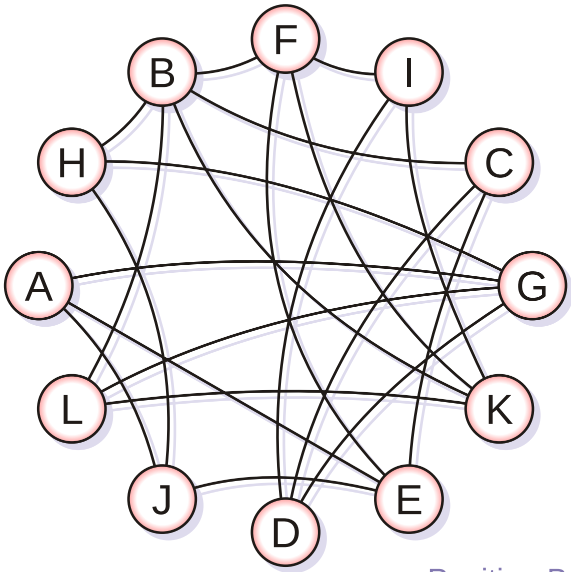


Example solution

*The puzzle was presented at the 4th 24 Hours Puzzle Championship, May 24-25, 2003, Budapest, Hungary.



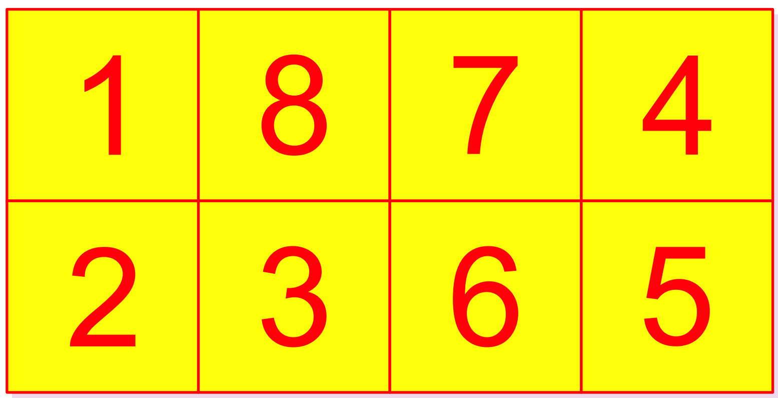
Position A



Position B

The completed Position B is shown in the illustration.

Folding Puzzles



1

2

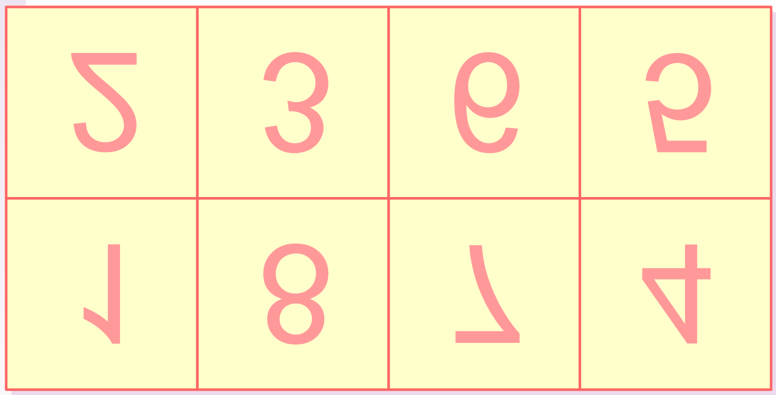
Fold the Sheet

by Henry E. Dudeney

Take a rectangle piece of paper divided into eight squares (2x4), and then number them on one side as shown in the left part of the diagram. Or simply print out the pattern from the Page 3 of this Print 'n' Play Version.

Henry E. Dudeney discovered that there are 40 different ways to fold this rectangle along the lines to form a square packet with number 1 face-up on top and all other squares beneath it like that shown in the right part of the illustration.

The object of this puzzle is to fold the rectangle along the lines in such a way that the squares are in serial order from 1 to 8, with number 1 face-up on top. You aren't allowed to tear the rectangle, just fold and possibly slightly bend it.



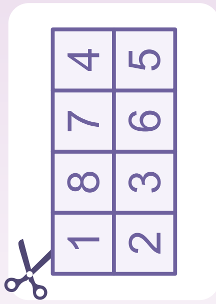
Fold the Sheet (solution)

The solution is as follows. Place the rectangle face down and upside down as shown in the diagram above. Now fold up the right half so that 5 goes on 2, 6 on 3, 4 on 1 and 7 on 8. Fold the bottom half up so that 4 goes on 5 and 7 on 6. Then tuck 4 and 5 together in between 6 and 3. Finally fold 1 and 2 beneath, and turn the whole square packet over to see number 1 on its top.

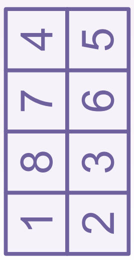
Treasure of Classic and Modern Puzzles

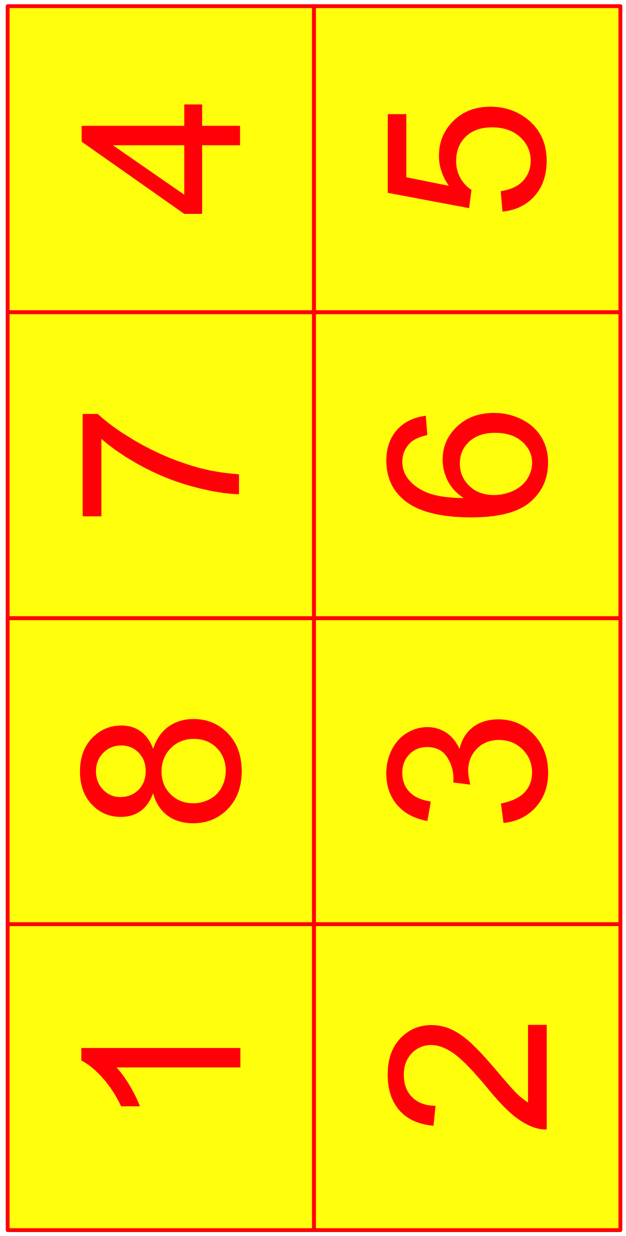
Folding Puzzles

1



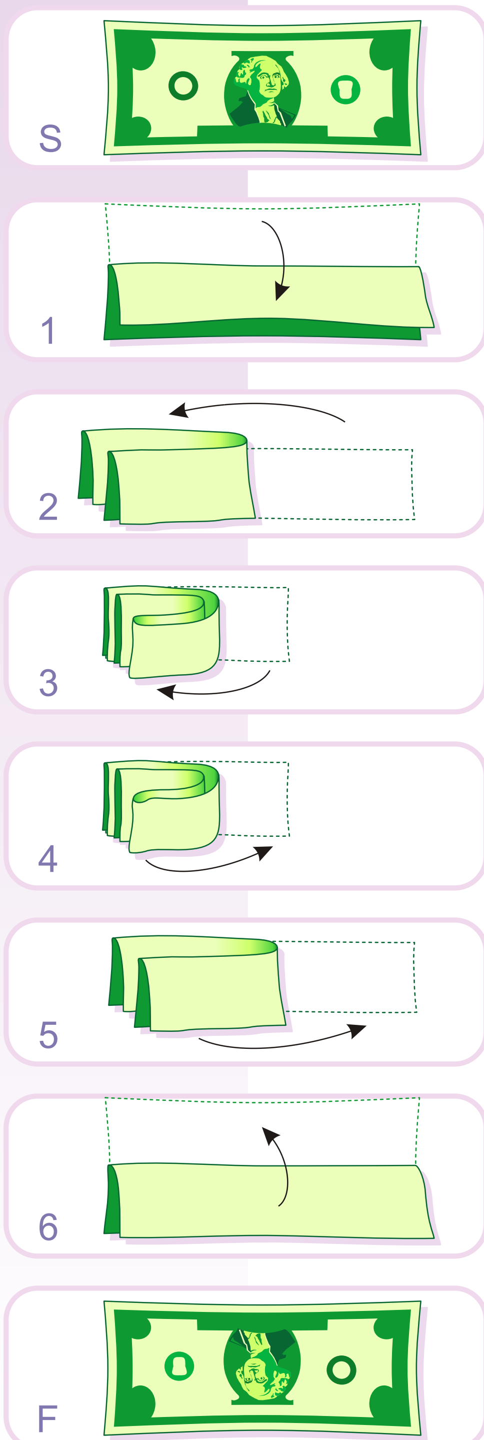
F





Fold the Sheet (pattern)

To produce the pattern first print it out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).



Fold to Turn

after Martin Gardner

Hold a dollar bill as shown at the Start (S), with the Washington's face upright.

Fold down the top half (Step 1).

Then fold the right part back and to the left (Step 2).

Fold the right part forward and to the left (Step 3).

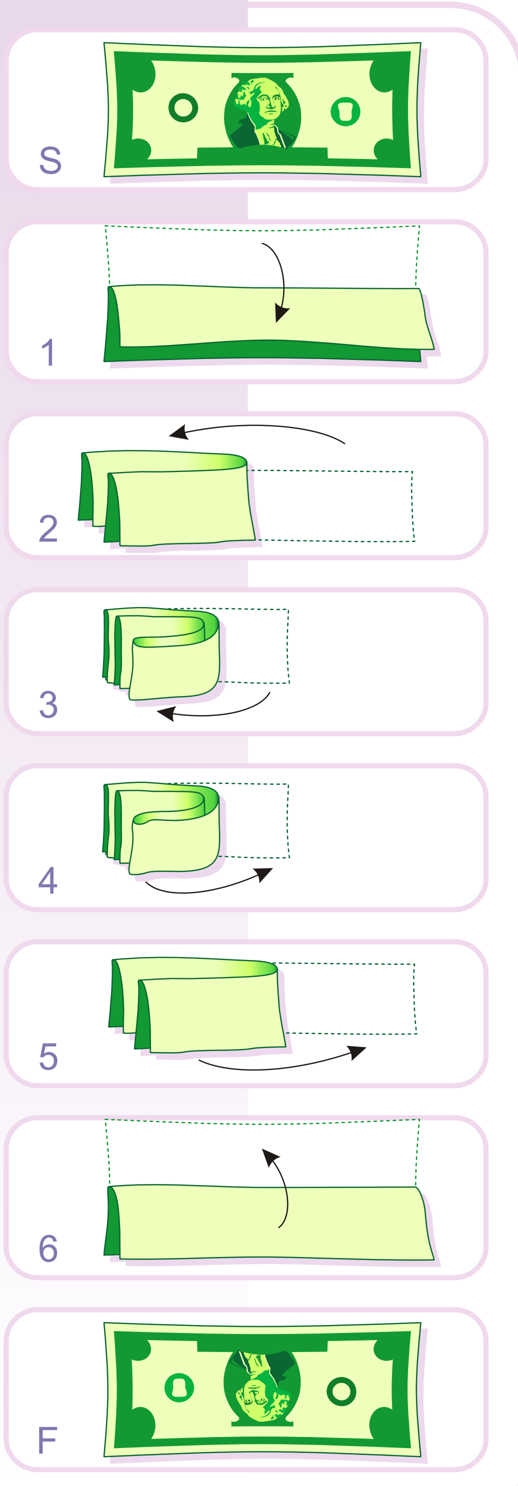
Now unfold from front and to the right (Step 4).

Then unfold from front to the right once again (Step 5).

Finally unfold the front flap up (Step 6).

If you have done everything exactly as shown in the illustrations and described above then you have to get Washington's face upside down!

Why did it happen, if it seems to be folded and unfolded in the same way?



Fold to Turn (secret)

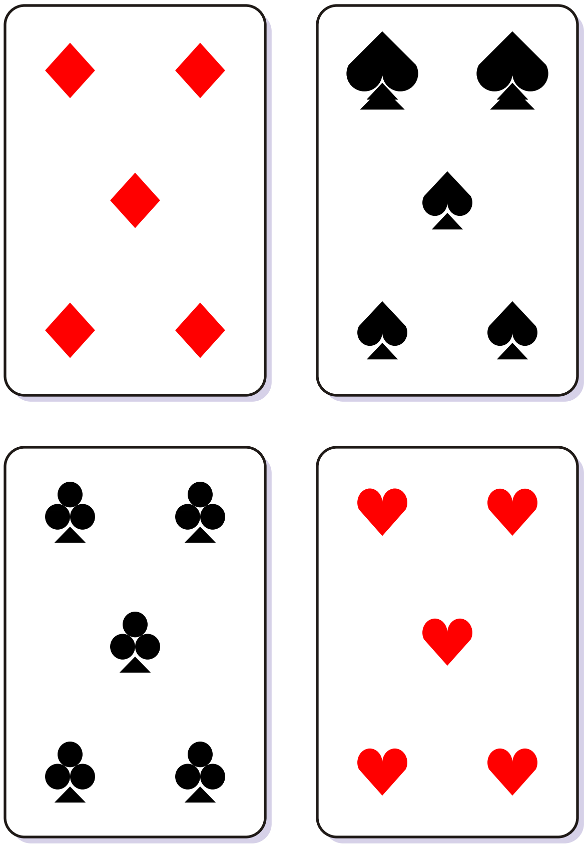
The secret is in the way you unfold the bill. When you fold the bill at Step 2, you fold it **back**. But when you unfold the bill at Step 5, you undo it from **front**. Very subtle but very substantial difference which makes a great trick!

Practice until you can do this trick fast, and have fun showing it to your friends. When they try to repeat it, the bill stays right side up.

Four Cards

after Professor Louis Hoffmann

Puzzles.COM



This is an old puzzle from the end of the 19th century. To its original task we've added two more challenges.

First print the four "fives" shown on the left, and then cut them out.

Original Puzzle. The object of the puzzle is to arrange these four cards, face upwards, so that only four pips of each are visible.

Puzzle 2. Arrange the cards, still face upwards, so that only three pips of each card are visible.

Puzzle 3. Now arrange the cards, face upwards again, in such a way that you'll see exactly 1, 2, 3, and 4 pips. Each of these four groups of pips have to be from another card. This means that one pip will be from one card, two pips from another, three pips from next one, and four pips - from the last of them.

You are not allowed to cut, bend or fold the cards while solving the puzzles.

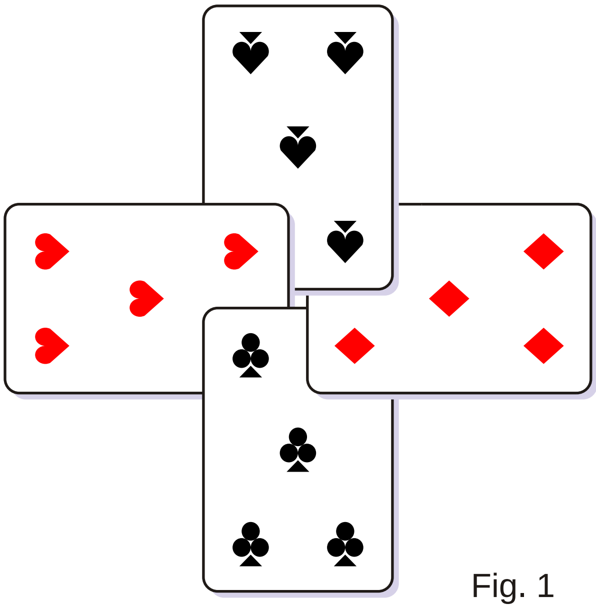


Fig. 1

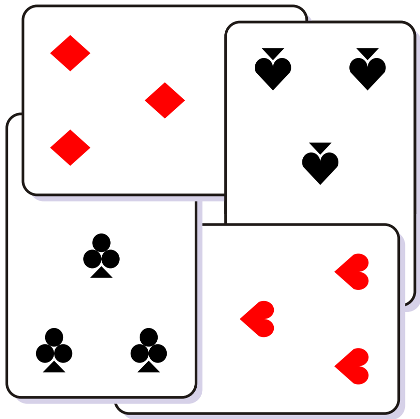


Fig. 2

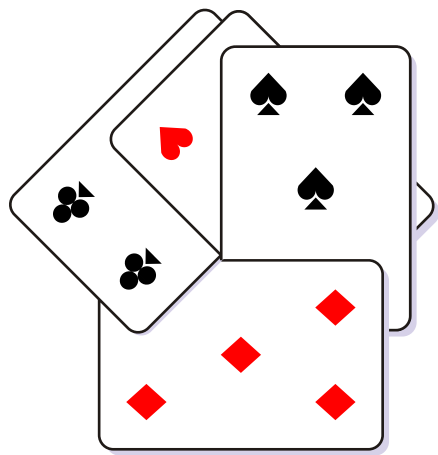
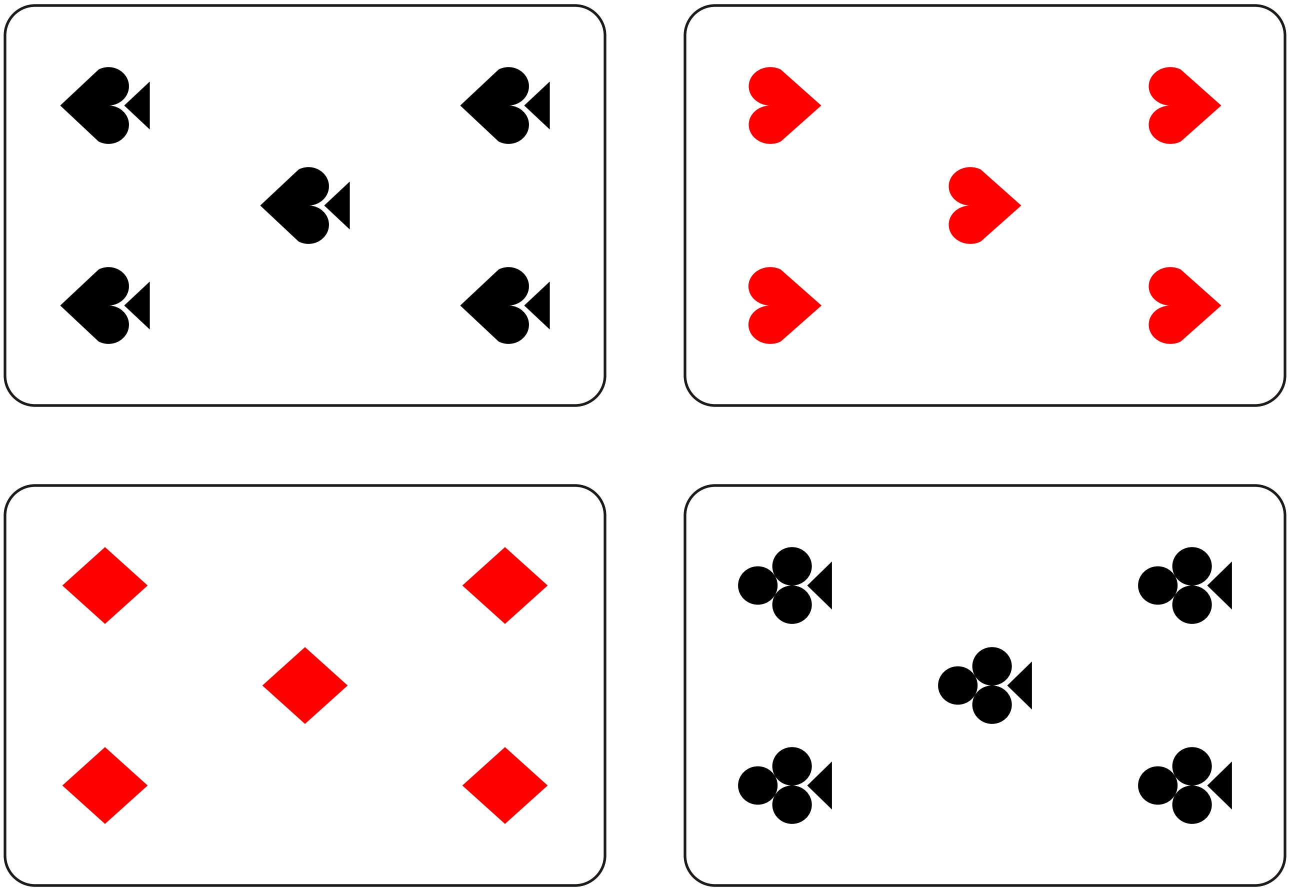


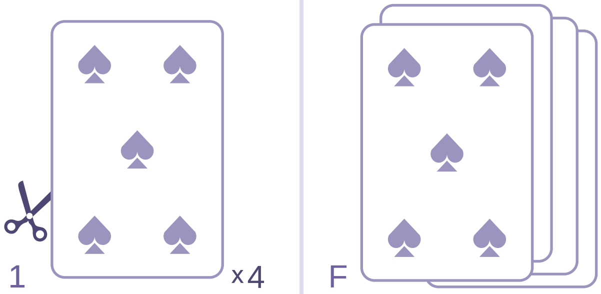
Fig. 3

One of the solutions with four pips is shown in Figure 1.

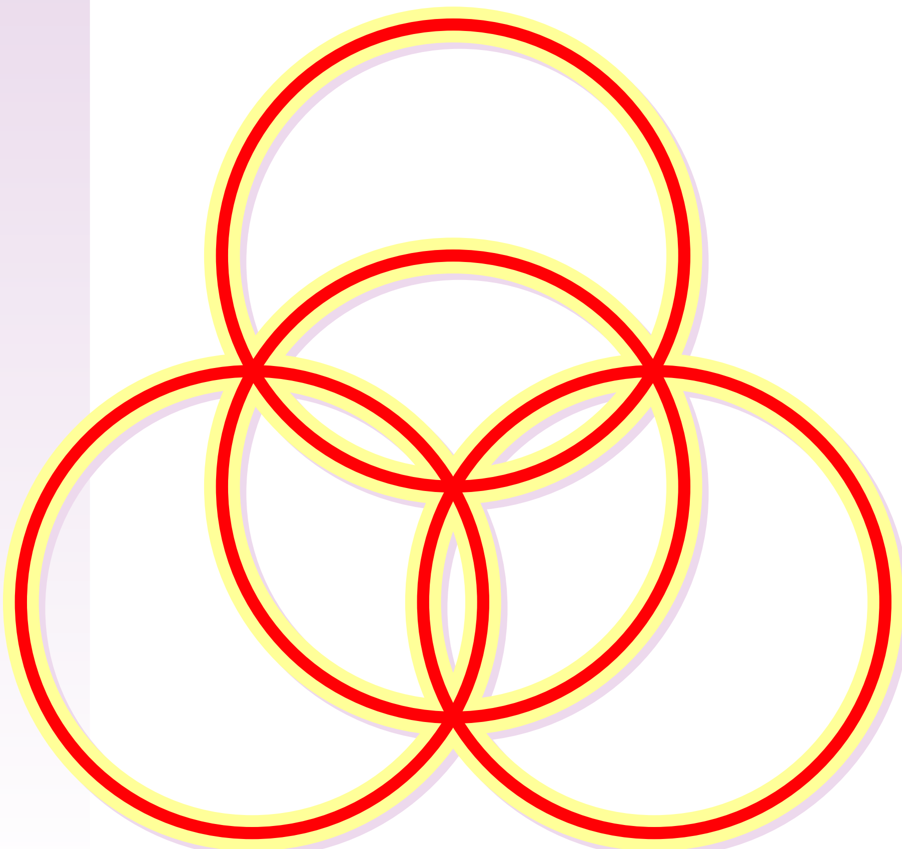
One of the solutions with three pips is shown in Figure 2.

Figure 3 shows one of the possible solutions with the "1-2-3-4" set of pips.





To produce the pieces first print them out. Then follow the diagram shown above - from step 1 to step F (finish).

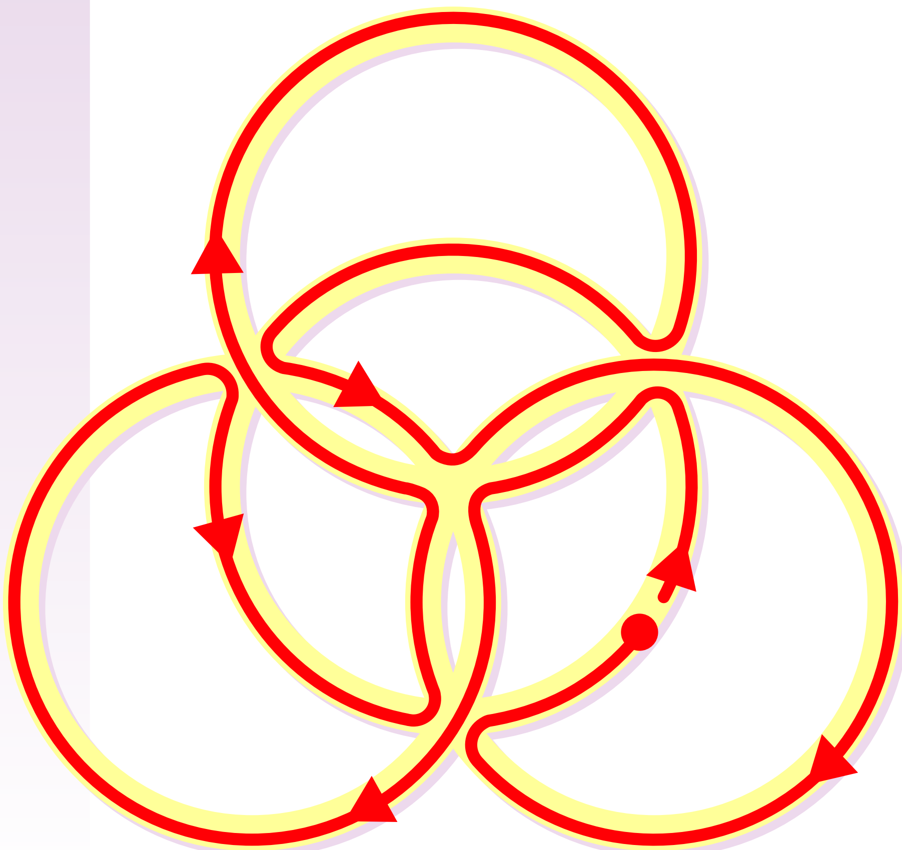


Four Circles

by Thomas H. O'Beirne

Draw this pattern of four crossing circles with pencil in one continuous line so that you don't take the pencil point off the paper.

You aren't allowed to go over any part of the line twice, or cross it.

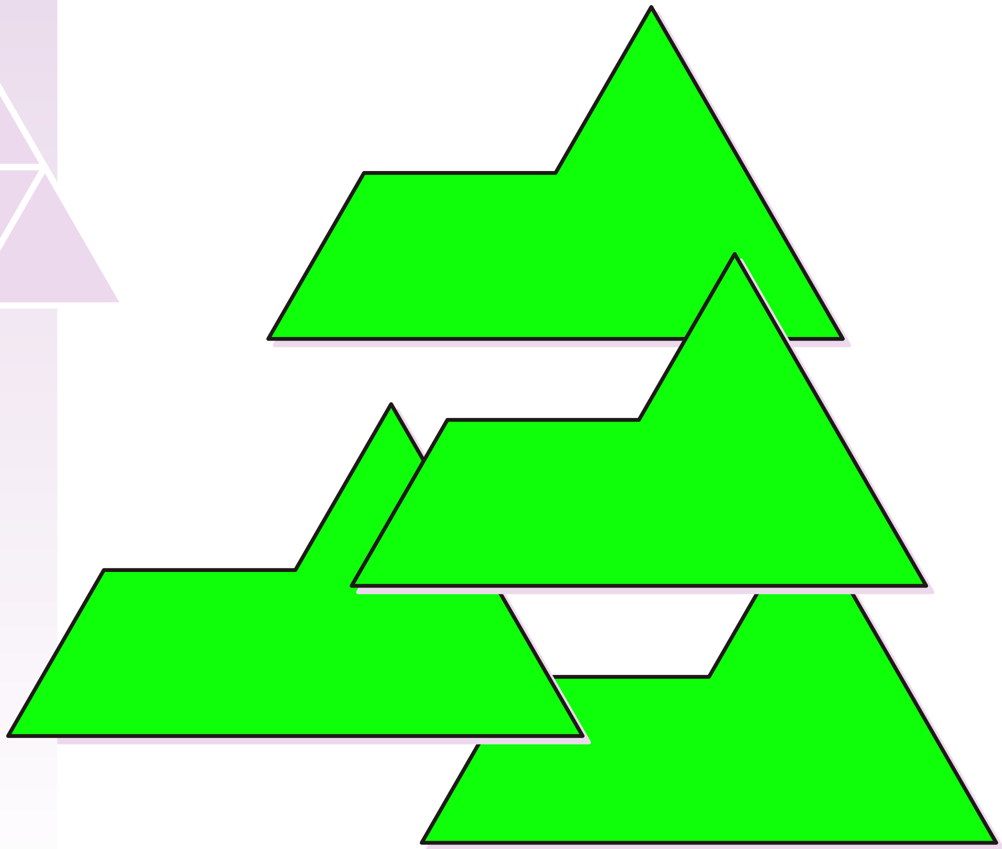


Four Circles (solution)

A pretty symmetrical solution to this puzzle is shown in the illustration.

Treasure of Classic and Modern Puzzles

Tangrams

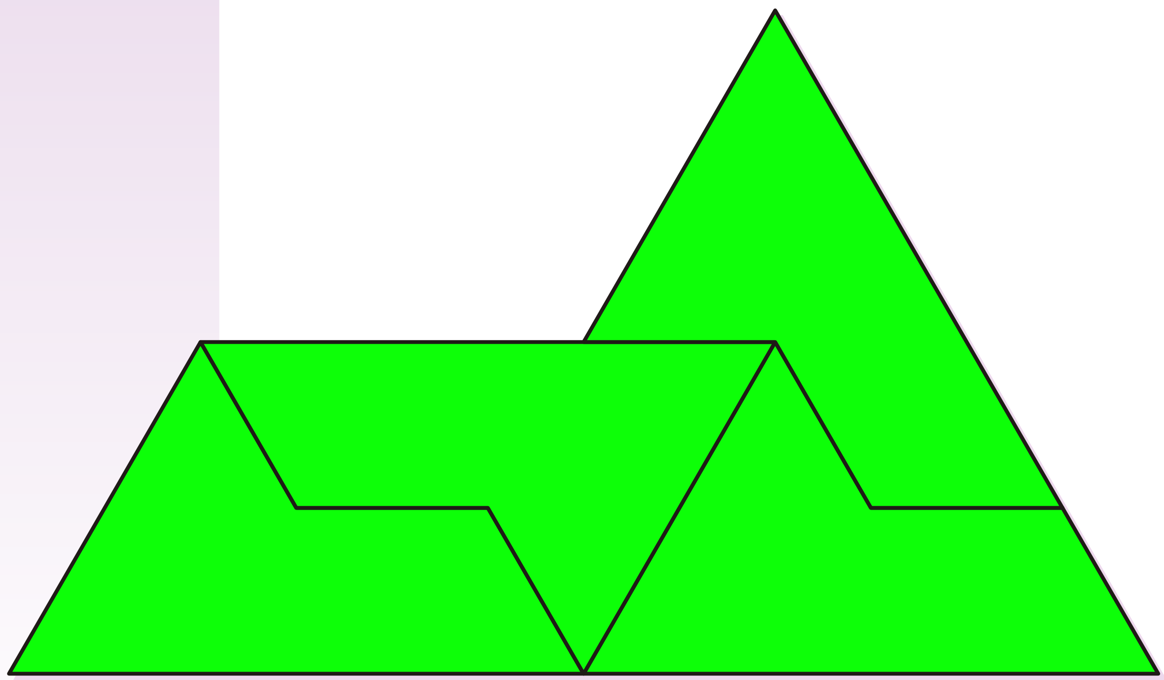


Four into One

The four identical equilateral triangles can be arranged together to make exactly the same equilateral triangle, only bigger, just as shown in the upper left illustration.

The object is to arrange the four shapes shown in the center of the illustration into the same shape as one of those shapes is, only bigger. You are allowed to rotate and flip the shapes as you wish but the pieces are not allowed to overlap in the final shape.

Tangrams

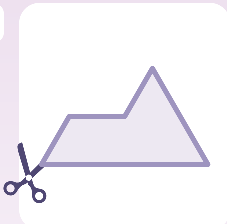


Four into One (solution)

The solution is shown in the illustration.

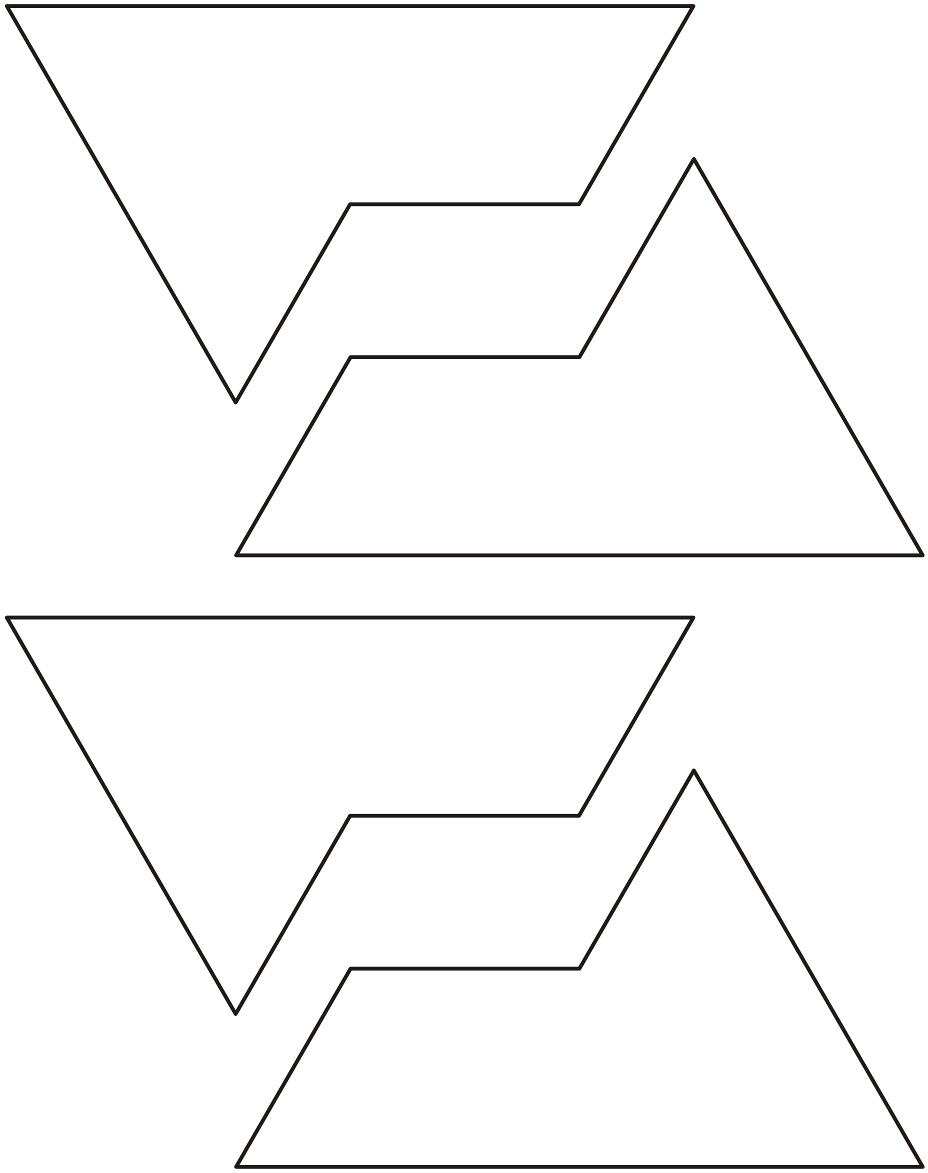
Tangrams

1



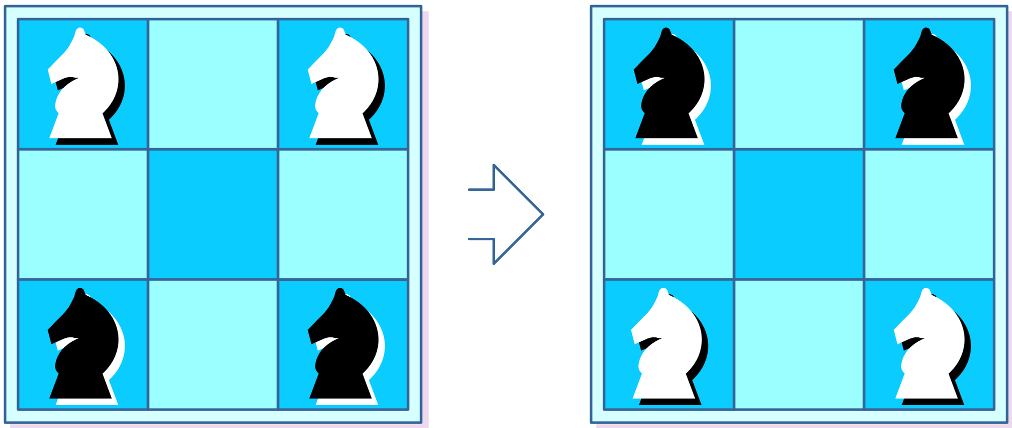
x 4

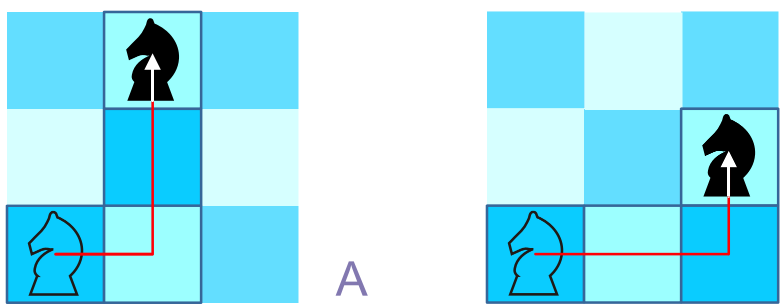
F



Four into One (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).





Four Knights

by Paulo Guarini di Forli

Exchange the black knights with the white knights as shown in Figure 1 in the minimum possible number of moves. One move is a normal knight's move on any vacant cell of the board.

Figure 2 shows some moves of the chess knight which may be done as follows:
A - one cell in one direction (horizontal or vertical), and then two cells in other direction (vertical or horizontal) - one such a move is shown in Figure 2,A;
B - two cells in one direction (horizontal or vertical), and then one cell in other direction (vertical or horizontal) - Figure 2,B shows one of such moves.

Chess 'n' Checkers Puzzles

1 - 8, 7 - 6, 9 - 2,
3 - 4, 8 - 3, 6 - 1,
2 - 7, 4 - 9, 3 - 4,
1 - 8, 7 - 6, 9 - 2,
4 - 9, 8 - 3, 6 - 1,
2 - 7.
(16 moves)

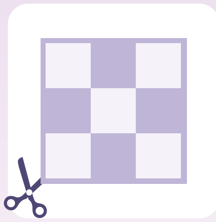
Four Knights (solution)

The minimum possible number of moves for this puzzle is 16. One of many possible solutions is given above. In the solution the numbers correspond to the board's cells. Every move is shown as two numbers - start and finish cells.

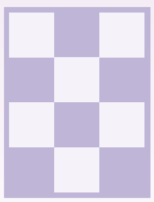
Treasure of Classic and Modern Puzzles

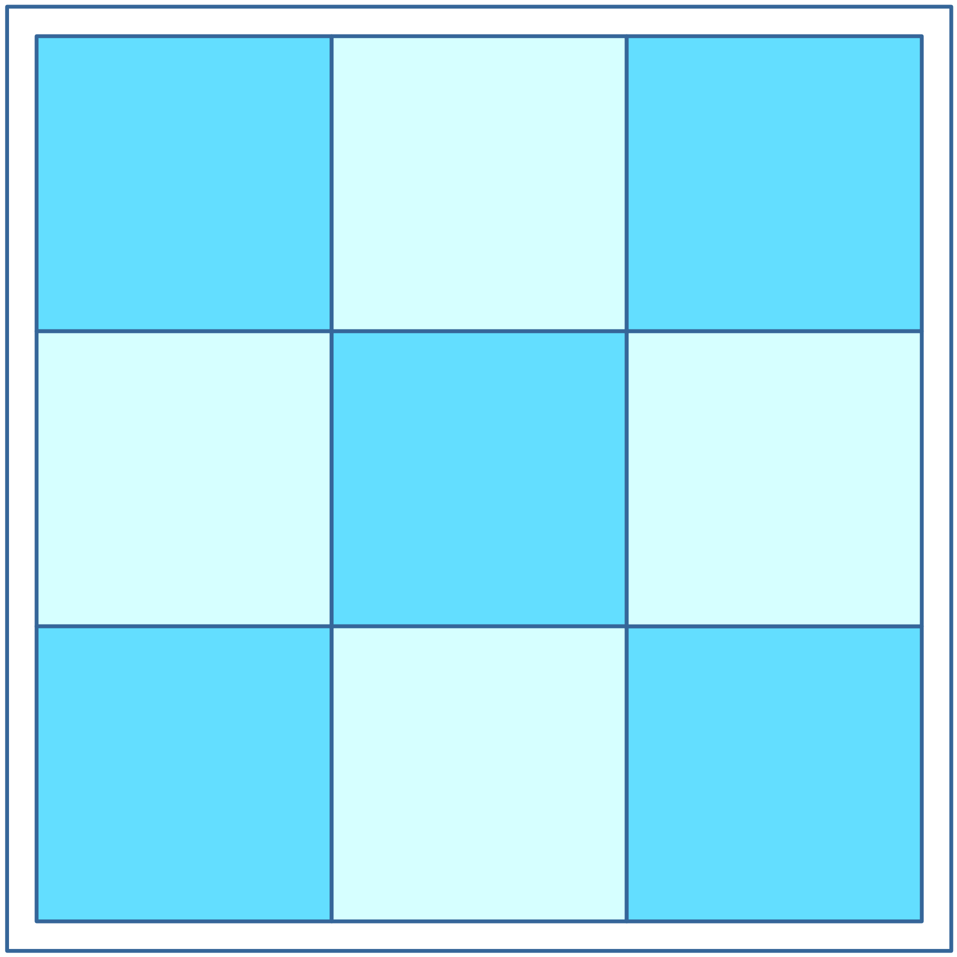
Chess 'n' Checkers Puzzles

1



F



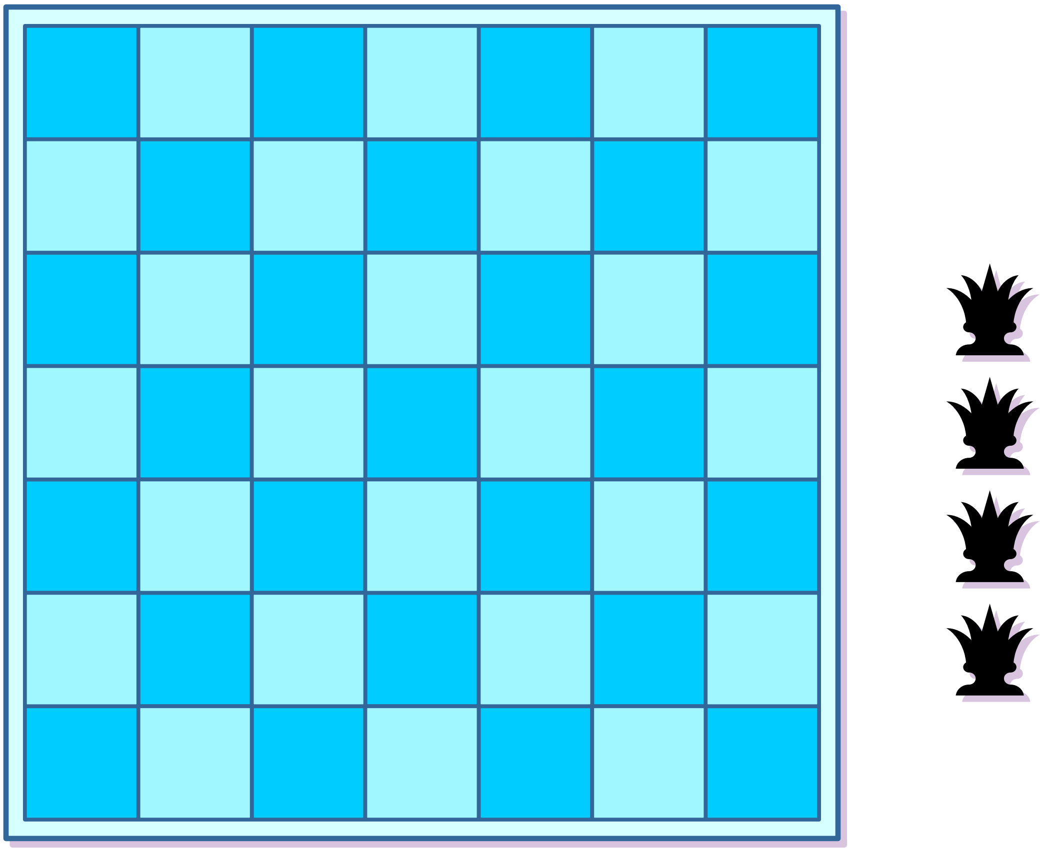


Four Knights (board)

To produce the board first print it out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

The Four Queens

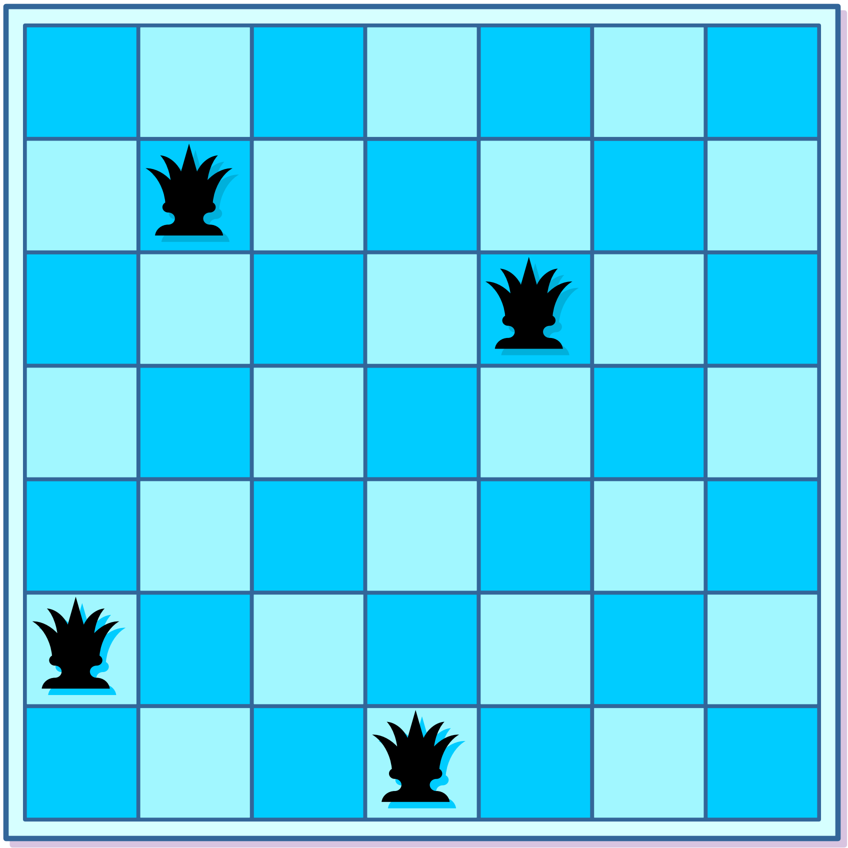
after Martin Gardner



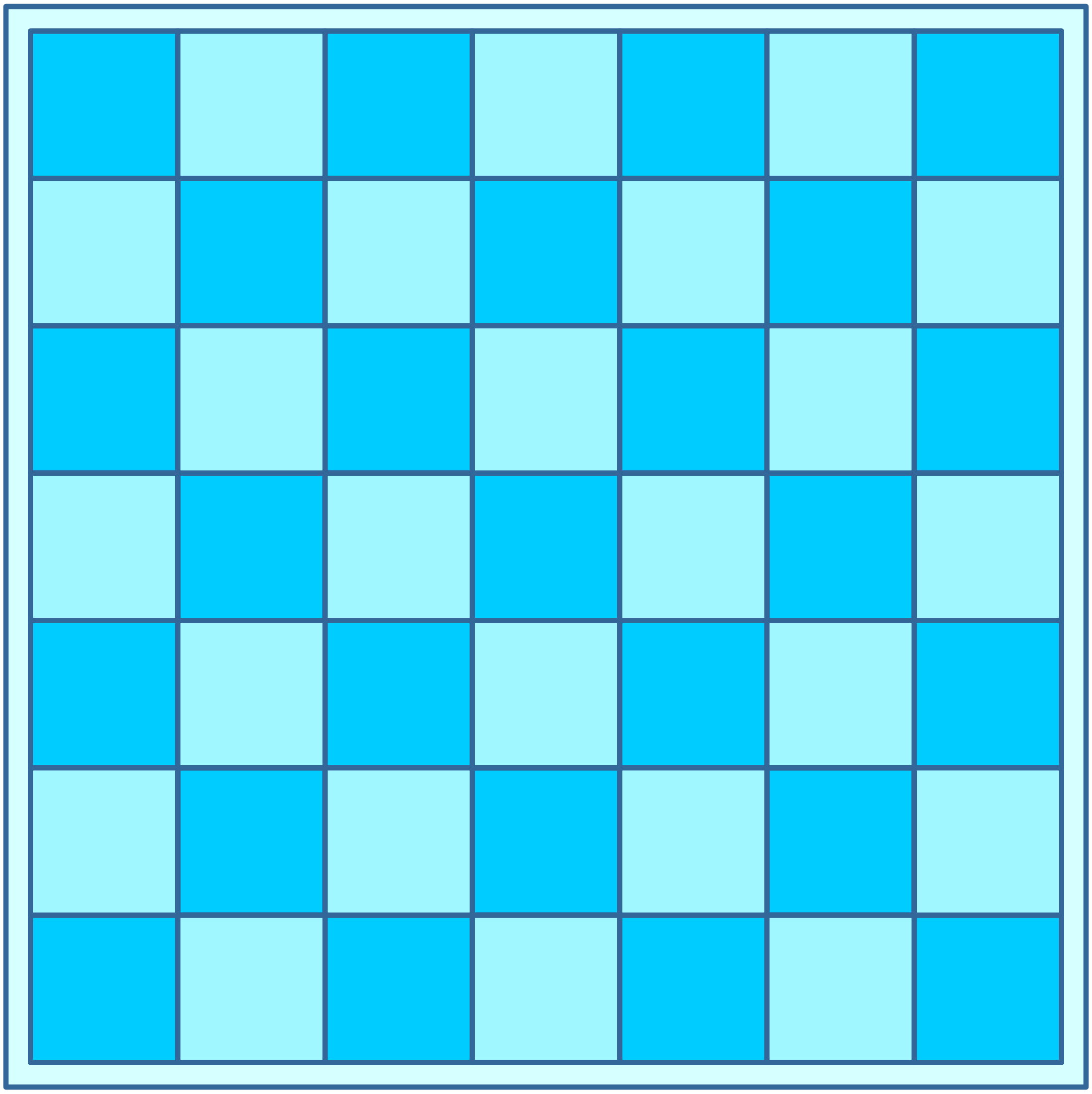
Place four chess queens on a 7x7 chessboard so that all vacant cells are under attack, and no queen attacks another.

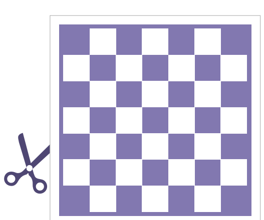
A vacant cell (or a queen) is under attack when it is in the same row, column or diagonal with at least one of the queens.

You may print out the board from the last page of this file and use four coins as queens.

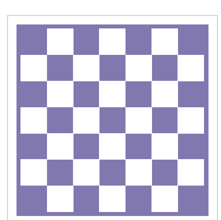


The illustration shows the only basic way how to put four queens on a 7x7 board so that all vacant cells are checked and no queen attacks another queen.





1



F

To produce the board first print it out. Then follow the diagram shown on the left - from step 1 to step F (finish).

$$(5 + 5) \times (5 + 5) = 100$$

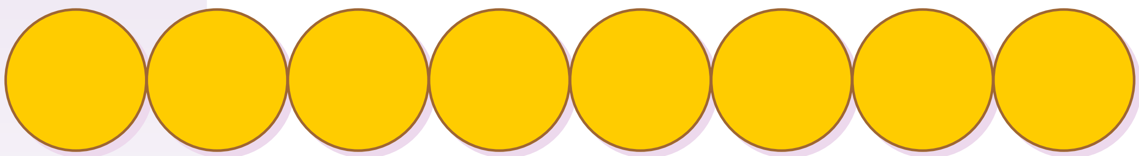
Four 5's written with simple arithmetical signs can be arranged into 100 in quite a straightforward way - just as shown.

Now the question is can you arrange exactly four 7's with arithmetical signs so that they total 100? Is there any trick or not?

$$(7/.7) \times (7/.7) = 100$$

The way to write four 7's with simple arithmetical signs in order to produce 100 is shown above. The fraction, 7 over decimal 7, equals 7 divided by 7/10, which in turn is the same as 70 divided by 7, or 10. Then 10 multiplied by 10 is 100. Such an equation's scheme can be applied to any number.

Coin Puzzles



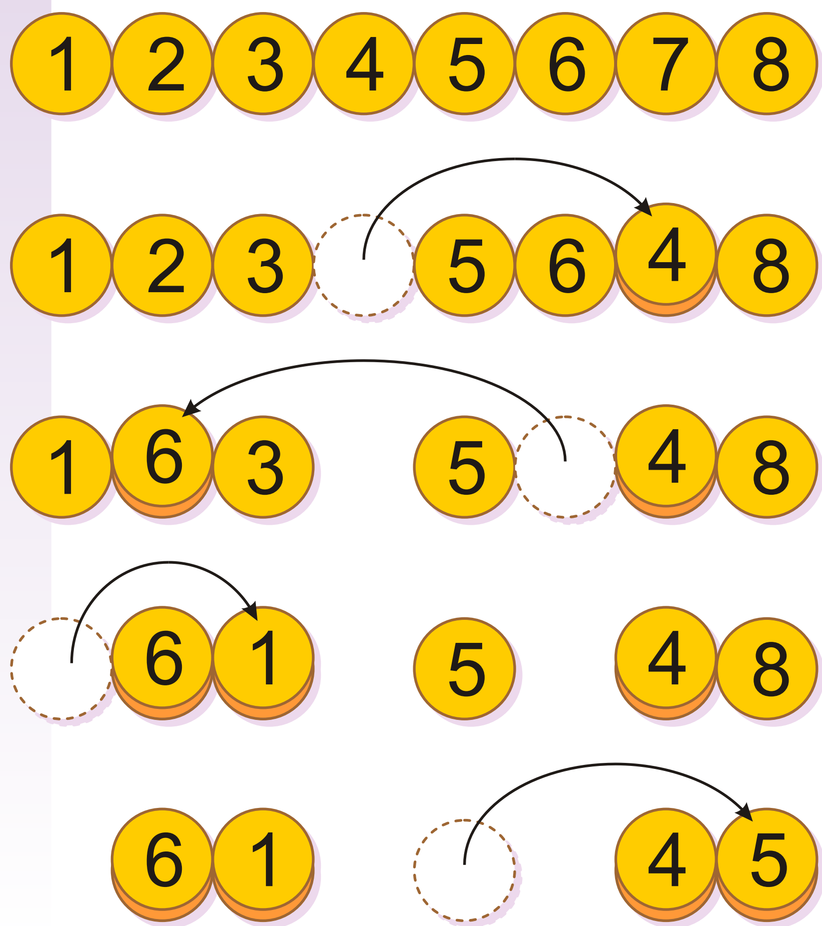
Four Stacks

after Martin Gardner

Place eight coins in a row as shown in the illustration. The object is to make from all the coins four stacks of two coins each and it should be done in four moves only.

Every move consists of jumping of a coin over any two coins (no matter lying flat or in a stack) in one direction, and stopping on the top of the next coin.

Coin Puzzles



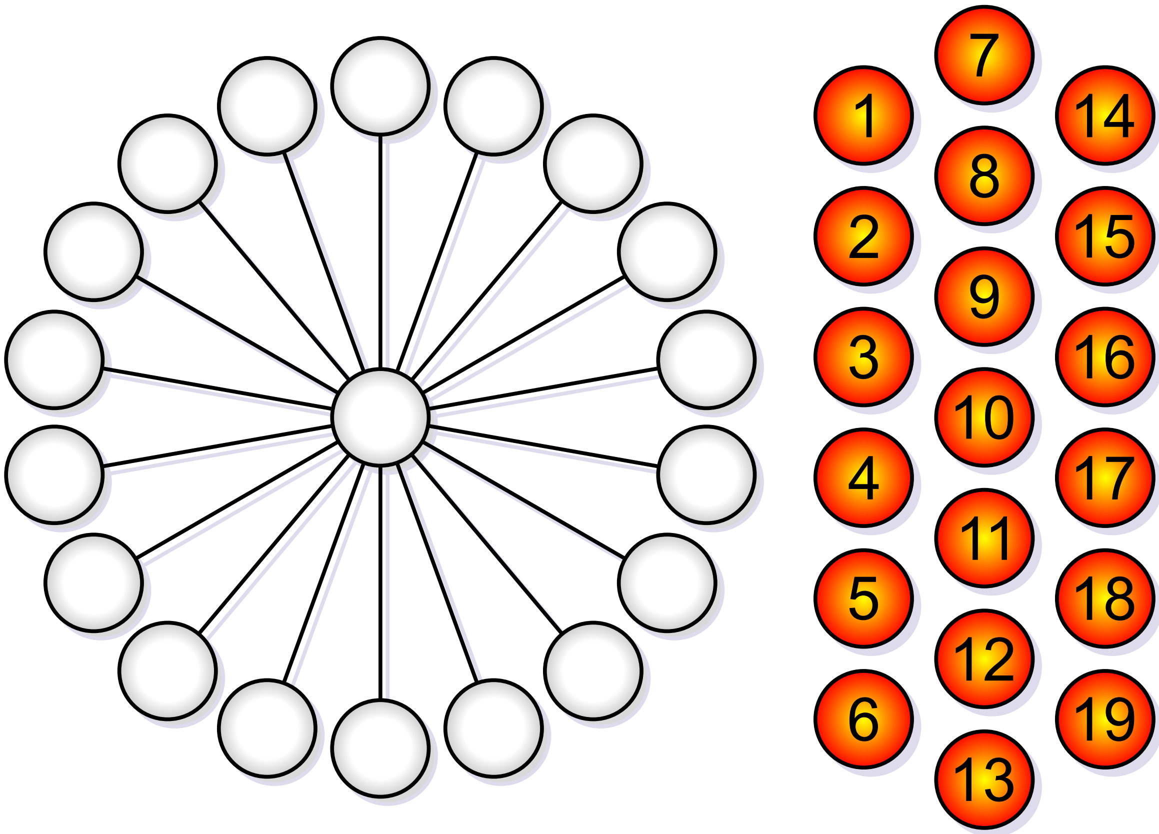
Four Stacks (solution)

If we number the coins from left to right as shown (1 through 8) then one of the possible solutions can be as follows:

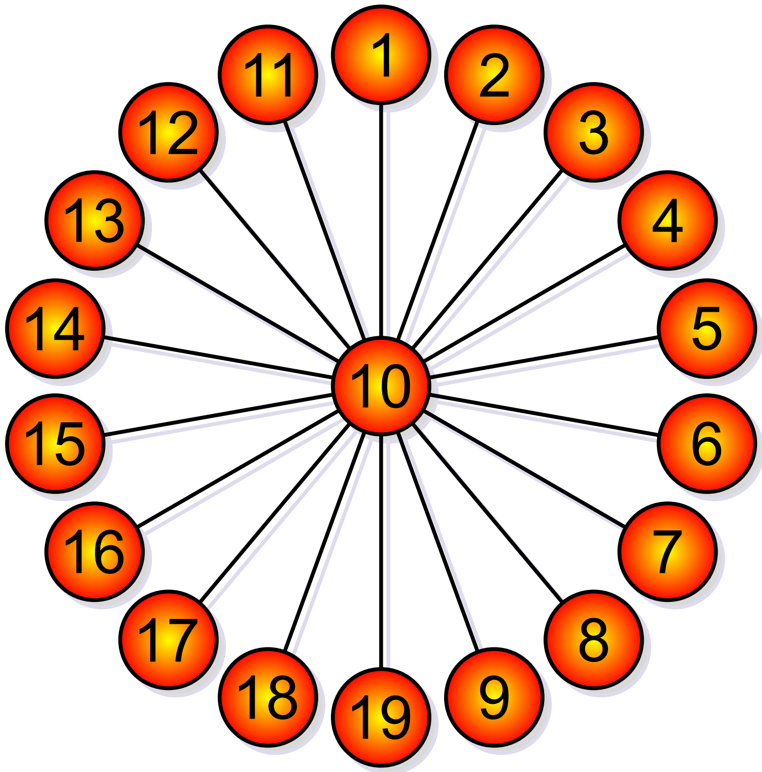
Step 1: 4 on 7;
Step 2: 6 on 2;
Step 3: 1 on 3;
Step 4: 5 on 8.

From 1 Through 19

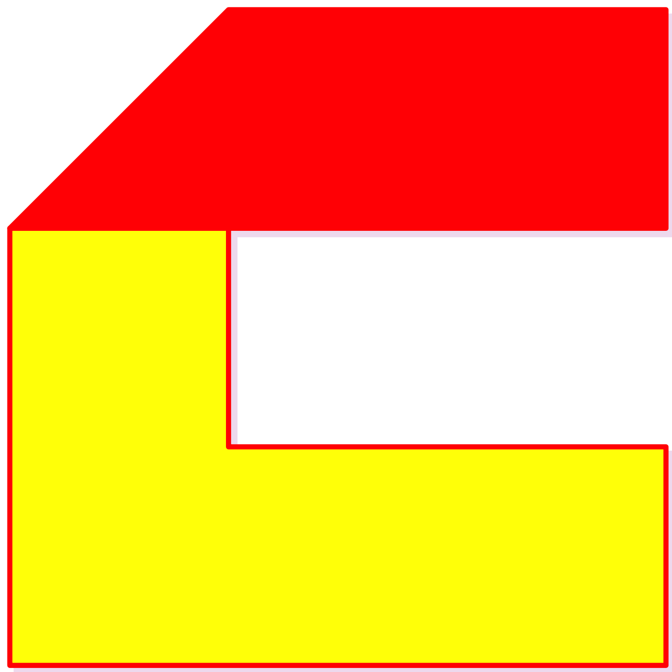
by Boris Kordemsky



Write the numbers from 1 through 19 in the circles so that the numbers in every 3 circles on a straight line total 30.



When all numbers from 1 though 19 are written in a row, the two numbers which are removed from the opposite sides of the row (one from each side) always total 20, i.e. 1 and 19, 2 and 18, and so on. Each of such pairs should be placed on the opposite sides of any straight line shown in the illustration. After all nine pairs are placed, the remaining number 10 goes into the central circle making the numbers in every 3 circles on a straight line total 30.



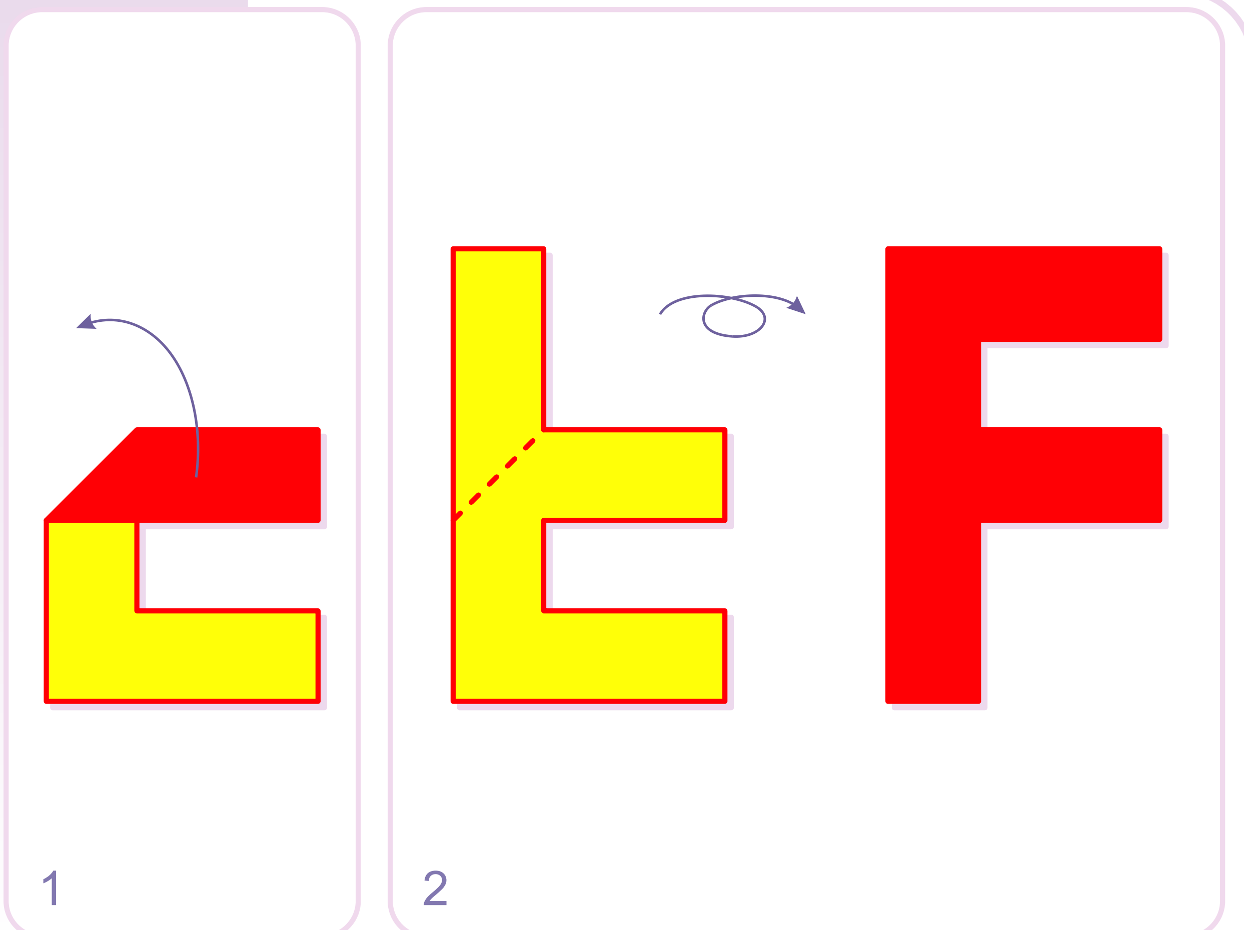
Funny Fold

by Scott Kim

This tiny puzzle was described by Martin Gardner.

If you cut some large capital letter of the English alphabet from a sheet of paper and give it a single fold you will get something like shown above. What letter is it, if it's known that this is not an L?

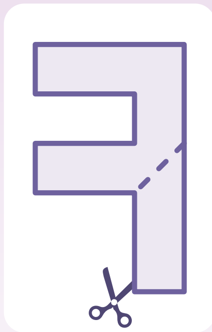
Folding Puzzles



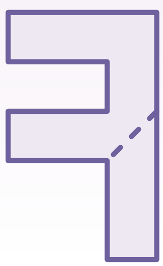
Funny Fold (solution)

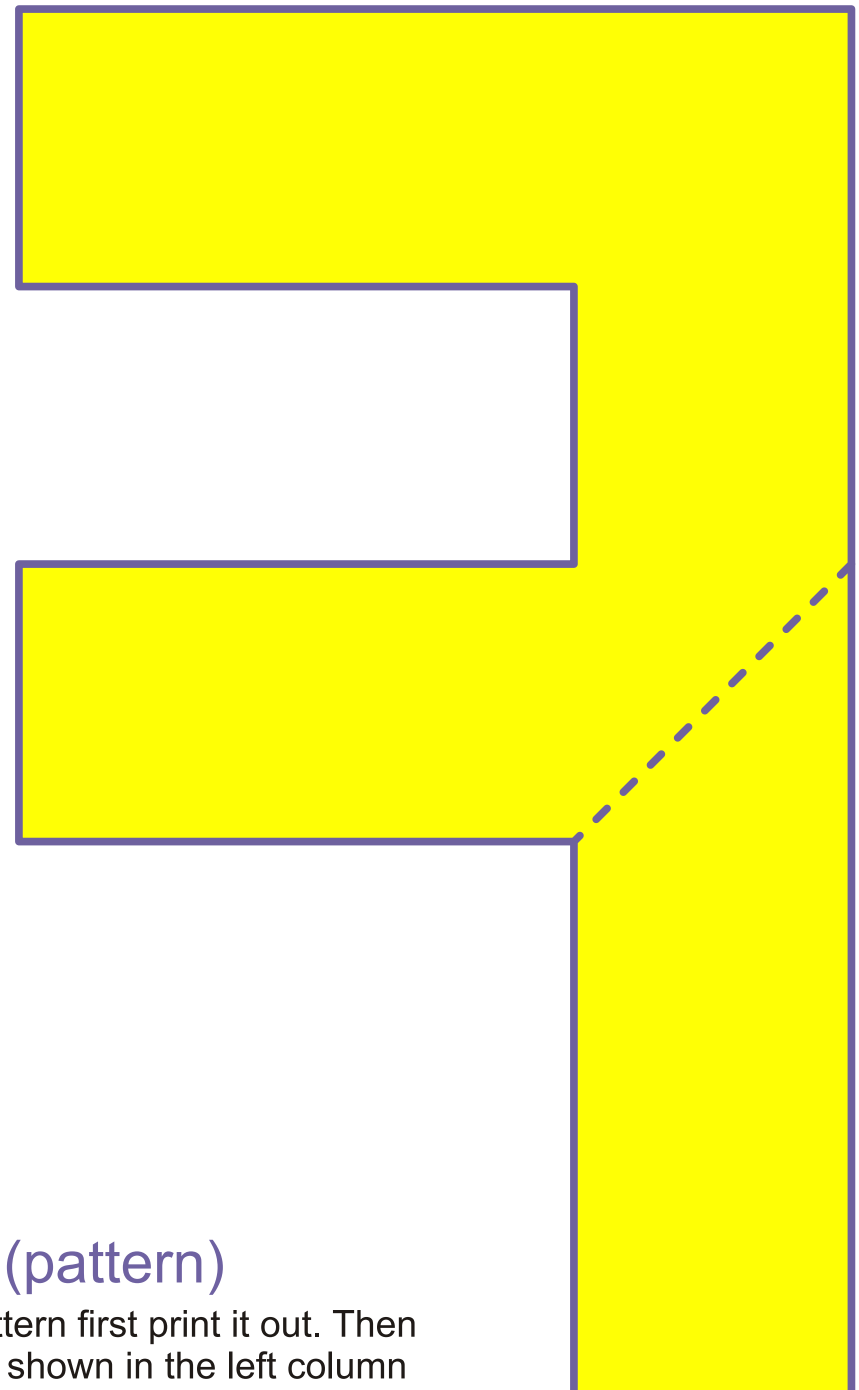
The folded letter is a capital F, that was rotated upside-down and then turned over as shown in the illustration.

1



F

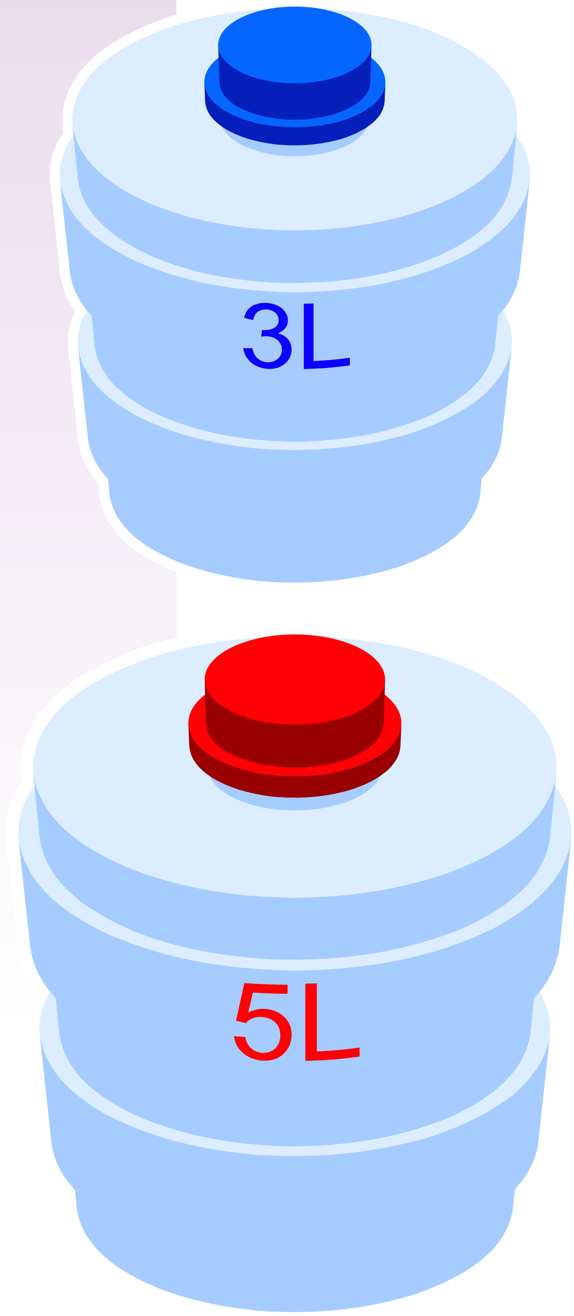




Funny Fold (pattern)

To produce the pattern first print it out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

Math 'n' Logic Puzzles



Get 4L

There are a 3L container and a 5L container available as shown in the illustration.

The object is to measure exactly 4L of water with the help of these two containers and some immense supply of water (say, river or lake).

How this can be done?

Treasure of Classic and Modern Puzzles

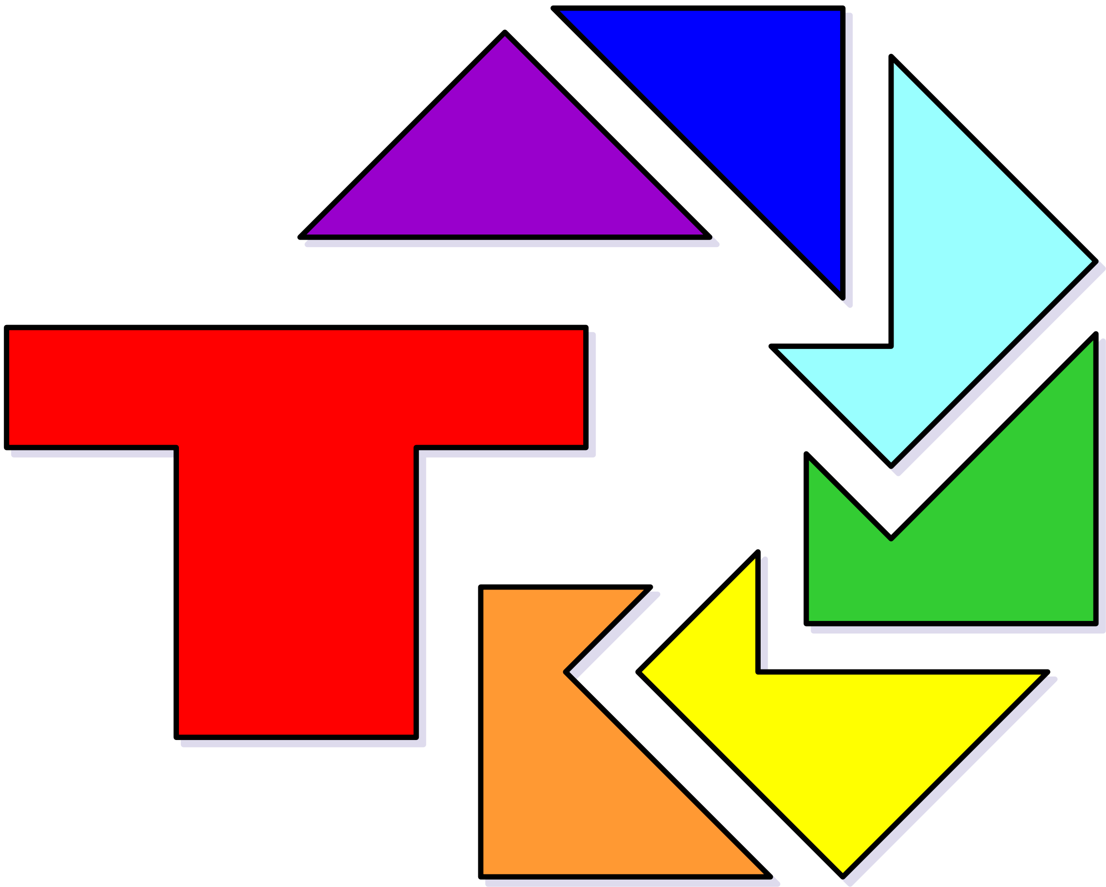
Math 'n' Logic Puzzles

Solution 1
8 steps

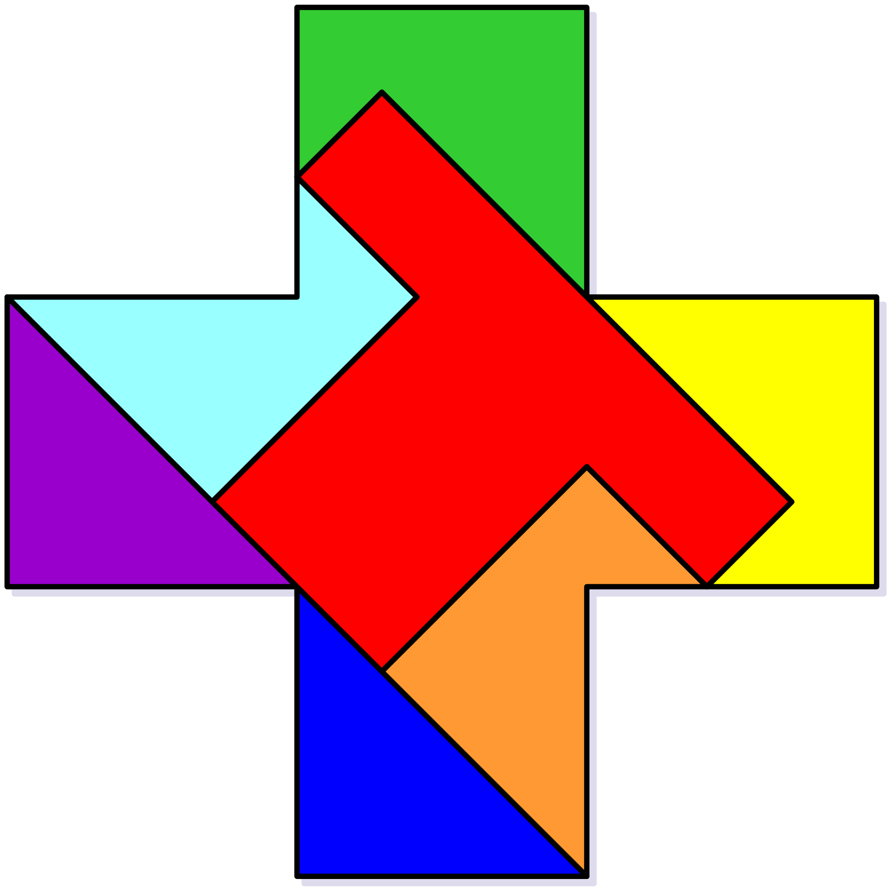
Solution 2
7 steps

Get 4L
(solution)

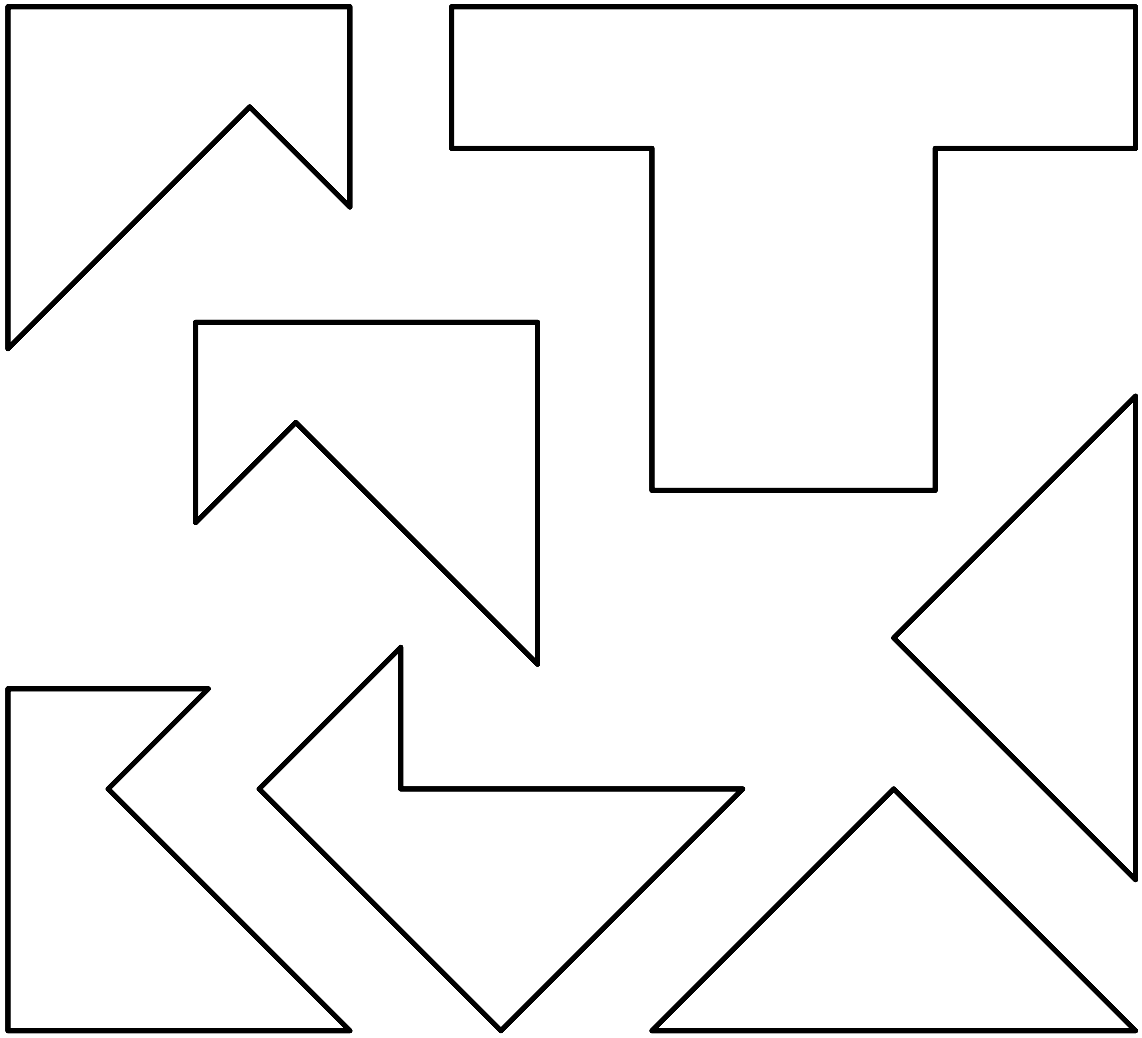
There are two basic ways how to measure 4L of water with the help of 3L and 5L containers. The first way employs 8 steps and is shown in the left column of the illustration. The second way employs 7 steps (if count the last 7th step too) and is shown in the right column of the illustration.

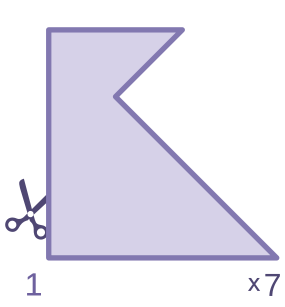


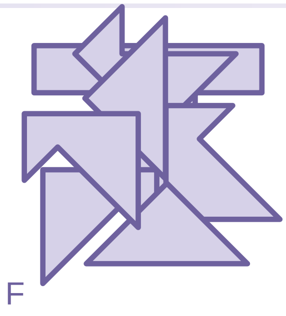
Can you arrange all the seven pieces shown in the illustration into a Greek cross? While solving the pieces can be rotated and turned over, but not overlapped.



The solution is shown in the illustration.

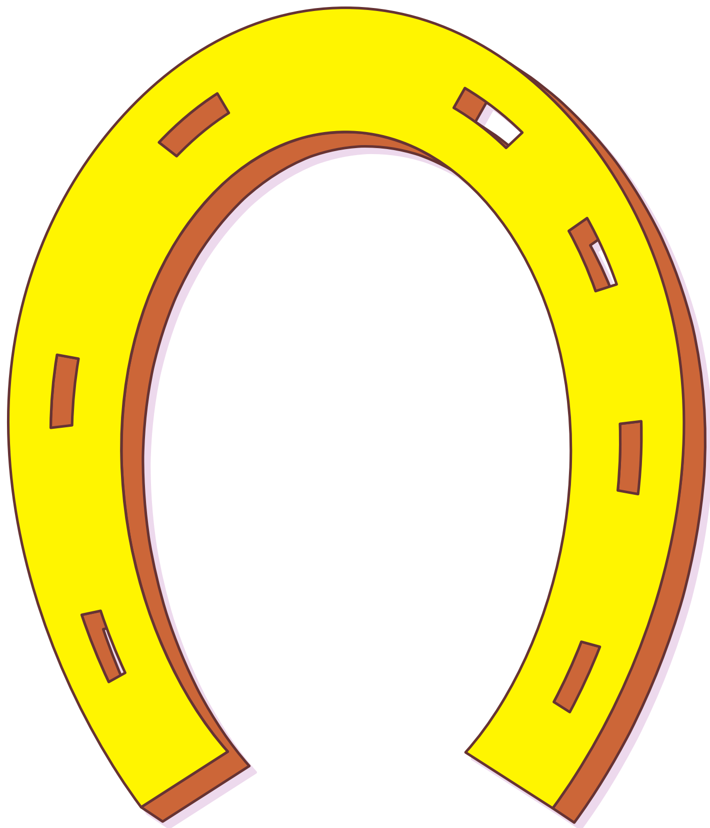






To produce the pieces first print them out. Then follow the diagram shown above - from step 1 to step F (finish).

Dissection Puzzles



The Good Luck Puzzle

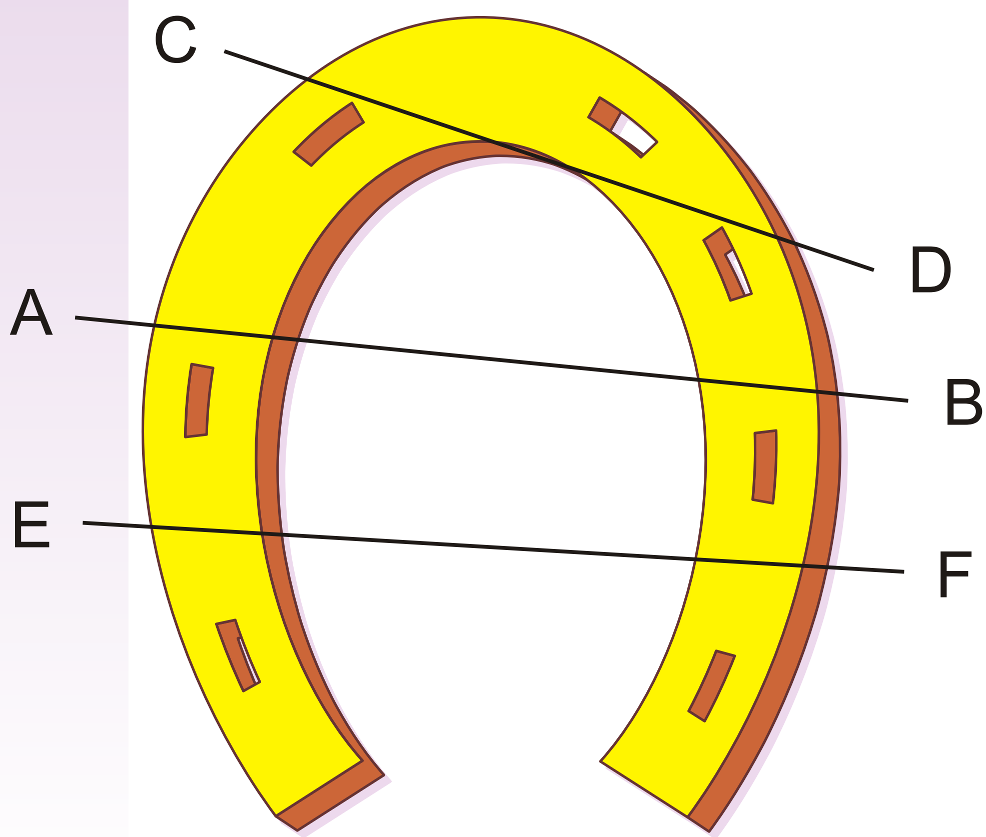
by Sam Loyd

With two straight cuts divide the horseshoe shown in the illustration into seven pieces, with one nail hole in each piece.

Before the second cut you're allowed to pile up the pieces you have got after the first one as you will wish, and then cut 'em all.

The cuts must be straight, and you aren't allowed to fold or bend the paper.

Dissection Puzzles



The Good Luck Puzzle (solution)

First make the cut AB to get three pieces. Then pile 'em up in such a way that the cuts CD and EF can be done simultaneously.

PRINTABLE COLLECTION

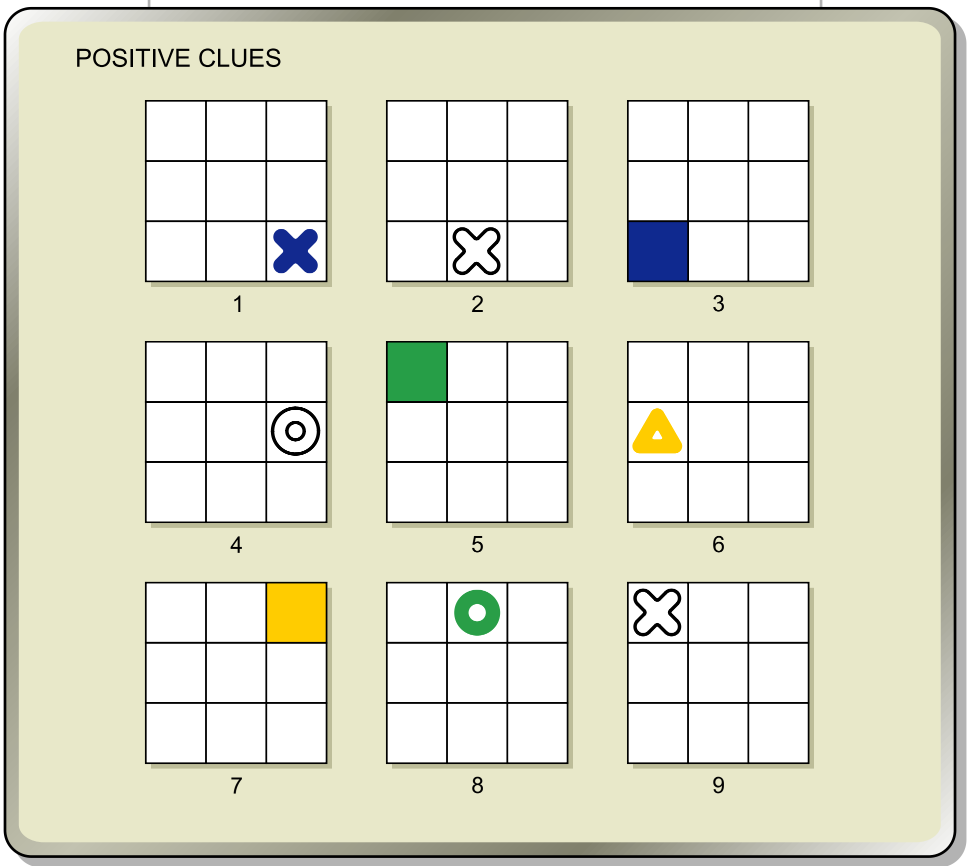
GRIDWORKS

EASY 12

PRINTABLE COLLECTION

GRIDWORKS

Easy Logic Puzzle 1



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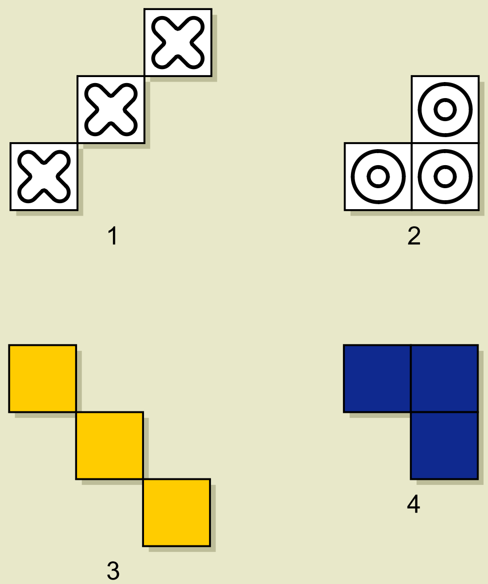
Easy Logic Puzzle 2

POSITIVE CLUES



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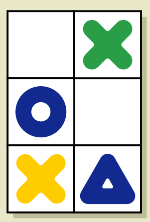
PRINTABLE COLLECTION

GRIDWORKS

Easy Logic Puzzle 3

POSITIVE CLUES



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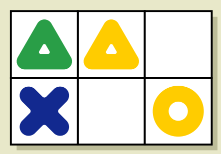

2

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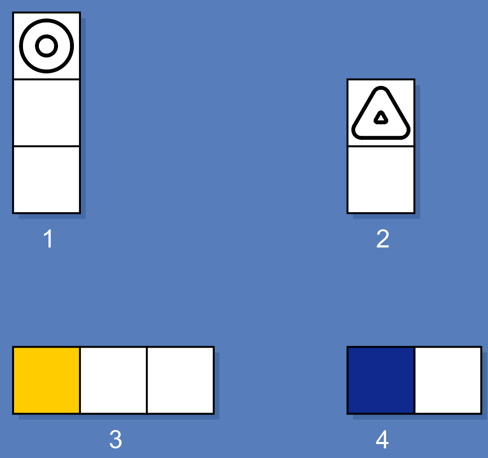
PRINTABLE COLLECTION

GRIDWORKS

Easy Logic Puzzle 4

NEGATIVE CLUES



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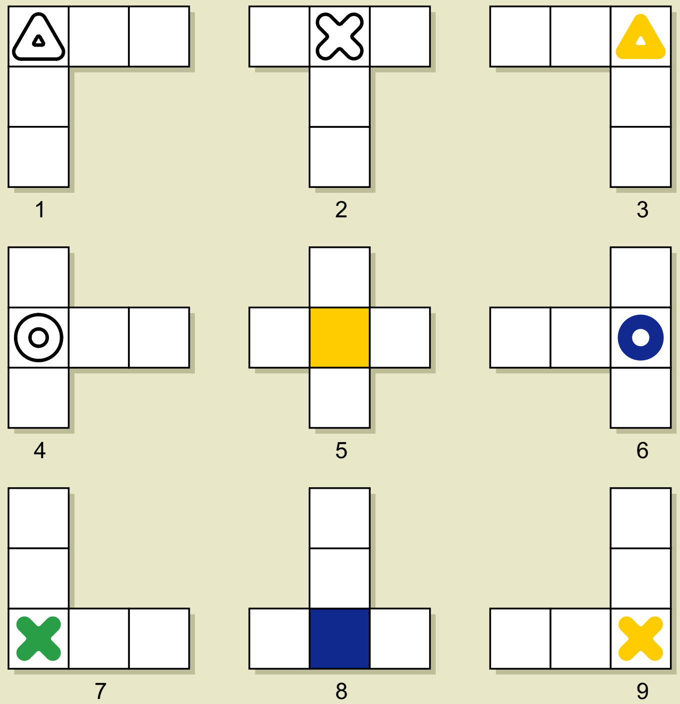
Easy Logic Puzzle 5

POSITIVE CLUES



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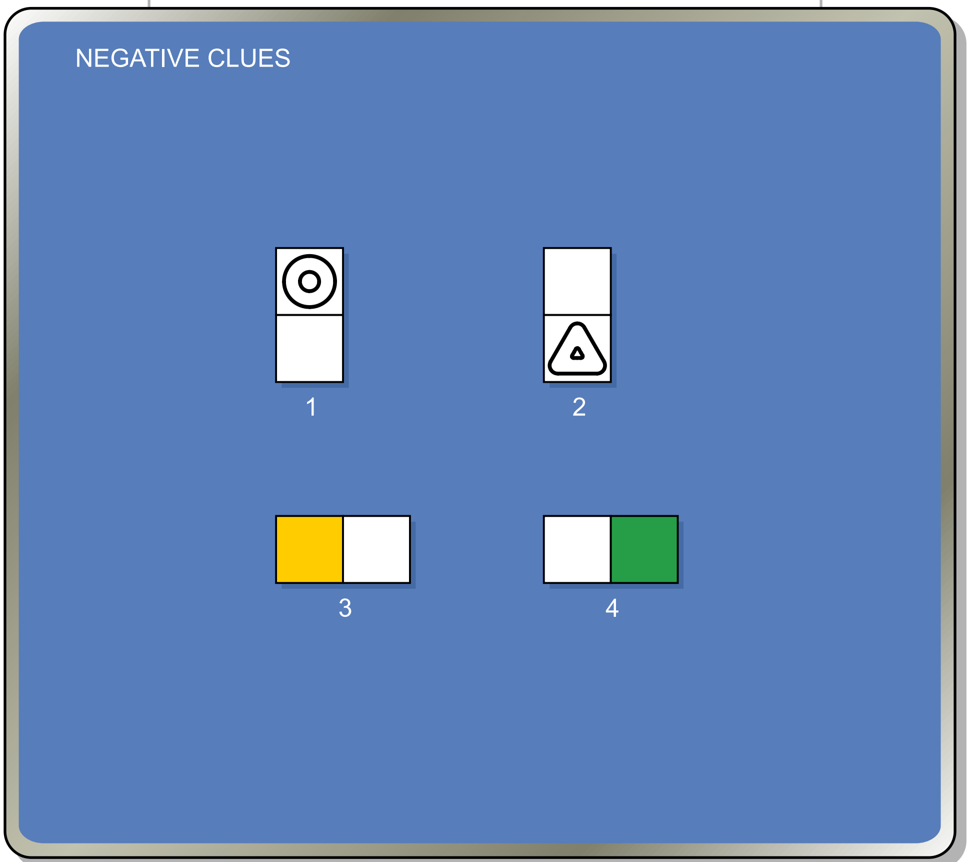
GRIDWORKS

Easy Logic Puzzle 6



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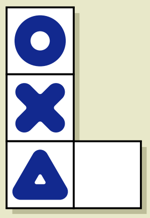
PRINTABLE COLLECTION

GRIDWORKS

Easy Logic Puzzle 7

POSITIVE CLUES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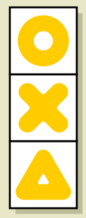
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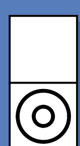
NEGATIVE CLUES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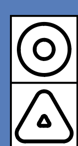
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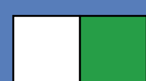
5

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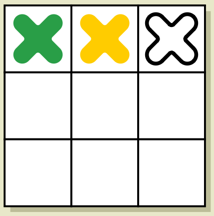
PRINTABLE COLLECTION

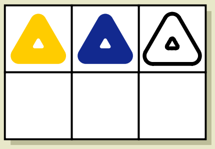
GRIDWORKS

Easy Logic Puzzle 8

POSITIVE CLUES



1



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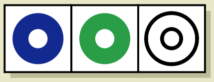
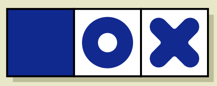


3

Easy Logic Puzzle 9

POSITIVE CLUES



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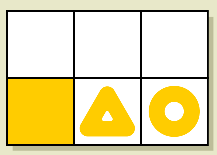

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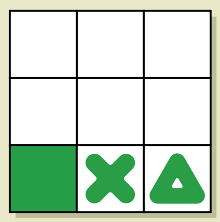


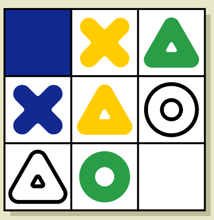
3

PRINTABLE COLLECTION

GRIDWORKS

Easy Logic Puzzle 10

POSITIVE CLUES



1

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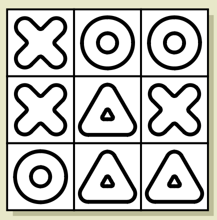
Easy Logic Puzzle 11

POSITIVE CLUES



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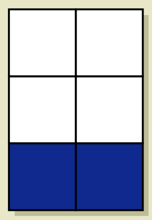

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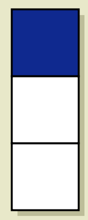

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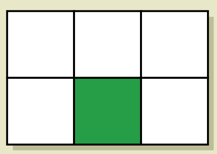

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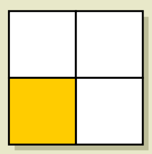

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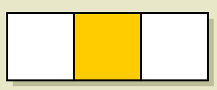

6

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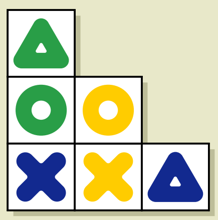
Easy Logic Puzzle 12

POSITIVE CLUES



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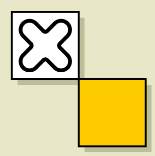

2

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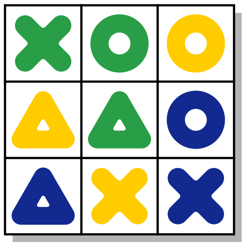
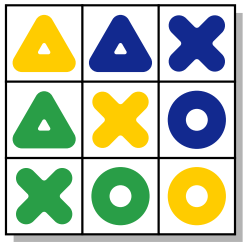
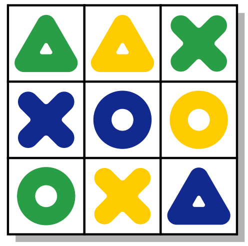
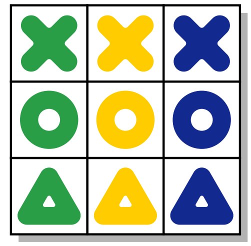
GRIDWORKS

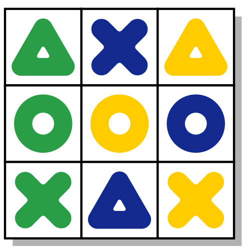
Solutions

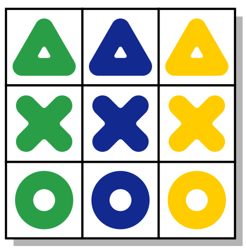

Easy 1

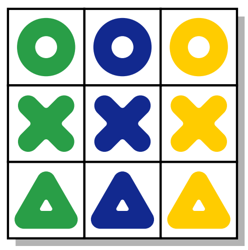

Easy 2

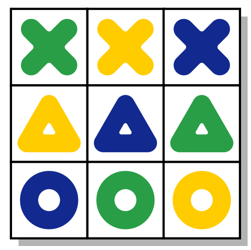

Easy 3

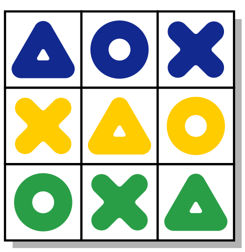

Easy 4

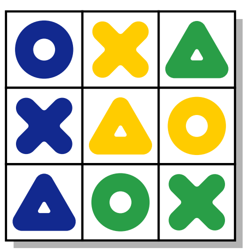

Easy 5

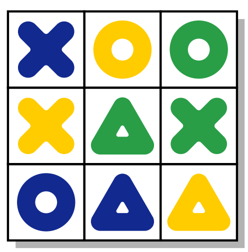

Easy 6

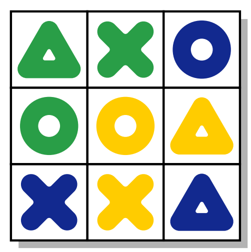

Easy 7


Easy 8


Easy 9


Easy 10


Easy 11


Easy 12

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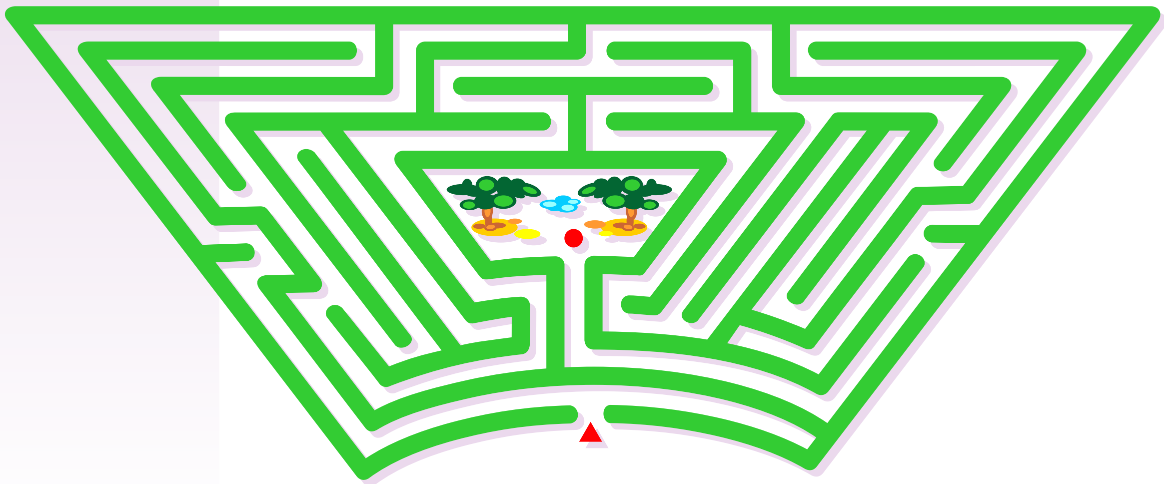
Mazes



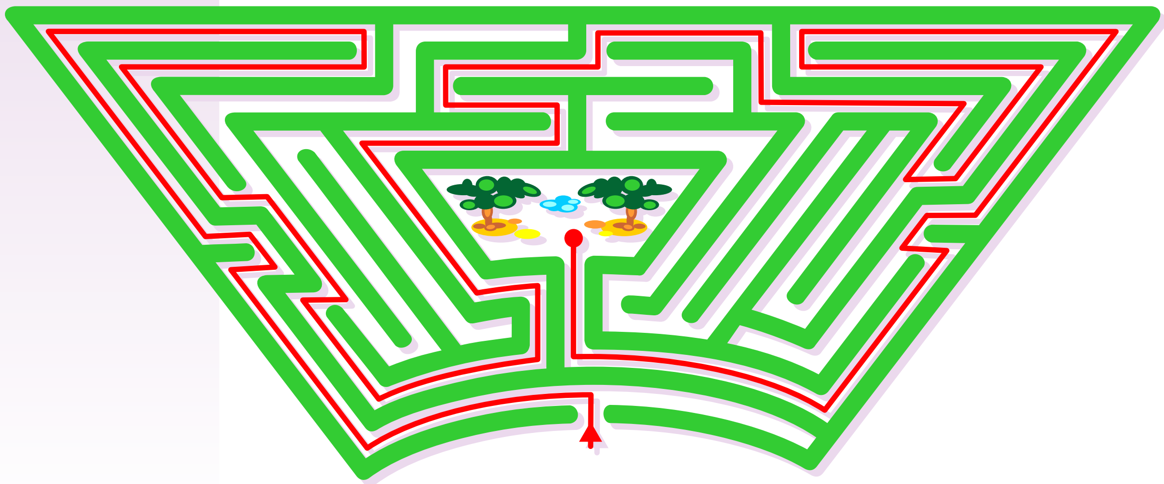
Hampton Court Maze

Find the path from the entrance at the bottom of the Maze (marked with the red triangle in the illustration) to its center (marked with the red dot).

The real Maze - the most famous hedge Maze in the World - is situated at Hampton Court near London. It covers an area of a third of an acre (about 1350 sq meters), and its paths are half a mile (0.8 km) long. It might happen that looking at the above illustration you'll find this maze to be very simple. But don't be misled with its seemingly "simple" pattern*; it's incredible easy to lose yourself in this Maze! Jerome K. Jerome described how this may happen in his famous novel "Three Men in a Boat (To Say Nothing of the Dog)."

The Maze was planted in the Hampton Court Palace Gardens in 1702. It still attracts people from all over the World, and every year thousands of them are happy "to be lost" in it.

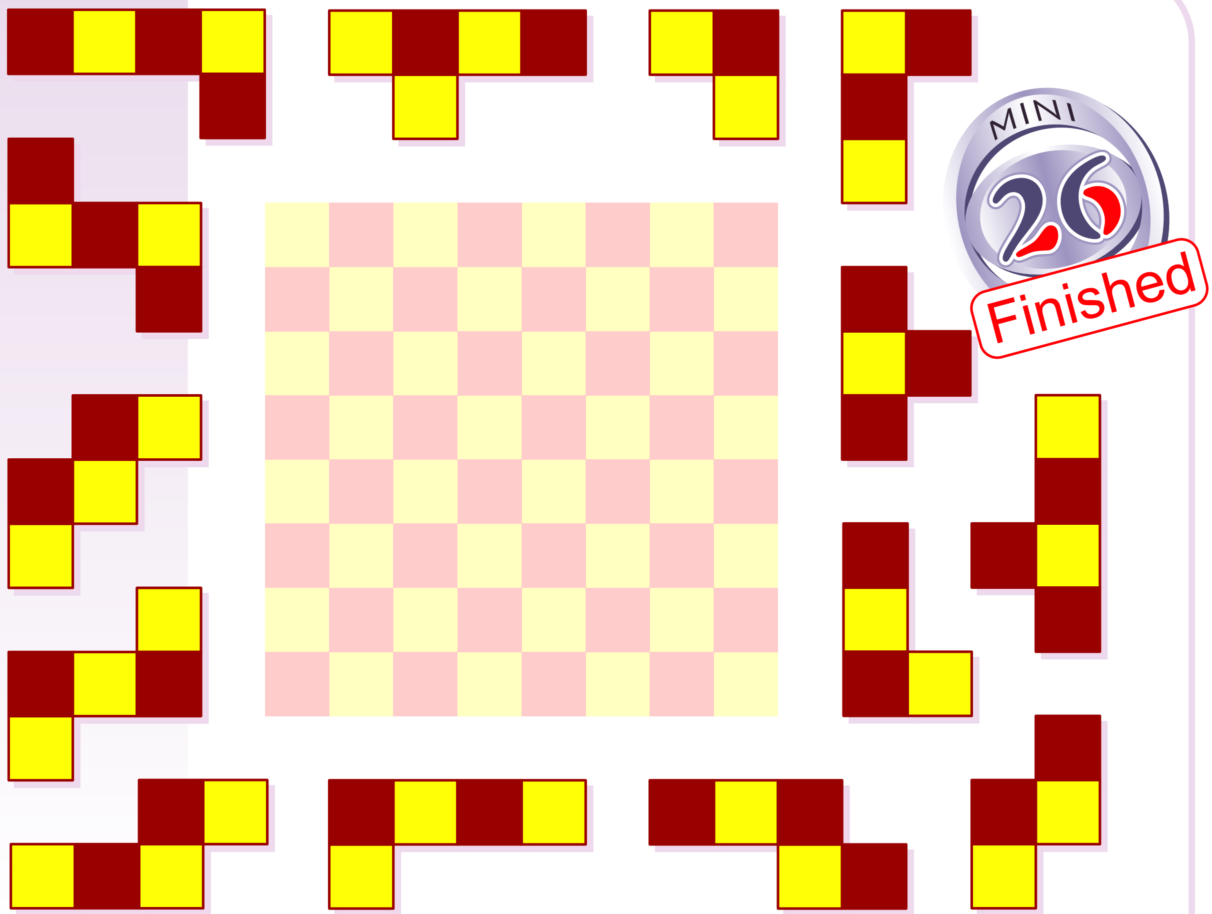
* It's an old pattern of the Hampton Court Maze, which was slightly altered for 300 years.



Hampton Court Maze (solution)

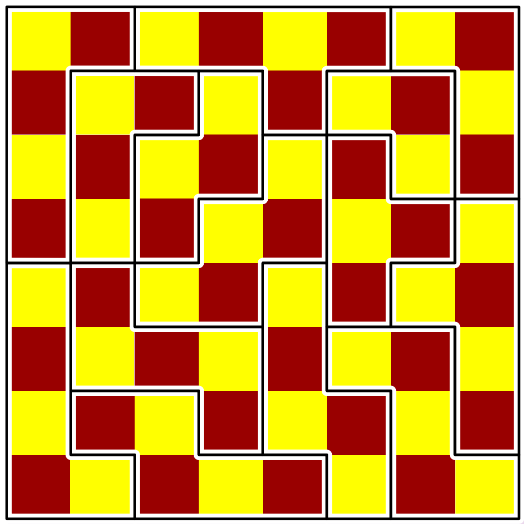
The path is shown in the illustration with the red line.

Checkerboard Puzzles - MC



Hard 14

Rearrange the fourteen pieces so that to form the 8x8 checkerboard shown in the center of the illustration.

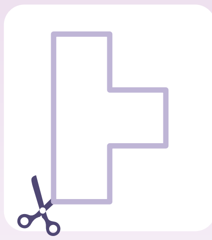


Hard 14 (solution)

One of the solutions is shown in the illustration.

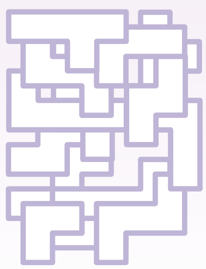
Checkerboard Puzzles - MC

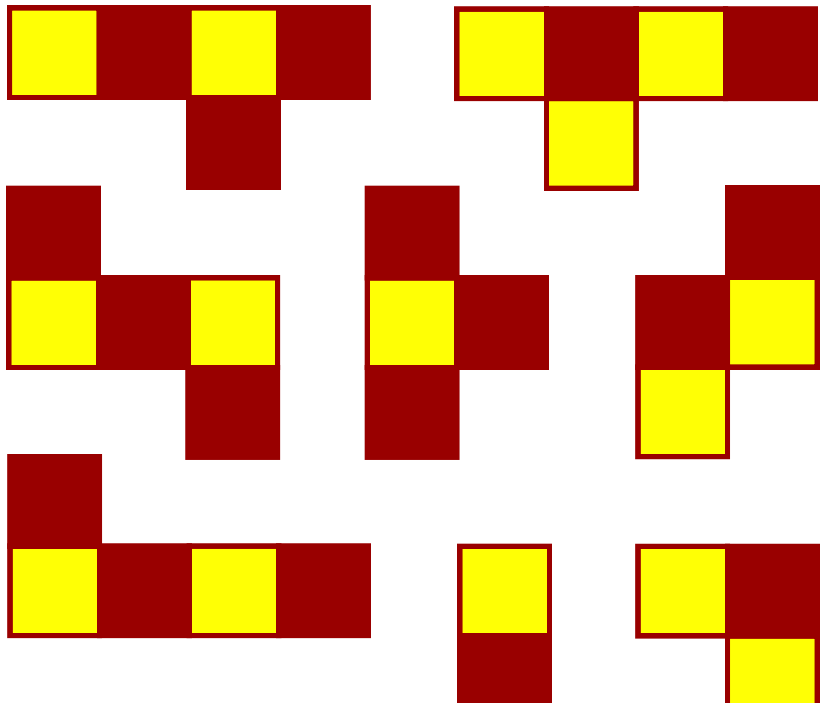
1

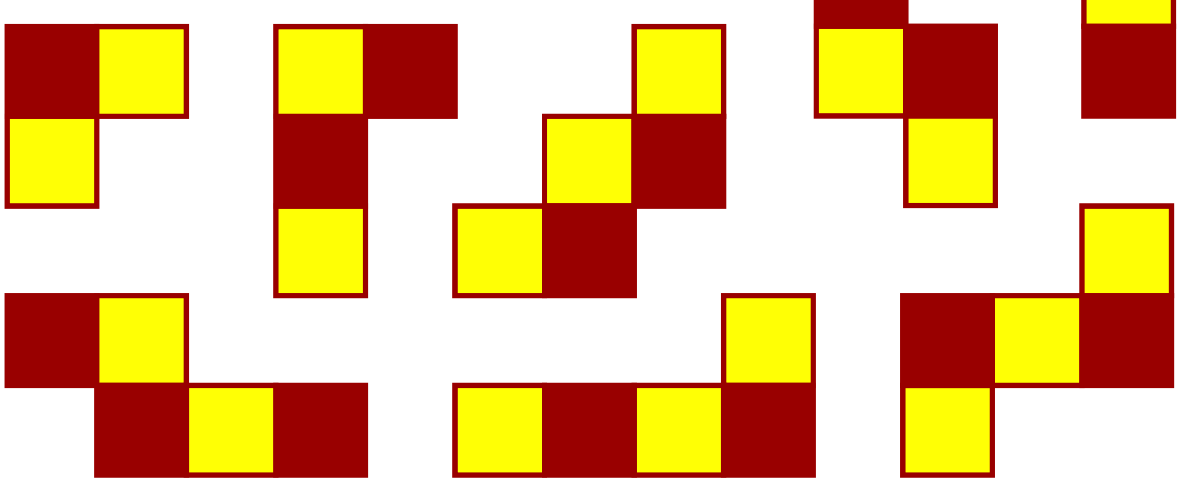


x 14

F



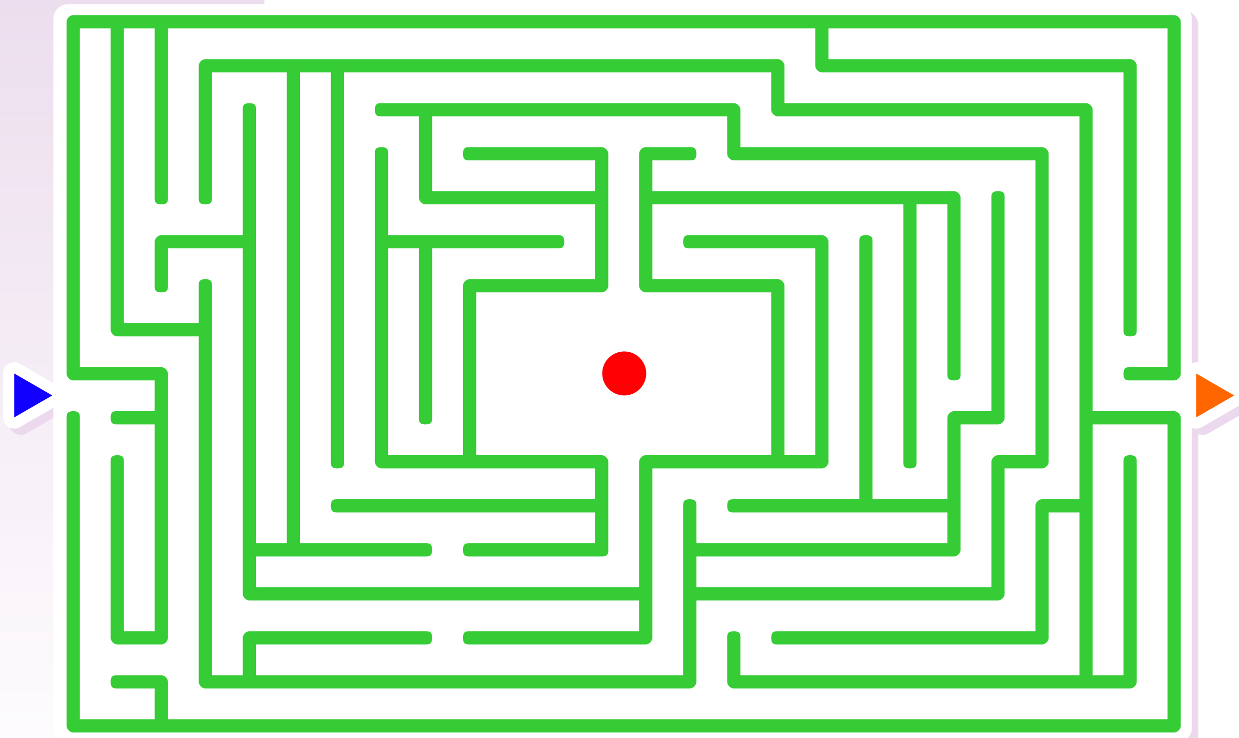




Hard 14 (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

Mazes

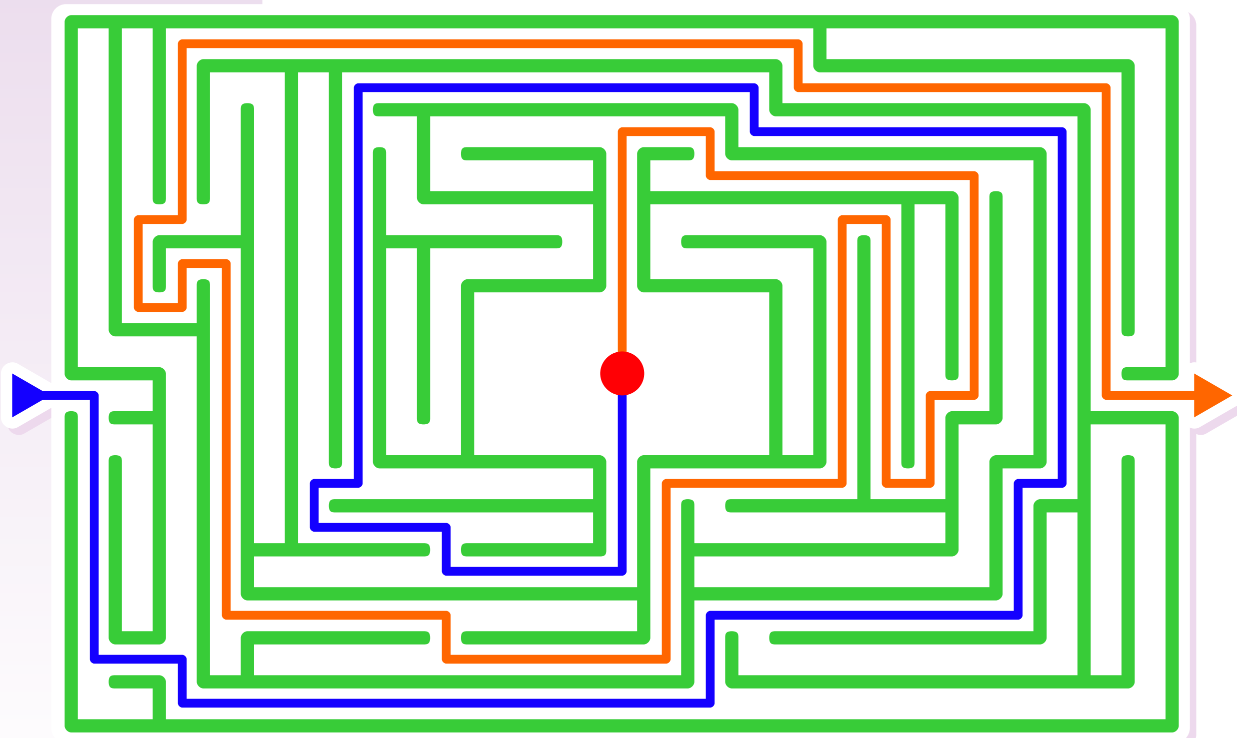


The Hatfield House Maze

Enter the maze where it is marked with the blue arrow, trace your route through the center of the maze (marked with the red spot) and then leave it where the orange arrow is shown.

The real maze is planted among the Gardens at famous Hatfield House, Hertfordshire, England. This celebrated Jacobean house was built by Robert Cecil, first Earl of Salisbury and Chief Minister to King James I, in 1611. The Gardens at Hatfield House (including the maze) date from the early 17th century when Robert Cecil, first Earl of Salisbury, employed John Tradescant the Elder to plant and lay them out around the house.

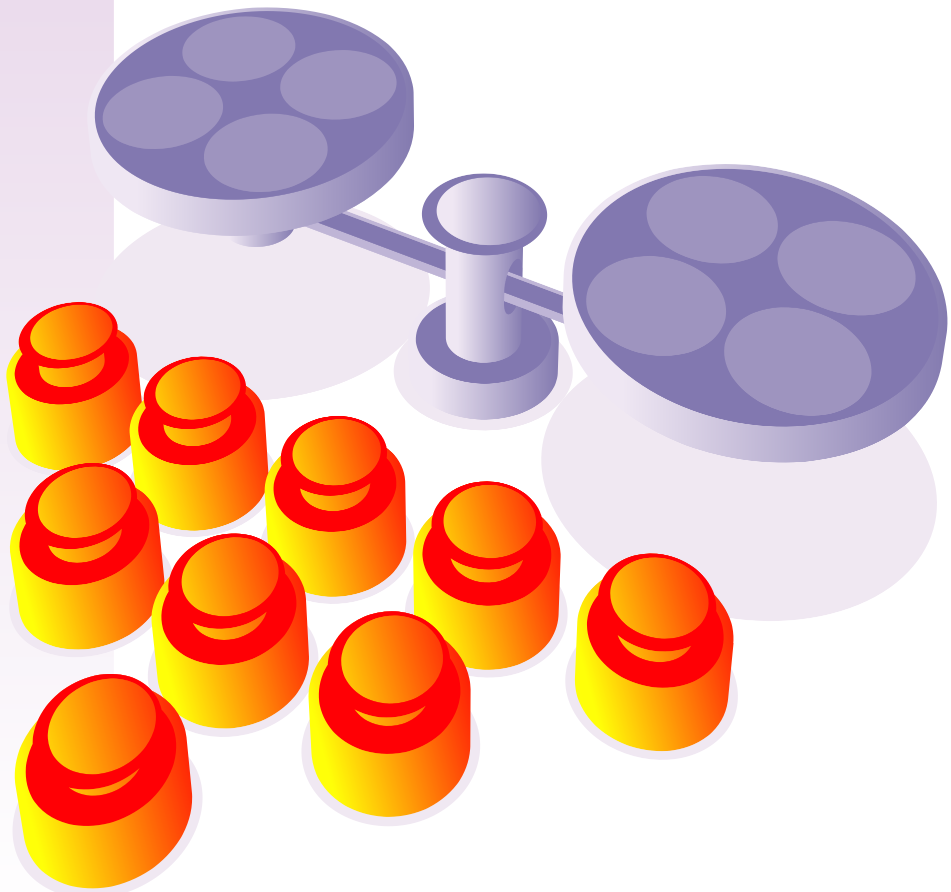
Mazes



The Hatfield House Maze (solution)

The path which avoids blind alleys is shown as a blue and orange line in the illustration. The blue part of it shows the path from the entrance to the center, while the orange part - from the center to the exit.

Puzzles with Weighings



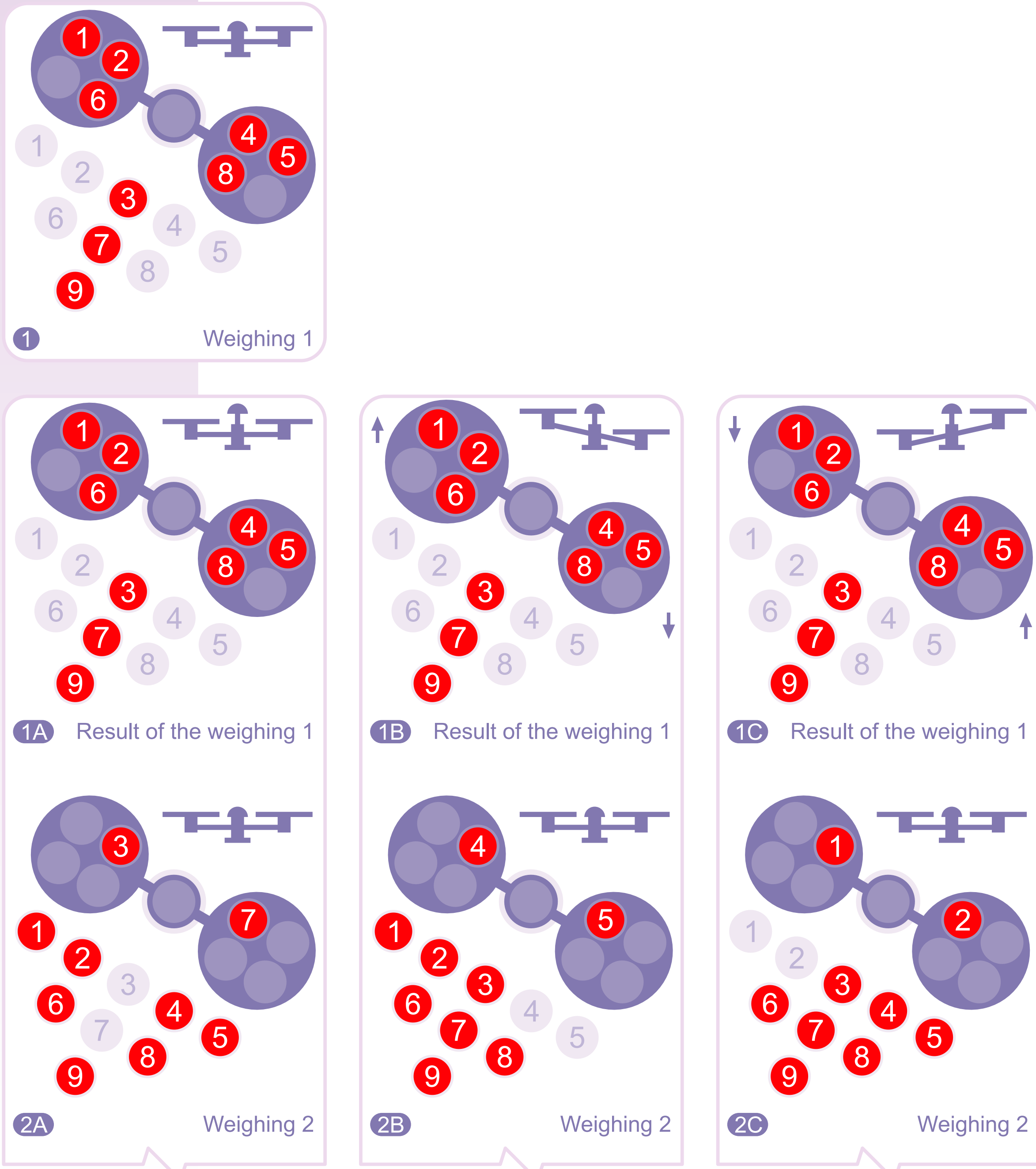
Heavy Weight

after Martin Gardner

There is a set of nine identical weights and simple scales (without any measures) - just as shown in the illustration. It is known that one weight is a little bit heavier than the eight others.

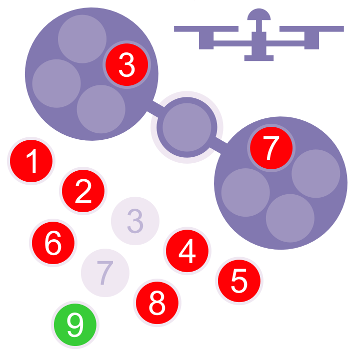
Using only the scales can you identify the heavier weight in two weighings only?

Puzzles with Weighings

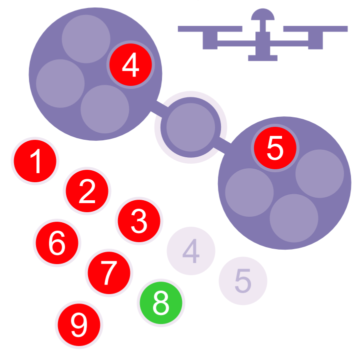


Heavy Weight (solution part 1)

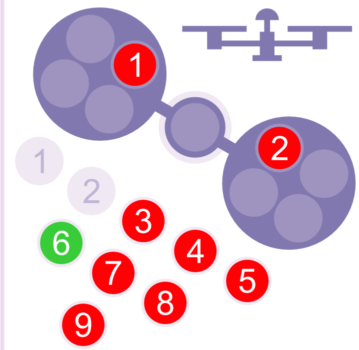
Puzzles with Weighings



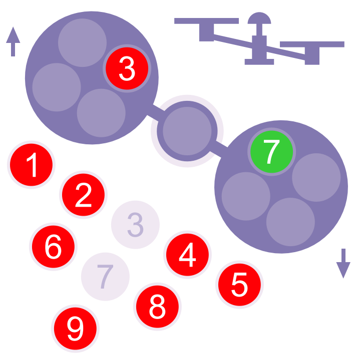
2AA Result of the weighing 2



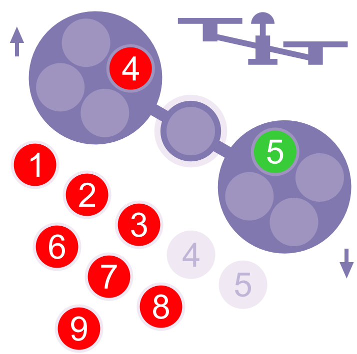
2BA Result of the weighing 2



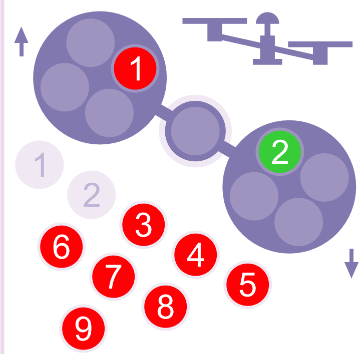
2CA Result of the weighing 2



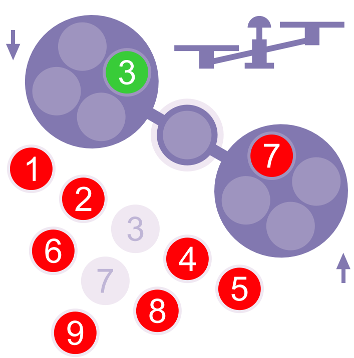
2AB Result of the weighing 2



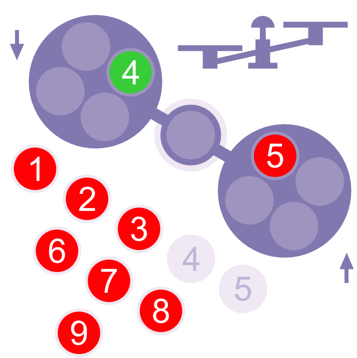
2BB Result of the weighing 2



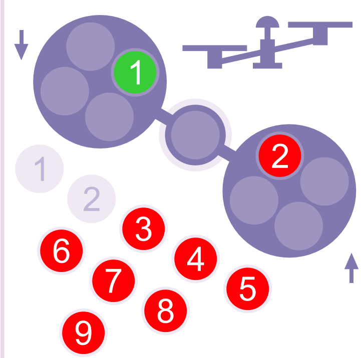
2CB Result of the weighing 2



2AC Result of the weighing 2



2BC Result of the weighing 2



2CC Result of the weighing 2

Heavy Weight (solution part 2)

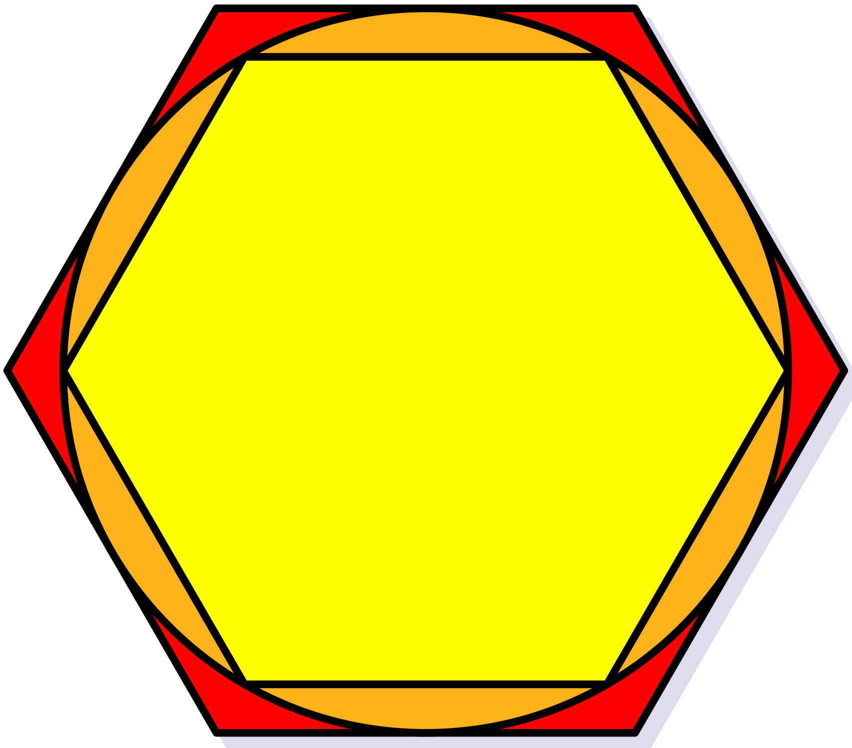
Puzzles with Weighings

Heavy Weight (solution part 3)

To identify the heavier weight in two weighings perform the following sequence of moves as shown in the illustration. First divide all the weights into three triplets. Weigh one triplet against another - see Weighing 1 in the top left corner of the illustration above. There can be three different results of the weighing 1 - phases 1A, 1B and 1C respectively (see the illustration).

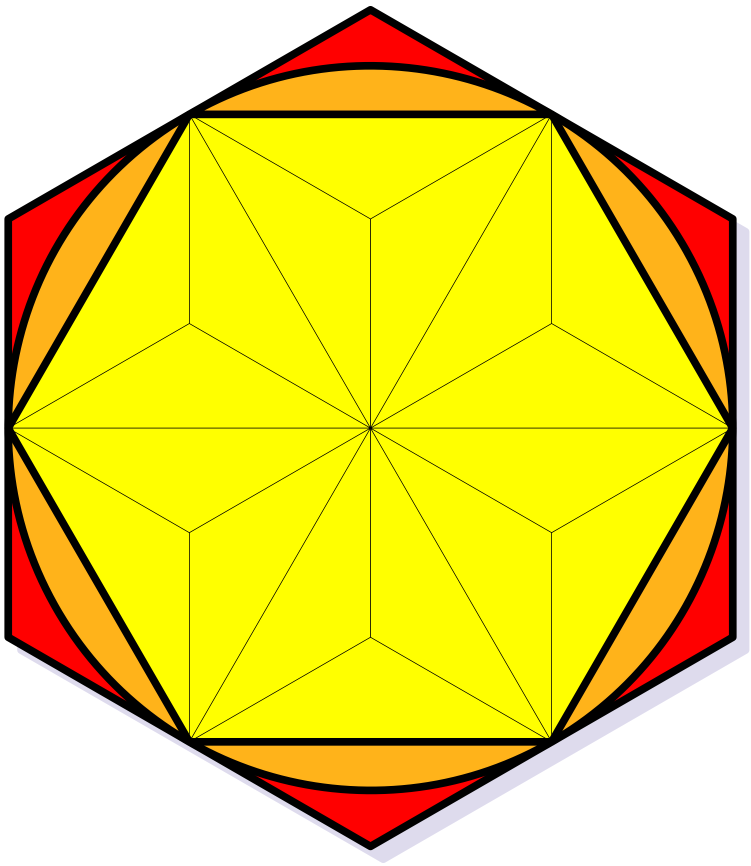
If the result is phase 1A, then choose any two weights from the third triplet and weigh one weight against another - this will be the second weighing (phase 2A). If the result after the second weighing is phase 2AA then the heavier weight is the one left from the third triplet. If the result is either of the phases 2AB and 2AC, then the heavier weight is the one on the lower pan.

If the result after the first weighing is either of the phases 1B and 1C, then choose any two weights from the triplet on the lower pan and then weigh one weight against another - this will be the second weighing (phases 2B and 2C respectively). If the result after the second weighing is phase 2BA (or 2CA respectively) then the heavier weight is the one left from the triplet taken from the lower pan after the first weighing. If the result is either of the phases 2BB and 2BC (2CB and 2CC respectively), then the heavier weight is the one on the lower pan.

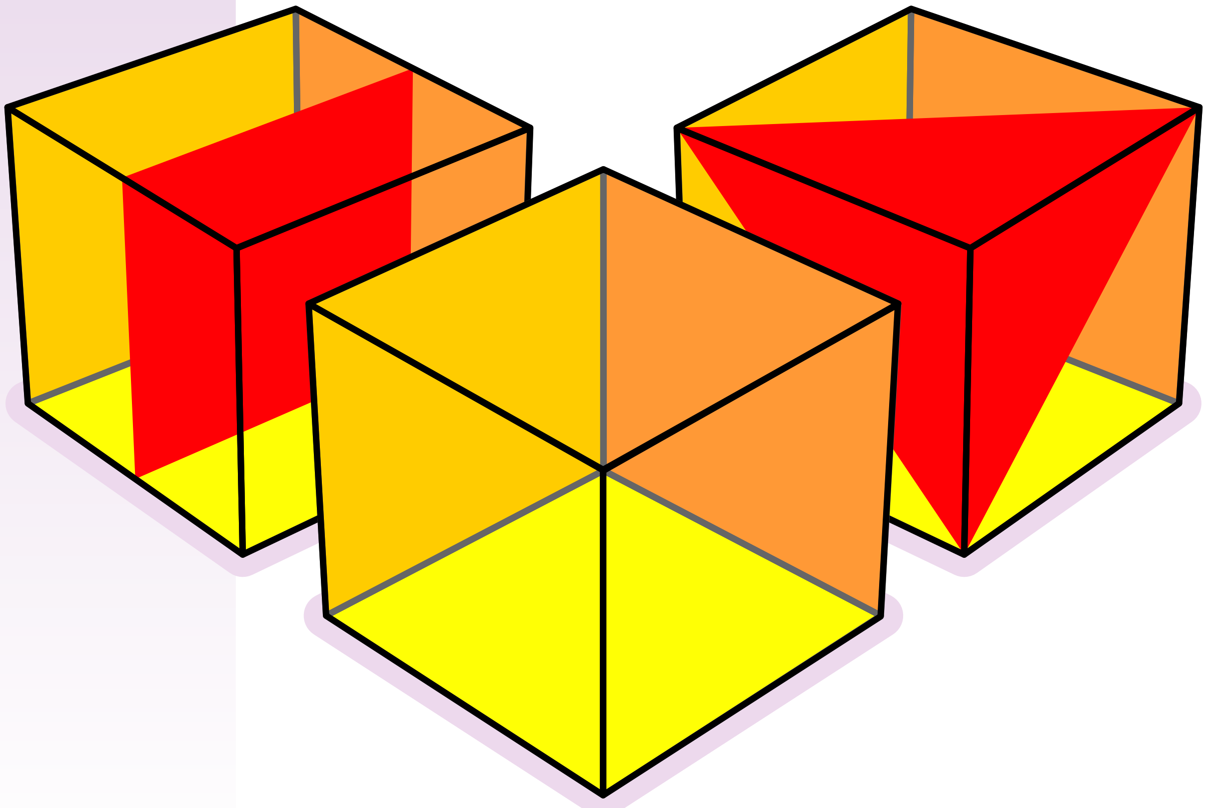


Regular hexagons are inscribed in and circumscribed outside a circle - as shown in the illustration.

If the smaller hexagon has an area of three square units, what is the area of the larger hexagon?



To solve the puzzle it is enough to turn the smaller hexagon as shown in the illustration. The inner straight lines divide the larger hexagon into 24 congruent triangles, 18 of which form the smaller hexagon. The ratio of areas is 18 : 24 = 3 : 4, and so if the smaller hexagon has an area of three, the larger one has as area of four.

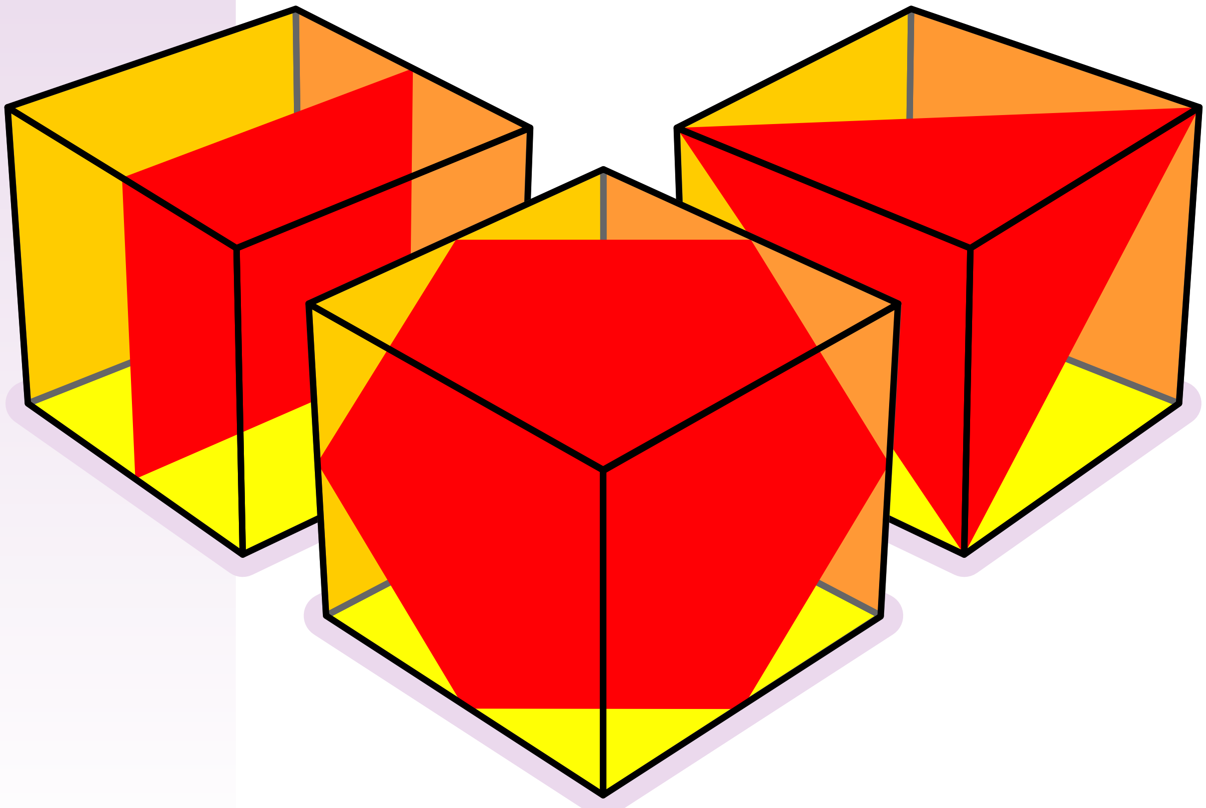


Hexagon Inside the Cube

after Martin Gardner

A plane which passes through the cube's center produces a cross section in form of a square (the leftmost cube in the illustration). A plane which passes through the three corners of the cube only produces a cross section in form of a regular triangle (the rightmost cube in the illustration).

The objective is to find the way how the plane should pass through the cube in order to produce a cross section that is a regular hexagon. If the cube's side is one unit, what is the side of the hexagon?

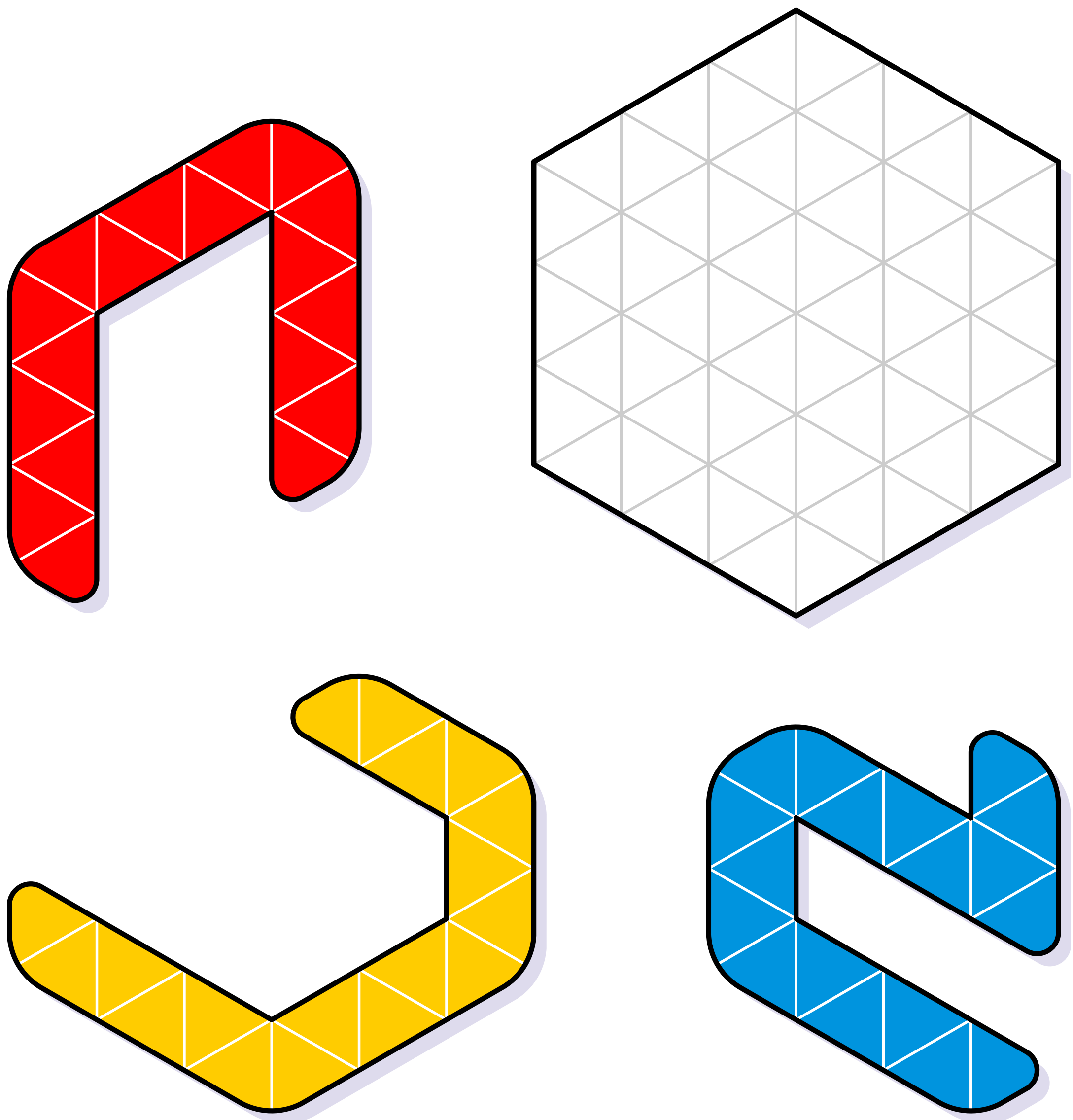


Hexagon Inside the Cube (solution)

A plane which passes through the midpoints of six sides of the cube as shown in the center of the illustration, produces a cross section that is a regular hexagon. Since the side of the cube is one unit, the side of the hexagon is square root of 1/2.

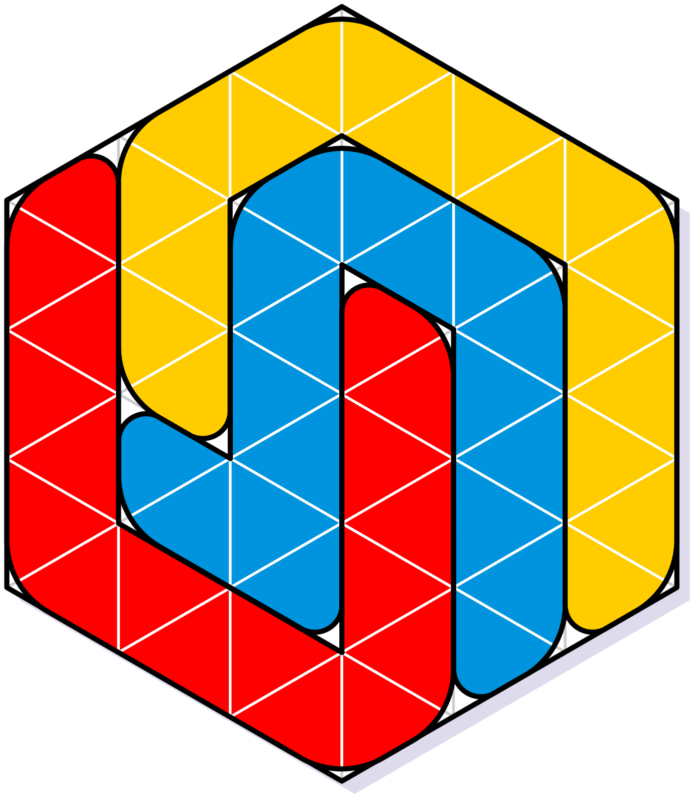
Hexa-Snakes

by Serhiy and Peter Grabarchuk



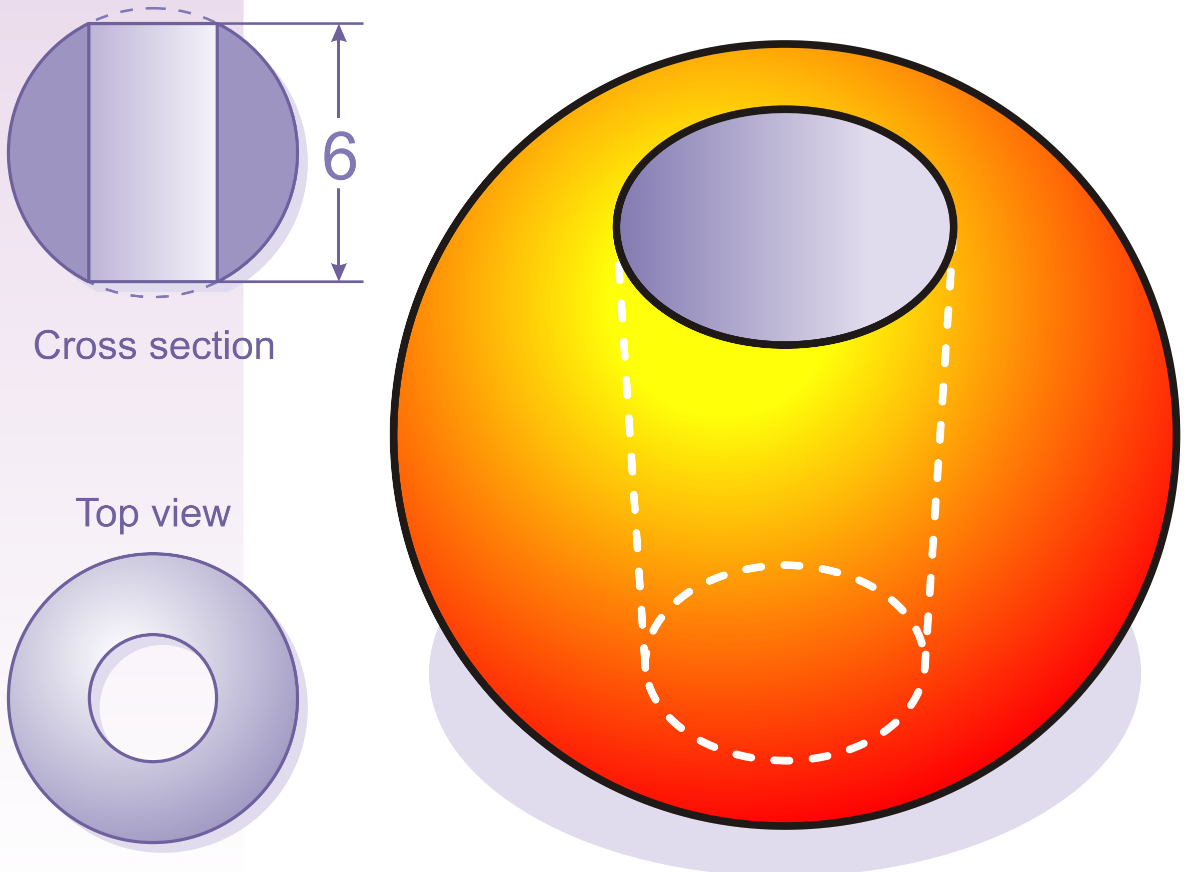
Place all three color snakes within the bounds of the hexagonal white board shown in the upper right corner. You can rotate the snakes and flip them over, but not overlap.

More from the authors at GrabarchukPuzzles.com



The solution is shown in the illustration.

Geometrical Puzzles



Hole in the Sphere

*by Samuel I. Jones**

A cylindrical hole six inches long has been drilled straight through the center of a solid sphere - just as shown in the illustration.

What is the volume remaining in the sphere?

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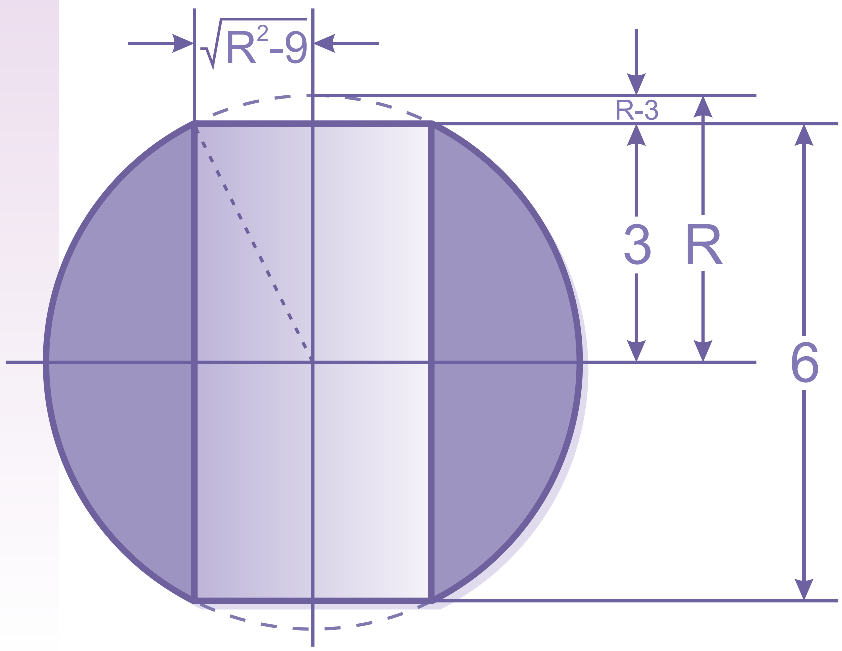
*Martin Gardner has found the earliest reference for this problem in Samuel I. Jones's *Mathematical Nuts*, self-published, Nashville, 1932.



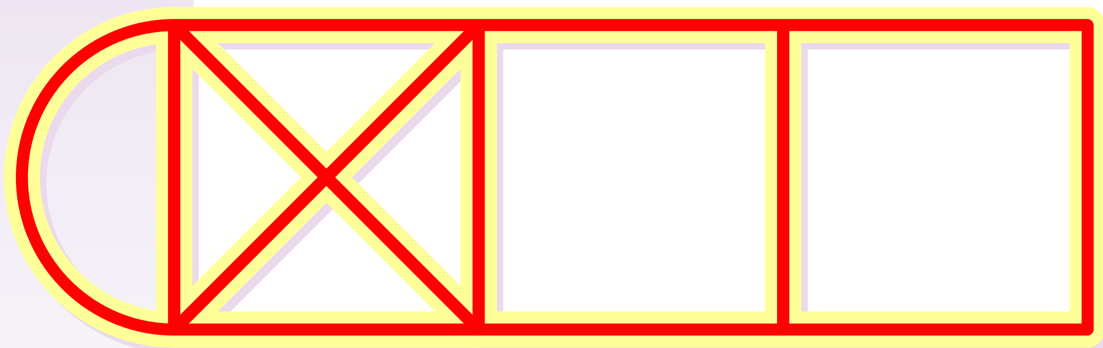
Hole in the Sphere (solution)

If you want to avoid the calculations in Solution 1, simply take a look directly at Solution 2 below it.

Solution 1. Let **R** be the radius of the sphere. As the illustration indicates, the radius of the cylindrical hole will then be the square root of $\mathbf{R^2 - 9}$, and the altitude of the spherical caps at each end of the cylinder will be $\mathbf{R - 3}$. To determine the residue after the cylinder and caps have been removed, we add the volume of the cylinder, $6\pi(\mathbf{R^2 - 9})$, to twice the volume of the spherical cap, and subtract the total from the volume of the sphere, $\mathbf{4\pi R^3/3}$. The volume of the cap is obtained by the following formula, in which **A** stands for its altitude and **r** for its radius: $\pi\mathbf{A(3r^2 + A^2)/6}$.

When this computation is made, all terms obligingly cancel out except $\mathbf{36\pi}$ - the volume of the residue in cubic inches. In other words, the residue is constant regardless of the hole's diameter or the size of the sphere!

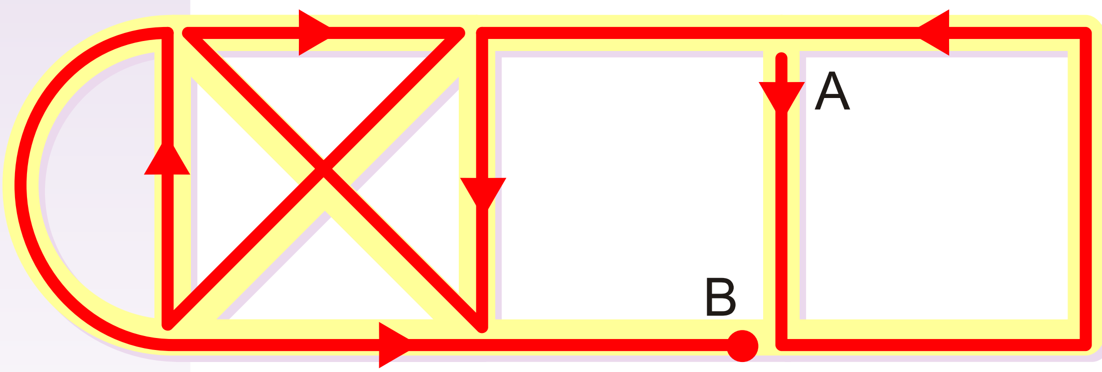
Solution 2. John W. Campbell, Jr., editor of *Astounding Science Fiction*, was one of several readers who solved the sphere problem quickly by reasoning adroitly as follows: The problem would not be given unless it has a unique solution. If it has a unique solution, the volume must be a constant which would hold even when the hole is reduced to zero radius. Therefore the residue must equal the volume of a sphere with a diameter of six inches, namely $\mathbf{36\pi}$.



A Hopscotch Puzzle

by Henry E. Dudeney

Can you draw the hopscotch figure shown in the illustration without taking your pencil off the paper or going along the same line twice?

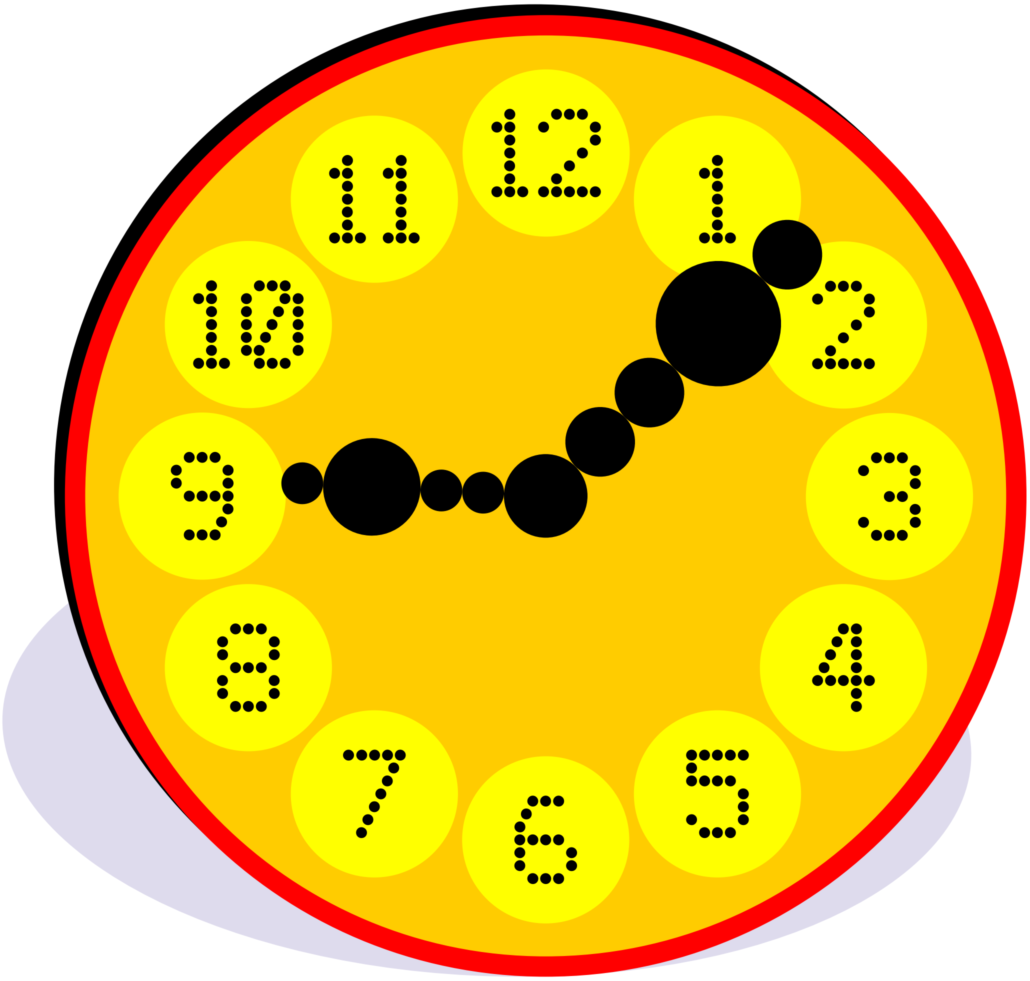


A Hopscotch Puzzle (solution)

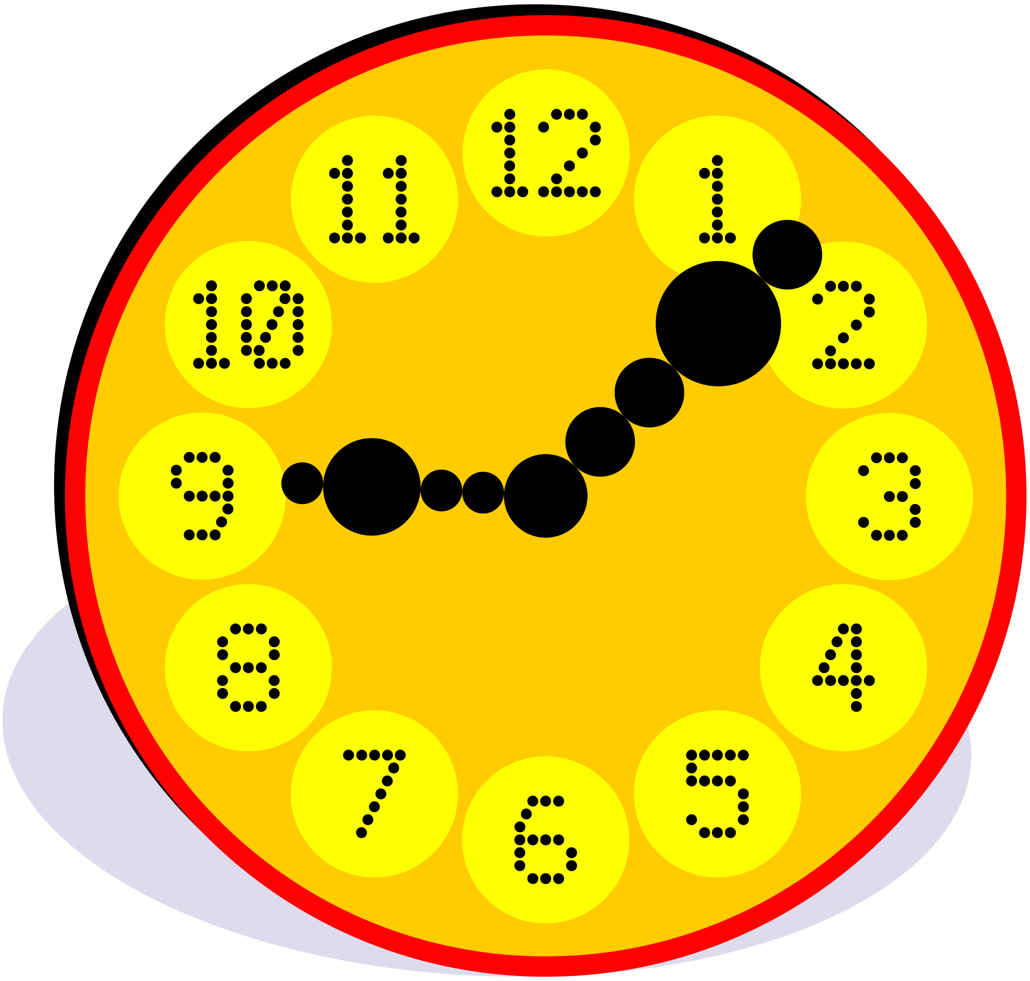
The solution is shown in the illustration above. It's necessary to begin at the point A (or B) and end at B (A respectively). Otherwise it can't be done.

How Many Minutes?

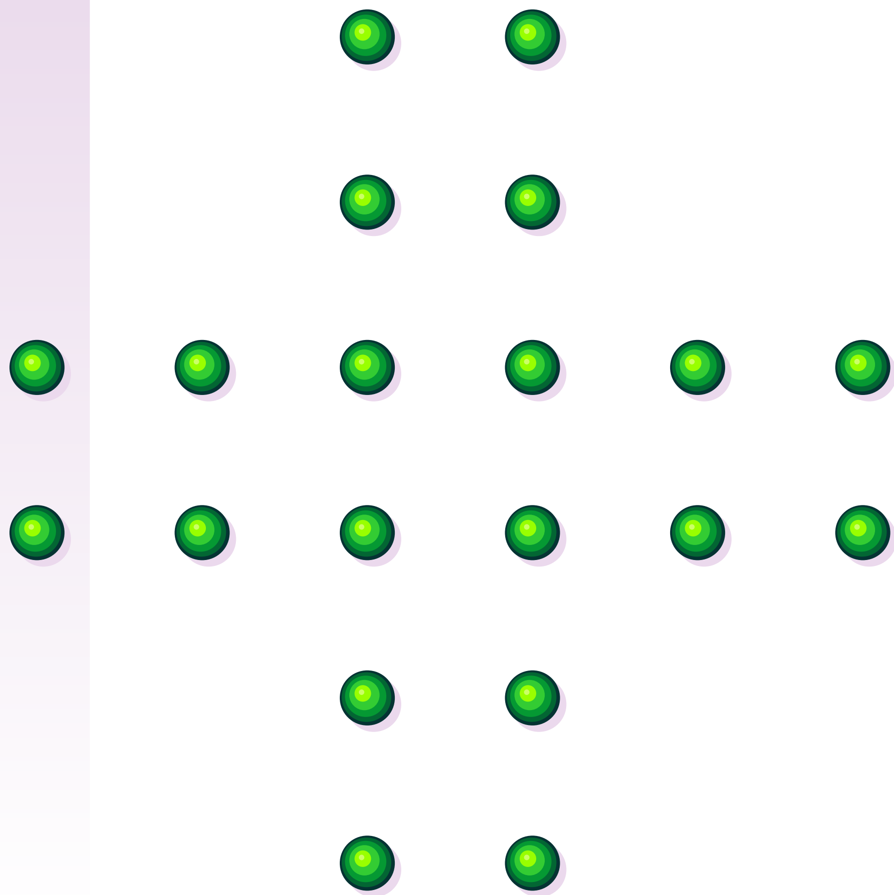
after Henry E. Dudeney



How many minutes is it until six o'clock if fifty minutes ago it was four times as many minutes past three o'clock?



It is twenty-six minutes until six o'clock.



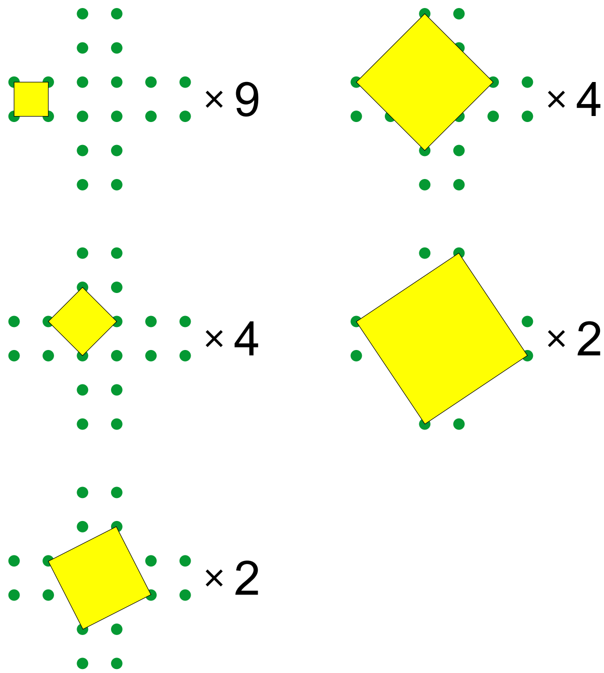
How Many Squares?

after Professor Louis Hoffmann

Puzzle 1. Count how many perfect squares of all possible sizes are hidden in the cross of dots above. A square is counting if any four dots are placed exactly in its respective corners.

Puzzle 2. It is more difficult than previous one. You have to remove exactly 6 dots so that any four dots from those remaining would not lie in the corners of a square. So you'll get the "no-squares" position for which there are no four dots that form a perfect square.

Visual Puzzles



Solution to Puzzle 1

The five diagrams above show all the 21 perfect squares which can be found in the cross of 20 green dots.

How Many Squares? *(solution)*

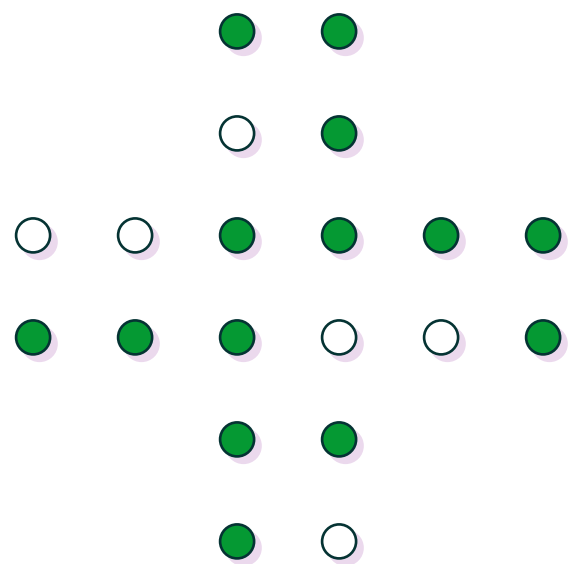
The answer to Puzzle 1 is 21 perfect squares. They are shown in the five diagram on the left.

There is a nice story behind this ingenious old puzzle. It illustrates a tricky nature of Puzzle 1 very well.

In 1893 professor Louis Hoffmann asked in his famous book Puzzles Old and New to arrange twenty counters so that they form thirteen different squares, and in his original solution (he showed a pattern exactly as our big cross of 20 green dots) stated that there are seventeen perfect squares.

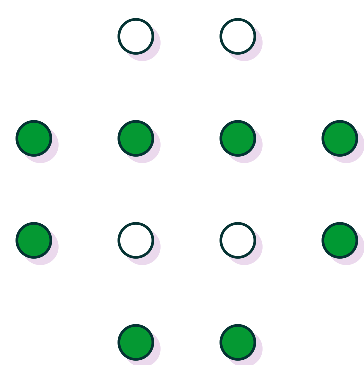
Several decades later, Henry E. Dudeney, England's greatest puzzle creator, improved Hoffmann's solution with 17 squares, and did this... twice - first it was a new solution with 19 squares, and then - 21. Both solutions were published in Dudeney's puzzle books.

Visual Puzzles



Solution to Puzzle 2

The diagram above shows "no-squares" position with the six dots removed.



Solution to Mini-Puzzle

The diagram above shows "no-squares" position with the four dots removed.

The answer to Puzzle 2 which we show on the left is exactly as that from Hoffmann's book - not a single square remains. Moreover, all your correct solutions fully coincide with this old one!

The answers to the mini-version are the following:
- there are 11 different perfect squares in the small diagram;
- to break all them and get "no-squares" position you need to remove just four spots as shown in the illustration.

"A rose-red city half as old as Time.
One billion years ago the city's age
Was just two-fifths of what Time's age will be
A billion years from now. Can you compute
How old the crimson city is today?"

Based on these five lines can you figure out how old is the Rose-Red city?

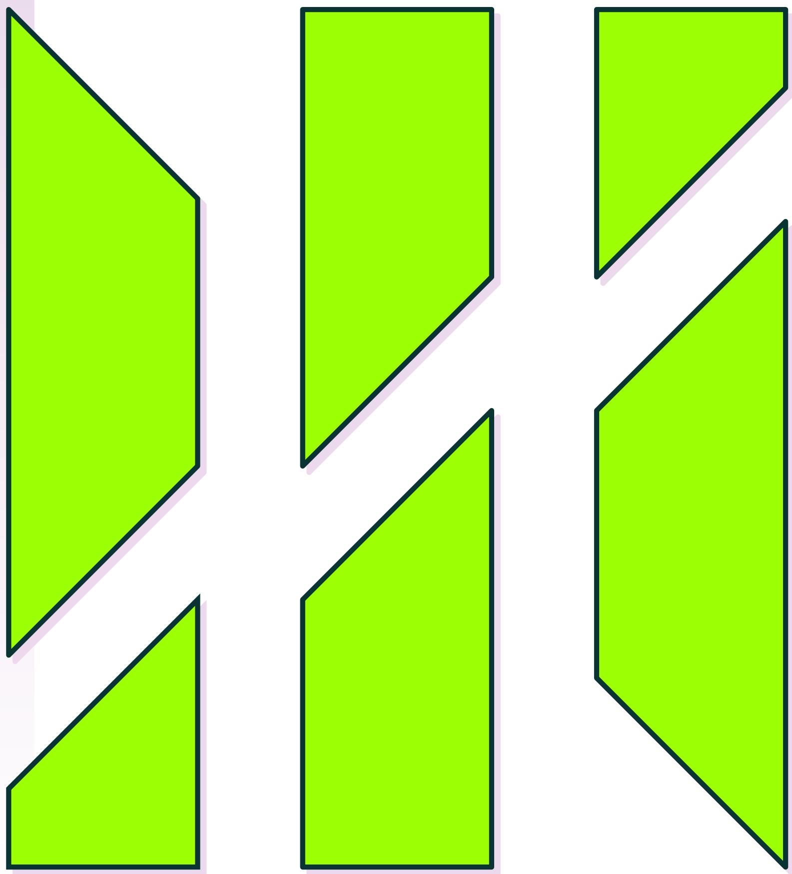
The Rose-Red city's age is seven billion years. Let C be the city's present age; T, the present age of Time. A billion years ago the city would have been C - 1 billion years old and a billion years from now Time's age will be T + 1. The data in the puzzle allows us to create two simple equations:

$2C = T$

$C - 1 = 2/5\,(T + 1)$

These equations give C, the city's present age, a value of seven billion years; and T, Time's present age, a value of fourteen billion years.

Tangrams

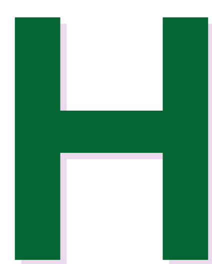


The H Puzzle

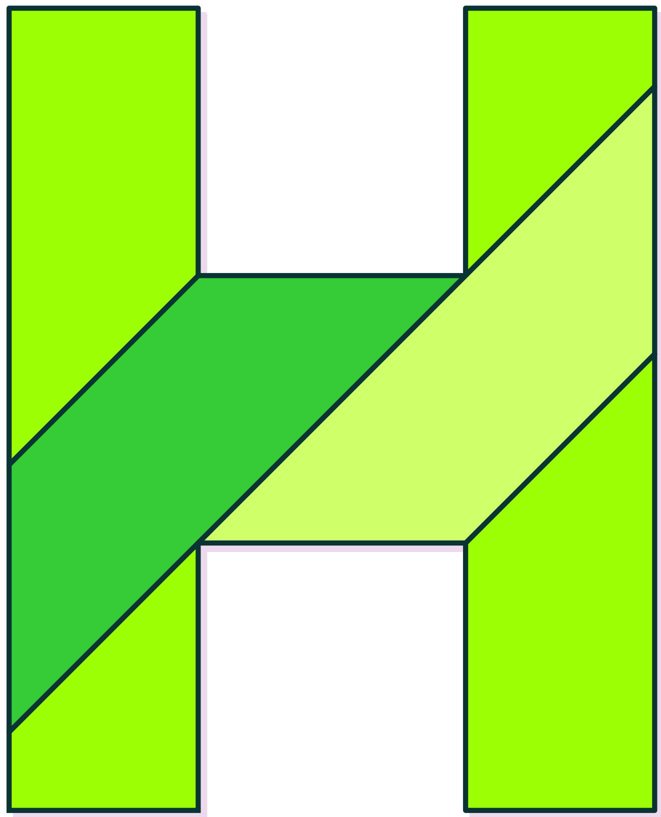
by Harry Lindgren

The object of the puzzle is to make from all the six pieces a symmetric capital H like one shown on the right.

You're allowed to rotate the pieces as you wish and even turn them over, but they must not overlap each other in the final letter.



Tangrams



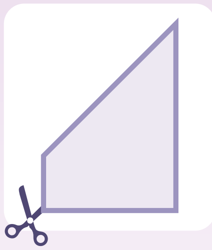
The H Puzzle (solution)

The solution to the H puzzle is shown in the illustration.

Treasure of Classic and Modern Puzzles

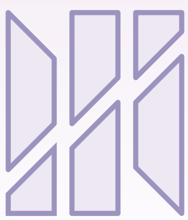
Tangrams

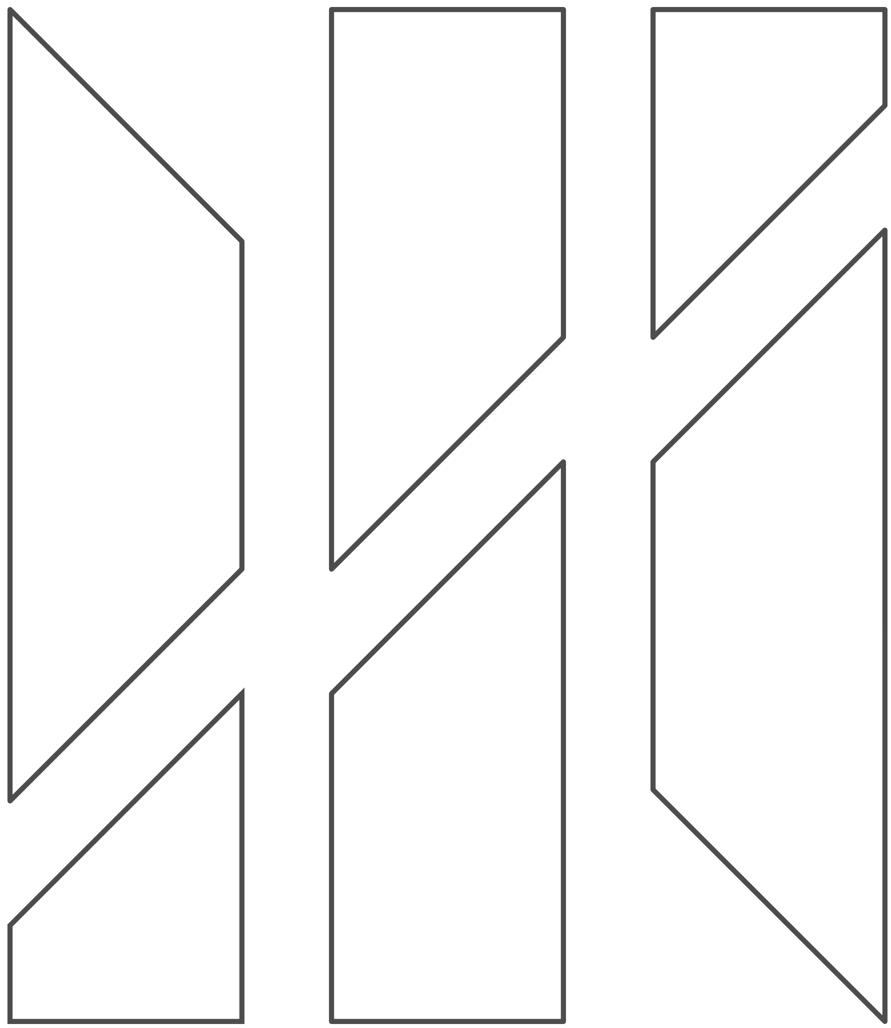
1



x 6

F

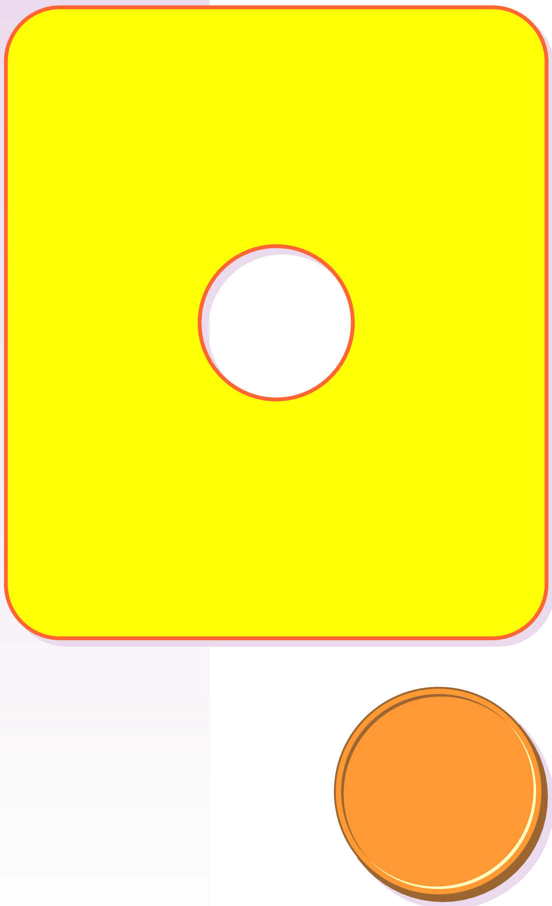




The H Puzzle (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

Tricks

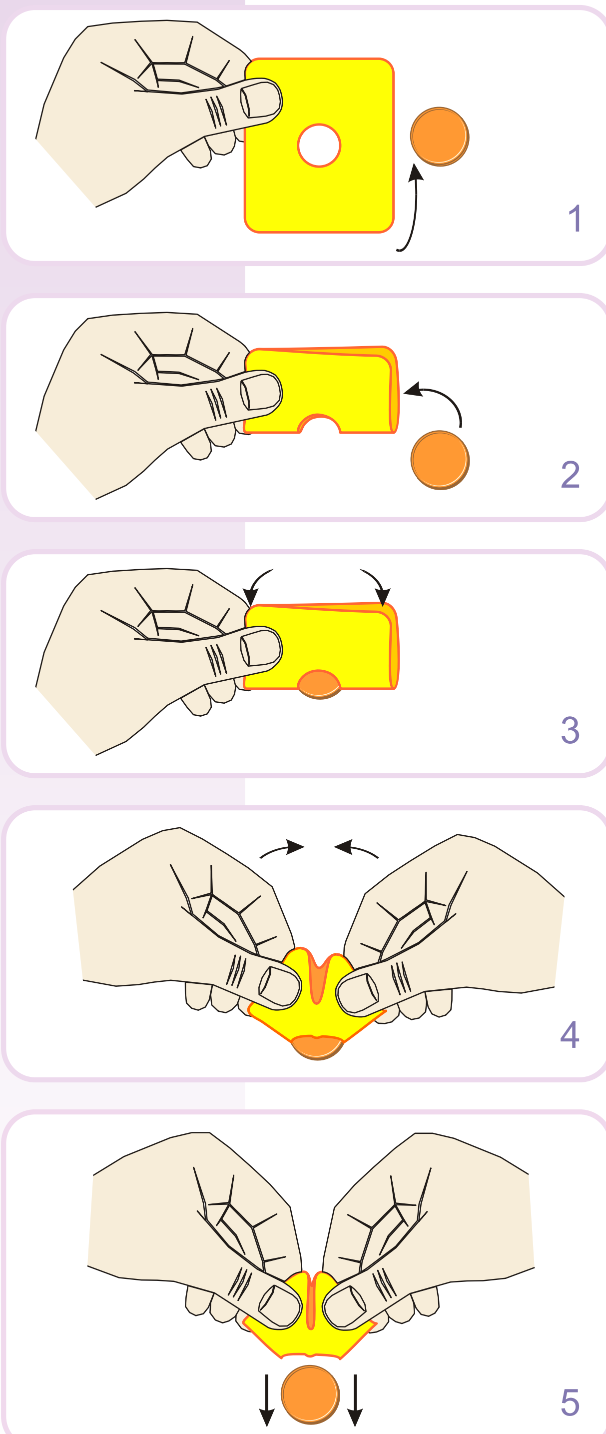


The Impossible Hole

after Henry E. Dudeney

Take a piece of paper and trace on it a circle around the rim of a penny. Then accurately cut in it a circular hole along that outline as shown in the illustration on the left.

Now you are ready to perform a cool trick - to pass a half-dollar or a new dollar through this hole without tearing the paper. How can you perform this trick?



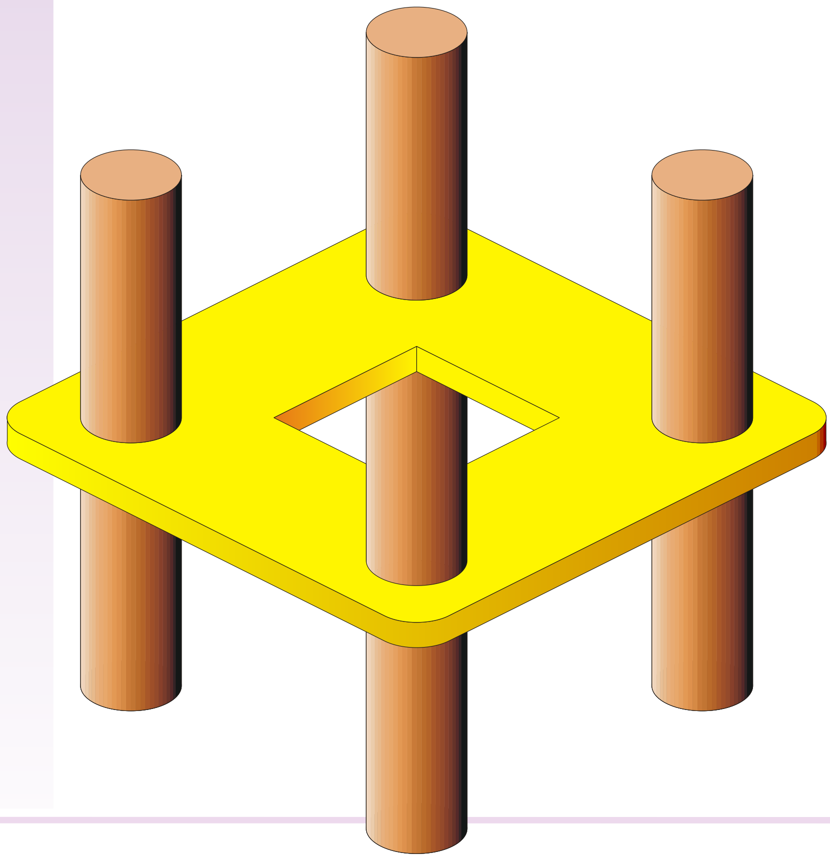
The Impossible Hole (secret)

To perform the trick follow the steps in the illustration on the left.

First fold the piece of paper in half and then drop the coin into the fold.

Now, holding the paper at both ends, bring your hands together upwards, and the coin will be squeezed through the hole.

Have fun showing this cool trick to your friends!



Impossible Object

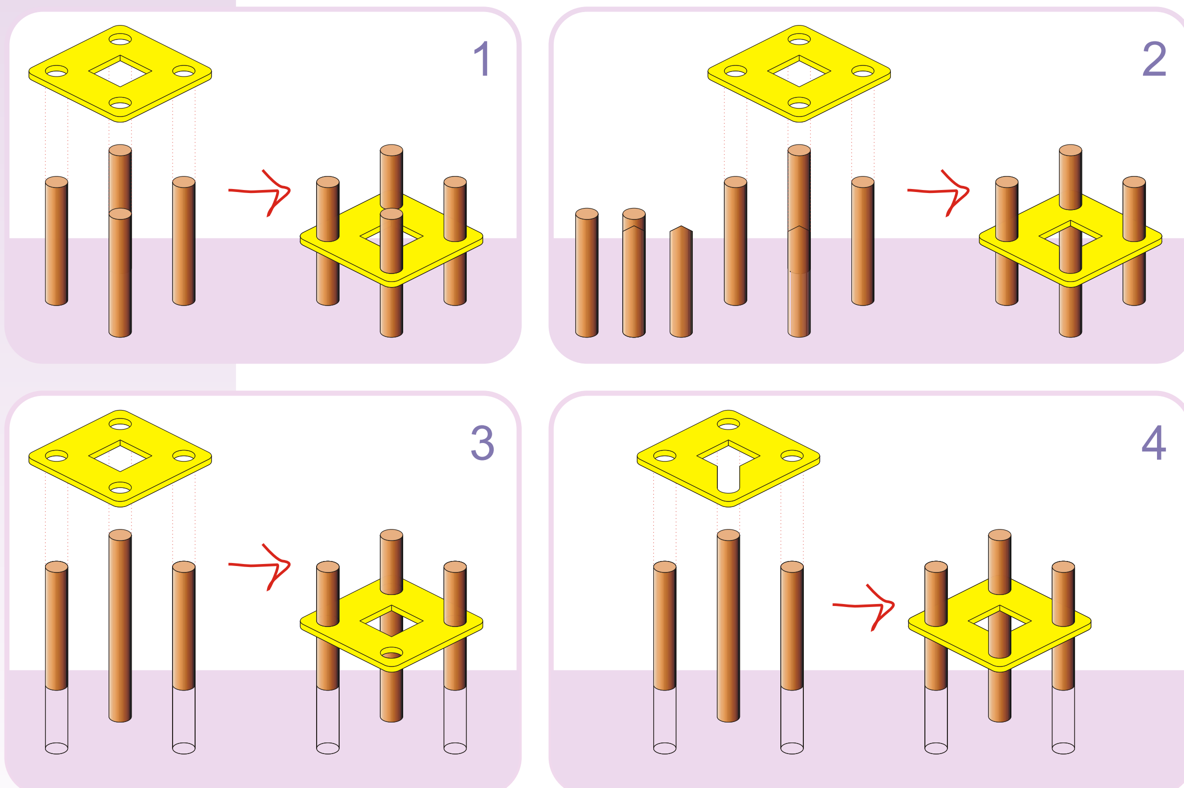
by Serhiy Grabarchuk

This object looks to be assembled of three rods and one frame.

Try to make it.

Do you think you will be successful?

Illusions



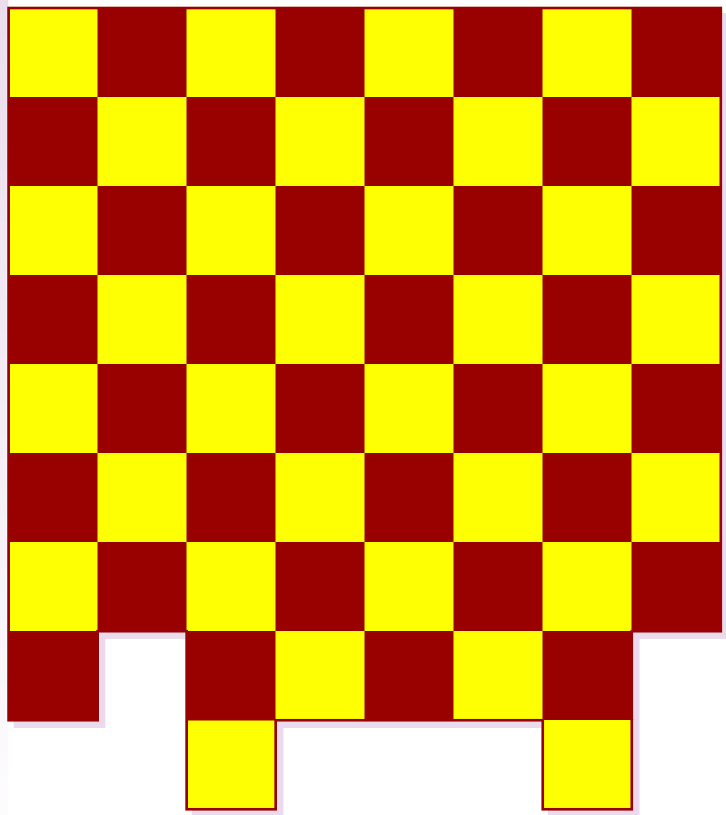
Impossible Object (explanation)

There are at least two ways to make this impossible object. For one of them we will need to improve one rod, for another - a frame. In either cases to see reached impossible object correctly you will need to look at it from the certain perspective.

Way 1. Take four identical rods, the square frame with the four round holes in it and make the composition shown in Figure 1. Of course, we didn't get the needed object yet. For this cut the rod nearest to you as shown in Figure 2, and make the final composition.

Way 2. Take three rods (two - 1 unit each and one - 1,5 unit) and place the square frame with four holes on them as shown in Figure 3. To get the intended object we slightly improve the square frame as shown in Figure 4. How to compose the final object is shown in the same figure. (Note that the reached object can't balance oneself when placed on the table).

Dissection Puzzles

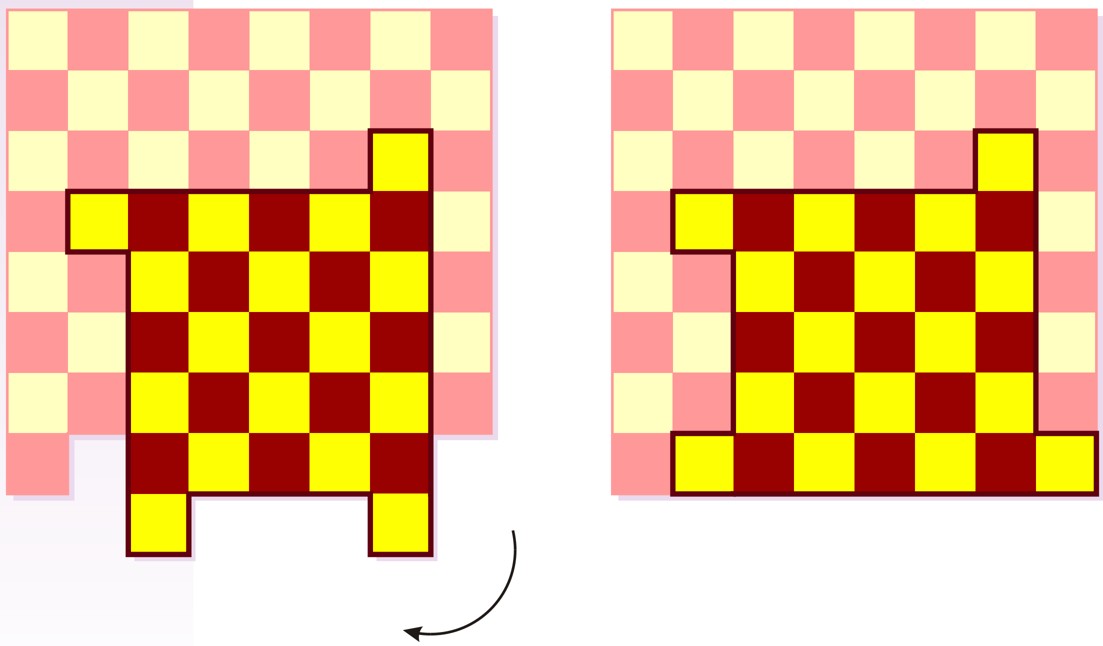


Improvised Chessboard

by Henry E. Dudeney

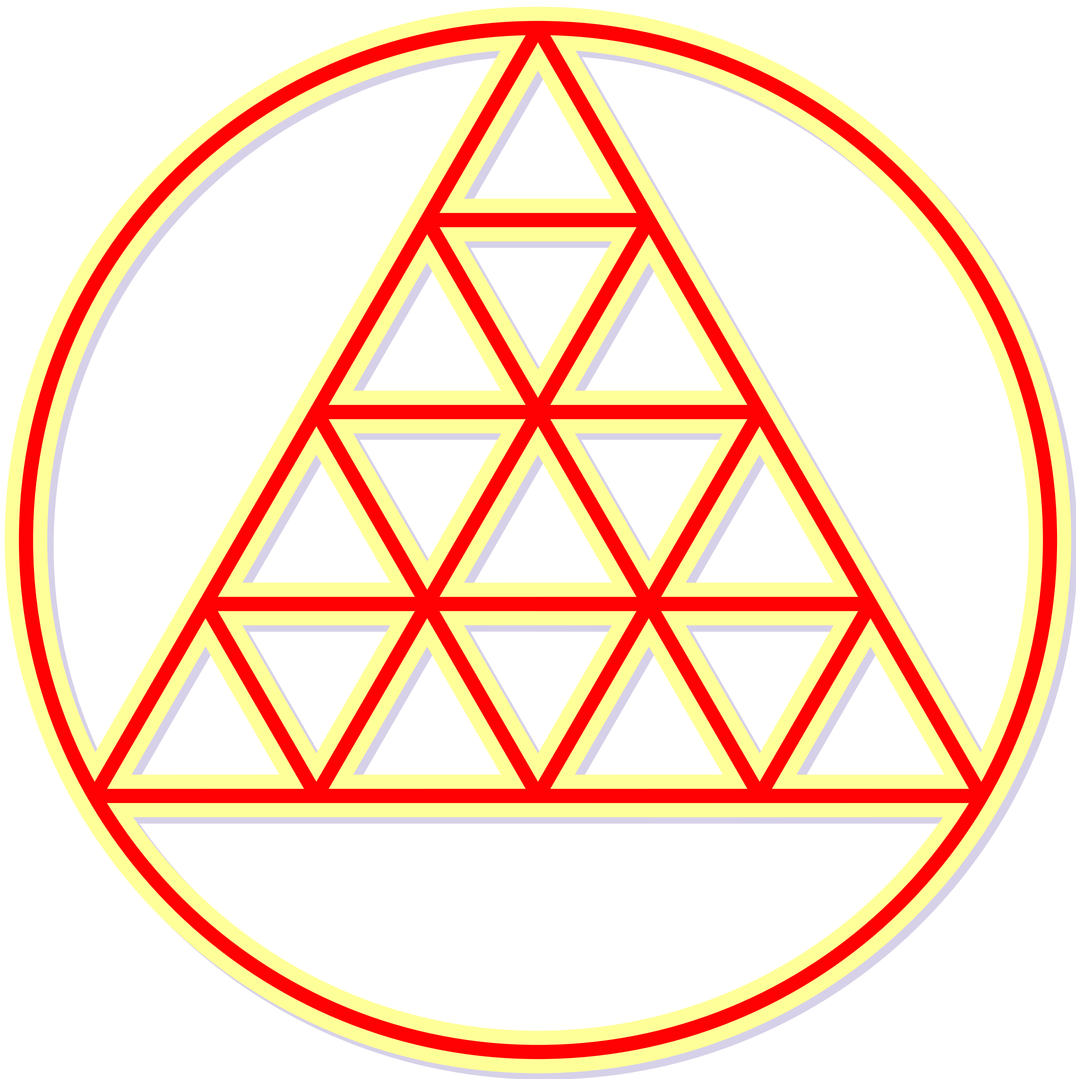
Two light squares have been cut off the 8x8 chessboard and pasted to it again into the new places as shown in the illustration. Now the object is to divide this board into only two pieces that will form a perfect chessboard again.

Dissection Puzzles

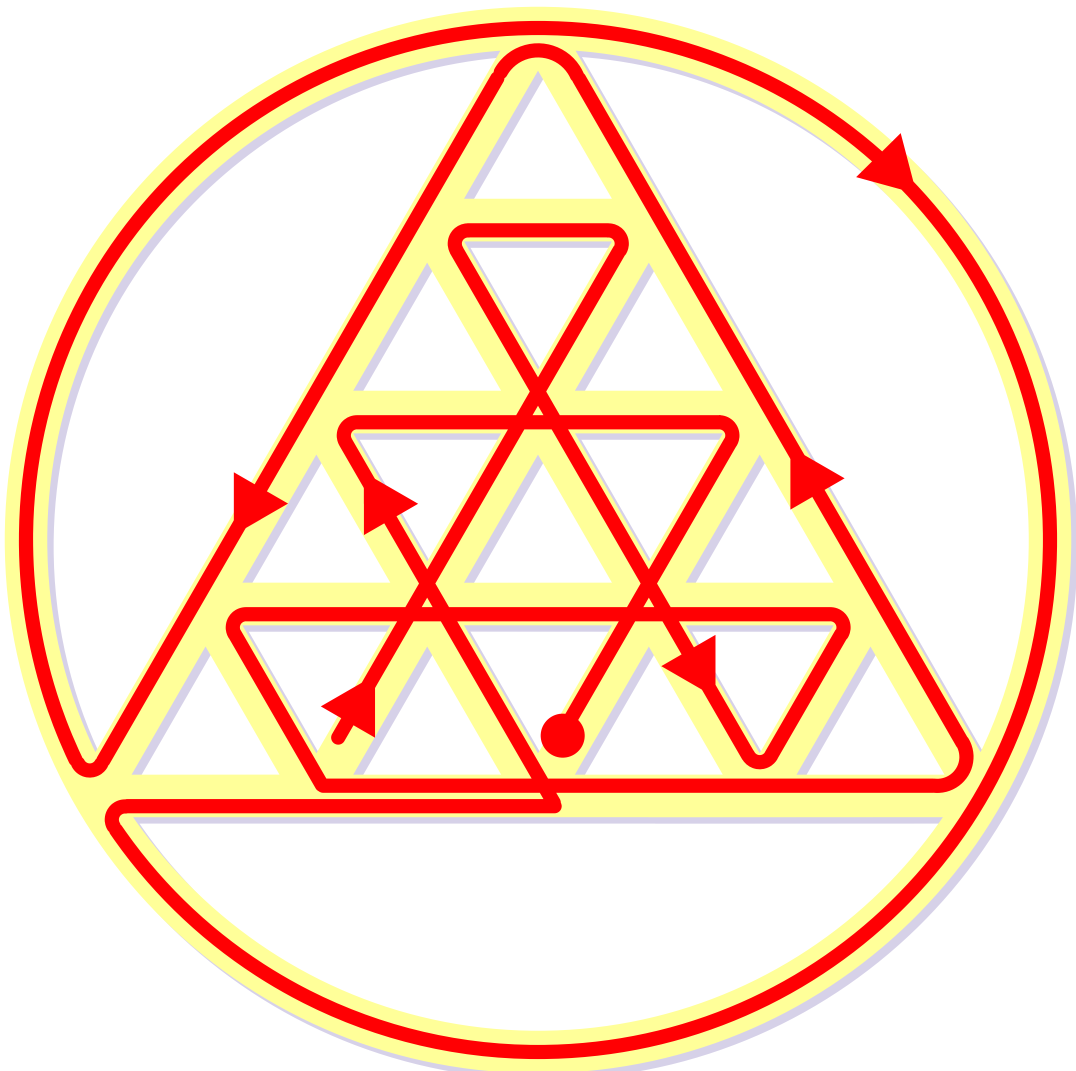


Improvised Chessboard (solution)

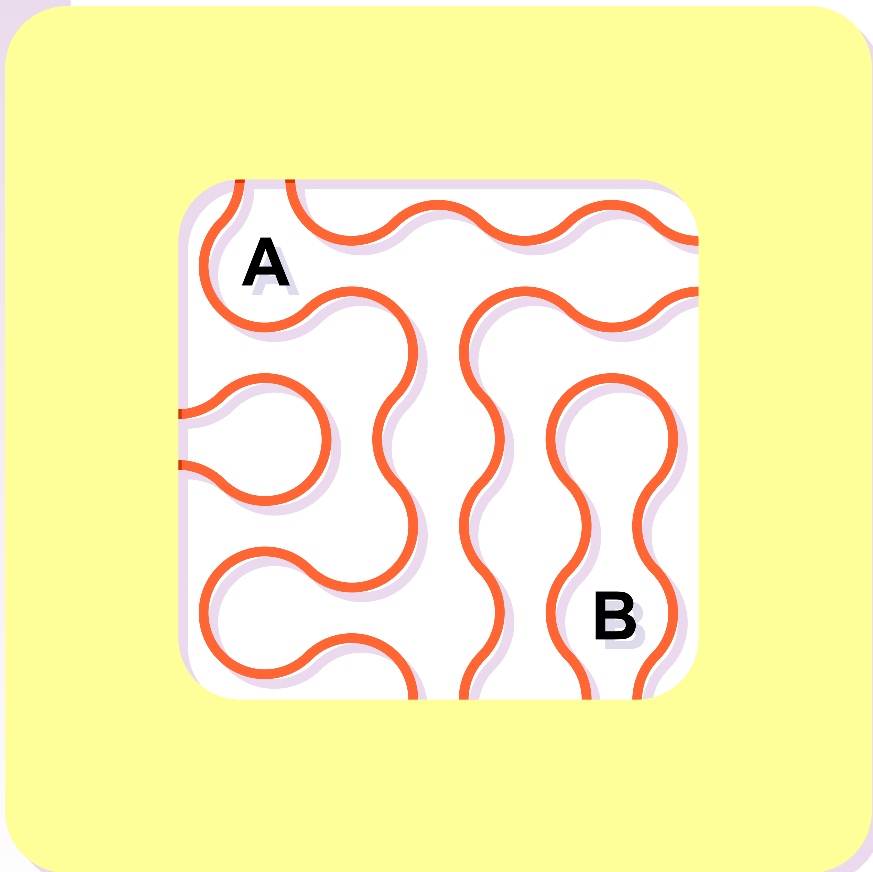
The solution is shown in the illustration.



Can you draw the ancient symbol shown in the illustration with one continuous line, making the minimum possible number of turns? You're allowed to go over the same lines more than once.



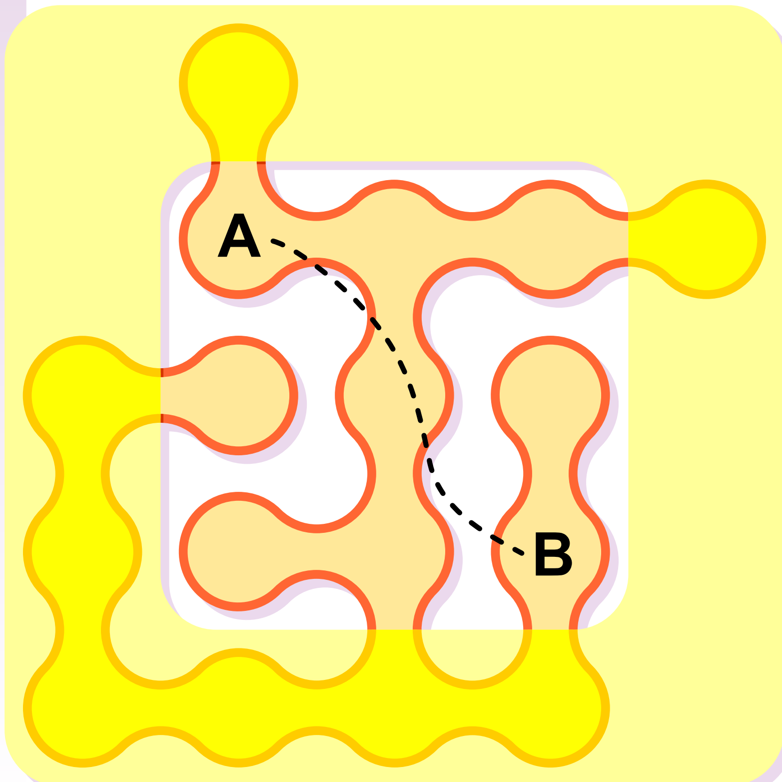
This ancient symbol can be drawn in 14 strokes, making only 13 turns as shown in the illustration.



In 'n' Out

after Martin Gardner

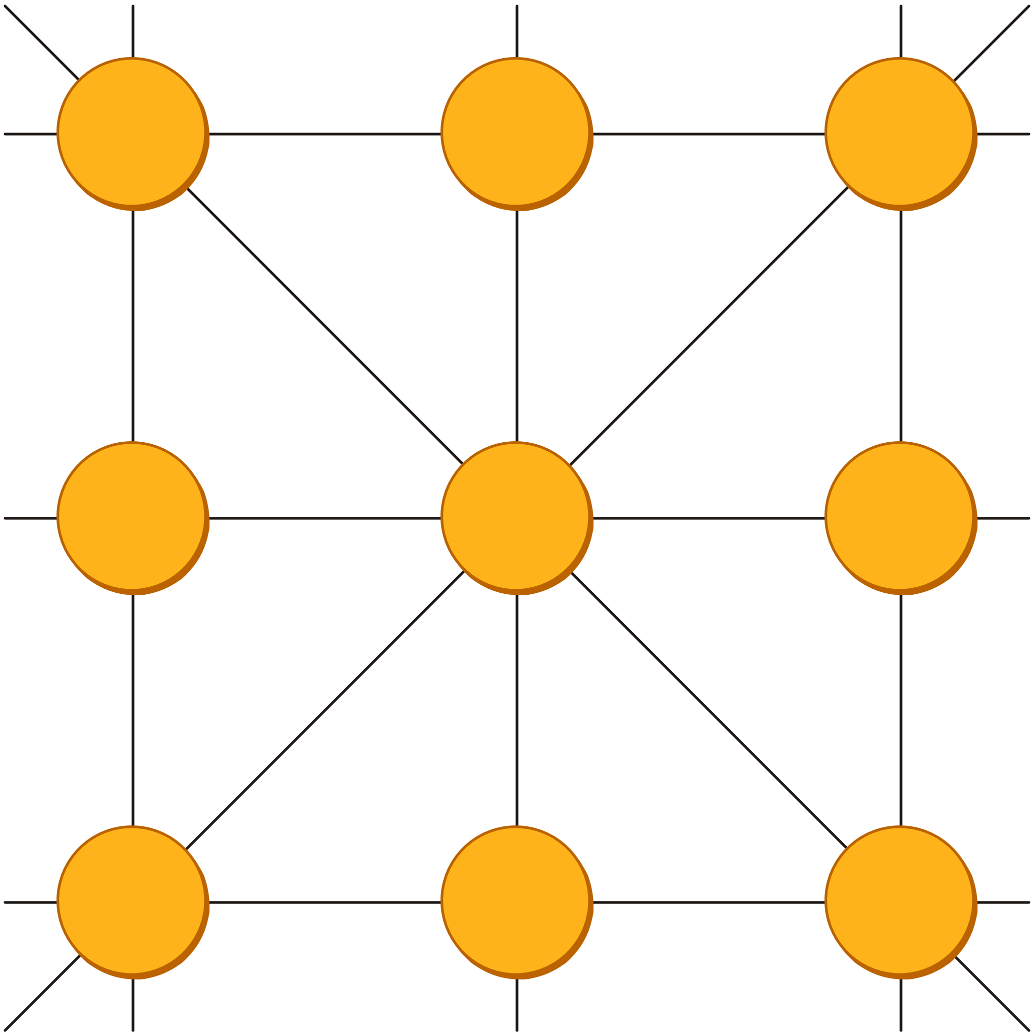
A simple closed curve that is very twisty is hidden under a piece of paper with the square hole in it so that a part of the curve is visible - as shown in the illustration. Now if it is told that region A is inside the curve, is region B inside or outside it?



In 'n' Out (solution)

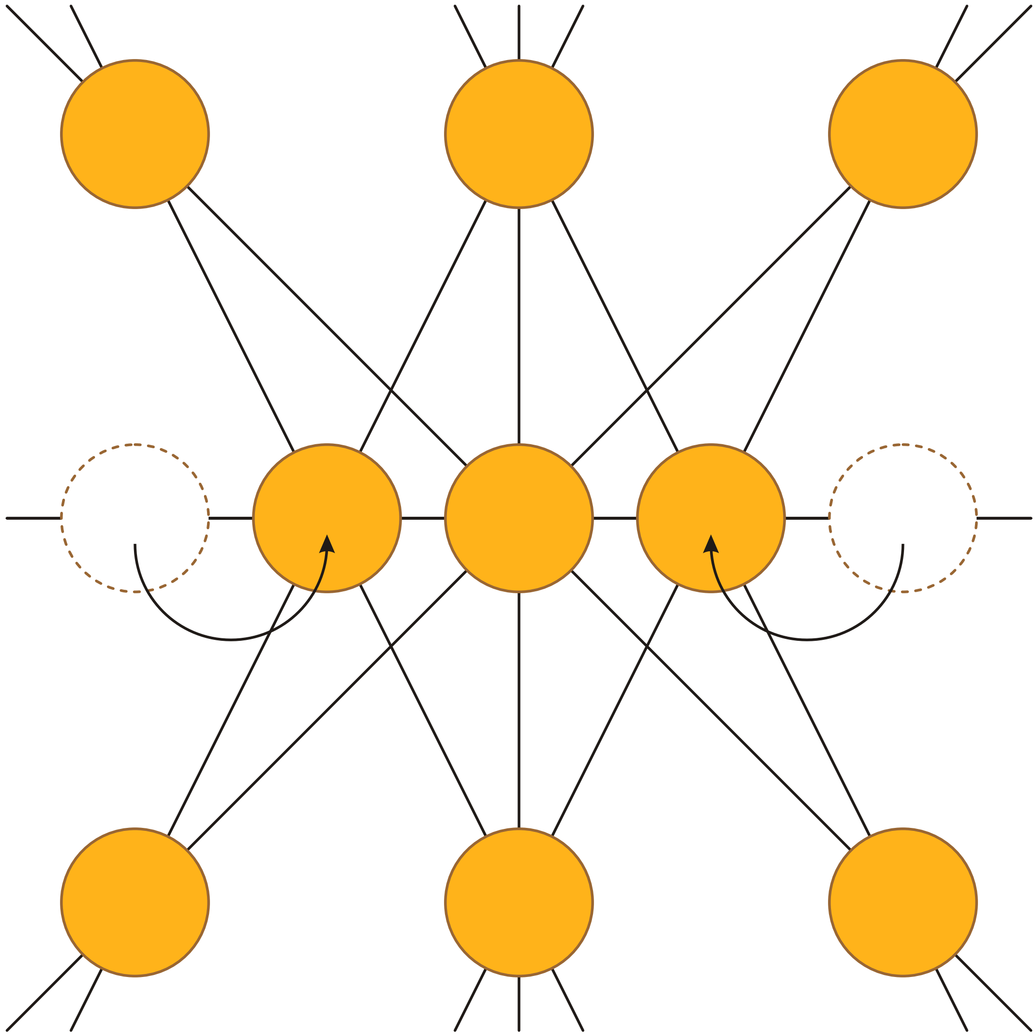
Region B is inside the curve. This can be said because of an interesting theorem about simple closed curves. All "inside" regions of such a curve are separated from each other by an even number of lines. The same is true of all "outside" regions. And any inside region is separated from any outside region by an odd number of lines. Zero is considered an even number, so if there are no lines between two regions, then of course they will be part of the same "side," and our theorem still holds.

When we pass from any part of region A to any part of region B, along any path, we cross an even number of lines. In the illustration one such path is shown by the dotted line. As it can be seen the line crosses four lines, an even number. So we can say with certainty that no matter what the rest of this curve looks like, region B is also inside.

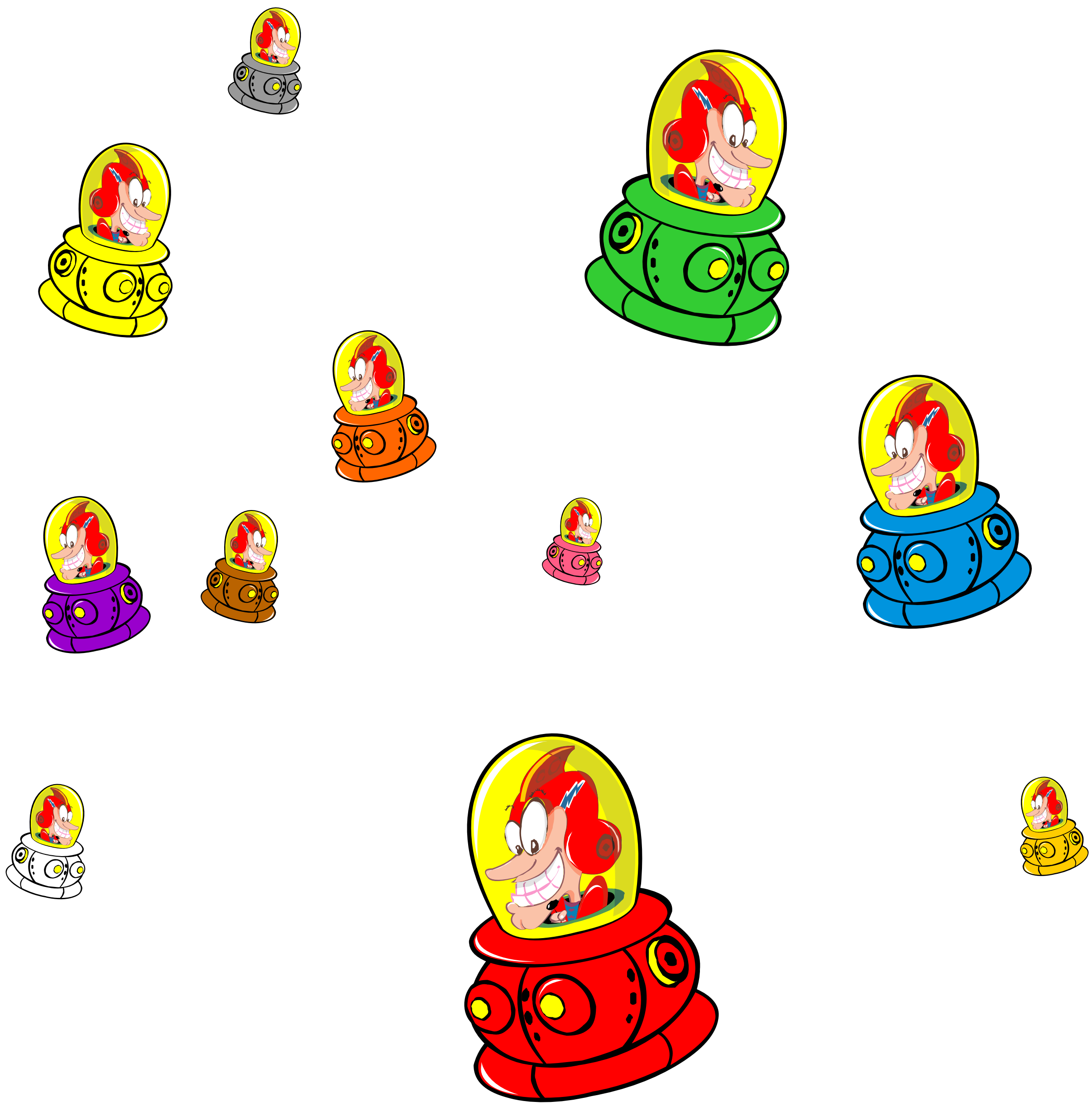


A square of nine coins shown in the illustration contains eight rows of three coins each (indicated with the lines) - three horizontal rows, three vertical rows and two main diagonals.

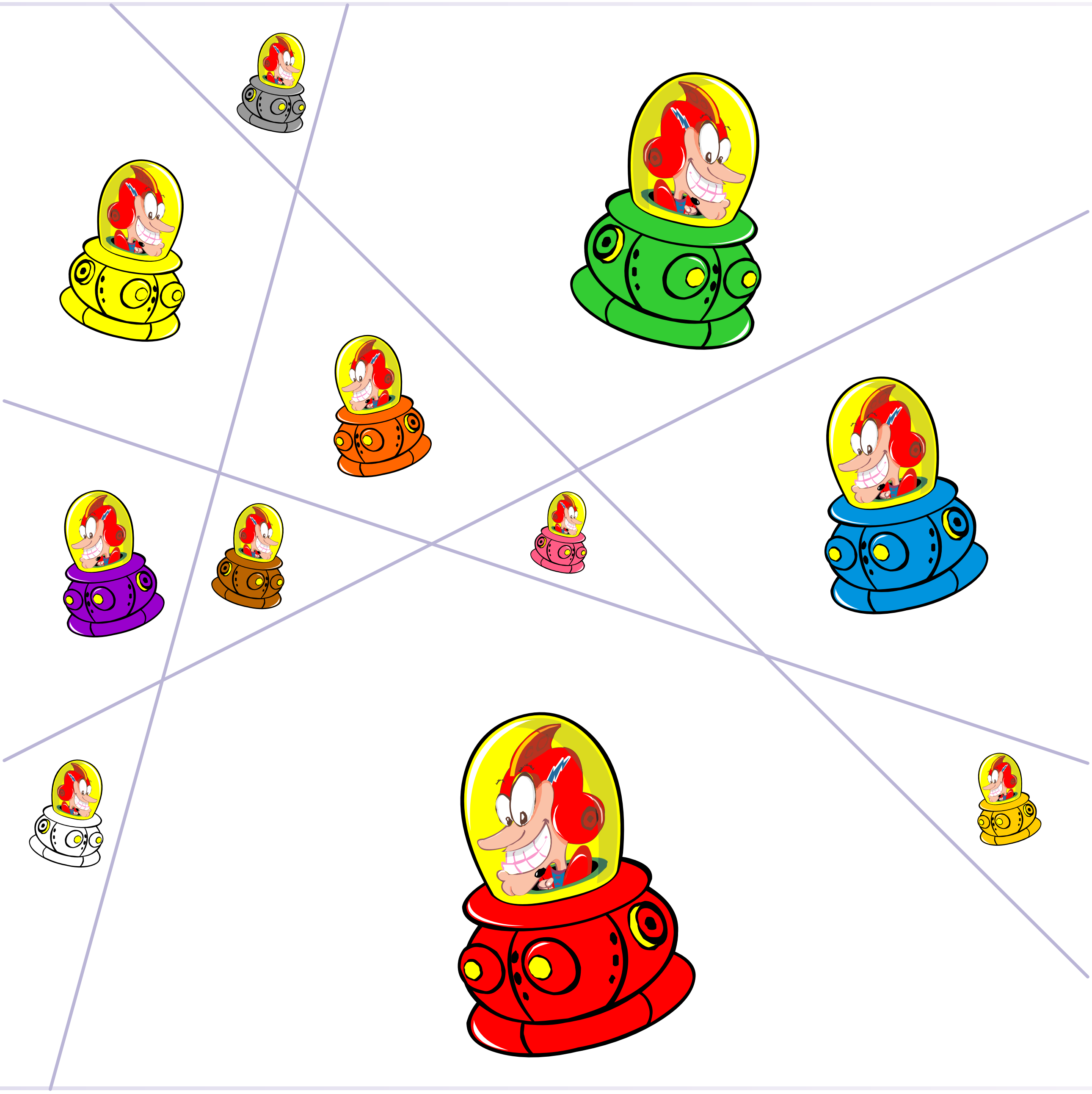
The object is to move the minimum possible number of coins to new positions so that to form ten rows of three coins each.



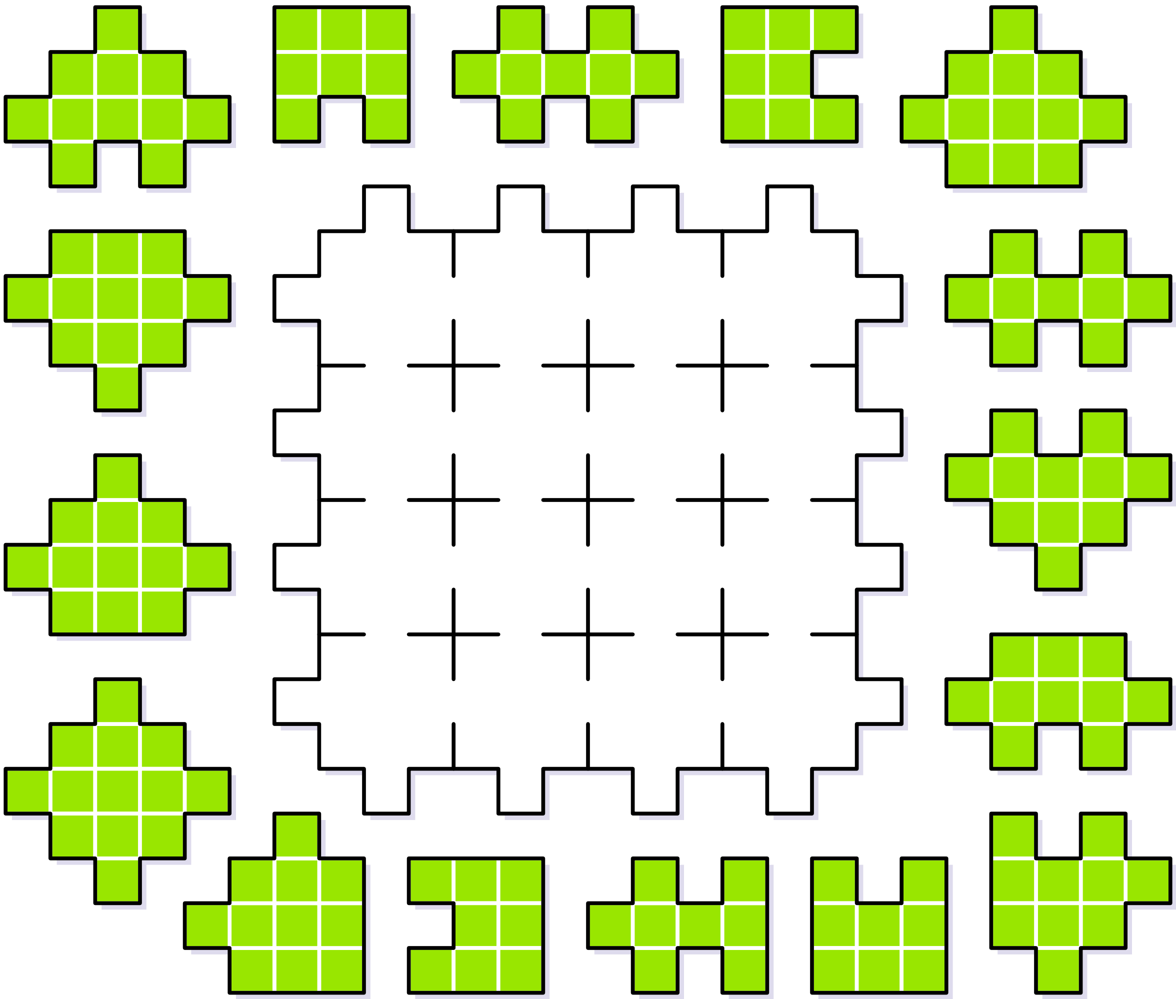
This puzzle can be solved in just two moves shown in the illustration above. This makes exactly ten rows of three-in-a-row coins each.



Eleven spacepods are visible on this snapshot from the space. Can you draw as few straight imaginary lines as possible on the snapshot so that there are eleven enclosures each containing exactly one spacepod in it? The lines can cross each other.

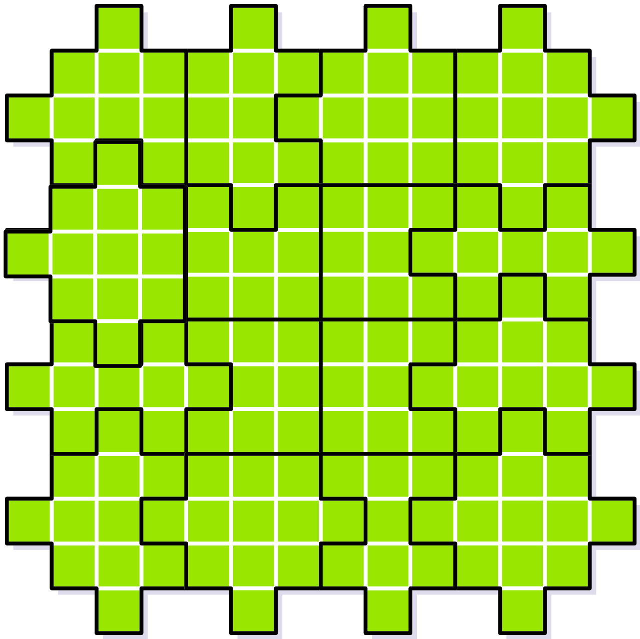


The solution is shown in the illustration.

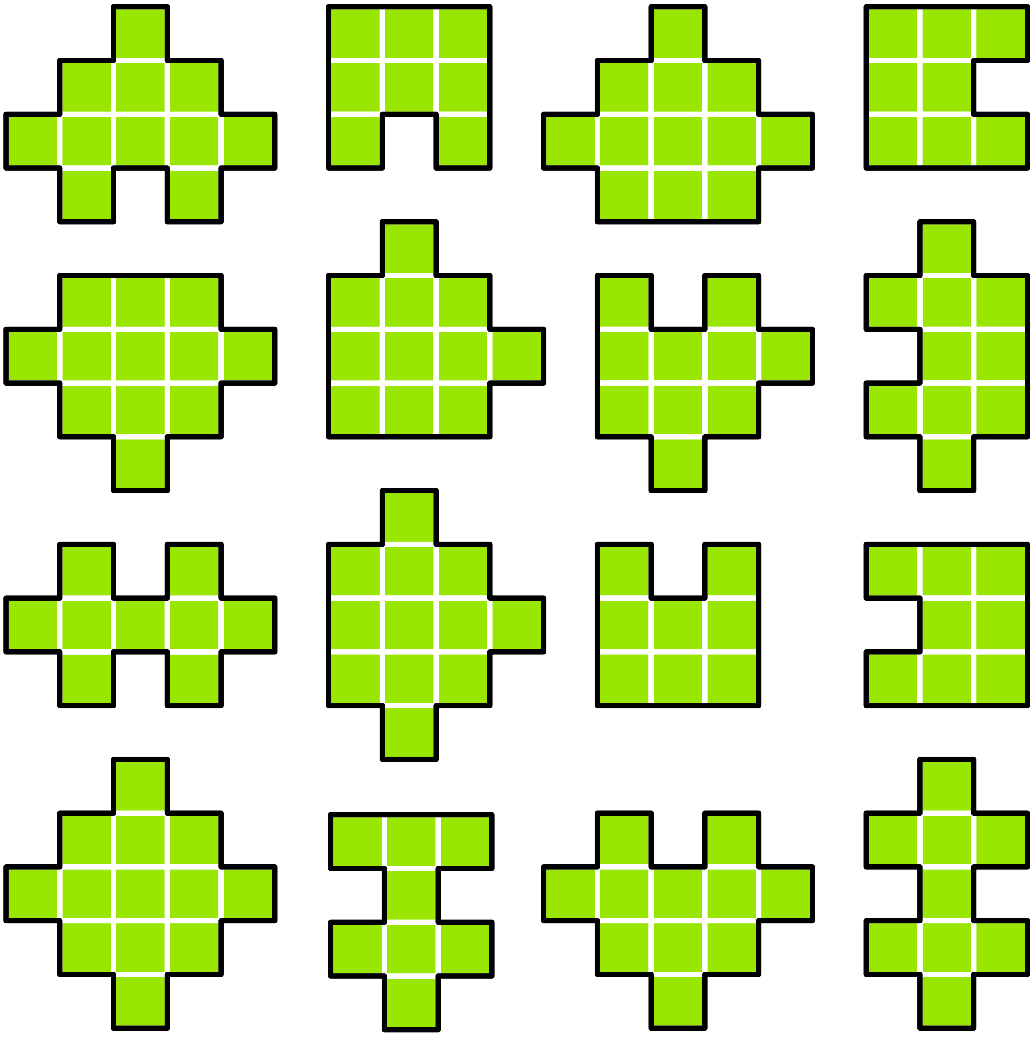


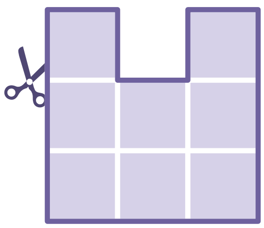
Place all the 16 pieces shown scattered around the board into the bounds of the board. The pieces can be rotated but it is not allowed to overlap them in the final combination.

*This puzzle was presented at the 5th 24 Hours Puzzle Championship, May 22-23, 2004, Budapest, Hungary.

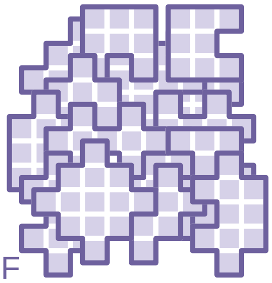


The solution is shown in the illustration.



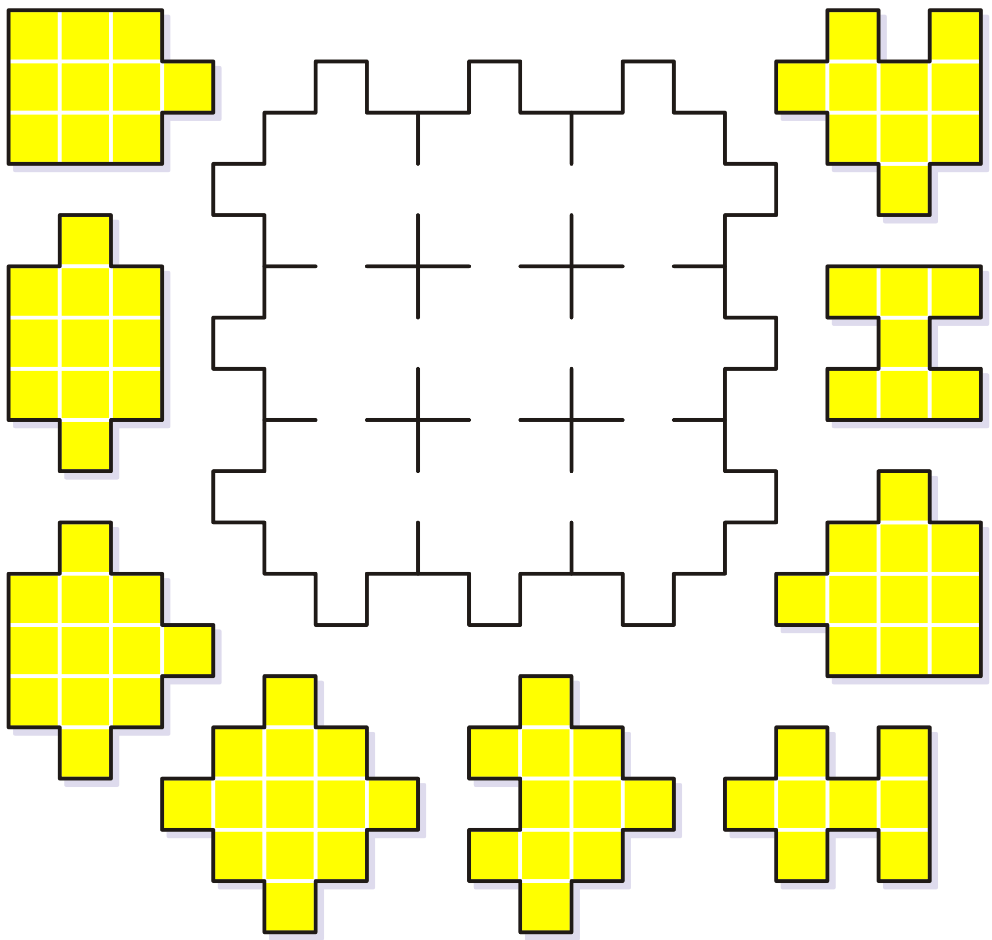


1 x16



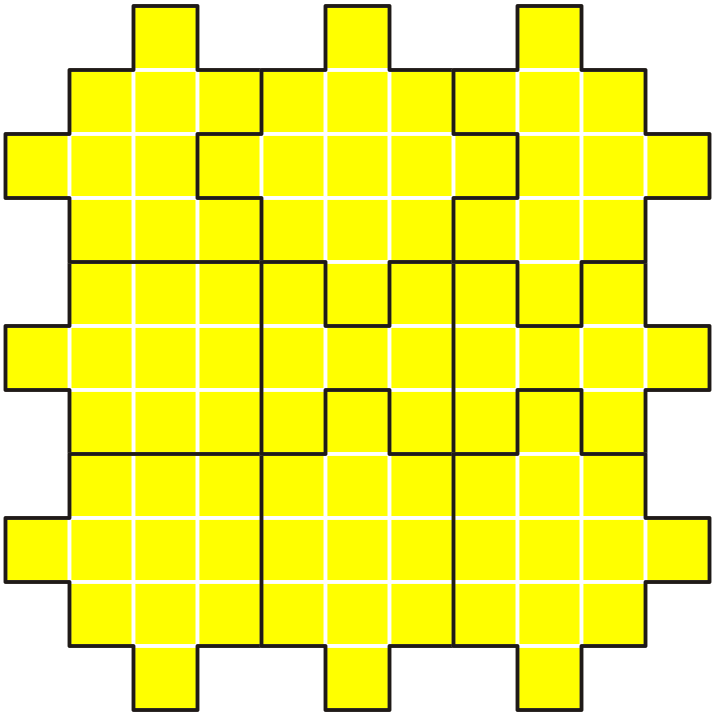
F

To produce the pieces first print them out. Then follow the diagram shown above - from step 1 to step F (finish).

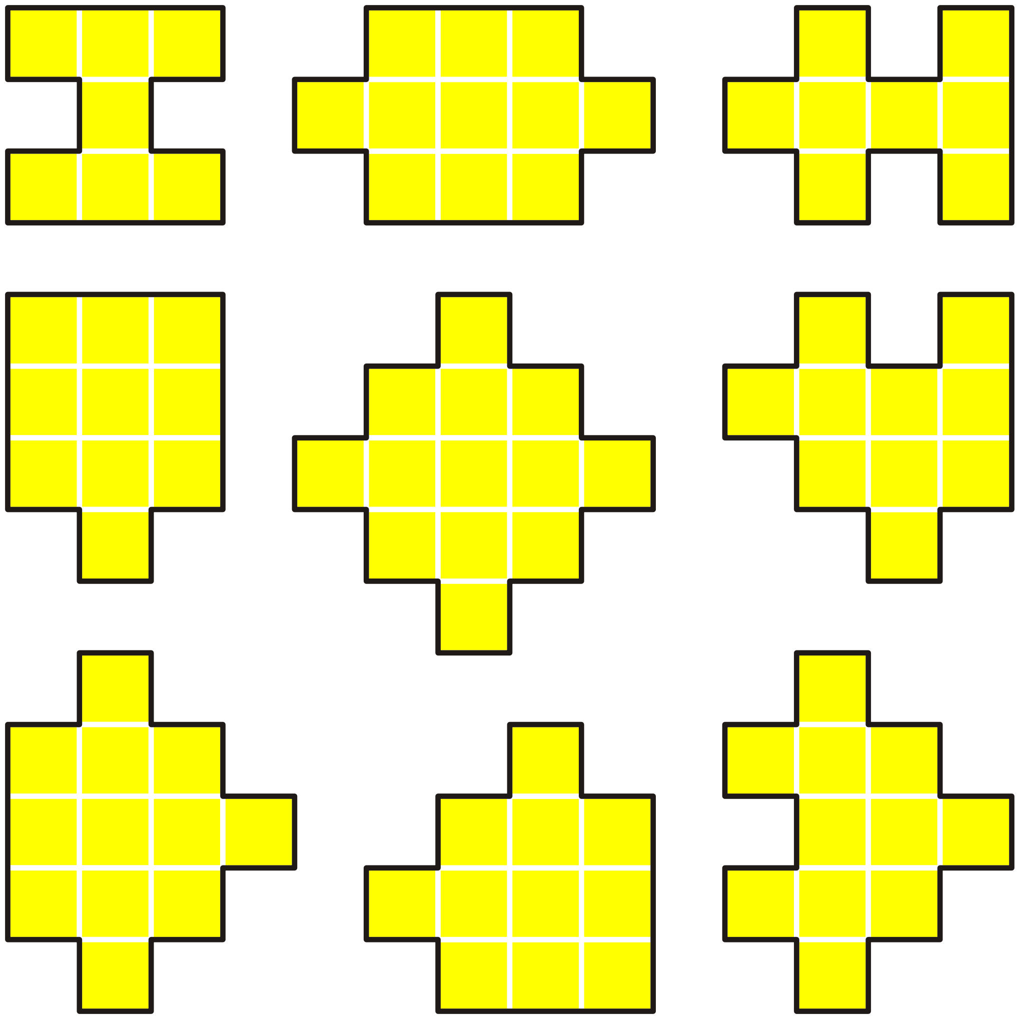


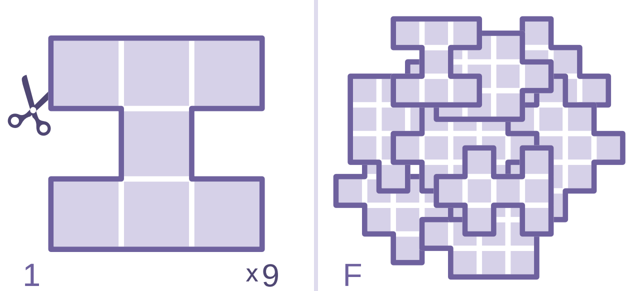
Place all the nine pieces shown scattered around the filed into the bounds of the field. The pieces can be rotated but it is not allowed to overlap them in the final combination.

*This puzzle was presented at the 5th 24 Hours Puzzle Championship, May 22-23, 2004, Budapest, Hungary.



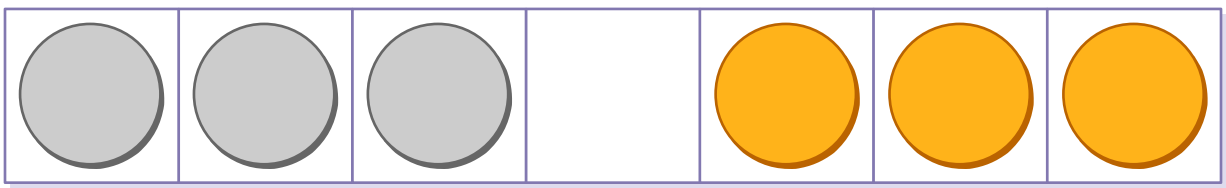
Almost a unique solution, not counting rotations and the two upper right pieces interchange, is shown in the illustration.

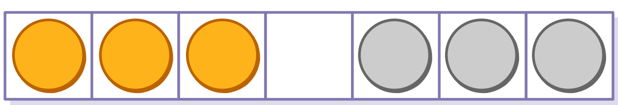




To produce the pieces first print them out. Then follow the diagram shown above - from step 1 to step F (finish).

The Jumping Coins





This puzzle was described by Edouard Lucas at the end of the 19th century.

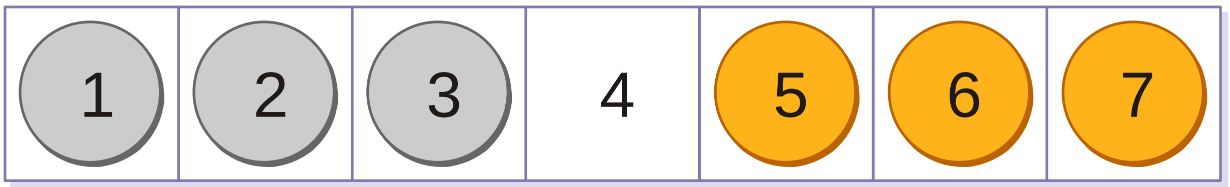
Place three quarters and three pennies in a line of seven cells as shown in the left illustration - quarters on the left, and pennies on the right. The middle cell is empty.

Now interchange two groups of coins moving quarters to the right and pennies to the left. The middle cell has to be empty when you finish.

Coins are moved just in a forward direction. This means you have to move quarters to the right and pennies to the left only. A move consists of moving a coin on the adjacent vacant cell, or jumping over an adjacent coin on the vacant cell immediately behind it.

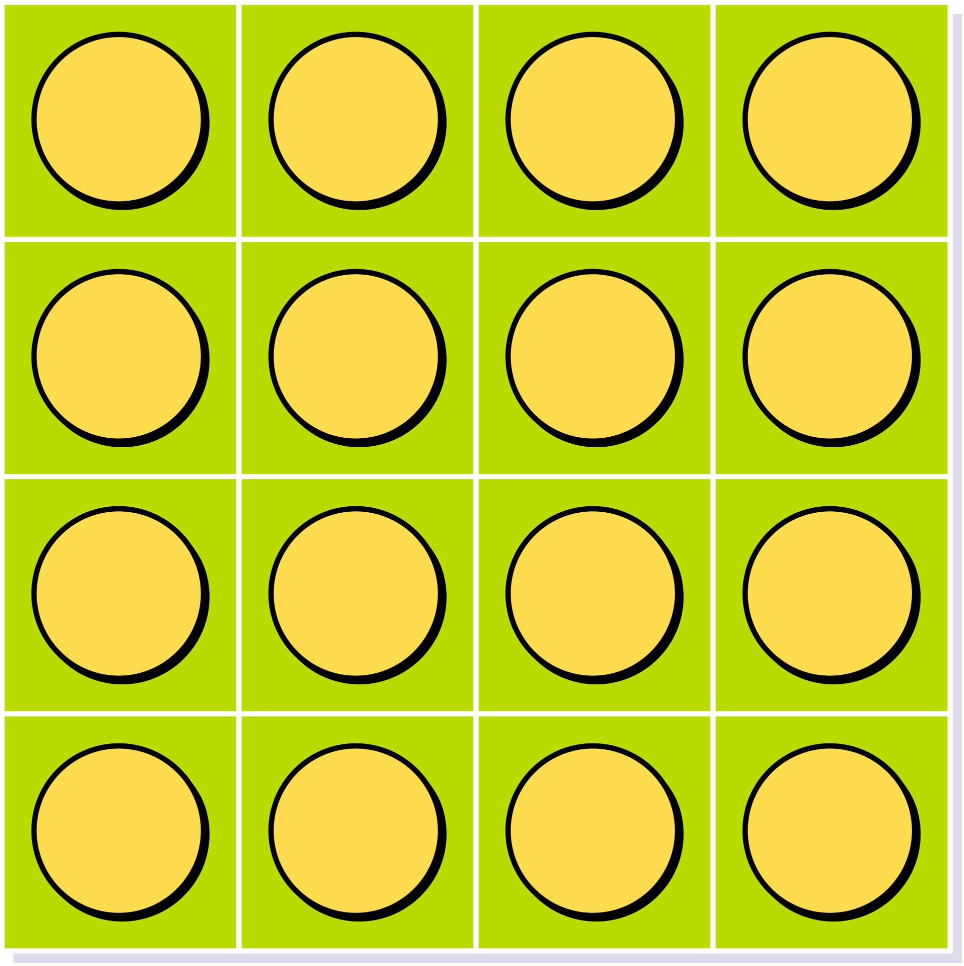
The Jumping Coins

Solution

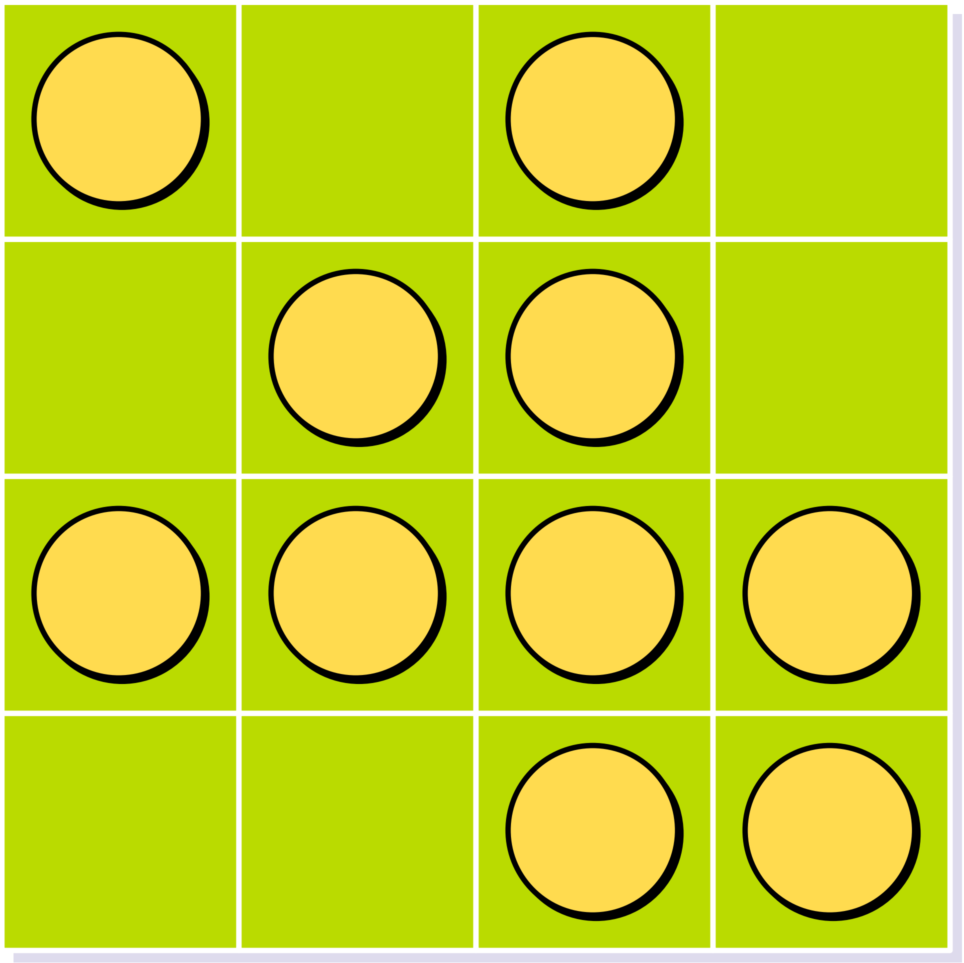


5 - 4, 3 - 5, 2 - 3, 4 - 2, 6 - 4,
7 - 6, 5 - 7, 3 - 5, 1 - 3, 2 - 1,
4 - 2, 6 - 4, 5 - 6, 3 - 5, 4 - 3.

The minimum possible number of moves for this puzzle is 15. One of possible solutions is given on the left. In the solution the numbers correspond to the board's cells. Every move is shown as two numbers - start and finish cells.



Sixteen coins fill the 4 x 4 grid as shown. Remove six of them so that each row and column contains an even number of coins.



Some of possible solutions is shown in the illustration.

Word Puzzles

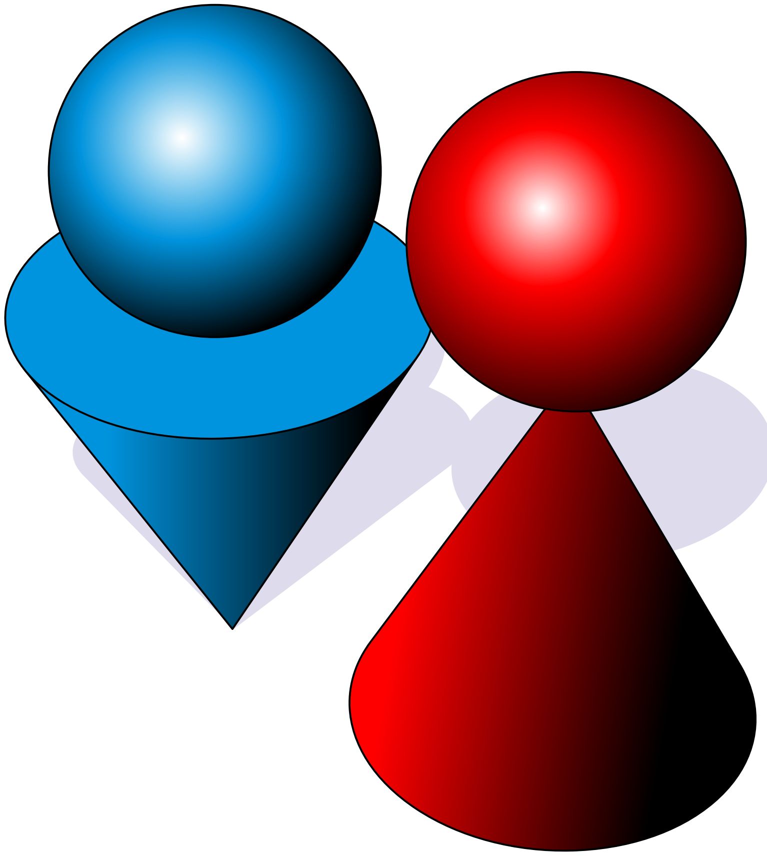
Key Word

after Martin Gardner

The four arrows on the four keys shown in the illustration can be replaced with the four respective letters which will allow you to type a familiar four-letter word starting from the left key in the row. What word is it?

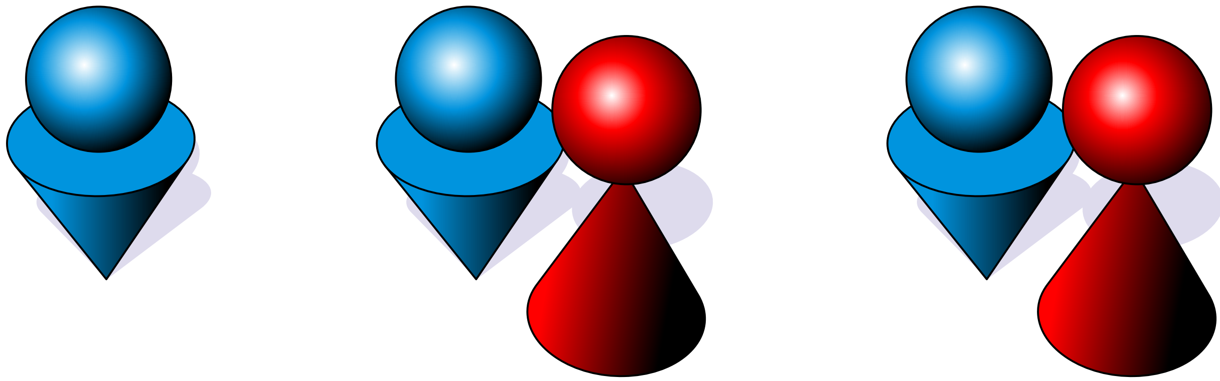
Key Word (solution)

The four arrows point in the four main directions: North, East, West and South, starting with North on the left key in the row. If the four arrows are replaced with the initial letters of the respective directions the word NEWS appears - just as shown in the illustration.



Kent and Hannah invited some of their friends at a dinner. Some friends arrived with their spouses while some arrived alone. Each guest greeted with every of the two hosts and with each other guest. When two men greeted each other there were handshaking. When two women greeted each other there were kissing. The same was true when a man and a woman greeted each other.

It is known 6 handshakes and 12 kisses have been done in total. Can you say how many guests arrived at the dinner, how many of them were in couples and how many of them were alone? Obviously, when two guests arrived as a couple



According to the conditions of the puzzle handshakes were only between the men. Thus, the total number of the handshakes is defined by the number of men arrived. If there were two men in total, then only one handshake would be performed. If there were three men, then three handshakes would be performed between them. If there were four men, six handshakes would be performed. Thus, there were four men in total - one host (Kent) and three guests.

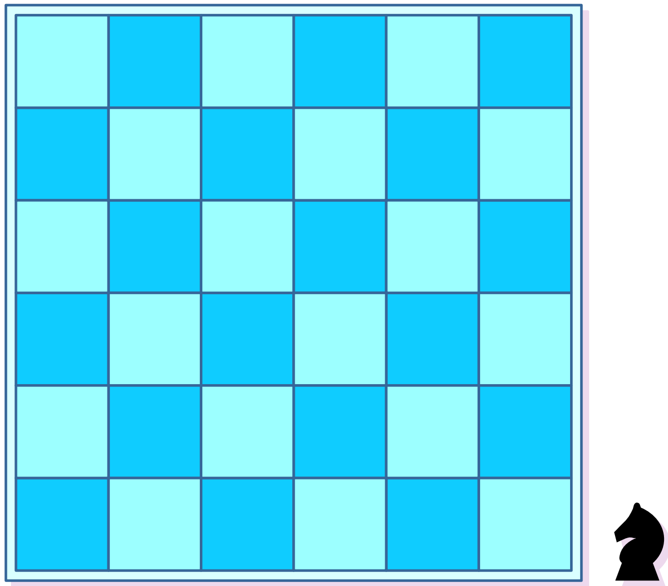
Now, how many women were at the dinner? Since three men arrived at the dinner, Hannah, the co-host, kissed with each of them, resulting in three kisses. 9 kisses are still left. If only one woman arrived, then she had to kiss Hannah (one more kiss), and even if she was alone she had to kiss all four men (three guests and Kent) - four more kisses. In total it makes 5 more kisses, which is not enough since 4 kisses are still left. Thus, one woman arrived is not enough.

Let’s assume that three women arrived. Counting Hannah, that would be four of them. That would mean the women alone exchange six kisses. Even if all women arrived with their spouses, they each would need to kiss three men, totaled in 12 additional kisses. 6 plus 12 equals 16 kisses in total. Thus, three women arrived is too many.

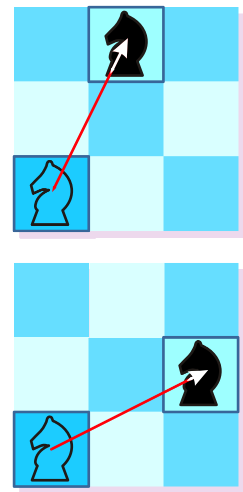
The only version left - two women arrived at the dinner. Combined with Hannah they would exchange 3 kisses between each other. Added to Hannah’s three kisses with male guests it makes 6 kisses so far. If both arrived women are alone, then they would kiss with each of the four men totaling in 8 kisses. 6 kisses plus 8 kisses is 2 kisses above 12. Thus, at least one of the arrived women was with the spouse. Then she would kiss only three men. The other arrived women would kiss four men. It makes 7 kisses in total. Still too many. Thus, both women arrived with their spouses resulting in three additional kisses for each of them with other men. In total it makes 12 kisses which finally satisfy the condition of the puzzle.

Let’s summarize. Three men arrived at the dinner. Two of them arrived with their spouses, and one - alone. As a result 6 handshakes and 12 kisses have been done.

Chess 'n' Checkers Puzzles

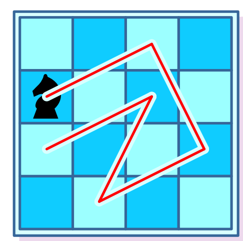


1



A

2 B



3

The Knight's Tour 2

after Martin Gardner

What is the longest possible route without self-crossings for the chess knight to travel on the 6x6 board shown in Figure 1?

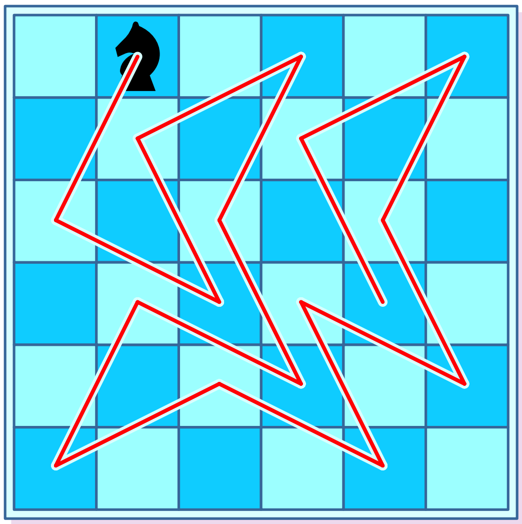
To see what the route "without self-crossings" means, let's show any route of the knight by drawing on the board a broken line that will join the centers of the successive cells visited by the knight. The examples of such lines for a single move of the knight are shown in Figure 2.

Now for a 4x4 board such a route without self-crossing may be shown as that in Figure 3. This 5-move route is the longest possible for this small board; not unique, though.

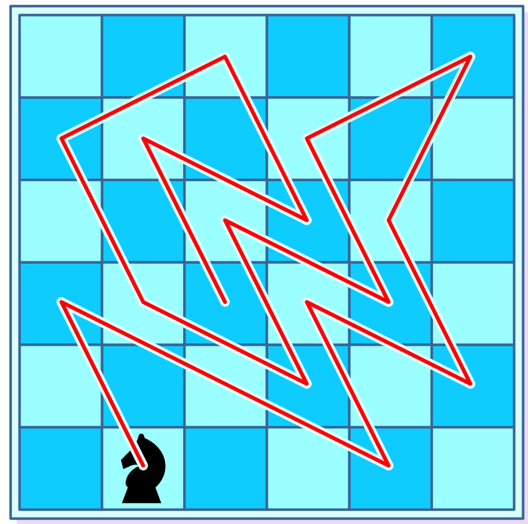
There is a 16-move route for a 6x6 board. Try to find it.

After that try to improve this route adding to it one more move. This new 17-move route makes the longest possible tour of the chess knight without self-crossing for a 6x6 board. It's unique, and hard to find. Can you discover it?

Chess 'n' Checkers Puzzles



1



2

The Knight's Tour 2 (solutions)

The 16-move solution for the knight's tour without self-crossing on a 6x6 board is shown in Figure 1.

It consists of exactly 16 segments what makes exactly 16 moves.

The unique 17-move solution for the longest possible route of the chess knight without self-crossing for a 6x6 board is shown Figure 2.

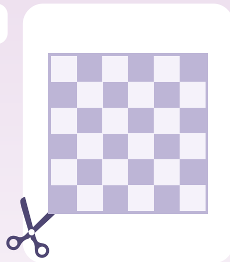
It has exactly 17 segments.

This fantastic route was found by Donald Knuth.

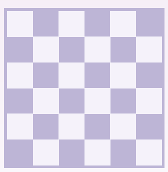
Treasure of Classic and Modern Puzzles

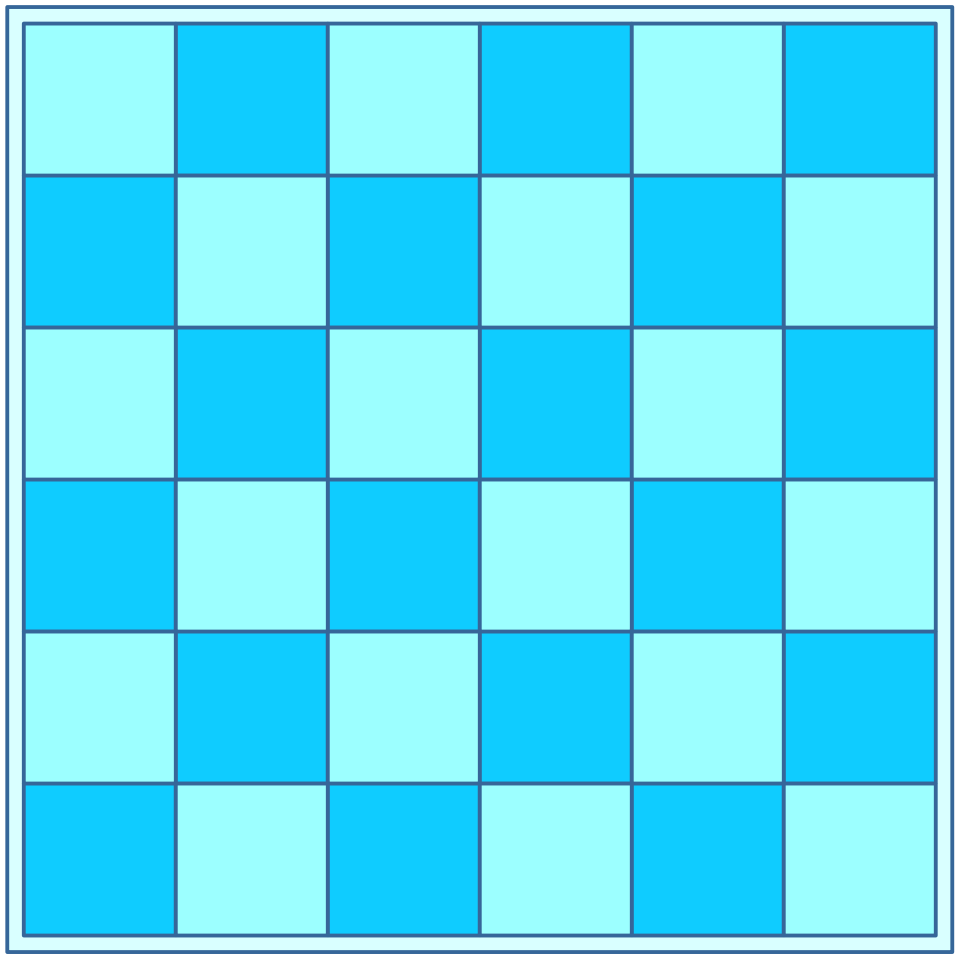
Chess 'n' Checkers Puzzles

1



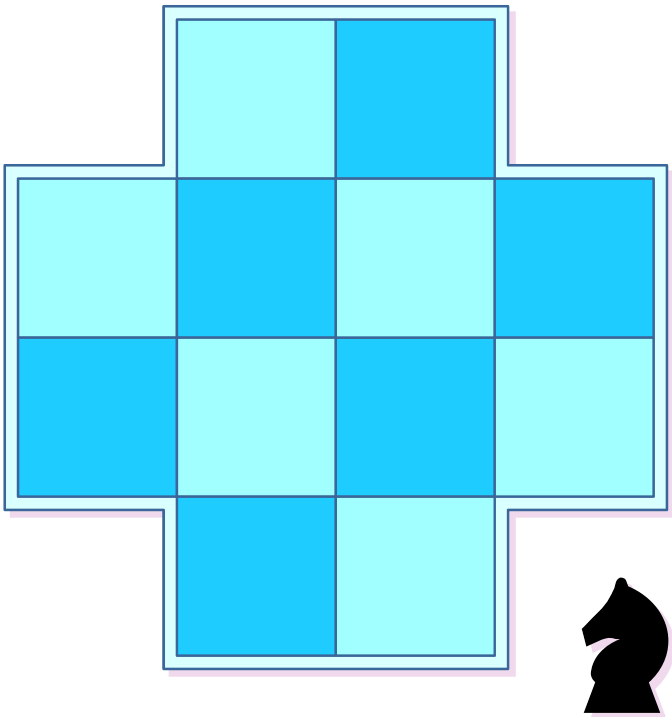
F



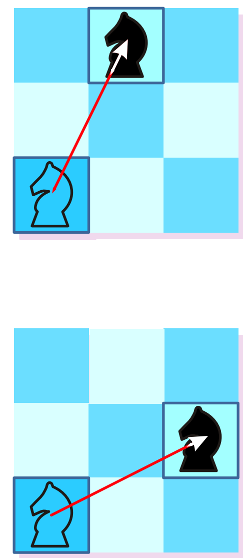


The Knight's Tour 2 (board)

To produce the board first print it out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).



1



2

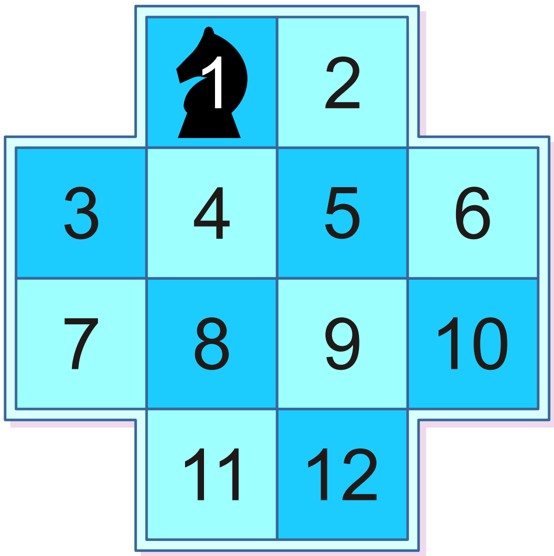
The Knight's Tour

after Martin Gardner

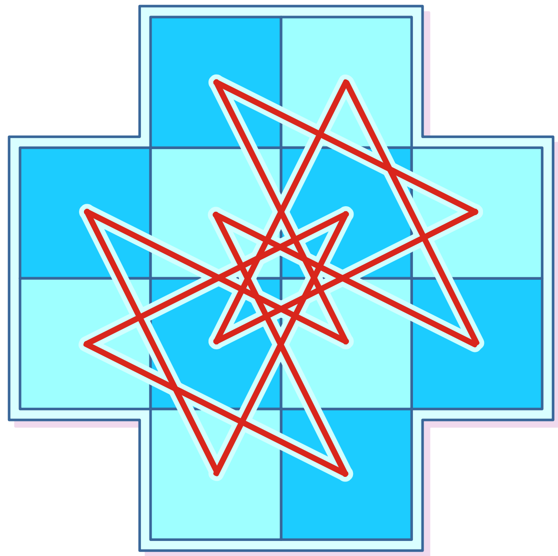
Draw the chess board shown in Figure 1 above or just print it out. Place a chess knight (or a simple coin) in any cell of this board.

The object is to visit with the knight every cell of the board exactly once, and return to the initial cell where your trip began from.

Figure 2, a and b, shows some possible moves of the chess knight.



1



2

The Knight's Tour (solutions)

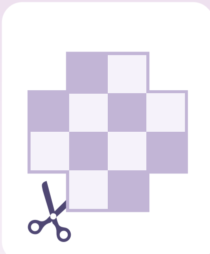
If we number all the cells of the board as shown in the top illustration, and place the knight in the cell 1, then the solution can be written as follows:

1 - 6 - 8 - 2 - 10 - 4 - 12 - 7 - 5 - 11 - 3 - 9 - 1.

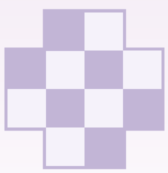
The scheme of the solution with the knight's tour (the red line) is shown in the lower illustration.

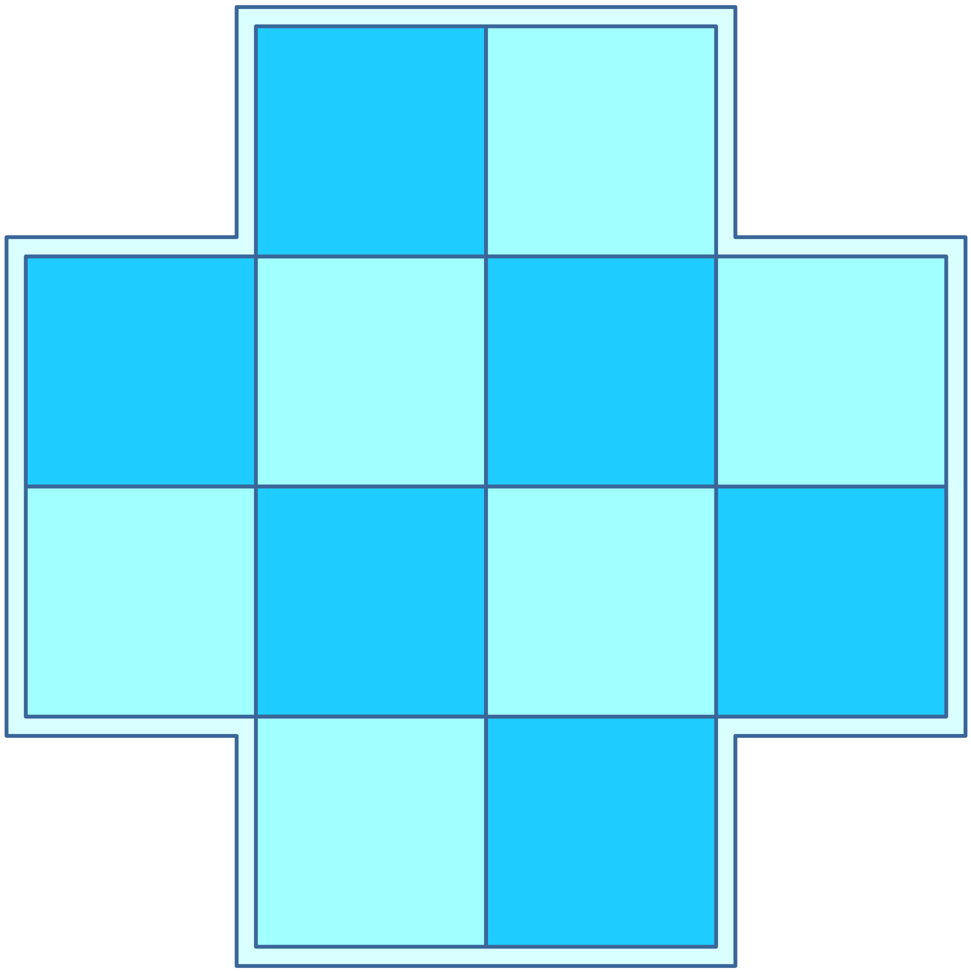
Chess 'n' Checkers Puzzles

1



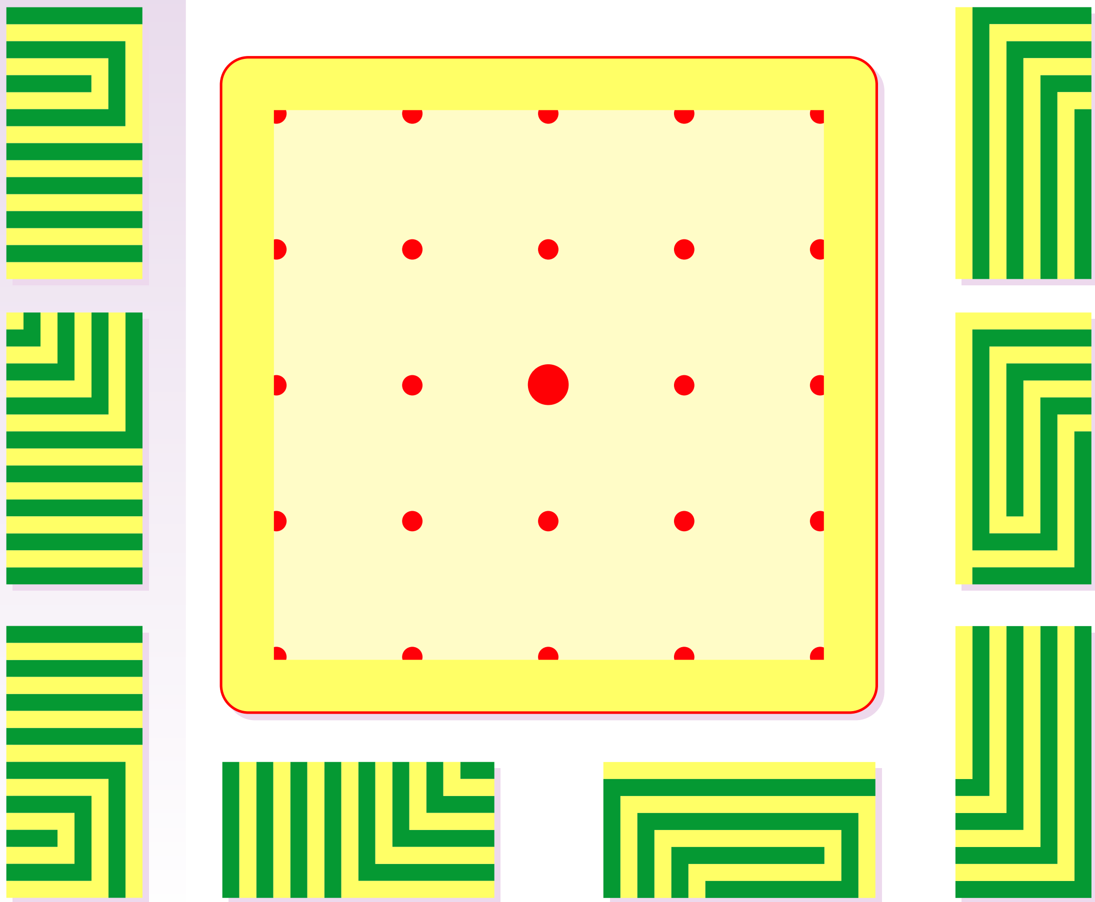
F





The Knight's Tour (board)

To produce the board first print it out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

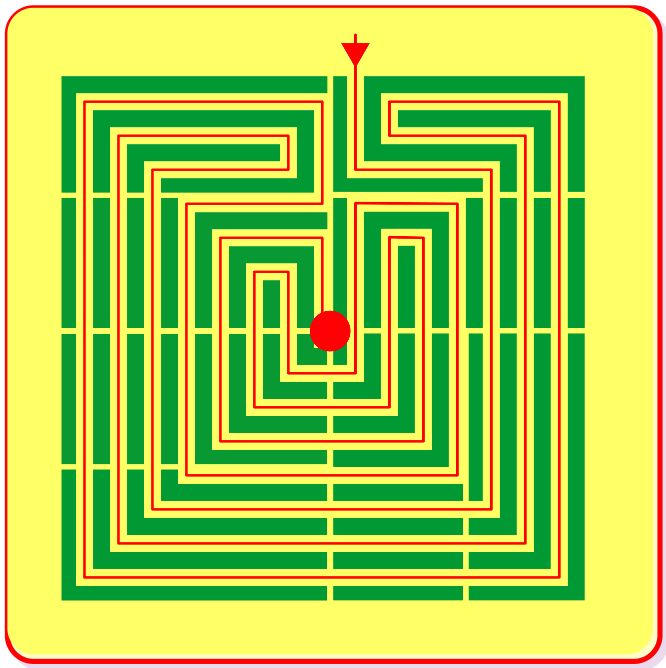


The Knossos Labyrinth

by Serhiy Grabarchuk

Place all the eight fragments within the yellow square 4x4 without gaps and overlapping in such a way that they form a labyrinth with the only enter on its periphery. A yellow path has to run from the enter through the labyrinth directly to its central point (it's marked with the big red spot - Ariadne's clew - in the center). The little red spots on the yellow square 4x4 help you to see how the square is divided into single cells 1x1.

Matching Cards

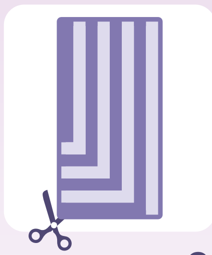


The Knossos Labyrinth (solution)

The solution is shown in the illustration. You can see the long path (marked with Ariadne's red thread) running from the only enter through all the labyrinth and ending exactly in its middle spot.

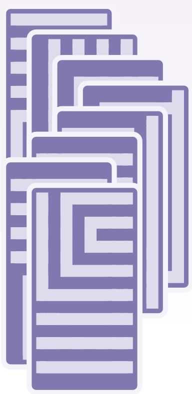
Matching Cards

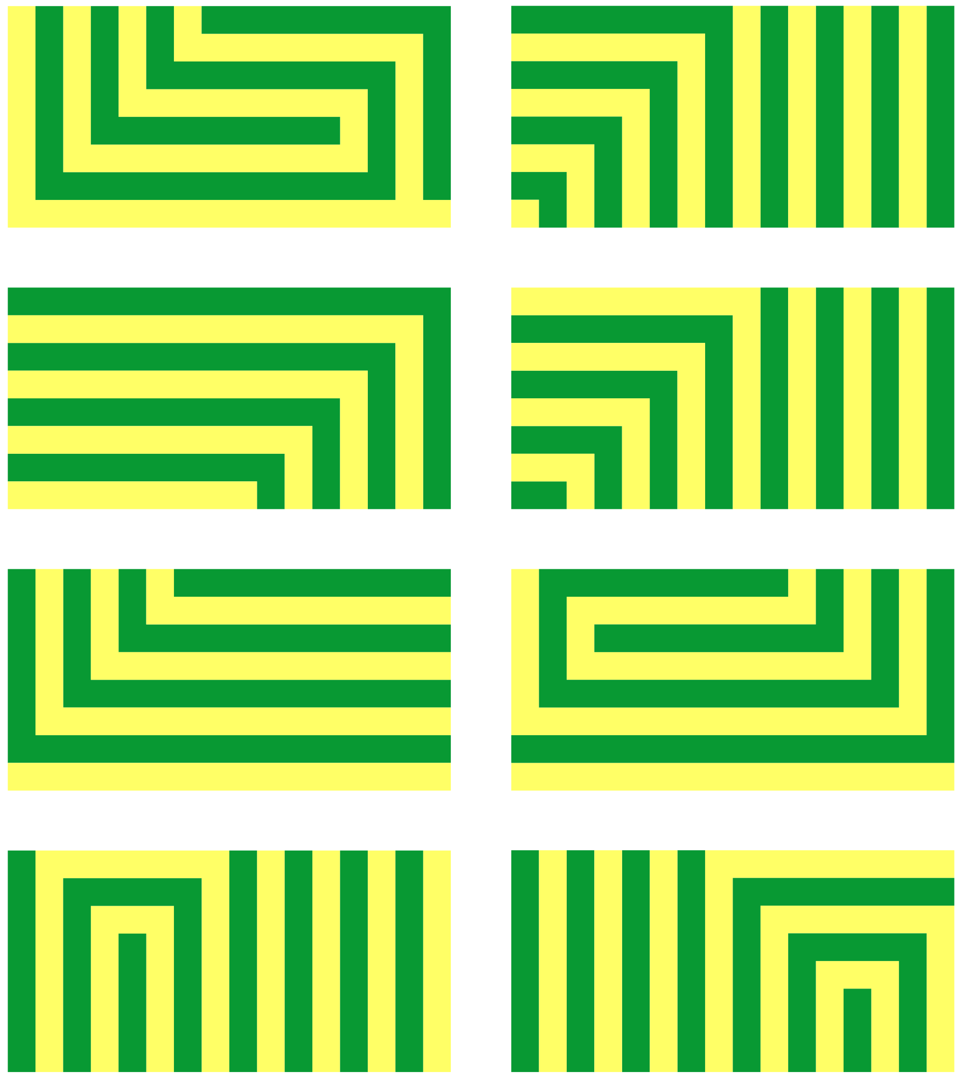
1



x 8

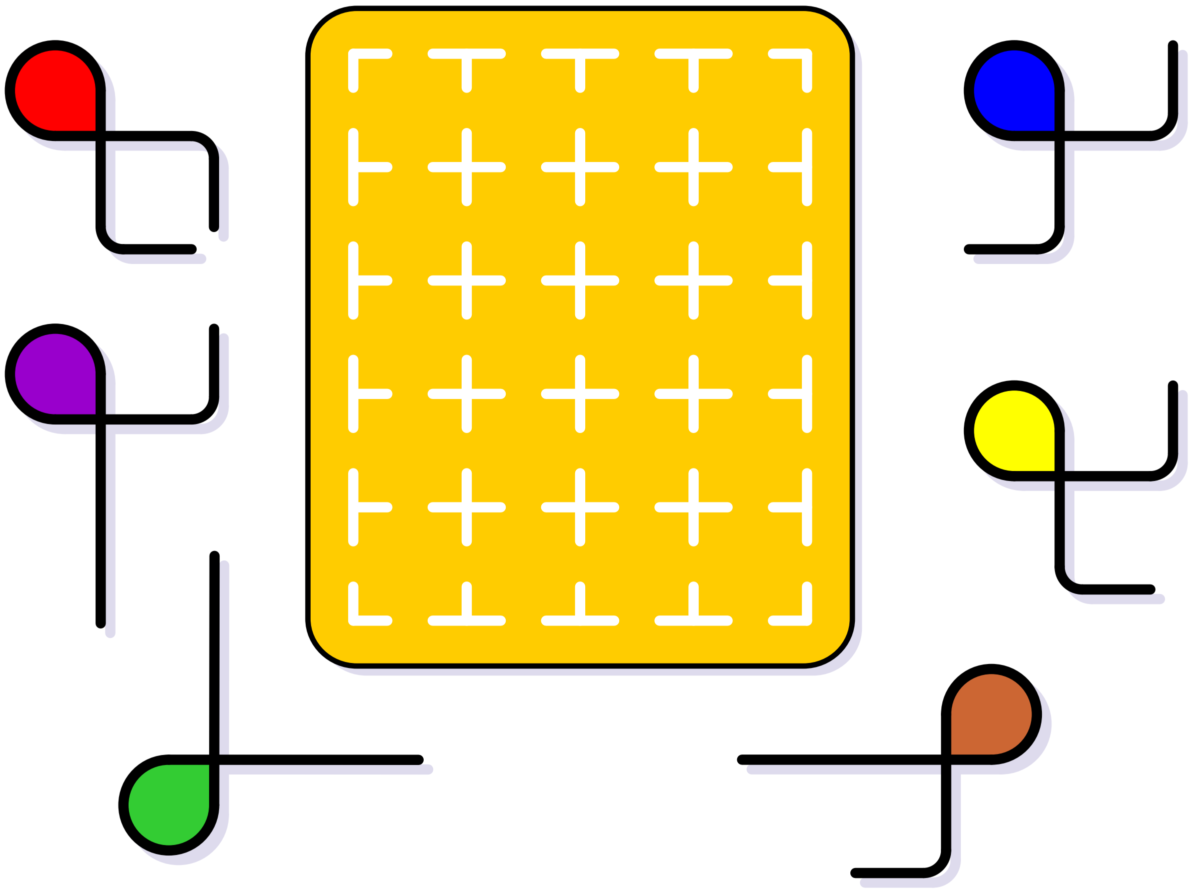
F



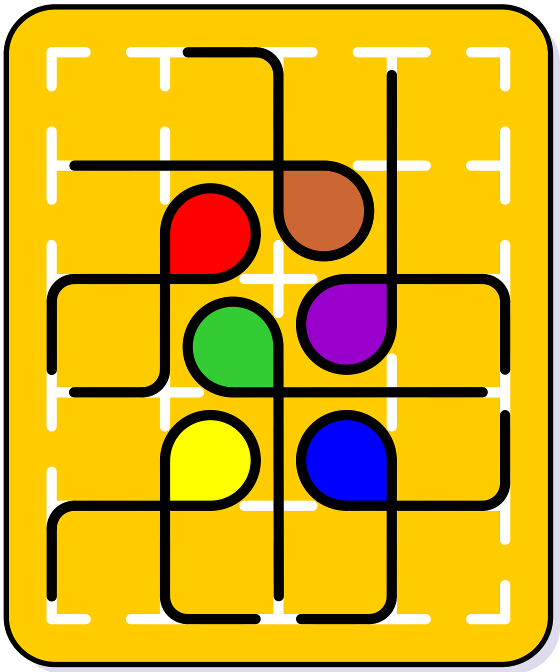


The Knossos Labyrinth (pieces)

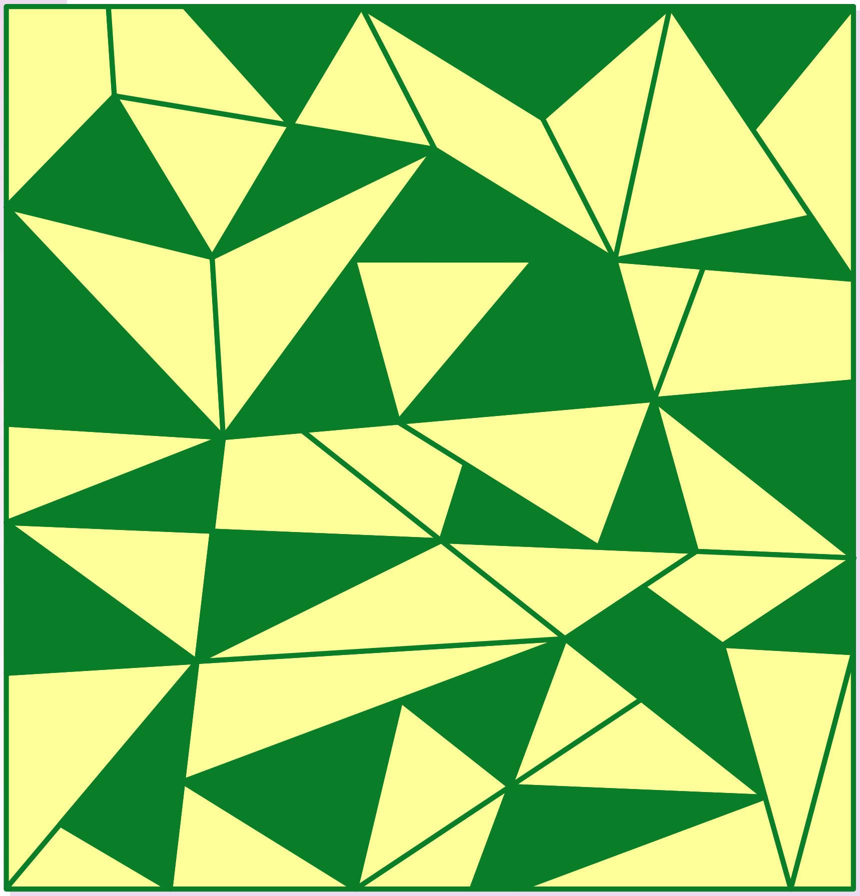
To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).



Place six color loops shown above onto the grid in the center so that no loop touches any other one even with its outline. No part of a loop should be left outside the grid's borders.



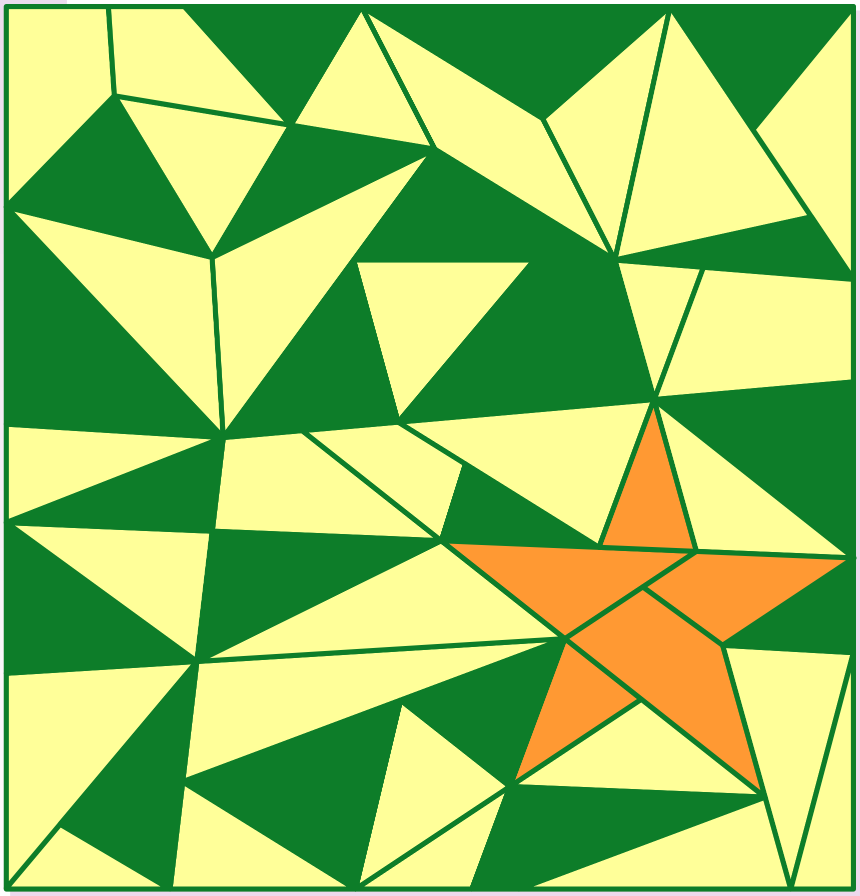
The solution is shown in the illustration.



The Lost Star

by Sam Loyd

There is a perfect star in the illustration above. Can you discover where this star is hidden?

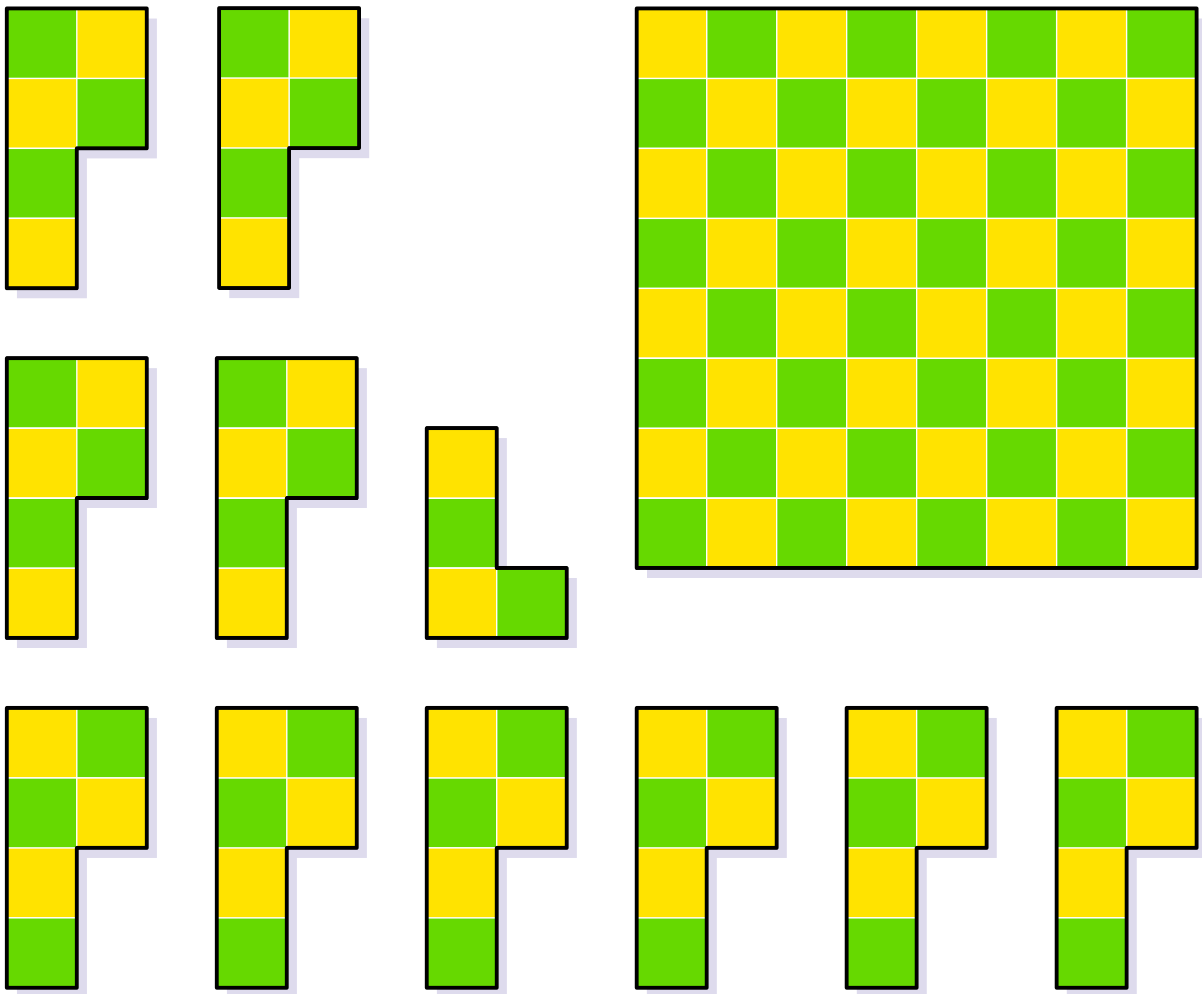


The Lost Star (solution)

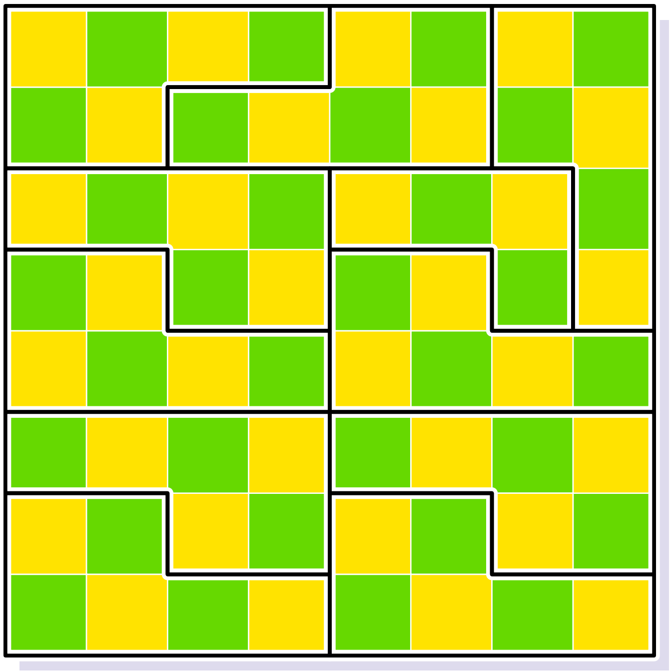
The lost star is shown in the illustration.

LPs

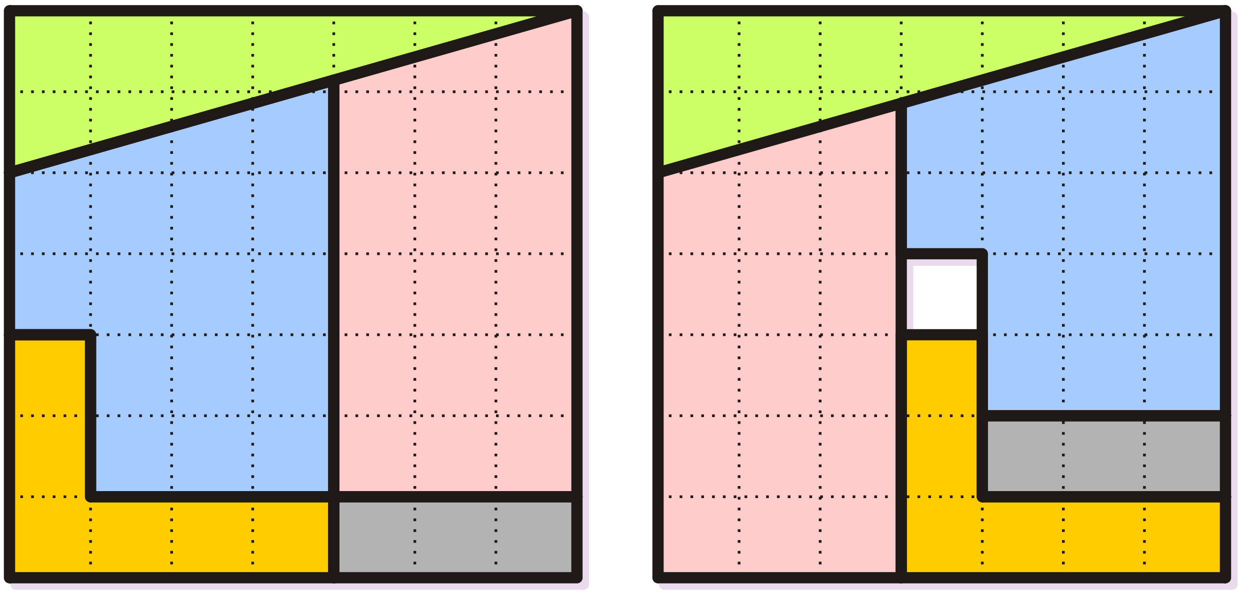
after Boris Kordemsky



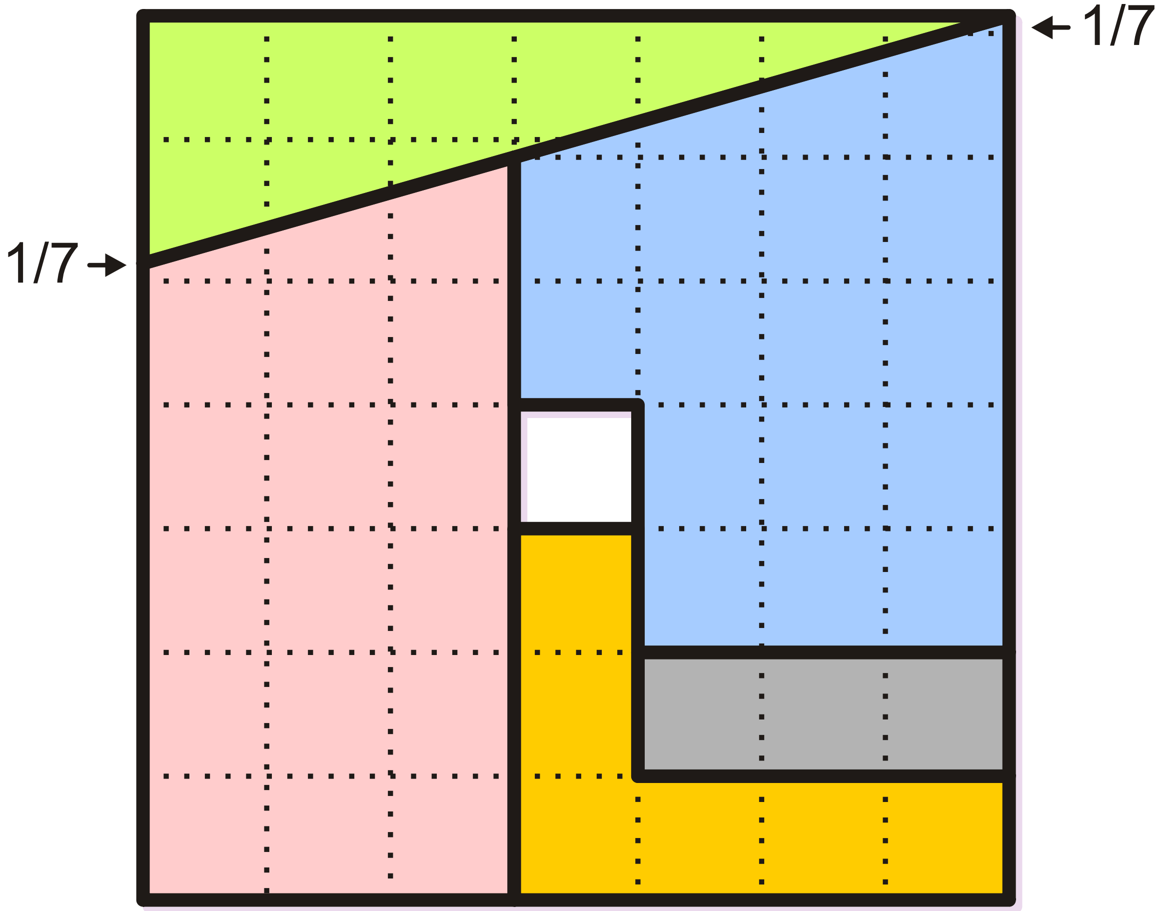
Arrange ten P-shaped and one L-shaped checkered pieces shown above into a regular 8x8 chessboard shown in the upper right corner. It is allowed to rotate the pieces but not overlap them.



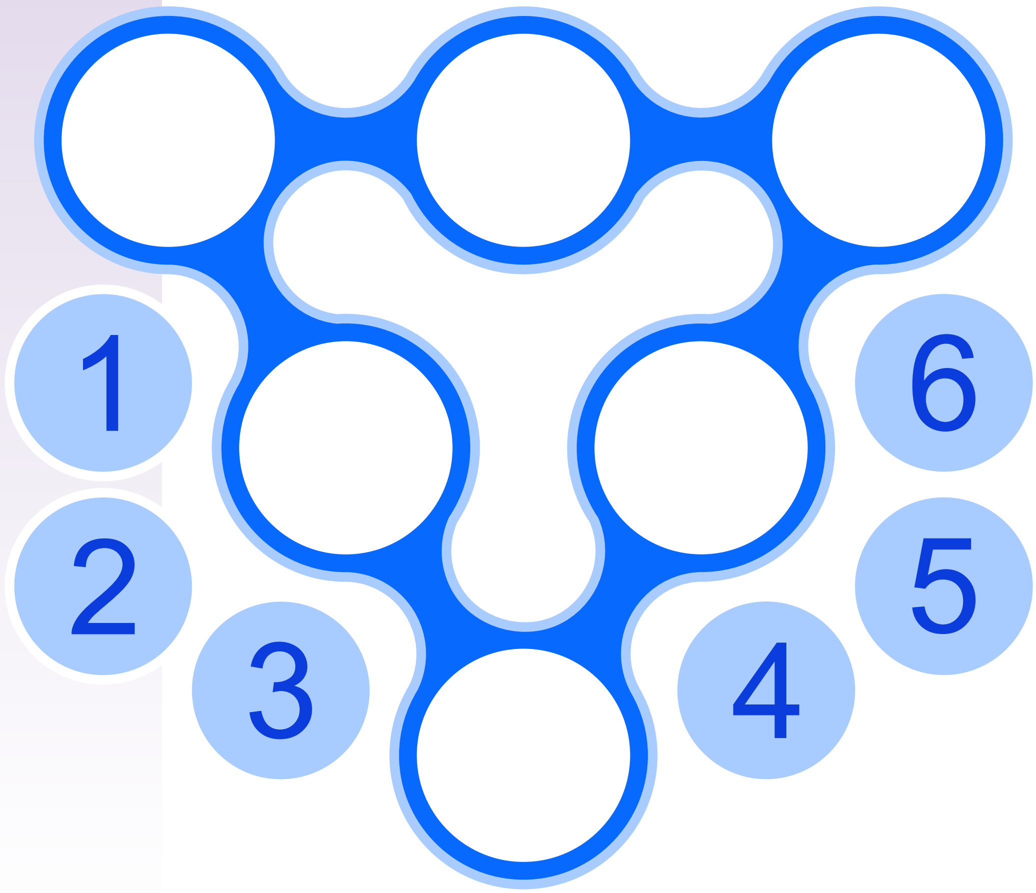
One of the possible solutions is shown in the illustration.



A 7x7 square in the left part of the illustration is divided into five pieces. Now if we rearrange the pieces in the way as shown in the right part of the illustration, we will get the same 7x7 square but... with a small square hole in the center. How could this happen?



When the two largest pieces are exchanged, each small square that is cut by the diagonal line becomes a little bit higher than it is wide. This means that the large square is no longer a perfect square. It has increased in height by an area that is exactly equal to the area of the 1x1 hole.

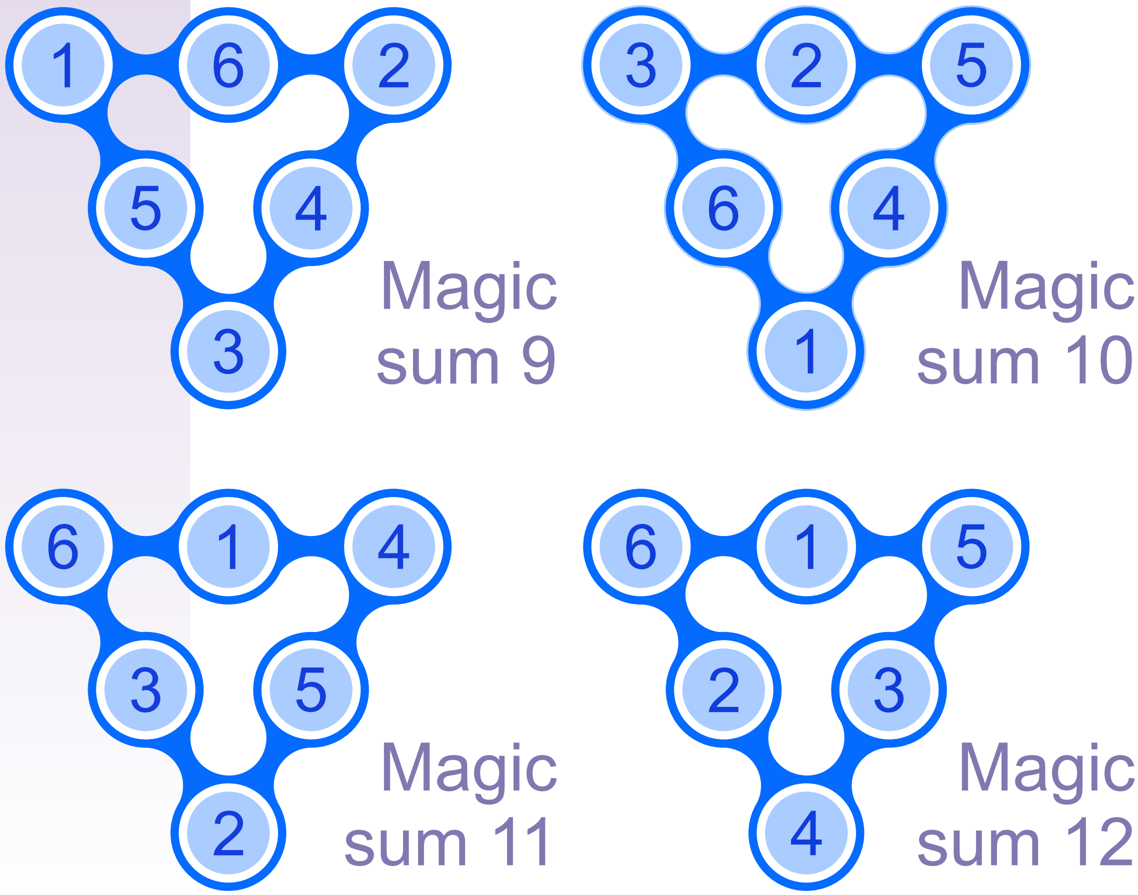


Magic Triangle 3X

Place all the numbers from 1 to 6 in the circles along the sides of the triangle (one number per circle), so that three numbers on each side add up to the same total - a magic sum.

There are four different magic sums that could be reached for this puzzle. All these sums are from 9-12 number range. Can you find all of them?

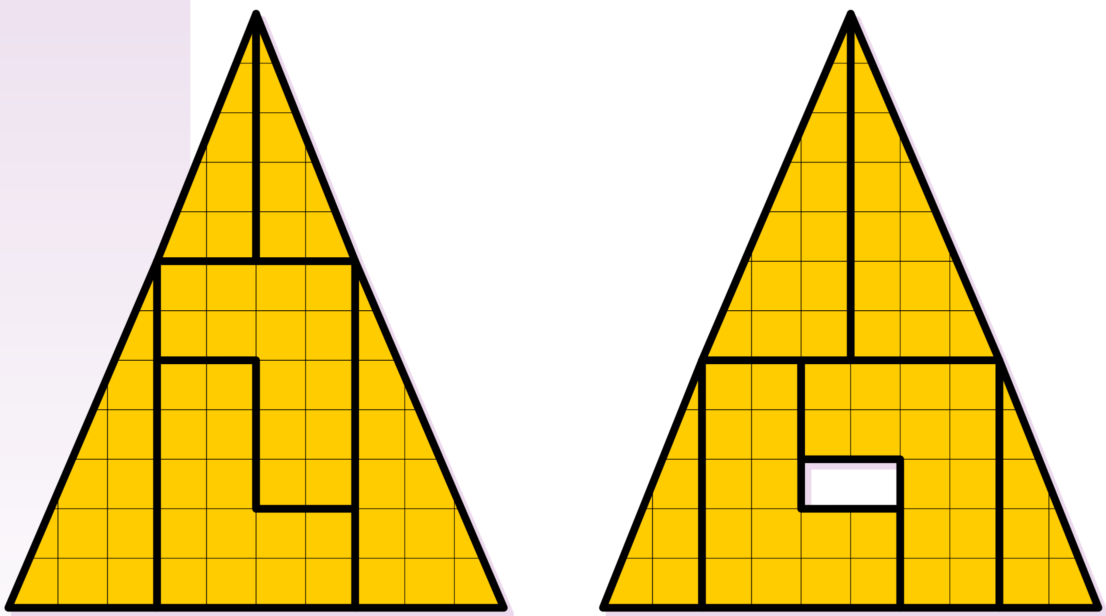
Puzzles with Numbers



Magic Triangle 3X (solution)

The solutions to 9, 10, 11 and 12 magic sums are shown in the illustration.

Tricks

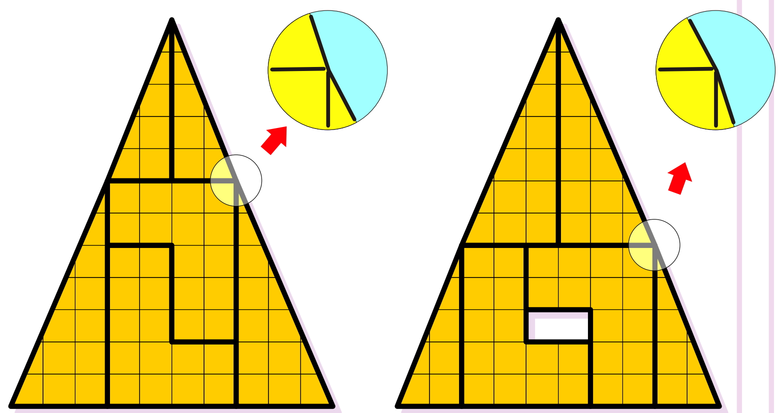


Magic Triangle

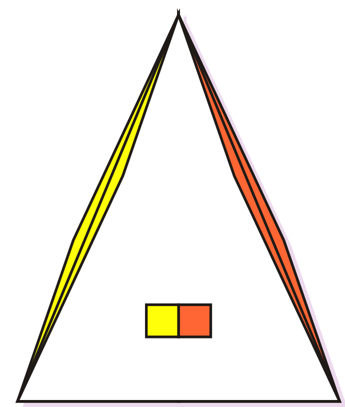
after Martin Gardner

Arrange the pieces into the triangle shown in the left part of the illustration above. Now rearrange all the pieces as shown in the right diagram. You may see a triangle of apparently the same size, but now with a rectangular hole 1x2 within it. How did this happen?

Tricks



1



2

Magic Triangle (secret)

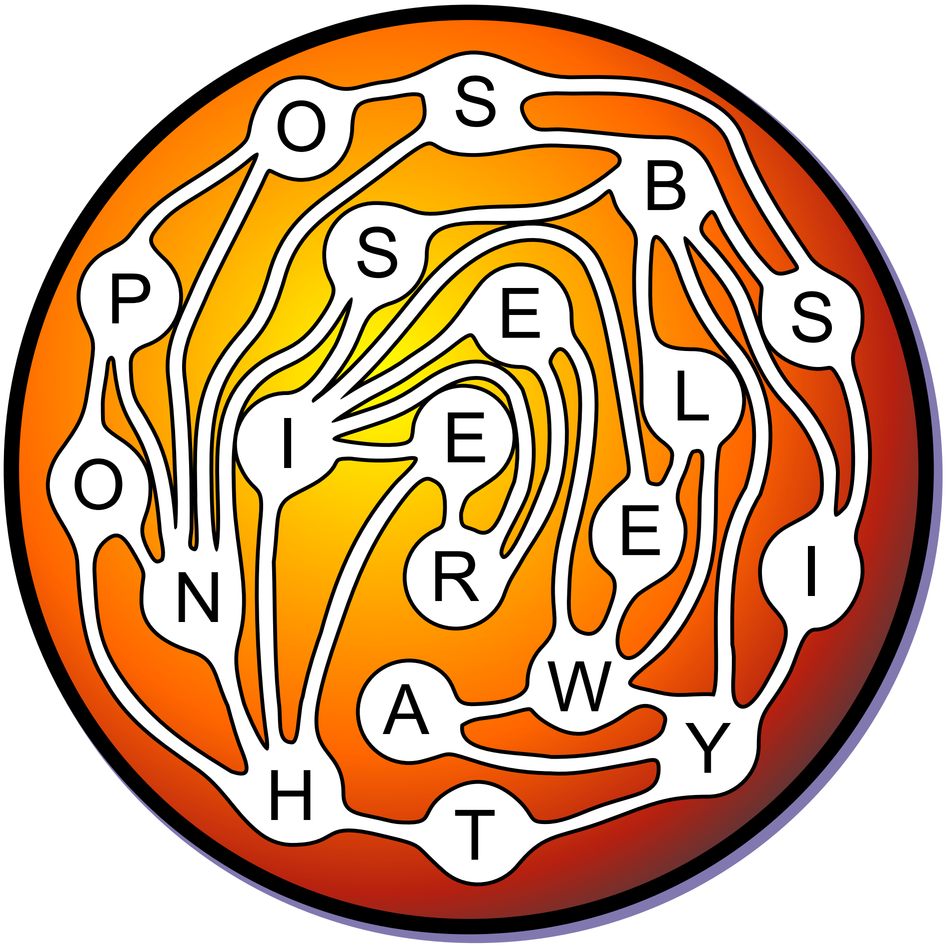
This clever trick is based on the great paradox invented by Paul Curry, a magician from New York City.

In fact, in both triangles their sides aren't perfectly straight; in the first triangle its sides are slightly concave, while in the second one they are convex a little bit as shown in Figure 1.

In this way the differences between the triangles' outlines form two elongated parallelogram spaces along the triangles' sides. Their total area is equal to two small square units, and this makes a hole in the second triangle. This is shown in Figure 2. Note that both parallelogram spaces are enlarged to show the principle of this trick.

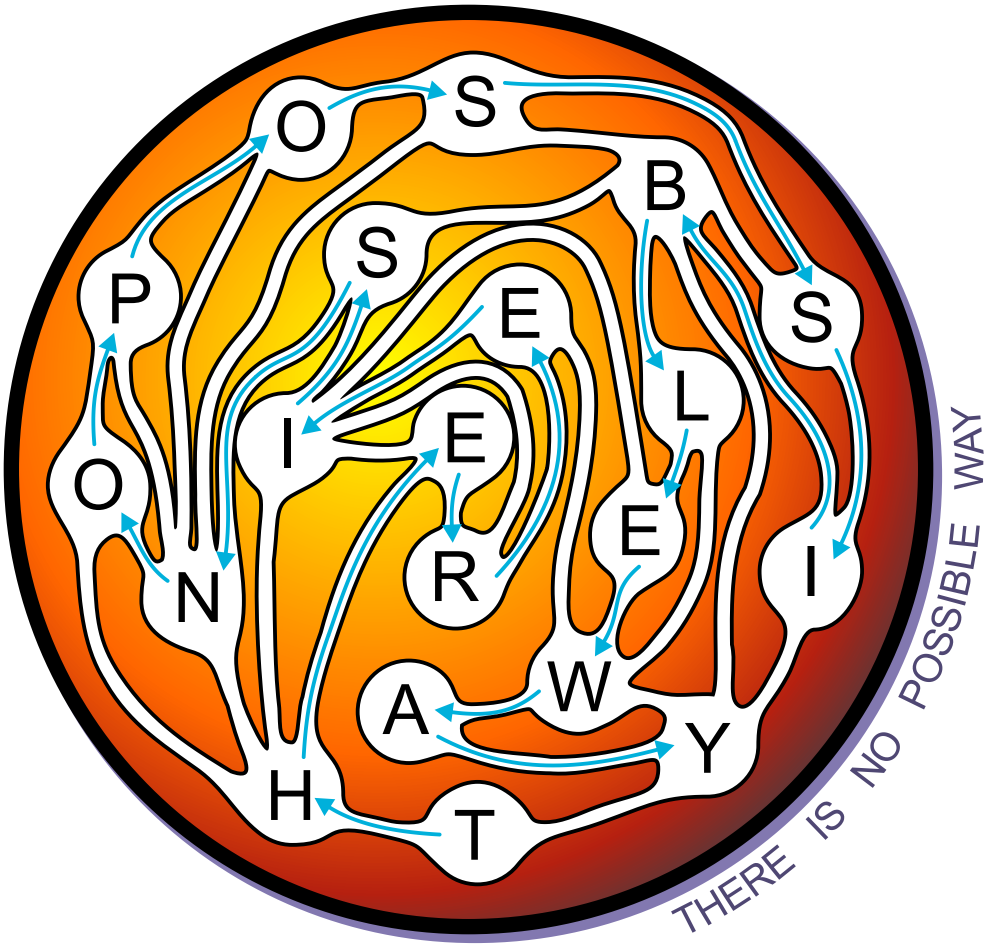
The Mars Tour

by Sam Loyd

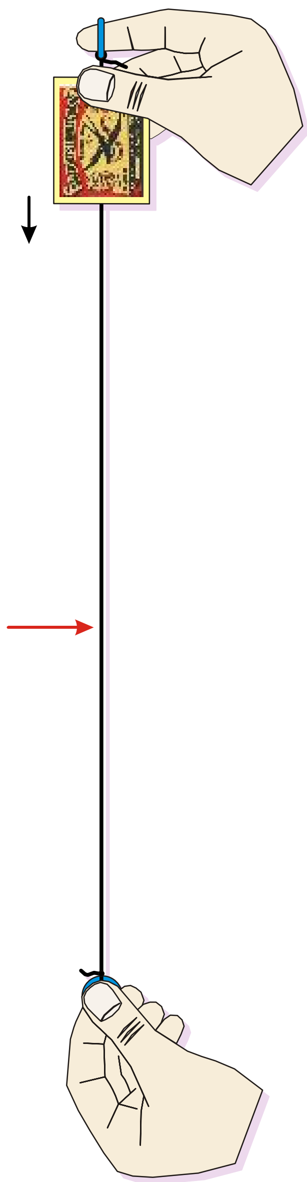


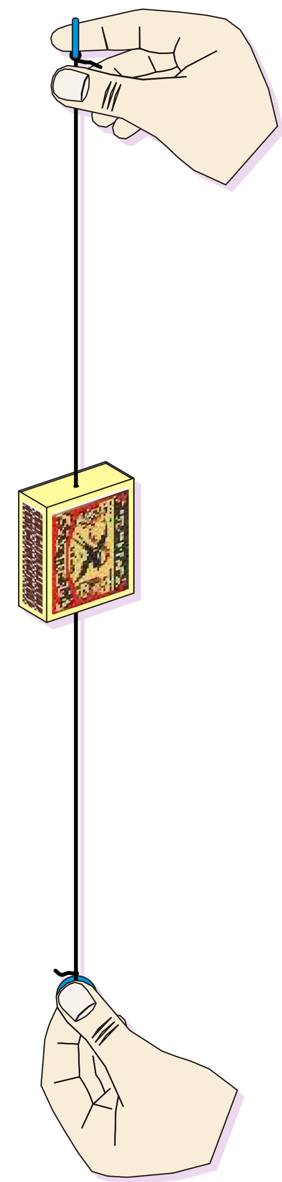
Here is a map of the newly discovered cities and waterways on our nearest neighbor planet, Mars. Start at the city marked with T, at the south pole, and see if you can spell a complete English sentence by making a tour of all the cities, visiting each city only once, and returning to the starting point.

When this puzzle originally appeared in a magazine, more than fifty thousand readers reported "There is no possible way." Yet it is a very simple puzzle.



"There is no possible way" is actually the solution sentence to the puzzle making a round trip of the planet as shown in the illustration.


1


2

MatchBox Slide

by Serhiy Grabarchuk

You have a matchbox with a thread (about 2 1/2 feet long) going through it, and two small rings tied to both ends of the thread. Put one ring on your forefinger and hold the box with your thumb and middle finger while your left hand is holding the lower end of the thread with other ring (see Figure 1).

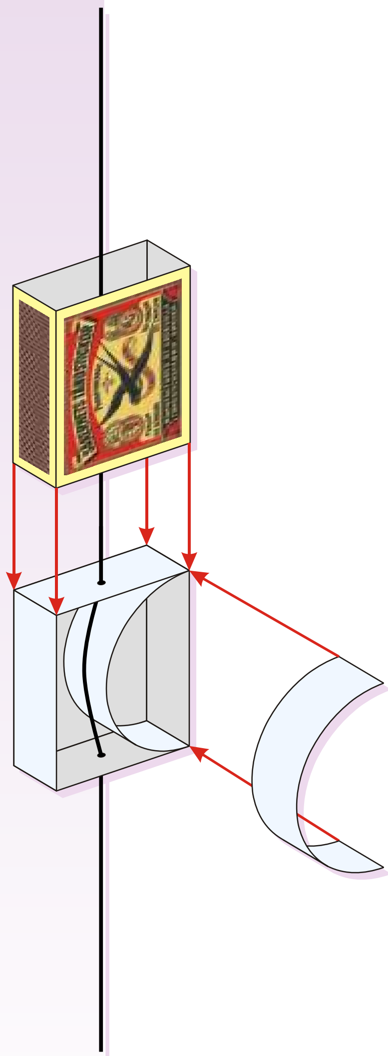
Ask someone to show on the thread any place (it's shown with the red arrow). Now let the matchbox go. It will slide down and stop exactly where you were asked (see Figure 2).

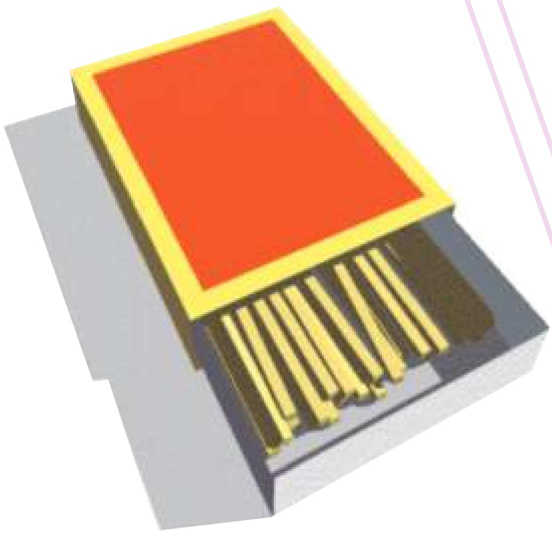
Do you have any idea how does this trick work?

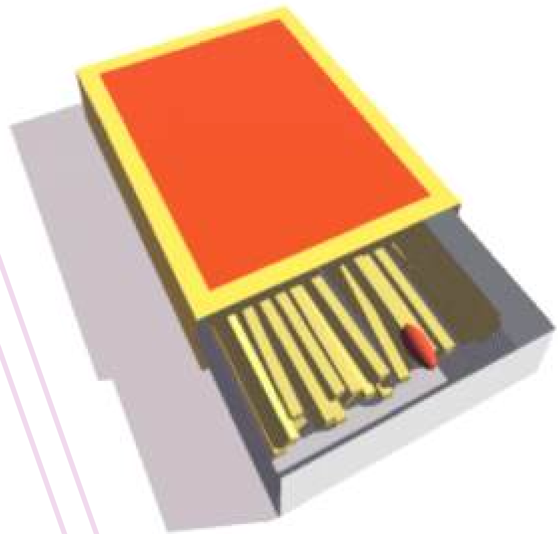
MatchBox Slide (secret)

The secret lies in a simple prepared matchbox. Put inside its drawer a bended piece of thin cardboard as shown in the figure.

Before you let the matchbox go, hold both rings so that the thread is tight, and this holds the matchbox on it. Changing the tension of the thread you may easy control the matchbox on its downward way stopping it anywhere you want.







A Match Trick

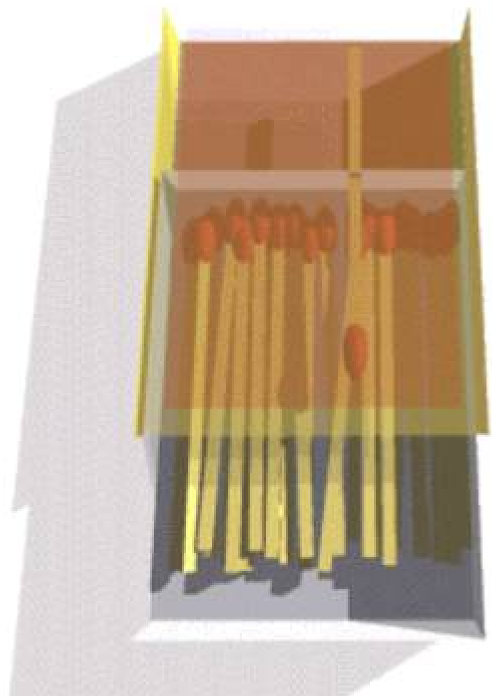
by Henry E. Dudeney

You are a performer. You take an ordinary box of matches, open it at the end where no head of match is visible and show it to your audience (see Figure 1). The heads are all at the other end of the box.

Now you close the box in front of your spectators, give it a shake, and then reopen it (see Figure 2). Everybody can see a match inside the box turned round with its head visible.

Then you let the spectators examine the box and the matches to see they are all sound.

Do you have any suggestions how such a trick can be performed?

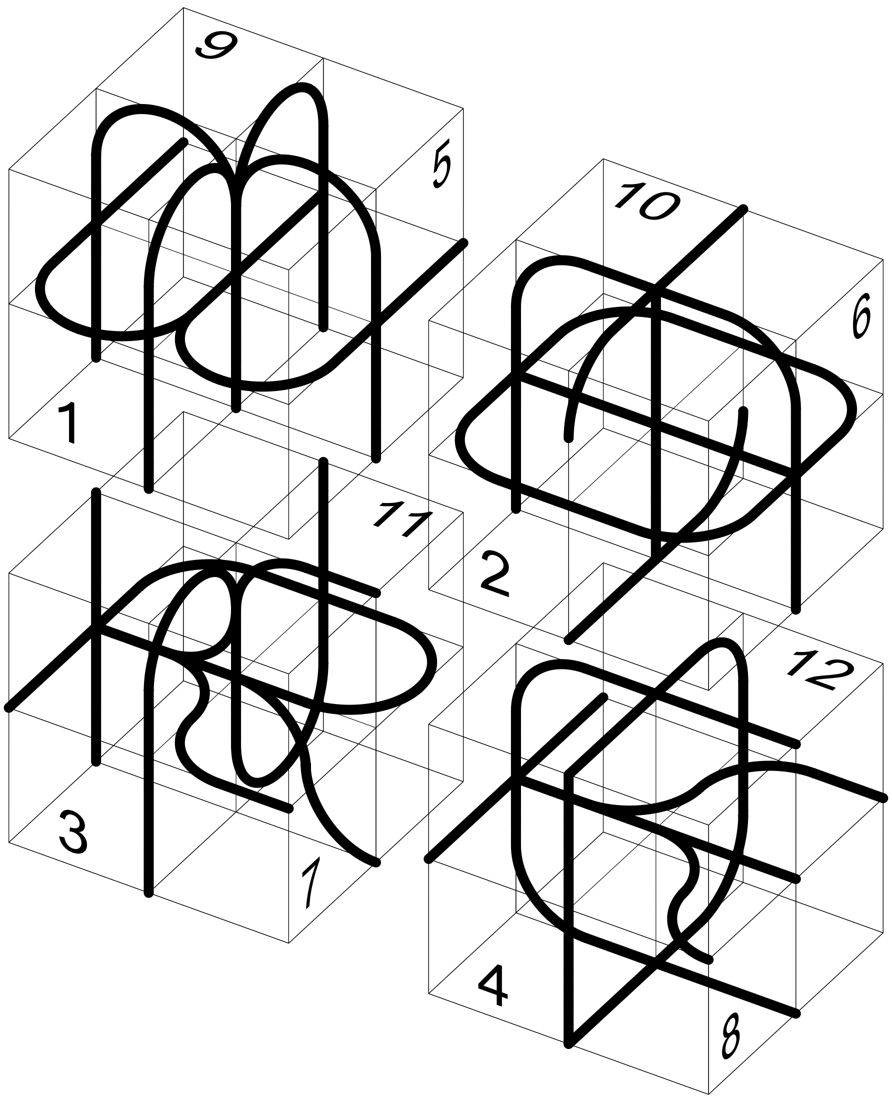


A Match Trick (secret)

This trick can be performed in such a way.

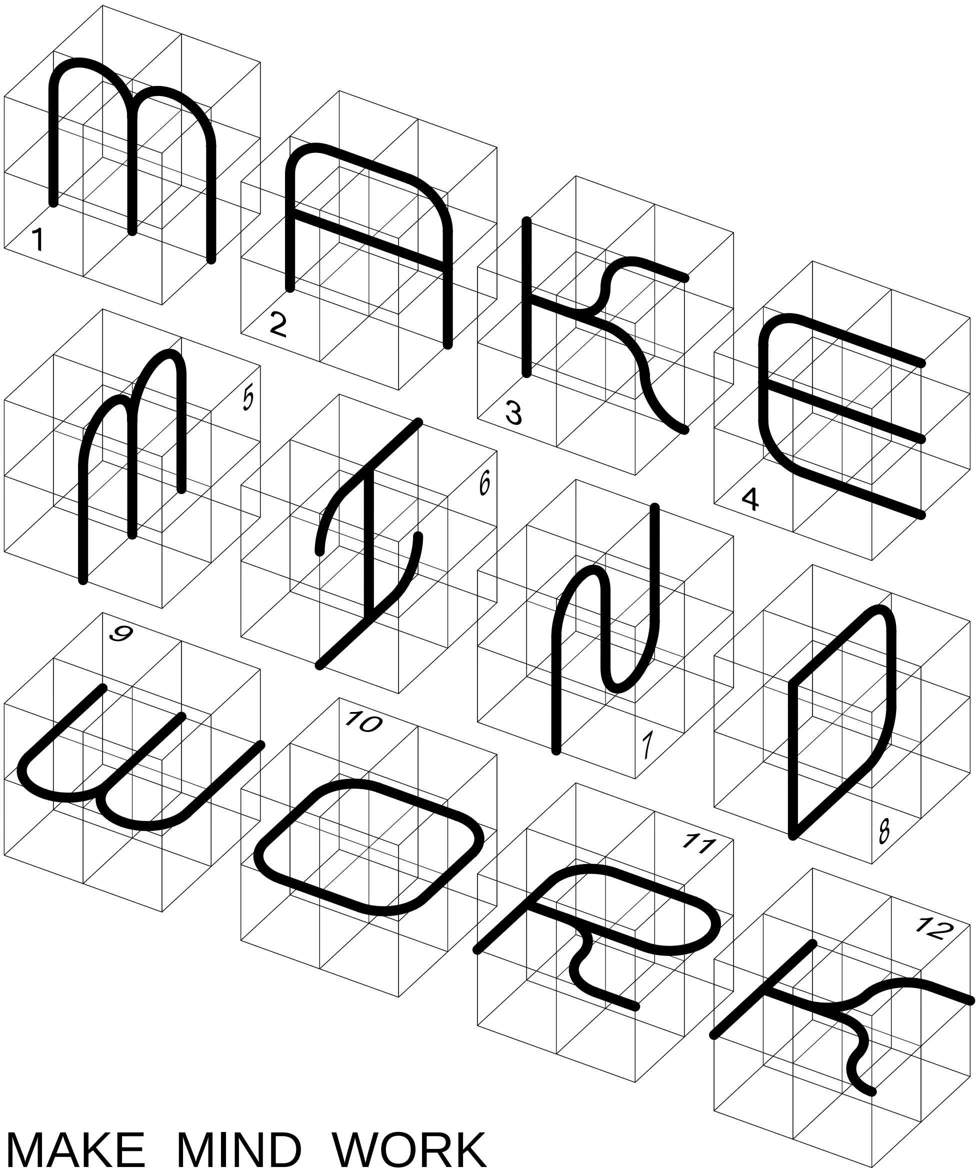
You secrete the match inside the box as shown in the illustration, so that the match is placed over the edge of the tray of the box.

While closing the box you press this extra match with your thumb and it falls down into place. Do this quickly and carefully, so that nobody can notice how you move this additional match.



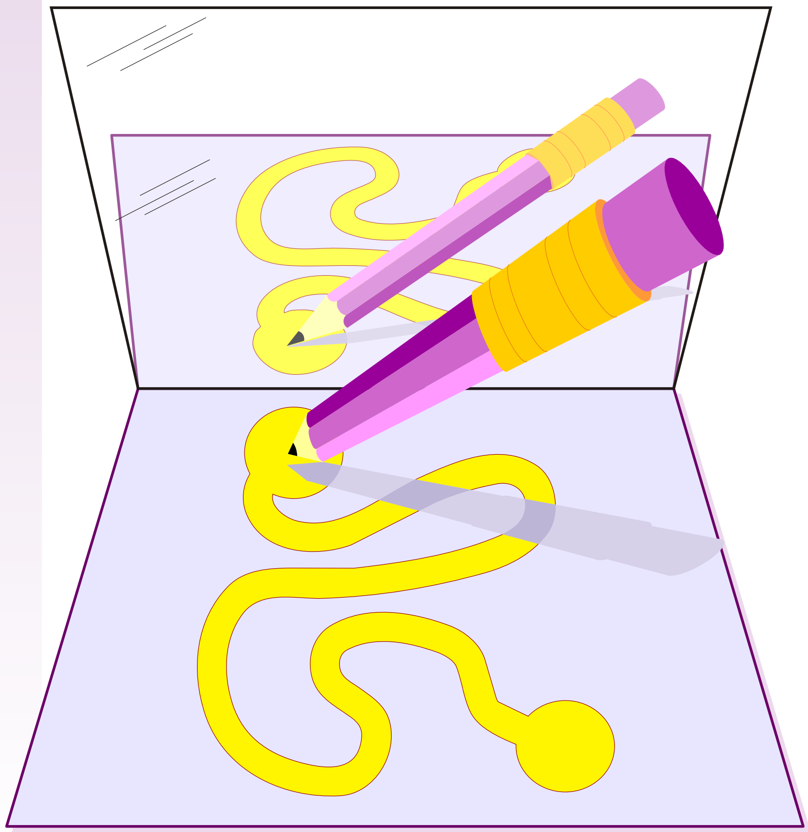
A distinct message is hidden in the four cubes shown in the illustration. Can you read it?

More from the author at PeterPuzzle.com



MAKE MIND WORK

There solution is the MAKE MIND WORK message.



Mirror Drawing

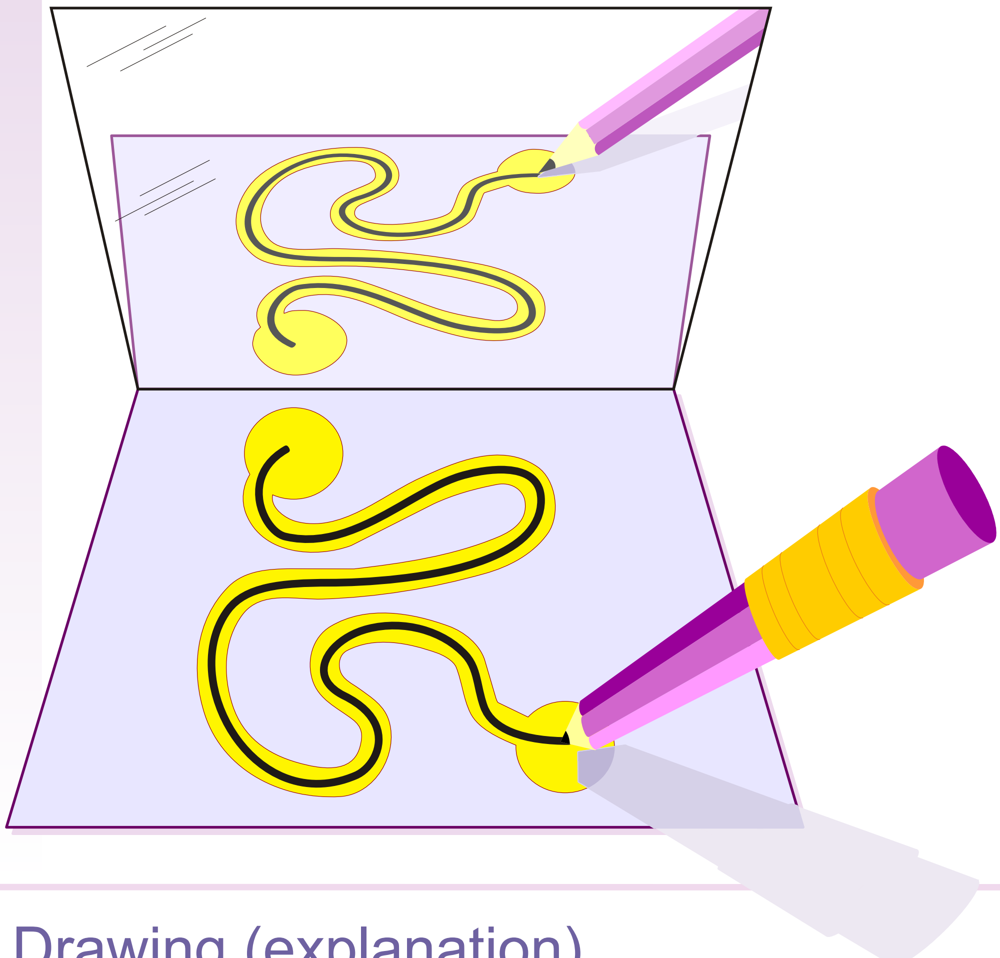
after Martin Gardner

If you want to feel like a child and maybe get closer to his/her problems when he/she tries to make his/her hand and eyes work together then just take this little "drawing test".

Print out the path, or draw a similar path, place it on the table and put a mirror in front of it as shown above.

Take a pencil in your hand and put it at the upper spot. Raise the other hand and hold it over the path in such a way that you cannot see it - you can only see its reflection in the mirror. Look only in the mirror and try to draw a line from the upper spot to the lower spot, but you must not cross the borders.

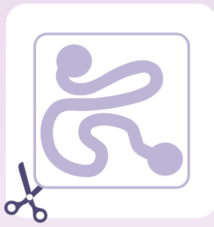
Do you think it will be easy?



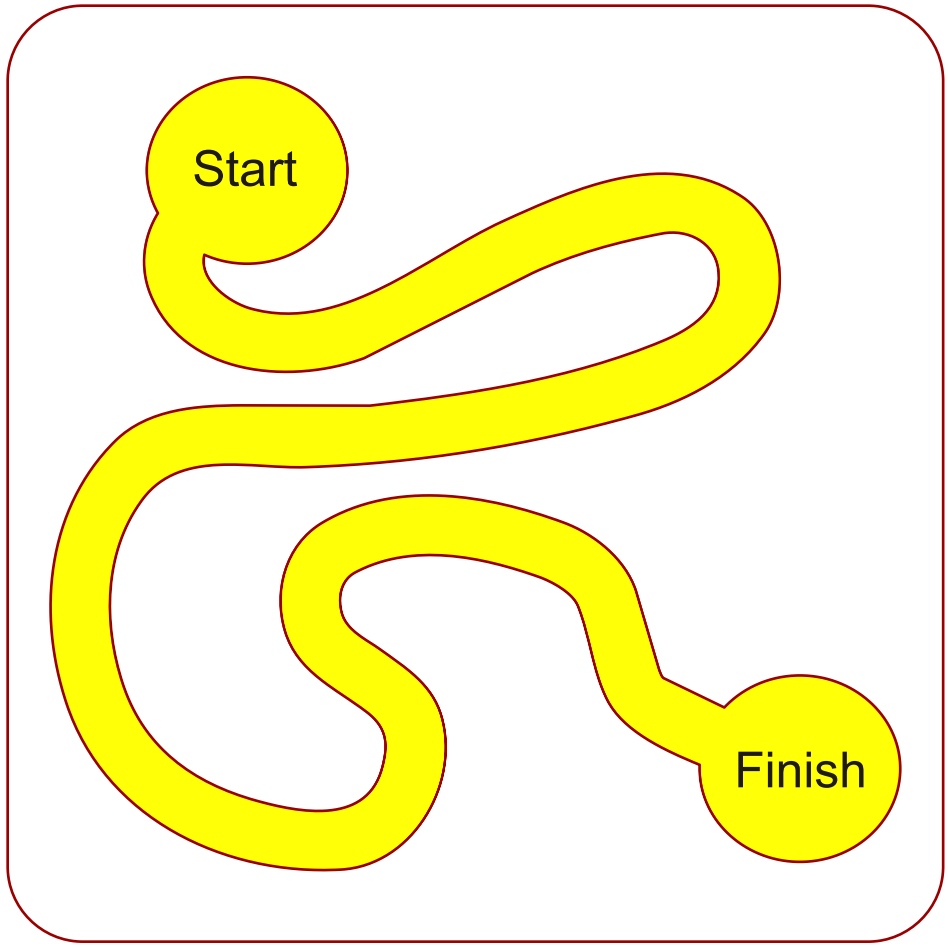
Mirror Drawing (explanation)

This task is not easy. Our reflexes don't work so well when we see a reversed image and try to draw something in a usual way. The same happens to a child when he/she begins to learn to write or draw pictures.

1



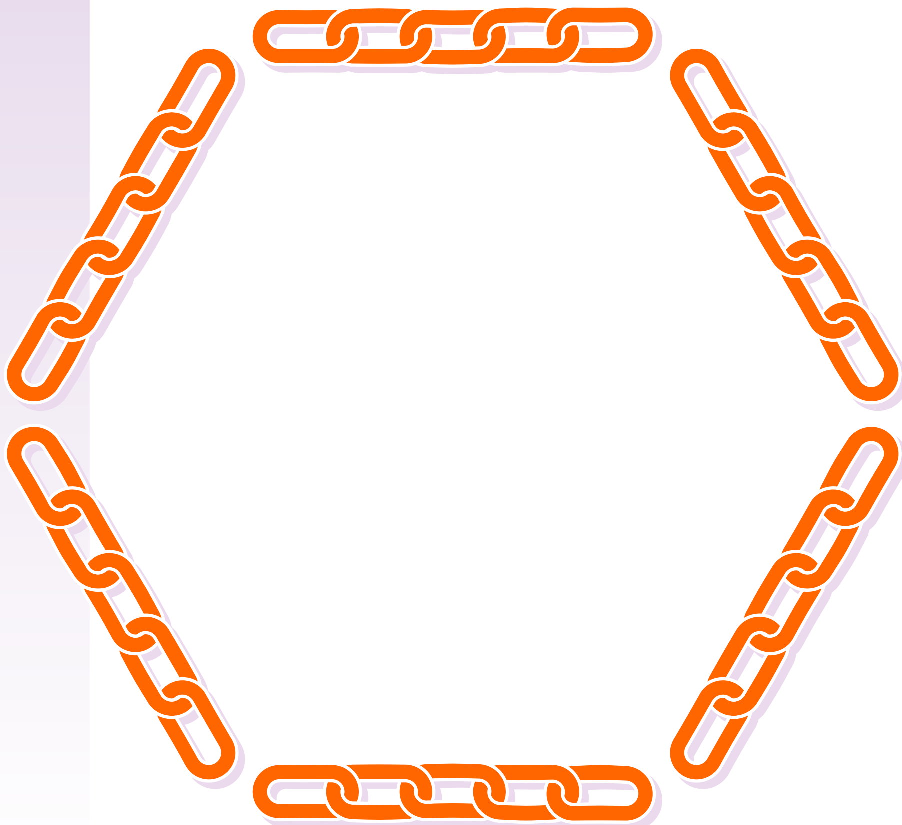
F



Mirror Drawing (path)

To produce the path first print it out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

Miscellaneous Puzzles



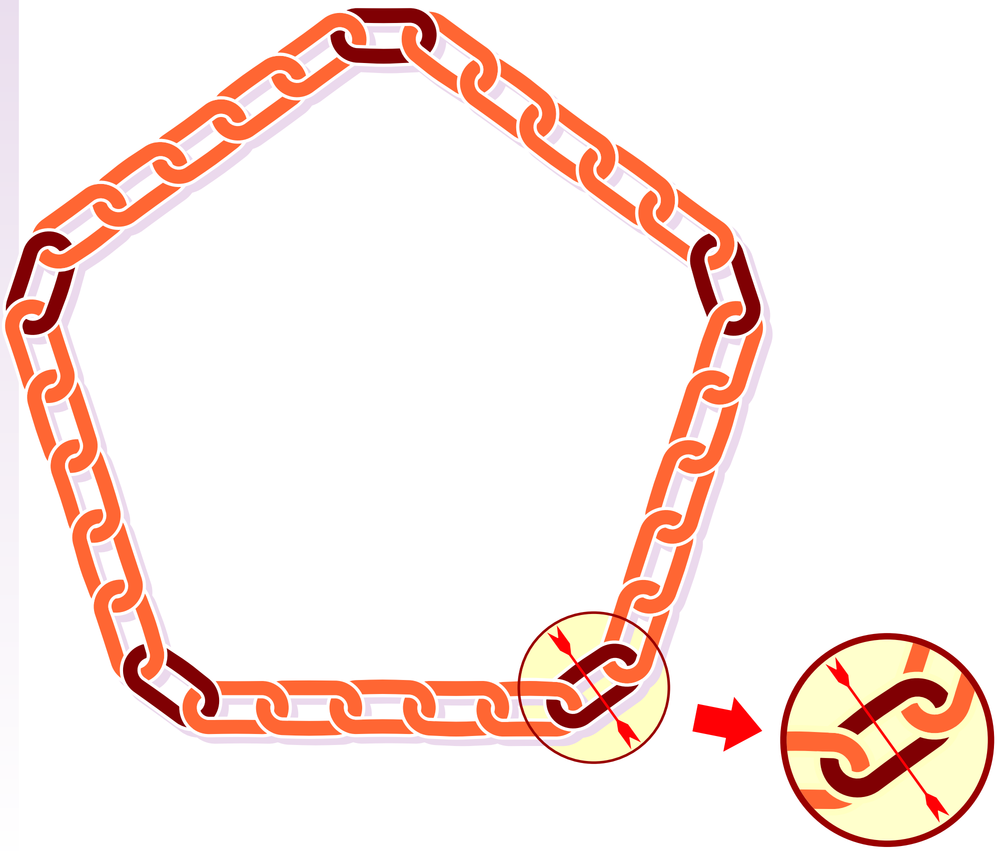
The Missing Link

by Sam Loyd

There are six pieces of chain of five links each shown in the illustration.

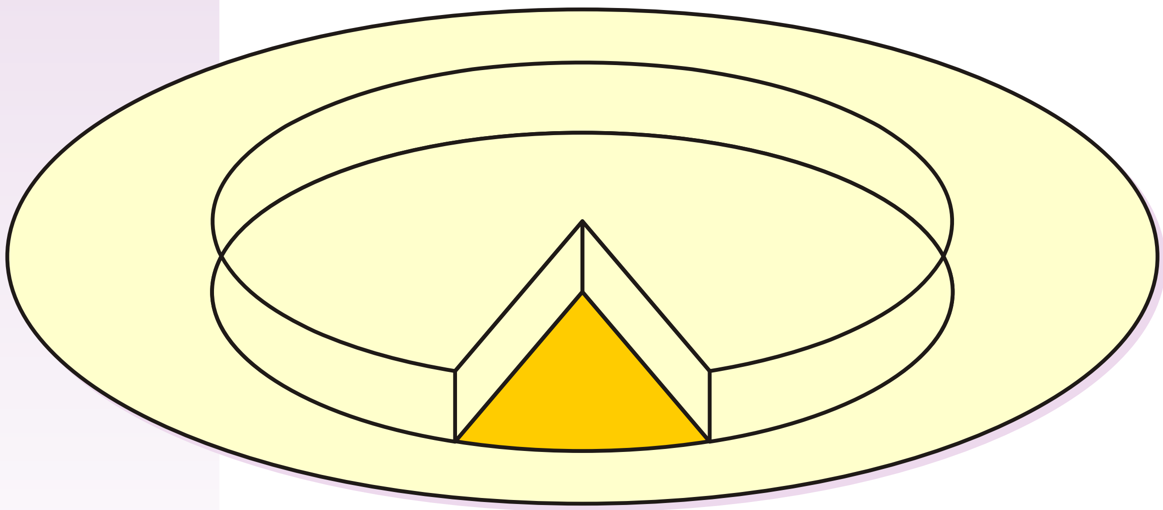
The object is to make of these pieces an endless chain of thirty links by cutting and welding the minimum possible number of links.

Miscellaneous Puzzles



The Missing Link (solution)

To solve the puzzle just cut the five links of one piece, and then use them to join the remaining five pieces into an endless chain as shown in the illustration.

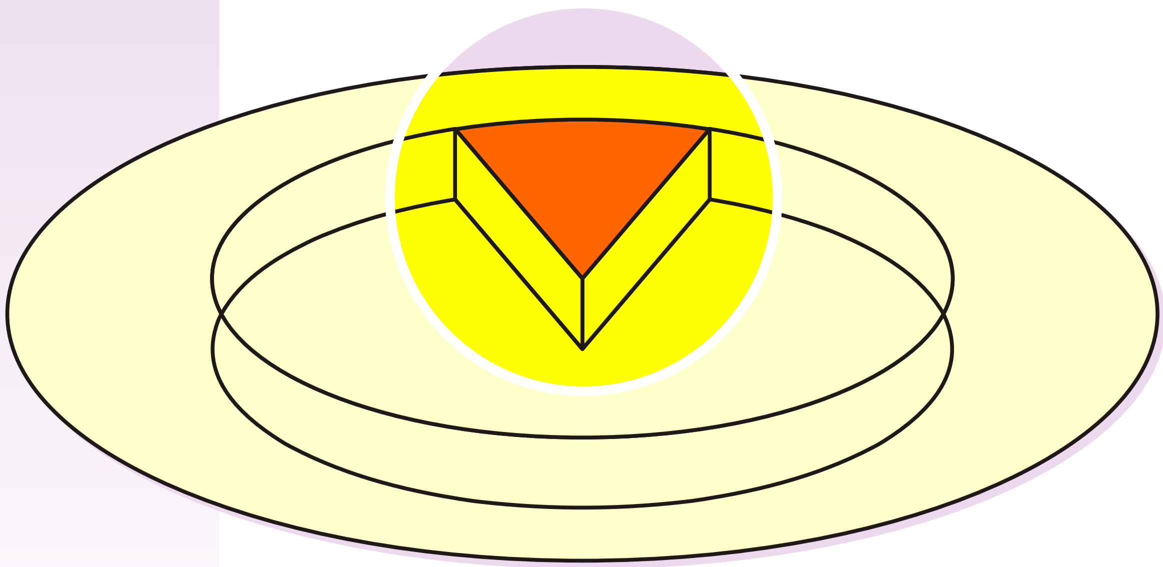


Missing Piece

after Martin Gardner

It seems that someone took a piece of cake. But in fact it is still there. Can you find it?

Illusions



Missing Piece (explanation)

Just turn the picture upside-down and you will find the missing piece of cake.

The Monk Travel*

after Karl Dunker

One morning, exactly at sunrise, a Buddhist monk began to climb a tall mountain. The narrow path, no more than a foot or two wide, spiraled around the mountain to a glittering temple at the summit.

The monk ascended the path at varying rates of speed, stopping many times along the way to rest and eat the dried fruit he carried with him. He reached the temple shortly before sunset. After several days of fasting and meditation he began his journey back along the same path, starting at sunrise and again walking at variable speeds with many pauses along the way. His average speed descending was, of course, greater than his average climbing speed.

Prove that there is a spot along the path that the monk will occupy on both trips at precisely the same time of day.

----

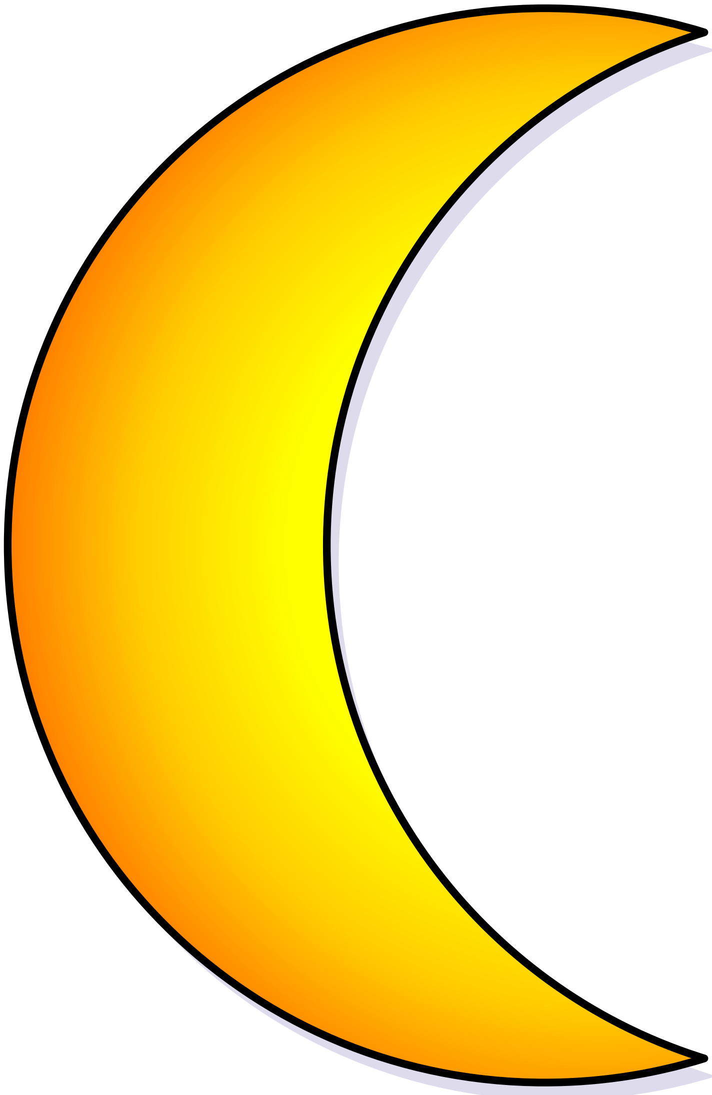
*This puzzle was inspired to the publication on our site by a message from Julia J.

The Monk Travel (solution)

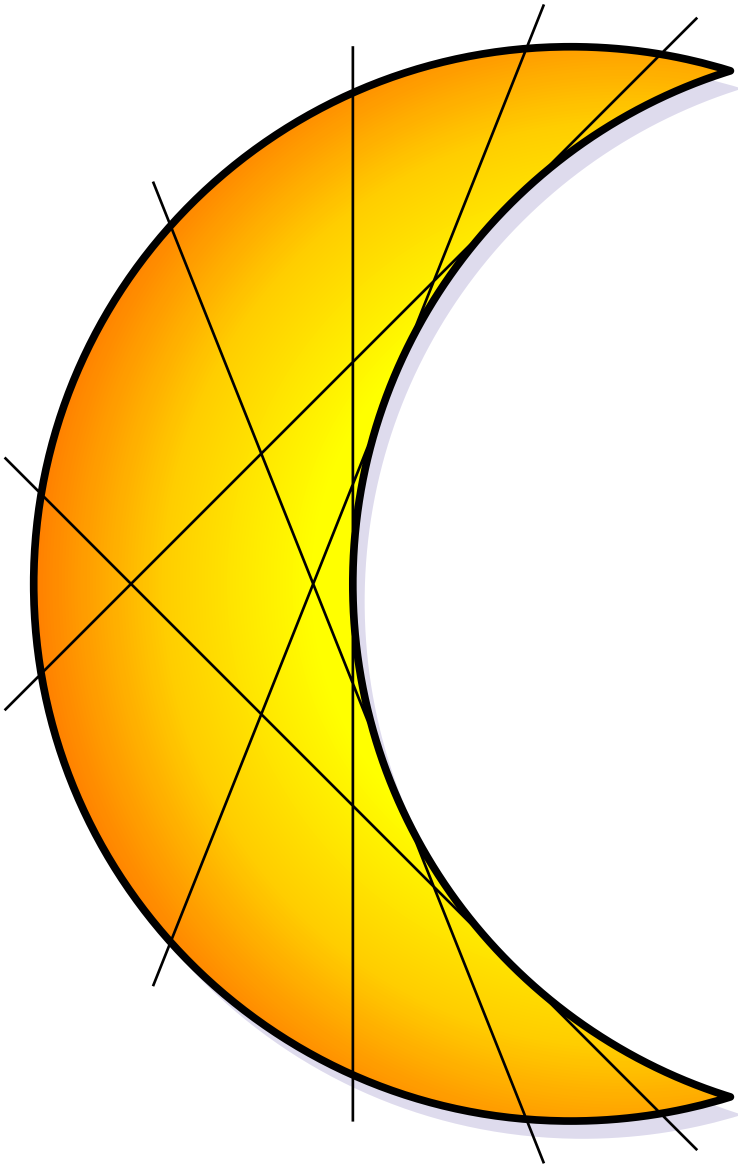
One of the most elegant ways to prove there is a spot along the path that the monk will occupy on both trips at precisely the same time of day is as follows.

The monk starts his way down at the same time as he starts his way up, except several days later - exactly at sunrise. Now let's suppose there are two monks. And they both start their own way, but one starts from the top of the mountain (i.e. descending down) while another - from the bottom (i.e. climbing up). Since there is only a narrow path spiraled the mountain the two monks will definitely meet at some point along the path and at some certain time of day (such a meeting always happens at some certain point of time and place)! This proves that the way up and the way down when are started at some certain time of day (in our case - at sunrise) both have a point along the path which the monk passes at precisely the same time of day.

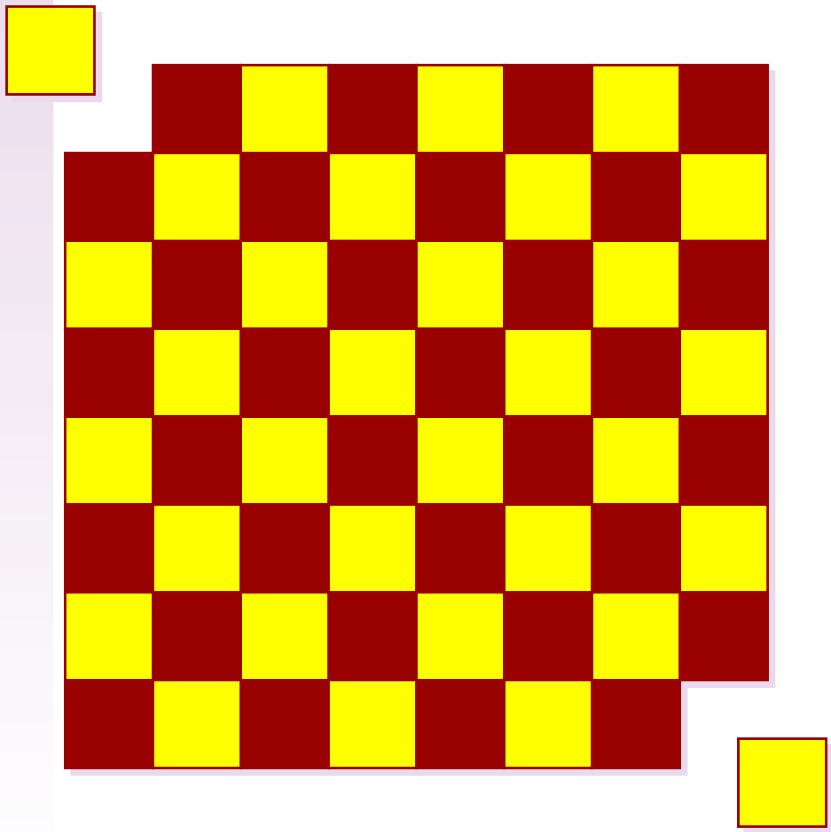
Karl Dunker himself writes that there are several ways to go about it, "but probably none is... more drastically evident than the following. Let ascent and descent be divided between two persons on the same day. They must meet. Ergo... With this, from an unclear dim condition not easily surveyable, the situation has suddenly been brought into full daylight."



Into how many pieces could you divide this moon with five straight cuts of a knife?



By taking the best possible advantage of the crescent form of the moon, 21 pieces can be obtained with five straight cuts.



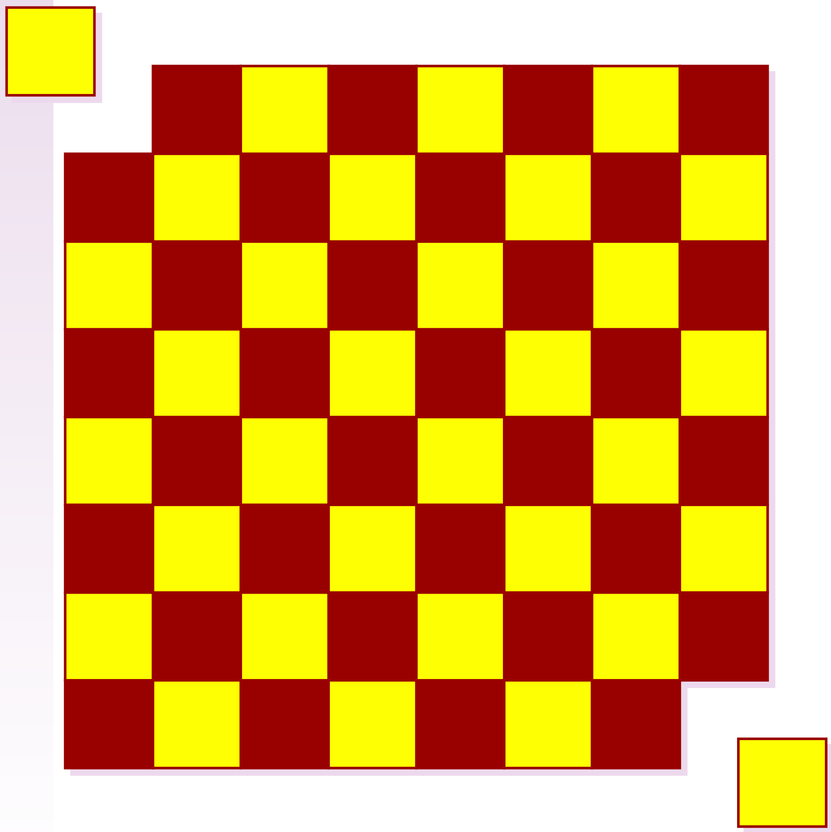
The Mutilated Chessboard

after Martin Gardner

A chessboard can be fully covered with 32 dominoes in size of two adjacent squares on the board.

Suppose we cut off two corner squares of the chessboard as shown in the illustration.

Now the question is if it's possible to cover entirely this new board (now consisting of just 62 squares) with the 31 dominoes?



The Mutilated Chessboard (solution)

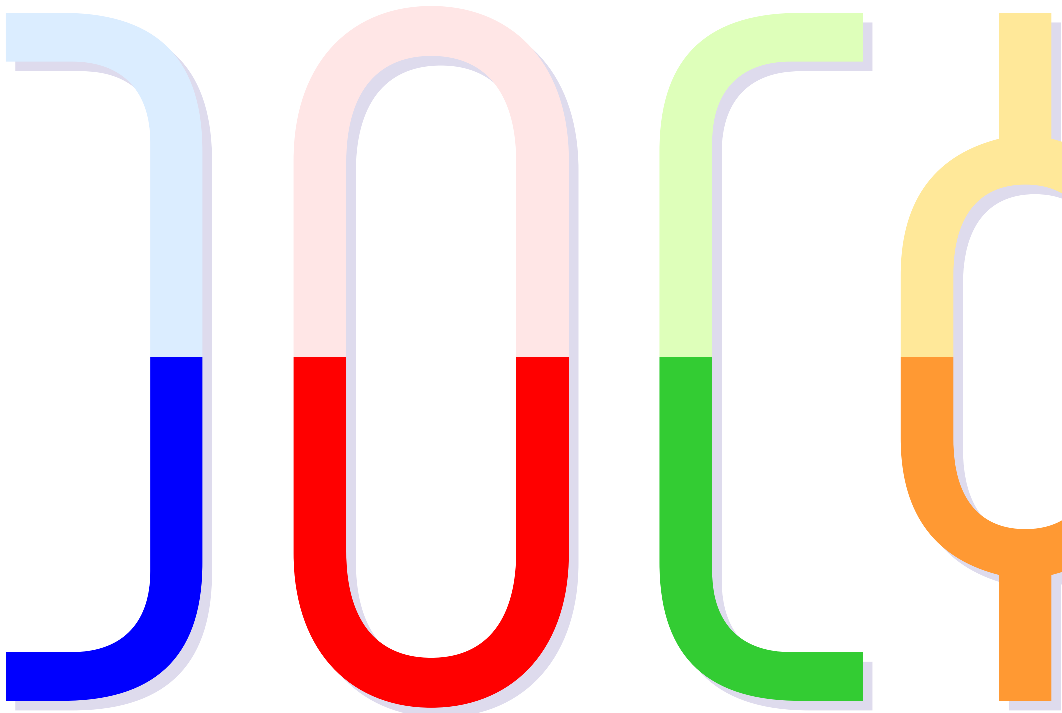
The chessboard without two opposite corner squares can't be covered with 31 dominoes because these squares are of the same color! When we remove them, the mutilated board of 62 squares will contain two more squares of one color than of the other.

Each domino always covers two adjacent squares of the chessboard which are always of opposite color. So when you cover (in ANY possible way) 60 squares with 30 dominoes, you will have two squares left, but, unfortunately, of the same color. These two squares are not of opposite color, so they can't be adjacent in any way. Therefore the last domino can't cover them.

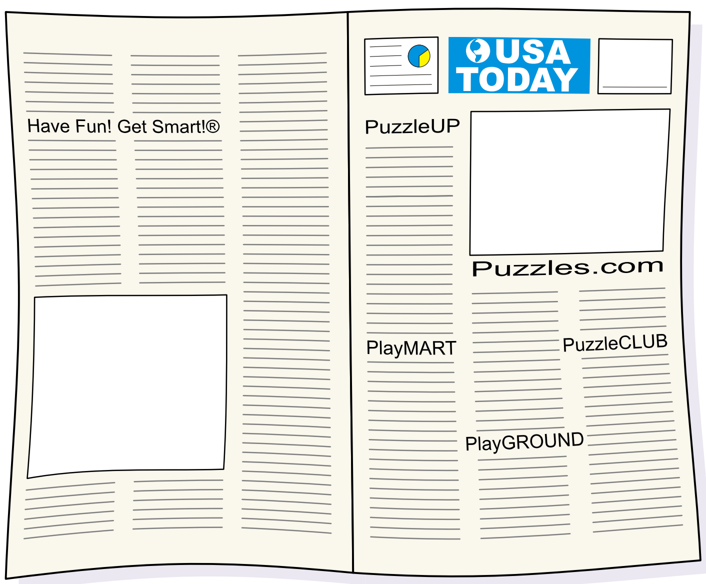
Name the Month
by Martin Gardner

What month is indicated by the strange symbols in the illustration?

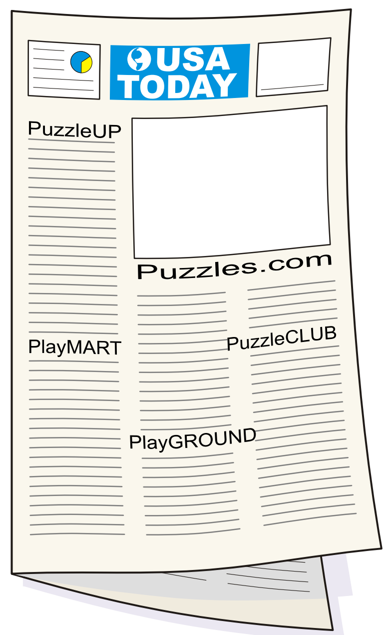
Name the Month
Solution



Covering the top halves of each symbol reveals the month JULY.



1



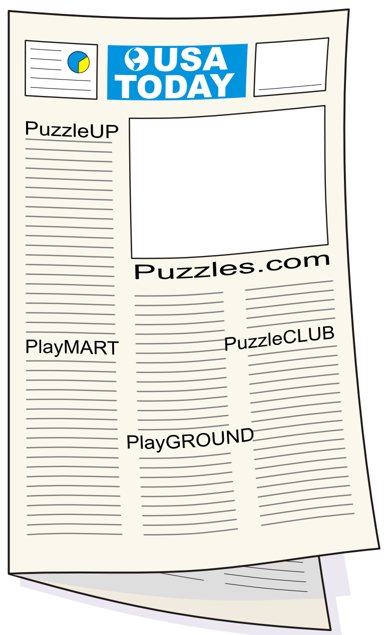
2

News Folder

Take a newspaper sheet of big size (for example USA TODAY), see Figure 1. Fold it in half as shown in Figure 2.

Now guess how many times you will be able to fold this newspaper sheet folding it every time across in half?

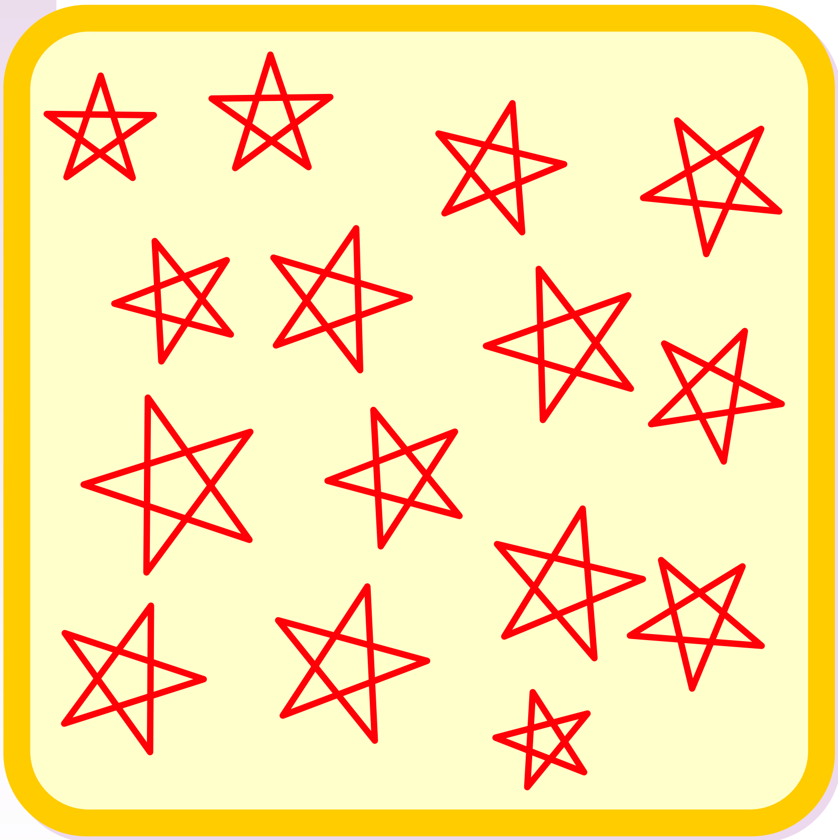
Then do it really as many times as you can, and compare your results with your guess.



News Folder (explanation)

When you fold the newspaper its area is halved each time. At the same time the pile's thickness is doubled and grows rapidly.

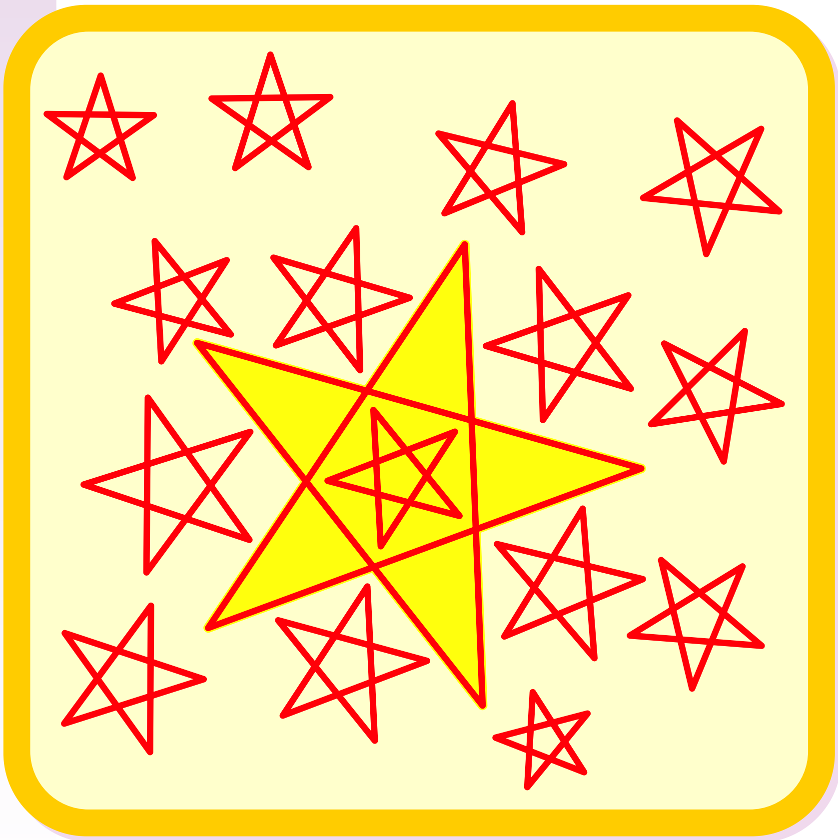
So after the first seven folds a pile has its area very small (only 1/128) of the full sheet's area, and its thickness is 128 times more. So it's a very hard task to fold so small and so thick pile for the eighth time, and almost impossible to do the ninth fold.



The New Star Puzzle

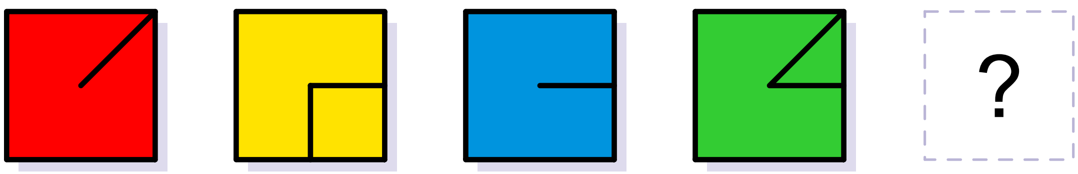
by Sam Loyd

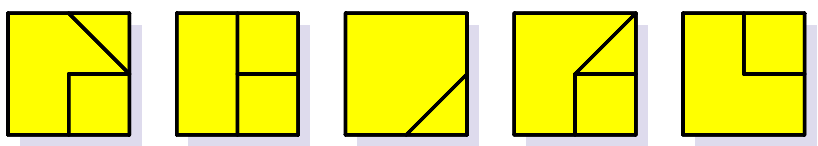
Can you add to the diagram shown in the illustration one more perfect five-point star - looking exactly like any of those in the diagram - that will be larger of any of them, but at the same time will touch none of them?



The New Star Puzzle (solution)

How to add a new, bigger star to the existing ones is shown in the illustration.

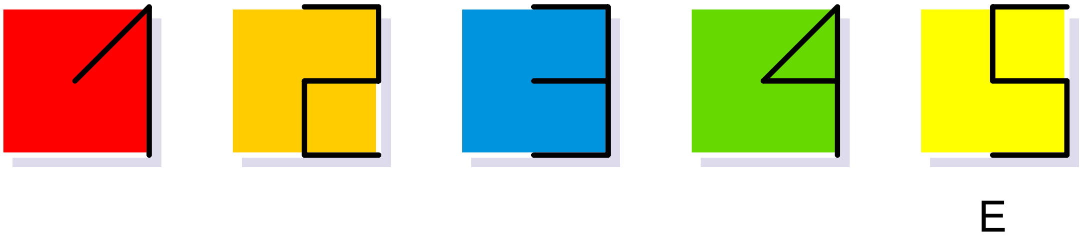




A B C D E

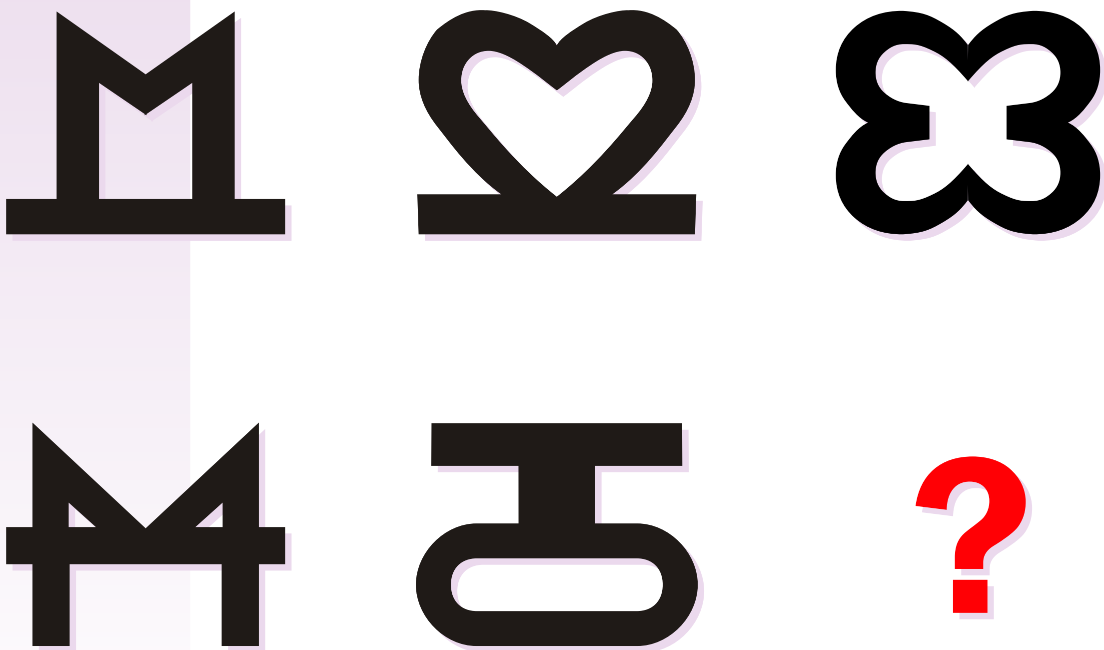
Which shape from the A-E options should be placed instead of the question mark in order to complete the sequence?

More from the author at UniPuzzle.com



Removing some unnecessary parts of the square outlines (highlighted in white) one can spot digits hidden in them - 1, 2, 3 and 4. The next one should be, obviously, 5. The E shape is the one which hides 5 in it. Thus, it should be chosen in order to complete the sequence.

Visual Puzzles

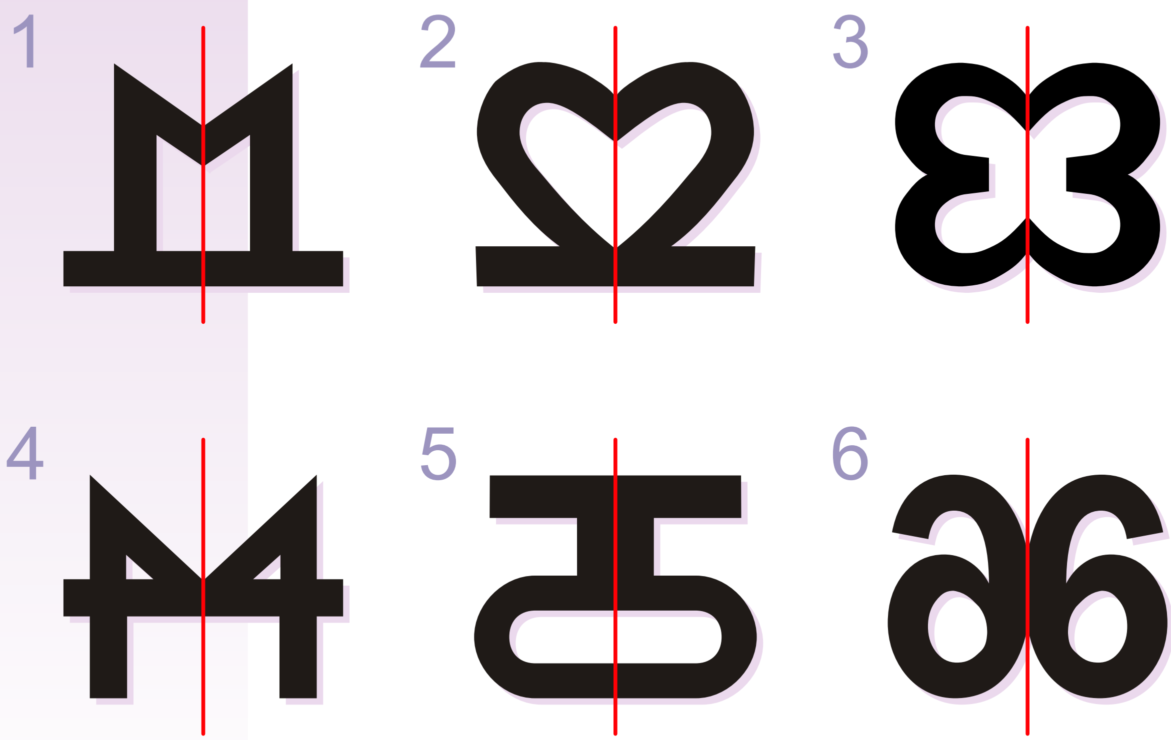


Next Symbol

after Martin Gardner

What symbol has to come next in the sequence of the five symbols in the illustration? Can you sketch this sixth figure?

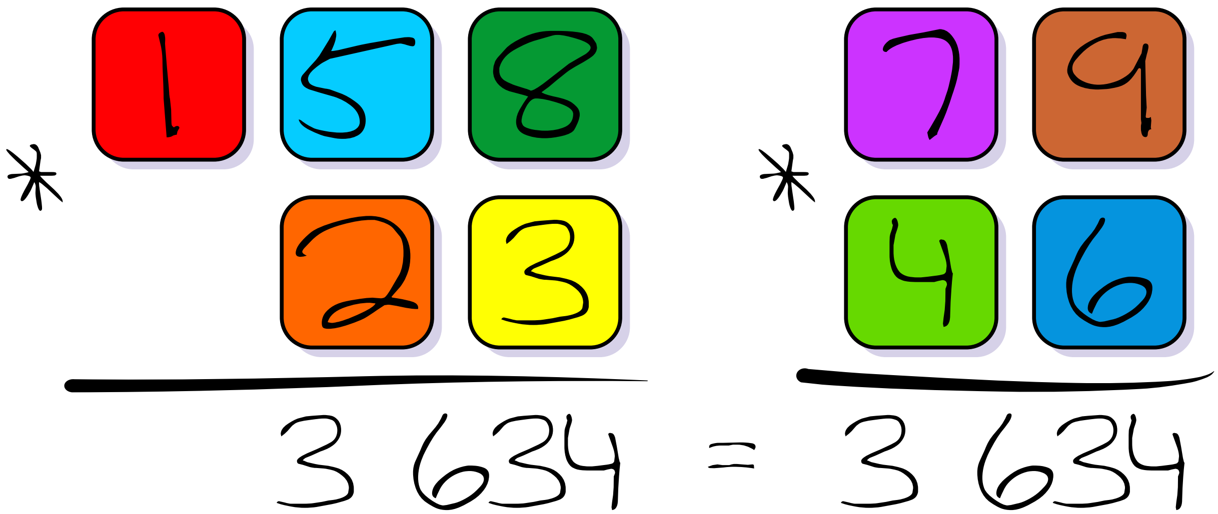
Visual Puzzles



Next Symbol (solution)

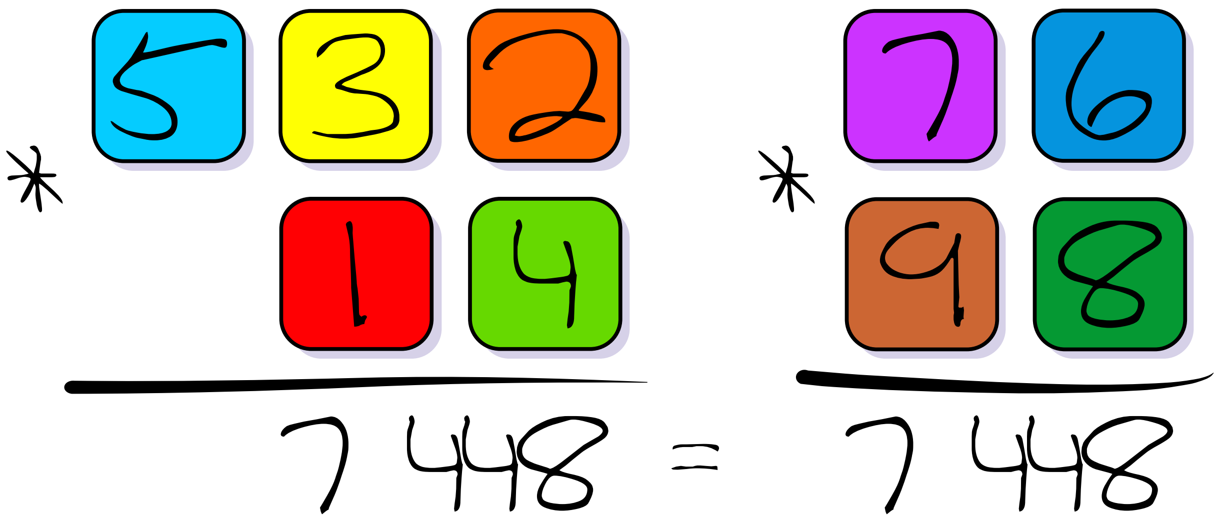
As shown in the illustration each figure in the sequence is formed of one of the numerals 1 through 5 and its mirror reflection joined together as the right and left parts of the figure. The vertical lines of symmetry are shown in red.

Thus the sixth figure has to be the 6 combined with its mirror reflection as shown.



Nine counters, each bearing one of the nine digits from 1 through 9, are arranged in two groups as is shown. Each group represents a multiplication and, more interestingly, results in the same product. As it can be seen 158 multiplied by 23 is the same as 79 multiplied by 46 which gives 3,634 in both cases.

The challenge is to rearrange the counters so that to get as large product as possible. Remember both groups must multiply to the same amount, and there must be three counters multiplied by two in one group, and two multiplied by two counters in the other, just as it is now. What is the biggest amount which can be produced?

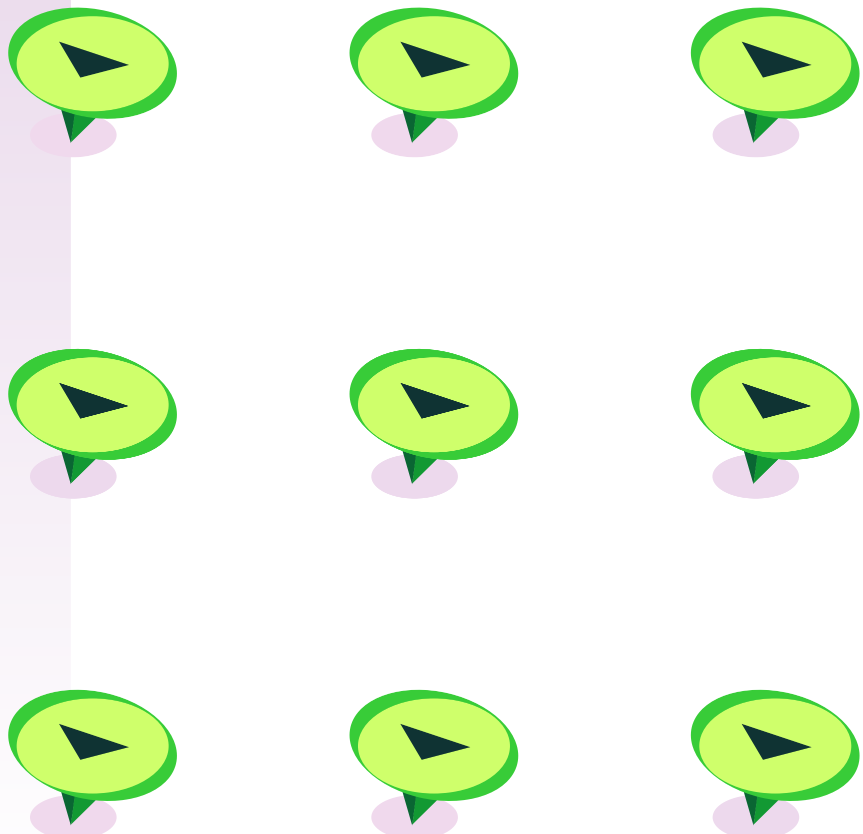


There are 11 different solutions*:

158 * 23 = 46 * 79 = 3634
138 * 27 = 54 * 69 = 3726
134 * 29 = 58 * 67 = 3886
174 * 23 = 58 * 69 = 4002
146 * 29 = 58 * 73 = 4234
259 * 18 = 63 * 74 = 4662
186 * 27 = 54 * 93 = 5022
158 * 32 = 64 * 79 = 5056
174 * 32 = 58 * 96 = 5568
584 * 12 = 73 * 96 = 7008
532 * 14 = 76 * 98 = 7448

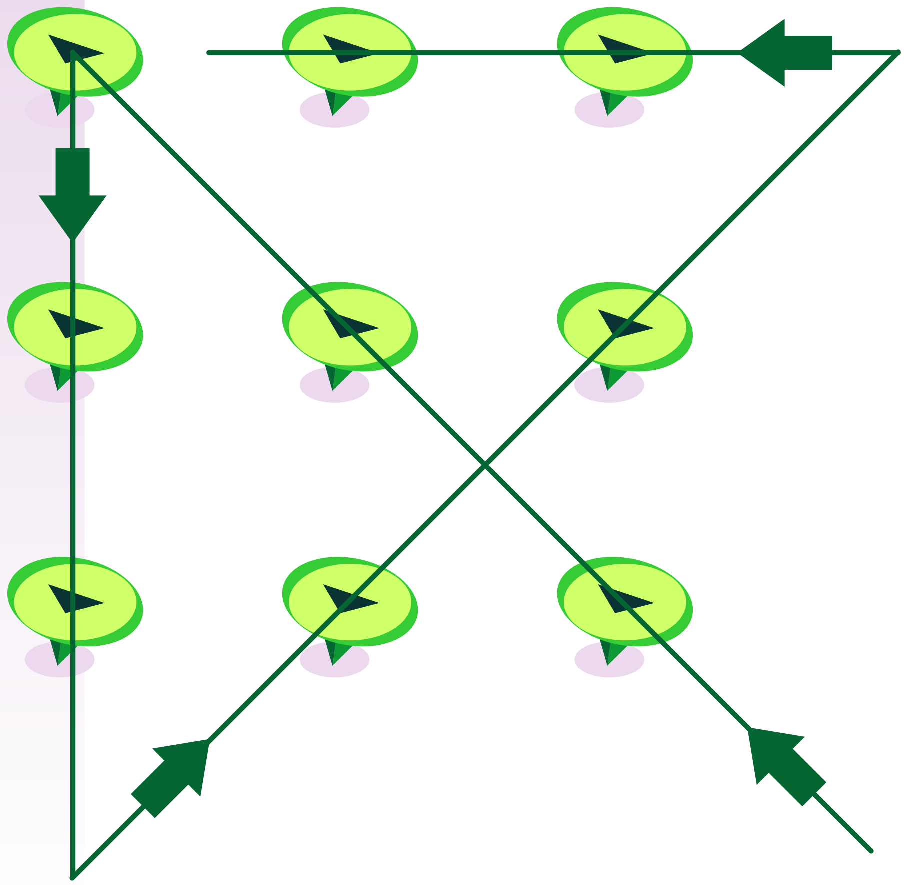
Solution with the largest product is shown.

*Thanks to our visitor Jeff H. for providing us with complete list of solutions.



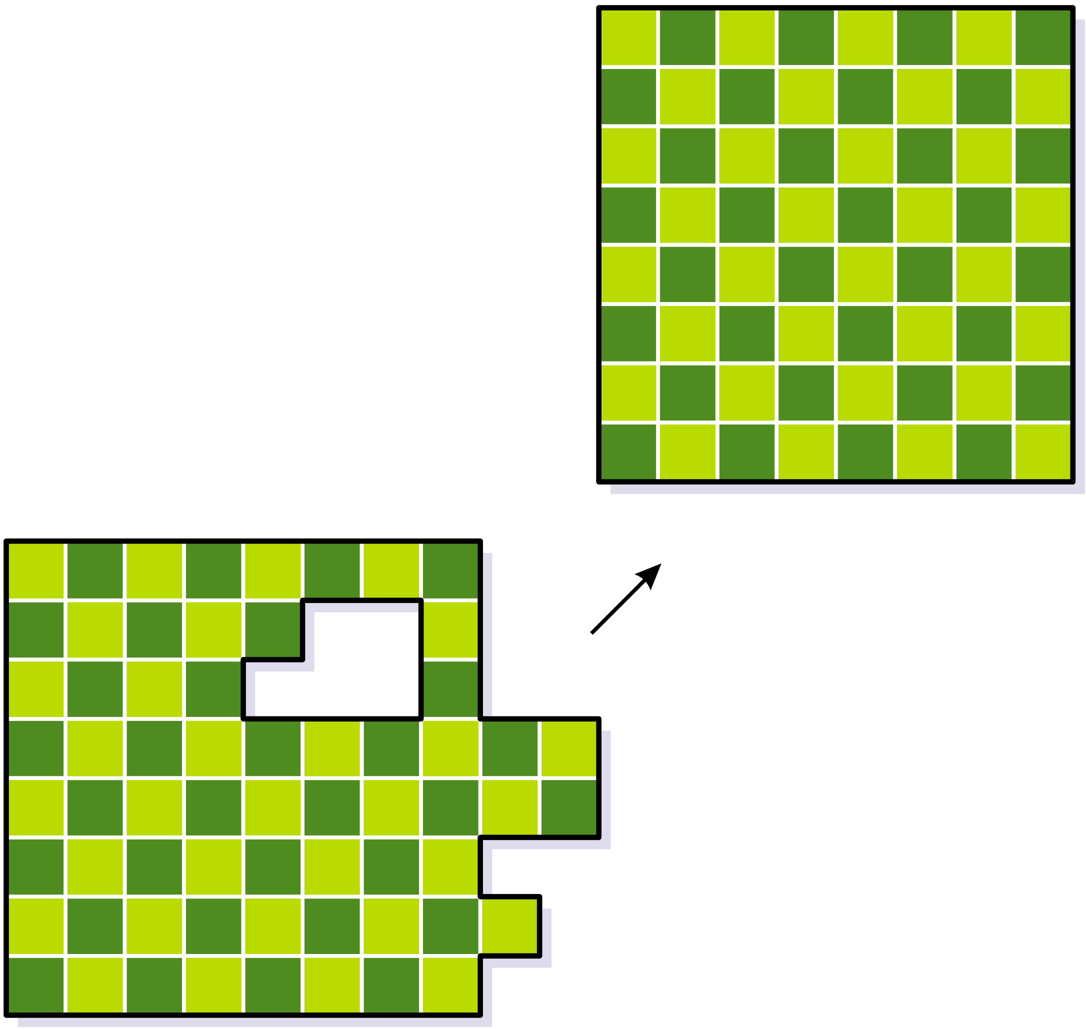
Nine Points

Connect all the nine points in the illustration with exactly 4 connected straight lines without lifting your pencil off the paper. Every line must go through the centers of the points.

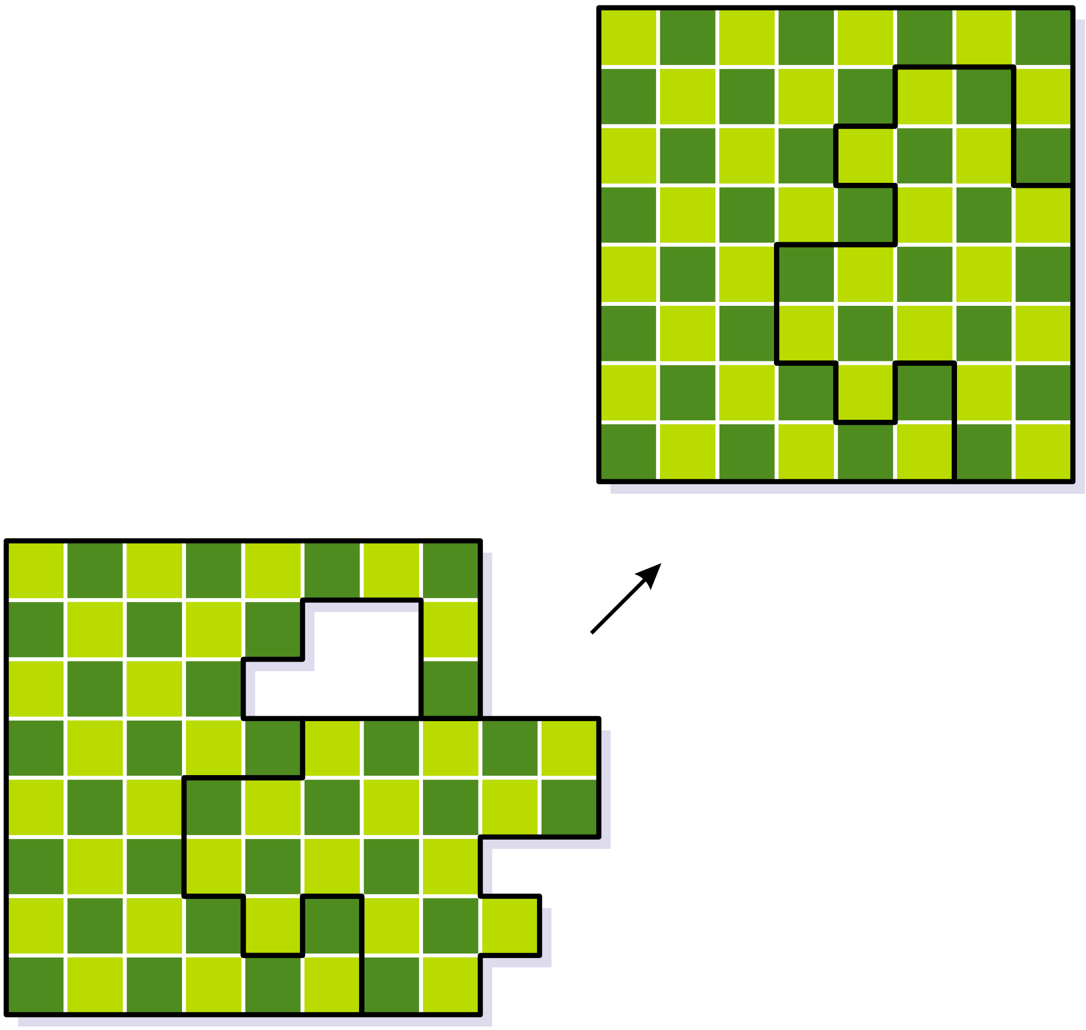


Nine Points (solution)

One of the solutions is shown in the illustration.



The checkered shape can be divided into just two parts which can form a perfect solid 8 x 8 checkerboard. How can it be done? Do not overlap the obtained parts.



The solution is shown in the illustration.

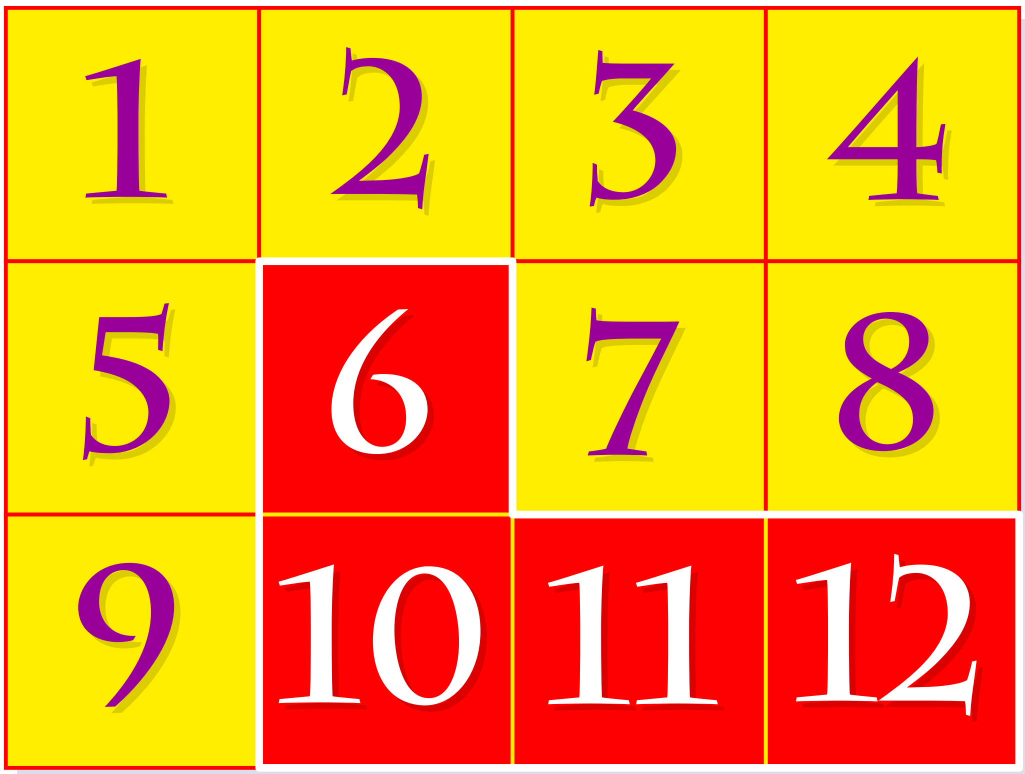
1	2	3	4
5	6	7	8
9	10	11	12

A 3x4 grid contains twelve numbers from 1 though 12 in it - a number per cell. This is shown in the diagram.

Divide this grid strictly along its lines only into two parts so that the total sum of the numbers in one part equals the total sum of the numbers in another.

Nob's Dozen

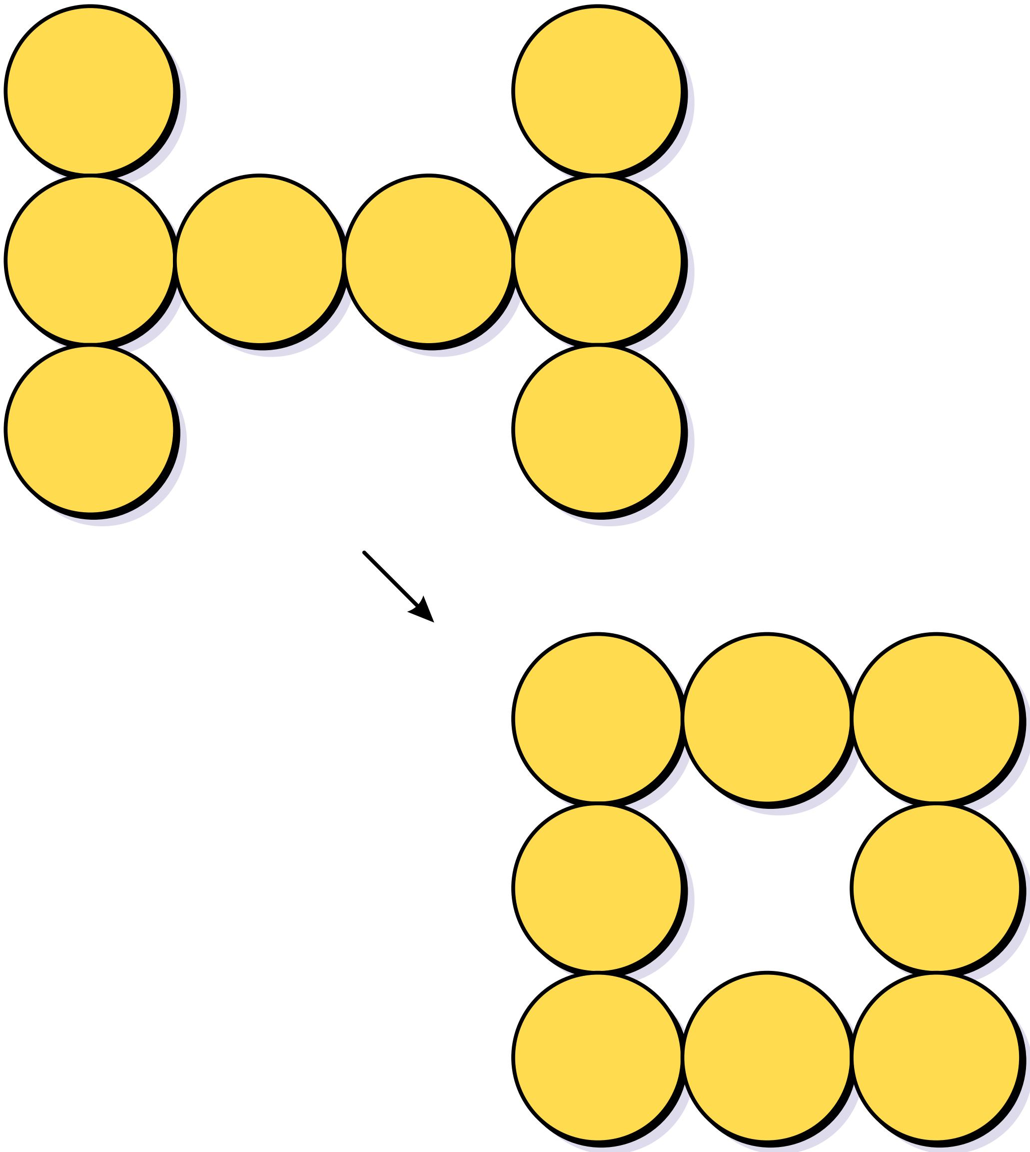
Solution



The solution is shown in the illustration.

Nob's H-2-O
by Nob Yoshigahara

Puzzles.COM

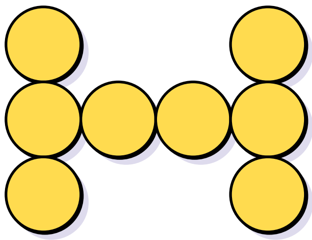


Eight identical coins are arranged in the H letter shown in the upper left corner.

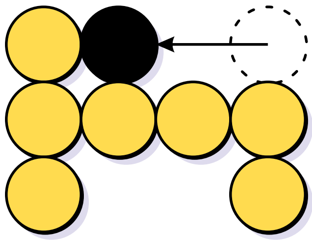
Can you convert the H letter into the O letter shown in the lower right corner observing one simple rule: move one coin at a time so that in its new position it touches at least two other coins from the unmoved group, except the case when this coin (marked as @) makes a straight line triad, like O@O.

Posted: November 4, 2009

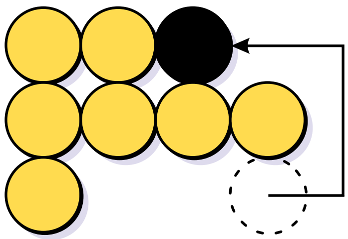
Nob's H-2-O
Solution



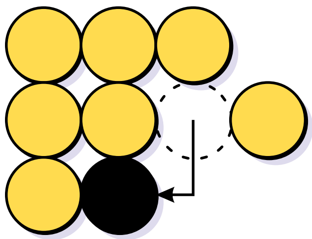
Start



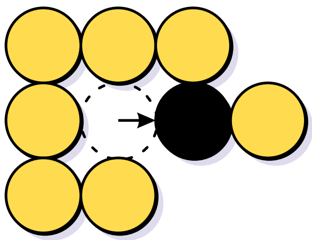
Move 1



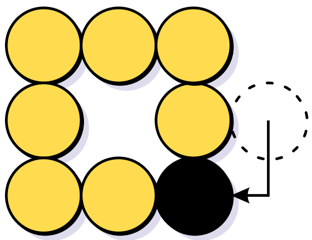
Move 2



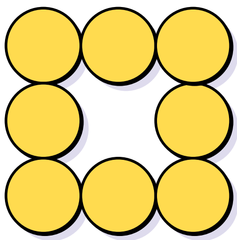
Move 3



Move 4



Move 5



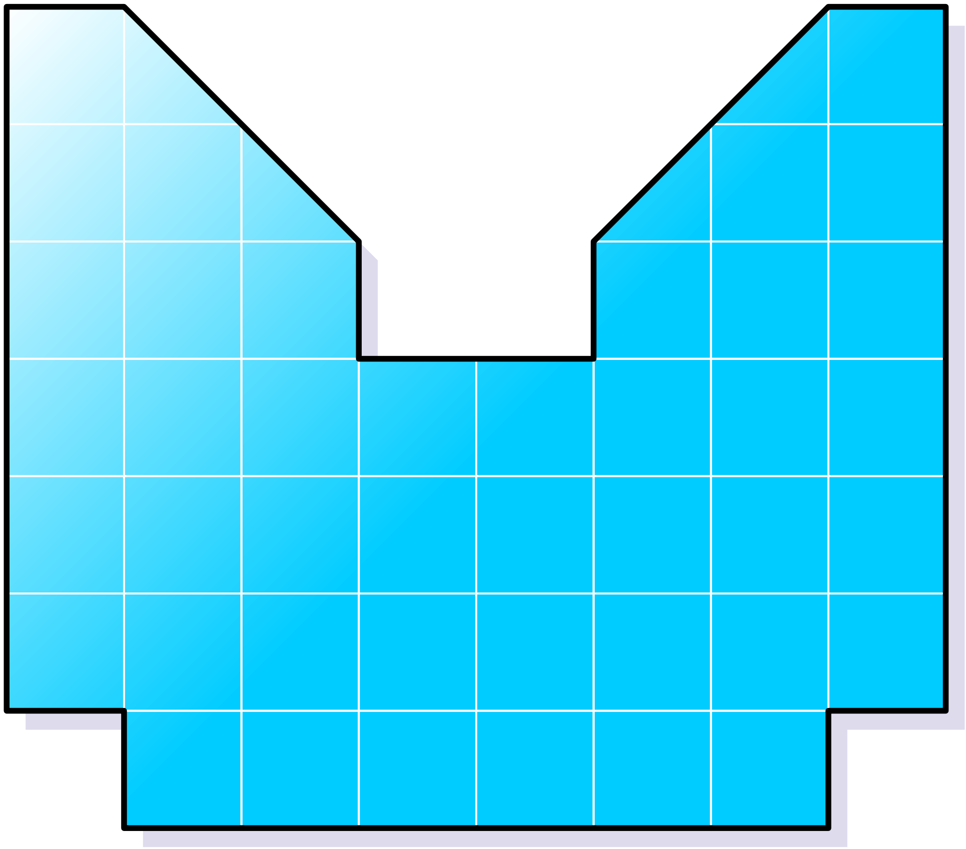
Finish

The solution is shown in the illustration.

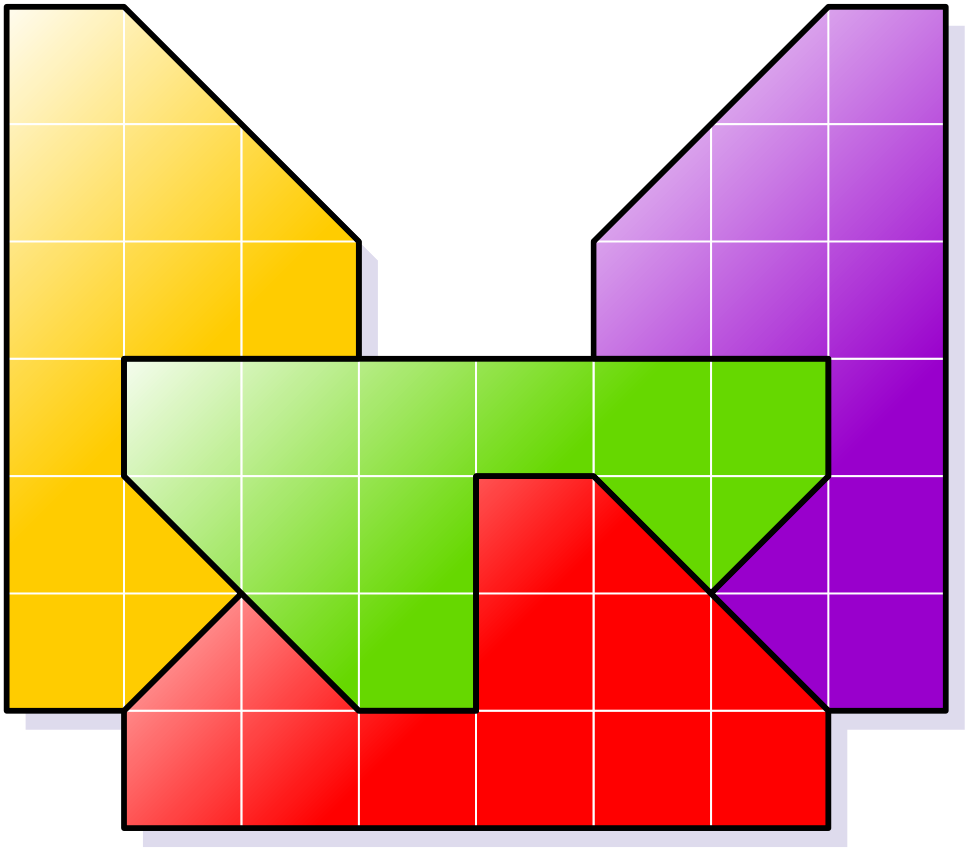
Nob's M

by Nob Yoshigahara

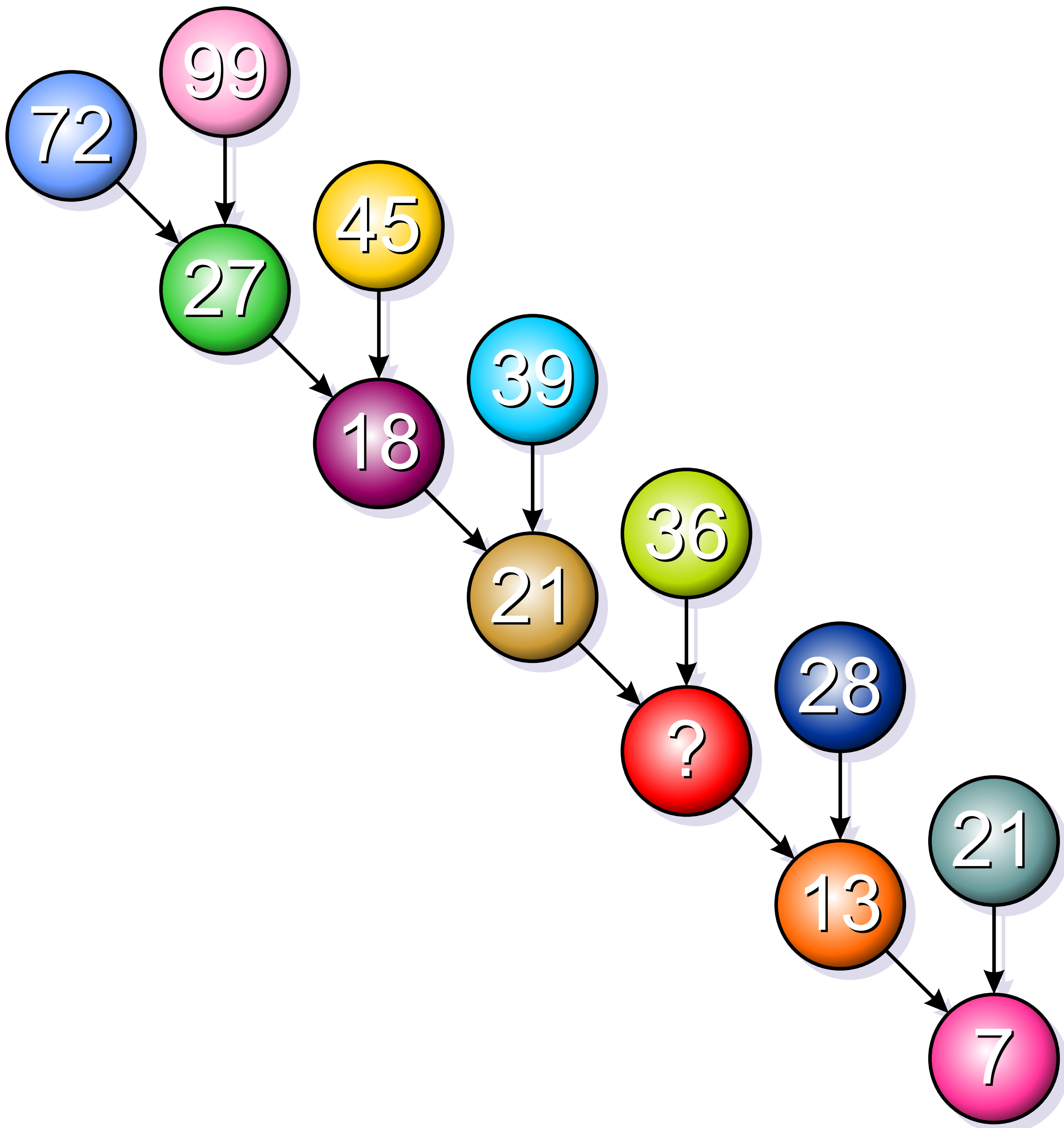
Puzzles.COM



Divide this shape into four identical pieces. The pieces can be mirrored.



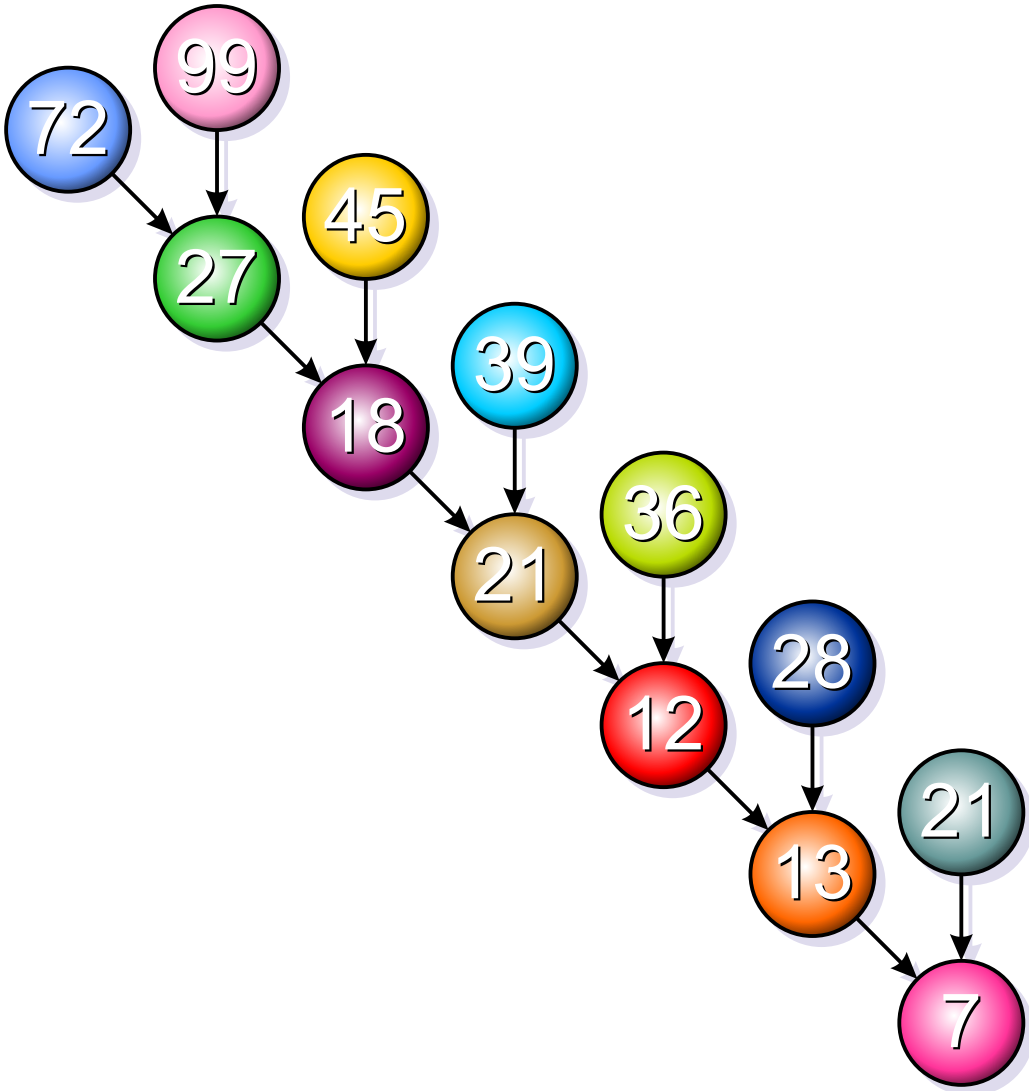
The solution is shown in the illustration.



Numbers which make a tree shown in the diagram are put in its nodes observing a certain rule. Which number should be put instead of the question mark?

Can you figure out what was the final scheme and what is the greatest possible number of roses which can be "hidden behind" the paths?

Posted: August 2, 2009



At first sight the puzzle seems to be rather easy "prompting" the one to put the "15" instead of the question mark. Unfortunately, in that case the pattern is "broken" by the lowest digit in the tree - the "7".

In fact the rule is different. It is that all the digits from any two circles pointing simultaneously to the third one are summed up producing the resulting number on that circle. For example, circles "72" and "99" are summed up in the way 7+2+9+9 and resulting in the "27" on the circle to which the respective arrows point to. In that way the resulting number of the circle with the question mark on it is "12". I.e. 2+1+3+6 = 12.

PHUSLULP

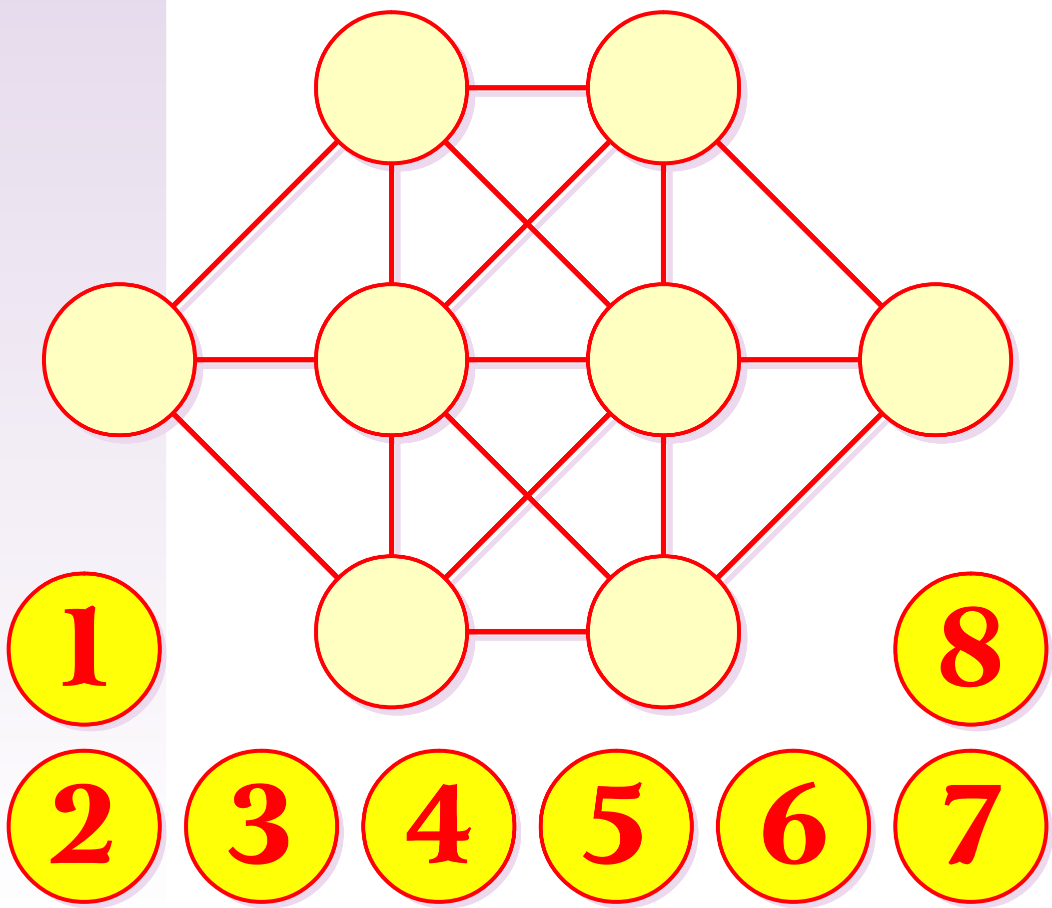
Can you come up with an idea what does this "wording" really mean?

Nob's Phuslulp
Solution

In fact this wording represents two words usually written on many doors. Imagine this is a glass door. Reading every second letter starting from the leftmost "P", you will see "PULL". Reading every second letter in the backward direction starting from the mirrored "P" at right, you will see mirrored "PUSH".

Nob Yoshigahara claimed he was inspired to this puzzle while visiting a cafe and looking outside through its windows and doors.

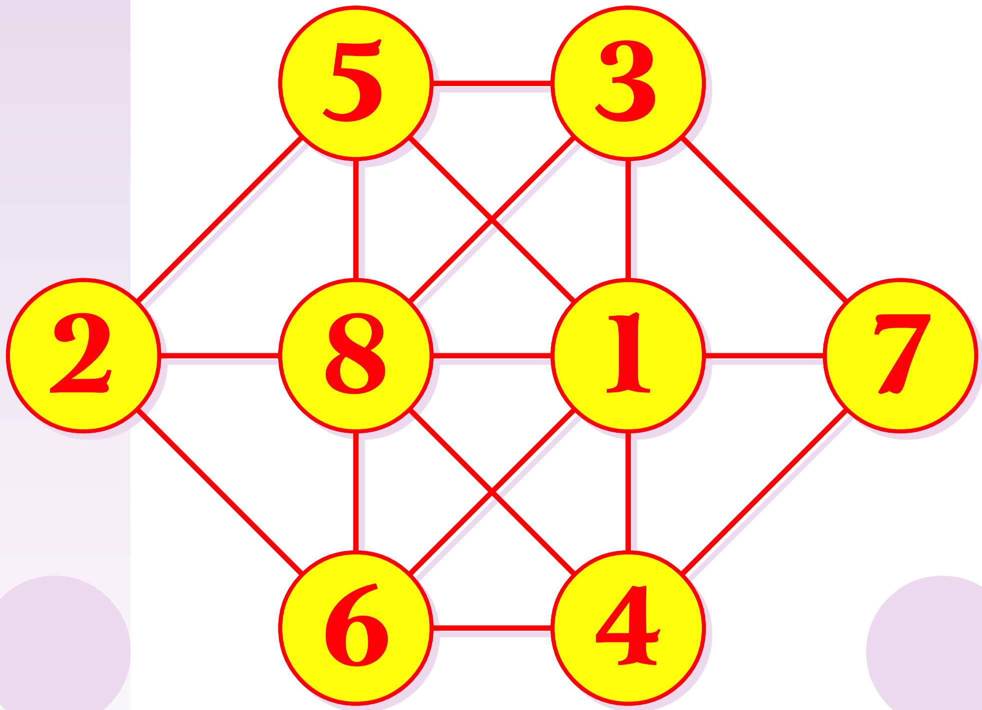
Puzzles with Numbers



The Number Grid Puzzle

In the grid shown above place eight digits from 1 through 8 - one digit per circle - in such a way that numbers that differ only by 1 (1 and 2, 2 and 3, 3 an 4, etc.) will not be placed in circles directly connected by a straight line.

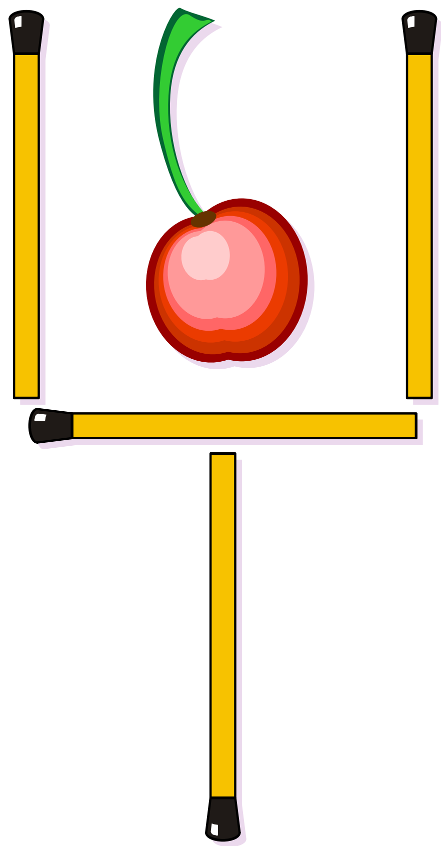
Puzzles with Numbers



The Number Grid Puzzle (solution)

The unique solution (except for rotations and reflections) is shown in the illustration.

Matchstick Puzzles

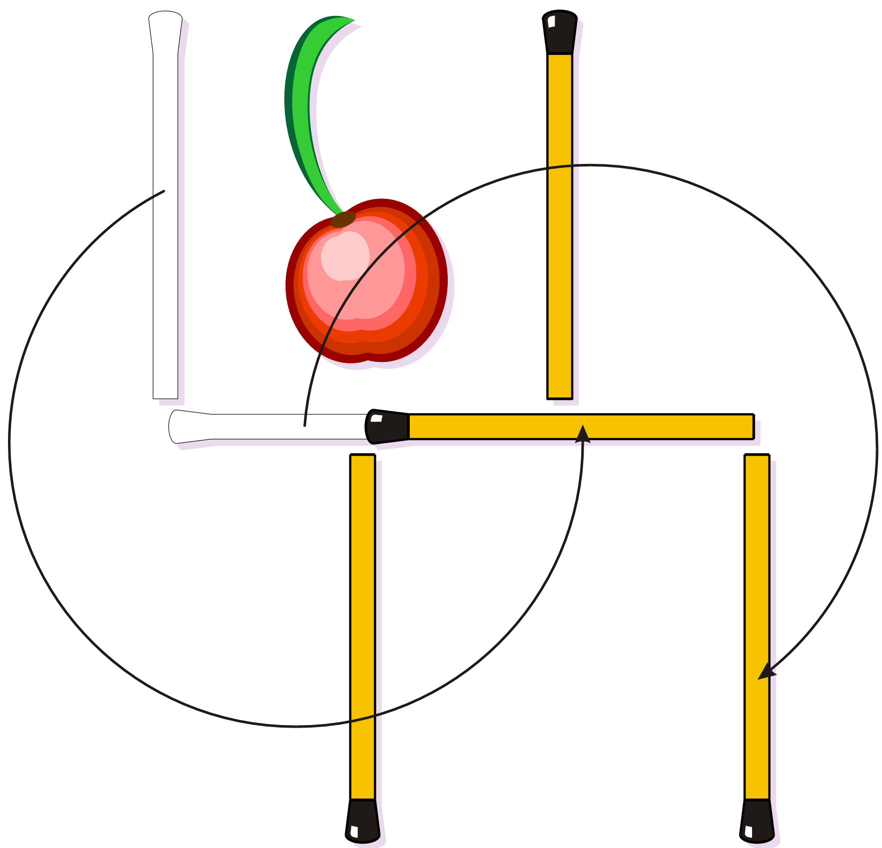


Out of Glass

after Martin Gardner

The object is to move 2 matches to get the cherry outside the glass. At the finish, the glass may be turned in any direction, but it must be exactly the same shape as before.

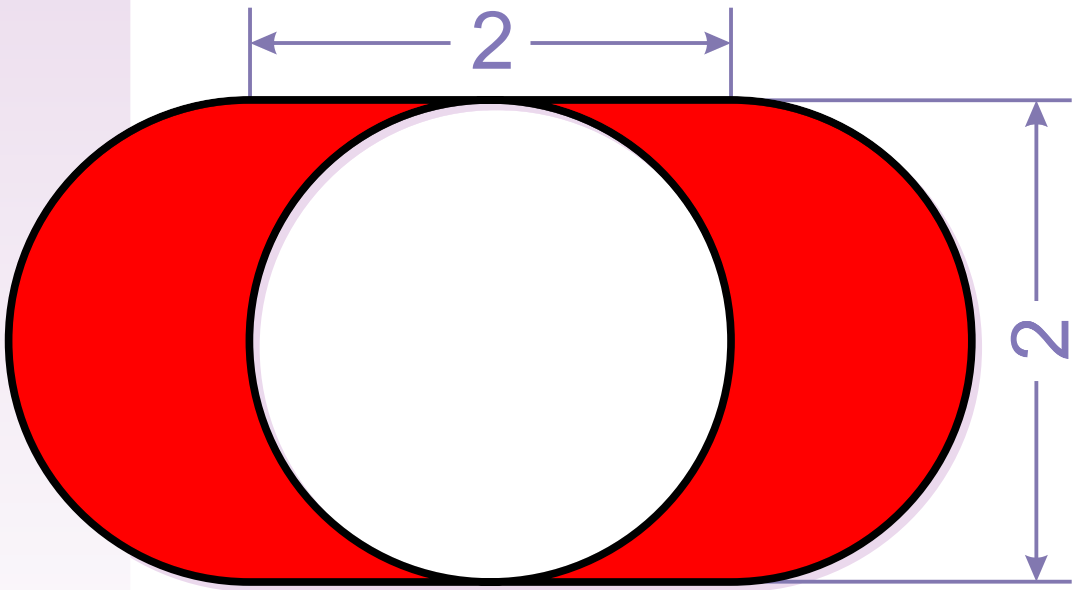
Matchstick Puzzles



Out of Glass (solution)

One of the two symmetric solutions is shown in the illustration.

Geometrical Puzzles

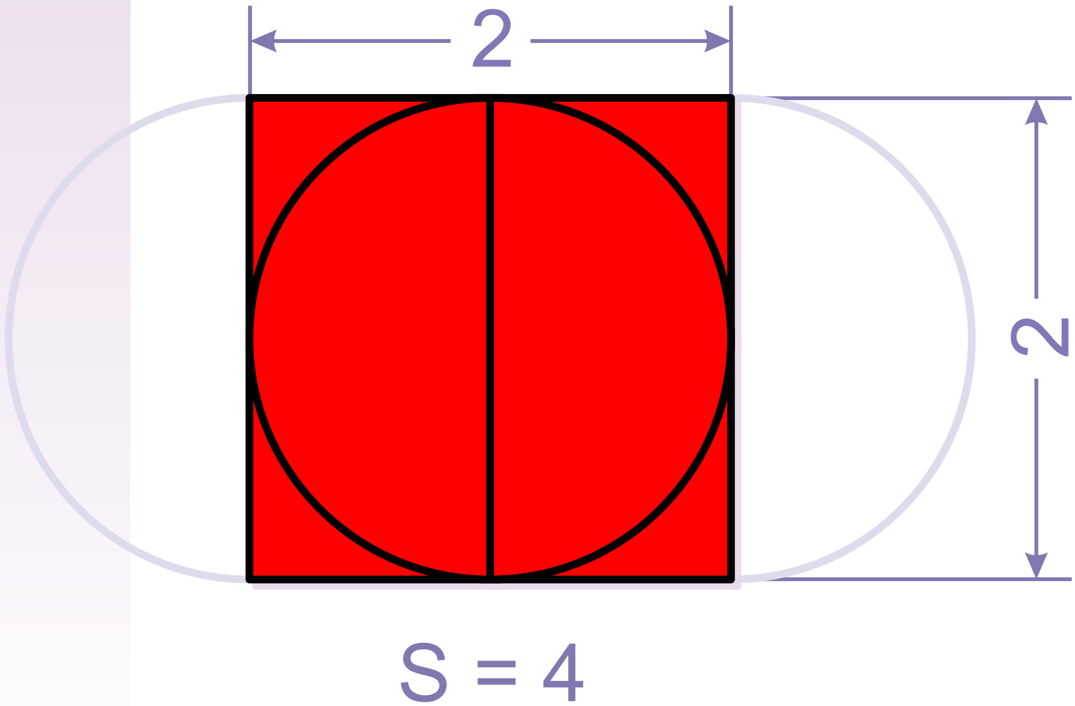


Outside the Hole

after Martin Gardner

A paper sheet has the shape of a two-unit square with semicircles on opposite sides. If a disk with a diameter of two units is removed from the center as shown in the illustration, what is the area of the remaining paper?

Geometrical Puzzles

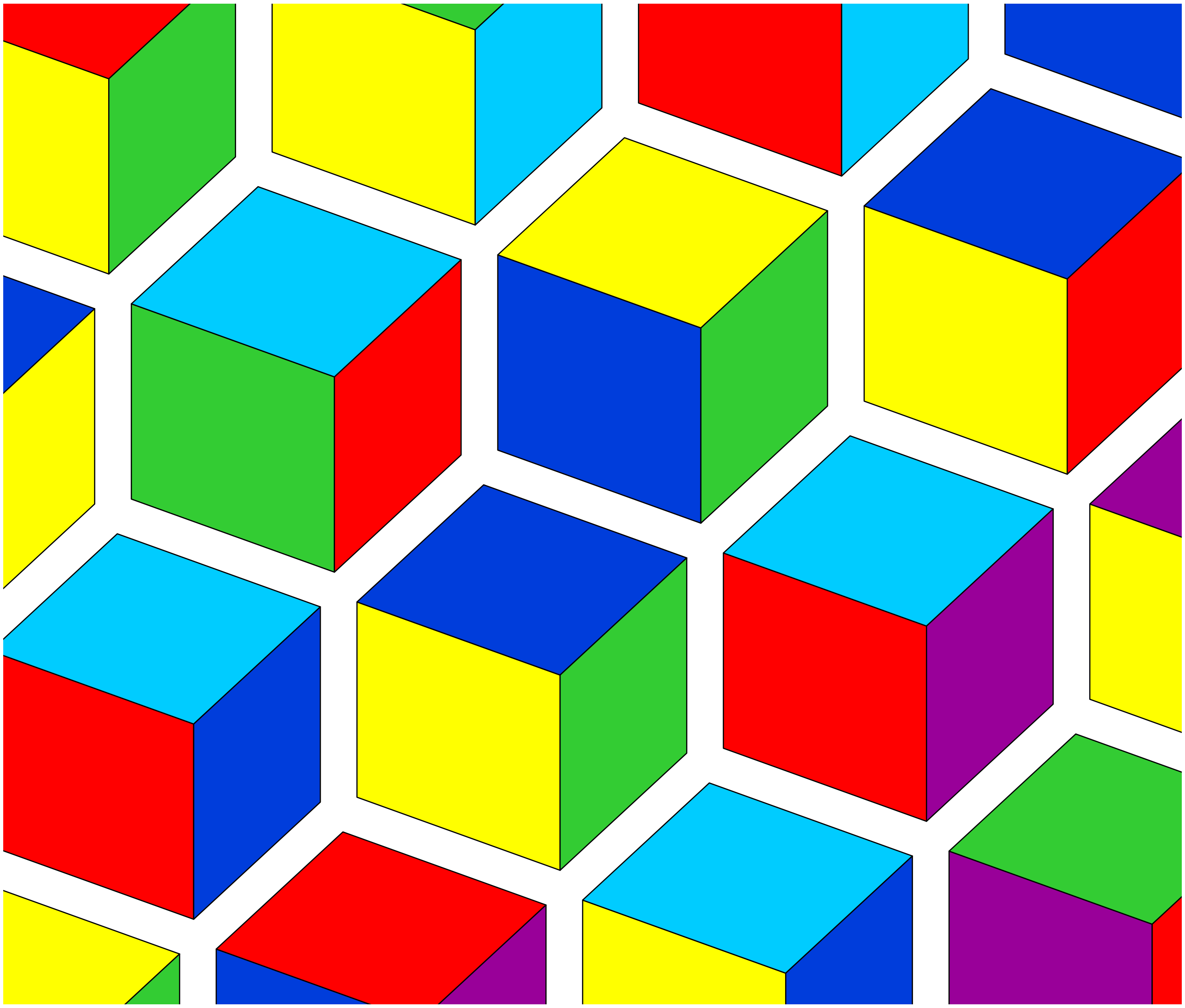


Outside the Hole (solution)

The two semicircles together form a circle that fits the hole. The remaining paper therefore has a total area of four square units.

Painting A Cube
after Lewis Carroll

Puzzles.COM



Imagine that you have some wooden cubes.

You also have six paint tins each containing a different color of paint.

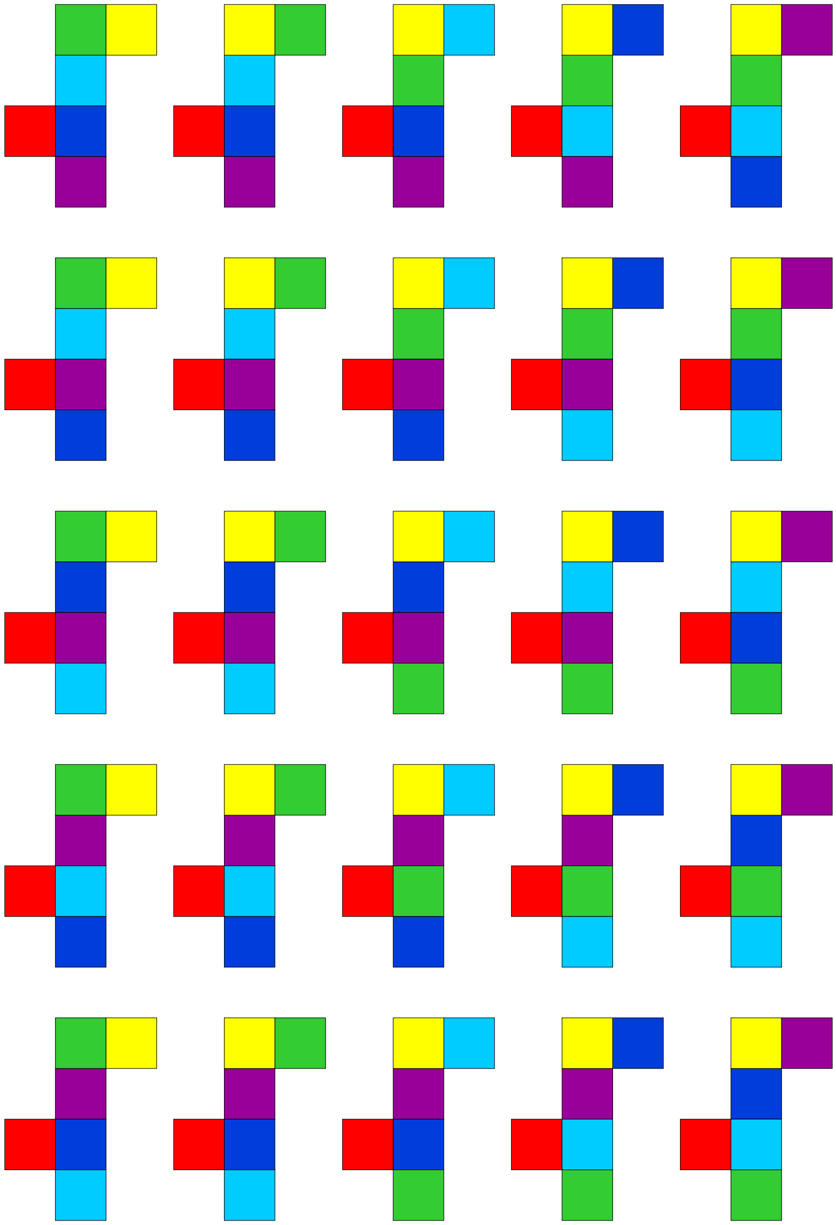
You paint a cube using a different color for each of the six faces.

How many different cubes can be painted using the same set of six colors?

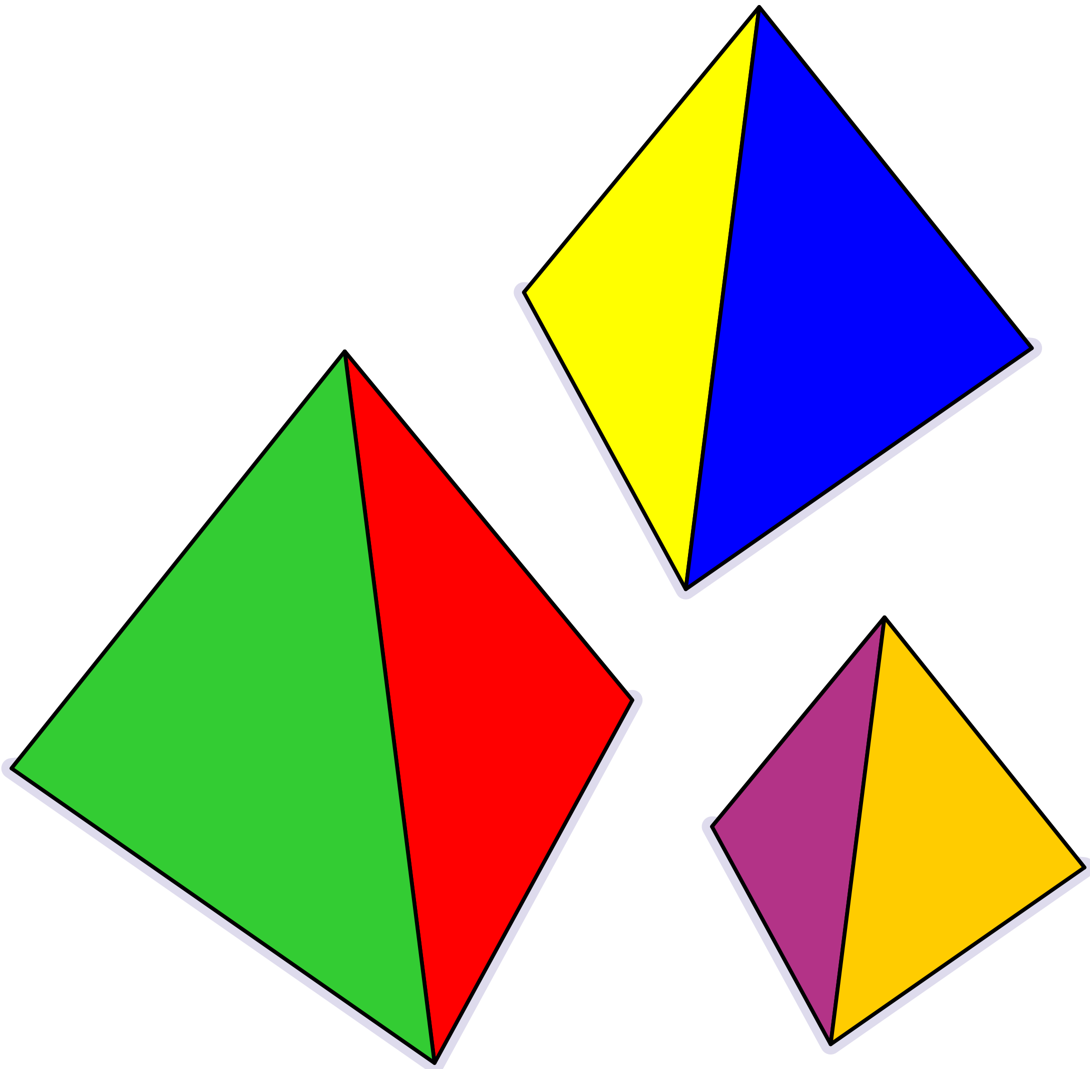
Remember that two cubes are different only when it is not possible, by turning one, to make it correspondent with the other.

Posted: July 1, 2009

ThinkFun® Everybody Plays®



Let the six faces be a, b, c, d, e and f. With face a opposite face b, there are six arrangements for the other four colors around the cube: cdef, cdfe, cedf, cefd, cfde and cfed. Likewise for face a opposite face c; face a opposite face d; face a opposite face e; face a opposite face f; all have six arrangements for the remaining four colors. Hence the total is 5 x 6 = 30 arrangements.



There are seven primary colors of the solar spectrum - violet, indigo, blue, green, yellow, orange, and red (or "Vibgyor").

This puzzle concerns the painting of the four sides of a tetrahedron, or triangular pyramid. Each time no more than four colors from the solar spectrum can be used to paint a pyramid.

The question is in how many unique ways may the triangular pyramid be colored, using in every case one, two, three, or four colors of the solar spectrum? A side can only receive a single color, and no side can be left uncolored. The crucial point of the challenge is careful selection of the painting scheme in order to avoid the repetitions of the pyramids. In other words if a colored pyramid cannot be placed so that it exactly resembles in its colors and their relative order another pyramid, then they both are different. Otherwise they are the same. Remember that one way would be to color all four sides red, another to color two sides green, and the remaining sides yellow and blue; and so on.

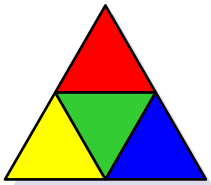


Fig. 1

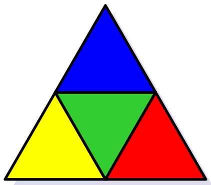


Fig. 2

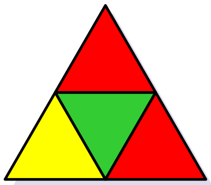


Fig. 3

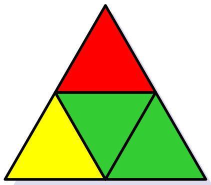


Fig. 4

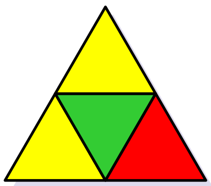


Fig. 5

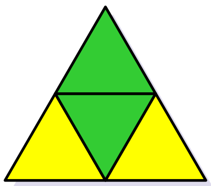


Fig. 6

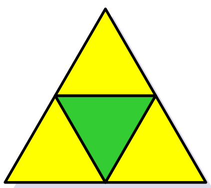


Fig. 7

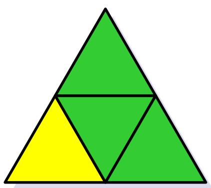


Fig. 8

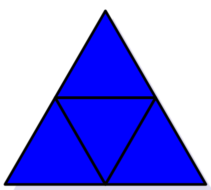


Fig. 9

We have a set of seven colors - Vibgyor. Now the question is how many combinations (subsets) of 4, 3, 2, and 1 colors can be selected from the 7-color set? Suppose, at this stage the order of the numbers in the subset doesn't matter. It means the subset of four colors "blue-green-red-yellow" is considered to be the same as the subset "green-blue-yellow-red."

There is a formula how to figure out the amount of unordered combinations of X with Y numbers. It is equal to Y!/(X! (Y-X)!). X! is factorial of X, Y! is factorial of Y and (Y-X)! is factorial of (Y-X). Any factorial is a product of consecutive numbers starting from 1 till the final number inclusive. For example, 4! equal to 1x2x3x4 or 24.

Thus, the amount of unordered combinations of X with Y is:
1) 4 numbers: 7!/(4! x (7-4)!) = 5040/(24 x 6) = 35;
2) 3 numbers: 7!/(3! x (7-3)!) = 5040/(6 x 4) = 35;
3) 2 numbers: 7!/(2! x (7-2)!) = 5040/(2 x 120) = 21;
1) 1 number: 7!/(1! x (7-1)!) = 5040/(1 x 720) = 7.

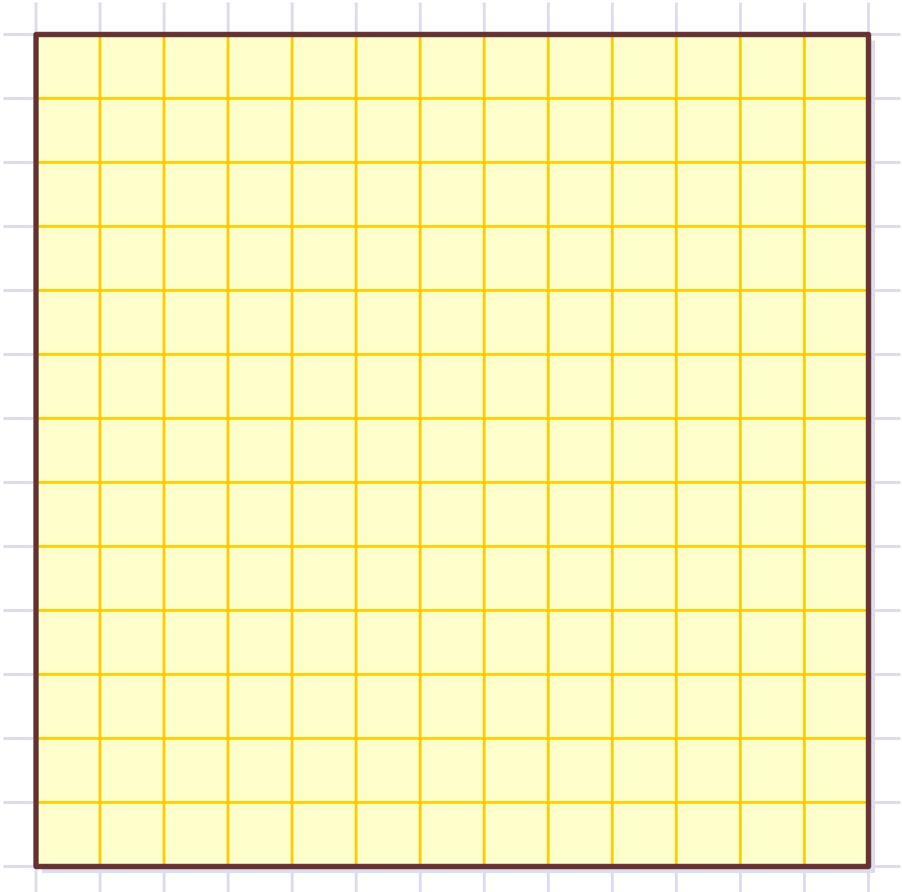
As you can see, because of the formula, the amount of 3-color combinations in a 7-color set is the same as the amount of 4-color combinations, i.e. 35.

Now as we have figured out the total amount of all possible unordered combinations the question is: what are unique schemes in which these combinations can be applied to paint the pyramid? It will be convenient to imagine we are painting our pyramids on the flat cardboard, as in the diagrams, before folding up.

If we take the 4-color subset (say, blue, green, red, and yellow), it can be applied in only 2 distinctive ways, as shown in Figs. 1 and 2. Any other way will only result in one of these when the pyramids are folded up. If we take three colors (say, green, red, and yellow), they may be applied in only 3 was shown in Figs. 3, 4, and 5. Two colors (say, green and yellow) may be also applied only in 3 ways shown in Figs. 6, 7, and 8. Any single color (say, blue) may obviously be applied in only 1 way shown in Fig. 9.

Multiplying the number of unordered combinations by the number of distinctive colored scheme for that combination we obtain the following amounts:
1) 4 colors: 2 x 35 = 70;
2) 3 colors: 3 x 35 = 105;
3) 2 colors: 3 x 21 = 63;
4) 1 color: 1 x 7 = 7.

Thus, a total amount of the unique ways how the pyramid me be painted in, using each time the colors from the solar spectrum is the sum of these four numbers: 70 + 105 + 63 + 7 = 245.



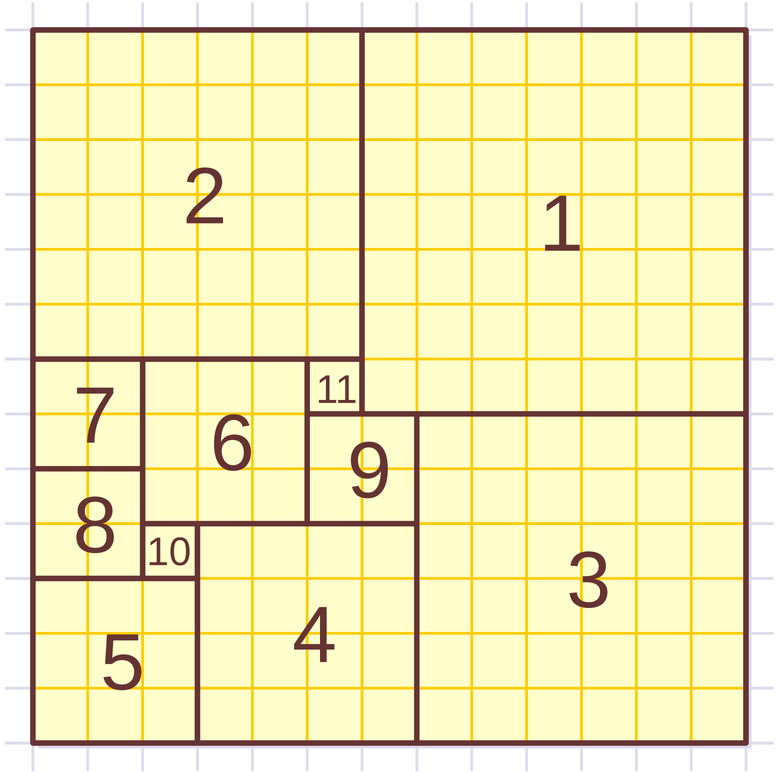
The big 13x13 square shown in the illustration can be dissected into some number of square pieces (cutting along the lines only).

The question is what is the minimum number of such squares?

Apparently, the largest possible number is 169, where all the pieces are of the same size - exactly one cell.

Another sample of solution can be one square 12x12 plus 25 small squares 1x1 - it makes 26 perfect squares. This is much more better than 169 perfect squares, but it's still more than a desired minimum...

In any case, you MUST use all 169 single squares of the 13x13 grid in your set of square pieces - no single square or their combination can be omitted. In other words your set MUST fully cover the 13x13 grid without gaps or overlapping.



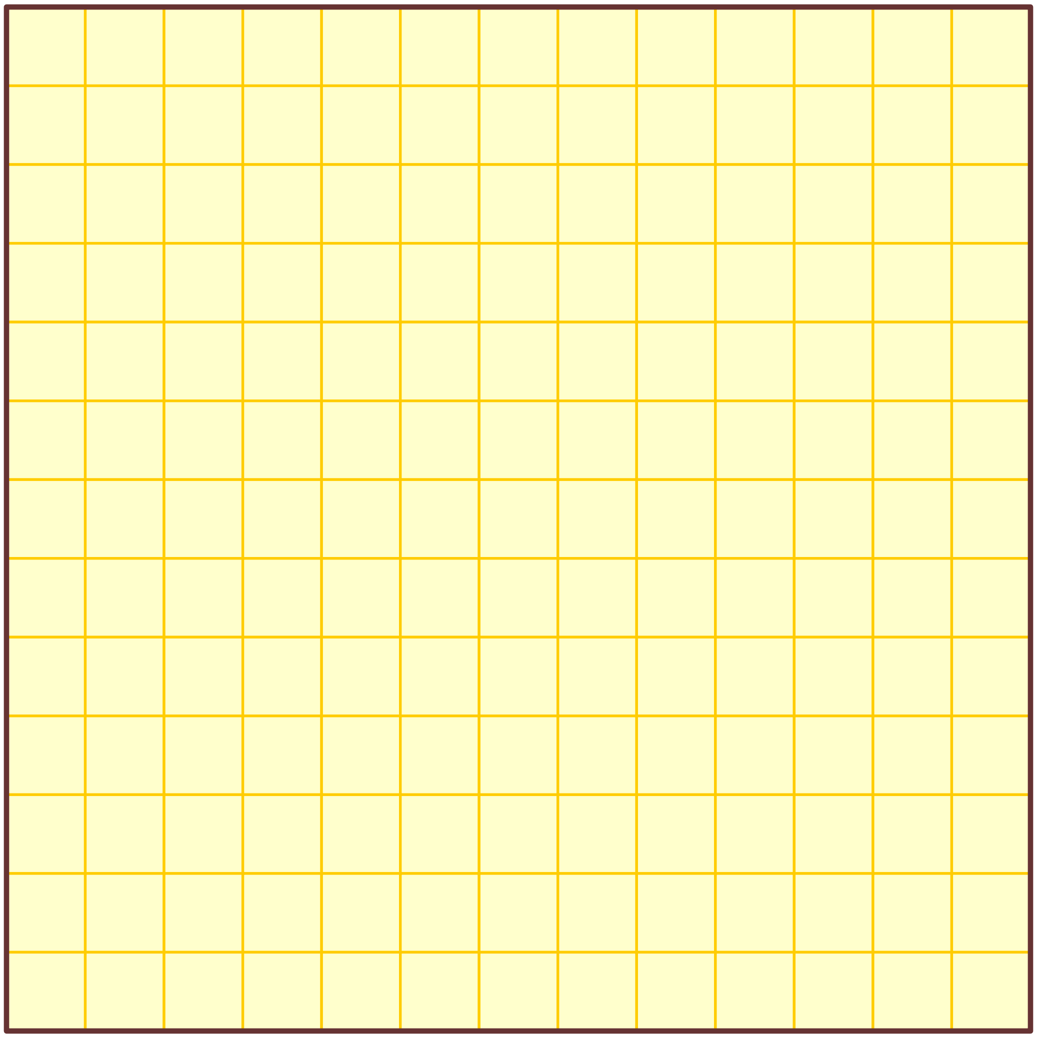
The big 13x13 square can be dissected into 11 squares as shown in the illustration above. We can see: 2 squares 1x1, 3 squares 2x2, 2 squares 3x3, 1 square 4x4, 2 squares 6x6, and 1 square 7x7.

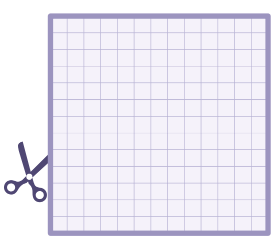
This is the only solution with so few single squares, and this is the minimum that can be reached for the 13x13 square.

It's a really hard puzzle nut. If you make a set of the 11 single squares shown above (simply print them and then cut 'em out) and propose to your friends to assemble into a 13x13 square, you'll see that even so this new puzzle will be amazingly hard to do.

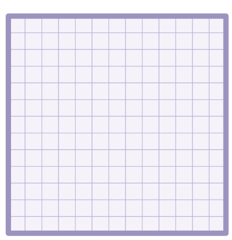
We've received many solutions with 12 squares, and some solutions with... 1 square 13x13. Apparently the last one is wrong, as in the description we told that: "The big 13x13 square shown in the illustration can be dissected into some number of square pieces (cutting along the lines only)."

Also one solution contained just 4 squares, but they are overlapped, so their total area is not 169 but 170. This isn't acceptable as the description says: "... your set MUST fully cover the 13x13 grid without gaps or overlapping."



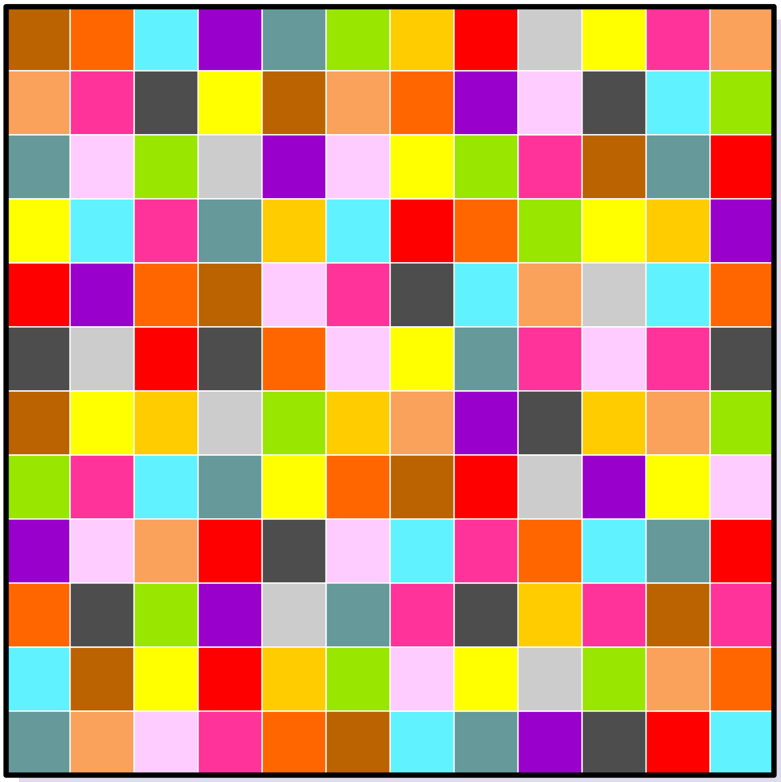


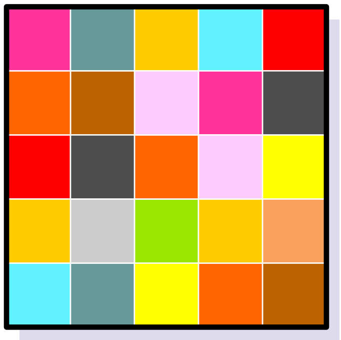
1



F

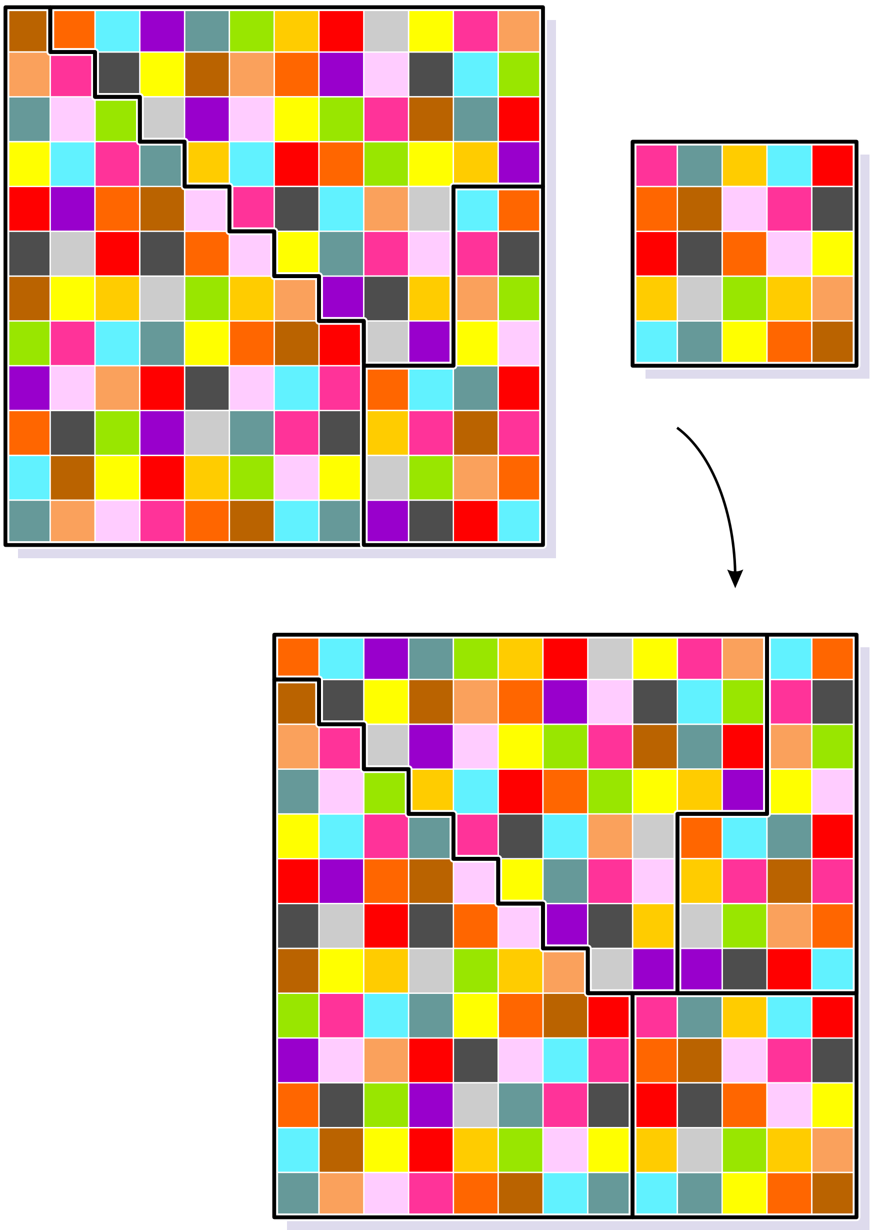
To produce the board first print it out. Then follow the diagram shown above - from step 1 to step F (finish).



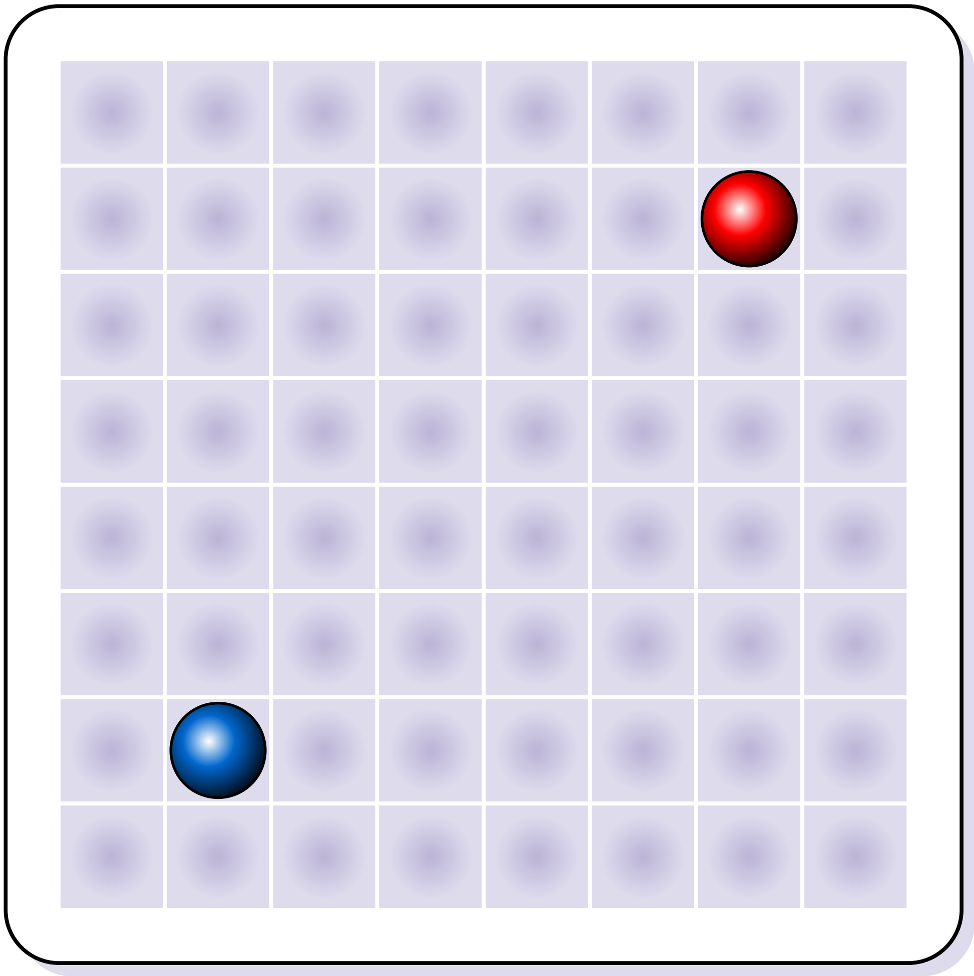


Suppose you have two silk patchwork quilts, each made up of the same-sized squares - one 12x12 and the other 5x5 - as is shown in the illustration. Imagine one day you decided to join them together to make one square patchwork quilt, size 13x13.

What if we would claim that the task is quite possible and that there is no need to cut any of the small squares - all cuts can be done along the stitches? Moreover, it is enough to produce four pieces in total from the two quilts in order to join up for the new one. The question is: would you be bold enough for such a needlework?

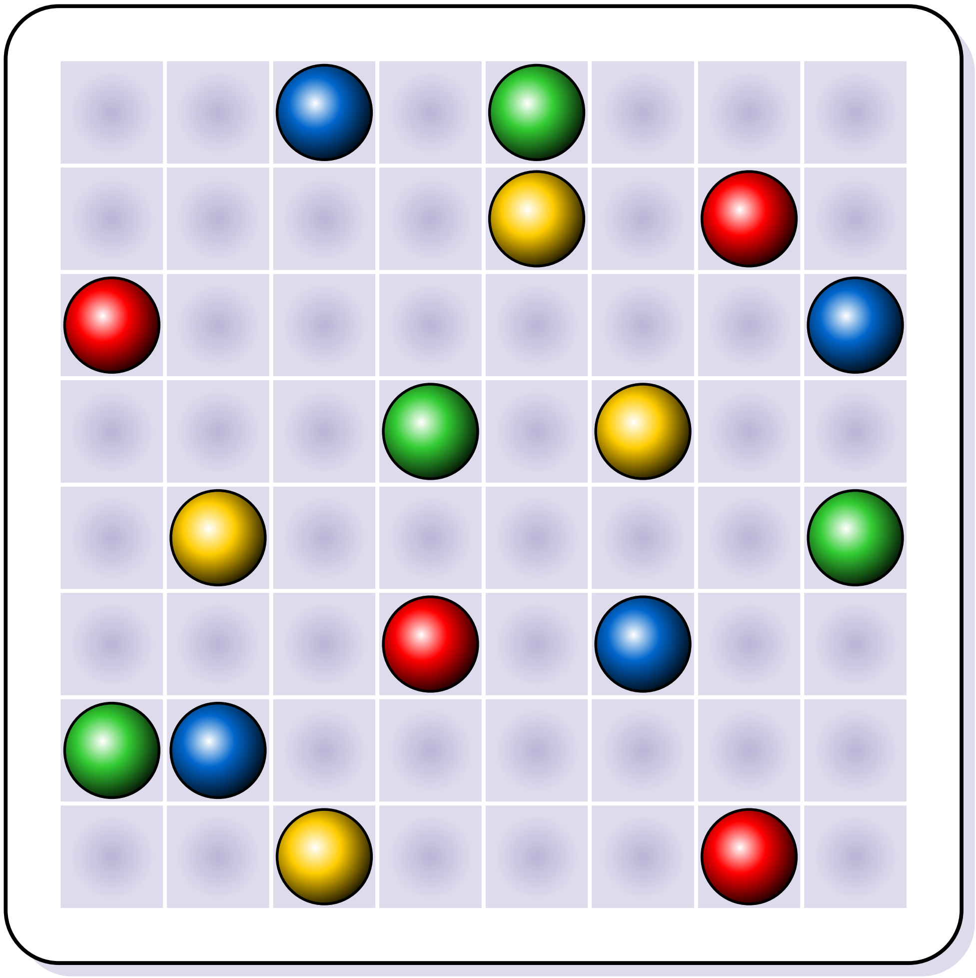


The solution is shown in the illustration.

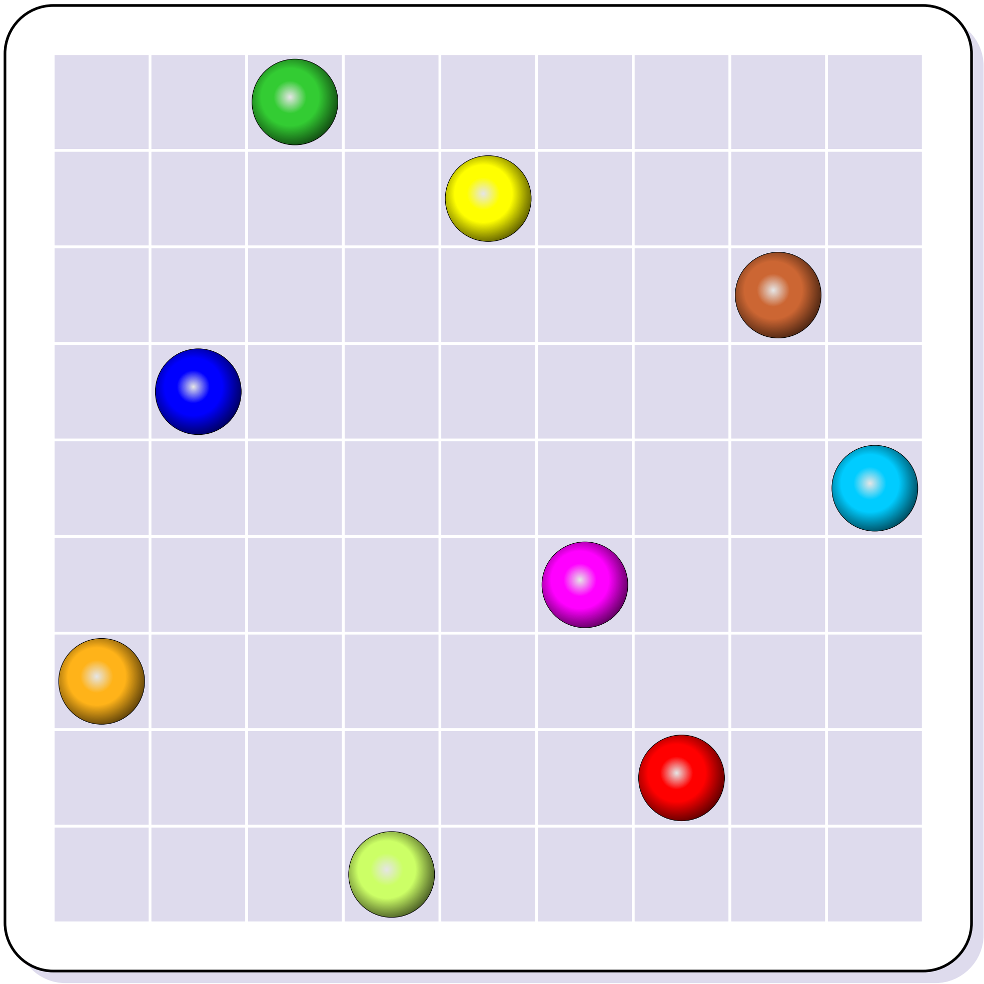


Two balls are placed in the cells of the 8x8 grid as is shown. A straight line can be drawn through the centers of these balls. When a ball is added in the upper right corner of the grid then the same line would pass through the centers of three balls.

The object is to place as many new balls on the grid (a ball per cell) as possible in such a way that any straight line which can be drawn on the gird doesn't pass through the centers of three balls. Thus, it is not possible to place a ball in the upper right corner. What is the maximum number of balls which you can place on the grid observing this "no three in straight line" rule?



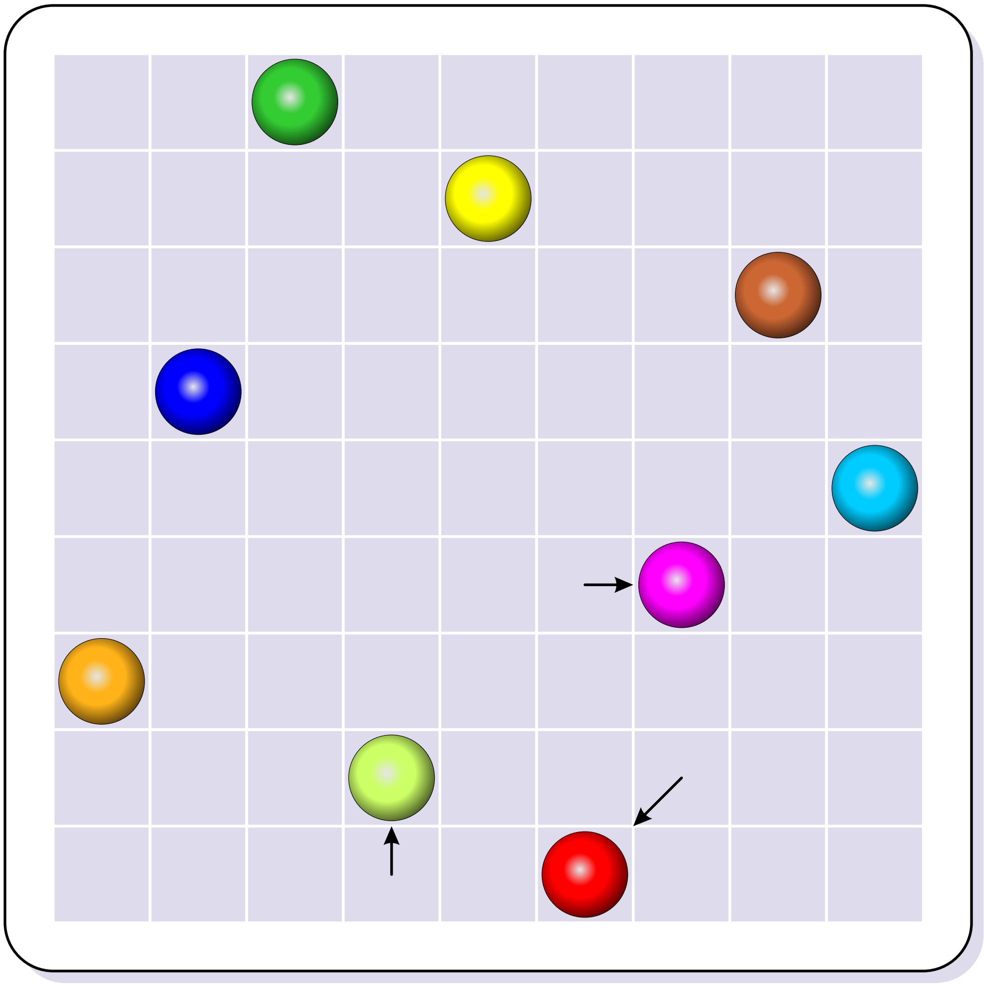
The solution is shown in the illustration. No any three balls are in a straight line.



Nine pearls are placed in the cells of a 9x9 grid in such a way that no pearl is in the same row, column, or diagonal as any other one.

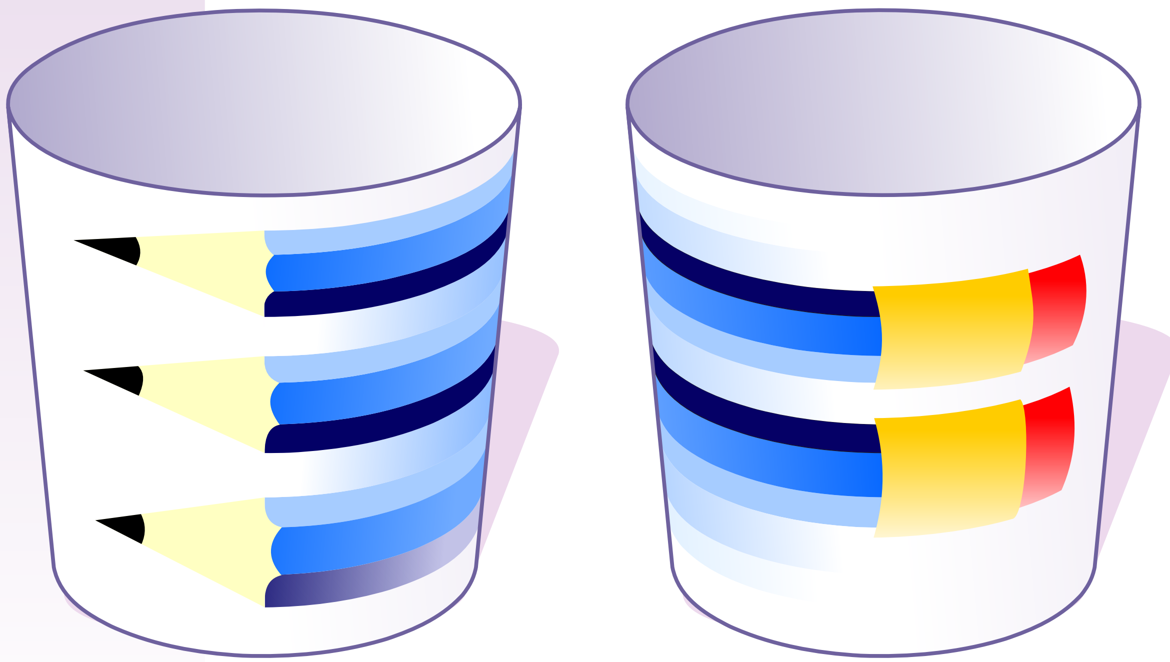
It is known that three pearls can be moved to adjoining cells (horizontally, vertically, or diagonally) and yet no pearl would be in the same row, column, or diagonal.

Can you figure out these three pearls and the adjoining cells they should be moved to?



The solution is shown in the illustration.

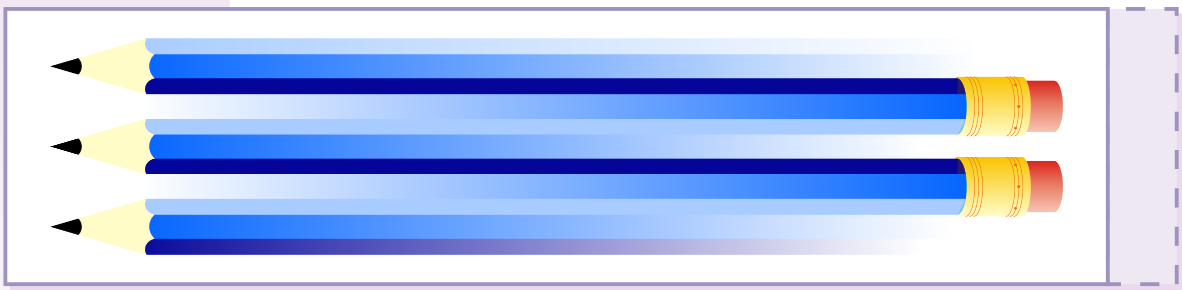
Illusions



Pencil Illusion

by Serhiy and Peter Grabarchuk

Three pencils are drawn on the surface of a cylinder as shown in the left illustration above. When you rotate the cylinder clockwise you'll discover that the three pencils turned... into just too - as shown in the right illustration above. How this could happen?



Pencil Illusion (explanation)

The illusion itself is based on a pattern that is drawn on the cylinder's surface. The pattern is shown in the illustration.

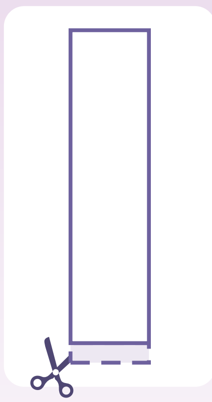
From this pattern it can be easily seen that the sides of each two pencils at the right are assembled of the sides of two its neighbors and a gap between them.

To produce the cylinder you may use its pattern shown in the last page of this file.

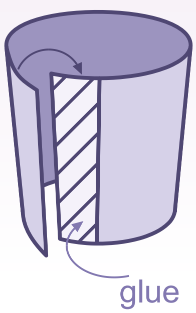
Treasure of Classic and Modern Puzzles

Illusions

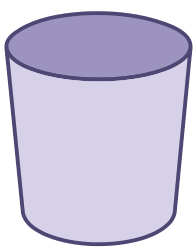
1

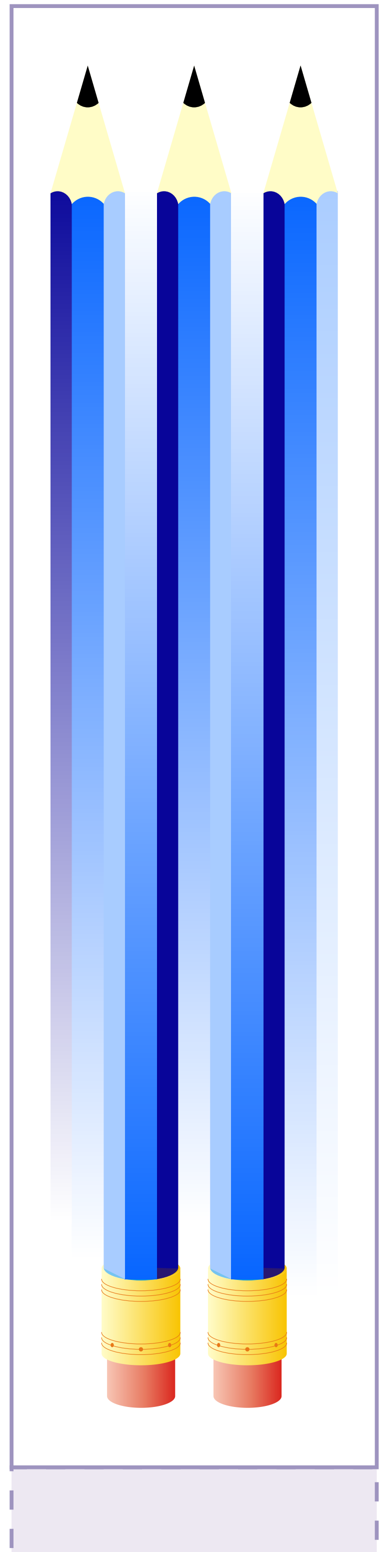


2



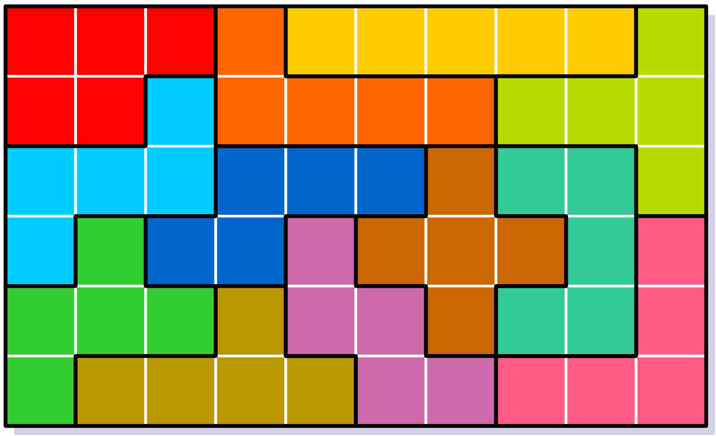
F

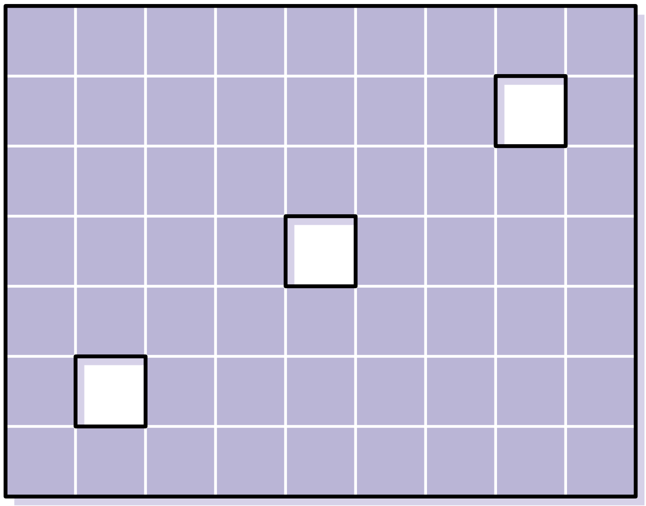




Pencil Illusion (pattern)

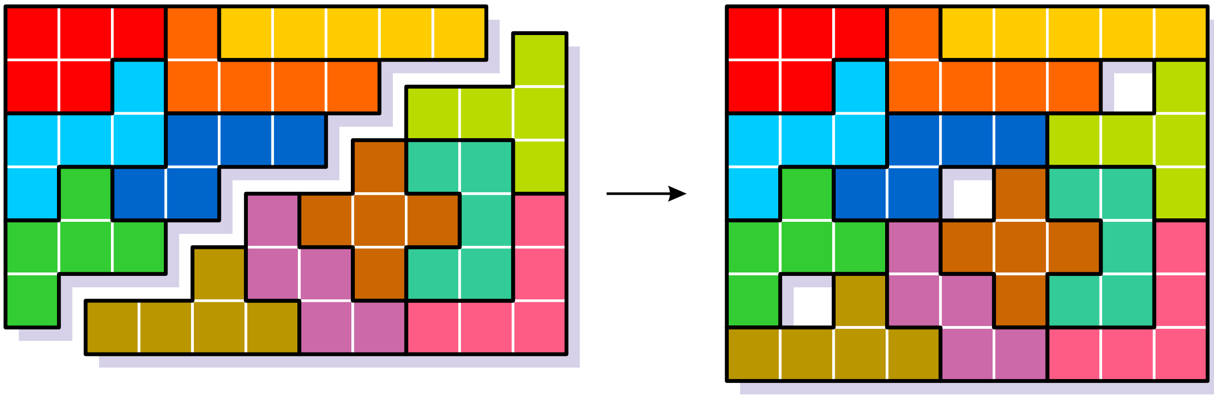
To produce the cylinder device first print its pattern out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).



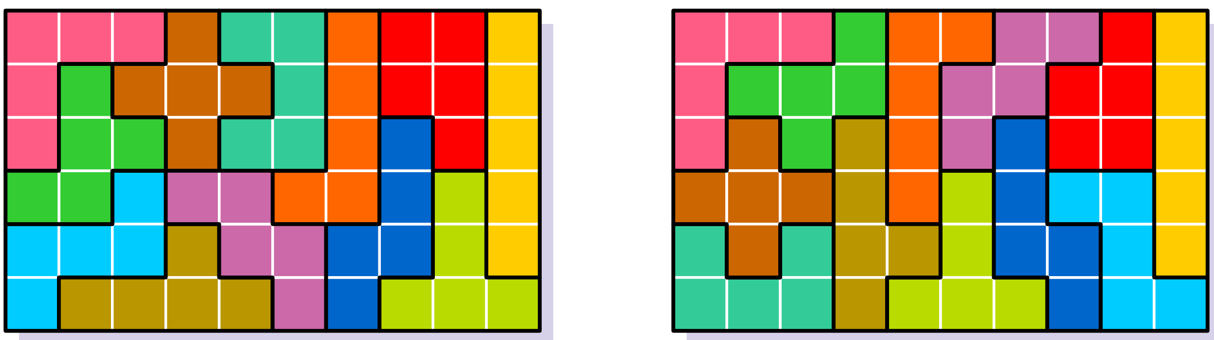


Puzzle 1. Twelve pentominoes are arranged in a 6x10 rectangle as is shown in the topmost diagram. Can you divide the rectangle, along the black lines only, into two parts that can be fitted together again to make the three-holed rectangle shown in the bottom diagram?

Puzzle 2. Arrange the twelve pentominoes to form a 6x10 rectangle but in such a way that each pentomino touches the border of the rectangle. Of the several thousand fundamentally different ways of making the 6x10 rectangle (rotations and reflections are not considered different), only two are known to meet the condition of this problem. Asymmetrical pieces may be flipped over.

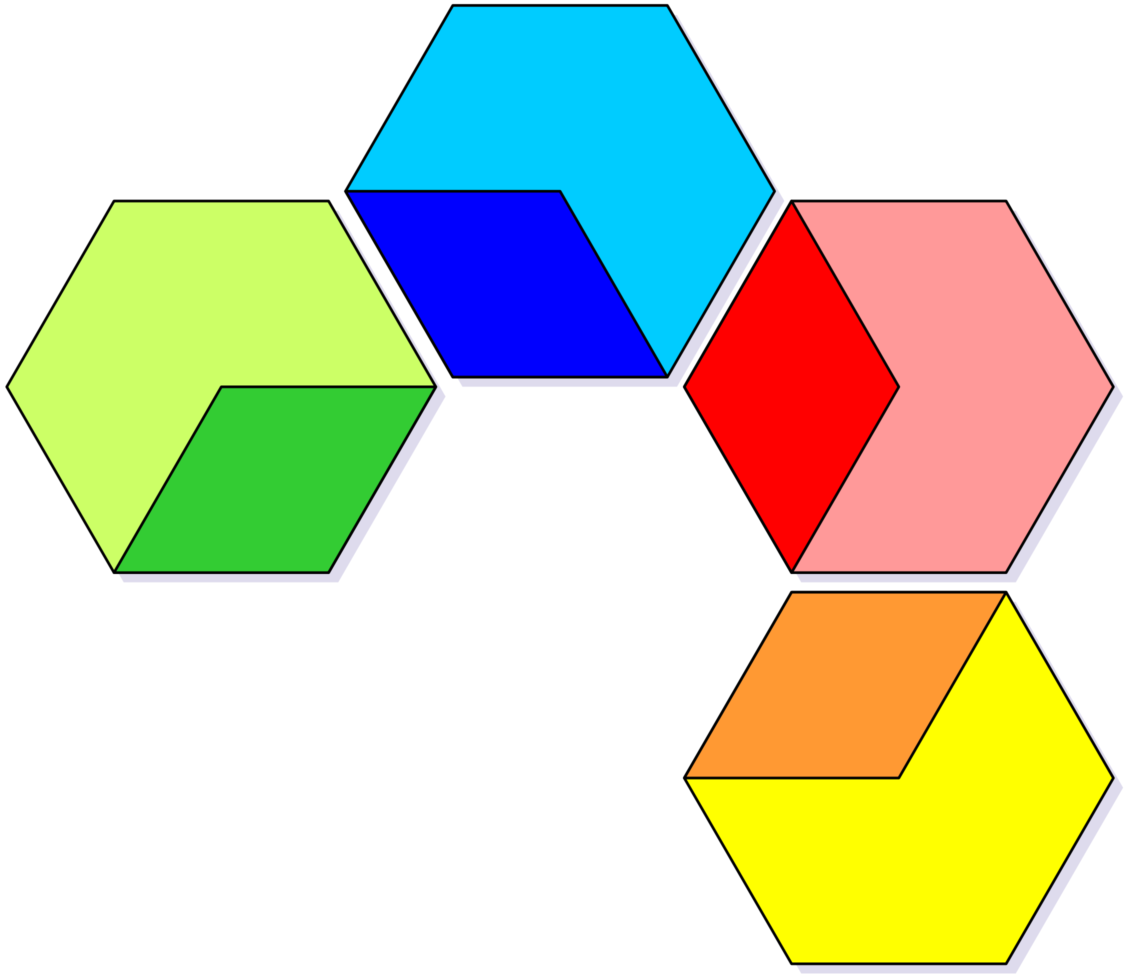


Solution to Puzzle 1



Solution to Puzzle 2

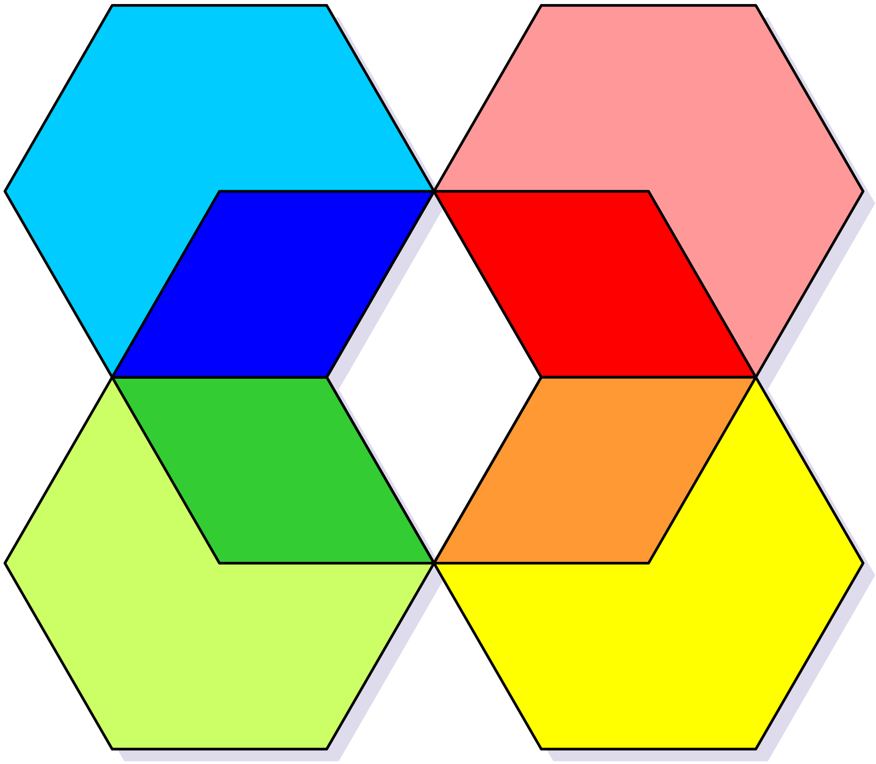
The solutions to both puzzles are shown in the respective diagrams above.



You are provided with four hexagon tiles as those shown in the illustration.

The object is to create from these tiles the contours of six regular hexagons. You can rotate and/or overlap the tiles, but you are not allowed to flip them over.

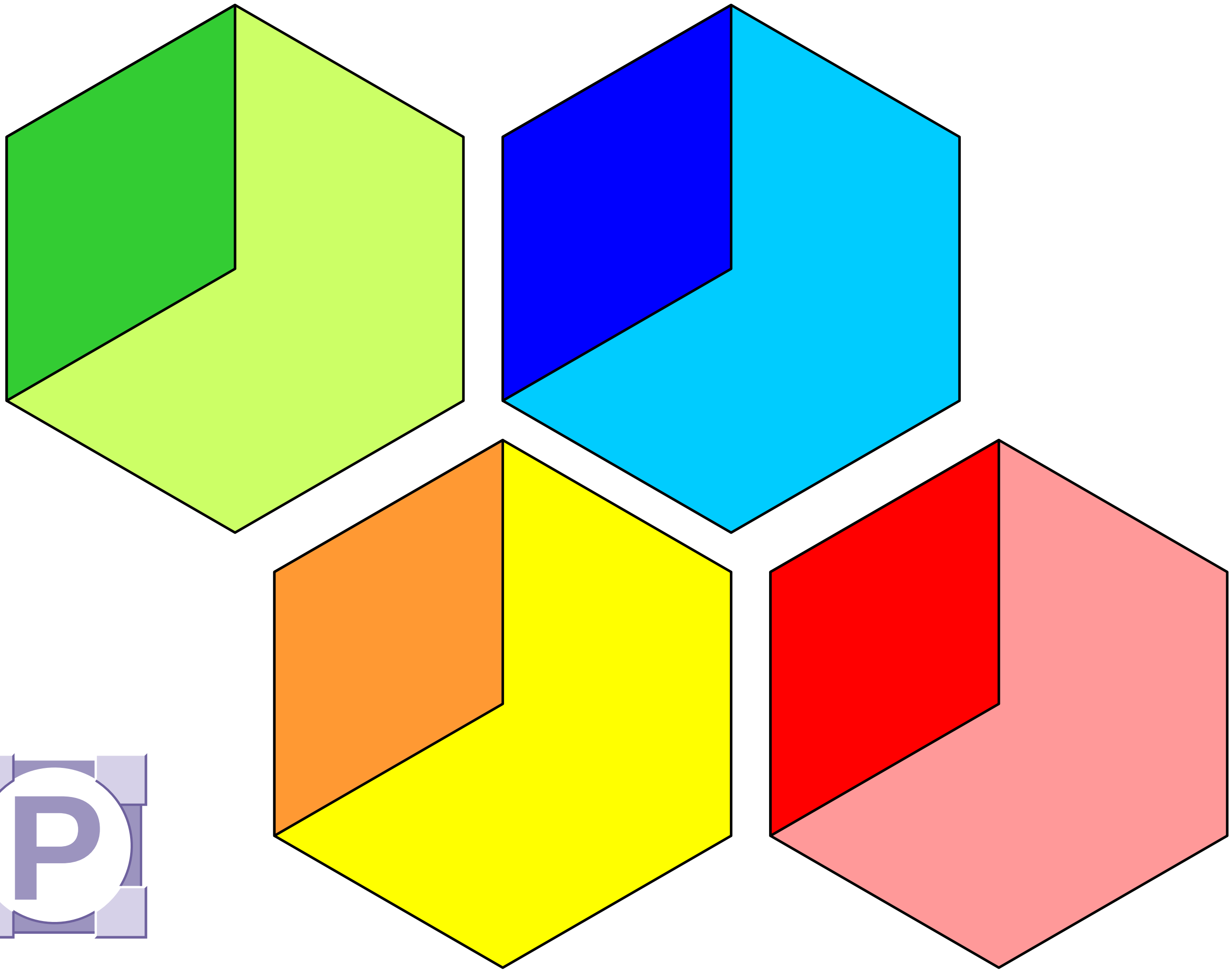
*Based on *Hexagons Plus* puzzle by Serhiy Grabarchuk, Jr.

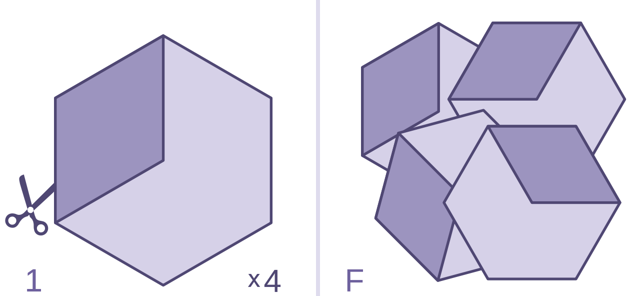


The solution is shown in the illustration.

Plus 2 Hexagons

Pieces

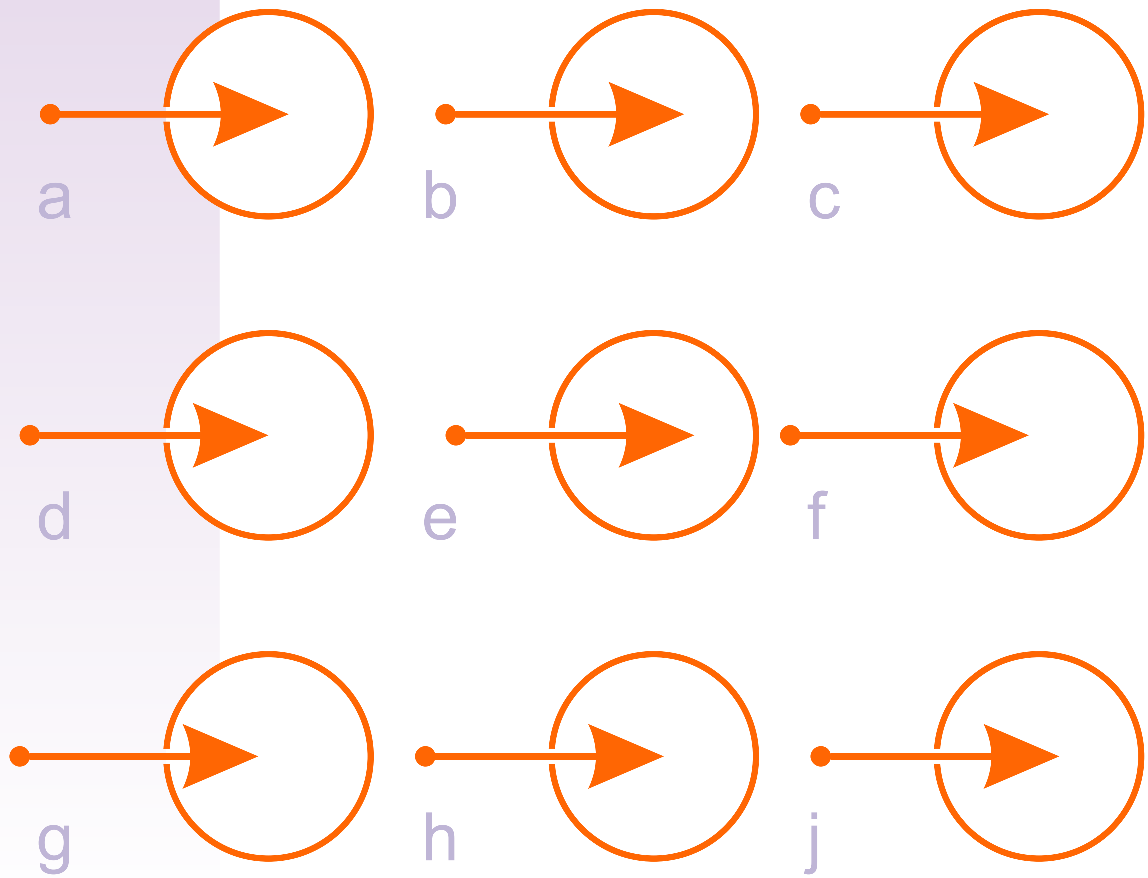




To produce the pieces first print them out. Then follow the diagram shown above - from step 1 to step F (finish).

Last Updated: April 4, 2007

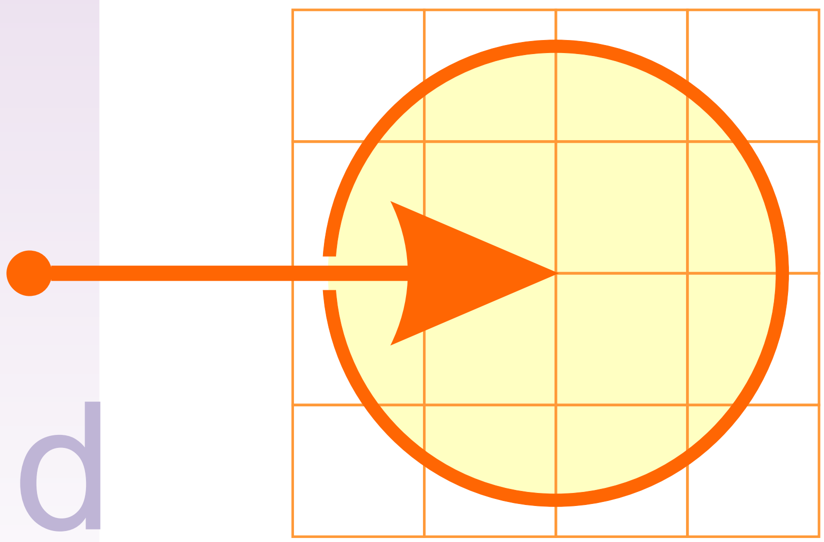
Illusions



Point the Center

by Peter and Serhiy Grabarchuk

Which one and only one of the nine arrows' tips points exactly into the center of the respective circle?



d

Point the Center (explanation)

Although the arrow in the circle ***d*** points exactly into its center, the very sharp tip of the arrow combined with a big lighter area around it makes the visual illusion that the arrow doesn't reach the center, and thus it seems to be pointing a little bit to the left of the center itself.

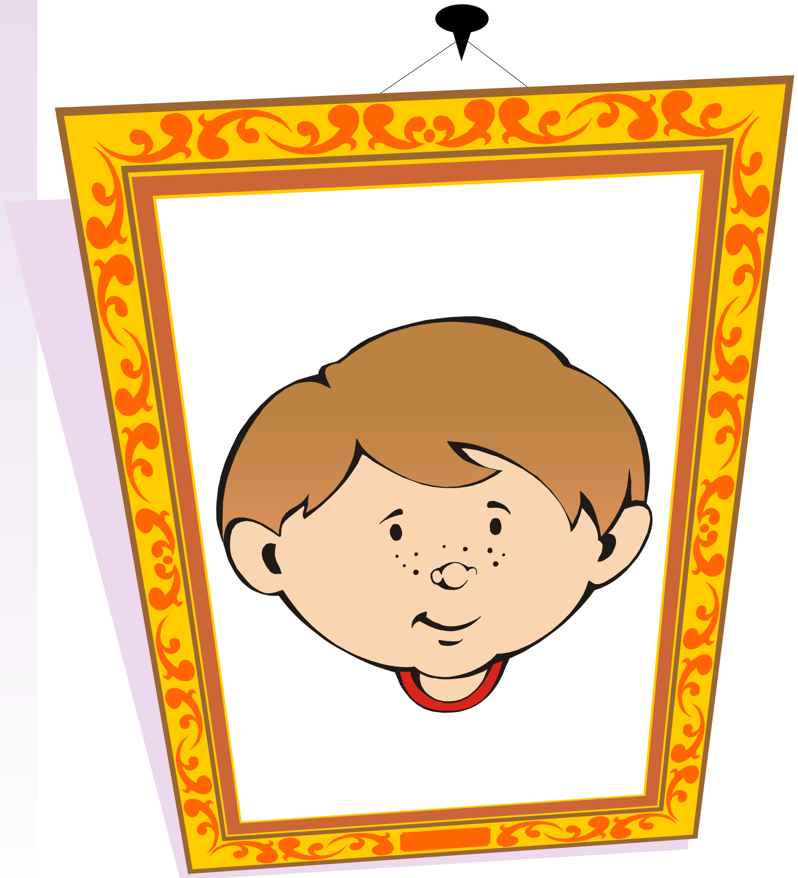
The Portrait

after Professor Louis Hoffmann

One man has a nice portrait in his library. When he was asked whom it represented, he replied:

Uncles and brothers
  Have I none,
But that man's father
  Is my father's son.

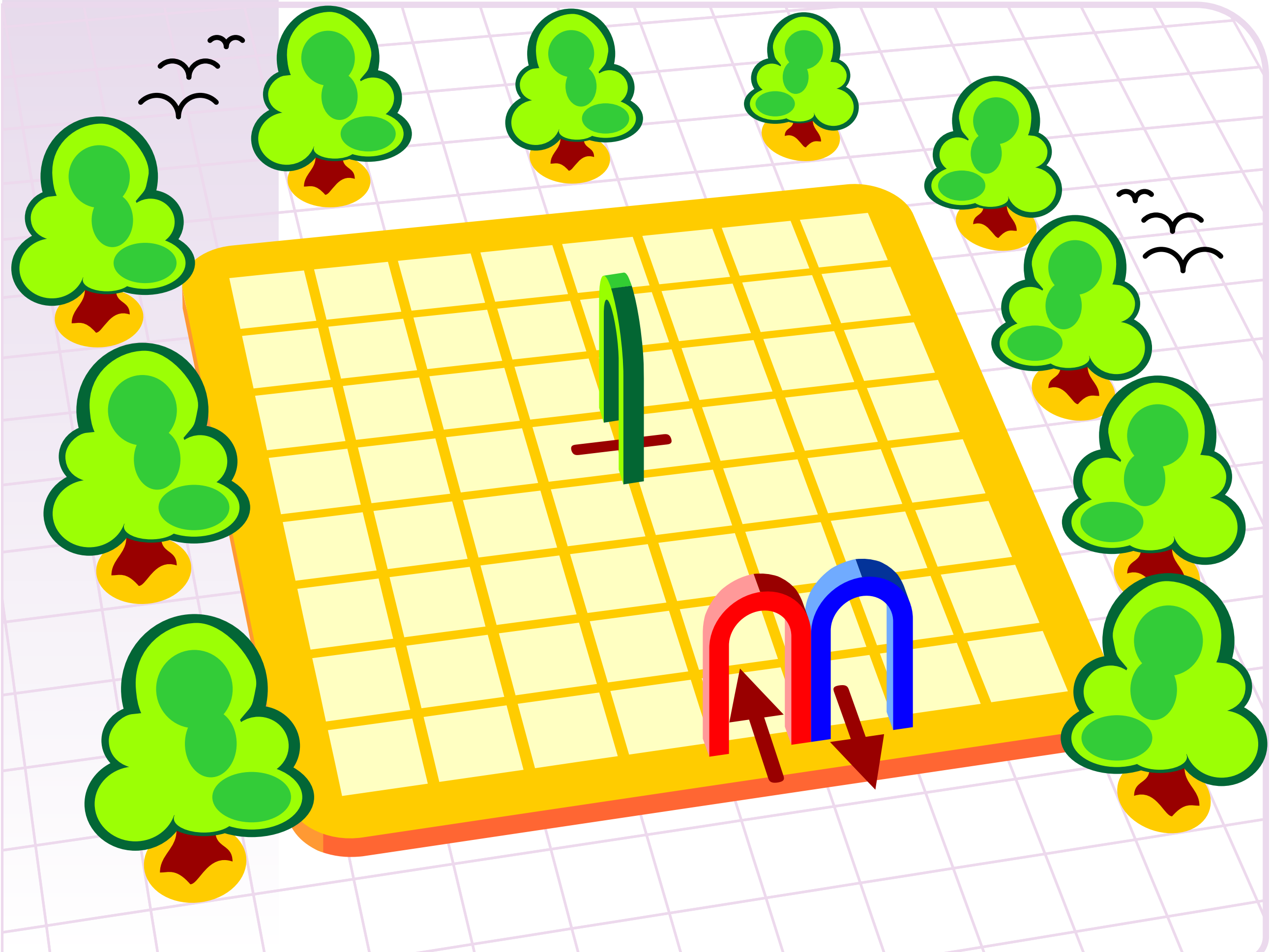
What relation was the subject of the portrait to that man?



The Portrait (solution)

The portrait represented that man's son.

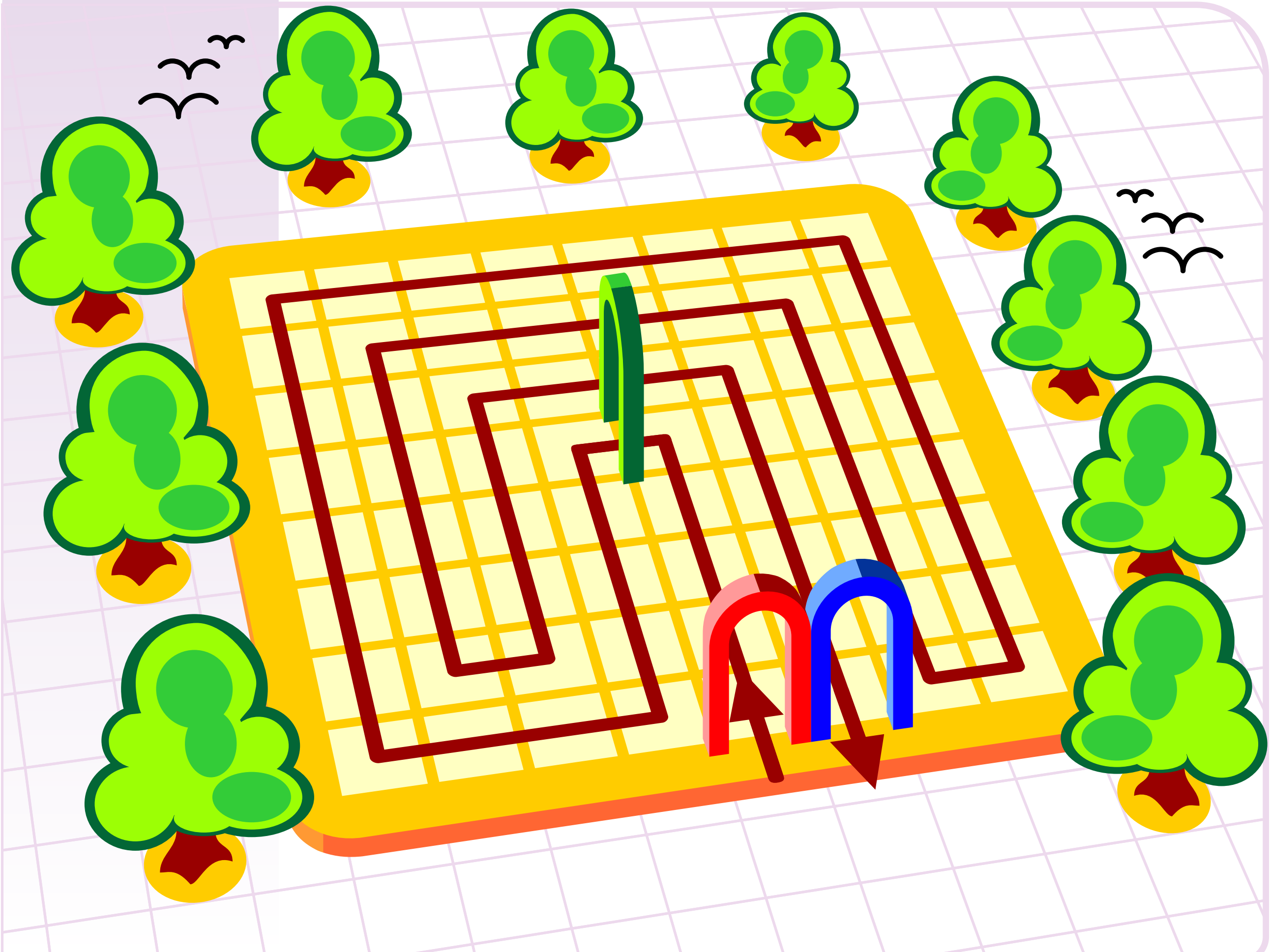
The man said: "The father of that man is my father's son." This means that the father of the subject must be either a brother of that man, or the man himself. He has already told that he has no brothers, therefore he himself is the father, and the portrait represents his son.



Puzzling Journey 2

by Sam Loyd

The goal is to draw a path that goes through each of the 64 cells of the board only once. The path must enter the board at the ***red*** gate, pass under the ***green*** gate in the center of the board and leave it at the ***blue*** gate. Your path must go horizontally and vertically (never diagonally).



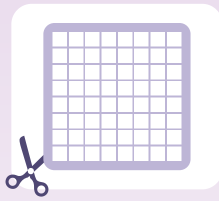
Puzzling Journey 2 (solution)

One of the solutions is shown in the illustration.

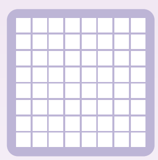
Treasure of Classic and Modern Puzzles

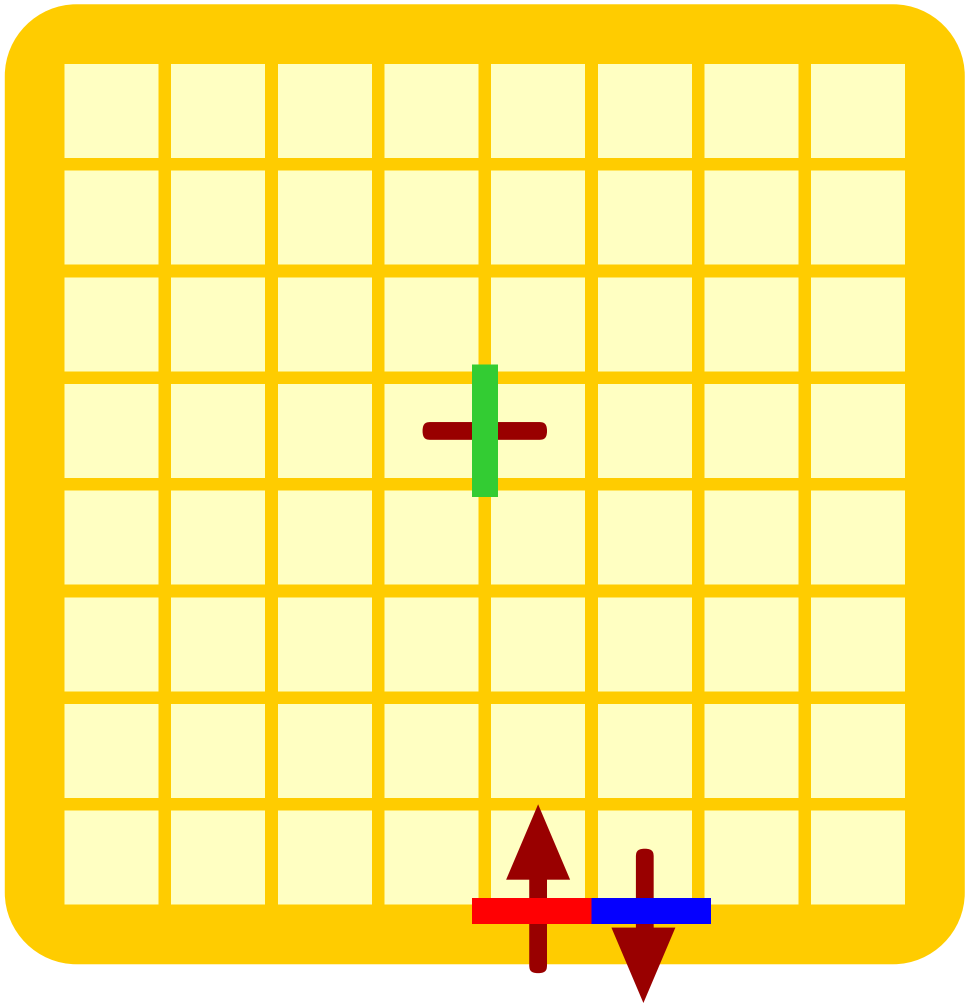
Pencil 'n' Paper Puzzles

1



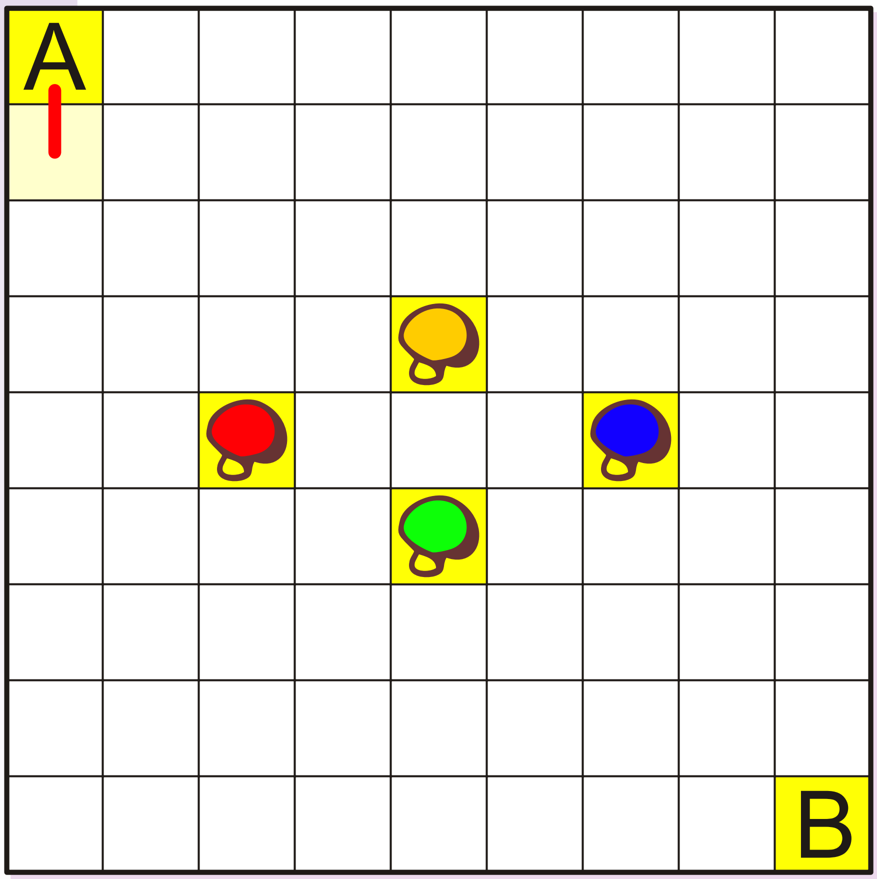
F





Puzzling Journey 2 (board)

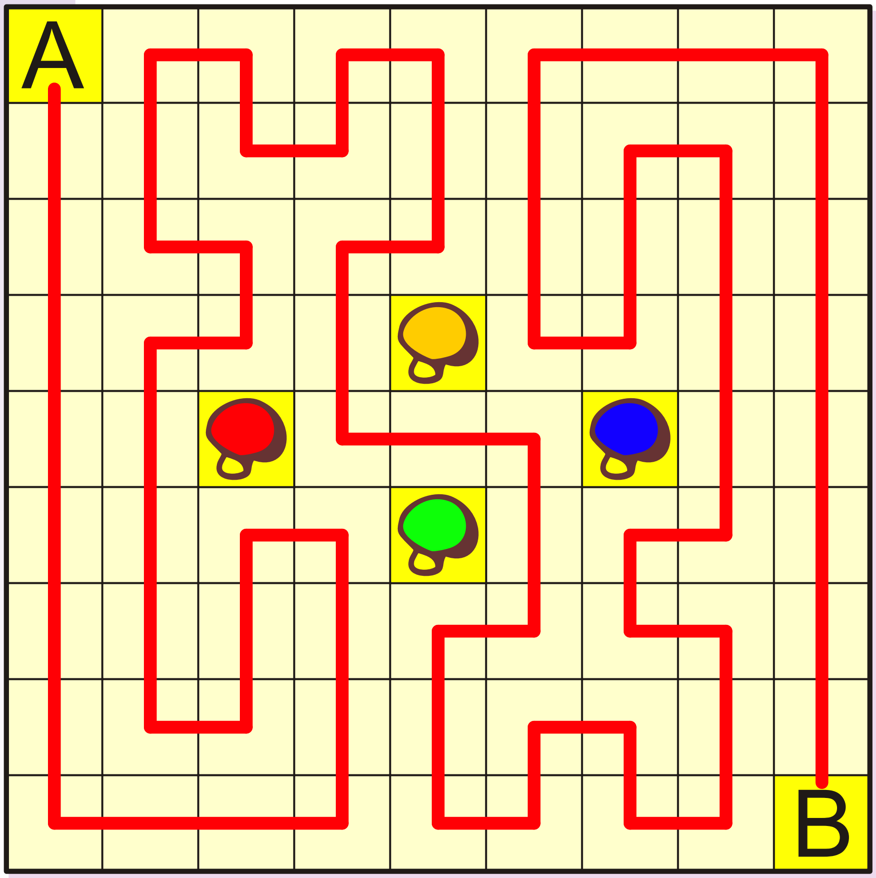
To produce the board first print it out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).



Puzzling Journey

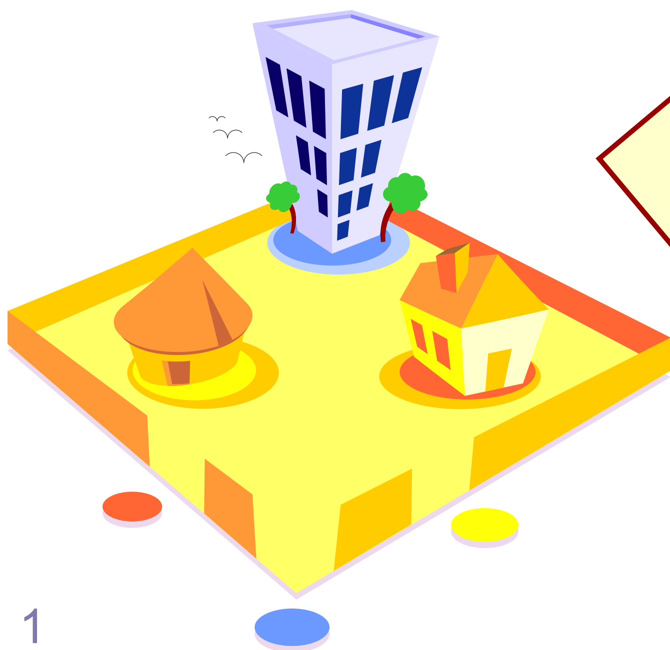
The goal of this puzzle is to draw a path from A to B so that it goes through each empty square of the board only once and has no self-crossings. Your path must go horizontally and vertically (never diagonally), and it has to avoid the four squares with the mushrooms in them.

There is an additional condition: the second square of the path must be exactly under the A square as shown in the illustration.

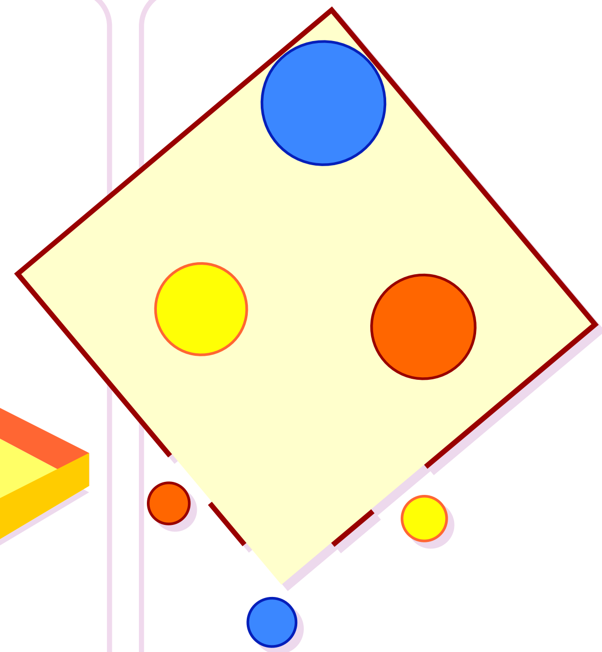


Puzzling Journey (solution)

One of the paths is shown in the illustration.



1



2

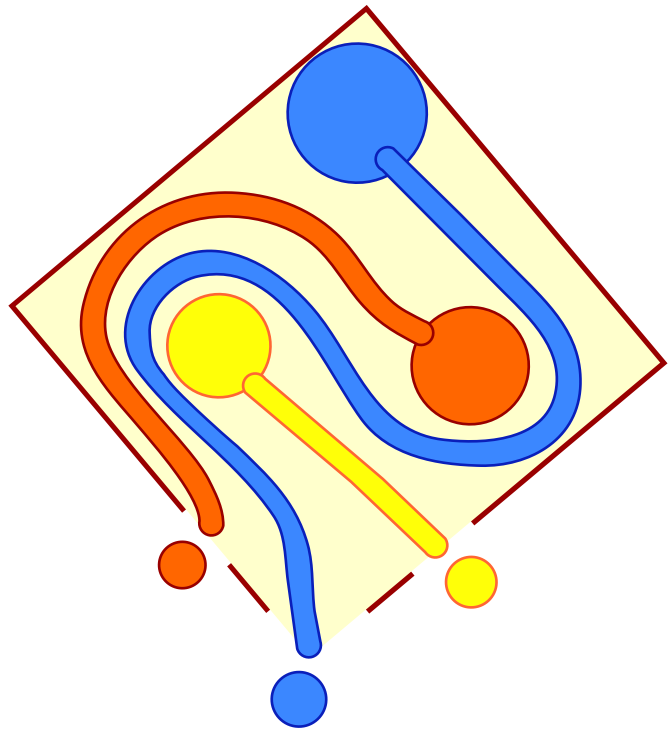
The Quarrelsome Neighbors

after Sam Loyd

Three neighbors - the owners of the skyscraper, the bungalow and the cottage - who share the small park, as shown in Figure 1, have a falling out. This led them to the decision to build three pathways from their houses to the gates of the park (every path to another gate), so that none of the paths cross each other!

The owner of the skyscraper wants to build the path to the central gate. The owner of the bungalow (on the left) wants to make the path to the gate on the right, and the owner of the cottage (on the right) wants to have his path to the left gate. The colors of the lawns around the houses and the respective spots next to the gates will help you to understand their plan. Please, notice that none of the path can go behind the skyscraper (Figure 2)

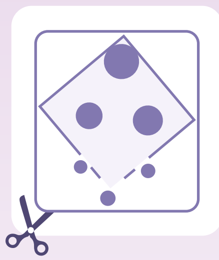
How do the quarrelsome neighbors have to build their pathways?



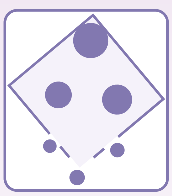
The Quarrelsome Neighbors (solution)

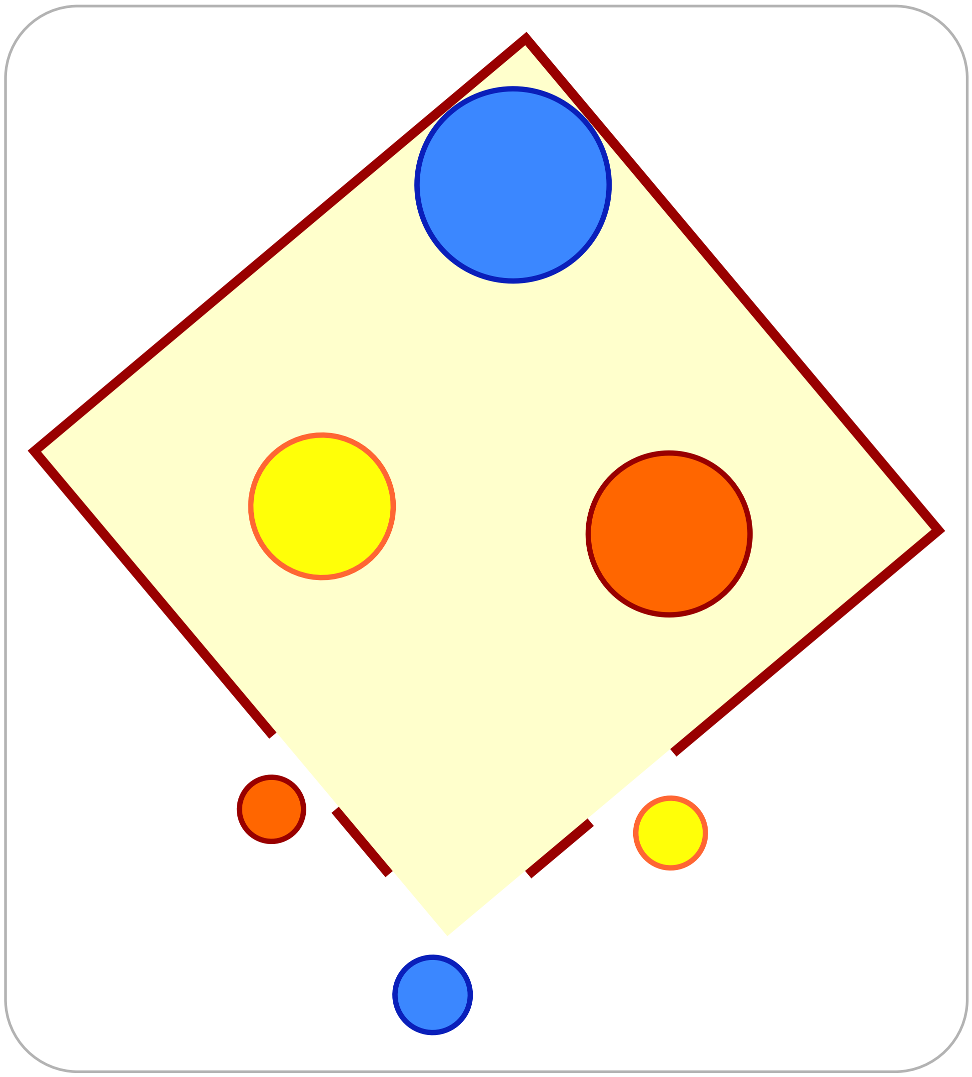
The quarrelsome neighbors have to build their paths as shown in the illustration or in a symmetric way.

1



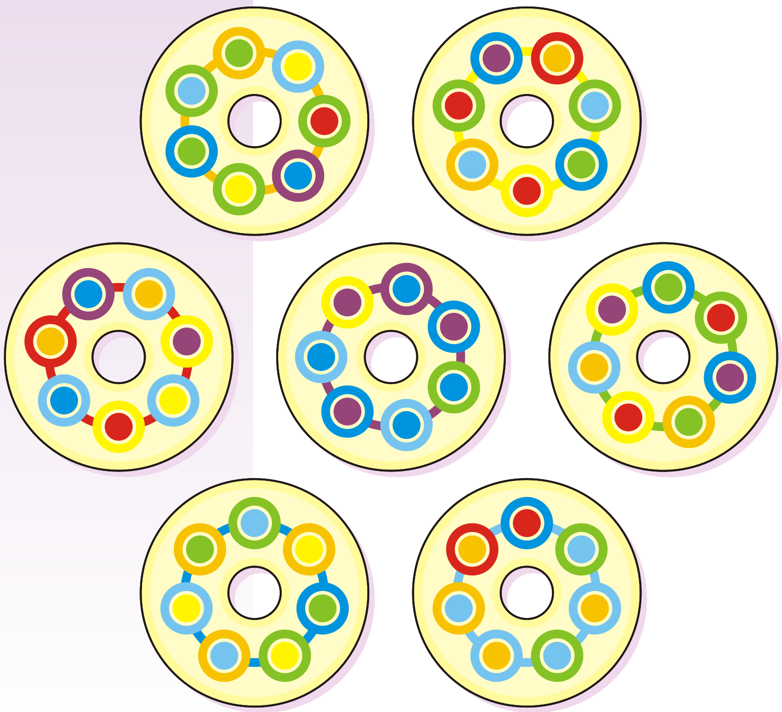
F





The Quarrelsome Neighbors (board)

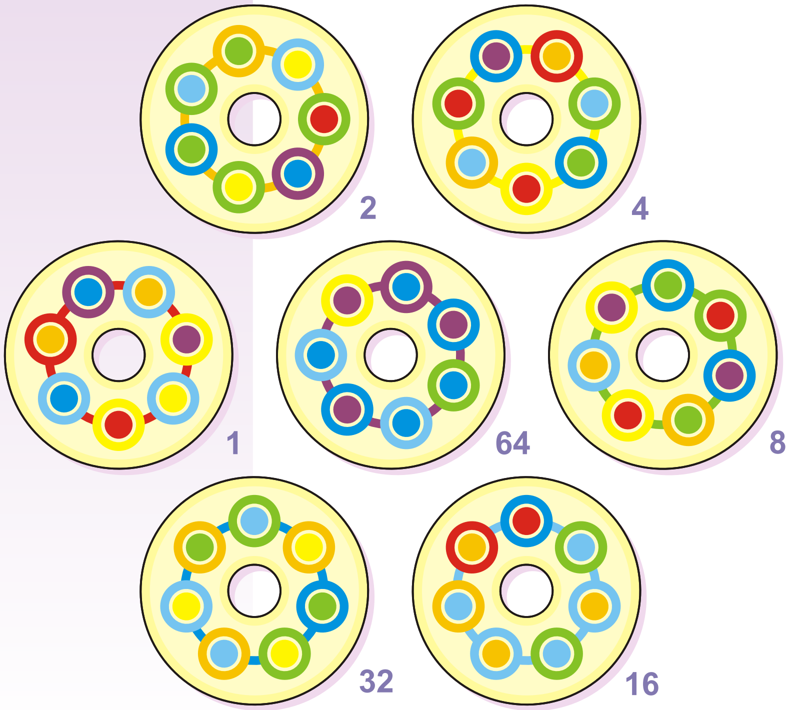
To produce the board first print it out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).



Rainbow Necklace Trick

by Serhiy Grabarchuk

You have the seven cards with a many-colored necklace on each of them. Ask someone to choose any two-colored bead from any necklace, and then ask to turn over all cards without chosen bead (for this simply click each of these cards). After a single peek at the cards you may say exactly which bead was chosen. How do you think you can perform it?



Rainbow Necklace Trick *(secret)*

Each of the seven colors on the cards has its own number.

Tiny color threads going through all the seven beads in each necklace have their numbers as follows:

Red - 1; Orange - 2; Yellow - 4; Green - 8; Light Blue - 16; Blue - 32 and Violet - 64. They use a binary code.

The colors on the beads are numbered as follows: Red - 1; Orange - 2; Yellow - 3; Green - 4; Light Blue - 5; Blue - 6 and Violet - 7.

All the colors form a rainbow spectrum, so this makes them and their order in both sequences easy to memorize.

When you look at the cards which remain unturned you simply have to count (as quick as you can) the sum of the colors of threads on these cards. You always get a two-digit number which says you the two colors of the chosen bead.

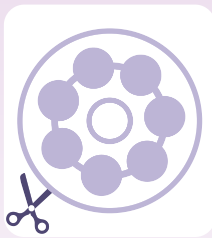
For example, your see that three threads - Orange, Green and Blue lie opened. They give you 2+8+32=42. This means that the center of the chosen bead has the 4th color (Green), while its border has the 2nd color (Orange).

To demonstrate this trick smoothly you may want to have some practice, however.

Treasure of Classic and Modern Puzzles

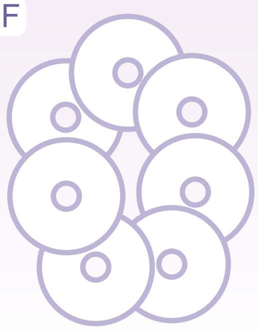
Tricks

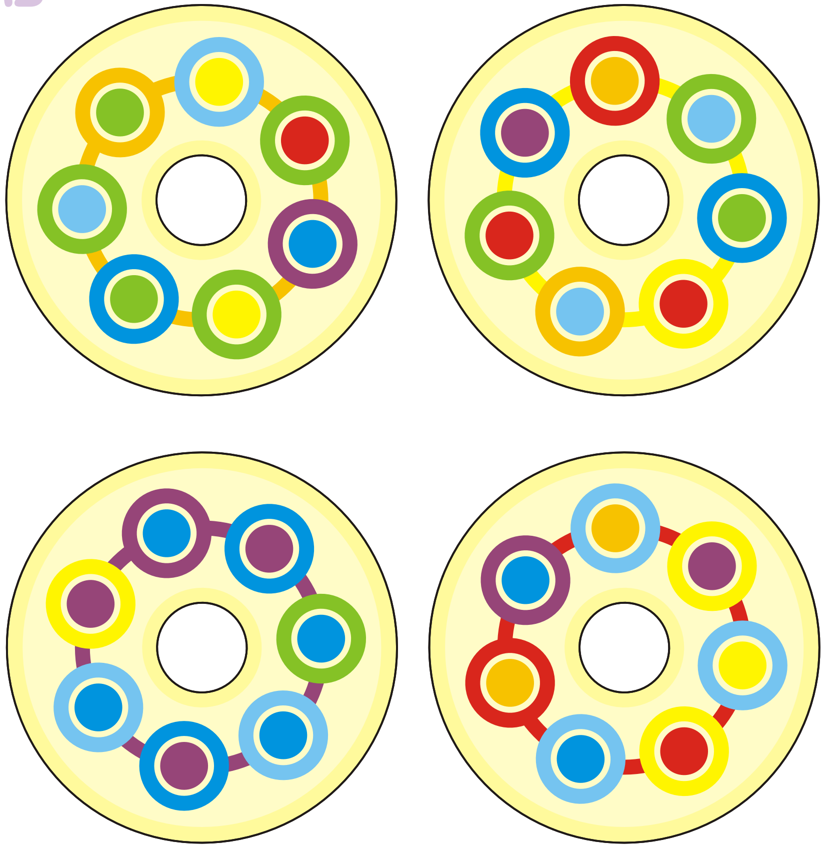
1

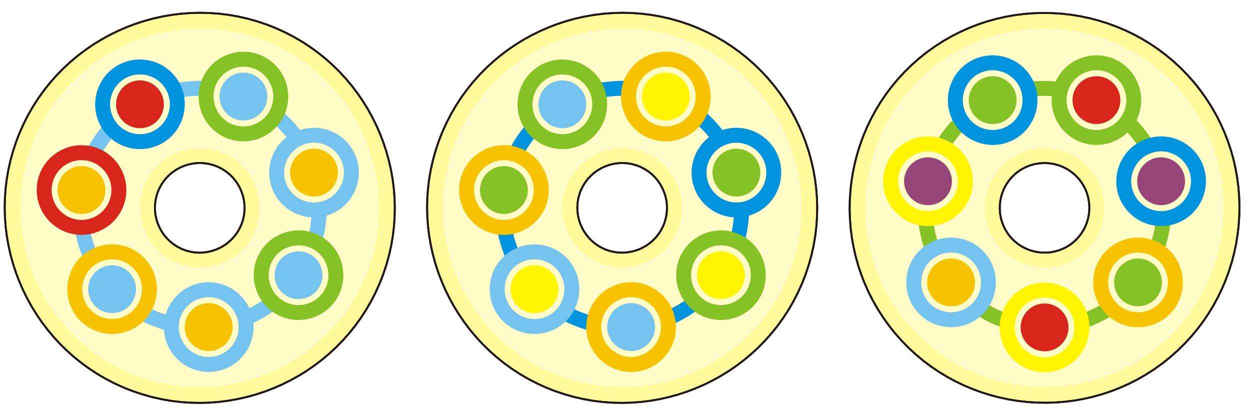


x 7

F



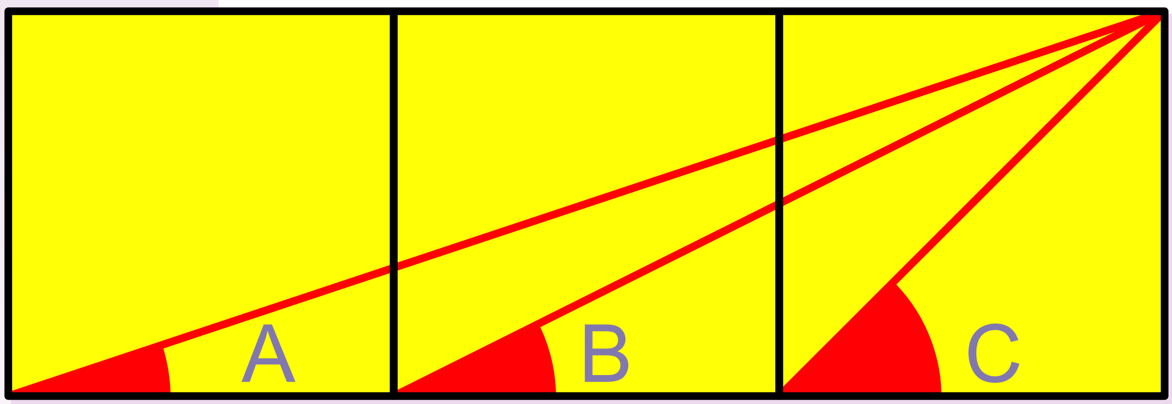




Rainbow Necklace Trick (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

Geometrical Puzzles

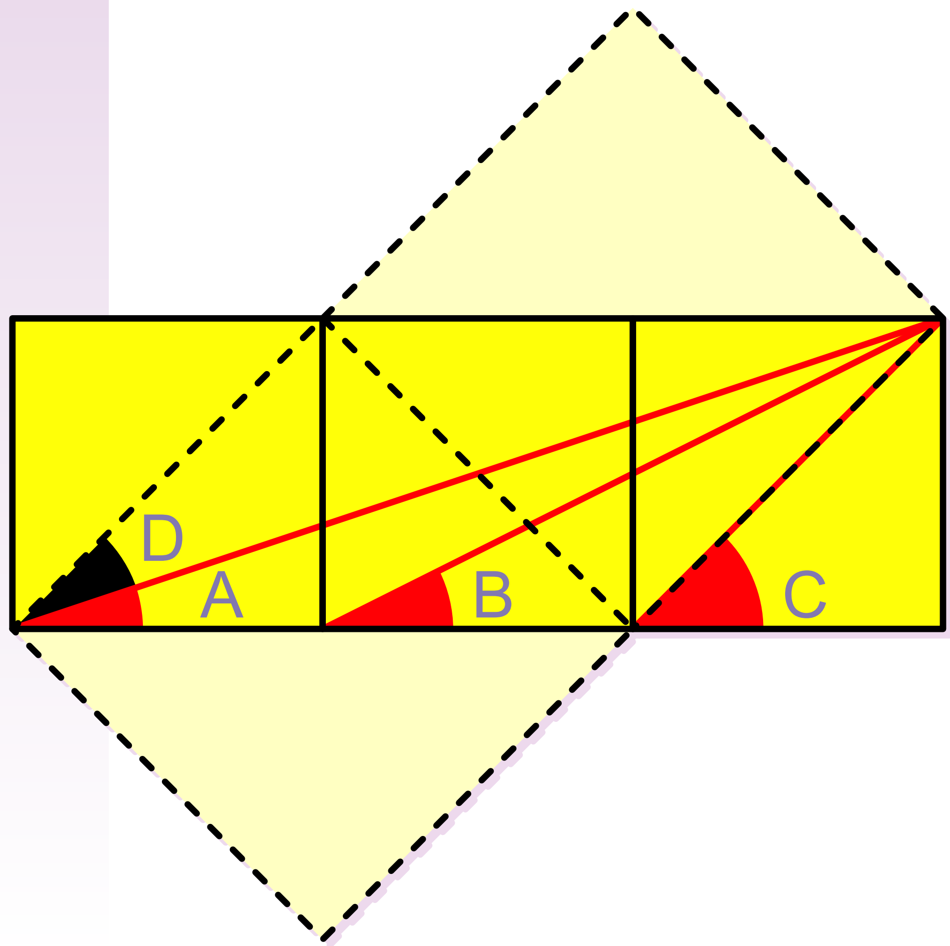


Rays Through the Squares

after Martin Gardner

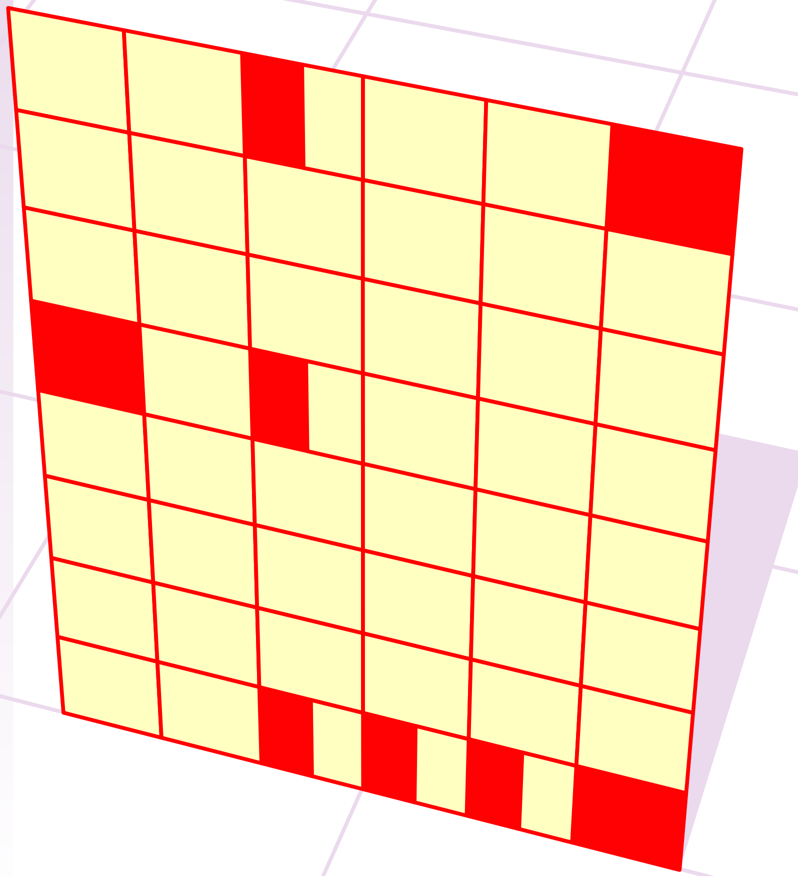
Using only elementary geometry (not even trigonometry), prove that angle C in the illustration equals the sum of angles A and B.

Geometrical Puzzles



Rays Through the Squares (solution)

Let's construct the additional squares indicated by dotted lines. It is clear from the illustration that angle C is the sum of angles A and D. Angle B equals angle D because they are corresponding angles of similar right triangles (with the respective legs in the 1:2 proportion). That means B can be substituted for D, which automatically makes the C equals the sum of A and B.



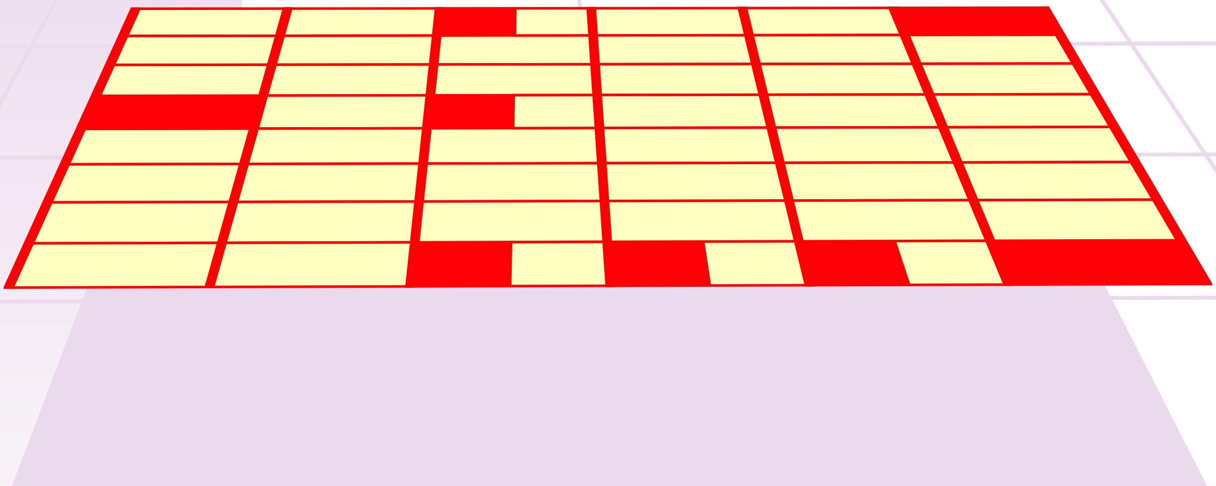
Read the Message

after Martin Gardner

Several cells or halves of them in a 6x8 grid are shaded as shown in the illustration.

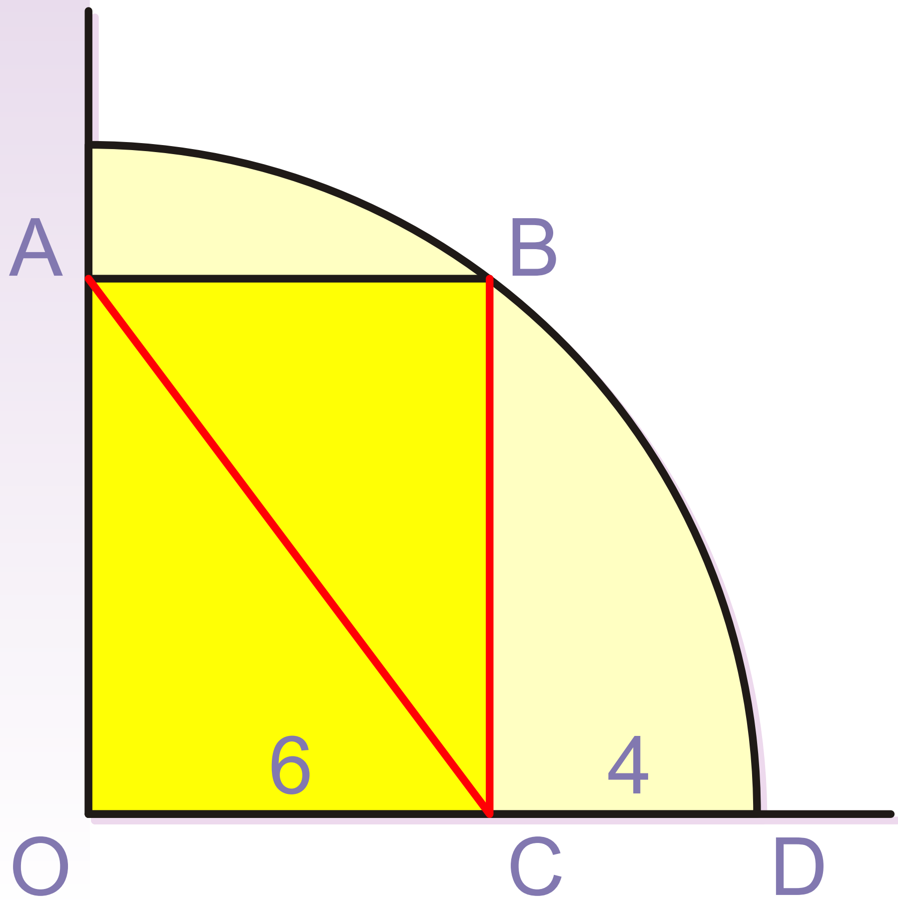
The object is to discover what message is hidden in such a grid?

Word Puzzles



Read the Message (solution)

To read the message it is better to turn the grid as shown in the illustration. Now the message can be read quite easily: HELLO.

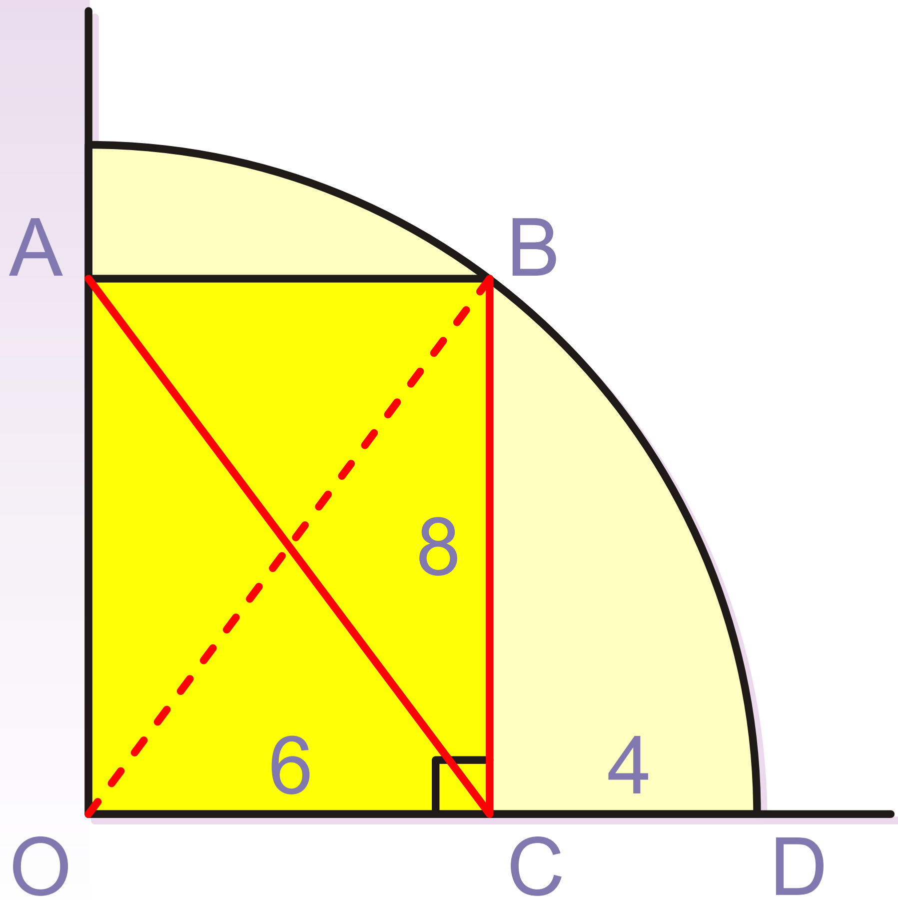


Rectangle Around

after Martin Gardner

A rectangle is inscribed in the quadrant of a circle as shown in the illustration. Given some distances indicated, can you accurately determine the length of the diagonal AC?

A little extra question: can you also determine the length of the rectangle's side BC?



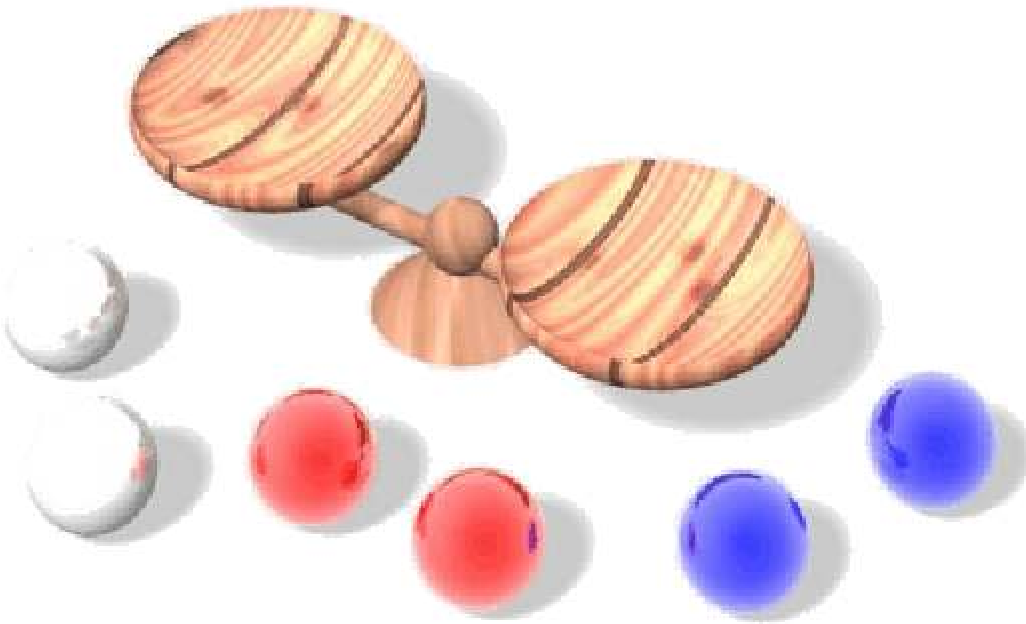
Rectangle Around (solution)

The line AC is one diagonal of the rectangle. As it can be seen form the illustration the other its diagonal BO is exactly equal to the radius of the circle, i.e. OC plus CD, 6 plus 4, or 10 units. Since the diagonals of a rectangle are equal, AC is 10 units long too.

Using the Pythagorean Theorem it can be figured out that the side BC is 8 units long ($10^2 - 6^2 = 8^2$).

Red, White, and Blue Balls

after Martin Gardner



There are three pairs of balls - red, white, and blue. In each pair one ball is a little bit heavier than another one. All the heavy balls weigh the same, and all the light balls weigh the same. Also you have a balance scale.

Now, in just two weighings you have to determine the light and the heavy balls in each pair. How can it be done?

This was a really hard and tricky challenge, and we got a lot of different solutions to this clever puzzle. Among them there were wrong solutions too. The main mistake in them was that some possible combinations of balls on the balance scales were overlooked, and - as the result - all these solutions don't give the correct and full solution for each of the six balls in any given combination.

Actually there are several different ways how to determine the light and the heavy balls in each of the three pairs. We show some of your solutions to illustrate these ways.

Also we got some solutions which imply that our balance scales can produce different angles (indicated with an arrow) or some distinguishable mutual displacements of the pans, and so this can show that some combinations of balls are "more unequal" or "less unequal" when balls on different pans have different weights.

In fact these solutions can't be fully accepted since in our picture we show simple balance scales which can indicate just whether the both pans hold the same weights or different.

Still these solutions are interesting, but unfortunately the same mistake - overlooked combinations - was in all but one of them. See the last solution below.

A solver called our attention that "... according to Gardner in his "Mathematical Circus" this problem was originally purposed by Paul Curry..." Thanks a lot for this important remark!

1. Take 2 balls of same color (say blue).
2. Take one ball each of the other 2 colors; and put each one along with a Blue ball on the trays of the balance. (say Blue & White against Blue & Red)
3. There are 2 possibilities:

First:
i) If the balance is equal, then of the Red and the White balls, one is heavy and the other is light.
ii) Keeping track of which Blue ball was paired with which color, weigh the White and the Red balls against each other. Find which one is heavy. (let us say, White turns out to be the heavier one)
iii) Then the Blue weighed with the White is light and the Blue weighed with Red is heavy.

Second:
i) One side is heavier.
ii) The Blue ball on the heavier side is the heavy Blue one.
iii) Put both Blue balls on one side against the White and the Red balls on the other.
iii) If the side with the Blue balls is heavier, then the Red and the White balls are the light ones of their respective colours.
iv) If the other side is heavier, then the Red and the White are both heavy balls.
v) If the balance is equal, the ball that was paired with the heavy Blue ball during the first time is heavy and the other is light.

Example:

Red: R
White: W
Blue: B

1st weighing:
B1R1 Vs B2W1
Equal:
2nd weighing:
R1 Vs W1 (say R1 is heavier, which implies W2 is also heavy)
Then:
B1 is light and B2 is heavy. We know R1 and W2 are heavy therefore R2 and W1 are light.

Say:
B1R1 is heavier, then B1 is the heavy one and B2 the lighter.
2nd weighing:
B1B2 Vs R1W1
If B1B2 is heavier, R1 and W1 are both light, hence R2 and W2 are both heavy.
If R1W1 is heavier, R1 and W1 are both heavy, hence R2 and W2 are light.
If the balance is equal, R1 is heavy and W1 is light, therefore R2 is light and W2 is heavy.

Nothing like a long shower to clear out the cobwebs...

Place a red and blue marble on one side, and a red and white marble on the other.

Case 1. The two sides are the same:

Since there are not four heavy marbles or four light marbles, each side must have one light and one heavy marble. Thus the heavy red marble has a light marble with it, and the light red marble has a heavy marble with it.

For the second massing, just compare the two red marbles. The heavy and light red marbles are directly discovered. Moreover, the marble with the heavy red marble in the first massing is now known to be light, and the marble with the light red marble in the first massing is now known to be heavy. The untouched blue and white marbles will respectively be the opposite of their known same-colour partners.

Case 2. One side is heavier.

The heavier side cannot have the light red marble, since such a situation would give at most one heavy marble on the heavier side, and at least one heavy (red) marble on the lighter side, which is impossible. So the heavier side must have the heavy red marble, and the lighter side has the light red marble. The red marbles are discovered.

For the second massing, place the two red marbles on one side, and the one blue and one white marble from the first massing on the other side. If the blue/white side is heavier than the two reds, both marbles are heavy. If the blue/white side is lighter, both are light. If the balance is the same, then one marble is light and the other heavy. The marble that was with the heavy red in the first massing is heavy and the marble with the light red in the first massing is light, since the reverse would have resulted in a tie in the first massing.

As before, the untouched blue and white marbles will respectively be the opposite of their known same-colour partners.

This is a great puzzle. The hardest part is giving the solution in simple steps, but here goes...

Let's first label our balls... R1,R2,W1,W2,B1,B2 and then start weighing...

Weighing 1: Lets weigh R1,W1 vs R2,B1
There are two possible results:
The scales will balance or they won't.

If the scales balance: R1,W1 = R2,B1
then we know that there is a Heavy and a Light on each side. We just don't know who's who. We know this because the Reds can't both be Heavy nor can they both be Light. So we have the following possibilities for R1,W1 = R2,B1:

R1(H),W1(L) = R2(L),B1(H) or
R1(L),W1(H) = R2(H),B1(L)

Notice that this makes W1 the opposite of R1 and B1 the opposite of R2 so.....

Reds opposite Whites R1 = W2, R2 = W1
Reds equal Blues R1 = B1, R2 = B2

For the second weighing we just weigh the Reds against each other and the above equations will finish the results.

If the scales don't balance then it gets a little harder.
We know that R1 can't equal R2 and since the scales didn't balance then we know that which ever side was Heavy has the Heavy Red ball. Don't believe me do you. Alright.

Let's say that the weighing looked like this:
R1,W1 > R2,B1 thus R1,W1 Heavier than R2,B1. If R1 was actually Light (thus making R2 Heavy) then the only values W1 and B1 could have would be Heavy and Light respectively. BUT that would have given us R1(L),W1(H) > R2(H),B1(L). WHICH WOULD HAVE BALANCED (see L,H = H,L) SO R1 has to be Heavy if it's scale went down.

That being proven, let's stick with the assumption that R1(H) and R2(L) just to make the logic easier to follow...

The first weighing then gives us the results...
W1 and B1 are the same (both Heavy or both Light) OR
W1 opposite B1 with W1 being the same as R1 and B1 being the same as R2.

This leads us to the final weighing...
We just switch R2 and W1 and wind up weighing R1,R2 vs. W1,B1.

If the scales balance then R1(H) R2(L) and W1(H) B1(L)
If the scales don't balance than R1(H) R2(L) and W1 = B1.

But wait, that doesn't tell us if W1 and B1 are Heavy or Light?
Just answer the question. Did the W1,B1 side of the scale go up or down. There's your answer. The final scale would look like one of the following:

R1(H),R2(L) > W1(L),B1(L) OR
R1(H),R2(L) < W1(H),B1(H)

Ta daaaa.

Like I said. This is a great puzzle. Hope you could get through the logic. I really need to draw it out. Gregory

I consider the pair as R1,R2; B1,B2 ; W1,W2

First weighing

R1+W1 against R2+B1
case 1: if it balances then
second weighing,
Weigh R1 and R2 and find out which is heavier, this also tells which of (W1,B1) is heavier.

case 2 if it does not balance
second weighing
weigh R1+R2 against W1+B1
if R1+R2 side goes down then both W1 and B1 are lighter balls of their pairs
if W1+B1 side goes down then both W1 and B1 are heavier balls of their pairs
if it balances
then the ball which was with lighter red ball in the first weighing is lighter i.e., if R1 was lighter then W1 is also lighter

6 Balls
White = W1, W2
Red=R1,R2
Blue=B1,B2

First weigh: W1+R1 v W2+B1

If balanced then R1 & B1 must be one HEAVY (H) and one LIGHT (L) (because we know W1 and W2 are one HEAVY and one LIGHT)
If balanced, the second weigh is to swap R1 and B1. ie second weigh is W1+B1 v W2+R1
The side of scales that goes down has 2 HEAVY balls, side of scales that goes up has 2 LIGHT balls.

>From this situation weight of all 6 balls is now known.

If first weigh W1+R1 v W2+B1 is not balanced then you know that the side that goes DOWN must contain the HEAVY white ball eg. W1+R1 v W2+B1
Possible combinations: H+H v L+H, H+H v L+L, H+L v L+L then W1 is HEAVY
or
Possible combinations: L+H v H+H, L+L v H+H, L+L v H+L then W2 is HEAVY
Cannot be combinations: H+L v L+H or L+H v H+L as scales would balance

So at this stage you know the weight of the two white balls only
*** HOWEVER you must also note the colour of the ball on the same side as the LIGHT white ball as this will have bearing depending on the results of the second weigh.

The second weigh would then be W1+W2 v R1+B1
If W1+W2 side goes down then combination must be H+L v L+L or L+H v L+L ie both R1 and B1are LIGHT
If W1+W2 side goes up then combination must be H+L v H+H or L+H v H+H ie both R1 and B1 are HEAVY
If W1+W2 balances with R1+B1 then you must have one HEAVY and one LIGHT ball on the R1+B1 side
The only way this can occur (bearing in mind the results of the first weigh) is if the coloured ball noted above *** was LIGHT

>From this situation weight of all 6 balls is now known.

Label the balls R1, R2, B1, B2, W1 and W2.
Place R1 and B1 on one side of the scale and B2 and W2 on the other side of the scale. There are two possible outcomes. They are equal or they are unequal.

Outcome 1: The two sides are equal.
If two balls on the same side were the same weight, then there would be 4 balls of the same weight. However there are only 3 heavy balls and 3 light ones. Therefore, two balls on the same side, are of different weights.

In the second weighing, weigh R1 and R2. From this weighing it can be determined which red ball is heavy and which is light. Whichever R1 is, B1 is the opposite since they were on the same side in the first weighing. B2 is the opposite of B1. W2 is the opposite of B2 since they were on the same side of the first weighing and W1 is the opposite of W2. So, if the two sides are equal in the first weighing, then R2, B1 and W2 are of the same weight, and R1, B2 and W1 are of the same weight. The second weighing determines which 3 are heavier and which 3 are lighter.

Outcome 2: The two sides are unequal.
There are four balls on the scales. Two are blue so one of them is lighter and the other one is heavier. Whichever one was on the heavier side must be the heavy blue ball. (The lighter blue ball could not have been on the heavier side because a light blue ball and a heavy other ball is not heavier than a heavy blue ball and a light other ball). The two remaining balls (R1 and W2) are either the same weight or they are different.

In the second weighing, weight R1 against W1. If R1 and W2 are the same weight, R1 and W1 must be different. If R1 and W2 are different weights, R1 and W1 will be equal. So the second weighing can be used to determine whether R1 and W2 are the same or different.

If the second weighing is unequal, R1 and W2 are the same weight and the second weighing will show whether they are heavy or light. R1 is the same as W2 and R2 and W1 are the same. If the second weighing is balanced, then R1 and W2 are different and the heavier one is whichever one was on the heaviest side of the first weighing. The heavier one could not have been with the lighter blue ball or else the first weighing would have been equal and that would be outcome 1 and not outcome 2. R2 is different to R1 and W1 is different to W2 it will be known which balls are heavier and which are lighter.

You have two red (R1, R2), two white (W1, W2) & two blue (B1, B2) balls.
The following are the possibilities for the light and heavy balls (L = light, H = heavy):

B1 R1 W1 B2 R2 W2 CASE #

H H H L L L 1
H H L L L H 2
H L H L H L 3
H L L L H H 4
L H H H L L 5
L H L H L H 6
L L H H H L 7
L L L H H H 8

Suppose you weigh B1 & R1 (LEFT) against B2 & W1 (RIGHT).
The following indicates the result in each case:
CASE # RESULT
----
1 LEFT HEAVIER
2 LEFT HEAVIER
3 BALANCED
4 LEFT HEAVIER
5 RIGHT HEAVIER
6 BALANCED
7 RIGHT HEAVIER
8 RIGHT HEAVIER

The second weighing depends upon the result of the first weighing. First, the balanced cases (3 & 6):

You will notice that in each case, R1, B2, and W2 weigh the same as each other, so they are either all the light balls or the heavy balls. Therefore, you weigh R1 against R2.

If R1 is heavier, then you have case 6. If R1 is lighter, then you have case 3.

Now for the cases where the left side is heavier (1, 2, 4):
In each case, B1 is the heavy ball, and B2 is the light ball. Now you have to contend with the red and white balls. If you weigh R1 against W2, the result will be different for each case.

If R1 is heavier, you have case 1.
If R1 is lighter, then you have case 4.
If the two balls balance, then you have case 2.

Finally, the cases where the right side is heavier (5, 7, 8):
In each case, B1 is the light ball, and B2 is the heavy ball. Again, you have to contend with the red and white balls. If you weigh R1 against W2, the result will again be different for each case.

If R1 is heavier, you have case 5.
If R1 is lighter, then you have case 8.
If the two balls balance, then you have case 7.

You have now determined the weight of each ball in two weighings.

Let's name the balls R1, R2, W1, W2, B1, and B2.
Let's assign value 0 to light balls and value 1 to heavy balls.
Let's name the scales X and Y.

NOTE: There are 8 possible combinations of weight values for the 6 balls (see table below), and 3 possible outcomes for each weighing - X>Y, X<Y, and X=Y. In choosing the balls to weigh first, the trick is to allocate 3 possible combinations to X>Y, 3 to X<Y, and 2 to X=Y.

Weigh R1-W1 on X and W2-B2 on Y (1st weighing).

The following table illustrates the possible combinations for each outcome of the 1st weighing. For instance, if X>Y, then the combinations in rows 1, 2, and 3 are possible.

X X Y Y
R1 R2 W1 W2 B1 B2
----
1 0 1 0 1 0 - X>Y
1 0 1 0 0 1 - X>Y
0 1 1 0 1 0 - X>Y
----
0 1 0 1 1 0 - X<Y
0 1 0 1 0 1 - X<Y
1 0 0 1 0 1 - X<Y
----
0 1 1 0 0 1 - X=Y
1 0 0 1 1 0 - X=Y

If X>Y, go to (a).
If X<Y, go to (b).
If X=Y, go to (c).

(a) Weigh R1 on X and B1 on Y (2nd weighing).

X Y
R1 R2 W1 W2 B1 B2
----
1 0 1 0 1 0 - X=Y
1 0 1 0 0 1 - X>Y
0 1 1 0 1 0 - X<Y

As illustrated above, each possible outcome will indicate the weight value of each ball. For instance, if X=Y, then R1=1, R2=0, W1=1, W2=0, B1=1, and B2=0.

(b) Weigh R1 on X and B1 on Y (2nd weighing).

X Y
R1 R2 W1 W2 B1 B2
----
0 1 0 1 1 0 - X<Y
0 1 0 1 0 1 - X=Y
1 0 0 1 0 1 - X>Y

As illustrated above, each possible outcome will indicate the weight value of each ball. For instance, if X<Y, then R1=0, R2=1, W1=0, W2=1, B1=1, and B2=0.

(c) Weigh R1 on X and R2 on Y (2nd weighing).

NOTE: Other ball pairs will work too, but let's use R1-R2 for this solution.

X Y
R1 R2 W1 W2 B1 B2
----
0 1 1 0 0 1 - X<Y
1 0 0 1 1 0 - X>Y

As illustrated above, each possible outcome will indicate the weight value of each ball. For instance, if X<Y, then R1=0, R2=1, W1=1, W2=0, B1=0, and B2=1.

We label the white, red & blue balls as w1, w2 ; r1, r2 & b1, b2 and distinguish the eight possibilities :

L(ight) H(eavy)
-------- --------
w1 r1 b1 w2 r2 b2 case 1
w1 r1 b2 w2 r2 b1 case 2
w1 r2 b1 w2 r1 b2 case 3
w1 r2 b2 w2 r1 b1 case 4
w2 r1 b1 w1 r2 b2 case 5
w2 r1 b2 w1 r2 b1 case 6
w2 r2 b1 w1 r1 b2 case 7
w2 r2 b2 w1 r1 b1 case 8

1ST WEIGHING : w1 & b1 against w2 & r1

a) if w1+b1=w2+r1 then

2ND WEIGHING : w1 against w2

if w1 < w2 then case 2
if w1 > w2 then case 7

b) if w1+b1<w2+r1 then
2ND WEIGHING : w1 & w2 against b1 & r1

if w1+w2=b1+r1 then case 3
if w1+w2<b1+r1 then case 4
if w1+w2>b1+r1 then case 1

c) if w1+b1>w2+r1 then
2ND WEIGHING : w1 & w2 against b1 & r1

if w1+w2=b1+r1 then case 6
if w1+w2<b1+r1 then case 8
if w1+w2>b1+r1 then case 5

Remark: b2 & r2 remaining untouched during the whole experiment, a NEW puzzle may be formulated using only 4 balls!!!

Ok, suppose we number the balls R1,R2,W1,W2,B1,B2. What we need to do is identify which of the balls are 'L', and which are 'H'.

We have eight possibilities:

1) R1=L,R2=H,B1=L,B2=H,W1=L,W2=H
2) R1=L,R2=H,B1=L,B2=H,W1=H,W2=L
3) R1=L,R2=H,B1=H,B2=L,W1=L,W2=H
4) R1=L,R2=H,B1=H,B2=L,W1=H,W2=L
5) R1=H,R2=L,B1=L,B2=H,W1=L,W2=H
6) R1=H,R2=L,B1=L,B2=H,W1=H,W2=L
7) R1=H,R2=L,B1=H,B2=L,W1=L,W2=H
8) R1=H,R2=L,B1=H,B2=L,W1=H,W2=L

Now... let's do the first weigh.

R1 & B1 against W1 & R2.

If it is even, then we know that we have either case 3 or case 6, and we can distinguish them by weighing R1 against R2 (our second weigh!)

Now, suppose that it went to the right. Then we have either case 1, 2 or 4, and we can distinguish them by weighing B2 and W2.

Similarly, if it went to the right, we have either 5, 7 or 8, which we can also distinguish by weighing B2 and W2.

First, let's call the 6 balls w1, w2, r1, r2, b1, and b2. There are 8 possible combinations:

#	Heavy Balls	Light Balls
1	w1,r1,b1	w2,r2,b2
2	w1,r1,b2	w2,r2,b1
3	w1,r2,b1	w2,r1,b2
4	w1,r2,b2	w2,r1,b1
5	w2,r1,b1	w1,r2,b2
6	w2,r1,b2	w1,r2,b1
7	w2,r2,b1	w1,r1,b2
8	w2,r2,b2	w1,r1,b1

So the goal is to find out which of these combinations is the right one. We have two weighings; each has 3 possible results (left heavier, right heavier, and equal).

Start by weighing w1+r1 (left) vs. w2+b1 (right). Three possible outcomes:
The first weighing leaves the left heavier. The combinations from our list of 8 that leave the left heavier are 1,2, and 4.

Our second weighing is r1 (left) vs. b2 (right). Three outcomes:
Left heavier. Must be combination 1; the heavy balls are w1, r1, and b1.
Equal weight. Must be combination 2; the heavy balls are w1, r1, and b2.
Right heavier. Must be combination 4; the heavy balls are w1, r2, and b2.

The first weighing leaves equal weight. Must be combination 3 or 6.

Our second weighing is r1 (left) vs. r2 (right). Two outcomes:
Left heavier. Must be combination 6; the heavy balls are w2, r1, and b2.
Right heavier. Must be combination 3; the heavy balls are w1, r2, and b1.

The first weighing leaves the right heavier. Must be combination 5, 7, or 8.

Our second weighing is r1 (left) vs. b2 (right). Three outcomes:
Left heavier. Must be combination 5; the heavy balls are w2, r1, and b1.
Equal weight. Must be combination 7; the heavy balls are w2, r2, and b1.
Right heavier. Must be combination 8; the heavy balls are w2, r2, and b2.

There you have it. In all cases, after two weighings I will know exactly which combination of balls I have and which are the heavy ones. There might be an easier or more elegant solution, but this one does work!

Do I win? :-)

1. weigh R1 & W1 vs R2 & B1.

if balanced

2a. weigh R1 vs R2
if left side is heavier:
R1, B1 & W2 are the heavy balls
if right side is heavier:
R2, B2 & W1 are the heavy balls

if left side is heavier

2b. weigh W2 vs B1
if left side is heavier:
R1, W2 & B2 are the heavy balls
if right side is heavier:
R1, B1 & W1 are the heavy balls
if balanced:
R1, B2 & W1 are the heavy balls (if B1 & W2 are heavy, 1 would be balanced)

if right side is heavier
2c weigh W1 vs B2
if left side is heavier:
R2, W1 & B1 are the heavy balls
if right side is heavier:
R2, B2 & W2 are the heavy balls
if balanced:
R2, B1 & W2 are the heavy balls (if W1 & B2 are heavy, 1 would be balanced)

Let’s call the balls R1, R2, W1, W2, B1, B2.

Put R1 and W1 on one side of the scale and put R2 and B1 on the other side.

If they are equal, then R1 + W1 = R2 + B1 and hence either (R1 > R2, W1< B1, W1 < W2, and B2 < B1) or (R1 < R2,W1 > B1,W1 > W2, and B2 > B1).

Next remove W1 & B1. If R1>R2 then W1 < W2 and B2 < B1. If R1 < R2 then W1 > W2 and B2 > B1.

If R1 + W1 > R2 + B1 then R1 > R2 and hence either (W1 > W2 , B2 < B1) or (W1 > W2, B2 > B1) or (W1 < W2, B2 > B1)

Next put R1 and B1 on one side of the scale and B2 and W2 on the other side. Since R1 > R2, if:

R1 + B1 > B2 + W2, then (B2 < B1, W1 >W2);
R1 + B1 = B2 + W2, then (B2 >B1, W1 >W2);
R1 + B1 < B2 + W2, then (B2 > B1, W1< W2).

If R1 + W1 < R2 + B1 then R1 < R2 and hence either (W1 < W2 , B2 > B1) or (W1 < W2, B2 < B1) or (W1 > W2, B2 < B1)

Next put R1 and B1 on one side of the scale and B2 and W2 on the other side. Since R1 < R2, if:

R1 + B1 < B2 + W2, then (B2 > B1, W1 < W2);
R1 + B1 = B2 + W2, then (B2 < B1, W1 < W2);
R1 + B1 > B2 + W2, then (B2 < B1, W1 > W2).

We'll call the two sides of the balance left and right.

First, have the first white marble and and first blue marble on the left, and the second white marble and the first red marble on the right.

Second, put the second white marble and the first blue marble and the second blue marble and the first red marble on the right.

Based on these weighings, there will be a unique solution of heavier and lighter balls for each possibility.

"There are three pairs of balls - red, white, and blue. In each pair one ball is a little bit heavier than another one."

So we have r (light) & r' (heavy), w & w' and b & b'. And r' = r + x.

"All the heavy balls weigh the same, and all the light balls weigh the same."

So we have r' = w' = b' and r = w = b.

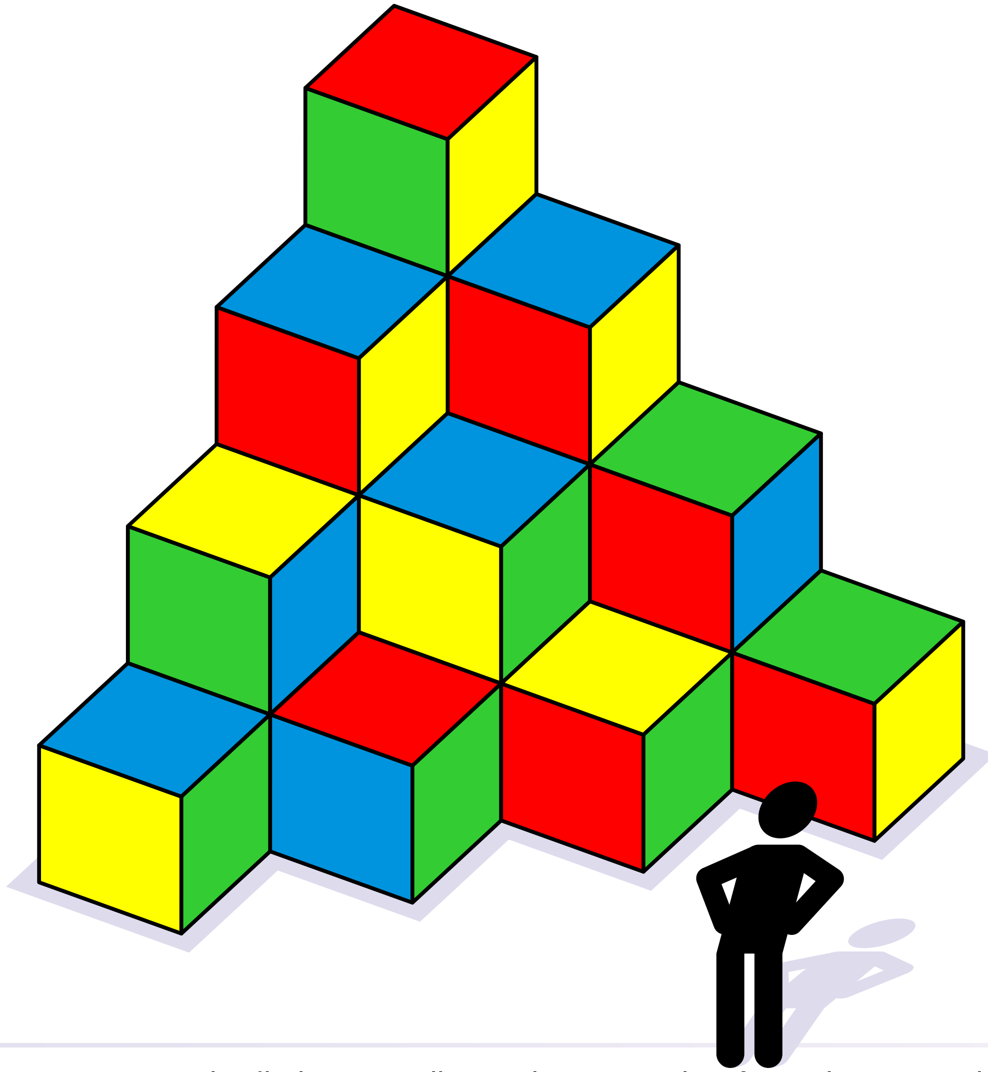
Weighing 1: Take the two white balls and place one on each side of the balance. This establishes w & w'.

Weighing 2: Put the heavy white ball, w', on the left side of the balance with one of the red balls. On the right side of the balance place the other red ball and one of the blue balls. This produces one of four possible, unique displacements of the balance. If we represent the displacement, D, as being the mass of the left side of the balance minus the right side (D = L - R) then we have the following combinations:

L R D
=================
w'+ r' b + r 2x (balance displaced twice w' vs w)
w'+ r' b'+ r x (same as w' vs w)
w'+ r b + r' 0 (balance balanced)
w'+ r b'+ r' -x (right side heavier)

The Rock Climber Maze

by Helen Homa and Peter Grabarchuk



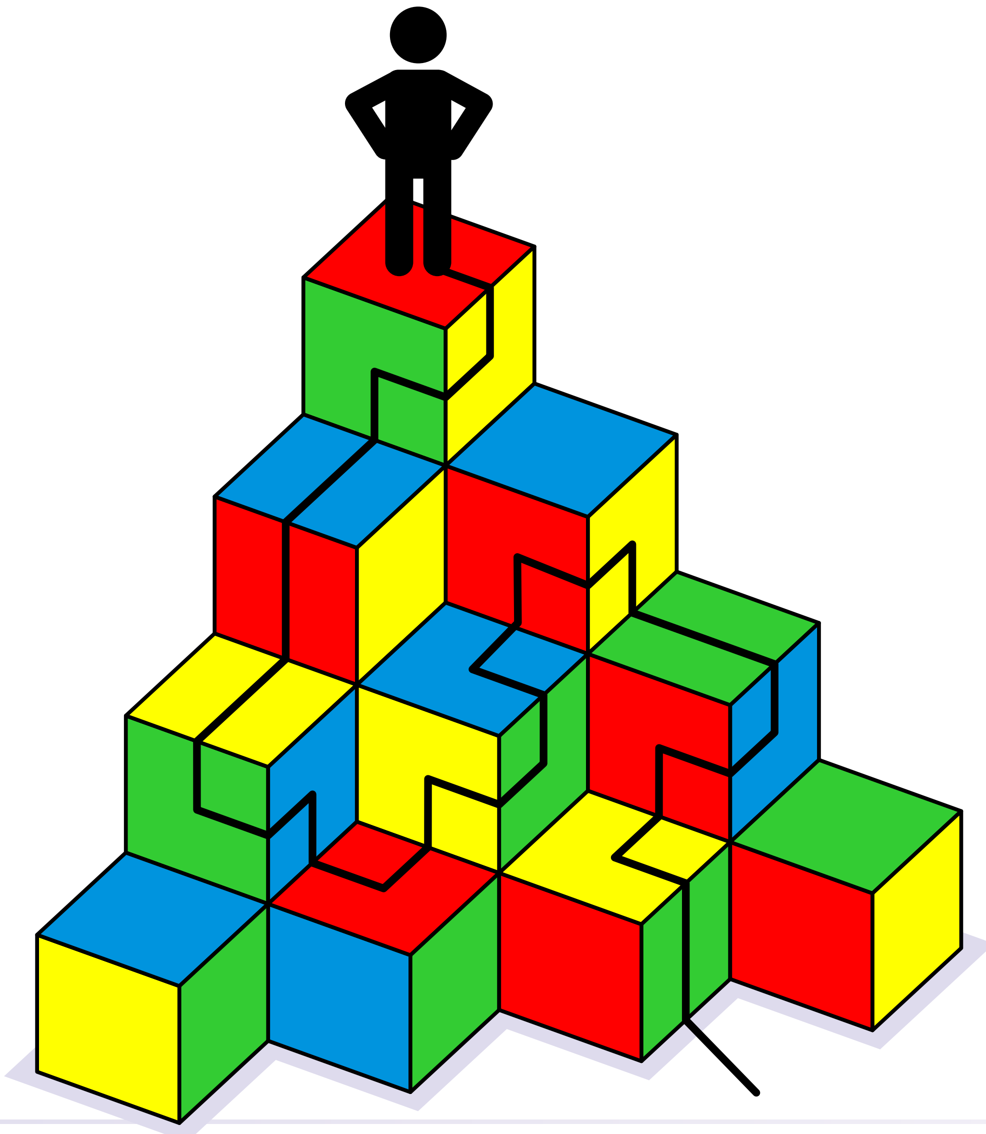
Suppose you are a Rock Climber, standing at the Mountain's foot. The Mountain consists of the rocks colored into four different colors - blue, green, red and yellow - as shown in the illustration.

You object is to get to the Mountain's top, always climbing from one rock to another adjacent rock, but never jumping over the rocks. As you climb to the top your route must contain a definite consecution of four colors constantly repeating. For example, yellow-green-blue-red, and then again yellow-green-blue-red-, and so on.

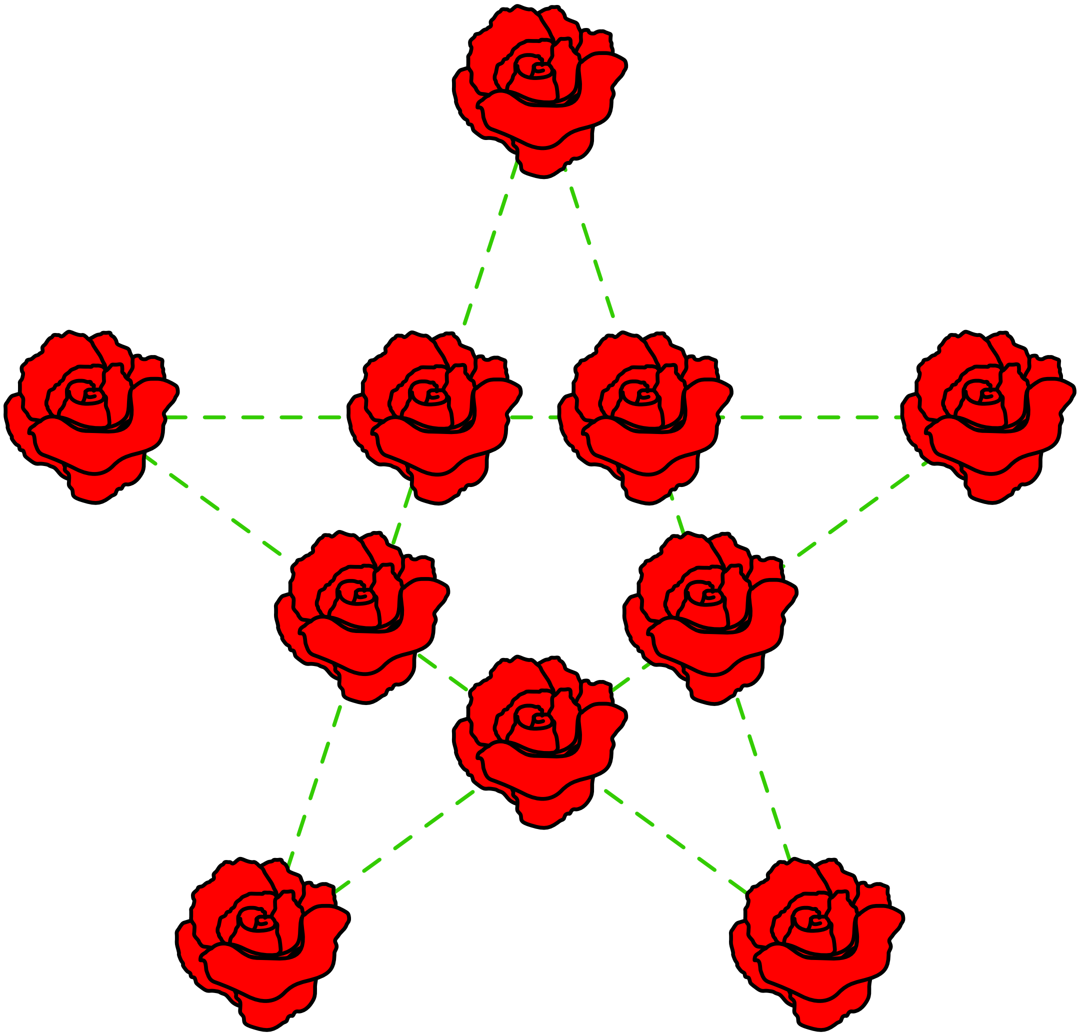
How quickly can you get to the top?

More from the authors at PeterPuzzle.com

Posted: June 27, 2008

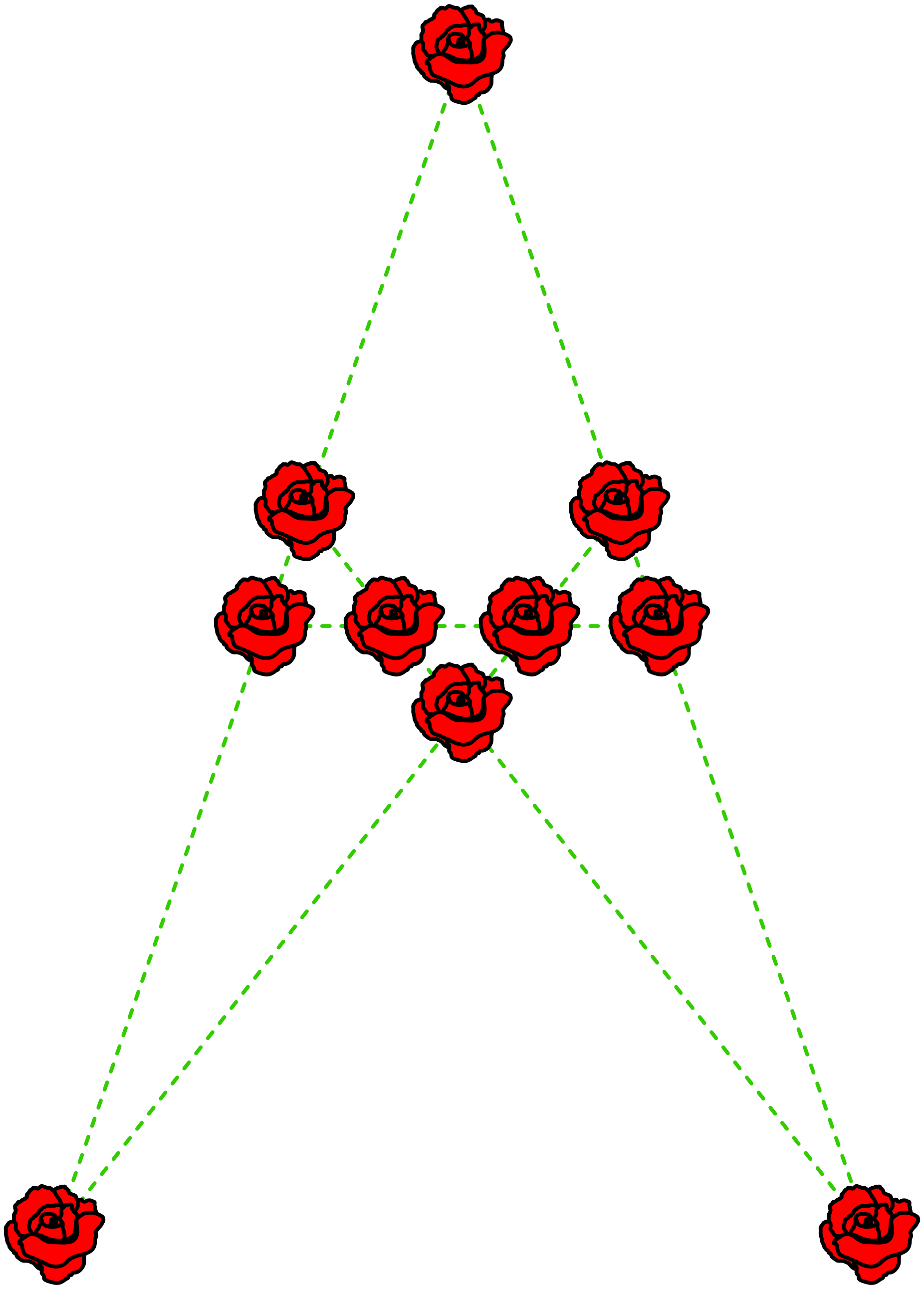


The solution is shown in the illustration.

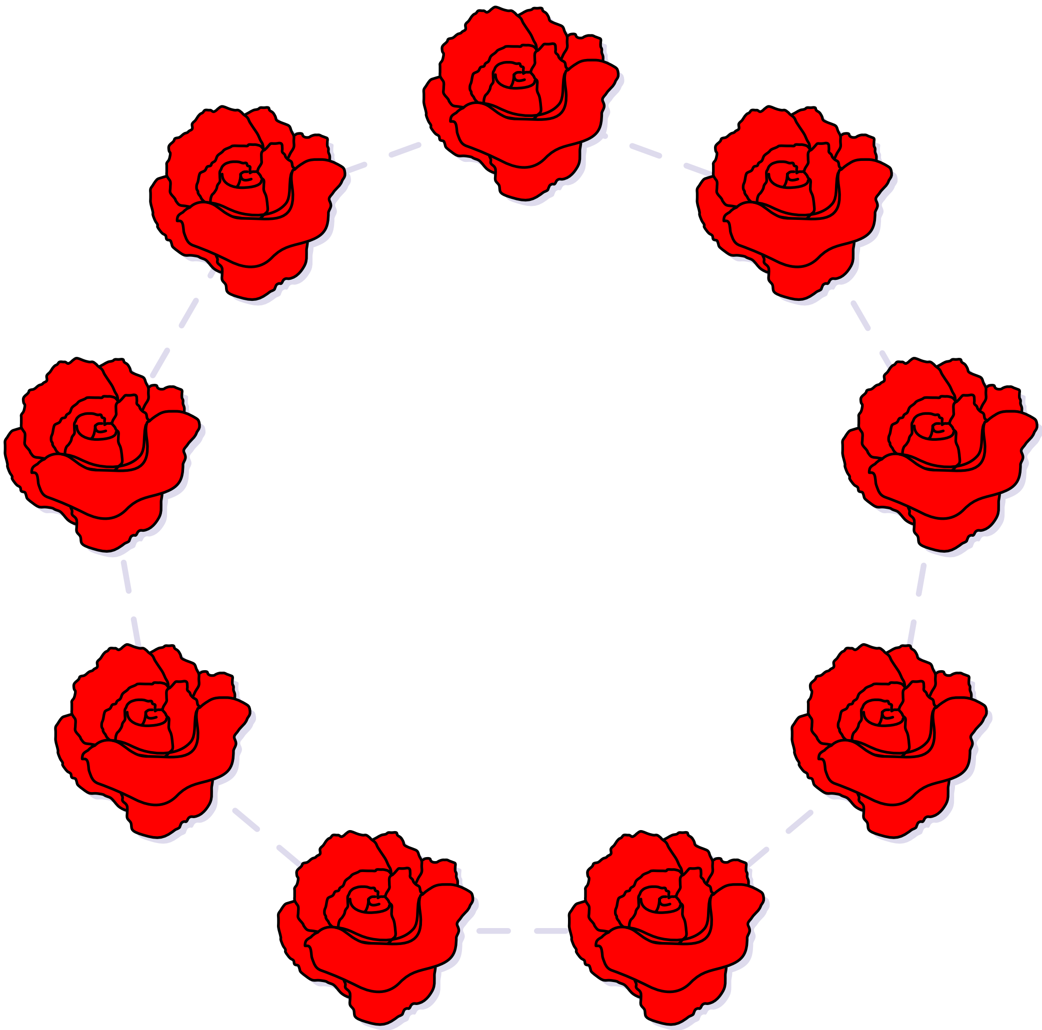


A nobleman has challenged his gardener with a task to plant ten shrubs of roses in his garden so that the shrubs would form five lines with four shrubs in every line. The gardener presented his preliminary plan in the form of five-point star as is shown in the illustration, adding paths between the roses. Looking at the plan the nobleman has pointed to the fact that every rose in it could be accessed without crossing any path in the garden. Thus, he complicated the task for the gardener ordering to improve the plan so that as many roses are "hidden behind" the paths as possible. In other words in order to get the access to such a rose one should cross a path. At first the gardener thought this was impossible but later he discovered the scheme which allowed him to successfully complete the task.

Can you figure out what was the final scheme and what is the greatest possible number of roses which can be "hidden behind" the paths?



The arrangement shown in the diagram is the only one that provides that two inner roses (the greatest possible number) can not be accesses without crossing a path.

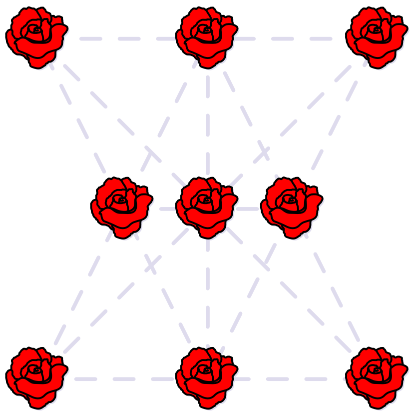


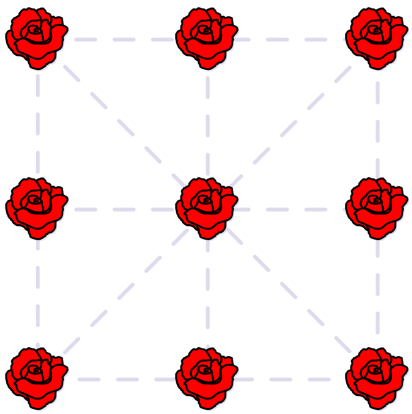
Nine roses are planted in the garden as a perfect circle. If you find this pattern to be quite tedious, here are three problems for you how to rearrange the roses in the garden.

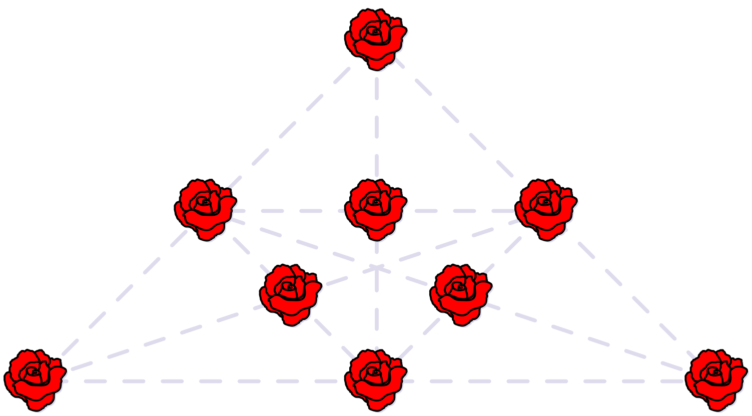
1. Plant the nine roses so that to create EIGHT rows with three roses in each row.

2. Plant the nine roses so that to create NINE rows with three roses in each row.

3. Plant the nine roses so that to create TEN rows with three roses in each row.

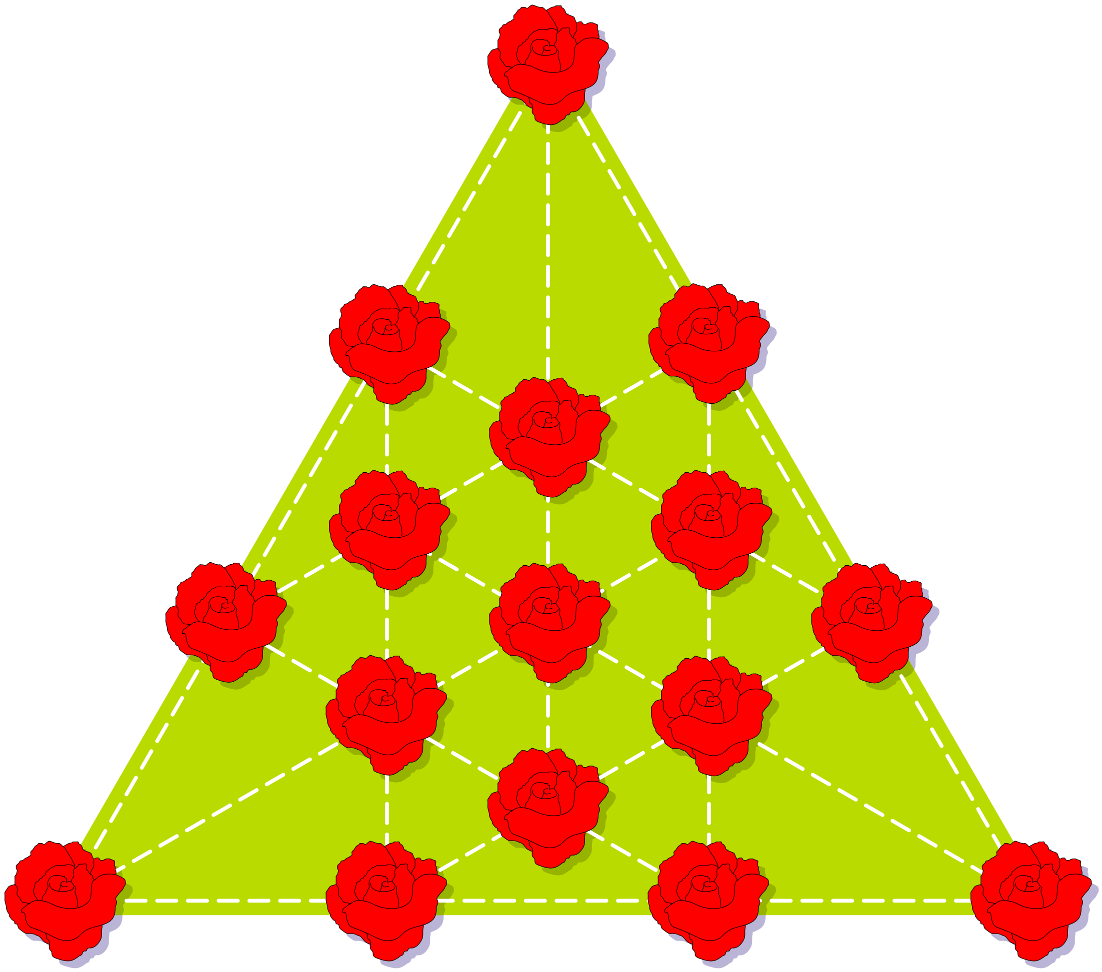






All solutions are shown in the respective diagrams.

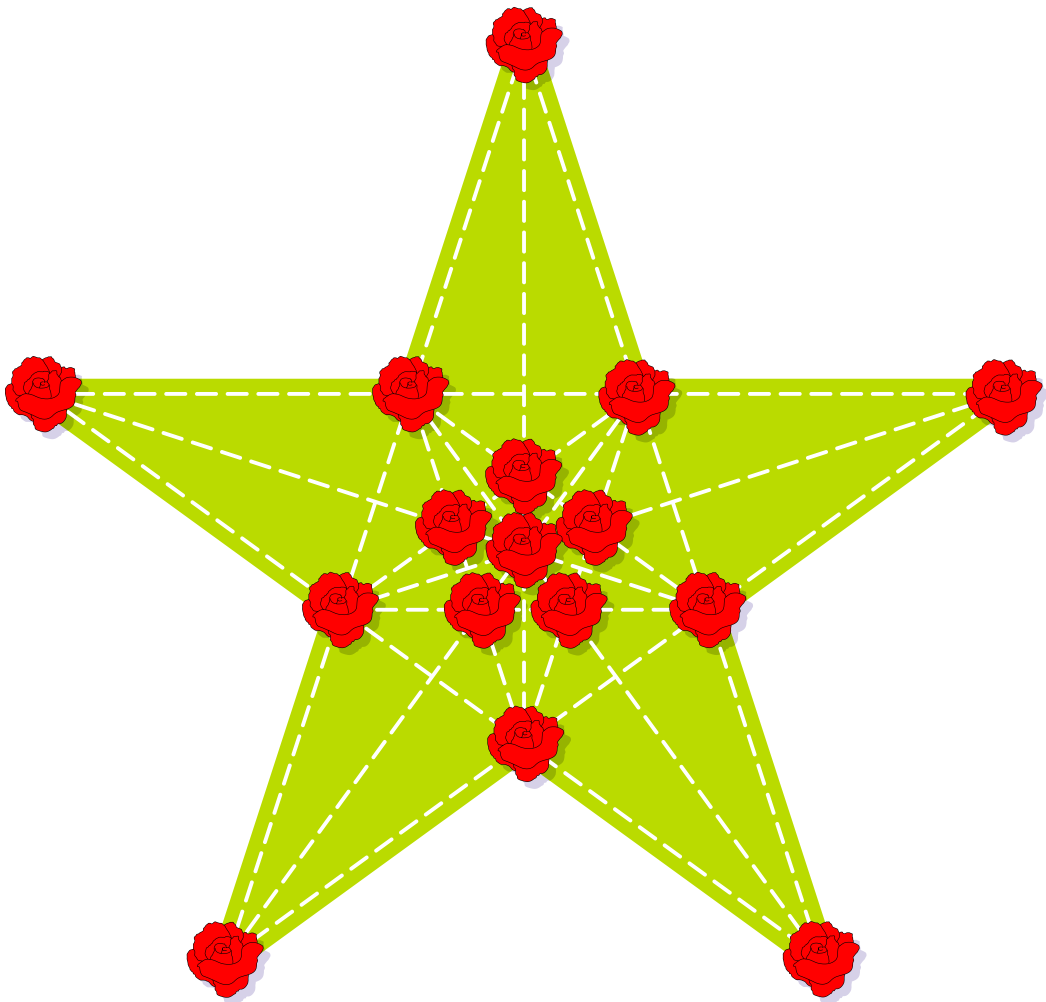
Rose Garden
by Boris Kordemsky



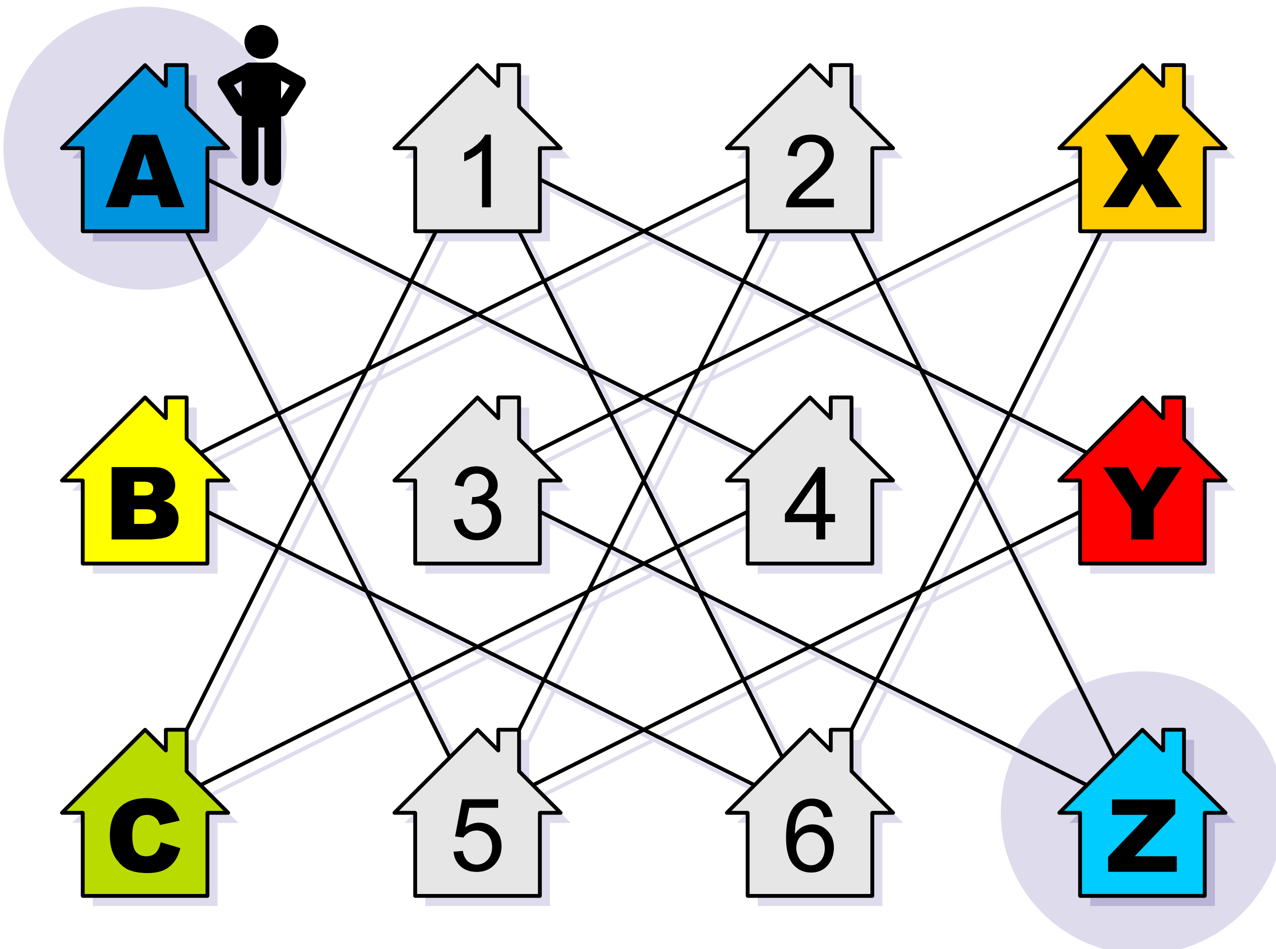
A gardener wants to replant a flower bed. At the moment the flower bed is of a triangular shape and consists of 16 roses planted in 12 straight-line rows with 4 roses in each row - just as shown in the illustration.

What the gardener plans to do is to change the layout of the 16 roses so that now they are planted in 15 rows with 4 roses in each.

Is it the task the gardener can complete? If yes, then how?

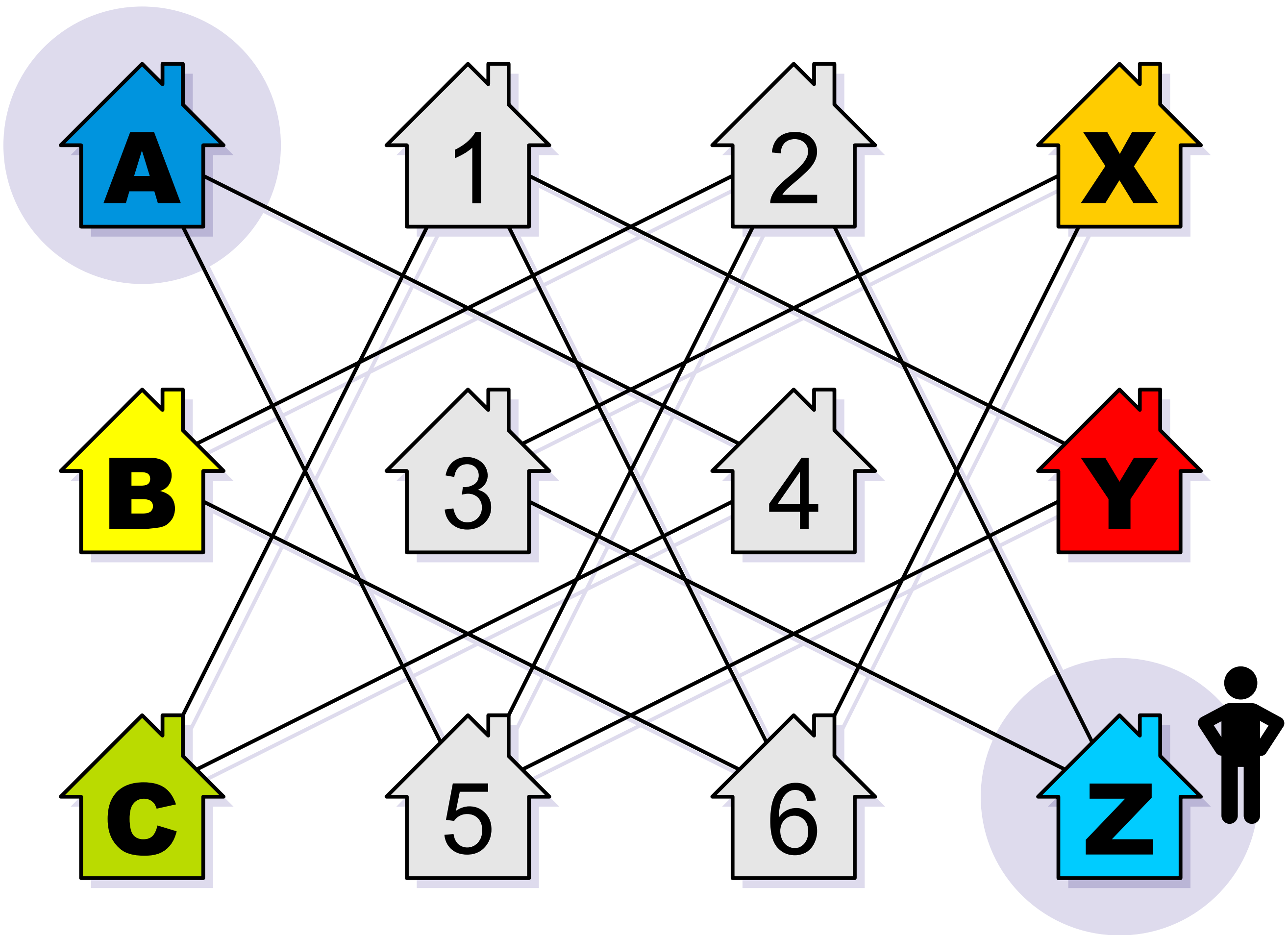


The solution is shown in the illustration.



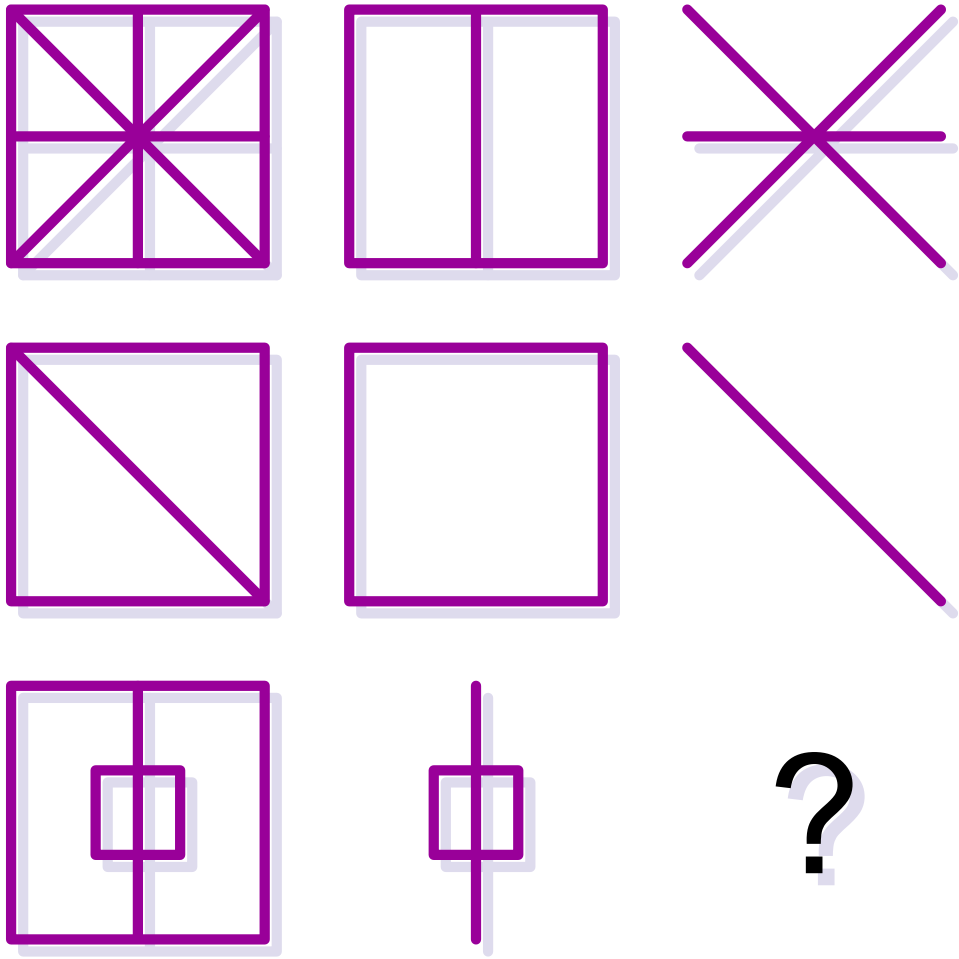
Today the Postman has to deliver the letters to six houses - the A, B, C houses on the left and the X, Y, Z - on the right. Unfortunately, the houses are not linked with each other by direct paths and thus, the Postman's route has to pass through around other six houses - marked with the numbers 1-6 on the diagram. The Postman starts at house A in the upper left corner and wishes to finish his route at house Z in the lower right corner - where he knows he will be treated with a cup of coffee after all the letters are delivered.

What is the shortest route the Postman has to choose in order to deliver all the letters to the A-C and X-Z houses?

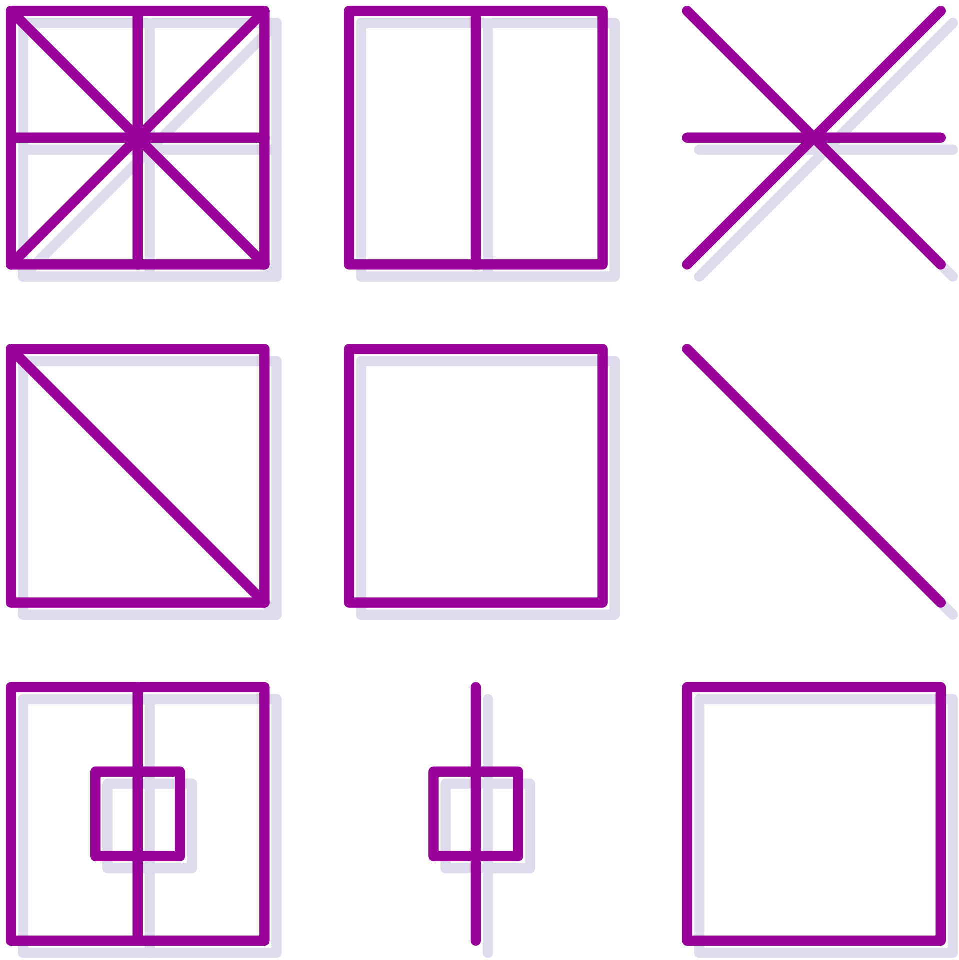


A-4-**C**-1-**Y**-5-2-**B**-6-**X**-3-**Z**

A product as large as 5,568 can be created if 174 is multiplied by 32 in one group and 96 by 58 in another.



In each row the third pattern is obtained from the first two by applying a rule. What is the rule, and what pattern goes at the end of the third row instead of the question mark?

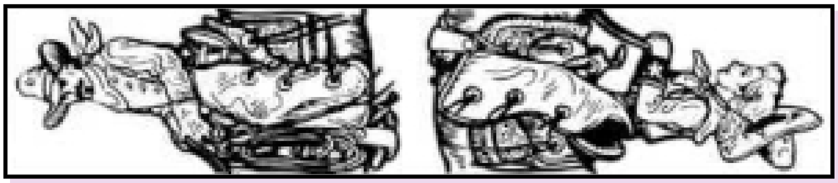


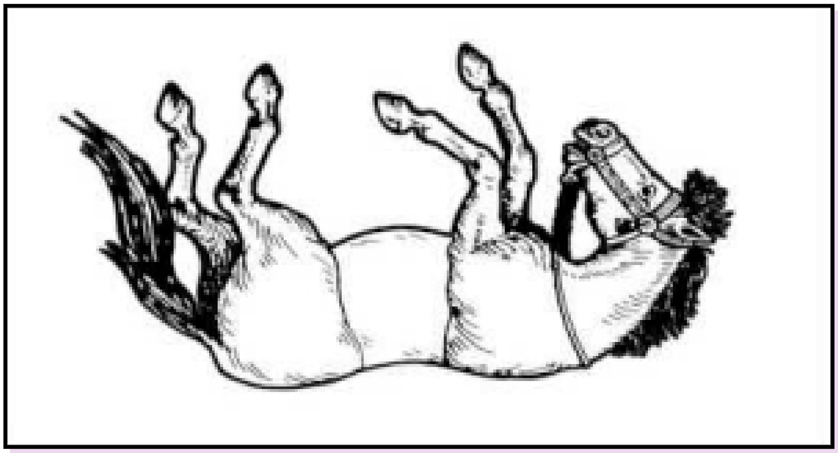
The rule for obtaining the third pattern in each row is to superimpose the first two patterns and eliminate any lines they have in common. Hence the pattern to be placed at the end of the third row is simply a square.

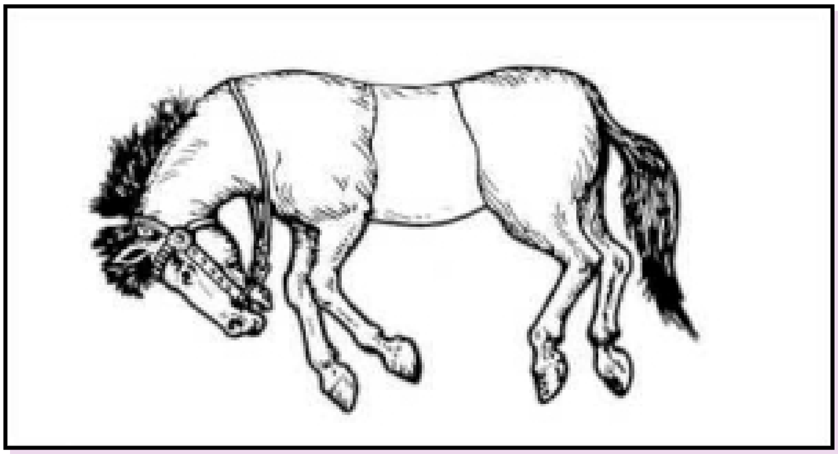
The puzzle is from a special issue of the French magazine *Science et Vie* (September, 1978).

Saddle the Horses

after Sam Loyd

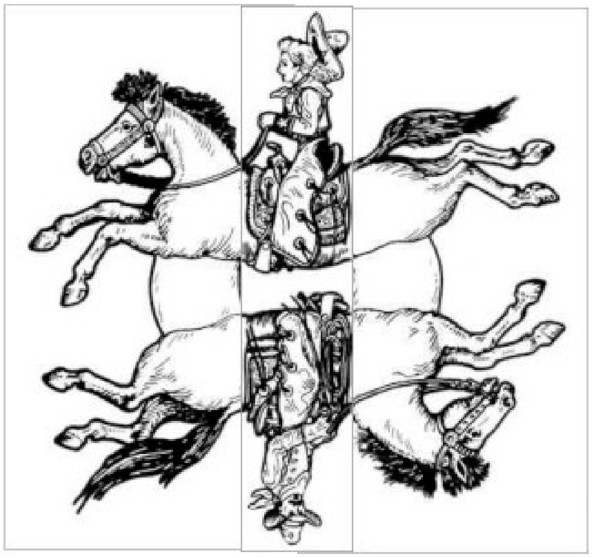




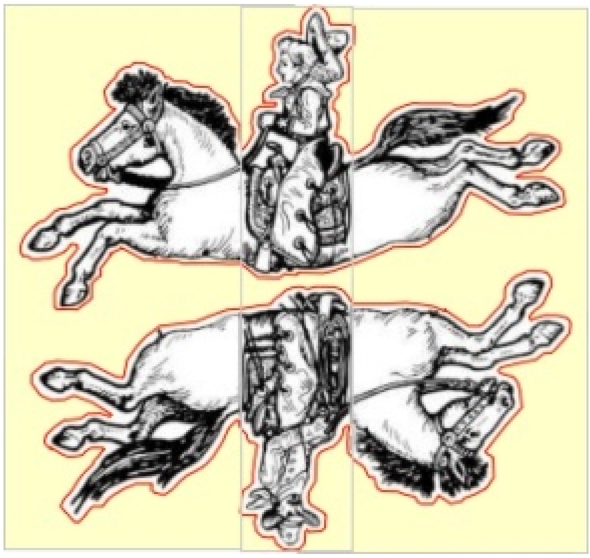


Arrange the three cards so that each rider is in his correct riding position on top of each horse.

When you solve the puzzle correctly, you will see a fantastic-crazy-cool-bomb-classic race. So, what are you waitin' for?



1

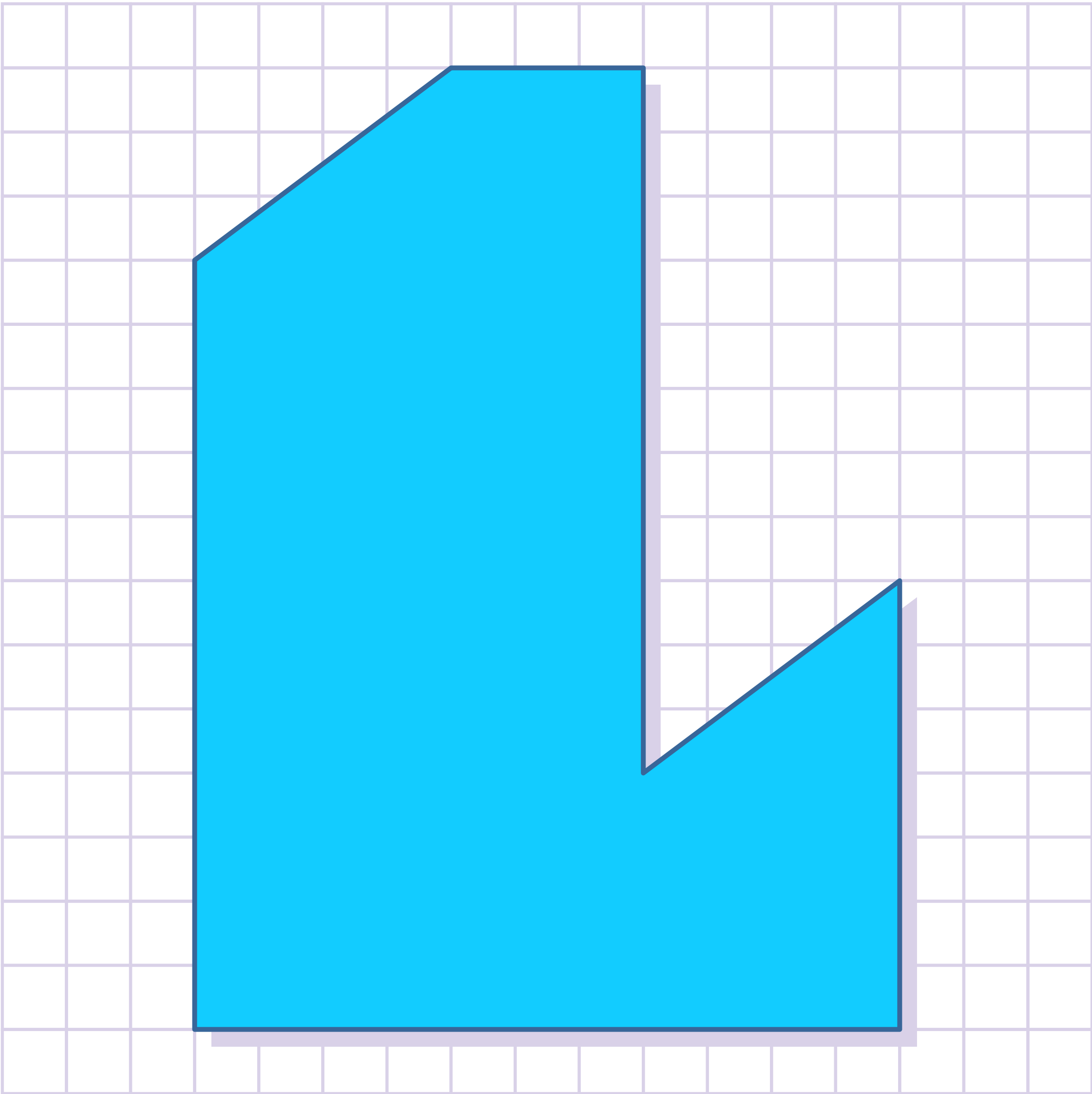


2

Puzzle promoter Sam Loyd invented "Saddle the Horse" in 1872. Loyd sold the concept to P.T. Barnum (of Barnum and Bailey circus fame), who handed out millions of them to circus-goers under the name "P.T. Barnum’s Trick Mules.”

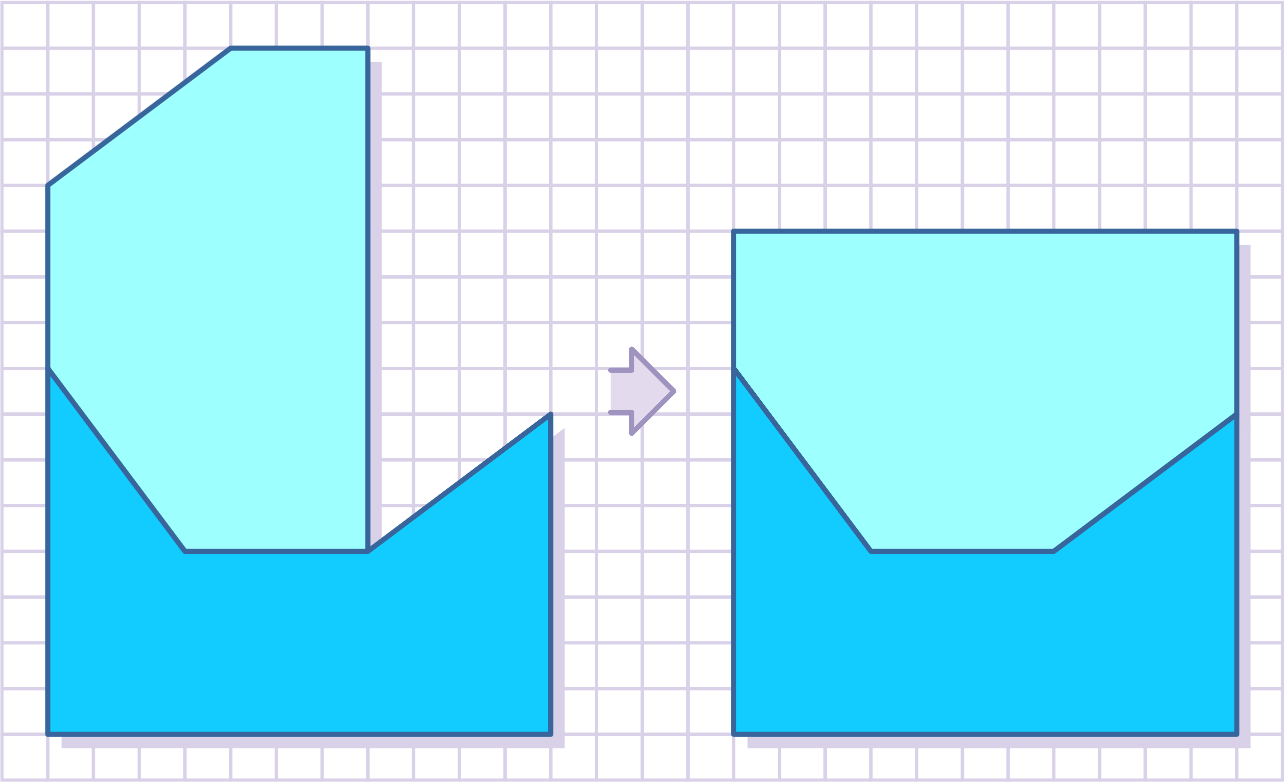
It has since taken on many variations, from clowns on donkeys to witches on black cats, and has delighted generations of puzzle lovers around the world.

The solution is shown in the figures. Please note that the pieces are shown in their orientation that clearly shows the puzzle's idea. Different parts of the cards now form two new galloping horses. In the right drawing we outlined with the red lines these two new horses with their riders. What a race!



Draw the figure of the sedan chair using a square grid as shown in the illustration.

Now divide this sedan chair into the minimum number of pieces so that to make from them a perfect square.



The minimum number of pieces required to solve this puzzle is two, and the solution itself is shown in the illustration.

Puzzles with Numbers

$$
\begin{array}{r}
\text{S E N D} \\
+\ \text{M O R E} \\
\hline
\text{M O N E Y}
\end{array}
$$

Send More Money

by Henry E. Dudeney

The same letters in this calculation mean the same digit.

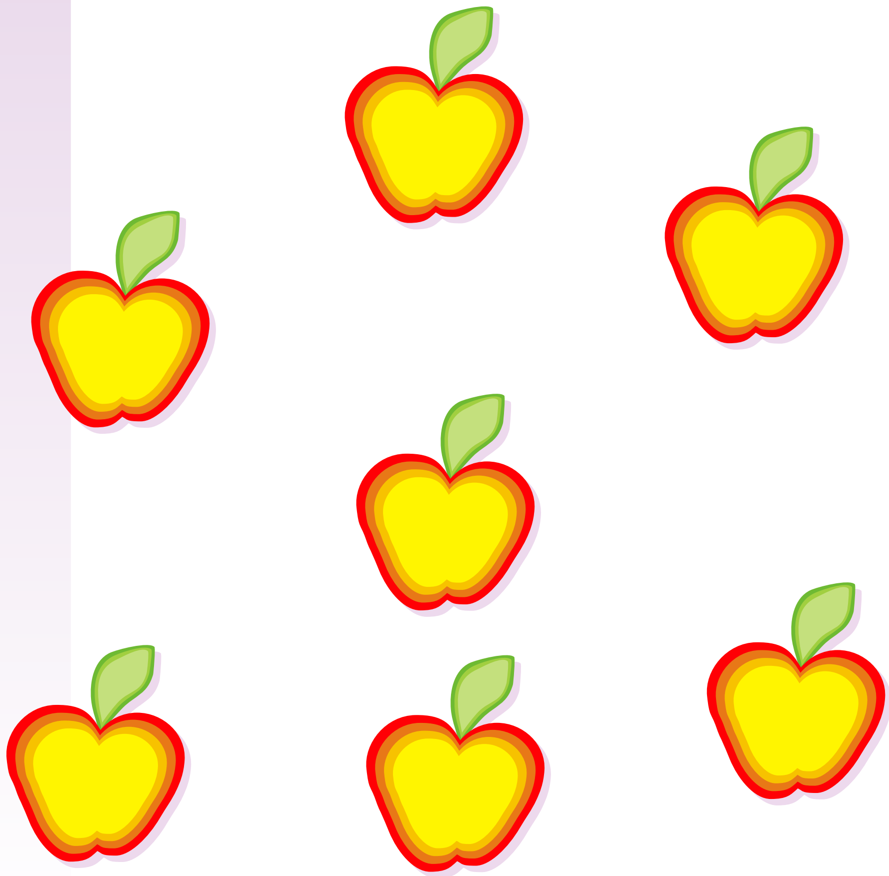
Can you replace all the letters with the respective digits in such a way that the calculation is correct?

$$\begin{array}{r} 9\,5\,6\,7 \\ +\ 1\,0\,8\,5 \\ \hline 1\,0\,6\,5\,2 \end{array}$$

Send More Money (solution)

The solution to this calculation is shown in the illustration.

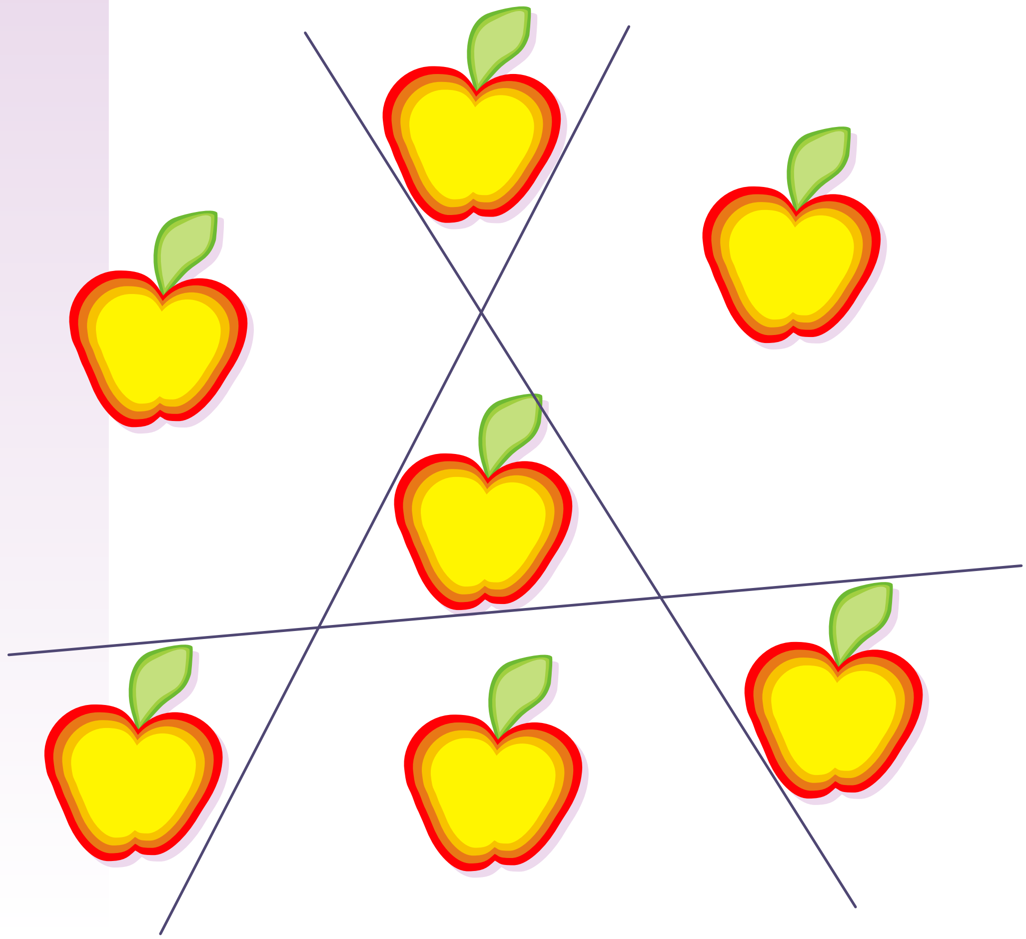
Dissection Puzzles



Seven by 3

Divide the image of apples above with three lines into seven sections each containing exactly one apple.

Dissection Puzzles



Seven by 3 (solution)

The solution is shown in the illustration.

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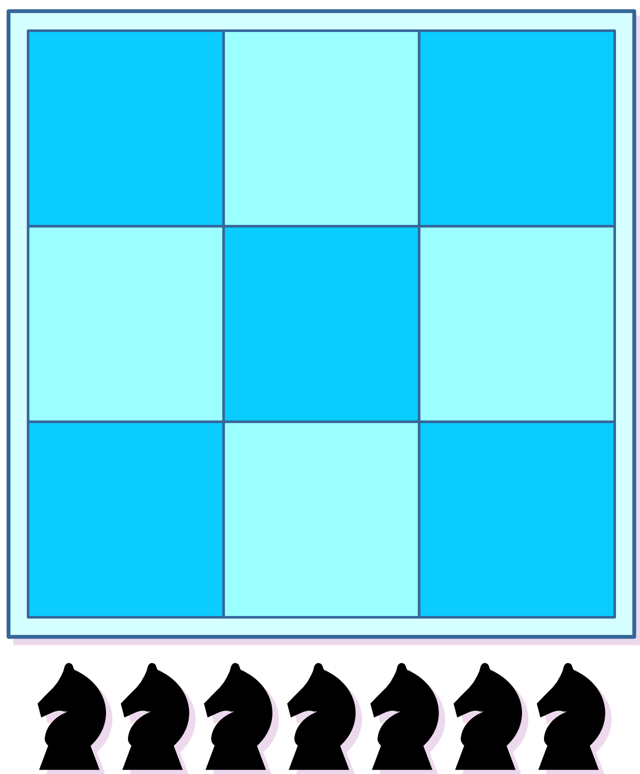
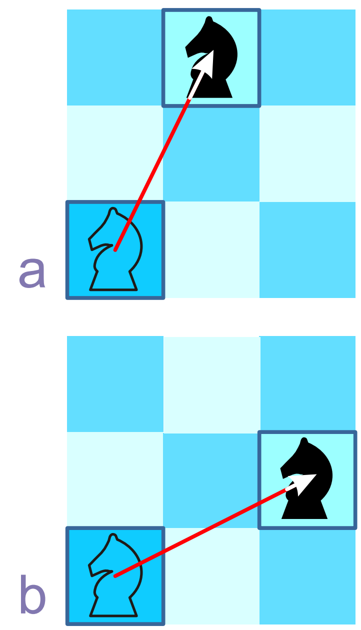
PRINT 'N' PLAY VERSION

Treasure of Classic and Modern Puzzles

Chess 'n' Checkers Puzzles



1



2

The 7 Knights Problem

You have 7 chess knights (Figure 1). Place one of them on any empty cell of a 3x3 board and then move it to another empty cell using knight's move (some examples of such moves are shown in Figure 2, a and b).

Then in exactly the same way place and then move another knight. Repeat your "place-move" steps till you have all 7 knights placed on the board.

To practice you may use our printable 3x3 board and 7 coins.

1	2	3
4	5	6
7	8	9

The 7 Knights Problem (solution)

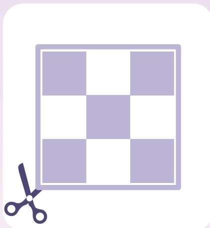
One of the solutions is given below. The first number in each pair indicates the initial cell of the move and the second - the finish one of the same move. 7-6, 2-7, 9-2, 4-9, 3-4, 8-3, 1-8.

Historical information by professor David Singmaster, England, shows how old this puzzle is. It appeared in the following manuscripts: King's Library MS.13, A, xviii, c.1275; Nicholas de St. Nicholai (attrib.): "Bonus Socius" - collection of chess problems, c.1275; at-Tilimsani, 1446.

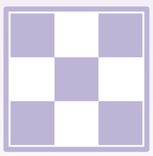
Treasure of Classic and Modern Puzzles

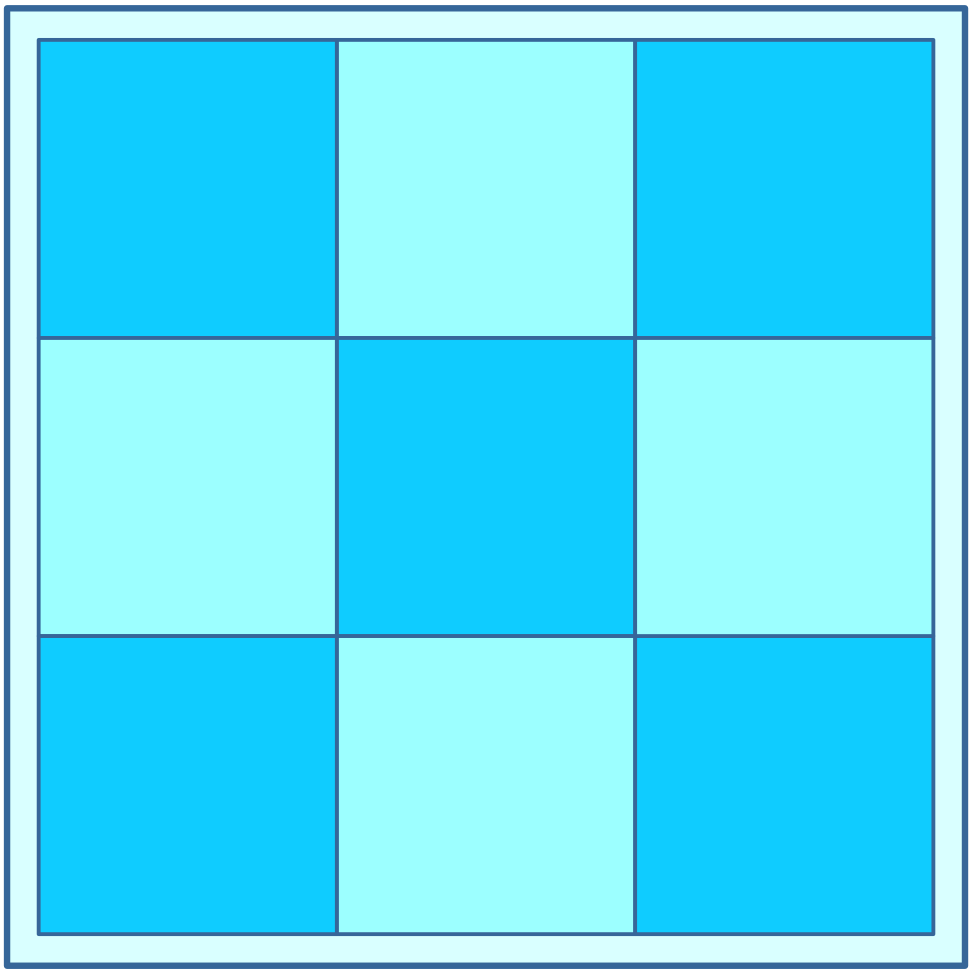
Chess 'n' Checkers Puzzles

1



F

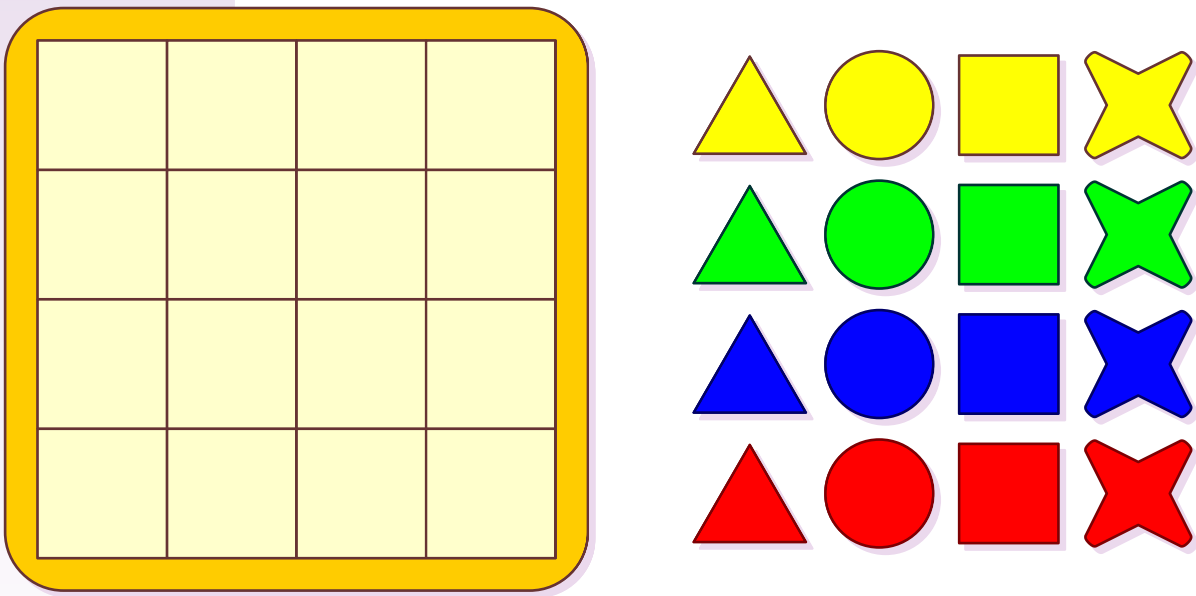




The 7 Knights Problem (board)

To produce the board first print it out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

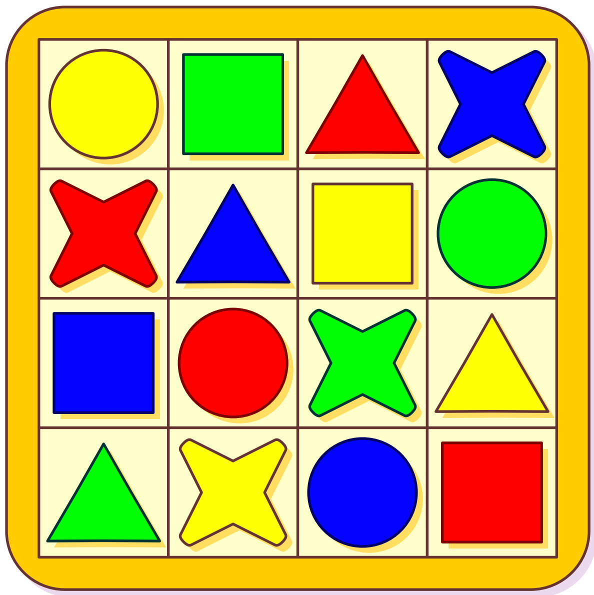
Miscellaneous Puzzles



Shapes & Colors

Place all the sixteen pieces shown in the illustration on a 4x4 board so that none of horizontal and vertical rows, and none of two main diagonals contains two pieces of the same shape or of the same color.

Miscellaneous Puzzles



Shapes & Colors (solution)

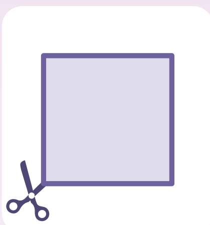
One of the basic solutions to this puzzle is shown in the illustration.

Miscellaneous Puzzles

1

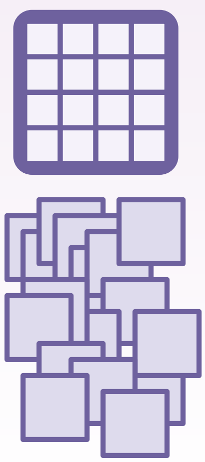
x 1

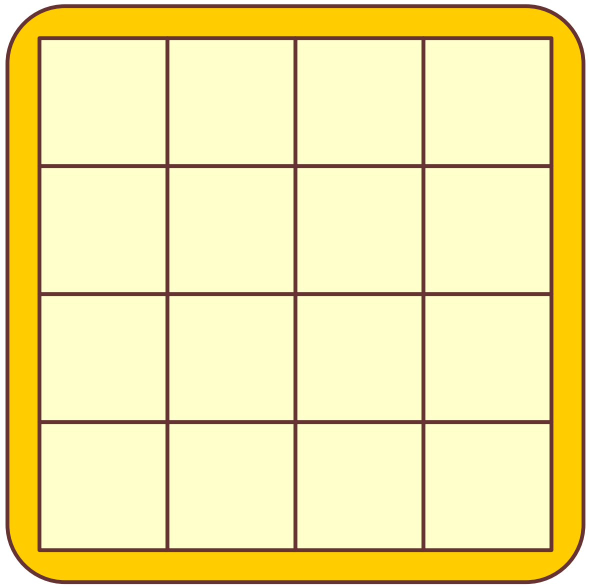
2

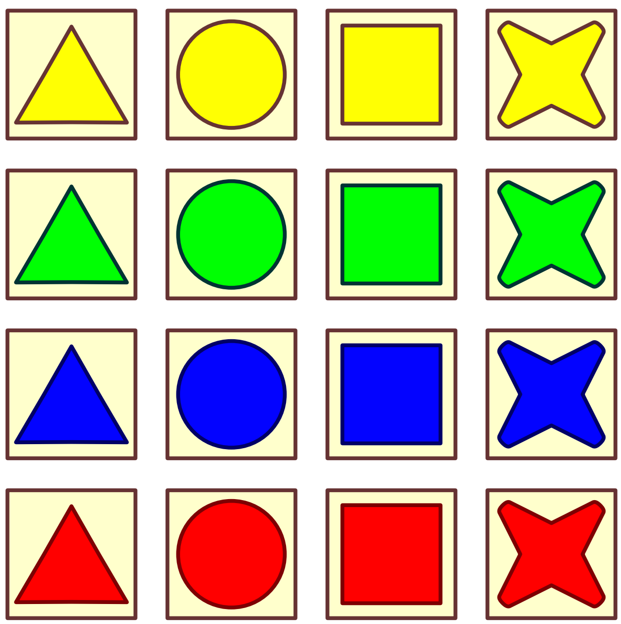


x 16

F







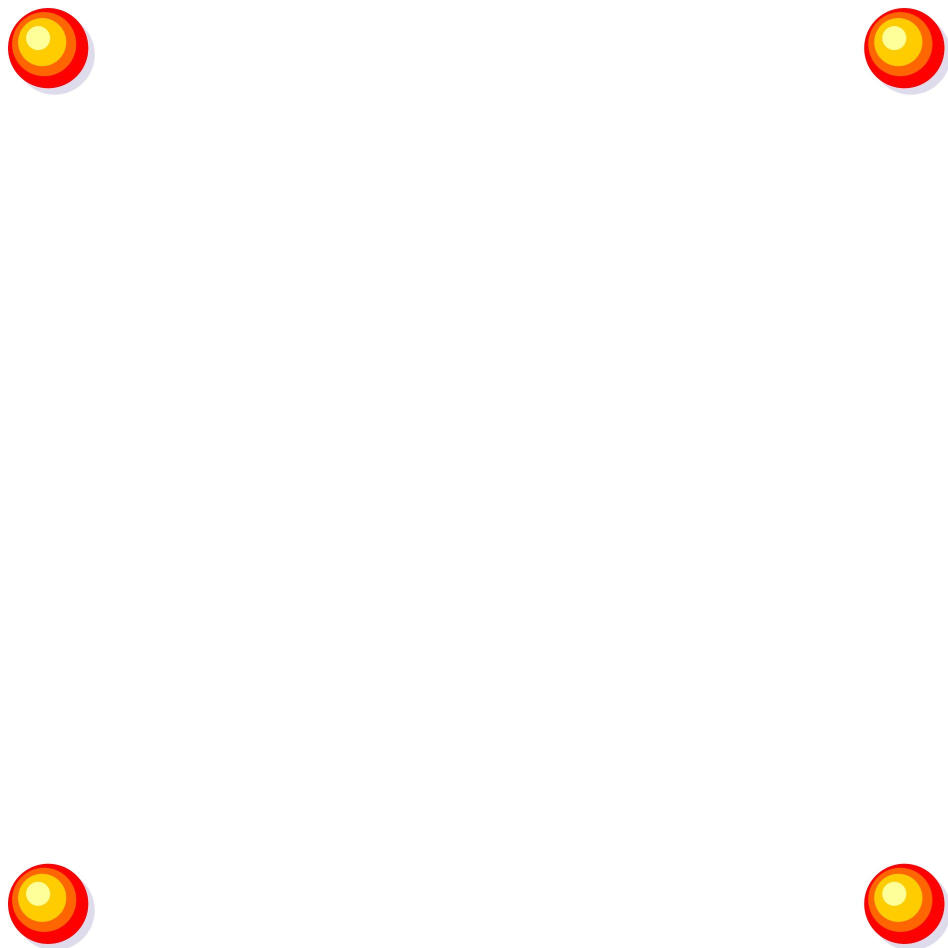
Shapes & Colors (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

Shortest Connection

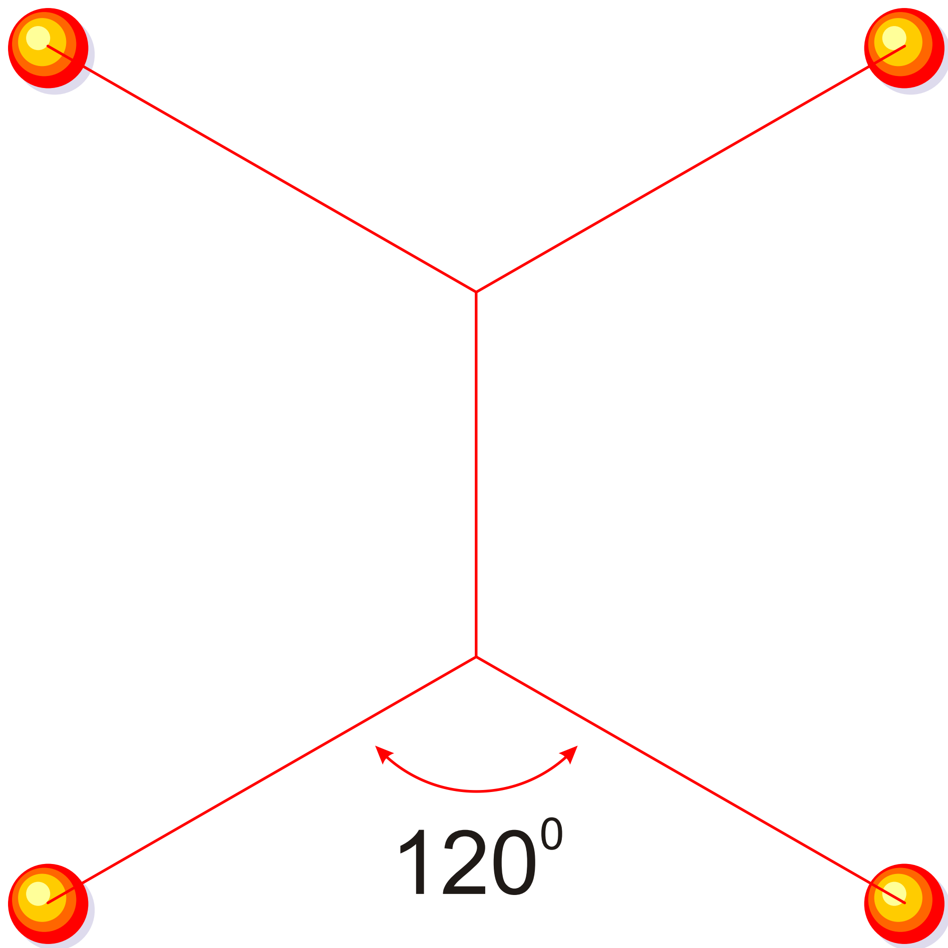
after Martin Gardner

Puzzles.COM



Draw four dots that mark the corners of a perfect square as shown in the illustration.

The object is to draw a minimal network spanning them. The parts of it may intersect, and you're allowed to use additional dots while drawing the network.



At first sight it seems that the cross of the two diagonals with one additional point makes the minimal network. But, in fact, it isn't. If the side of the square is 1 then the total length of the cross is 2sqrt2, or about 2.828. With the same side of the square total length of the network (with two points of intersections) shown in the illustration on the left is only (1 + sqrt3), or about 2.732, that makes it the minimal possible network to span the four corners of a square.

Put-Together Puzzles - MC

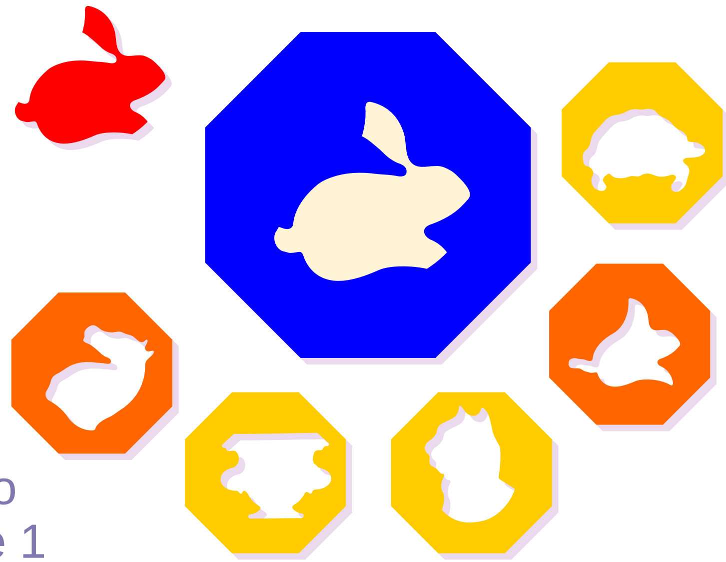
Silhouettes

There are two similar challenges for this puzzle.

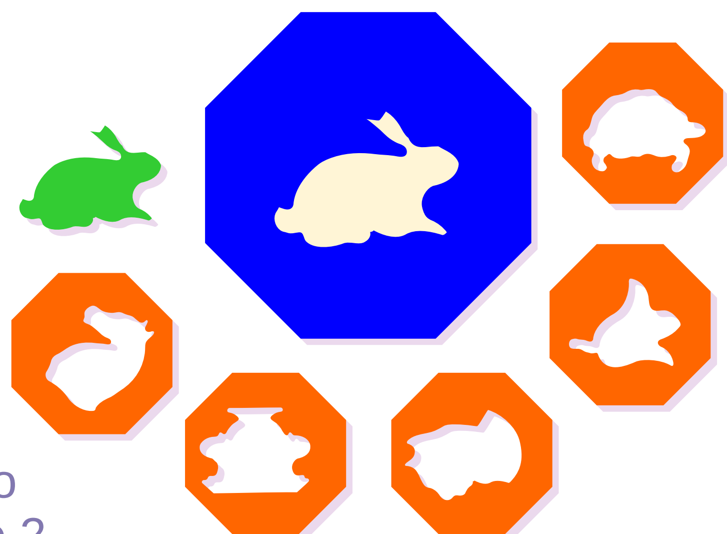
The first challenge is to superimpose some number of octagonal shapes with the silhouettes in them into one pile so that the silhouette of a rabbit appears. The shape of the resulted silhouette is shown as the Red rabbit in the upper left corner of the scene.

The second challenge is almost the same as the first one, except that there is some other number of the octagonal shapes which has to be employed and the resulted silhouette should be as that one indicated by the Green rabbit.

Put-Together Puzzles - MC



Solution to Challenge 1



Solution to Challenge 2

Silhouettes (solution)

The solutions are shown in the illustration.

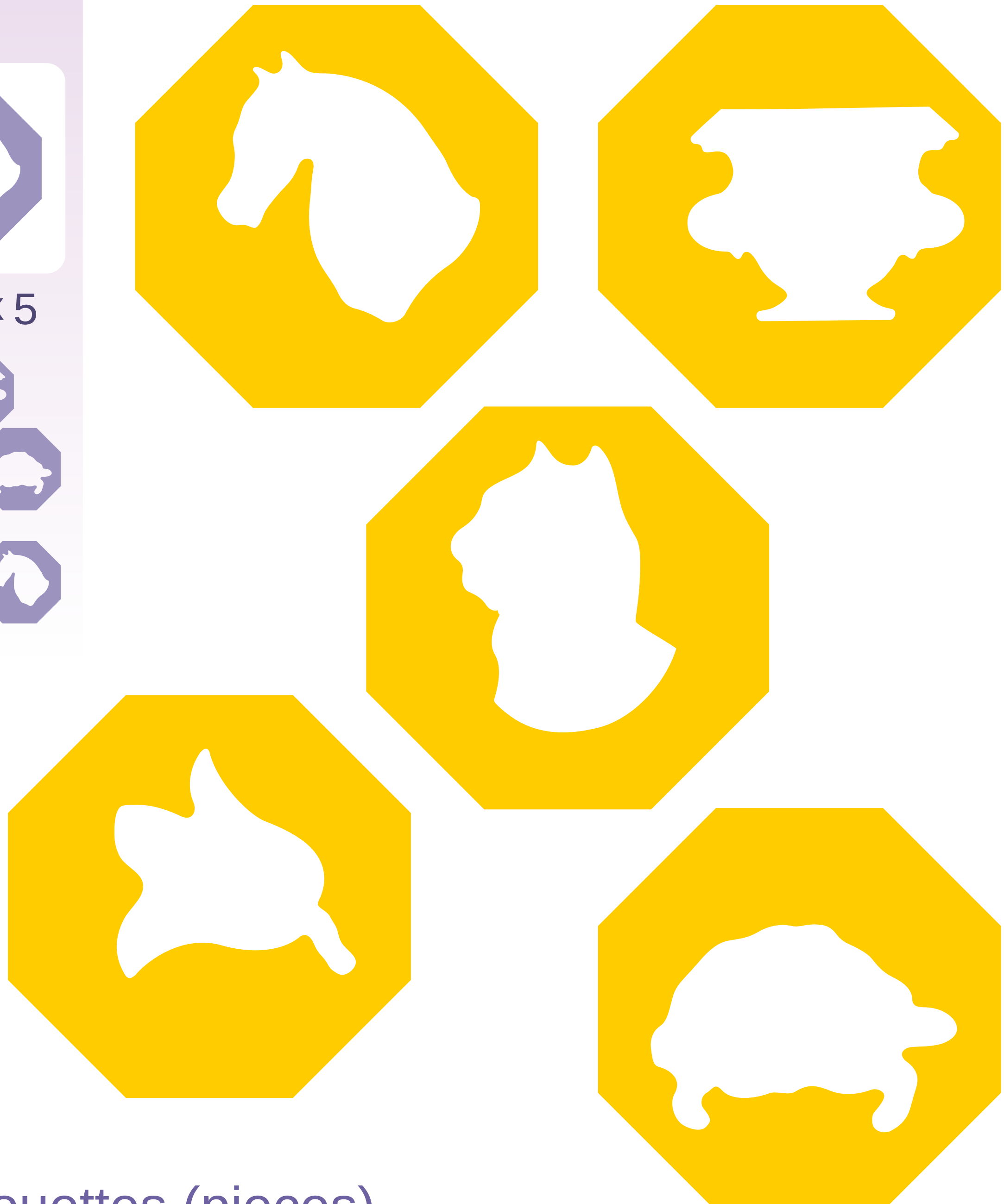
Treasure of Classic and Modern Puzzles

Put-Together Puzzles - MC

1

x 5

F



Silhouettes (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

```
      * *
×       *
---------
      * *
+     * *
---------
      * *
```

A Simple Cryptarithm

by Henry E. Dudeney

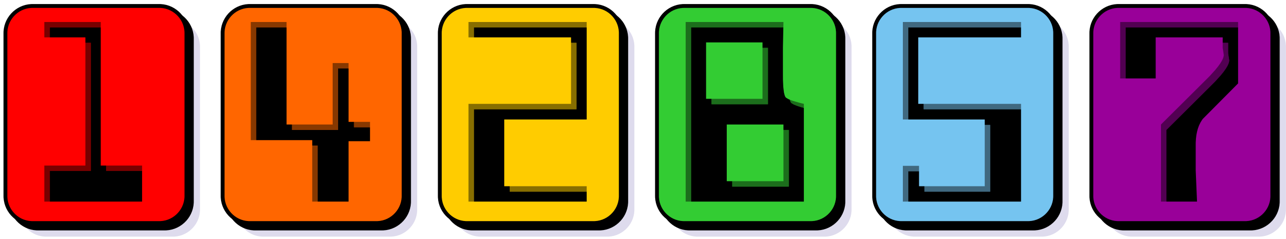
This cryptarithm is built in such a way that first you multiply two numbers and then add to the result one extra number to get the final result. Every asterisk in this cryptarithm means some digit from 1 through 9, and every digit is used exactly once. 0 isn't used.

The object is to replace all the asterisks with digits from 1 through 9 so that the whole calculation is correct. The solution is unique.

$$
\begin{array}{rr}
 & 17 \\
\times & 4 \\
\hline
 & 68 \\
+ & 25 \\
\hline
 & 93
\end{array}
$$

A Simple Cryptarithm (solution)

The unique solution to this cryptarithm is shown in the illustration.



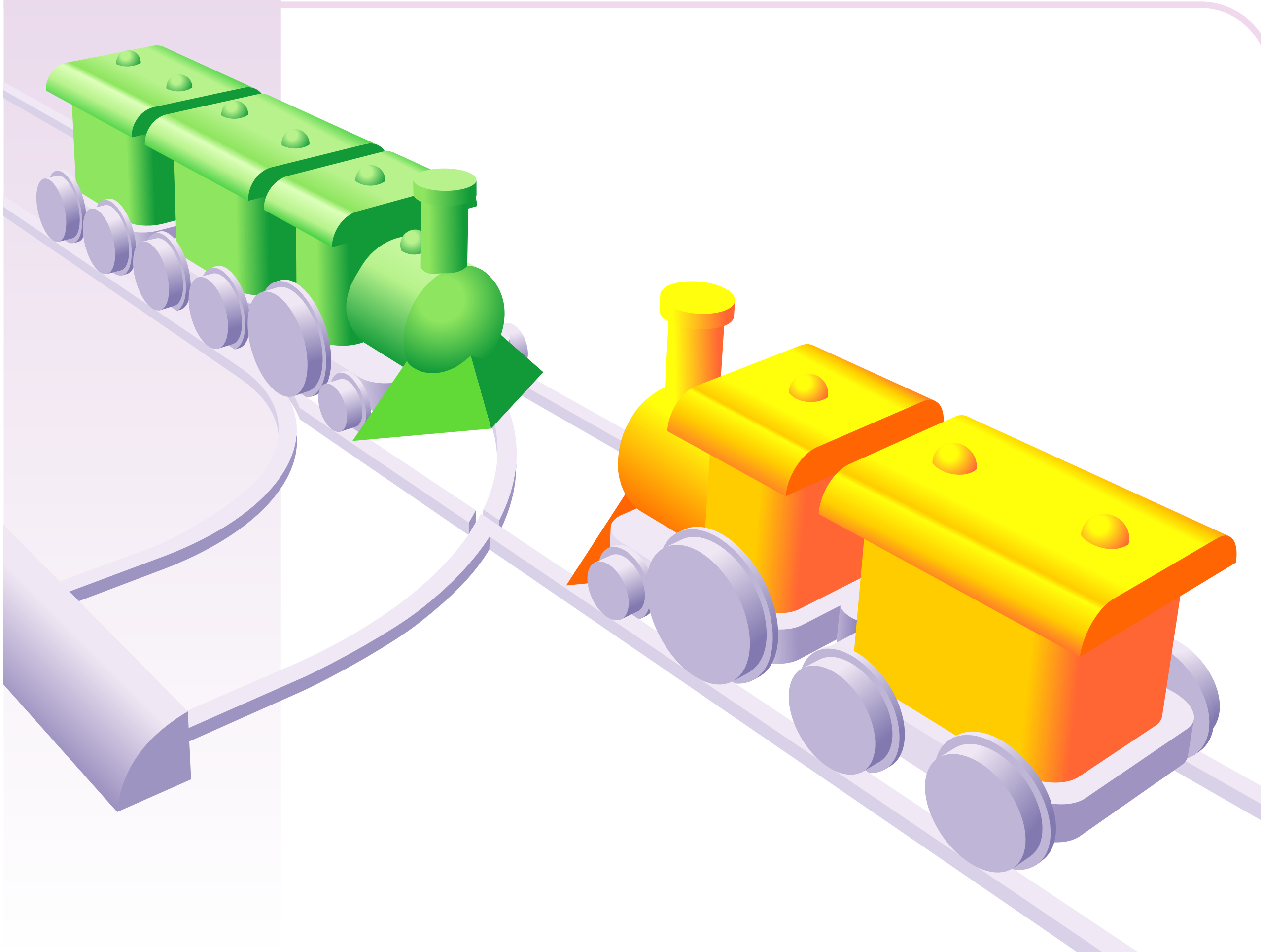
Some multiplications can be done in an unusual way – by moving a digit from one position to another. This challenge is about the multiplication and... a proper number which such a multiplication should be applied to.

3 5 2 9 4 1 1 7 6 4 7 0 5 8 8 2

The number 142,857 shown in the diagram can be multiplied by 3 in an unusual but yet simple way. All that is necessary is to move the 1 to the other end of the row, and the thing is done. The answer is 428,571.

It is known there is a number that, when multiplied by 3 and divided by 2, the answer will be the same as if we moved the first digit (which in this case is to be a 3) from the beginning of the row to the end. Can you guess how many digits this number consists of? Don't be surprised by looking at the solution!

Puzzles with Trains



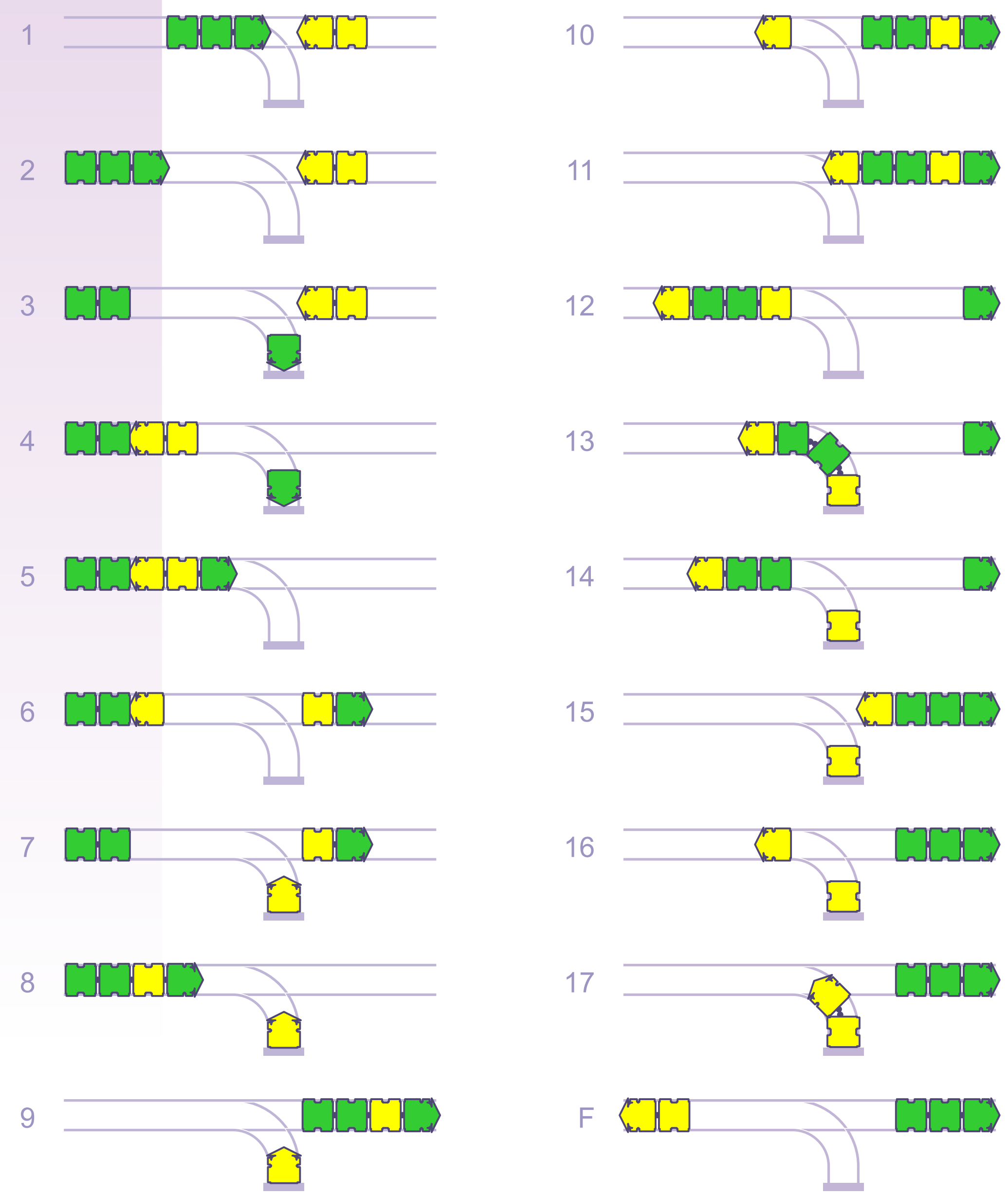
Simple Train Exchange

after Sam Loyd

Two trains, one of an engine and a car and another - of an engine and two cars, meet at a segment of railroad. There is a switch or side-track on that segment of railroad - just as shown in the illustration. The switch is large enough only to hold one engine or one car at a time.

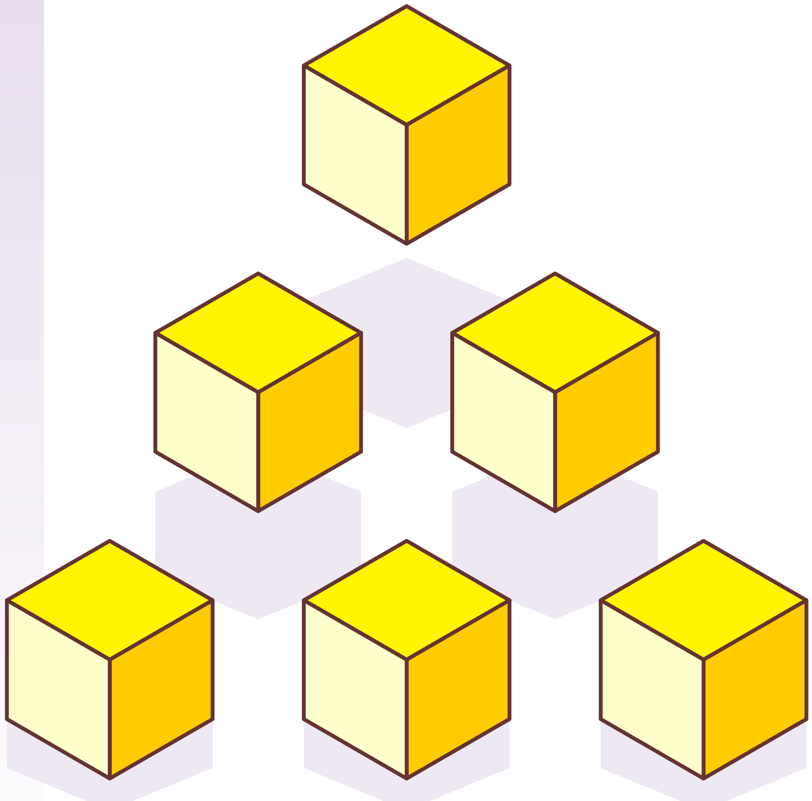
The object is, using only this switch, to exchange the trains in order they can continue their journeys and do that in the most expeditious way. No other outside help, except the switch itself, is allowed. Please, note that a car cannot be connected to the front of an engine.

Puzzles with Trains



Simple Train Exchange (solution)

To exchange the trains 17 moves are required. The moves are shown in the illustration.

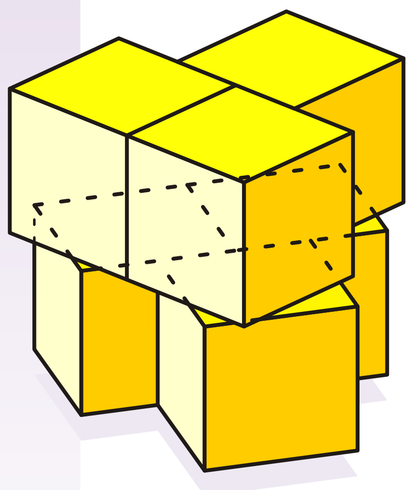


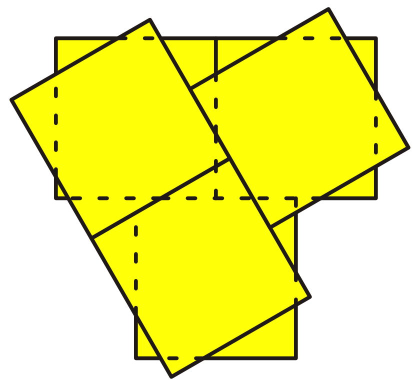
Six Cubes

by Martin Gardner

Take six identical cubes and place them on the table in such a way that each cube will touch every of the rest five cubes with some part of its side (touching along edges or at corners doesn't count).

You may use six identical matchboxes instead of cubes.

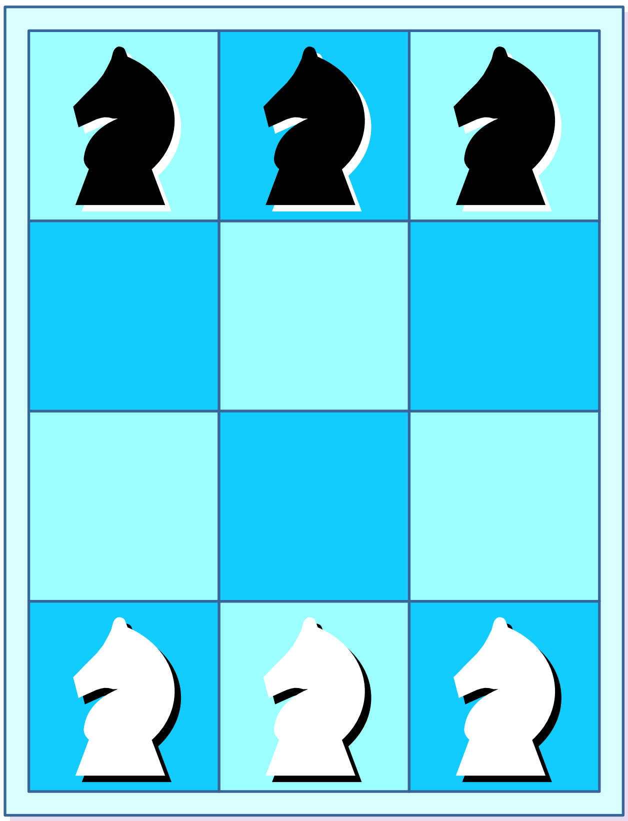




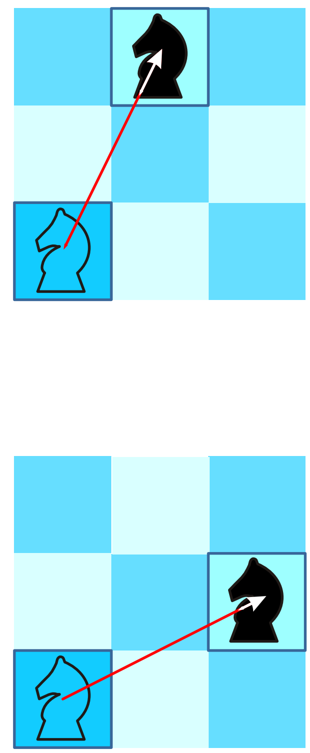
top view

Six Cubes (solution)

The solution is shown above.



1



A

2 B

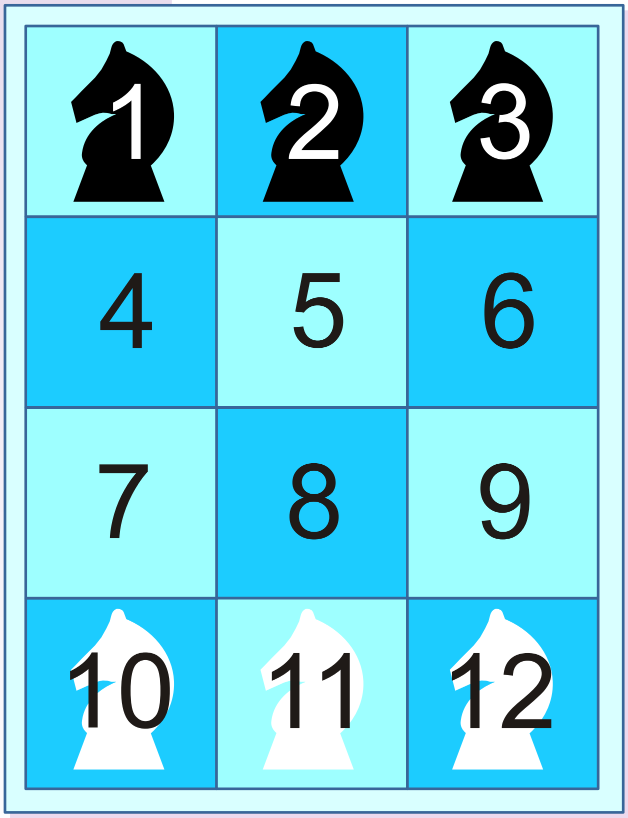
Six Knights

by Henry E. Dudeney

Place three black and three white chess knights on a 3x4 board as shown in Figure 1.

The object is to exchange black and white knights in the fewest possible number of their moves (some examples of such moves are shown in Figure 2, a and b).

Moves should be made by black and white knights in turn. And after every move none of the knights should be under attack of any of the knights of the opposite color. Only one knight can be on a square at the same time.



10-5, **1-8**;
11-6, **2-9**;
12-7, **3-4**;
5-12, **8-3**;
6-1, **9-10**;
7-6, **4-9**;
12-7, **3-4**;
1-8, **10-5**;
6-1, **9-10**;
7-2, **4-11**;
8-3, **5-12**.
(22 moves)

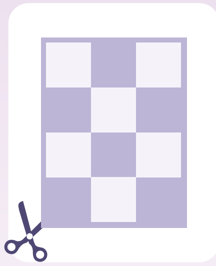
Six Knights (solution)

The minimum number of moves for this puzzle is twenty-two - eleven for the black and eleven for the white.

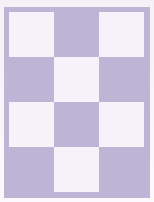
The pairs of numbers in the illustration make up the way how such a solution may be completed (based on the numeration of the board's squares shown in the illustration). Pairs in bold represent the moves for the black knights, the rest pairs - for the white knights, respectively. The first number in each pair indicates the initial square of the move and the second - the finish one of the same move.

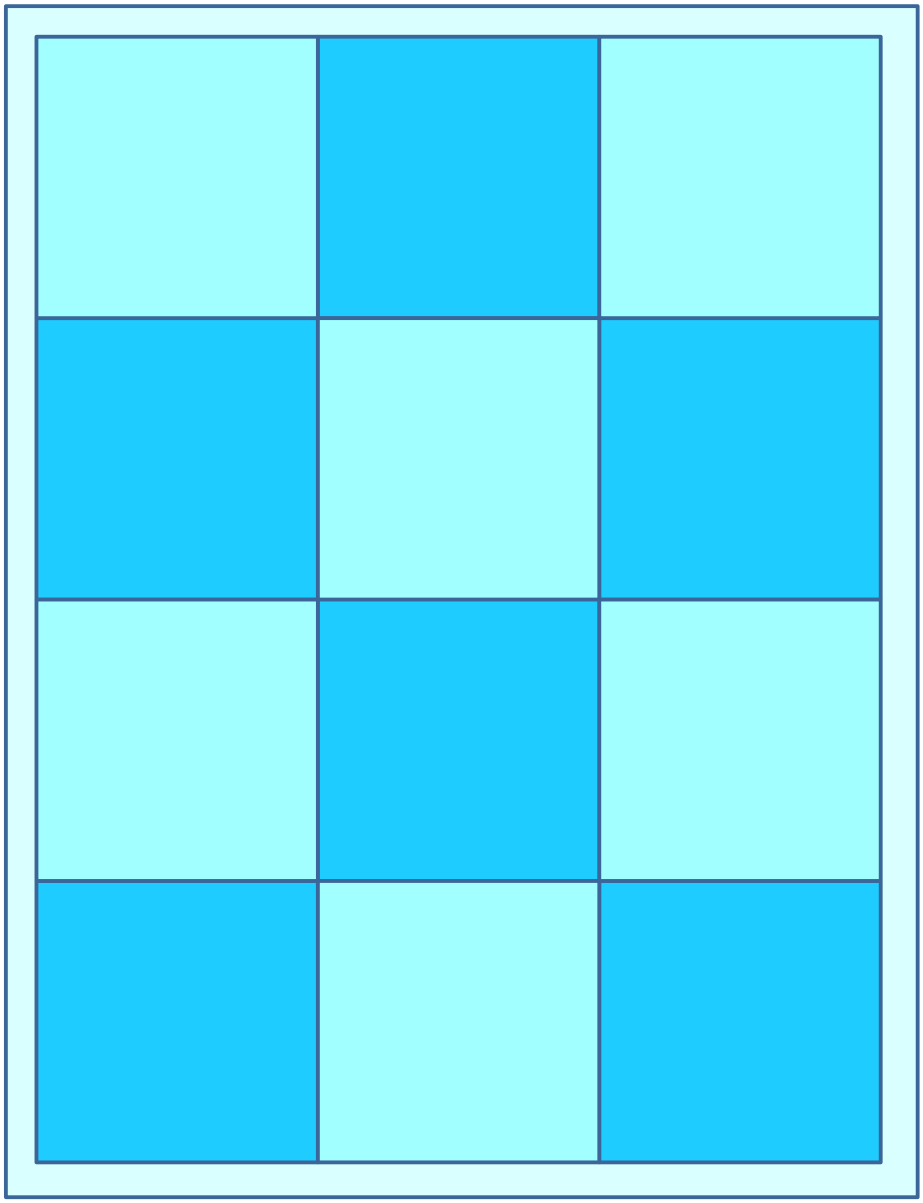
Chess 'n' Checkers Puzzles

1



F





Six Knights (board)

To produce the board first print it out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

9	9	9
5	5	5
3	3	3
1	1	1

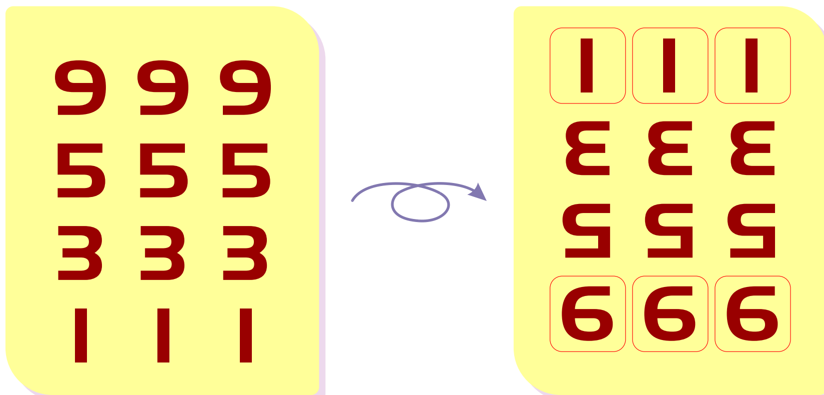
Six Numbers

by Martin Gardner

Write down the numbers in four rows as shown in the illustration or simply print them out.

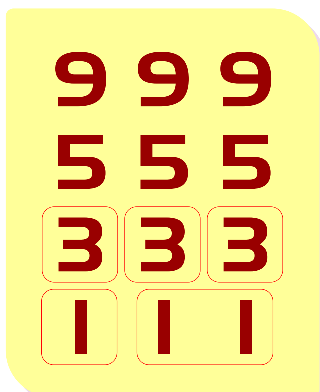
Now circle exactly six numbers from this set so that they add up to 21.

Solution 1



1

Solution 2



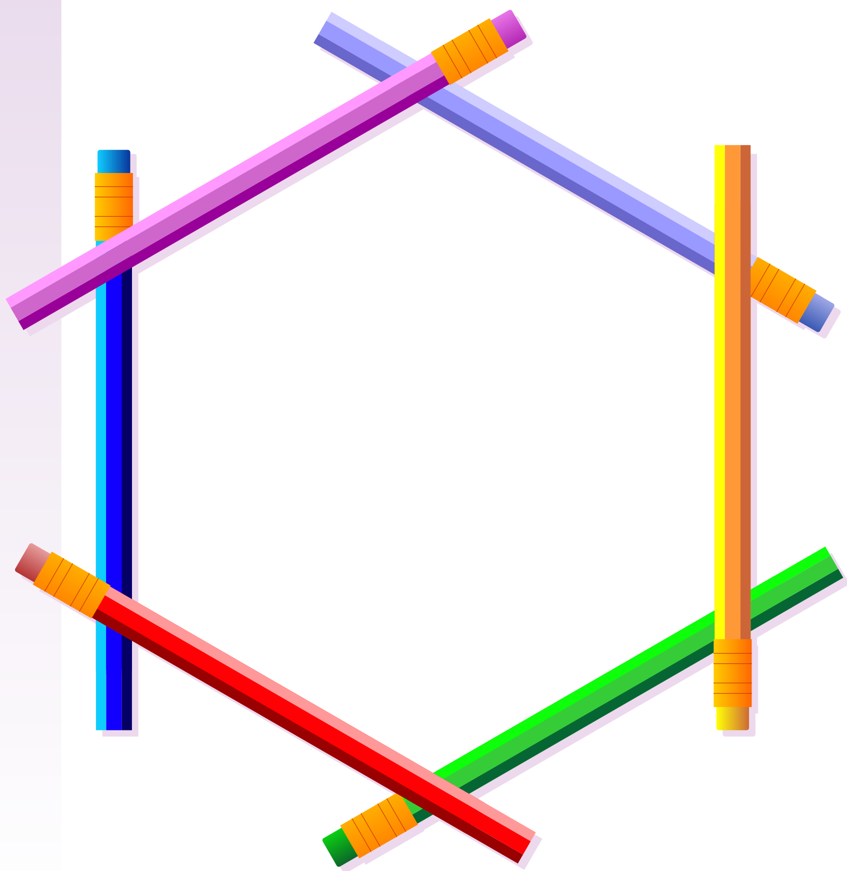
2

Six Numbers (solution)

Martin Gardner made this puzzle as a joke. His own answer (Solution 1) was to turn the piece of paper with the numbers upside down and then circle three 6's (that were created from 9's) and three 1's. These six numbers (6,6,6,1,1 and 1) add up exactly to 21.

But there is another, more witty answer (Solution 2) that doesn't involve turning the puzzle upside down. One reader sent this solution to Martin Gardner. All you have to do is to circle three 3's, one 1 (left or right only), and then outline the remaining adjacent 1's with a circle to create one number - 11. All these numbers (3, 3, 3, 1 and 11) will add up exactly to 21 as well!

Miscellaneous Puzzles



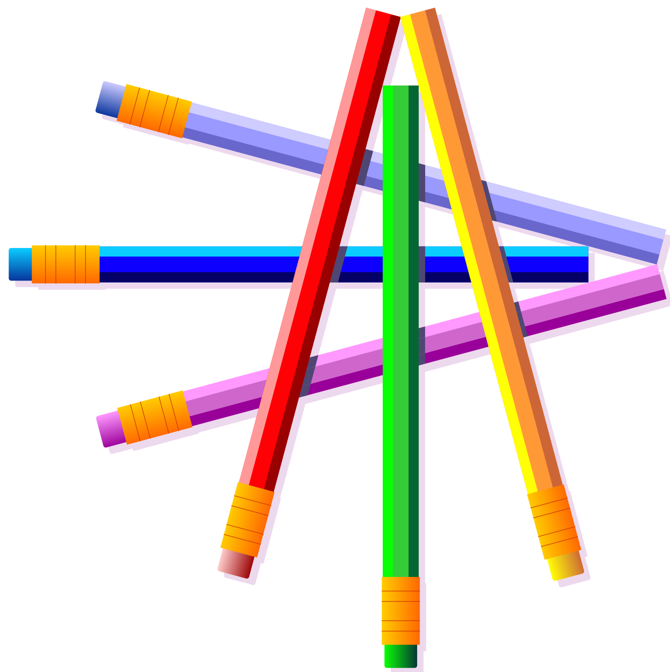
The Six Pencils

after Henry E. Dudeney

It's possible to place six pencils on the table in such a way that every of them touches the other two - as shown in the illustration. Can you place the same six pencils on the table so that each pencil touches every other one?

Some readers of Martin Gardner's famous puzzle column in the Scientific American magazine discovered that this puzzle has a solution for seven pencils too. So, after you solve the challenge with six pencils, add to them one more pencil, and try to discover that incredible 7-pencil solution.

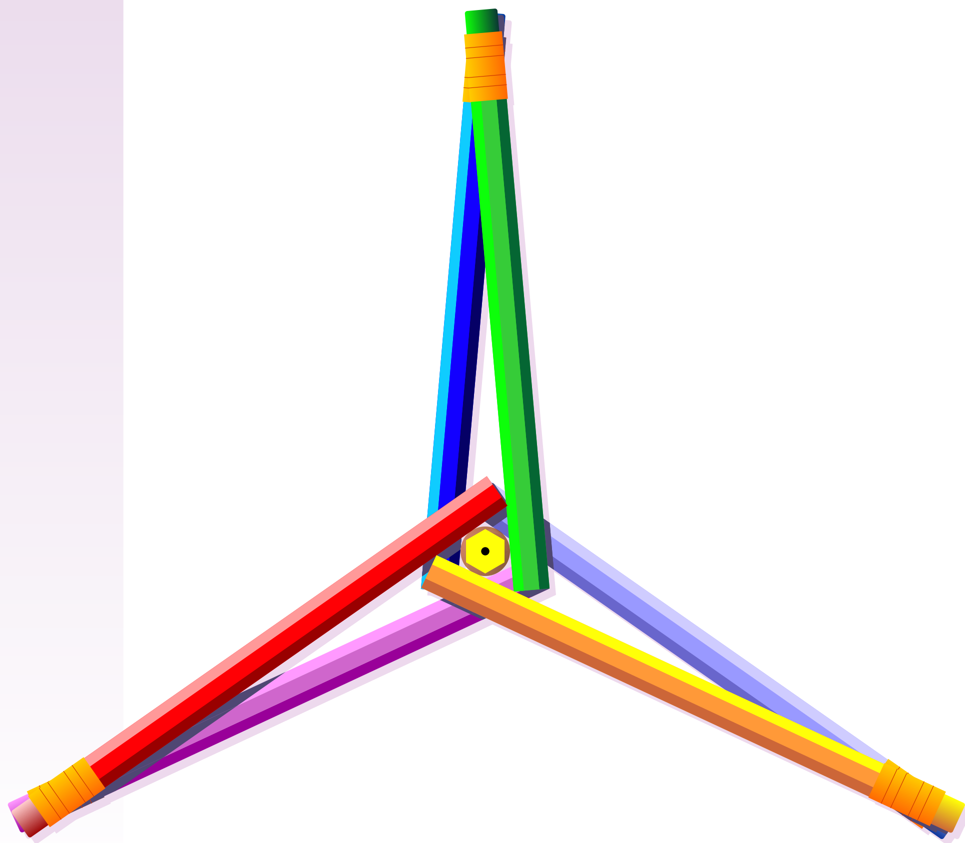
Miscellaneous Puzzles



The Six Pencils (solution 1)

One of the 6-pencil solutions is shown in the illustration.

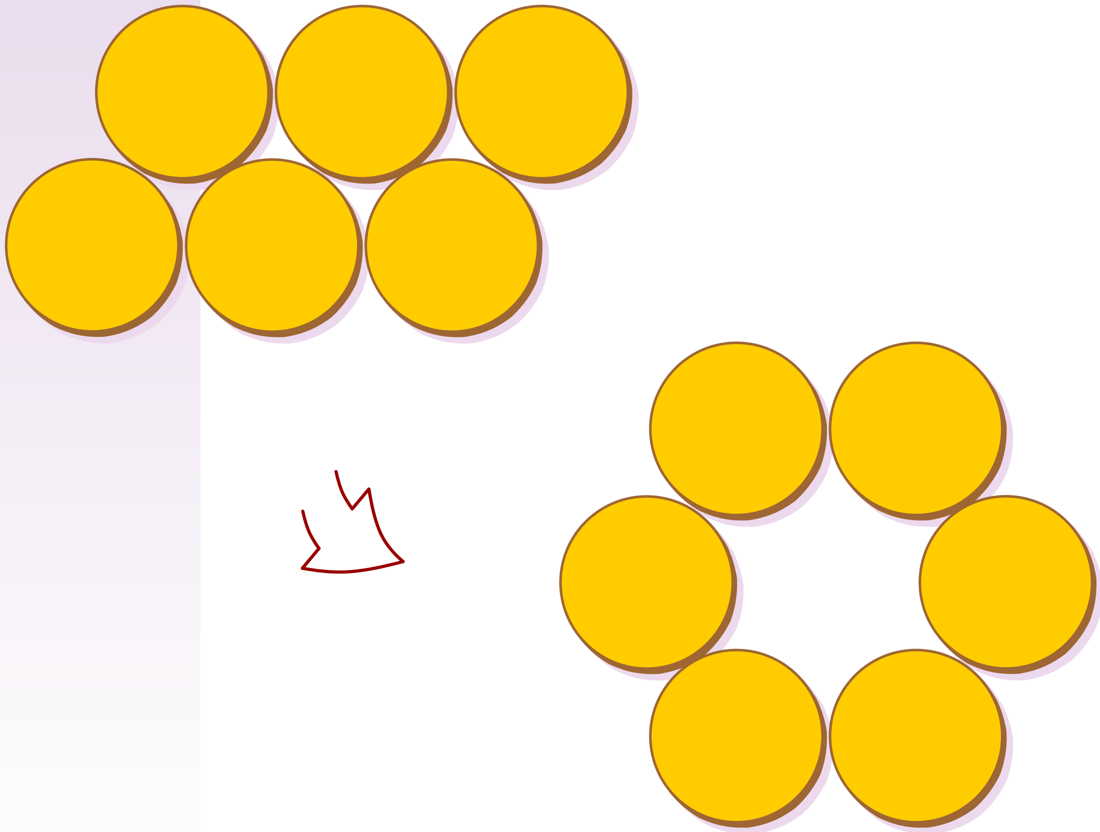
Miscellaneous Puzzles



The Six Pencils (solution 2)

The 7-pencil solution is shown in the illustration.

Coin Puzzles

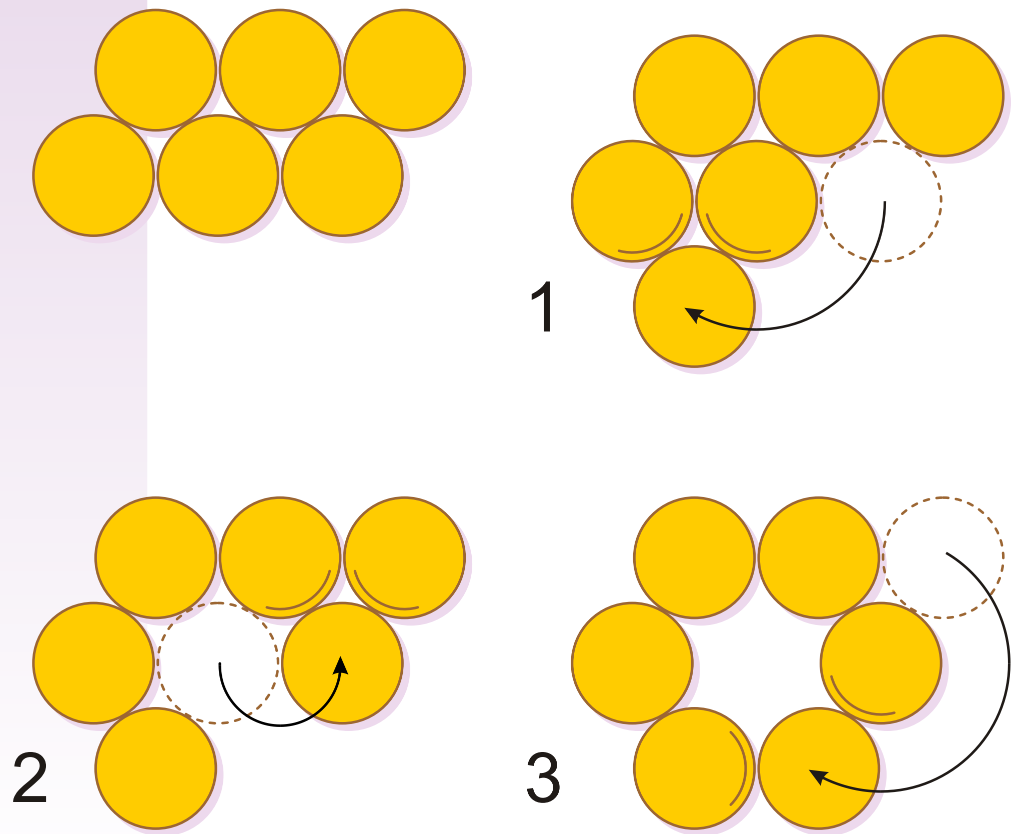


The Six Pennies

by Henry E. Dudeney

Place six pennies on the table in two rows as shown in the uppermost figure. The object is to turn these two rows into the coin circle shown in the lowermost figure in only three moves.

A move consists of sliding one coin to a new position, where the moved coin has to touch two other coins.



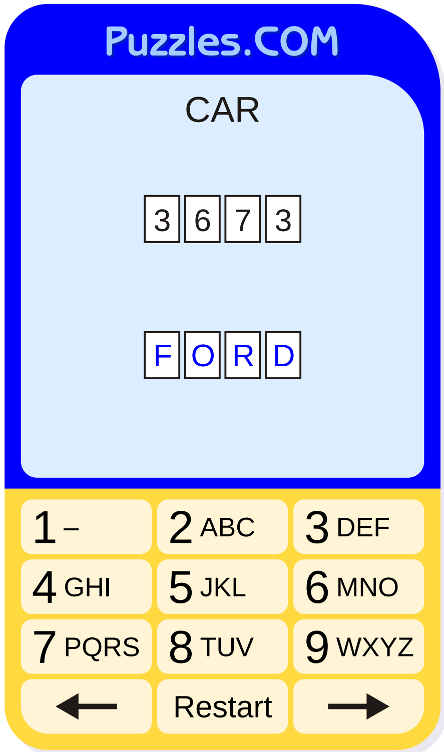
The Six Pennies (solution)

The solution is shown in the illustration.

SMS Codes

by László Mérő and László G. Nagy*

Rock Artist	7 8 4 6 4	
Rock Artist 2	7 7 4 6 2 3	
Rock Group	7 4 6 5	3 5 6 9 3
Rock Group 2	2 3 7 6 7 6 4 8 4	
Rock Group 3	2 3 2 8 5 3 7	
Car	7 6 8 3 7	
Car 2	7 6 7 7 2 4 3	
Car 3	7 3 6 2 8 5 8	
Car 4	5 2 6 2 4 2	
Car 5	7 5 6 3 2	
City	5 6 6 3 6 6	
City 2	2 2 7 2 2 2 7	
City 3	9 3 5 5 4 6 4 8 6 6	
City 4	2 4 4 2 2 4 6	
City 5	7 9 3 6 3 9	
European City	3 3 4 6 2 8 7 4 4	
Movie Actor	2 4 2 7 5 4 3	2 4 2 7 5 4 6
Movie Actress	7 4 2 7 6 6	7 8 6 6 3
Football Player	3 2 8 4 3	2 3 2 5 4 2 6



Find out the words coded by the keys used when writing them in an sms.

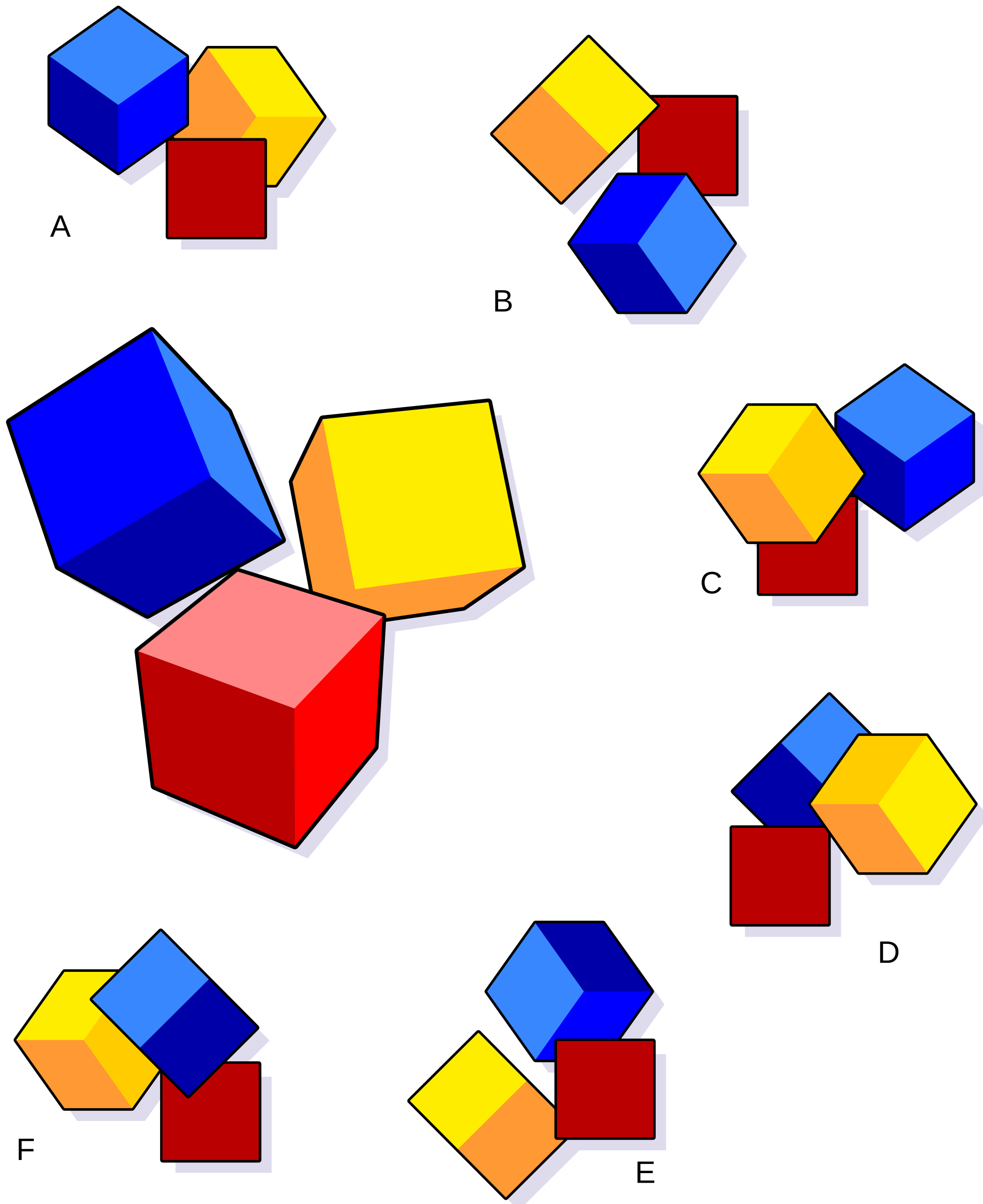
Example. Car: 3673 = FORD

*The set is compiled from the SMS challenges created by László Mérő for the 4th 24 Hours Puzzle Championship, May 24-25, 2003, Budapest, Hungary; and by László G. Nagy for the 5th 24 Hours Puzzle Championship, May 22-23, 2004, Budapest, Hungary.

Last Updated: October 6, 2005

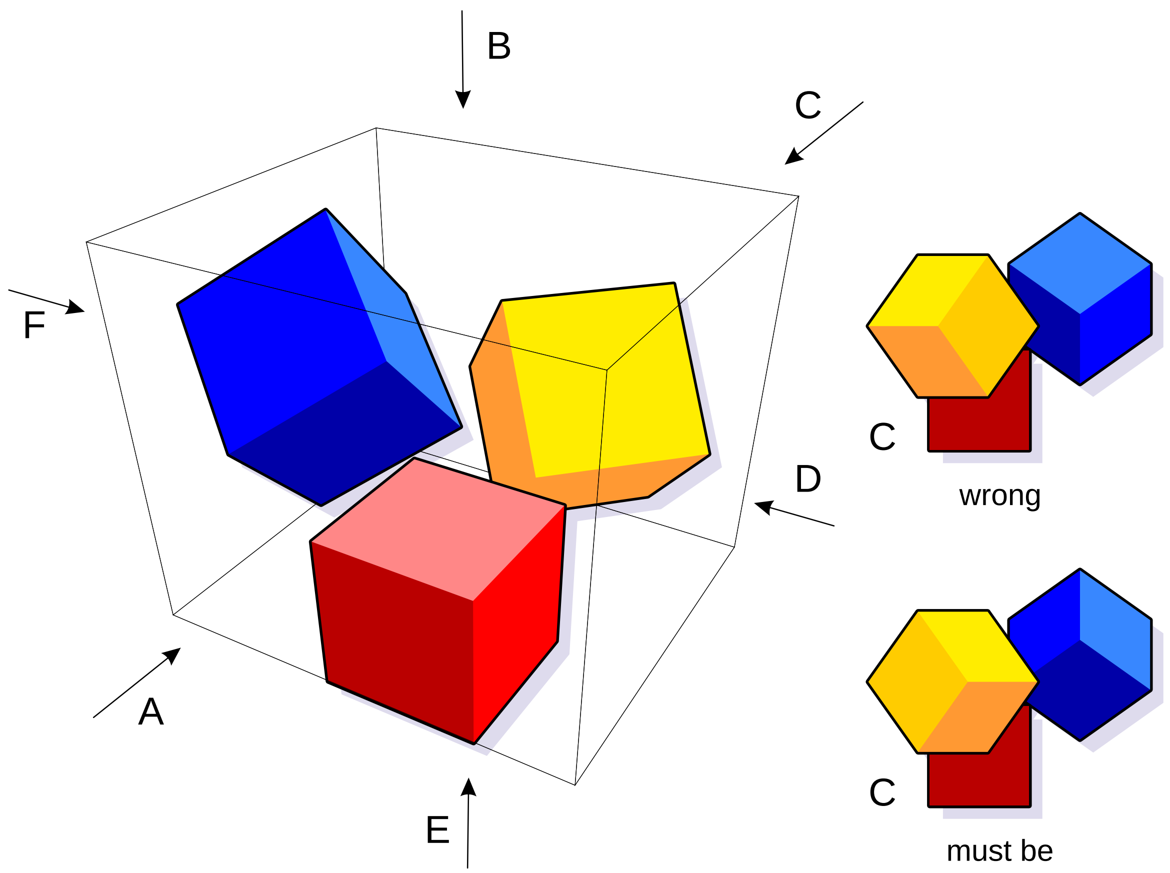
Rock Artist	7 8 4 6 4	S T I N G
Rock Artist 2	7 7 4 6 2 3	P R I N C E
Rock Group	7 4 6 5 3 5 6 9 3	P I N K F L O Y D
Rock Group 2	2 3 7 6 7 6 4 8 4	A E R O S M I T H
Rock Group 3	2 3 2 8 5 3 7	B E A T L E S
Car	7 6 8 3 7	R O V E R
Car 2	7 6 7 7 2 4 3	P O R S C H E
Car 3	7 3 6 2 8 5 8	R E N A U L T
Car 4	5 2 6 2 4 2	L A N C I A
Car 5	7 5 6 3 2	S K O D A
City	5 6 6 3 6 6	L O N D O N
City 2	2 2 7 2 2 2 7	C A R A C A S
City 3	9 3 5 5 4 6 4 8 6 6	W E L L I N G T O N
City 4	2 4 4 2 2 4 6	C H I C A G O
City 5	7 9 3 6 3 9	S Y D N E Y
European City	3 3 4 6 2 8 7 4 4	E D I N B U R G H
Movie Actor	2 4 2 7 5 4 3 2 4 2 7 5 4 6	C H A R L I E C H A P L I N
Movie Actress	7 4 2 7 6 6 7 8 6 6 3	S H A R O N S T O N E
Football Player	3 2 8 4 3 2 3 2 5 4 2 6	D A V I D B E C K H A M

The solutions to the codes are presented above.

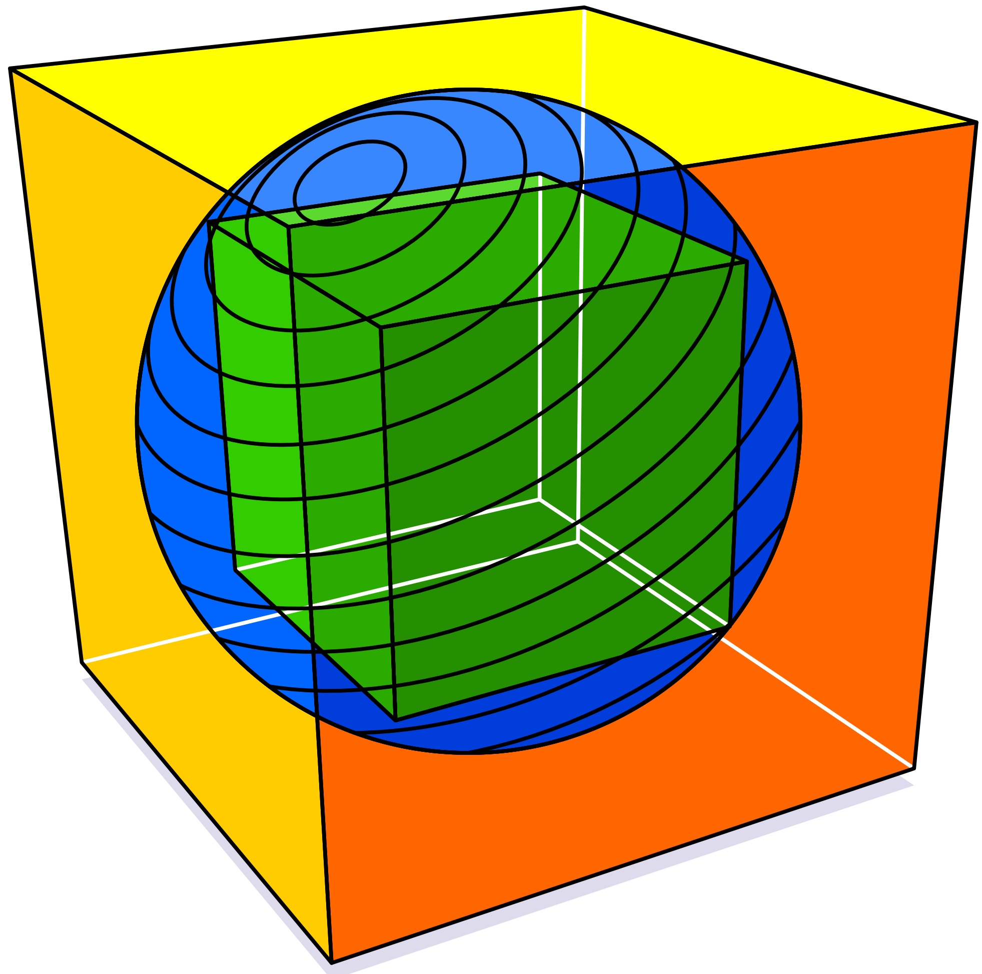


Six different snapshots are scattered around the composition of three cubes - as shown in the illustration.

All snapshots except one are taken from the three cubes. Can you figure out the snapshot from among A-F which doesn't belong to the set?

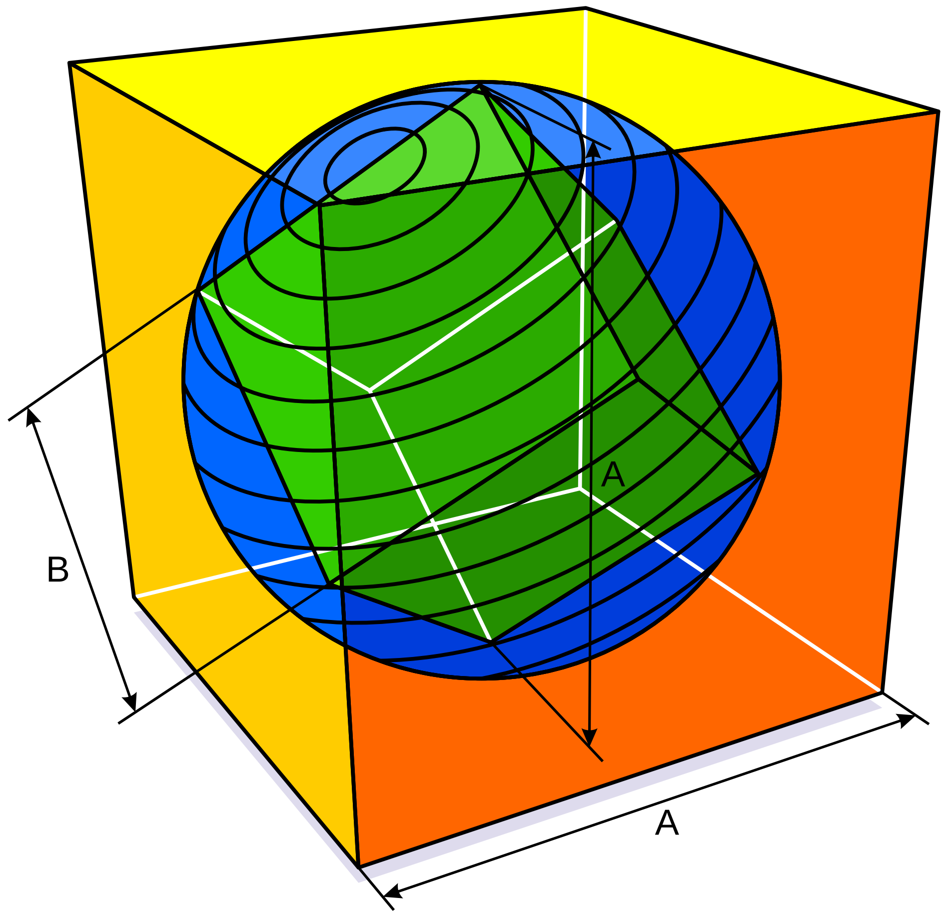


The wrong snapshot is C. The illustration shows what it should be instead.



A bigger cube is circumscribed outside a sphere, while a smaller cube is inscribed in the same sphere - just as shown in the illustration. What is the volume of the smaller cube, if the bigger one's volume is 1?

More from the author at PeterPuzzle.com

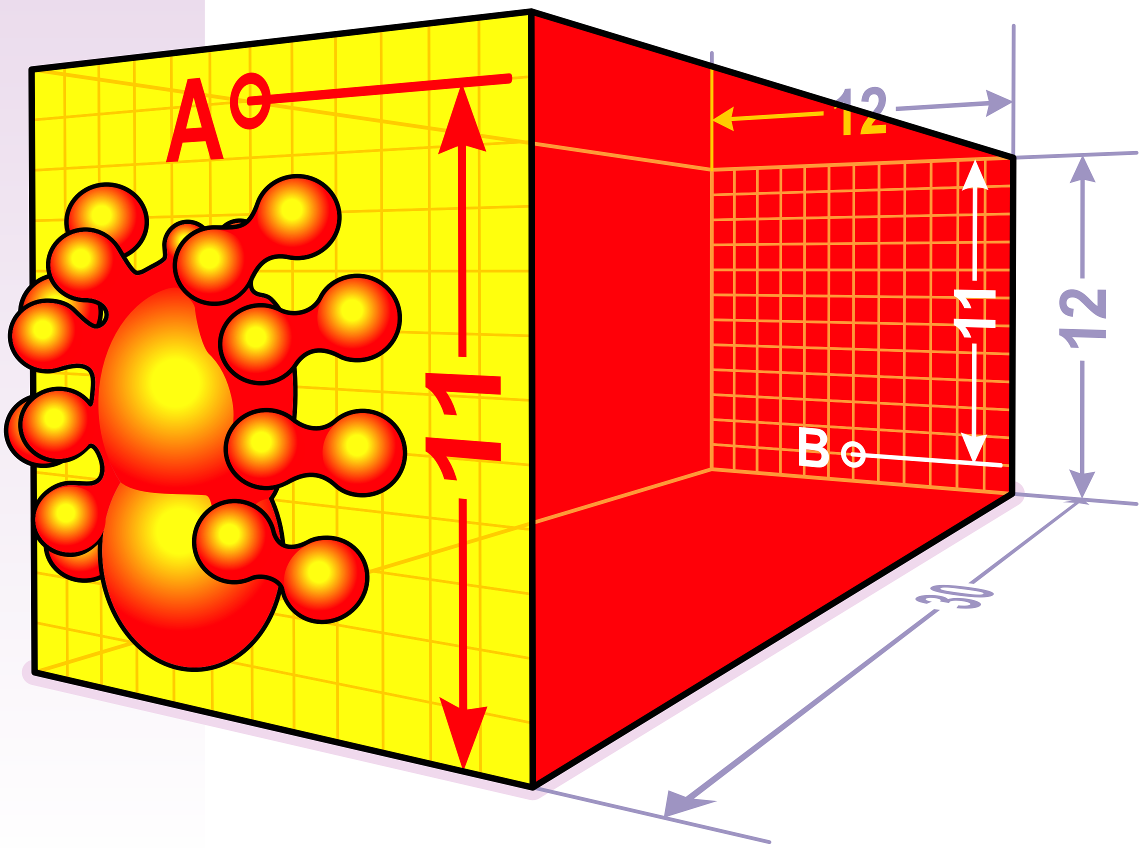


In order to make proper calculations, let's rotate the small (green) cube in the sphere first in such a way as it is shown in the illustration. Now it can be seen clearly the small cube's diagonal is equal the side of the big (orange) cube.

The following calculations provide us with the final volume of the small (green) cube.

Volume of the Orange Cube = 1;
Edge of the Orange Cube = 1;
Main Diagonal of the Green Cube = 1;
$(\text{Edge of the Green Cube})^2 + (\text{Edge of the Green Cube})^2 + (\text{Edge of the Green Cube})^2 = 1^2$;
$3*(\text{Edge of the Green Cube})^2 = 1$;
$(\text{Edge of the Green Cube})^2 = 1/3$;
Edge of the Green Cube = 1/sqrt(3) = sqrt(3)/3;
Volume of the Green Cube = $[\text{sqrt}(3)/3]^3$ = sqrt(3)/9 = 0.193.

Geometrical Puzzles

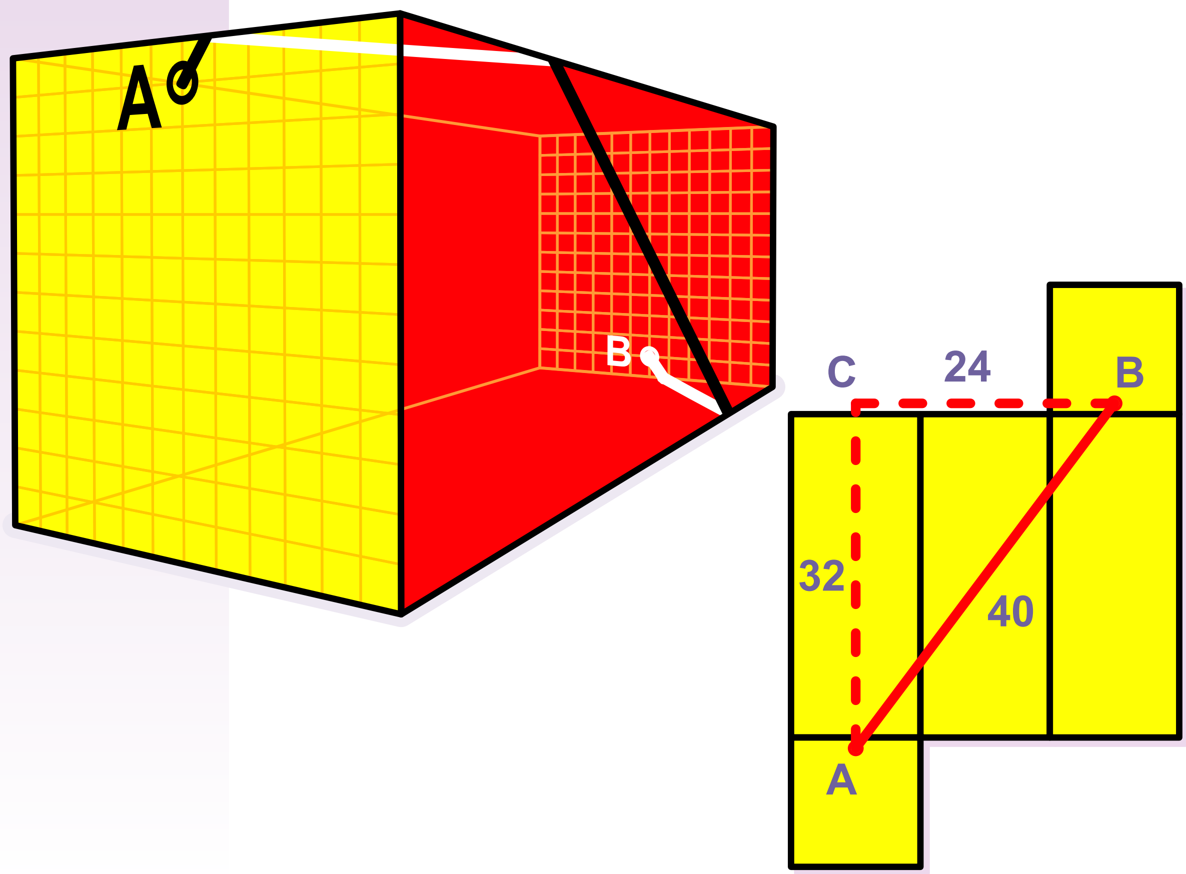


Spider Ride

by Sam Loyd

A rectangular box is 30 units long, 12 units wide, and 12 units high. A Spider starting from spot A should reach spot B. Spot A is midway from the sides of the box and 1 unit from its top. Spot B is midway from the sides of the box, 1 unit from the bottom of the box, and on the opposite side from A. The box, its dimensions and the proper locations of spots A and B are shown in the illustration.

What is the shortest way for the Spider to reach spot B? During the journey from A to B the Spider can use any side and edge of the box. Hint: the shortest distance between A and B is less than 42 units.

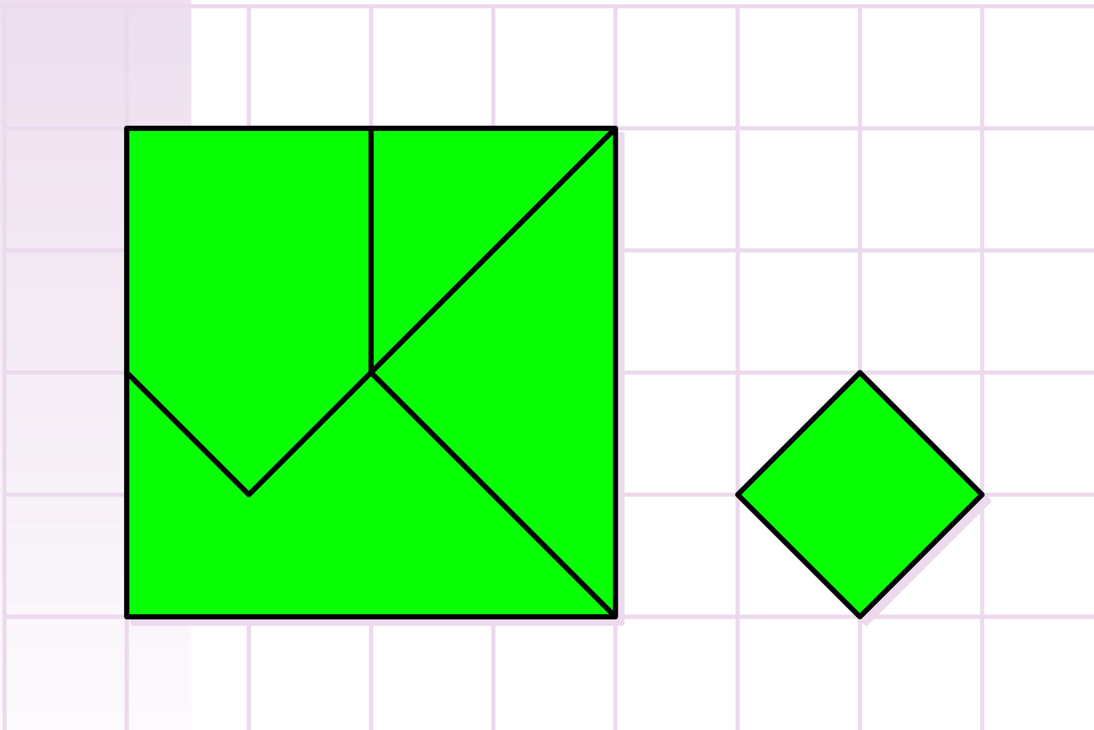


Spider Ride (solution)

At first glance it seems that the shortest distance between A and B is the straight way along the sides of the box, i.e. 1 unit up, 30 units along the top side of the box and then 11 units down the opposite side - 42 units in total. But as it was stated in the hint the shortest distance between A and B is less than 42.

To find the shortest distance out it is useful to unfold some sides of the box into a 2D model. If to unfold them as shown in the lower right corner of the illustration, we get a right triangle where the hypotenuse AB is the distance between the two spots. It equals square root of ($AC^2 + BC^2$). AC is 32 units long (1 + 30 + 1) and BC is 24 units long (6 + 12 + 6). Thus the distance AB equals square root ($32^2 + 24^2$) = square root of 1600 or 40.

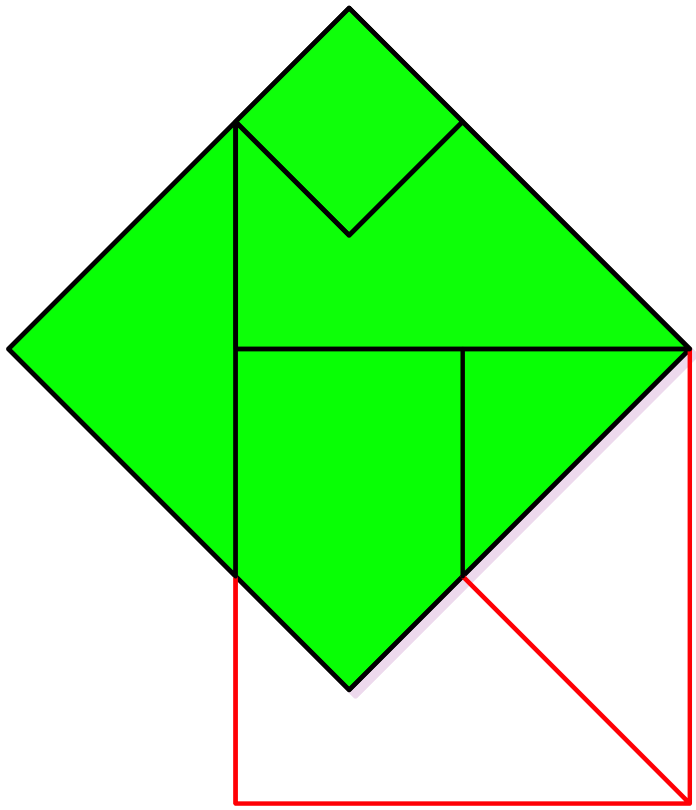
Tangrams



Square by Square

The bigger square in the illustration is divided into four pieces. Using all the five pieces shown above - including the smaller square - complete one big square. You are allowed to flip the pieces over, and rotate them as you will wish. Pieces can't overlap each other though.

Tangrams



Square by Square (solution)

The solution is shown in the illustration.

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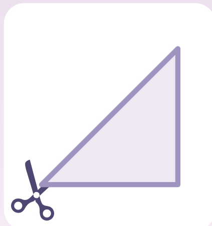
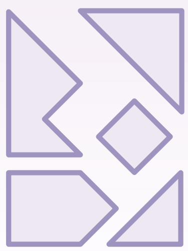
Tangrams

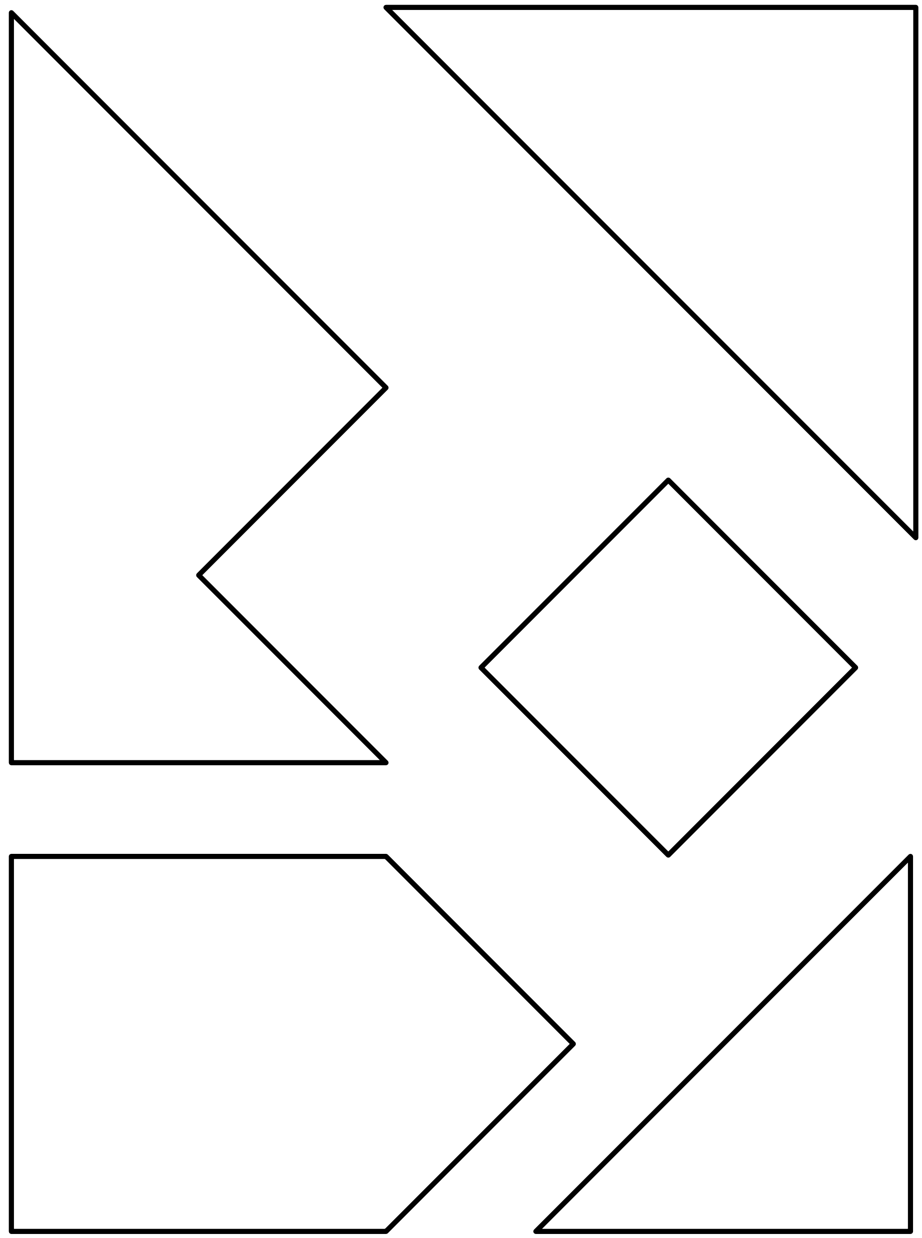
1



x 5

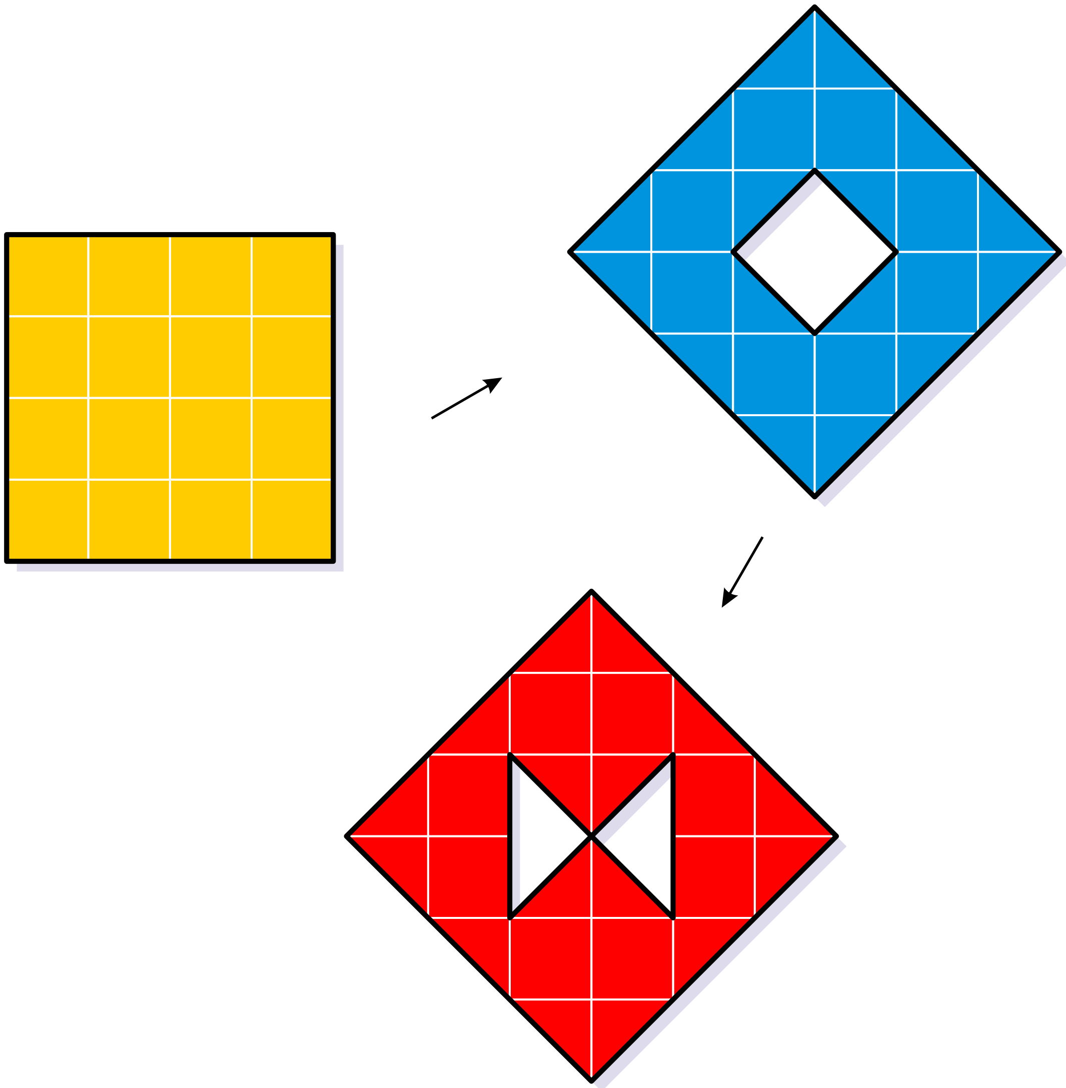
F





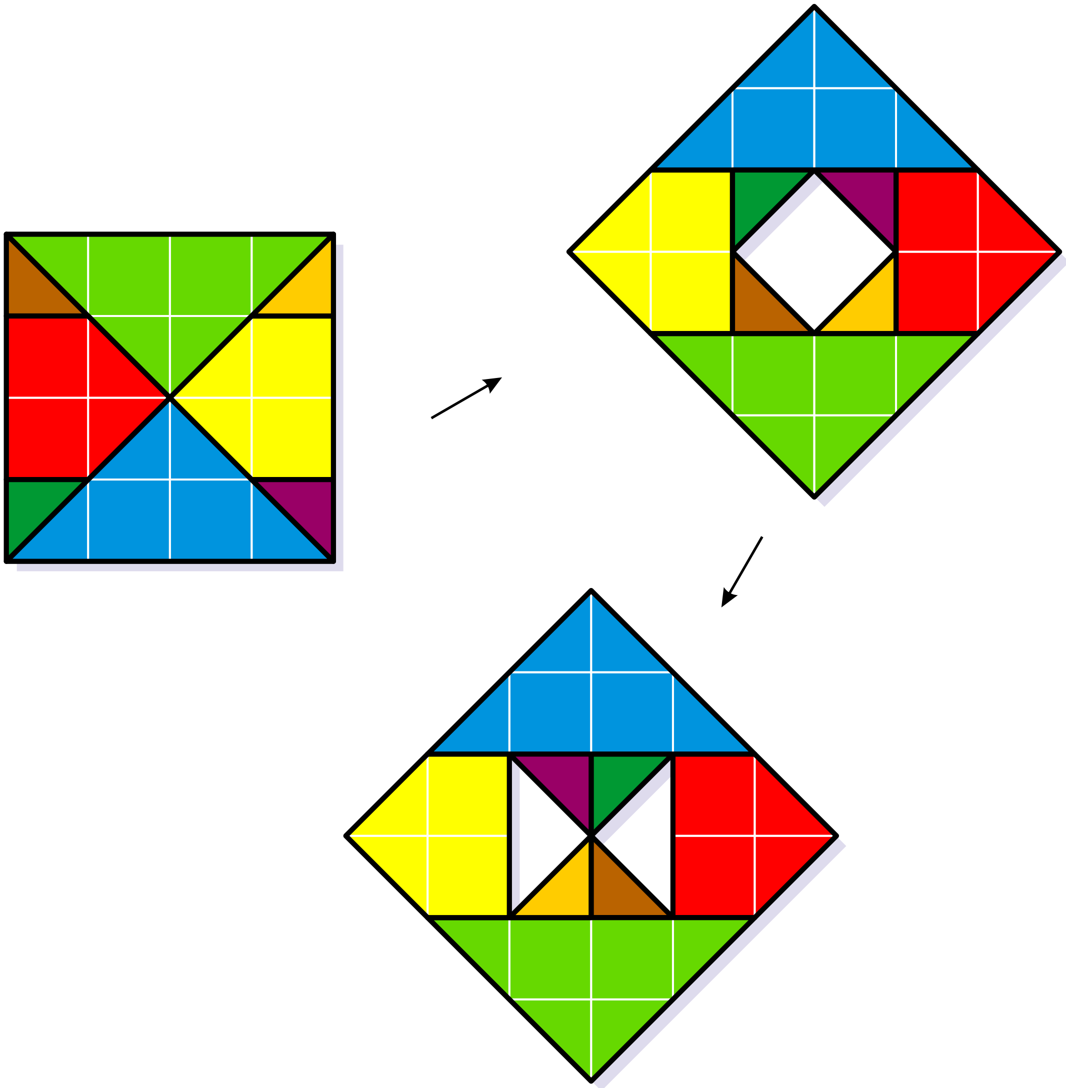
Square by Square (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

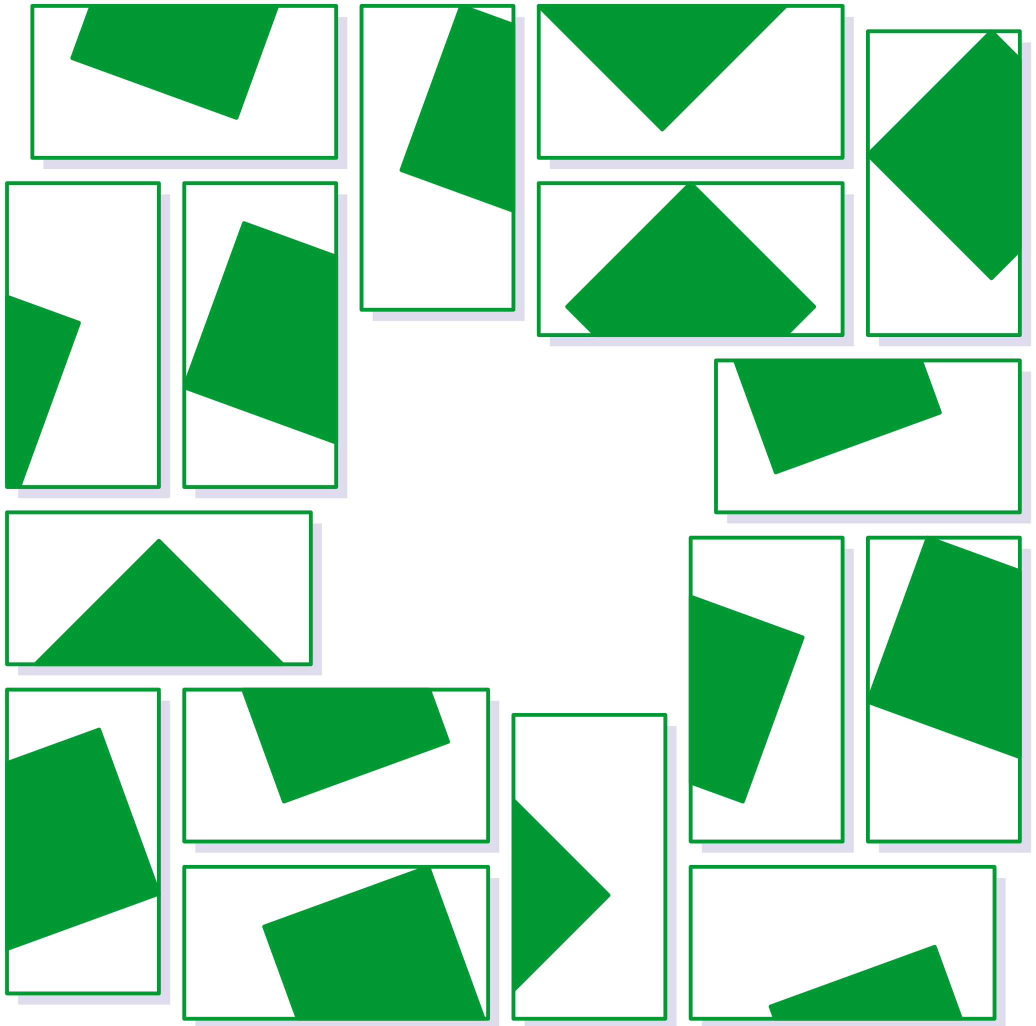


Into how many pieces should the orange square be divided so that they can be first arranged into the blue "Cocoon" shape and then rearranged into the red "Butterfly" shape? The pieces can be rotated but not overlapped.

More from the authors at GrabarchukPuzzles.com

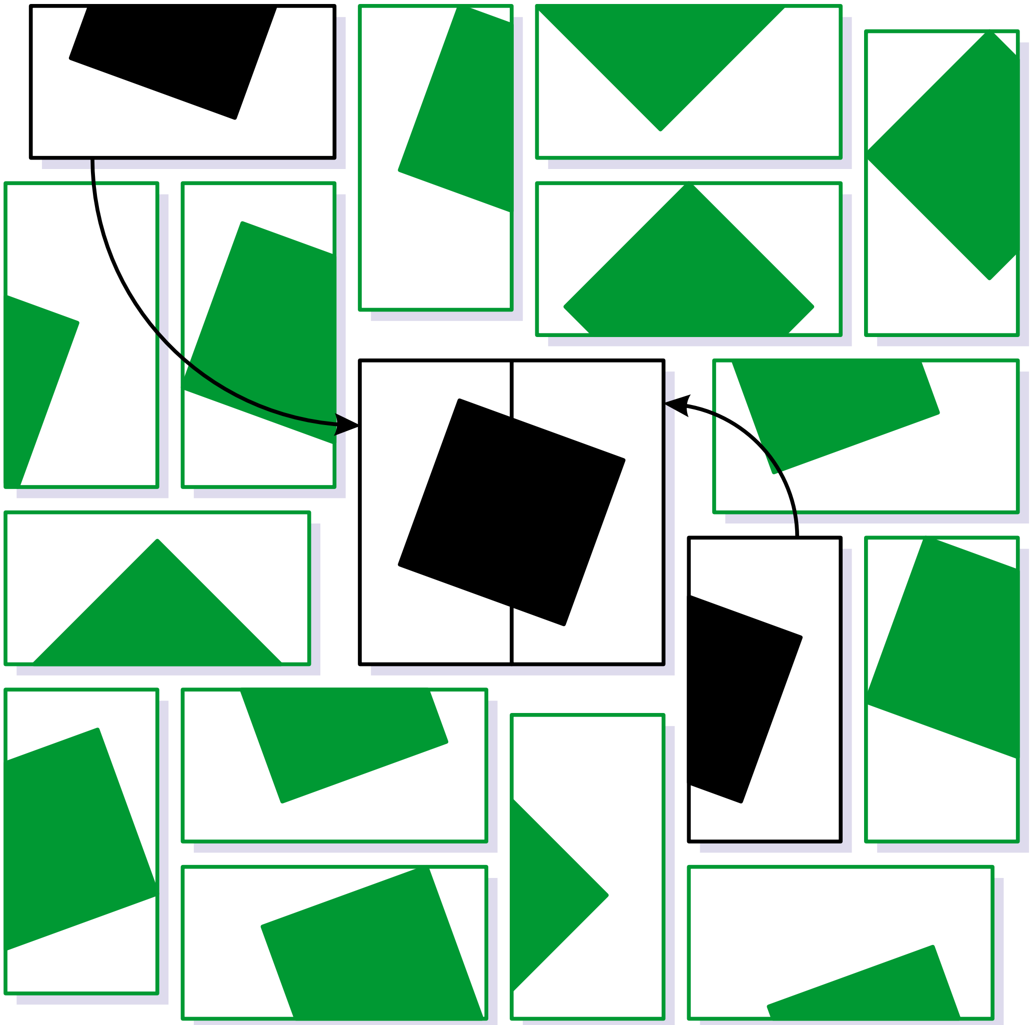


The square should be divided into eight pieces. The solutions are shown in the illustration.



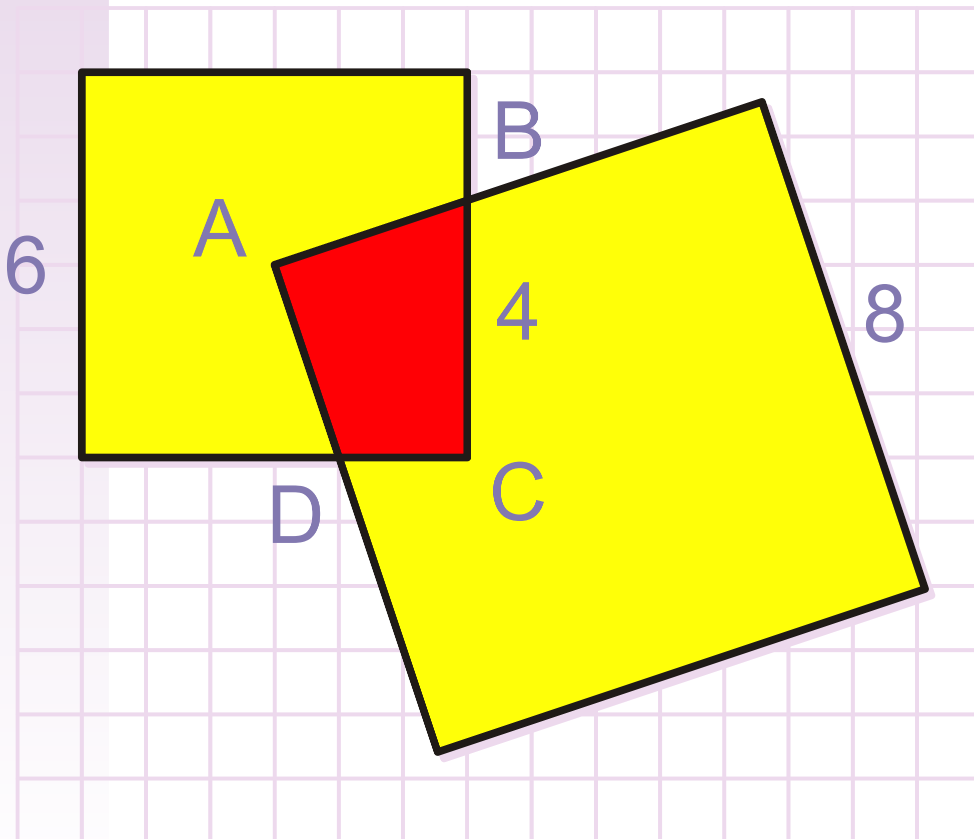
Among these sixteen rectangles only two can be adjusted together so that to form a perfect square with another perfect square of green color depicted on it. Which two of them?

More from the author at PeterPuzzle.com



The two rectangles are highlighted.

Geometrical Puzzles

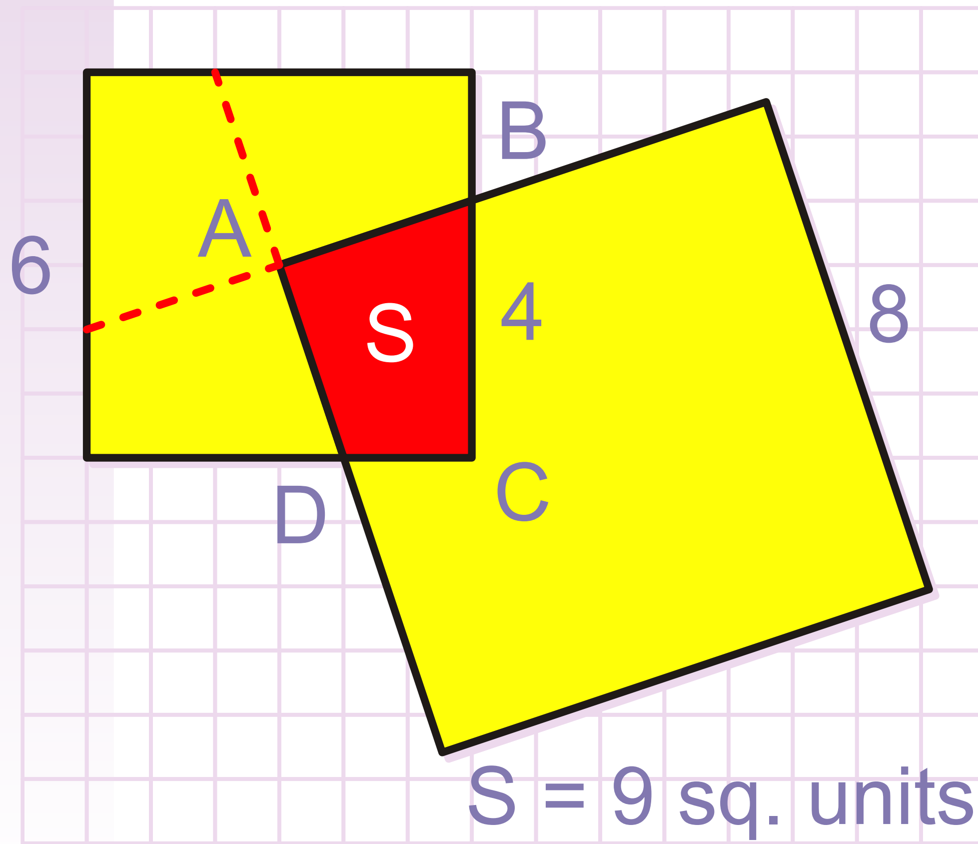


Square Intersection

after Martin Gardner

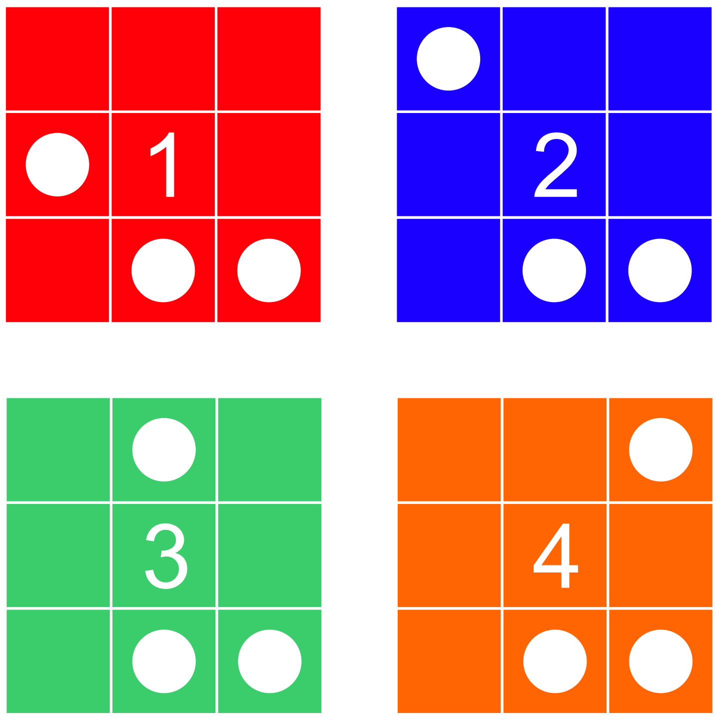
A square with side of eight units overlaps a square with side of six units in such a way that its corner A is placed exactly at the center of the small square. As the result of the overlapping the two sides of the large square intersect the two sides of the small square exactly at the points B and D as shown in the illustration. The BC line is 4 units long.

What is the area of overlap of the two squares, i.e. the area of the red quadrangle ABCD?

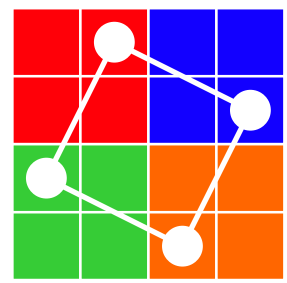


Square Intersection (solution)

To solve this puzzle just extend two sides of the large square as shown by the dotted lines in the illustration. This obviously divides the small square into four congruent parts. Since the small square has an area of 36 square units (6 x 6), the overlap (red quadrangle) must have an area of 36/4, or 9 square units. The amusing thing about the problem is that the area of overlap is constant regardless of the large square's position as it rotates around A. The fact that BC is 4 units long is actually irrelevant information.



1



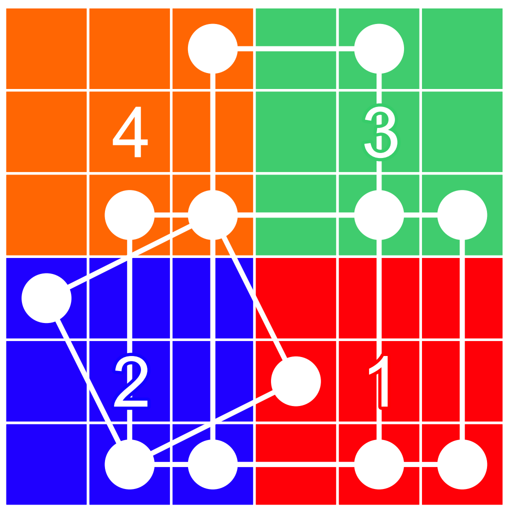
2

Squares 4 Four

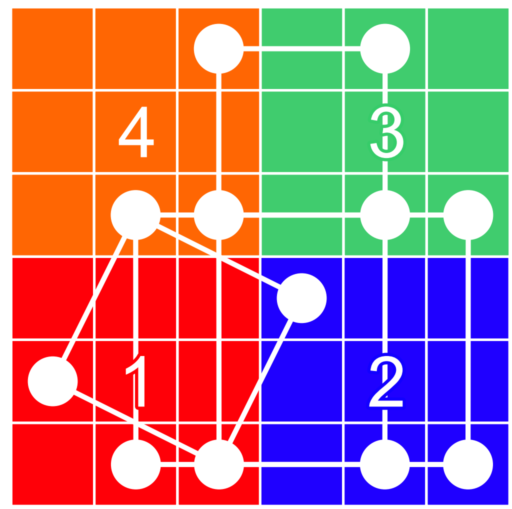
by Peter Grabarchuk

Arrange the four pieces shown in Figure 1 (the pieces for printing out can be found at the last page of this file) into the 2x2 square so that four squares formed of the white dots appear. A square is formed when four dots lie in its respective corners (as shown in Figure 2 above).

Matching Cards



1



2

Squares 4 Four (solution)

The two solutions to this puzzle are shown in the illustration.

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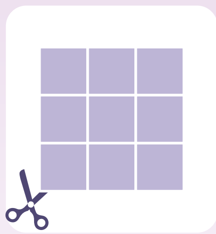
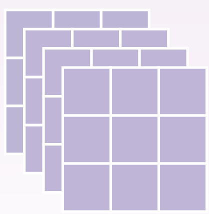
Matching Cards

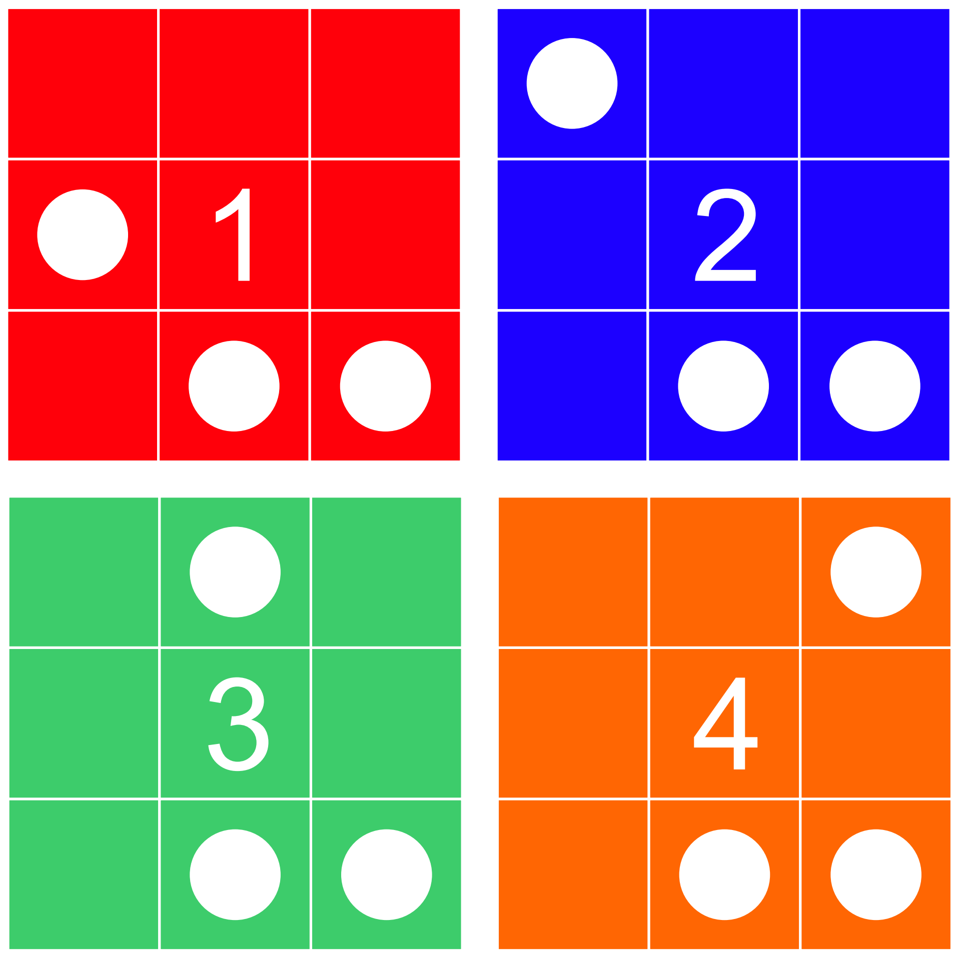
1



x 4

F



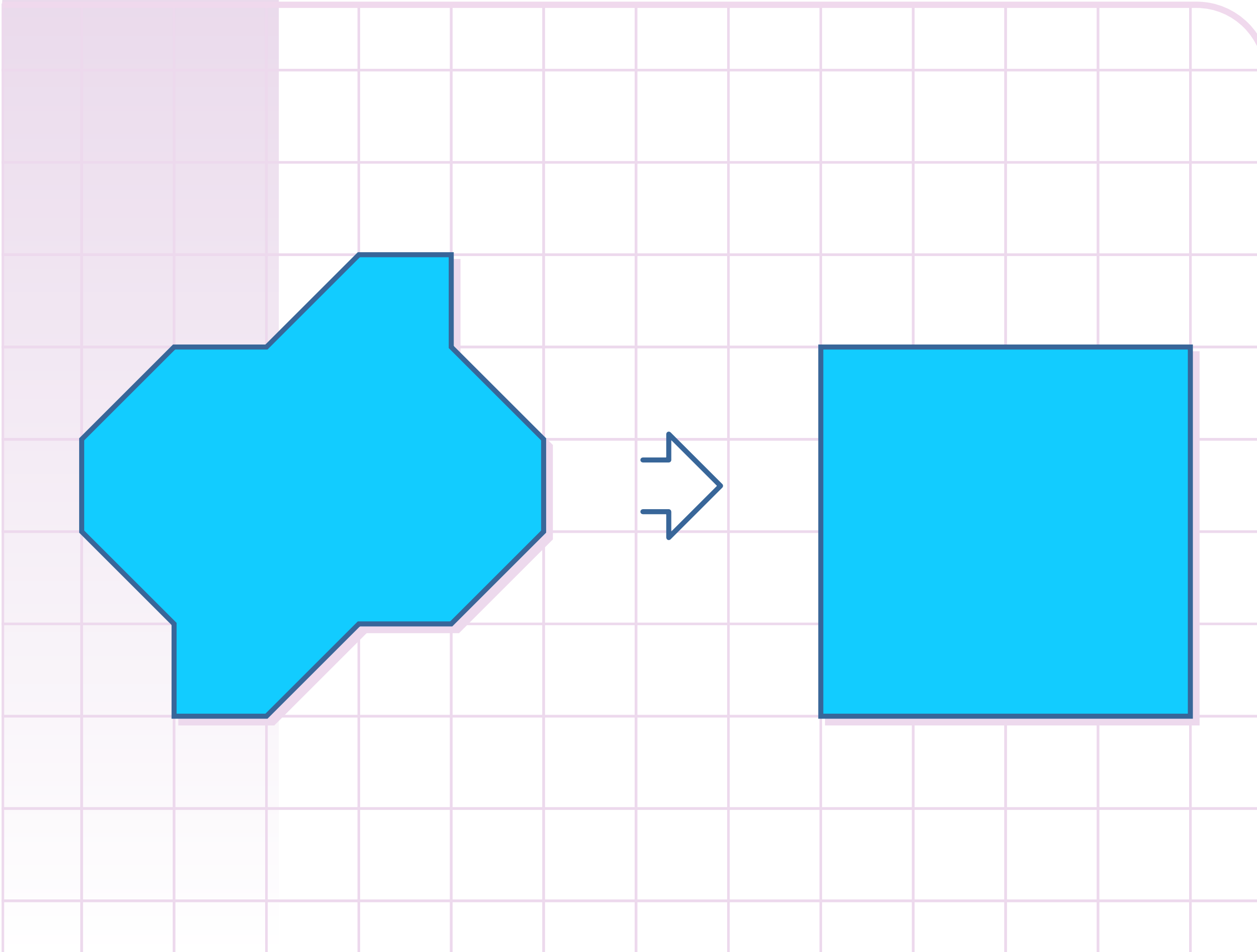


Squares 4 Four (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

September 6, 2003 www.puzzles.com

Dissection Puzzles

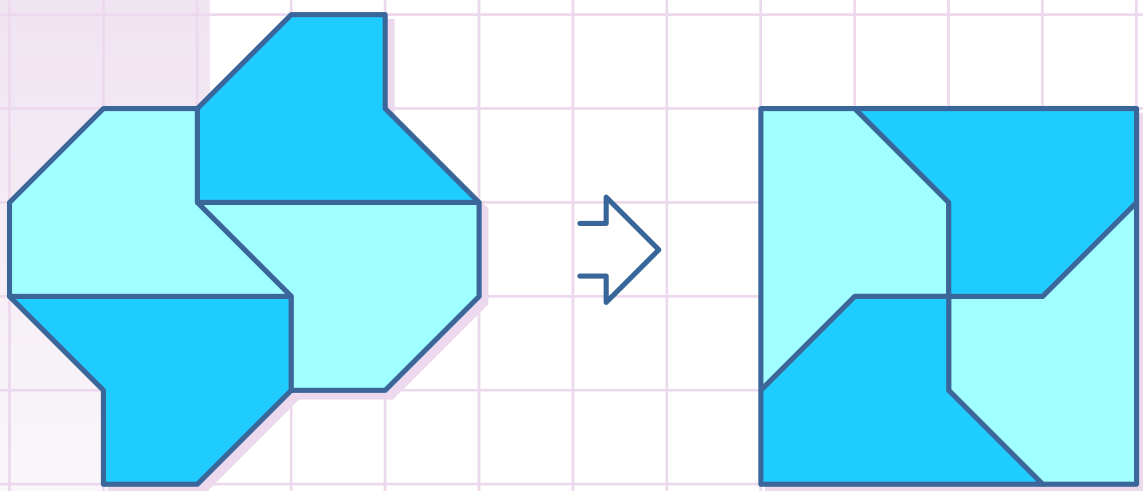


Square Skate

by Peter Grabarchuk

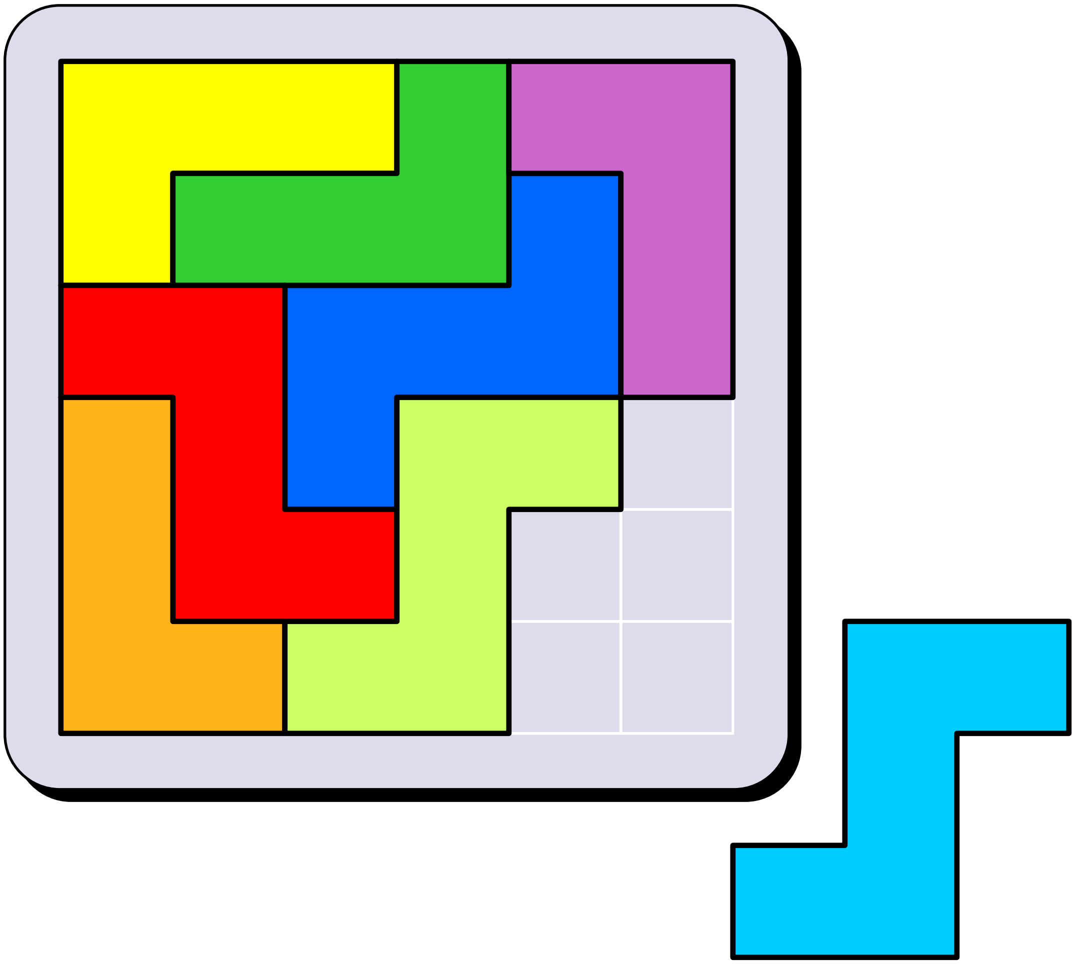
Divide the left figure shown above into four identical parts (of the same shape and size) which may form a square.

Dissection Puzzles



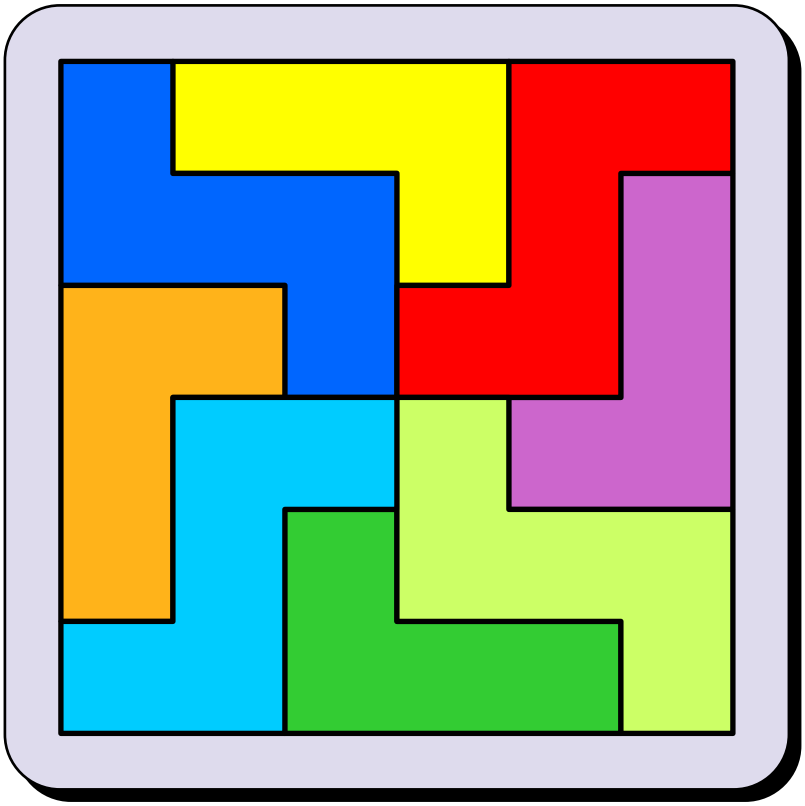
Square Skate (solution)

The illustration above shows how to divide the figure into four identical parts and then arrange them into a square.

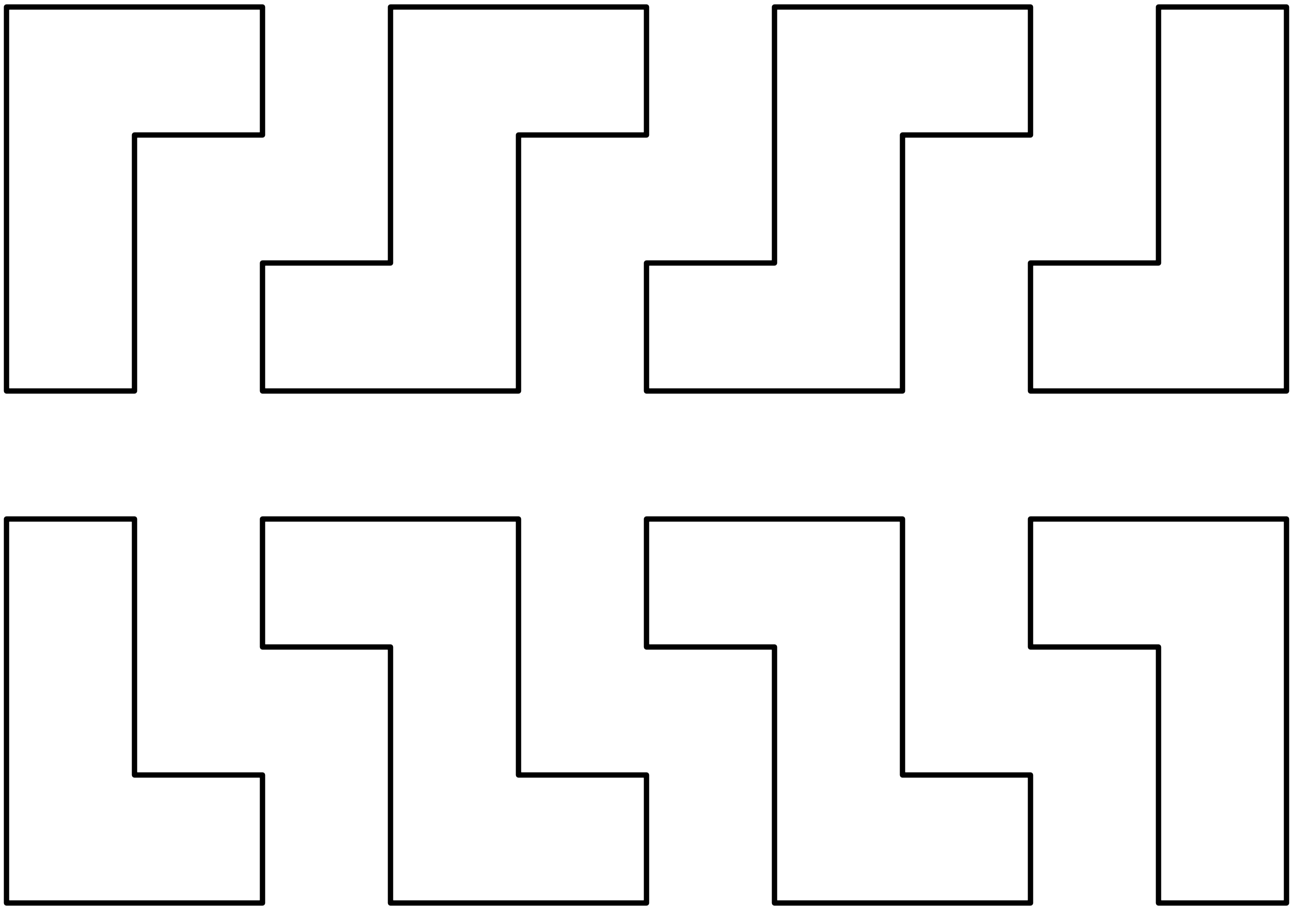


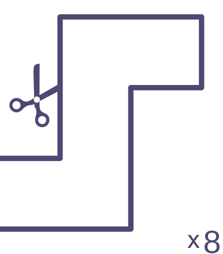
A cabinetmaker has already fitted seven pieces into the 6x6 square table top as shown above. Unfortunately, the final one shown at left can no be fitted in because of the shape variance.

Can you help the cabinetmaker to rearrange the pieces in order to form the complete 6x6 square table top?

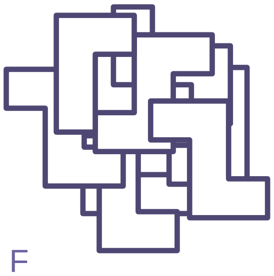


The solution is shown in the illustration.





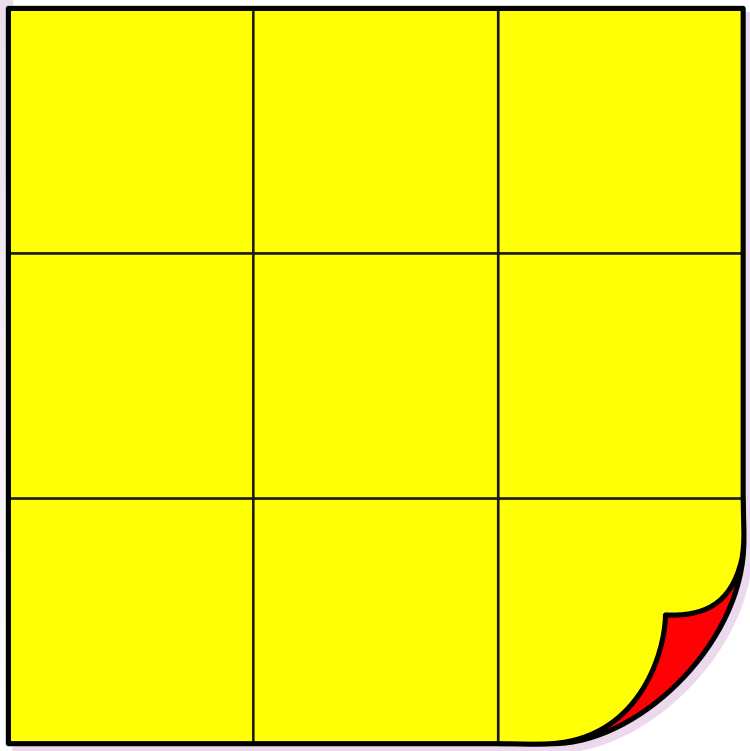
1 ×8



F

To produce the pieces first print them out. Then follow the diagram shown above - from step 1 to step F (finish).

Folding Puzzles



Square to Cube

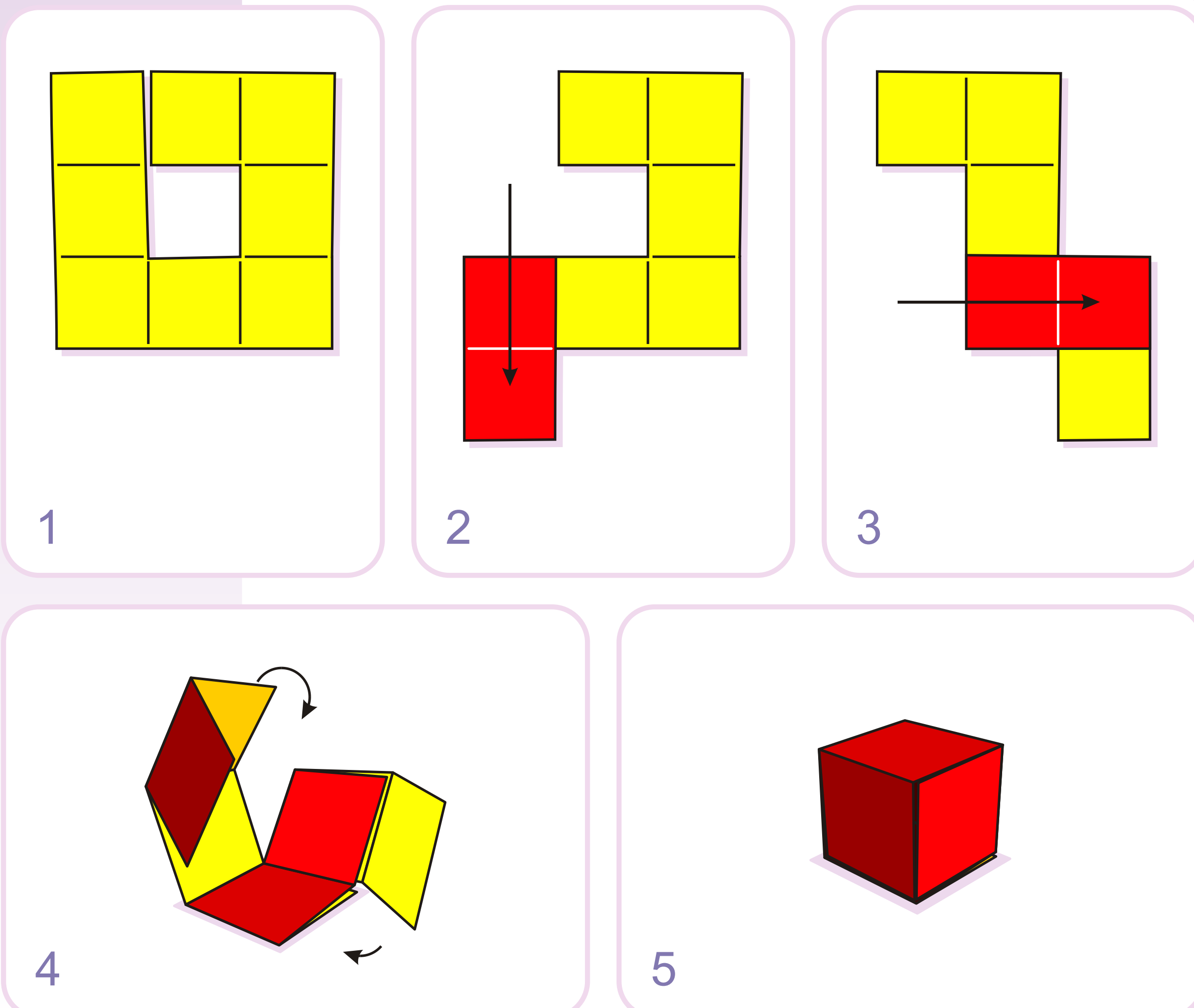
after Martin Gardner

Take a square piece of paper with one color on one side and another on the other. Now rule the square into nine squares as shown in the illustration. You may also use our prepared printable version of such a square.

The question is if it's possible by cutting only along the ruled lines, cut out from this square a pattern (it must be a single piece) that will fold along the ruled lines into a cube that has just one color on the outside?

No cuts or folds are allowed that are not along the ruled lines that divide the piece of paper into the squares.

Folding Puzzles

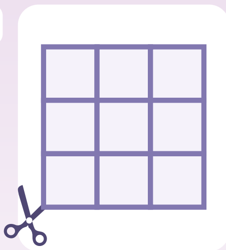


Square to Cube (solution)

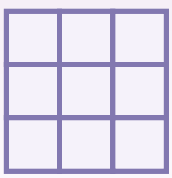
The entire folding is shown in the illustration.

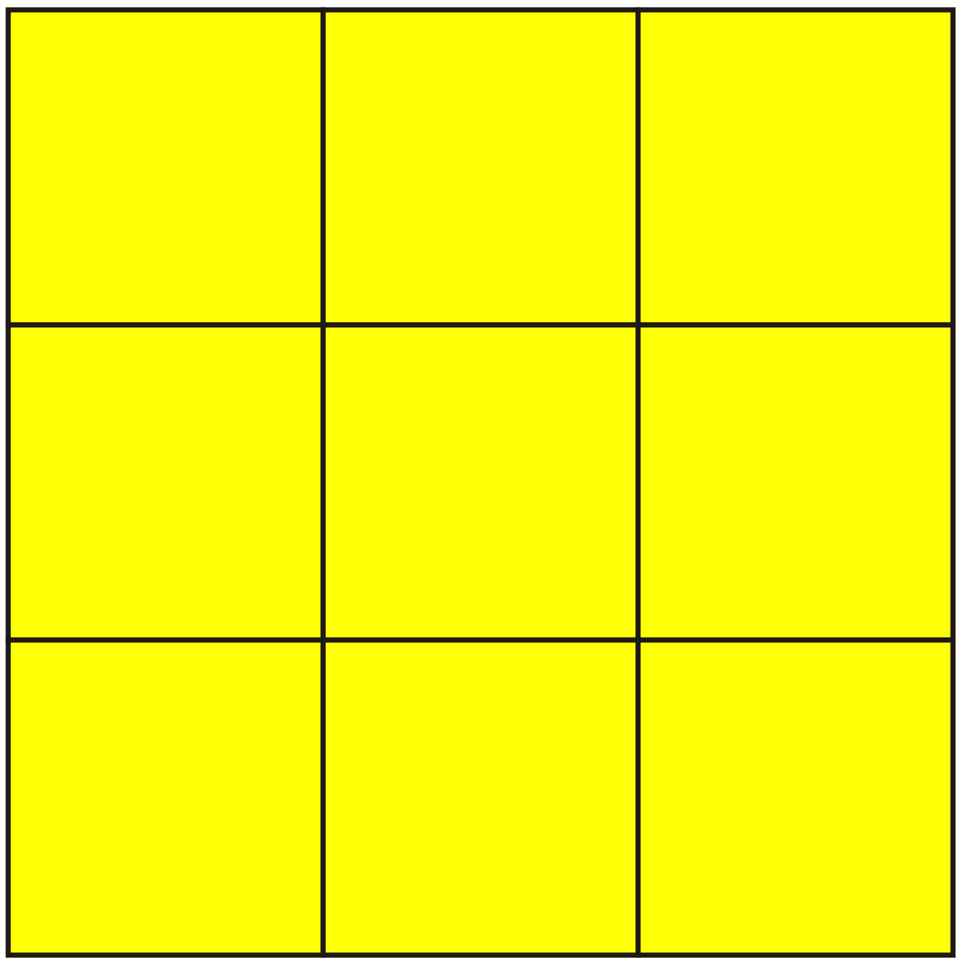
Folding Puzzles

1



F

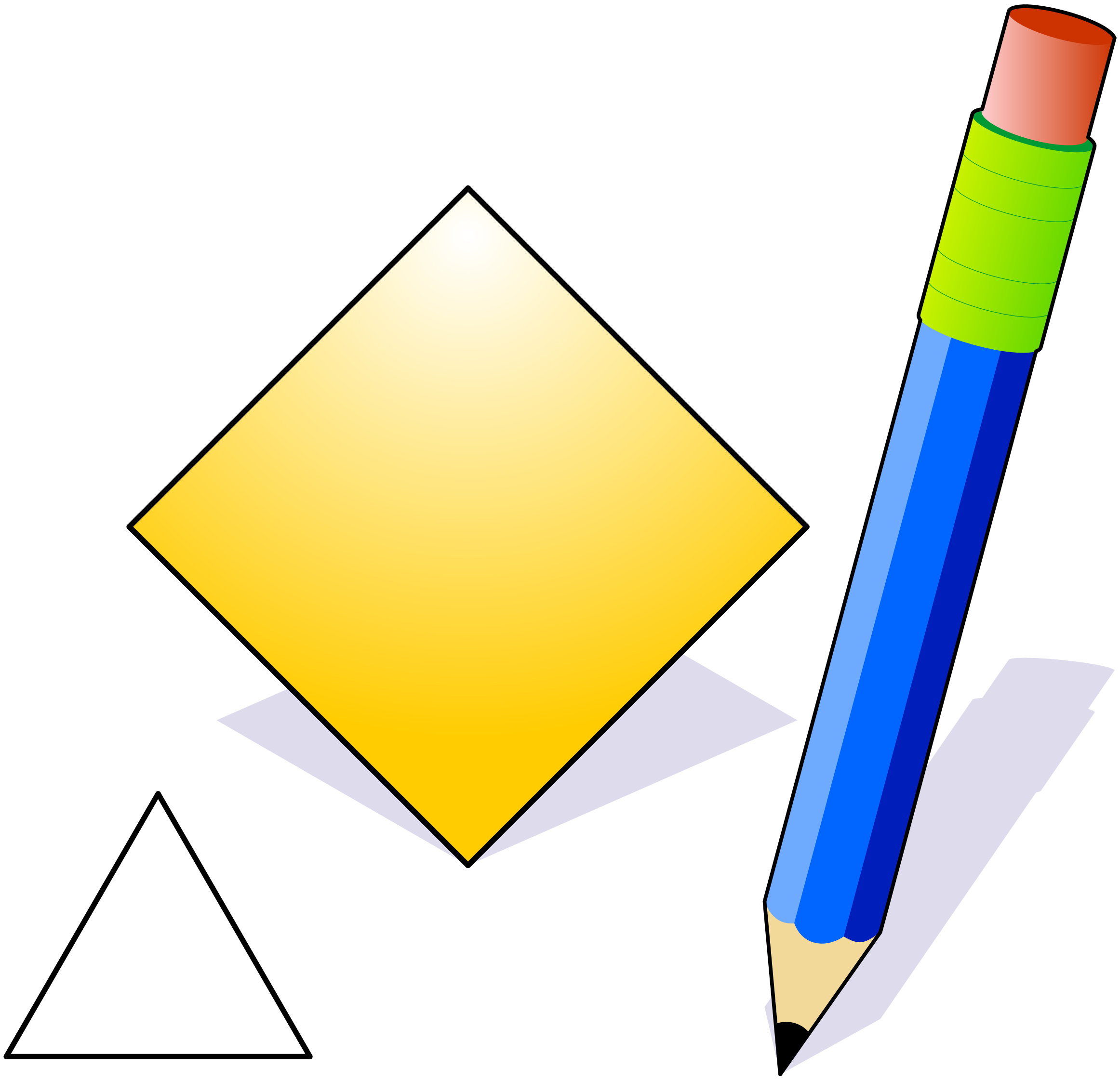




Square to Cube (pattern)

To produce the pattern first print it out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

Square to Triangle
by Serhiy Grabarchuk, Jr.



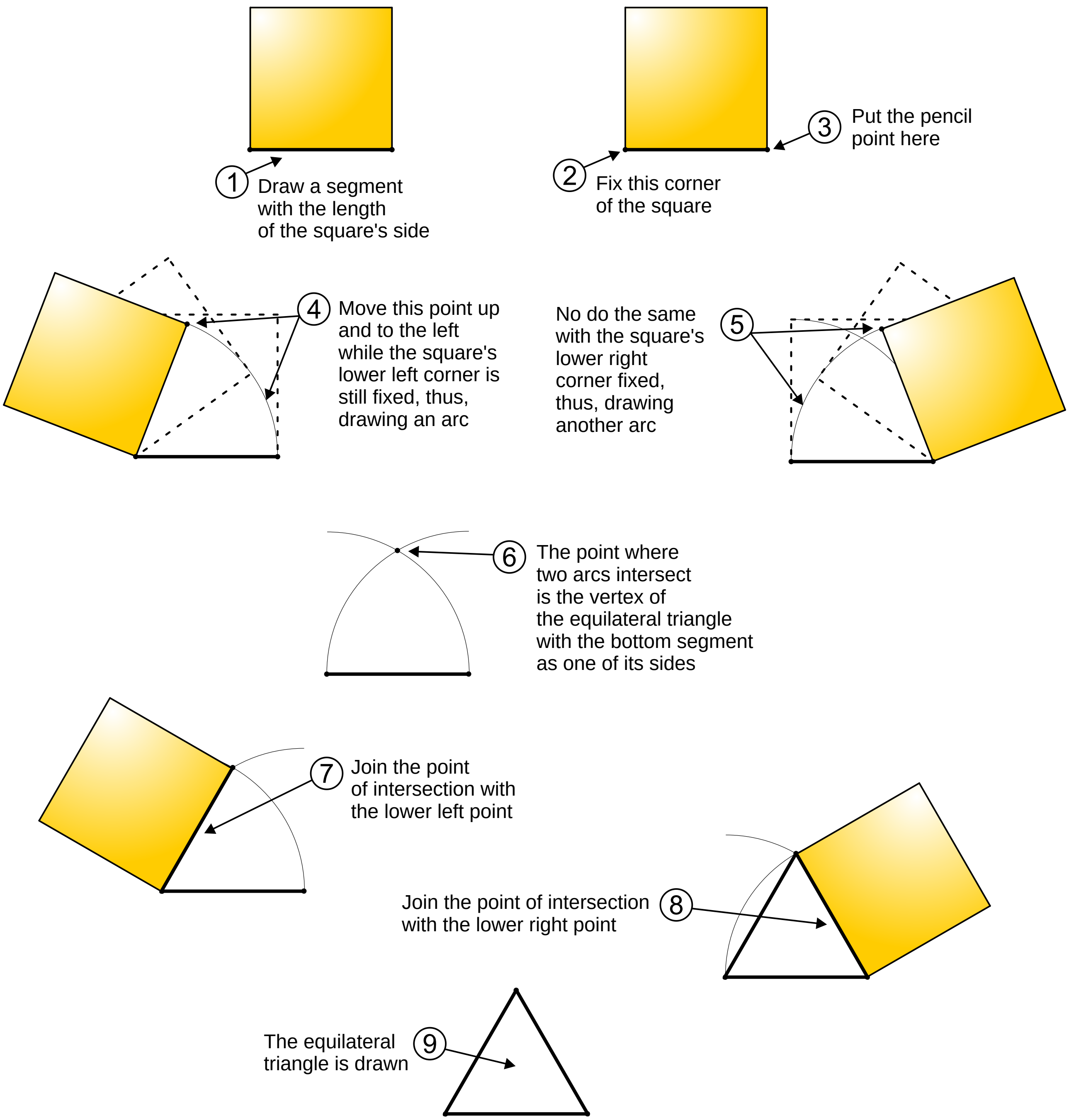
Suppose you have the shape of a perfect square with straight sides.

Can you draw on a piece of paper an equilateral triangle with a pencil using this square as a ruler? No other tools for drawing or measuring are allowed.

The triangle in the lower left corner is provided as an illustration. The actual size of the final triangle is up to you only.

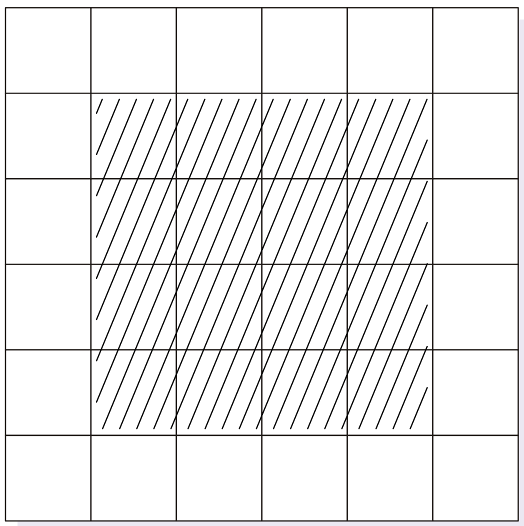
More from the author and the reverse puzzle, Triangle to Square, can be found at UniPuzzle.com.

Posted: February 23, 2008

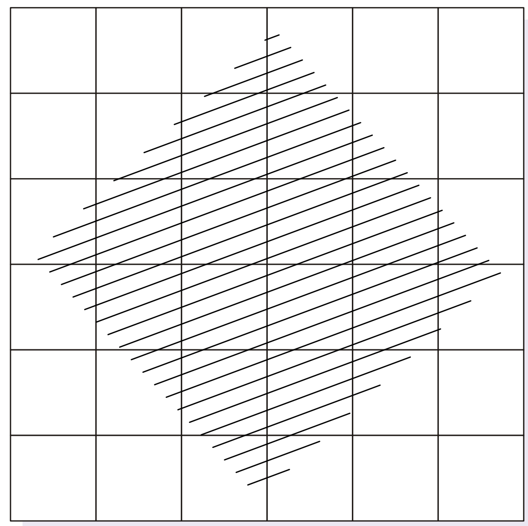


One of the solution methods is shown in the diagram.

Illusions



1

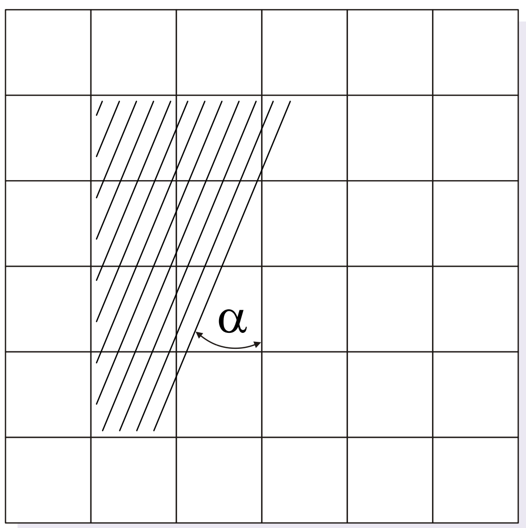


2

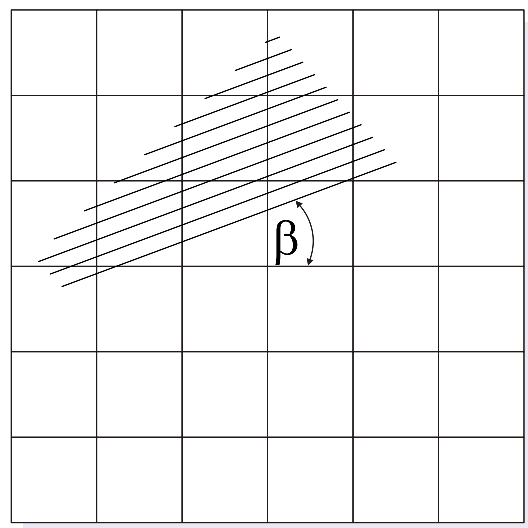
Square Waves

by Serhiy Grabarchuk, Jr.

The straight lines on both grids seem to be curved where they are covered with the shaded figures.



1

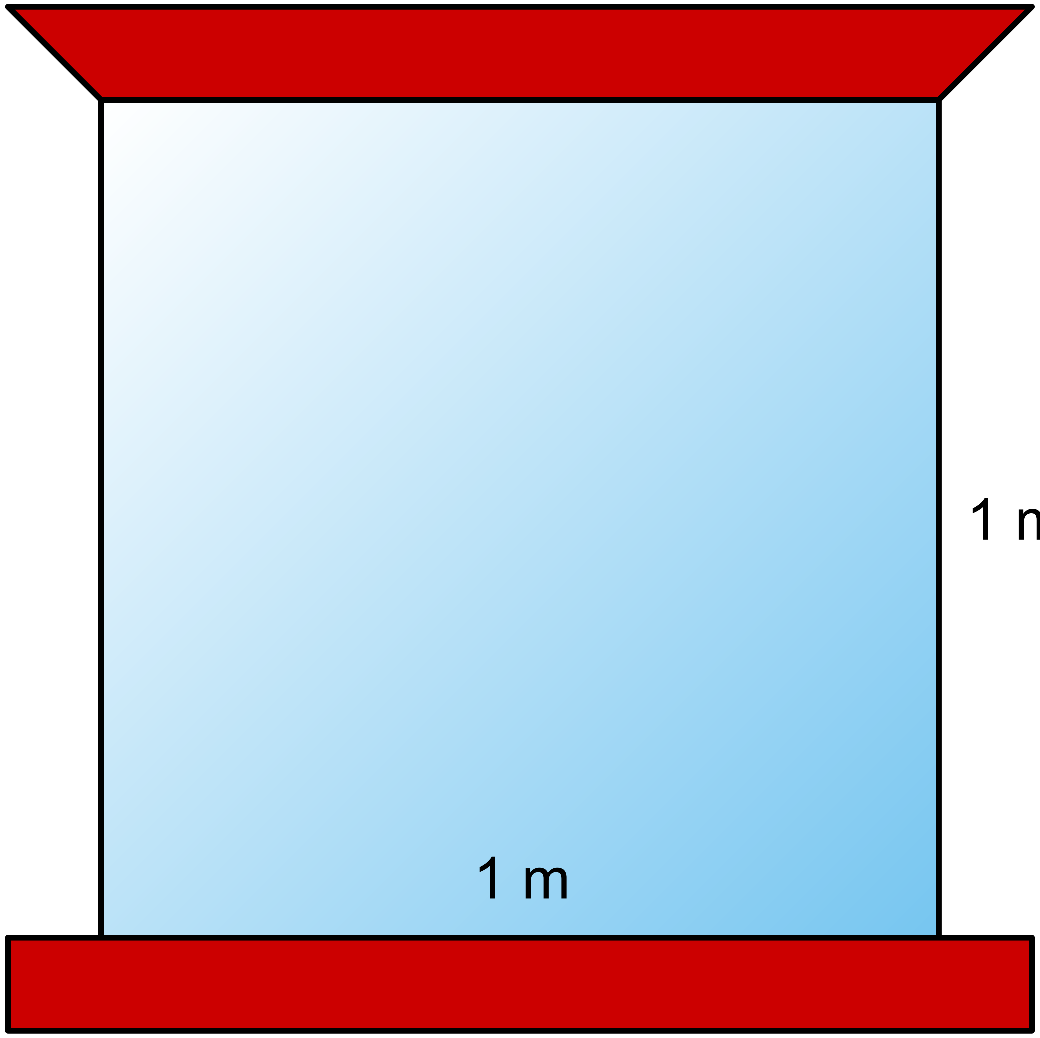


2

Square Waves (explanation)

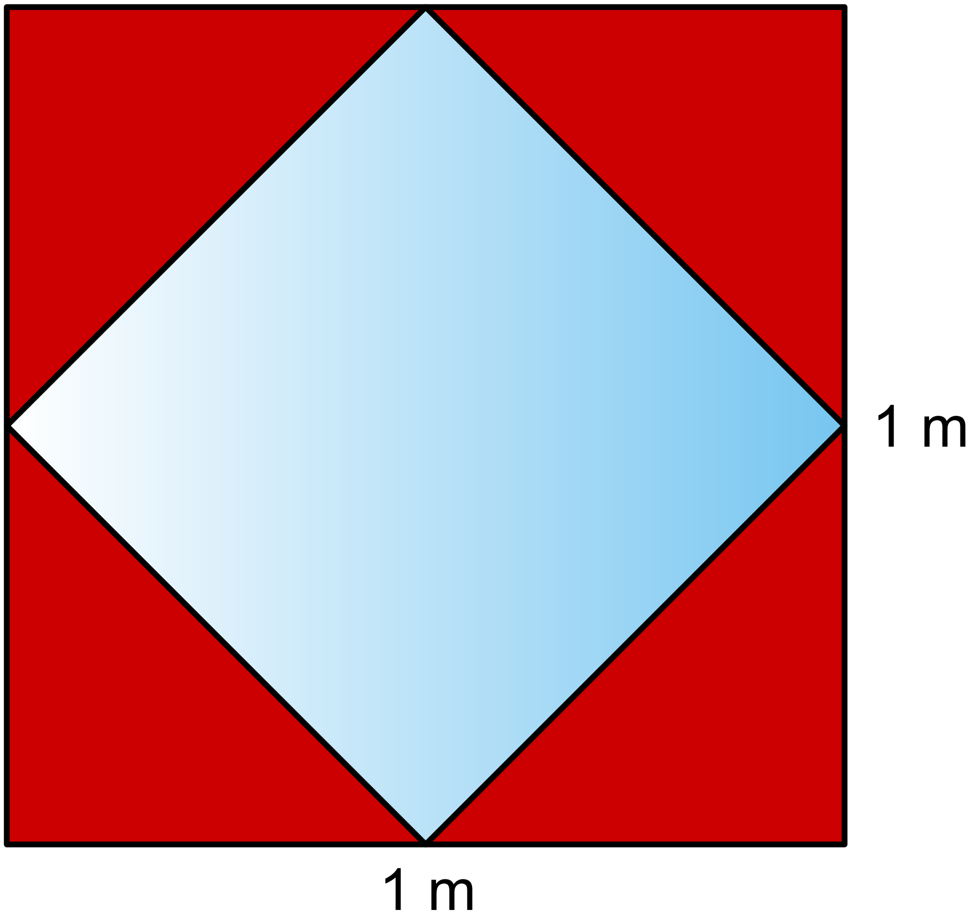
The steep sloping lines in Figure 1 cause that the vertical sides of the squares seem to be inclined in the opposite direction. In Figure 2 gentle sloping lines cause that the horizontal sides of the squares seem to be inclined in the opposite direction.

If you become to practice by yourself you will notice that the less the angle between the sloping lines and the respective sides of the squares (angle in Figure 1, and angle in Figure 2, respectively), the more these squares seem to be distorted.

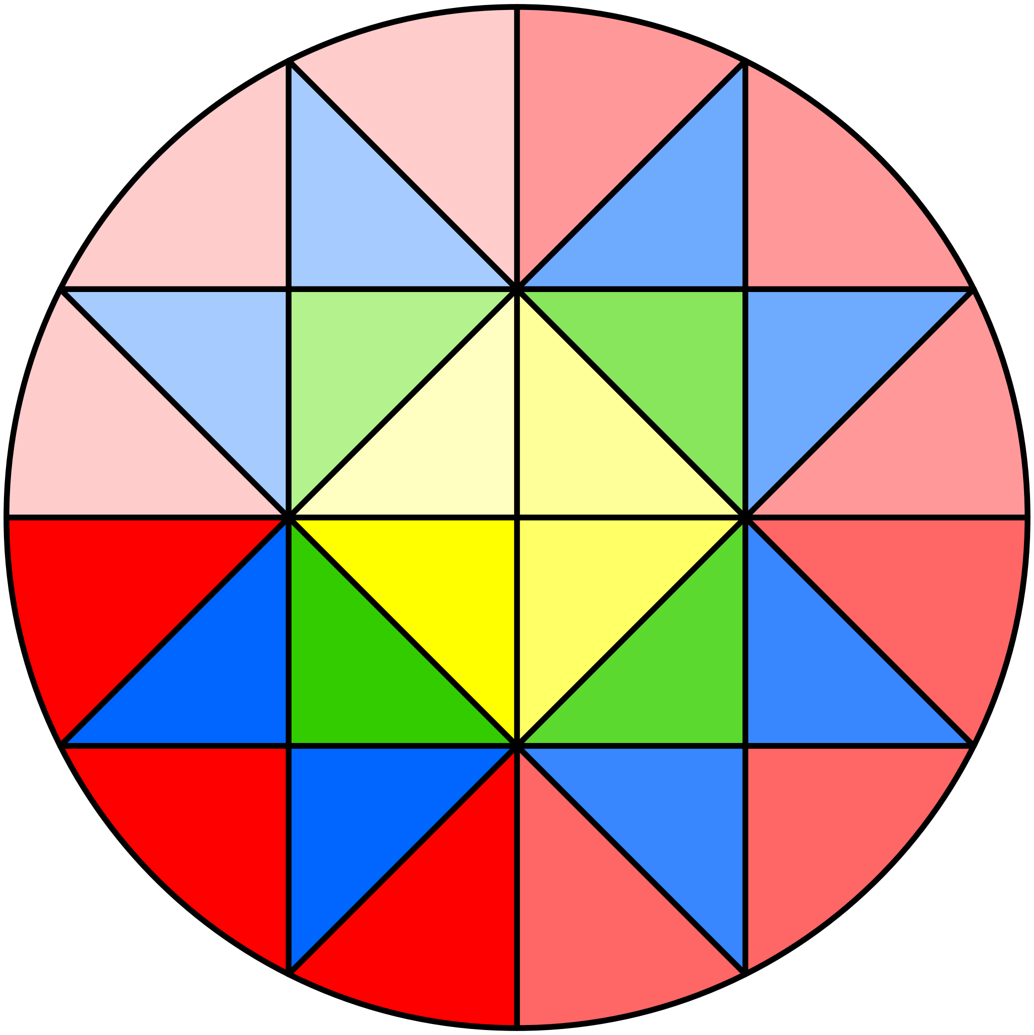


A nobleman had a sitting-room with only one window in it - a square window, 1 meter high and 1 meter wide - as is shown in the diagram. He had weak eyes, and the window gave too much light. He sent for the builder, and told him to alert the window, so as to give half the light. Only he was to keep it square - the same 1 meter high and 1 meter wide. How did he do it? The builder wasn't allowed to use curtains, or shutters, or colored glass, or anything of that sort.

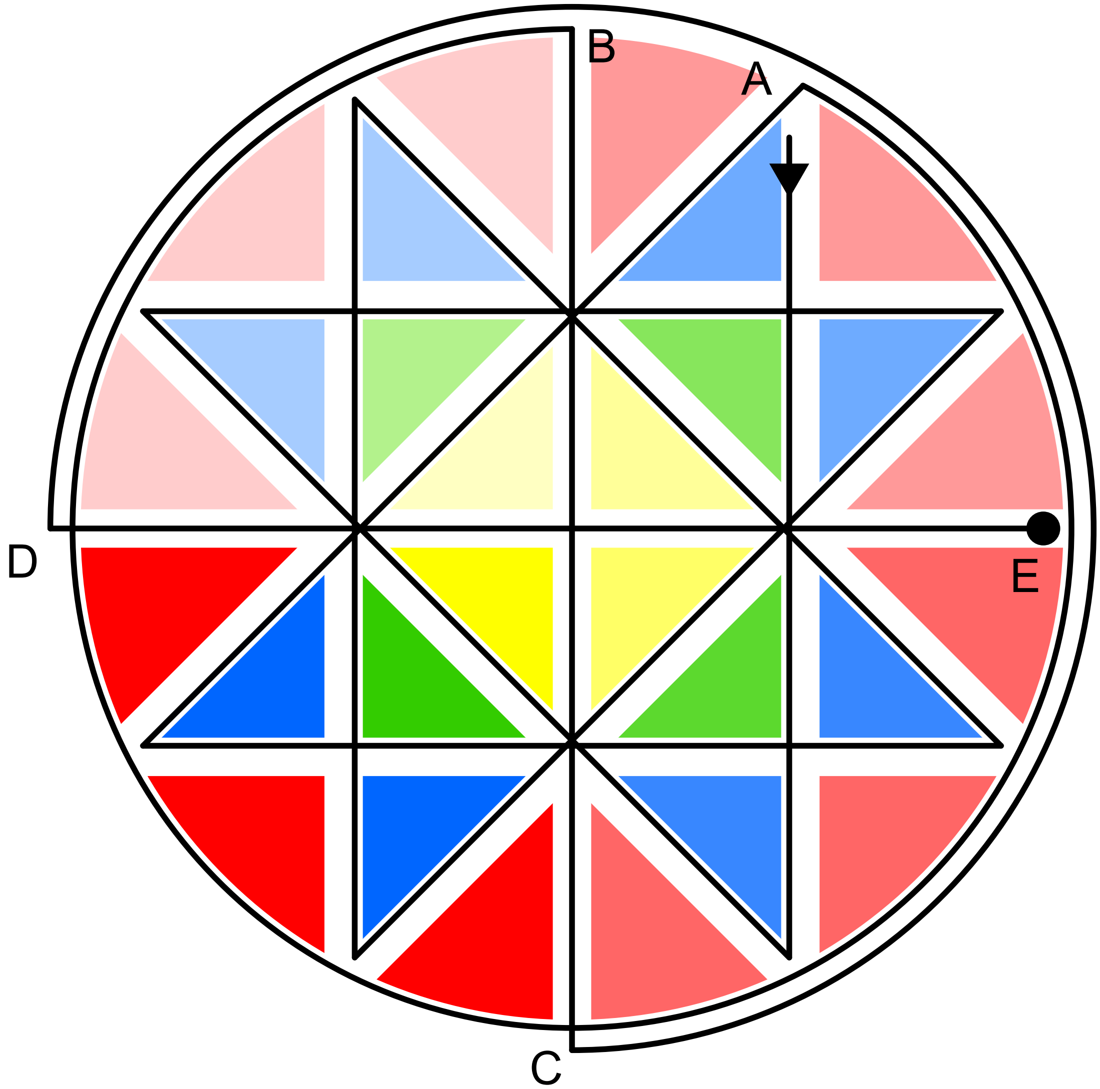
*This is a retelling of the problem posed by Lewis Carroll in a letter to Helen Fielden, then fourteen, which he wrote in March 1873.



The window was reduced as is shown in the diagram.



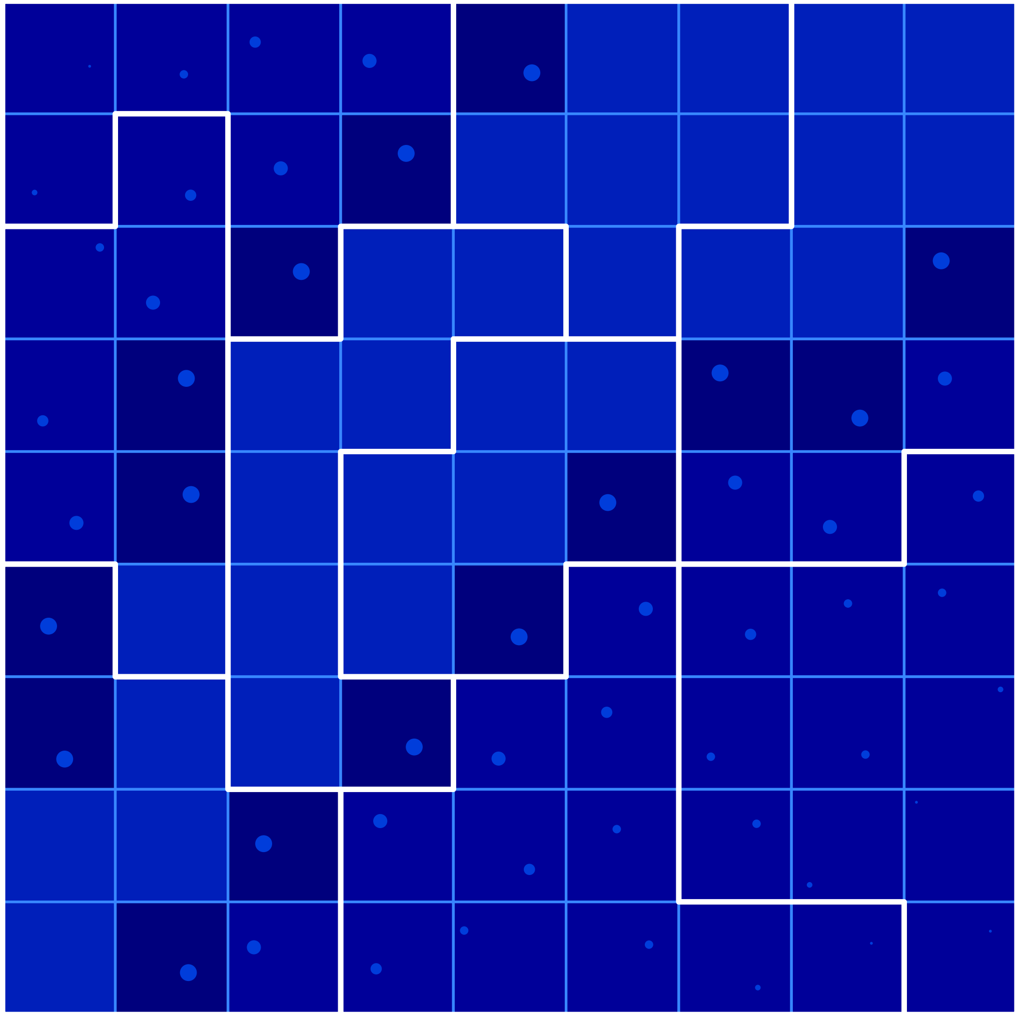
How many continuous strokes, without lifting your pencil off the paper, do you require to draw the pattern shown in the diagram? When the direction of your pencil is changed it begins a new stroke. It is allowed to go over the same line more than once if necessary.



It can be done in twelve continuous strokes. Start at A in the diagram, and eight strokes, forming the star, will bring you back to A. Then one stroke round the circle to B, one stroke to C, one round the circle to D, and one final stroke to E.

Star Battle

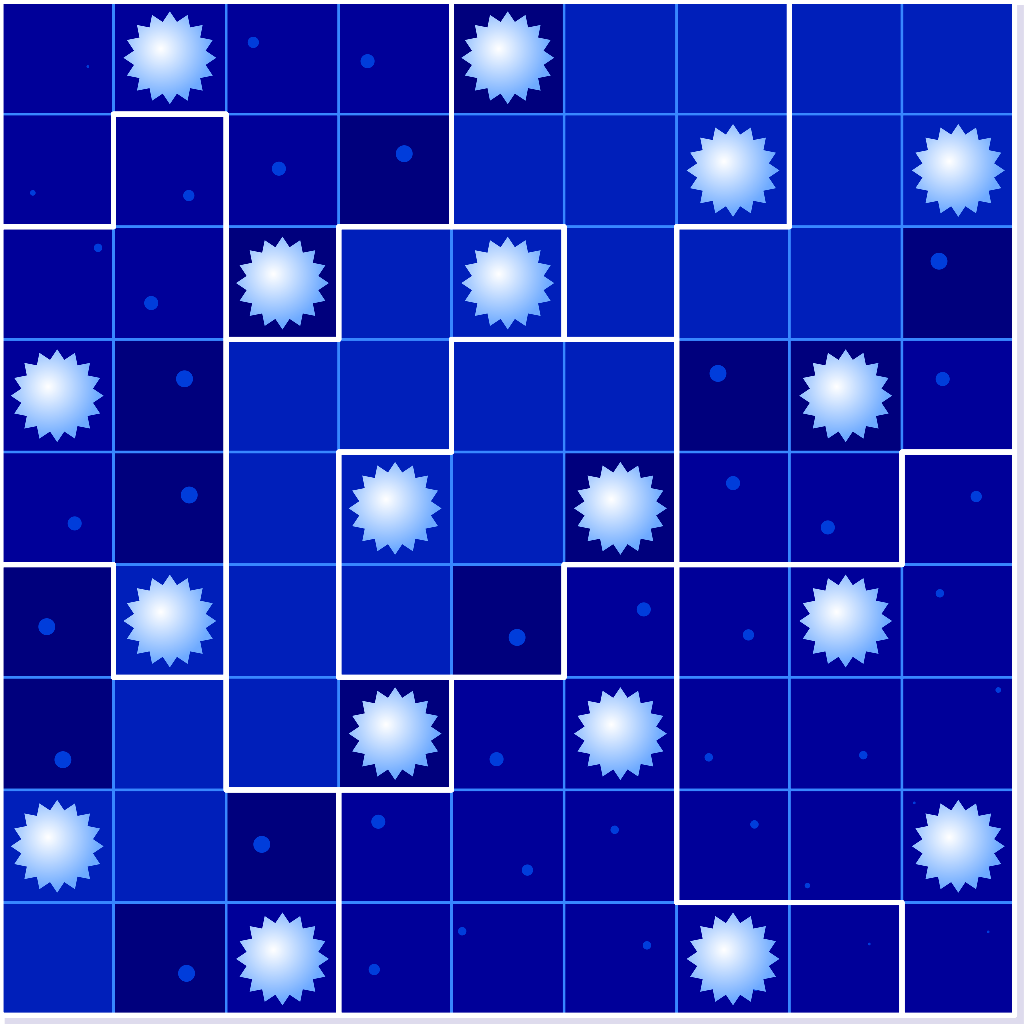
by Zoltán Horváth*



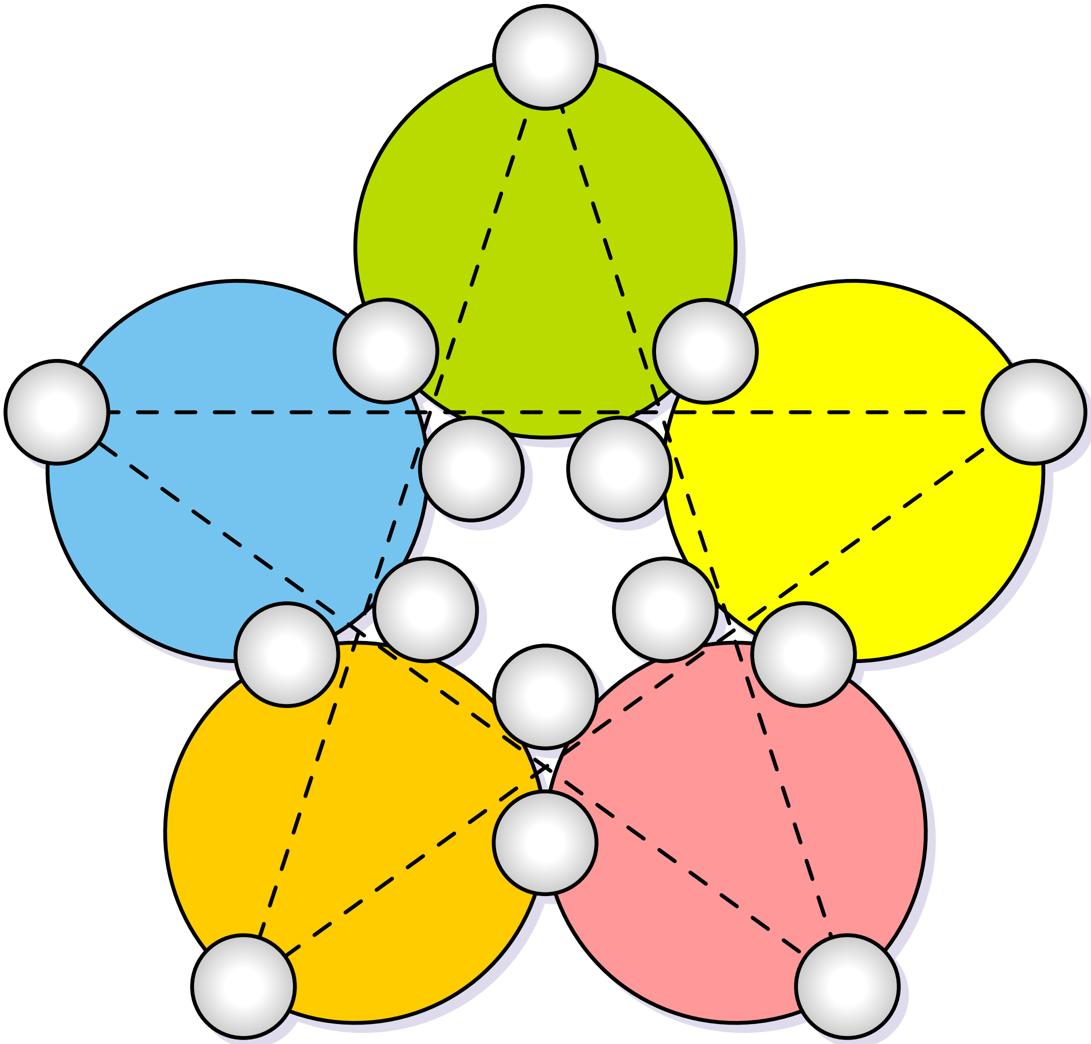
The object of this puzzle is to place two stars, the size of one square, in each column, each row and each white-edged part of grid. The stars must not touch each other, even diagonally.

The puzzle can be solved with the help of logical reasoning only, and without guessing. Though at places logical reasoning is quite sophisticated.

*The puzzle in its original pencil-n-paper version was presented at the 5th 24 Hours Puzzle Championship, May 21-23, 2003, Budapest, Hungary.



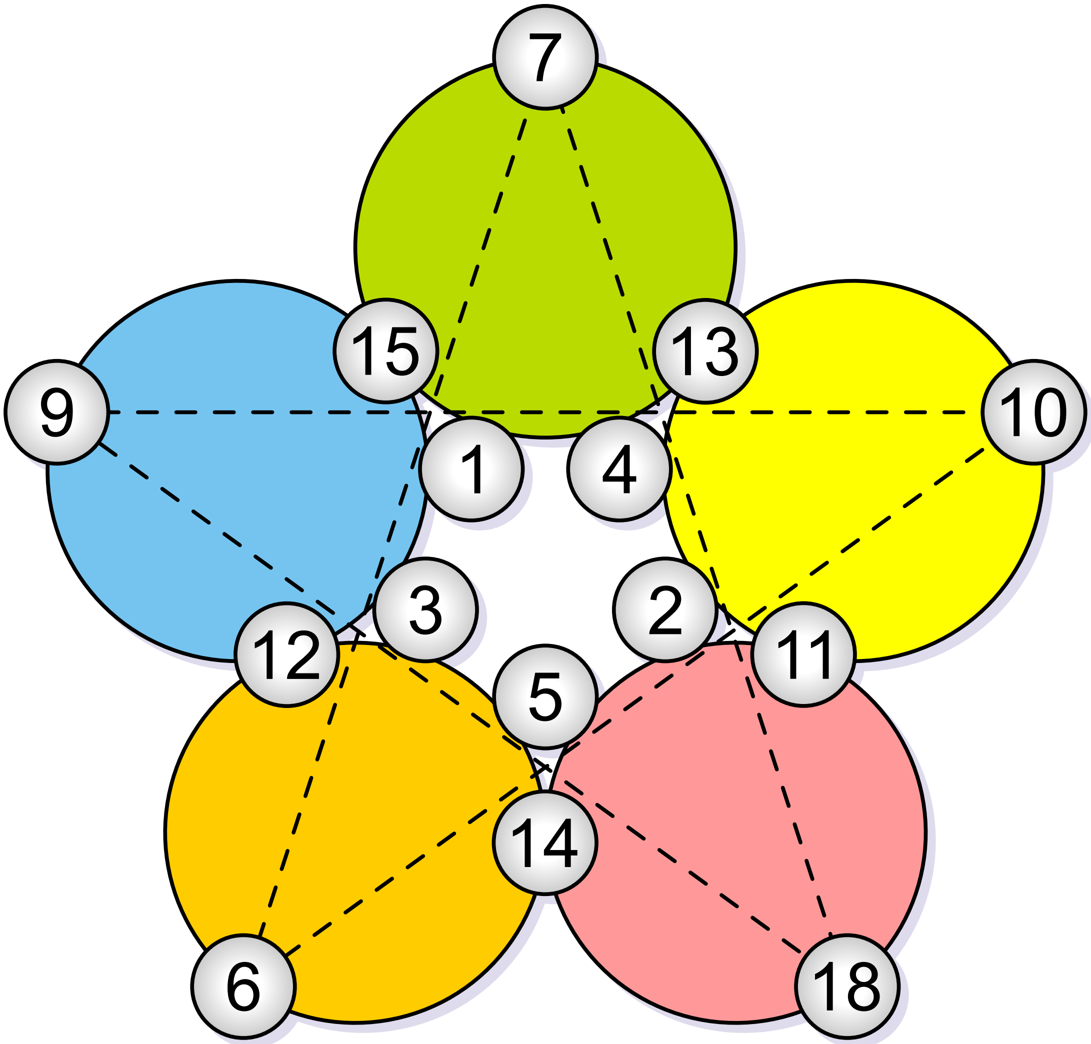
The solution is shown in the illustration.



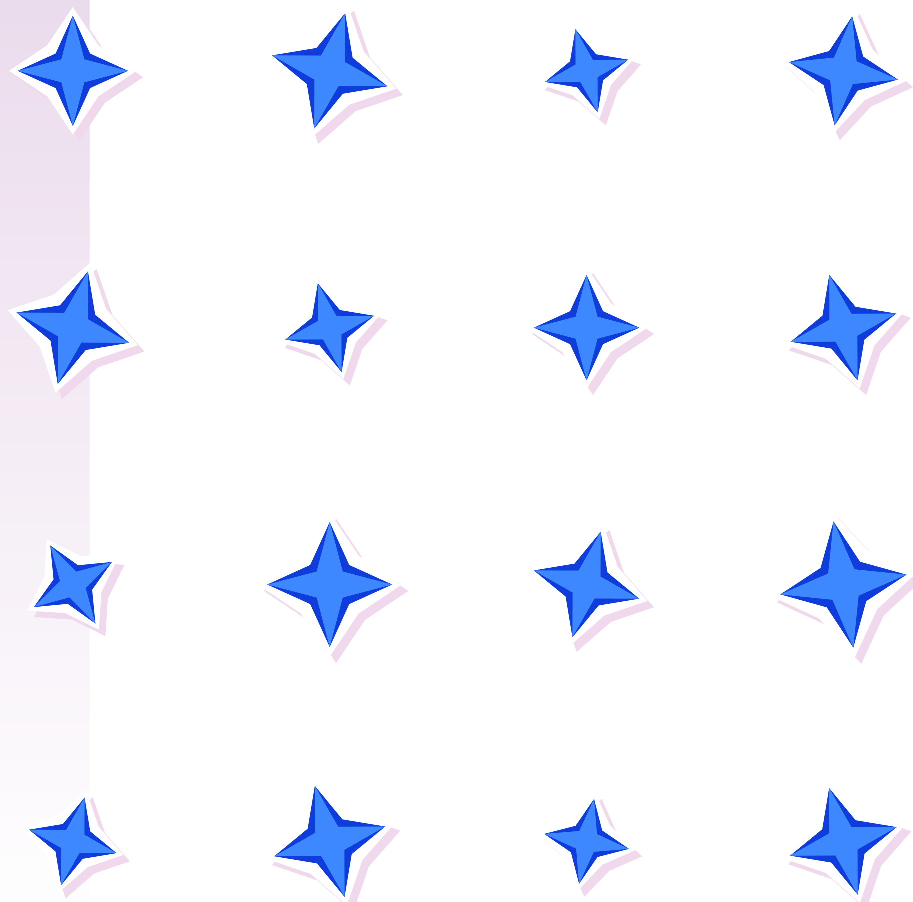
A five-pointed star is made of circular spots held together by wire as is shown in the illustration.

The fifteen spots hold from 1 through 15 stones (each number used once). Each of the five circles holds 40 stones, and at the five ends of the star there are 40 stones.

Fill in the circles with the correct numbers of stones.



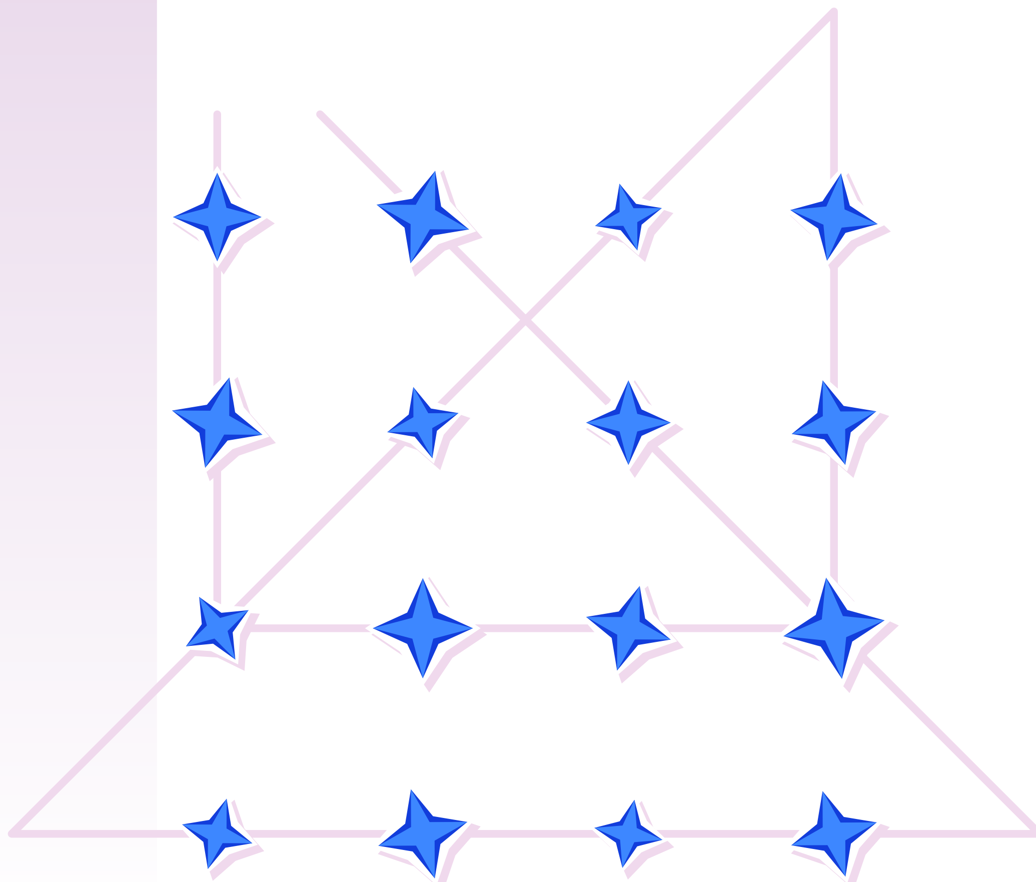
The solution is shown in the illustration.



Starry Sky

The object of this puzzle is to connect all the sixteen stars above with exactly 6 connected straight lines without lifting your pencil off the paper. The lines must go through the centers of the stars.

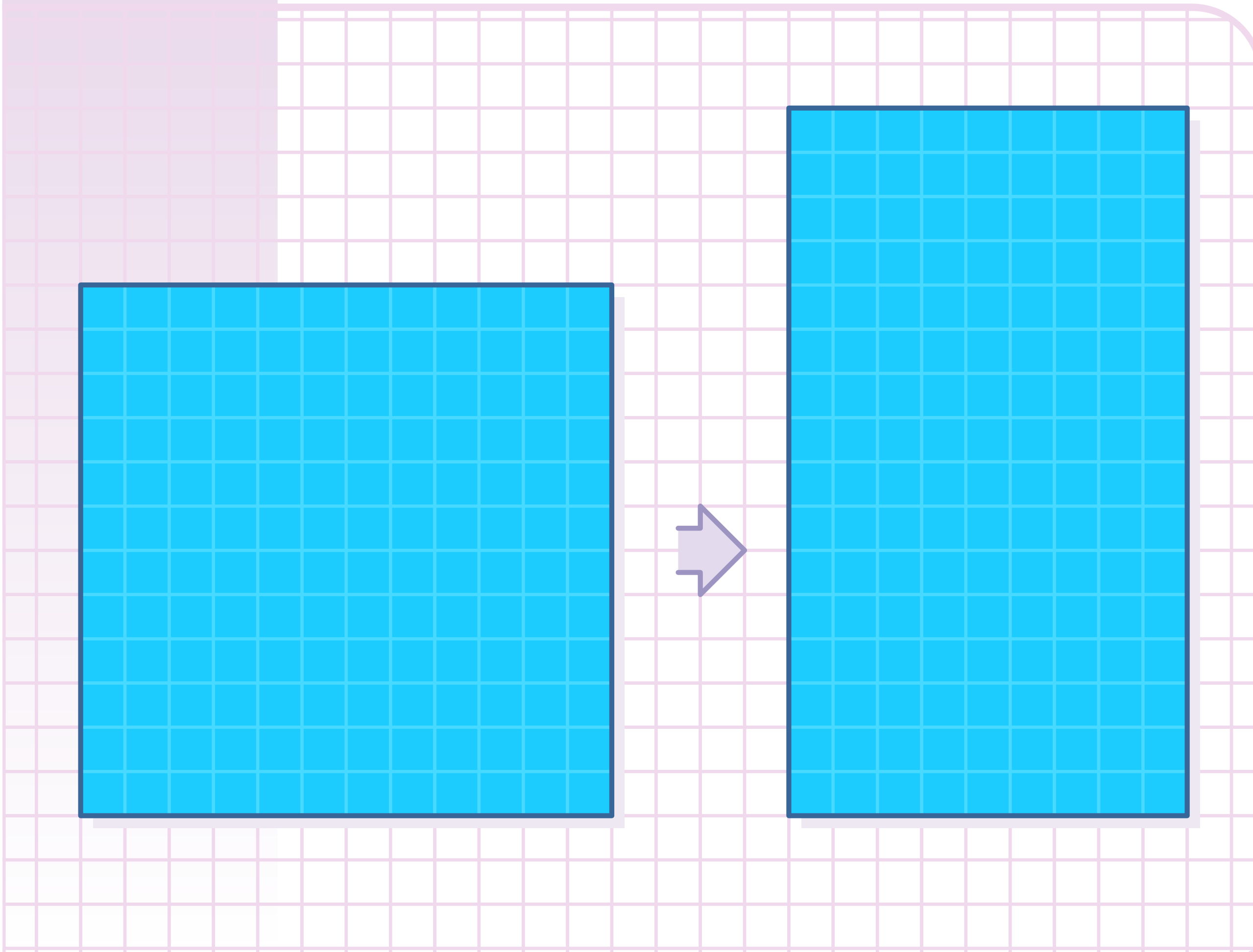
Pencil 'n' Paper Puzzles



Starry Sky (solution)

One of the solutions is shown in the illustration.

Dissection Puzzles

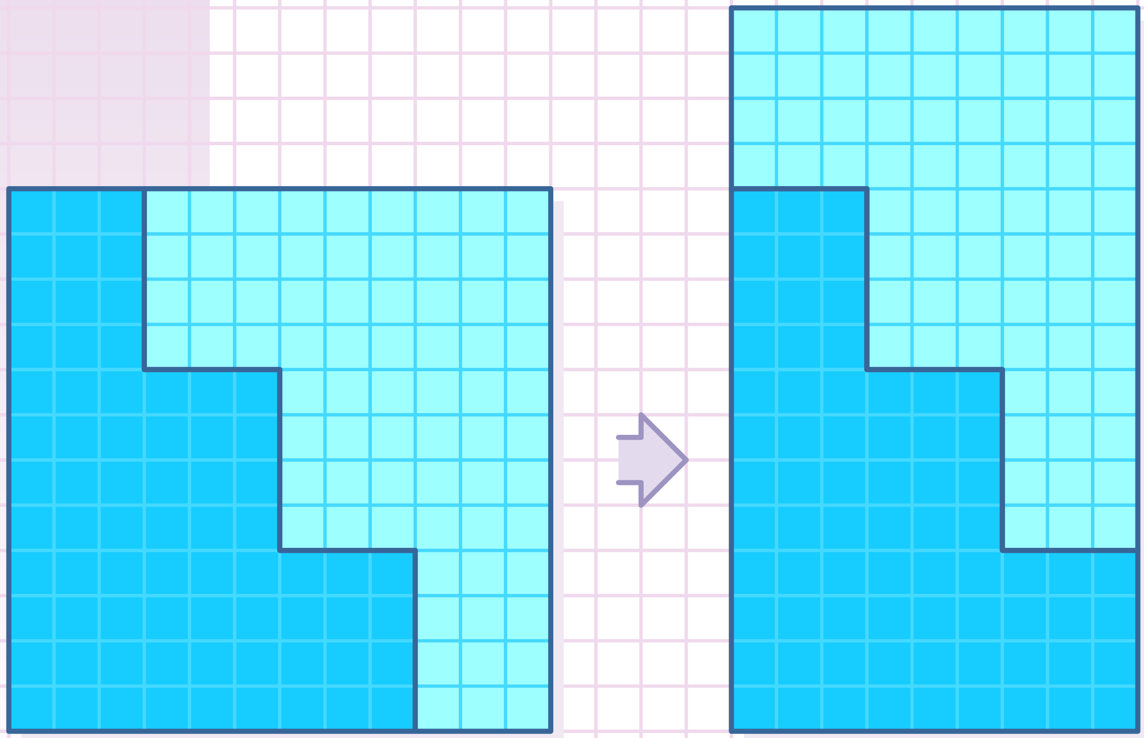


Step the Square

after Girolamo Cardano

Divide the 12x12 square on the left into two pieces so that to rearrange them into the 9x16 rectangle on the right.

Dissection Puzzles

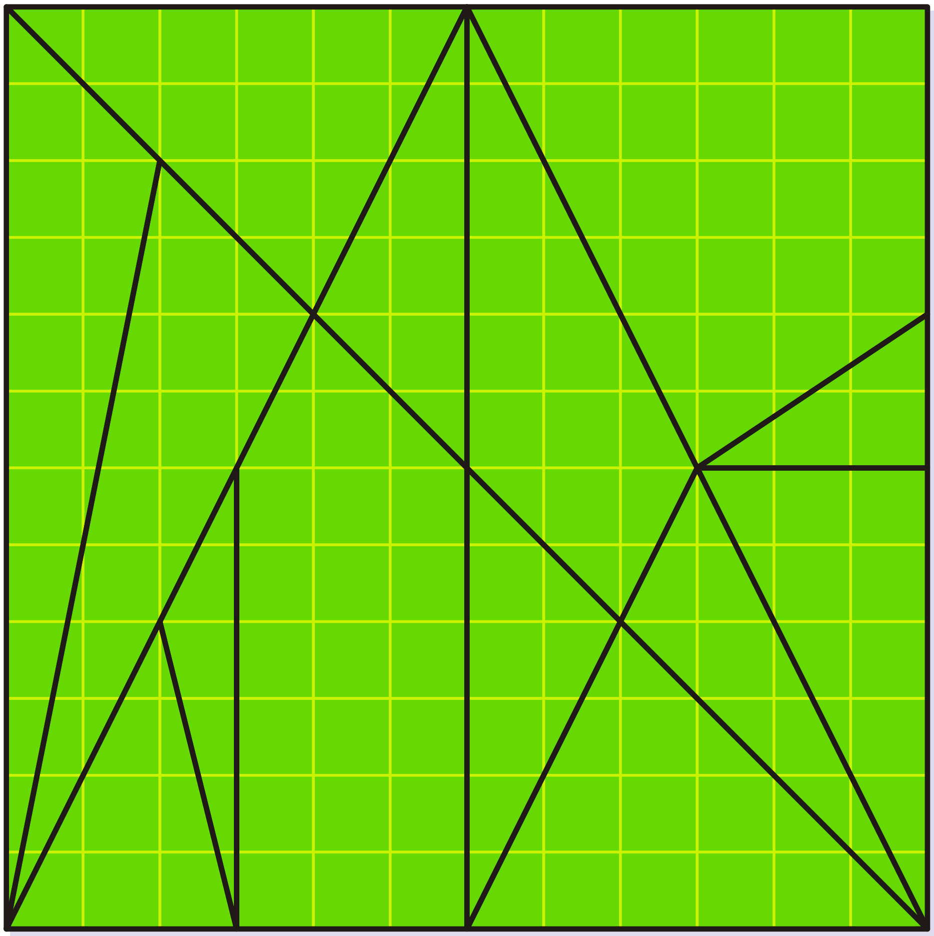


Step the Square (solution)

The solution to this puzzle is shown in the illustration.

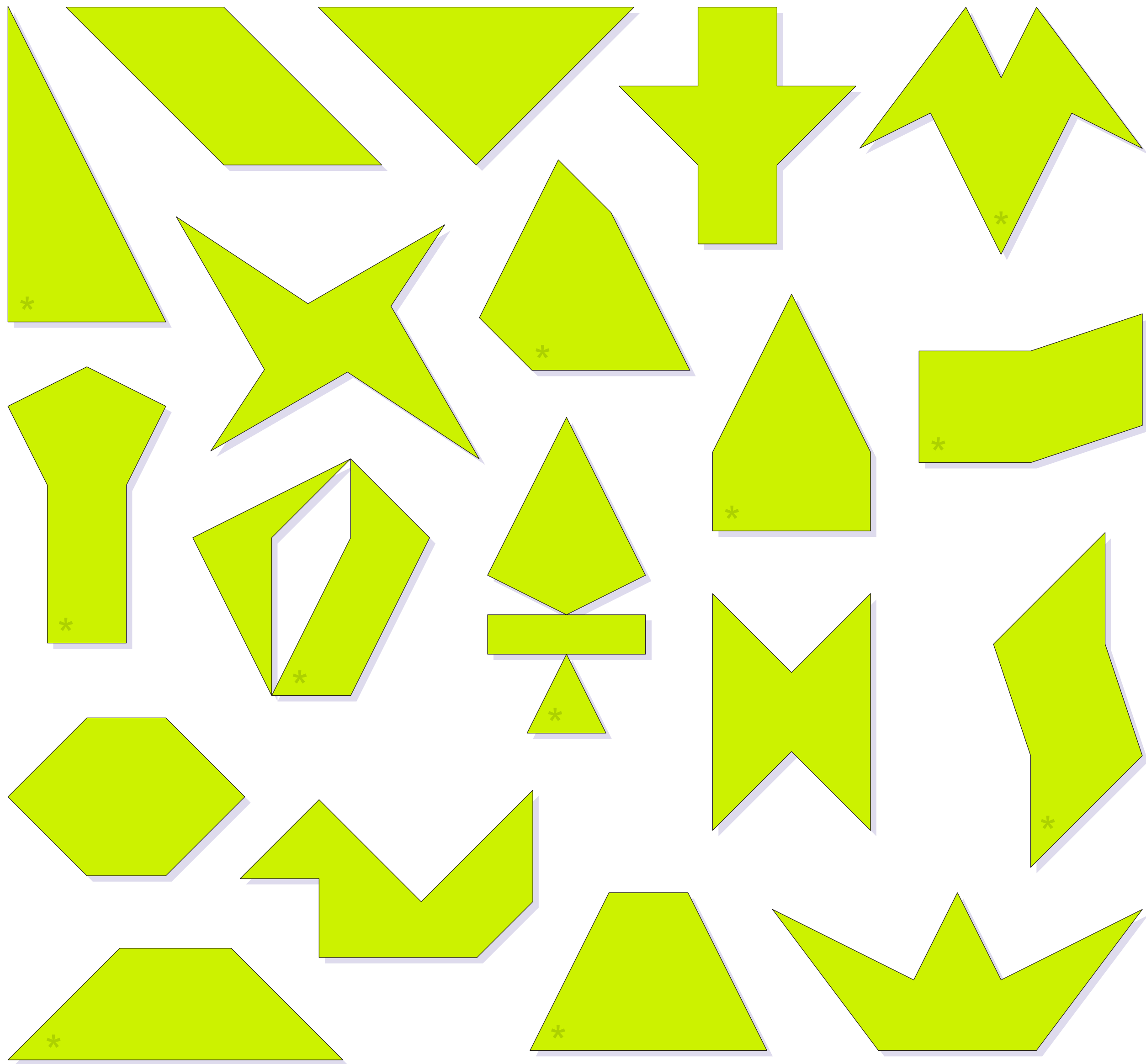
The solution is based on a dissection that uses the *step* technique, so named because of the resemblance to stair steps. Girolamo Cardano, an Italian physician and mathematician, described this dissection in 1663 in his *De Rerum Varietate.*

Greg N. Frederickson in his *Dissections: Plane & Fancy* writes: "...In its simplest form, the step technique cuts a rectangle in a zigzag pattern, alternating horizontal cuts of one length with vertical cuts of another. By shifting the two resulting pieces by one step relative to each other, we form a different rectangle..."



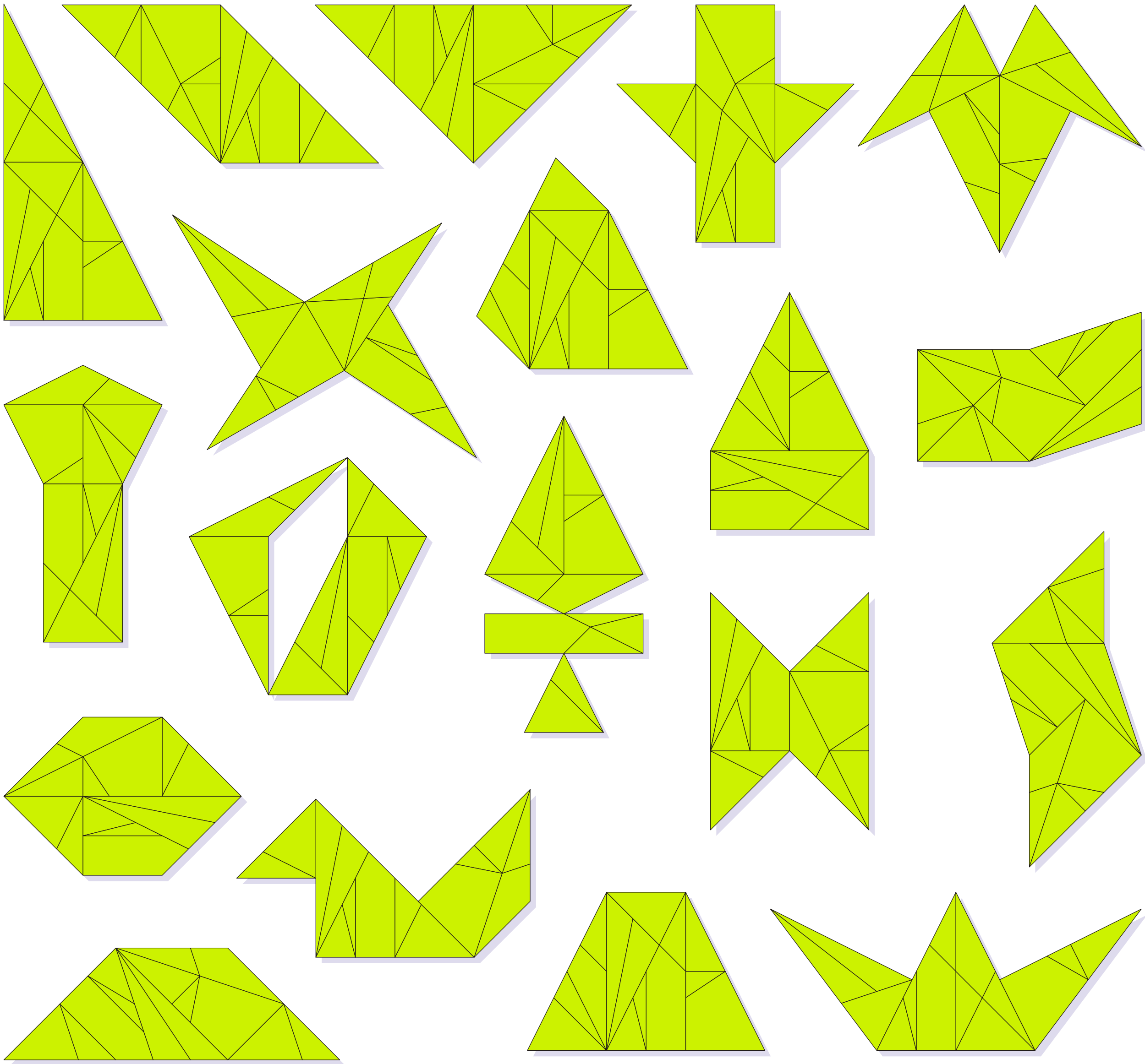
Stomachion is considered to be the world's oldest puzzle. The history of the puzzle is estimated to be 2200 years old, tracing its roots back to the Ancient Greece and the third century B.C. An ingenious inventor Archimedes of Syracuse (287 B.C. - 212 B.C.) is often credited with creating of the puzzle. Even one of the other names for the puzzle is "The Loculus of Archimedes." Unfortunately, today it is not known for sure if he invented the puzzle or just explored the geometrical aspects of it. The latter version is treated to be more probable. Though, who knows... In addition to this introductory paragraph on the puzzle's history, it should be mentioned that the puzzle was discovered accidentally, in 1846, but then again lay in obscurity for over a century.

Home / Puzzle Playground / Puzzles / Tangrams /

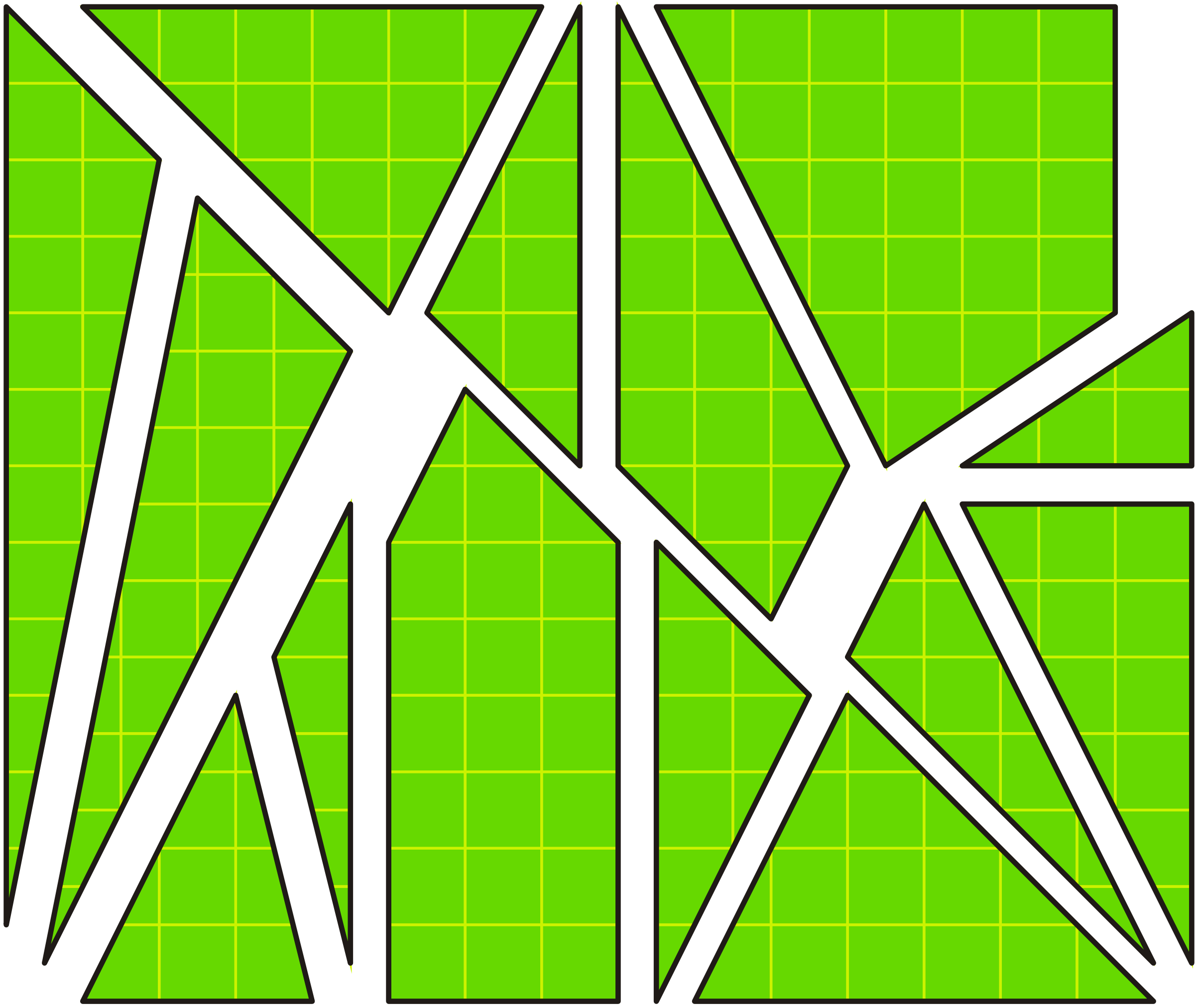


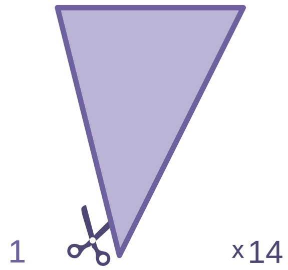
The puzzle consists of 14 pieces of various polygonal shapes originally forming a square. The object of the puzzle is to rearrange the pieces to form interesting shapes. These can be shapes of people, animals, geometrical shapes, etc. A selection of such shapes is presented in the illustration above.

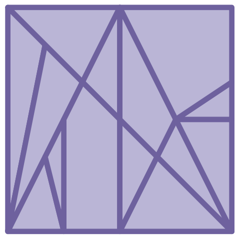
The shapes marked with asterisk were created by Peter Grabarchuk specially for Puzzles.COM.



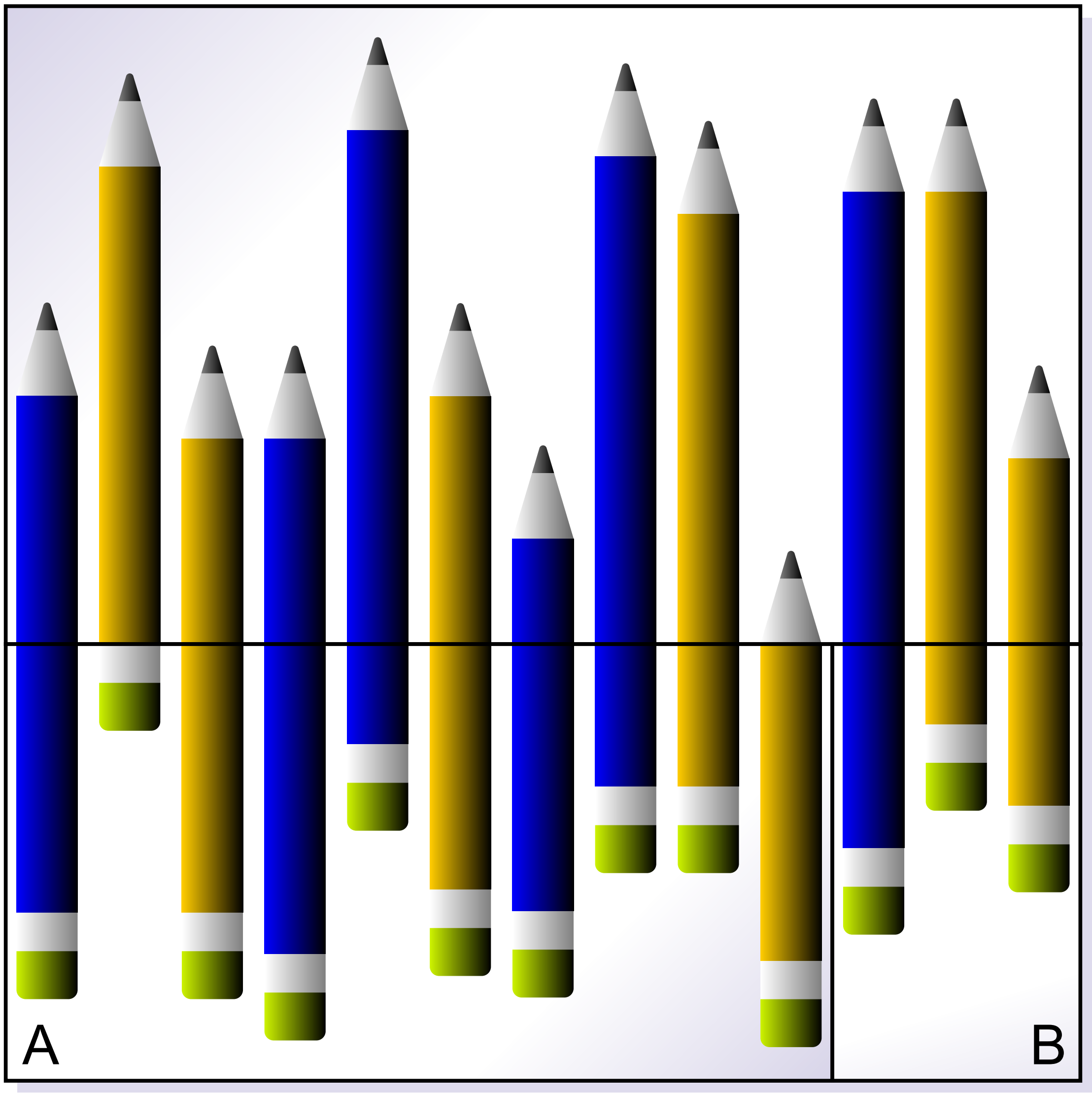
The solutions to the shapes are shown in the illustration above.





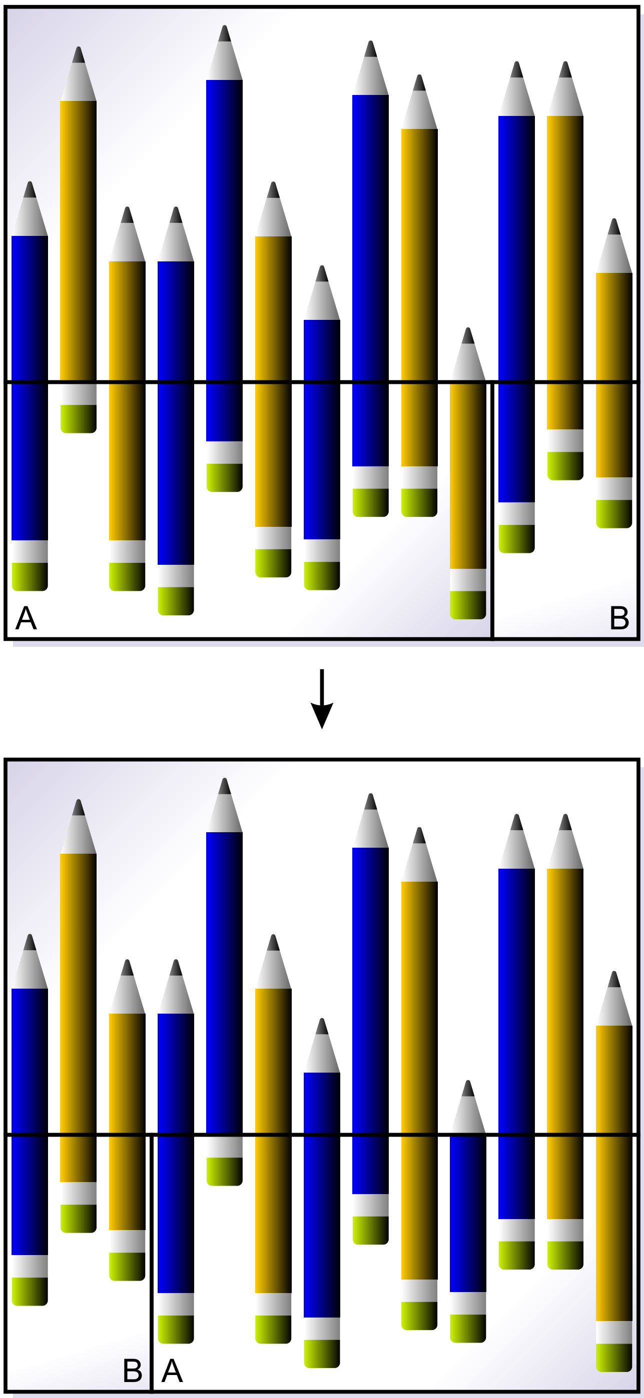


To produce the pieces first print them out. Then follow the diagram shown above - from step 1 to step F (finish).



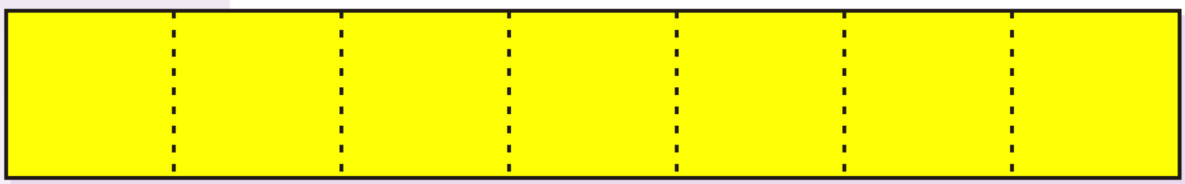
This interesting diagram shows a number of yellow and blue pencils.

More interesting is that when the pieces A and B are exchanged in relation to the larger top piece a yellow pencil suddenly disappears. The question is what happens with the exchange?



In fact the yellow pencil "disappears" in such a way that the remaining six yellow pencils in total become a little bit longer, while instead of the "missing" yellow pencil a blue one appears resulting in the seven blue pencils now instead of the initial six ones.

Folding Puzzles



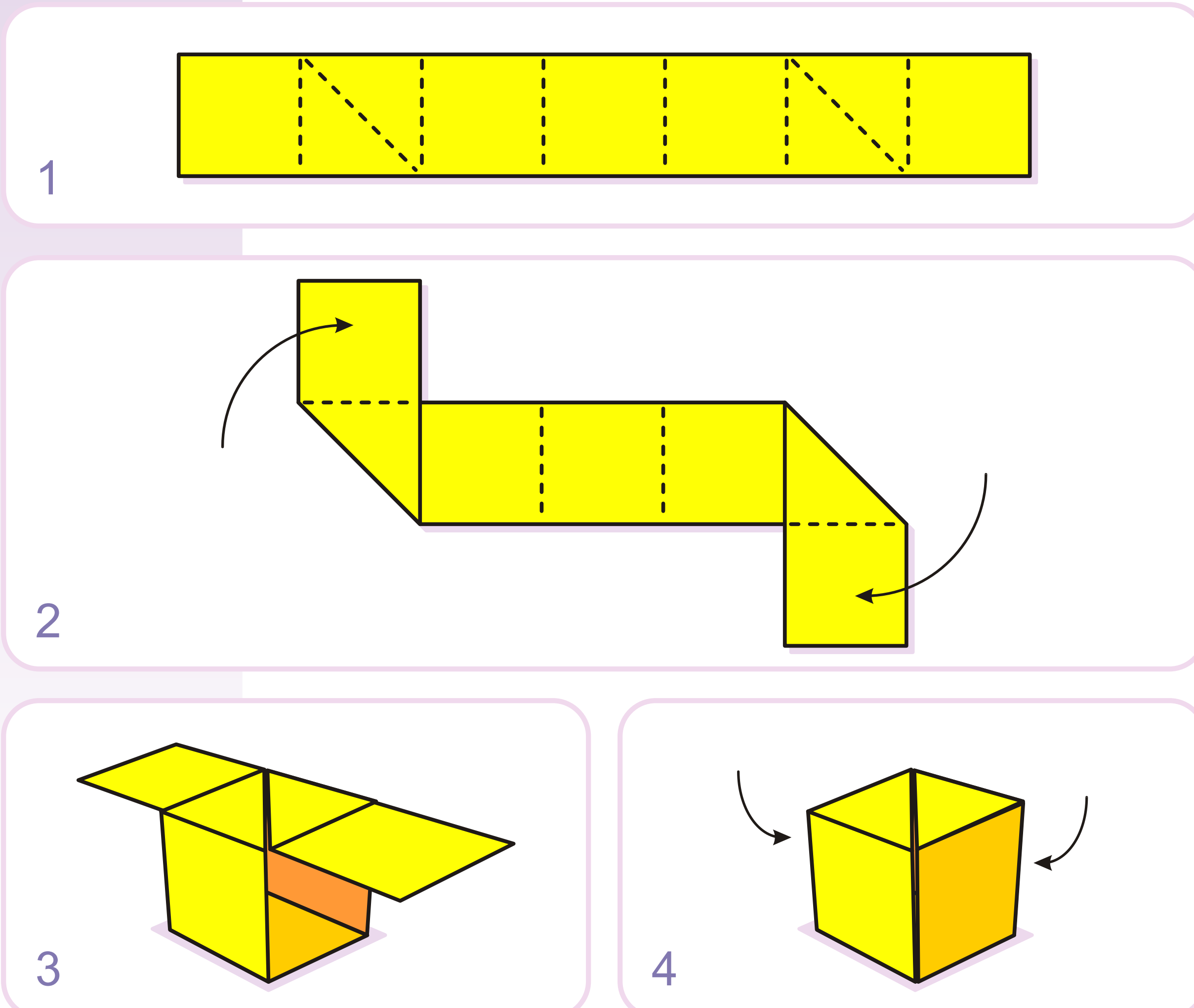
Strip to Cube

after Martin Gardner

The minimal strip that can be folded into a one-unit cube is one unit wide and seven units long (1x7) as shown in the illustration.

The object is to show how it can be done.

Folding Puzzles



Strip to Cube (solution)

The entire folding is shown in the illustration.

ThinkFun Everybody plays.
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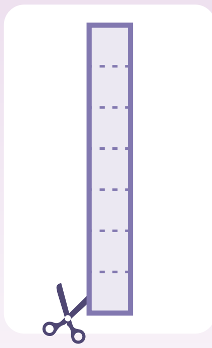
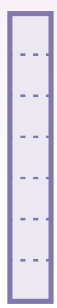
Treasure of Classic and Modern Puzzles

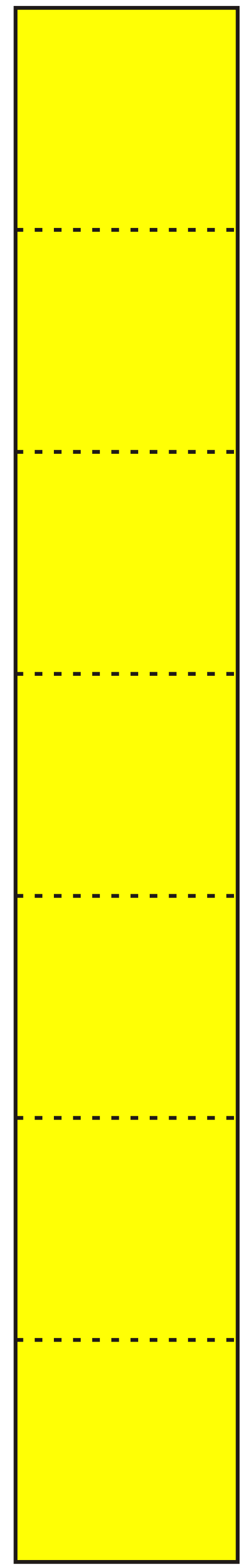
Folding Puzzles

1



F

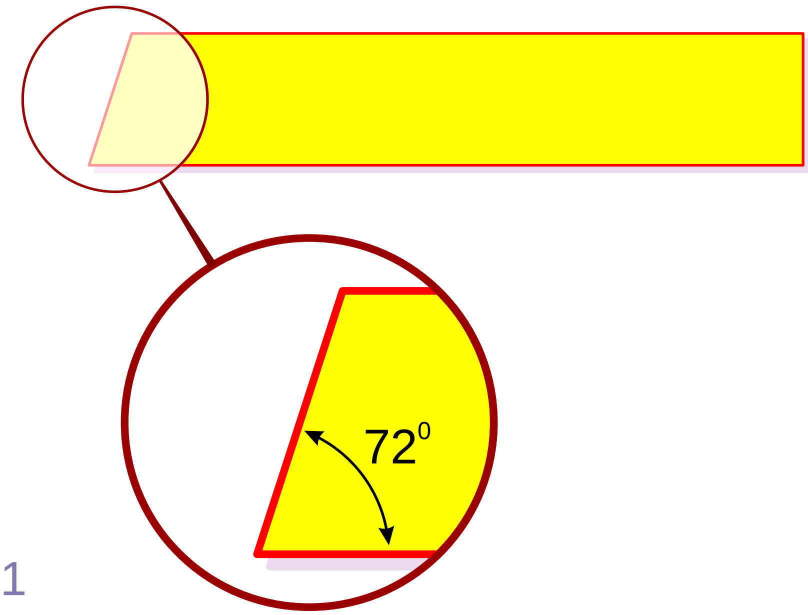




Strip to Cube (pattern)

To produce the pattern first print it out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

Folding Puzzles



Puzzle 1

Puzzle 2

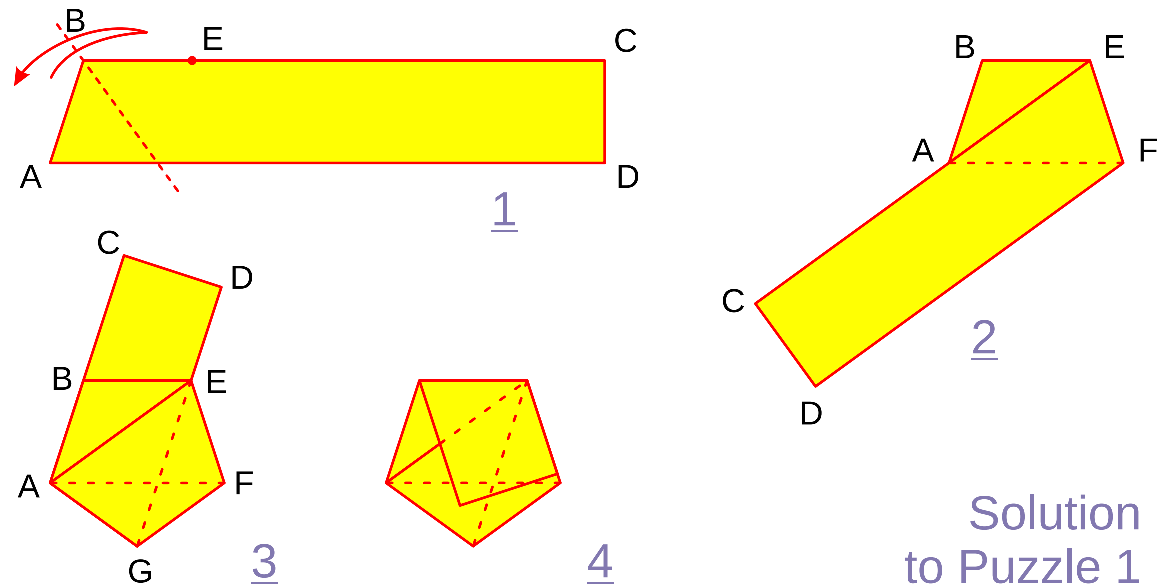
Strip to Pentagon

by Henry E. Dudeney

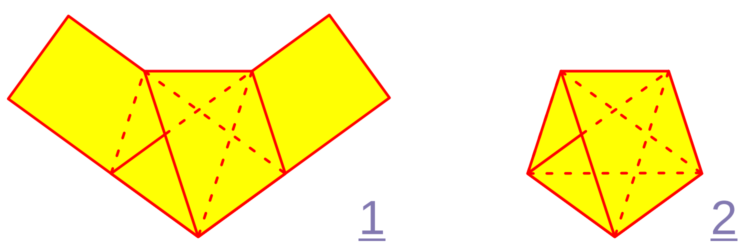
Puzzle 1. Take a strip of paper with the one edge cut out as shown in the upper illustration. The object of the puzzle is to fold this strip into a perfect pentagon.

Puzzle 2. This is a generalized version of Dudeney's puzzle. The object is the same - to fold the strip into a perfect pentagon - except that this time the strip is a perfectly rectangle ribbon of paper as shown in the lower illustration.

Folding Puzzles



Solution to Puzzle 1



Solution to Puzzle 2

Strip to Pentagon (solution)

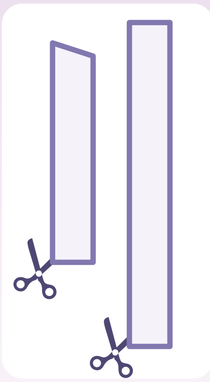
Puzzle 1. Fold the side AB so that it lies along BC, and find E so that BE equals AB. Then unfold the side AB. See Step 1 in the Solution to Puzzle 1. Now fold the strip as shown in Step 2; point A lies on EC. This will give you the point F. Fold the strip back as shown in Step 3; its edge AC lies along AB. This will give you the last point G. You already have the shape of a perfect pentagon. Finally, fold the rest of the strip as shown in Step 4, and a perfect pentagon is ready!

Puzzle 2. Neatly tie the strip in a knot, and then gently press it (while continuing very gently to tighten it). This allows to make the knot flat. See Step 1 in the Solution to Puzzle 2. As you can see the knot itself is a perfect pentagon already. So now fold the ends of the strip along its sides as shown in Step 2, and you get a perfect pentagon again!

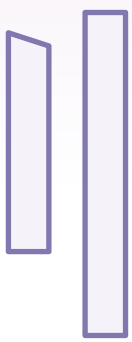
Treasure of Classic and Modern Puzzles

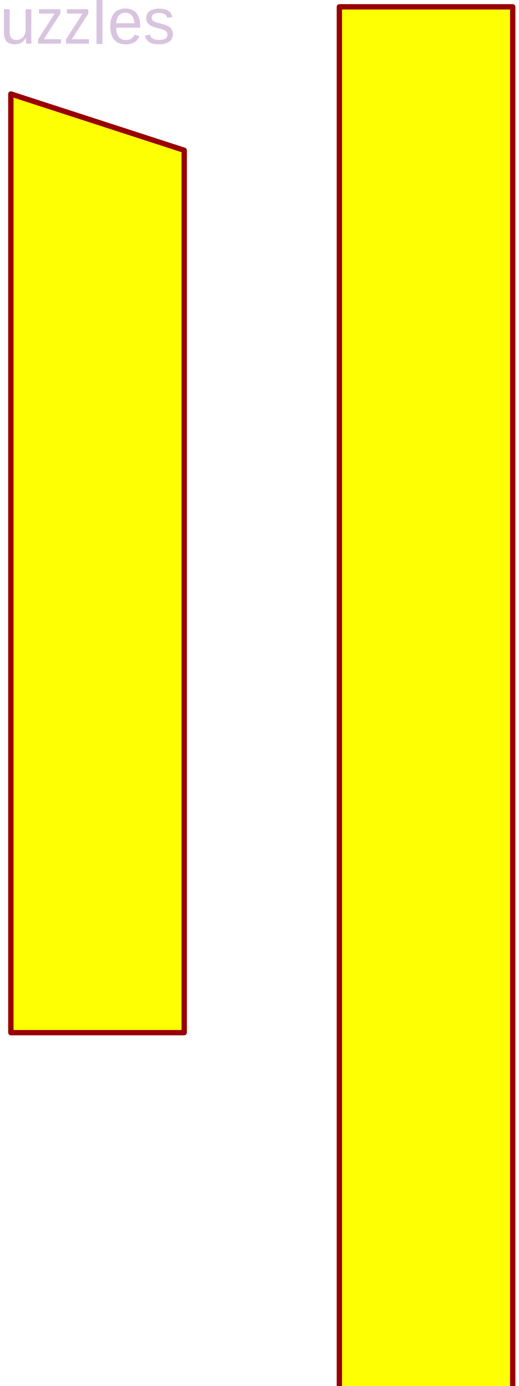
Folding Puzzles

1



F





Strip to Pentagon (patterns)

To produce the patterns first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

$$
\begin{array}{r}
O\;N\;E \\
O\;N\;E \\
O\;N\;E \\
+\quad O\;N\;E \\
\hline
T\;E\;N
\end{array}
$$

The same letters in this calculation mean the same digit.

Can you replace all the letters with the respective digits in such a way that the calculation is correct?

Note: no beginning letter of a word can be 0.

*This puzzle was inspired to the publication on our site by the message from Priti Ghai.

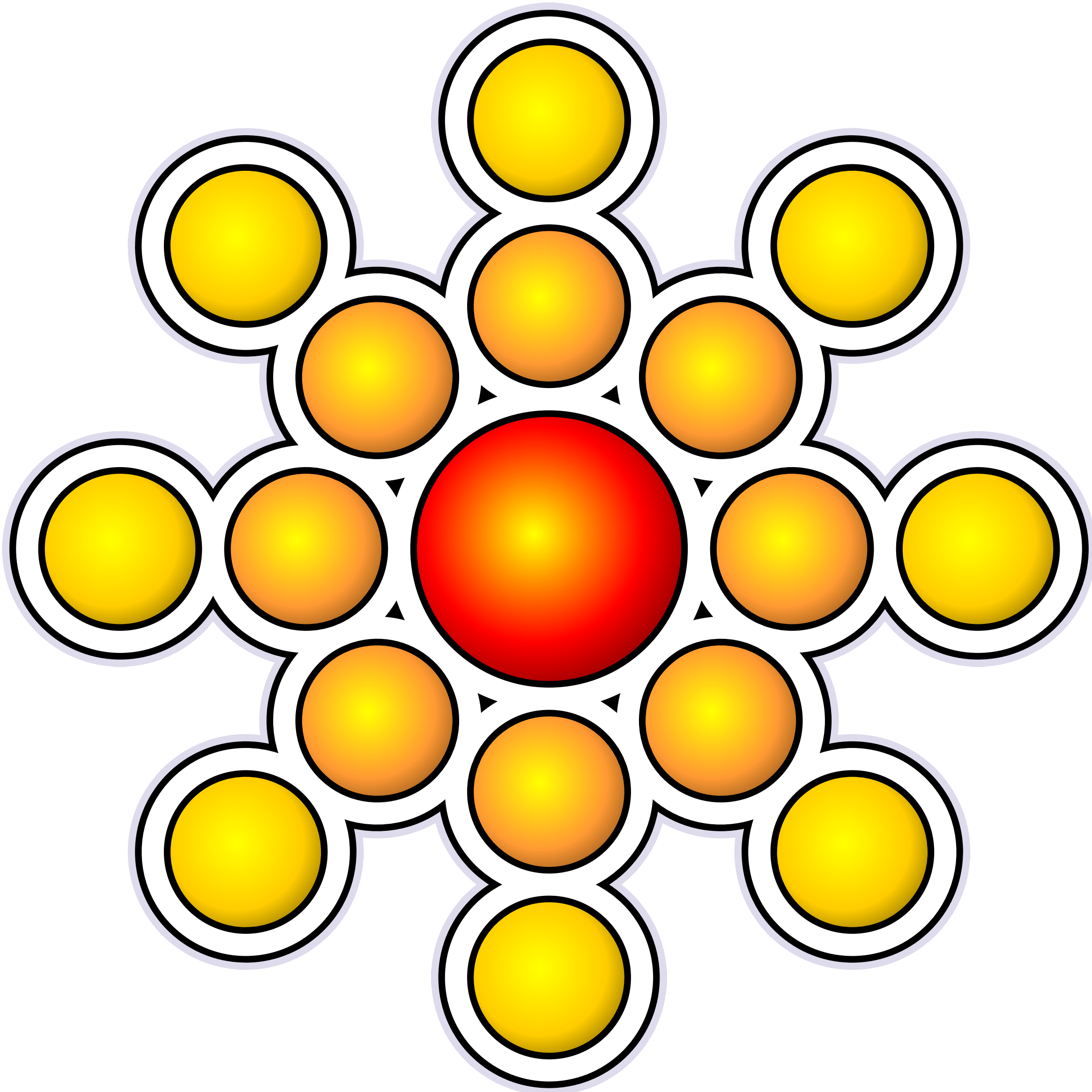
$$
\begin{array}{r}
182 \\
182 \\
182 \\
+\ 182 \\
\hline
728
\end{array}
$$

The solution to this calculation is shown in the illustration.

Sunny Walk

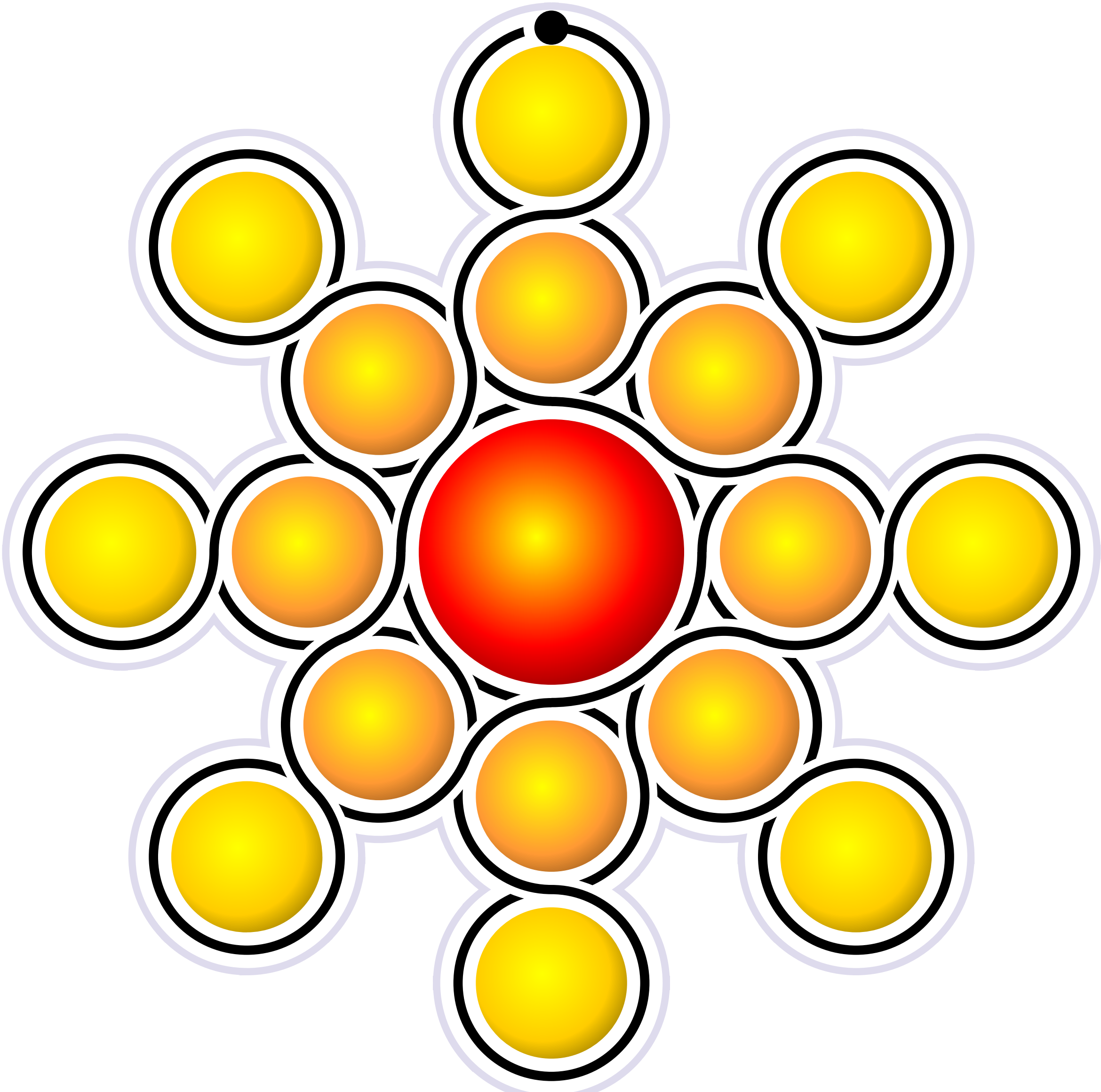
after Lewis Carroll

Puzzles.COM



Imagine this is a top view over the garden with hemispherical stones arranged in it in a sun-like pattern and the white paths around them.

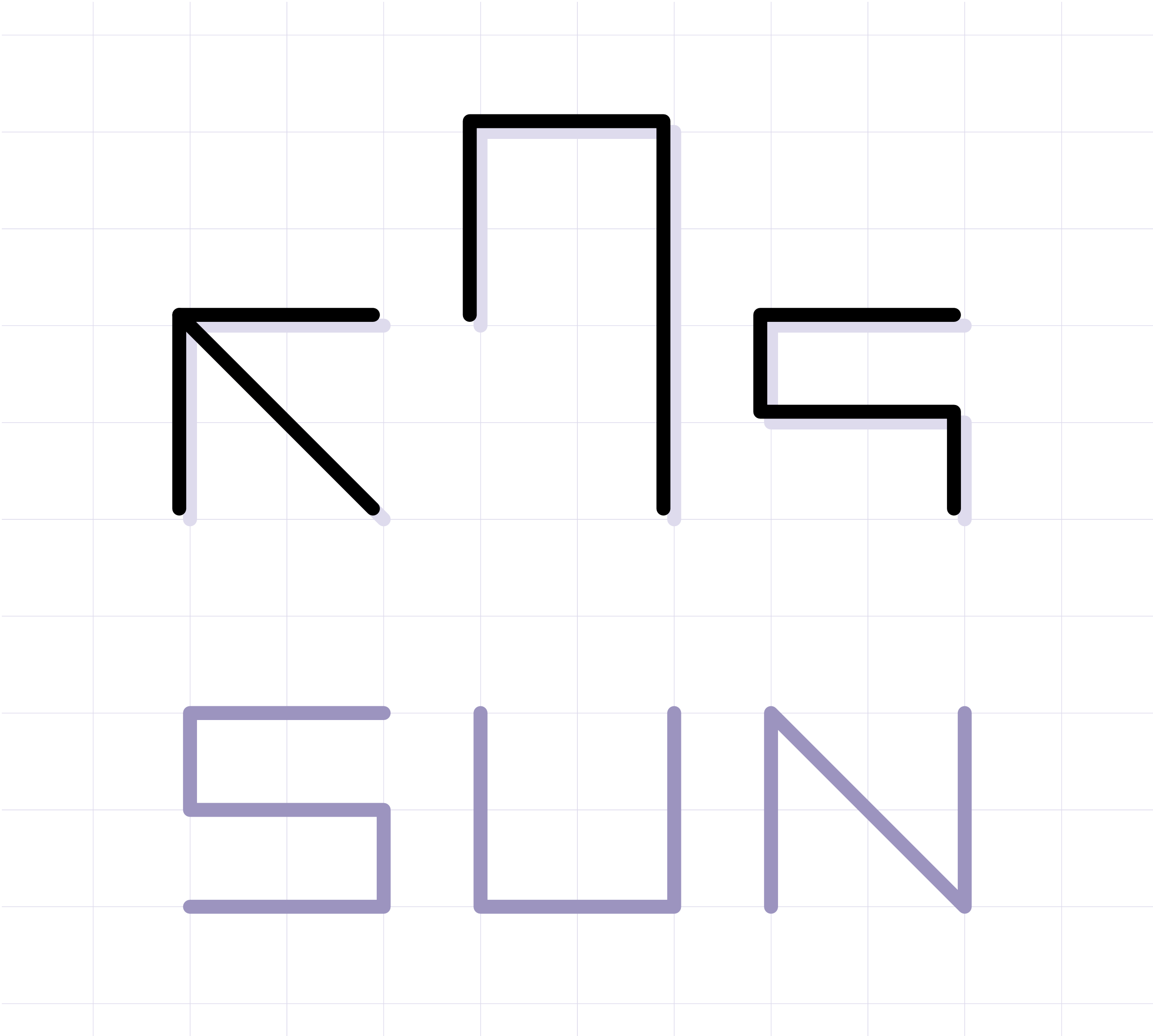
Can you walk through every inch of this path's pattern following the rule of always crossing to a new circle at every point of contact, and thus keeping on, not turning back?



This challenge is really possible but you should be very careful in deciding which direction to take at a point of contact with a new circle. As a general strategy, if you start on an outer circle and alternate the directions left and right at each new contact point, you will find that it is quite easy to walk through the entire path in the garden.

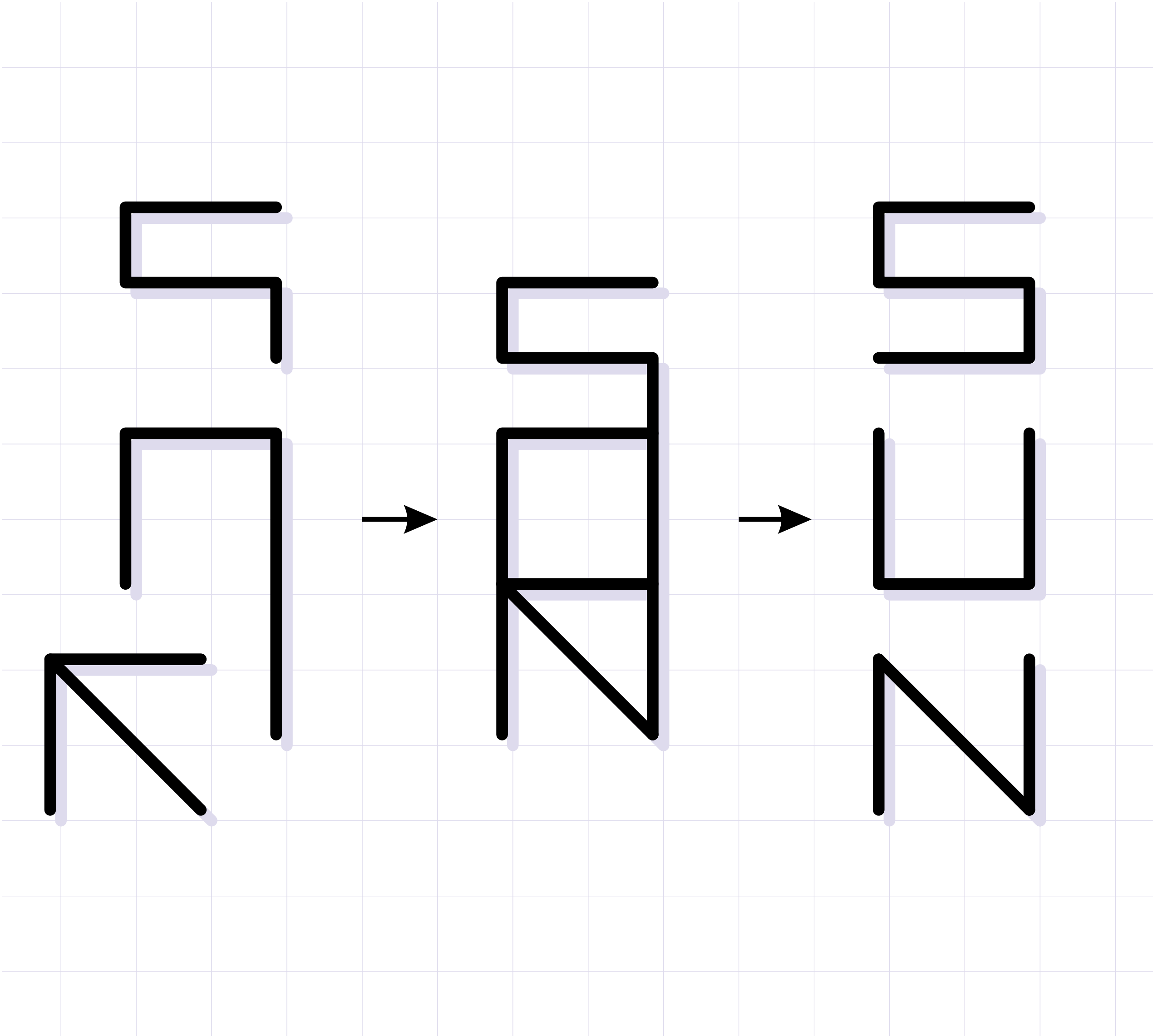
The Sun

by Helen Homa and Peter Grabarchuk



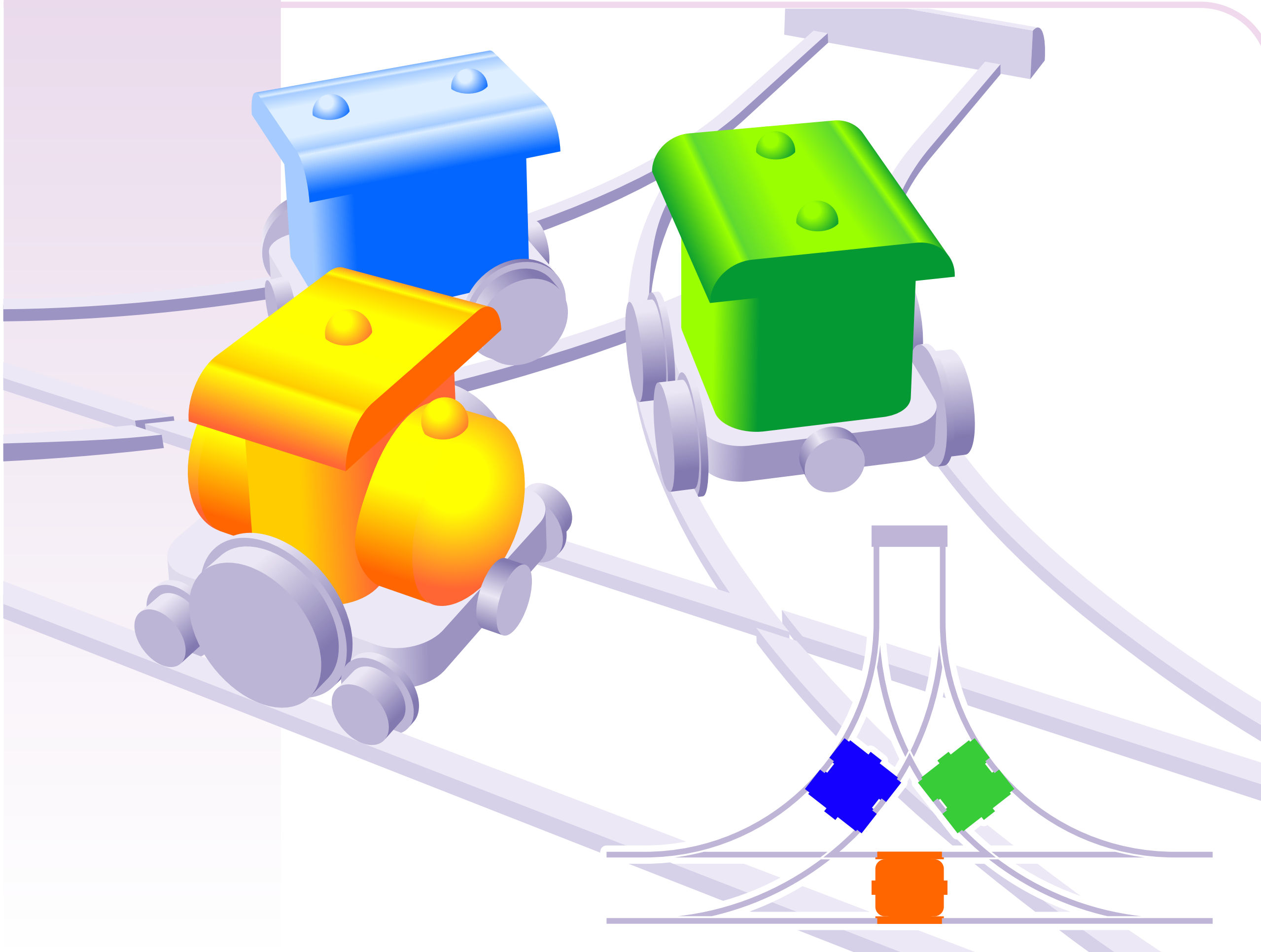
Put together three black wire pieces to form a composition of three letters, S, U and N. The letters' shapes should be the same as shown beneath the pieces and with no rotation or reflection. In the final composition the letters can touch each other with their corners only. It is not allowed to rotate the pieces, overlap or flip them over.

More from the authors at GrabarchukPuzzles.com



The solution is shown in the illustration.

Puzzles with Trains



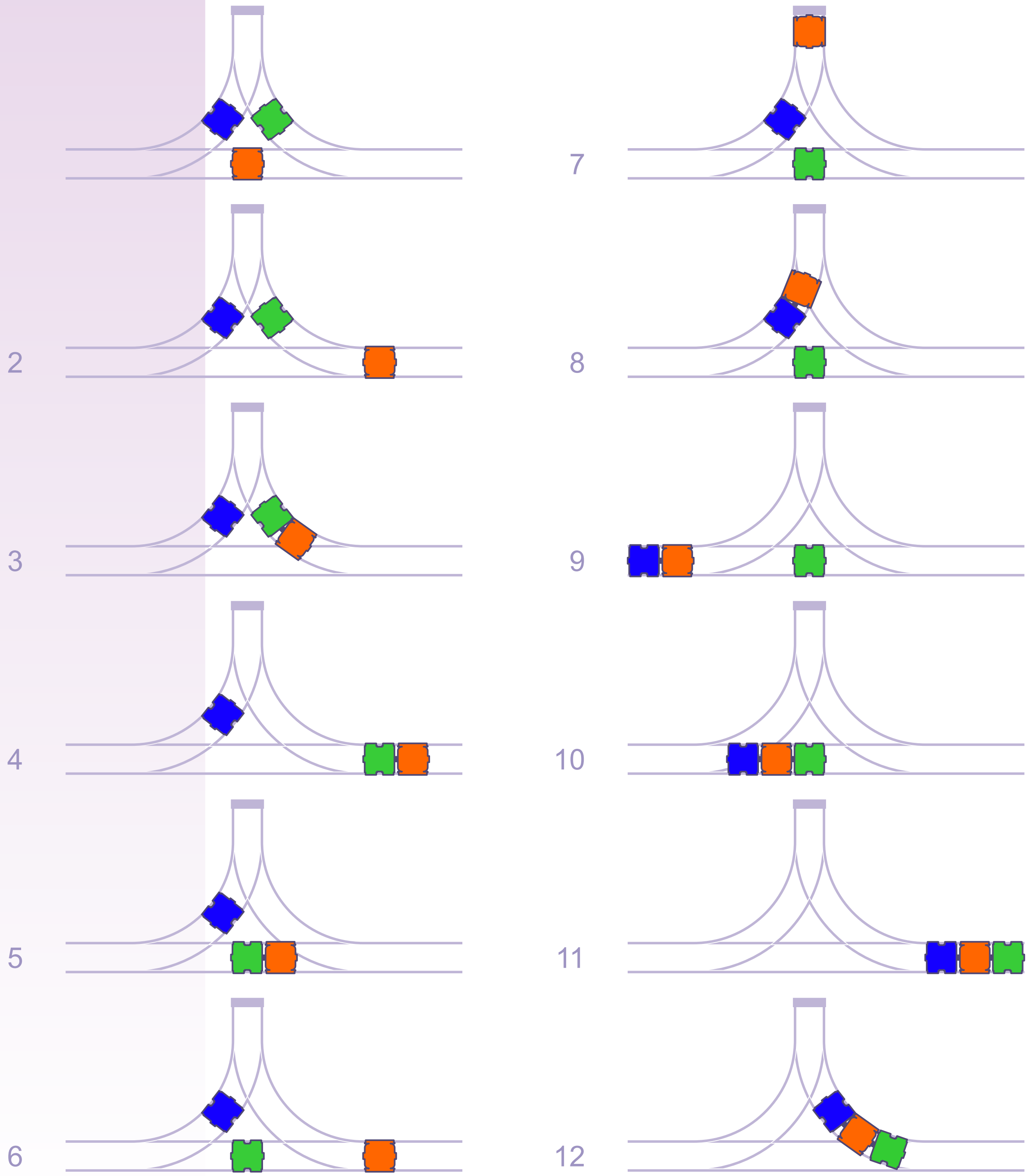
Switch the Cars

Two sidings join the main track of a railroad. They meet together and lead on to a dead end. All this is shown in the illustration above. The dead end is long enough to hold a car or an engine at a time.

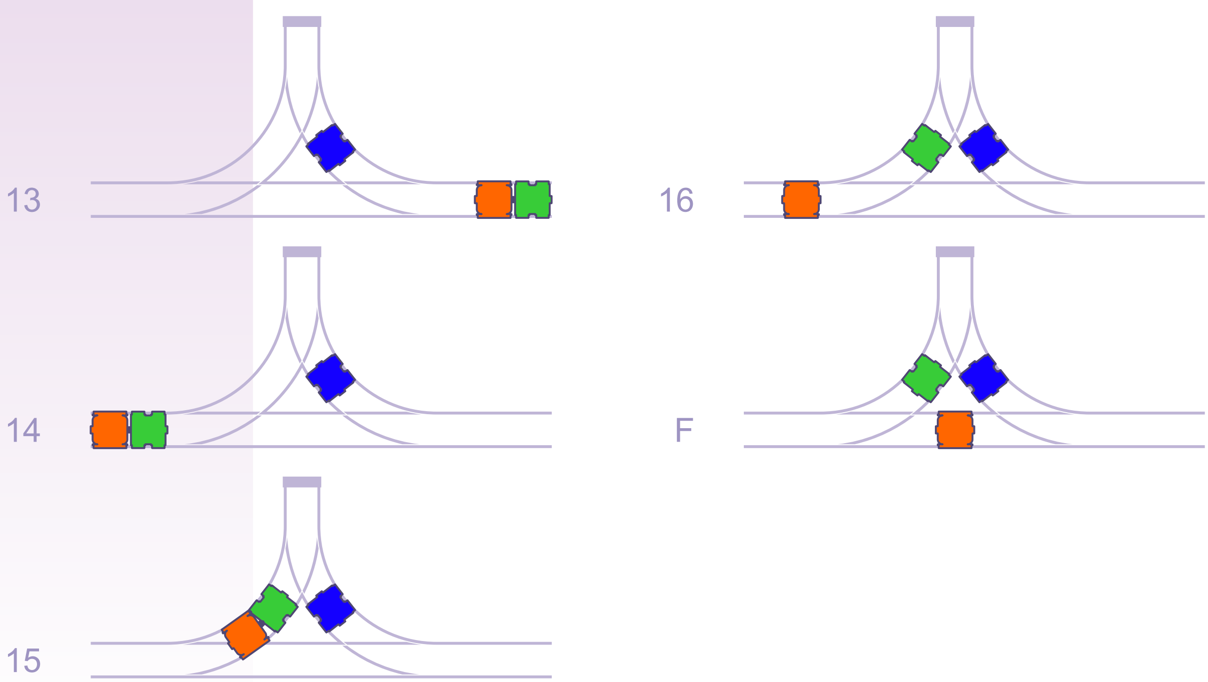
Currently a blue car is located on the left siding and a green car - on the right siding. An engine is located on the main track on the midway between the two cars.

The objective of the challenge is to exchange the positions of the cars and then return the engine to its initial position. And it has to be done with the smallest number of couplings and uncouplings.

Puzzles with Trains



Puzzles with Trains



Switch the Cars (solution)

To exchange the cars and return the engine to its initial position 16 moves are required. Within the moves six* couplings and uncouplings are performed. A move is either a coupling/uncoupling or moving of an engine alone/with car(s) till the moment it reverses its direction. The moves are shown in the illustration in the illustration.

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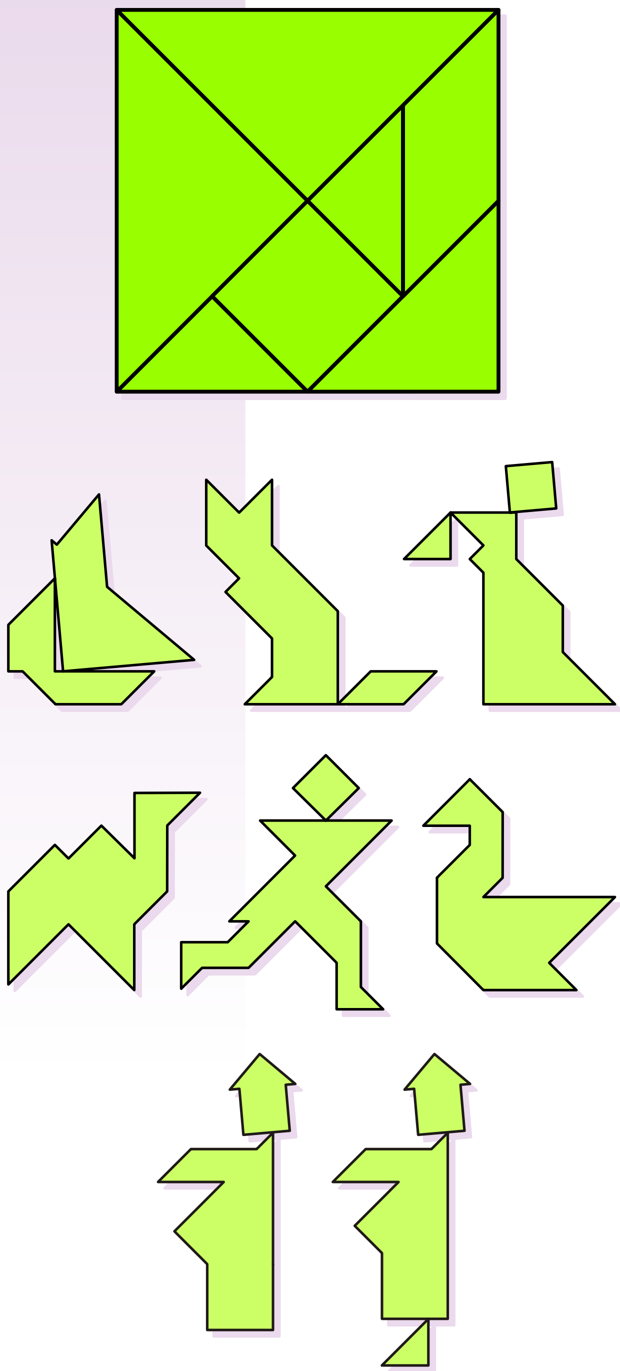
*
The improvement on the number of required couplings and uncouplings, decreased from 8 to 6, has been sent to us by Japhet Stevens. Many thanks!



The Tangram

Without doubt the Tangram is the most popular put-together puzzle, and one of the most well known puzzles ever. The origins of the Tangram are unknown, but the earliest references date back to the beginning of the 19th century, China. That's why the puzzle is also known as the Chinese puzzle.

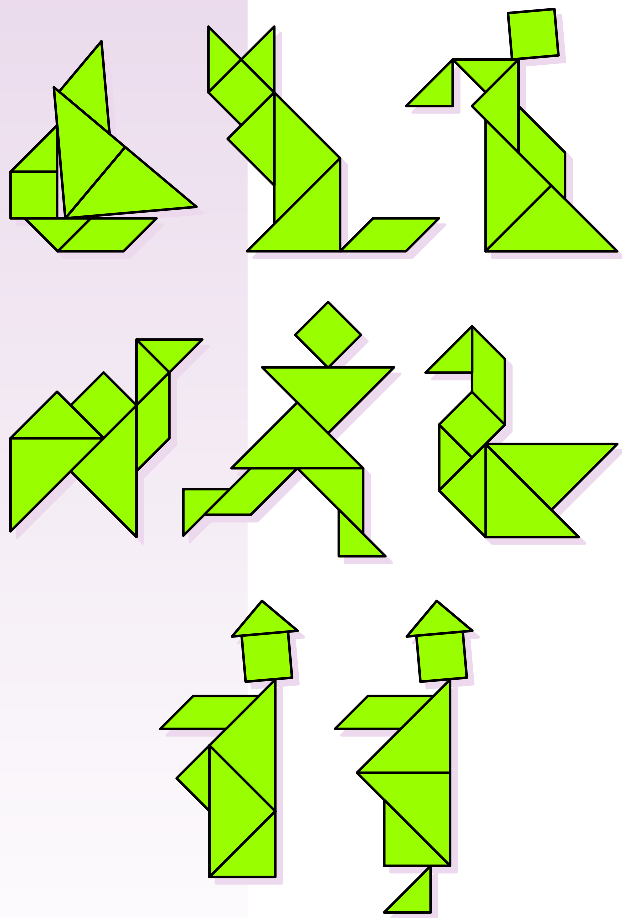
The puzzle consists of seven pieces - tans - obtained by dividing a square as shown in the illustration.

Now you're able to arrange them in many different ways making an infinite number of nice, fun, and sometimes very puzzling figures. For every figure you have to use all the seven tans. You're allowed to rotate the pieces as you wish, and even flip them over. But you can't overlap the pieces.

We've chosen just a few most popular figures that you may assemble using all the seven tans. They will give you a good taste of the puzzle.

The two Men in the bottom row are developed by Henry E. Dudeney, and demonstrate a beautiful paradox. Both Men are assembled with all the seven tans, but one of them has a foot, while the other hasn't. Can you make both men, and then explain what's happening with the foot?

Tangrams



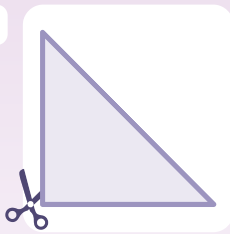
The Tangram

The solutions to all the figures are shown in the illustration.

Treasure of Classic and Modern Puzzles

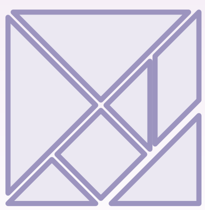
Tangrams

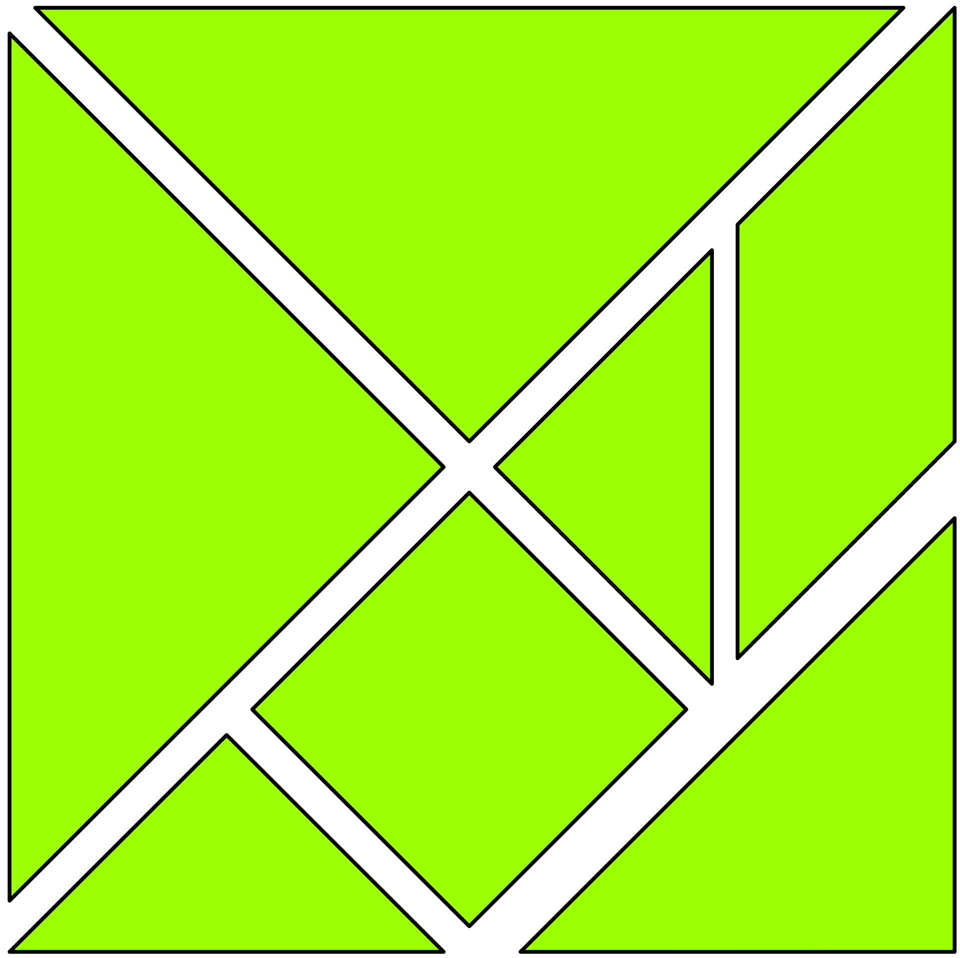
1



x 7

F



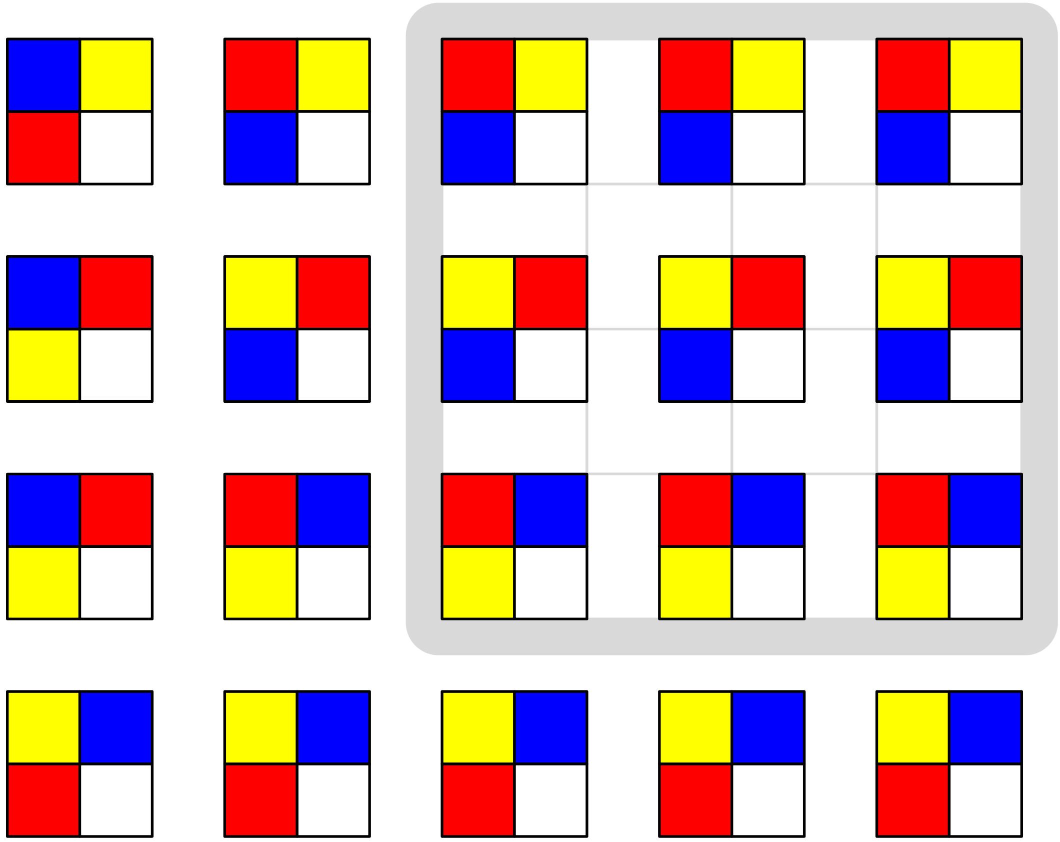


The Tangram (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

Tessellated Tiles

by Henry E. Dudeney

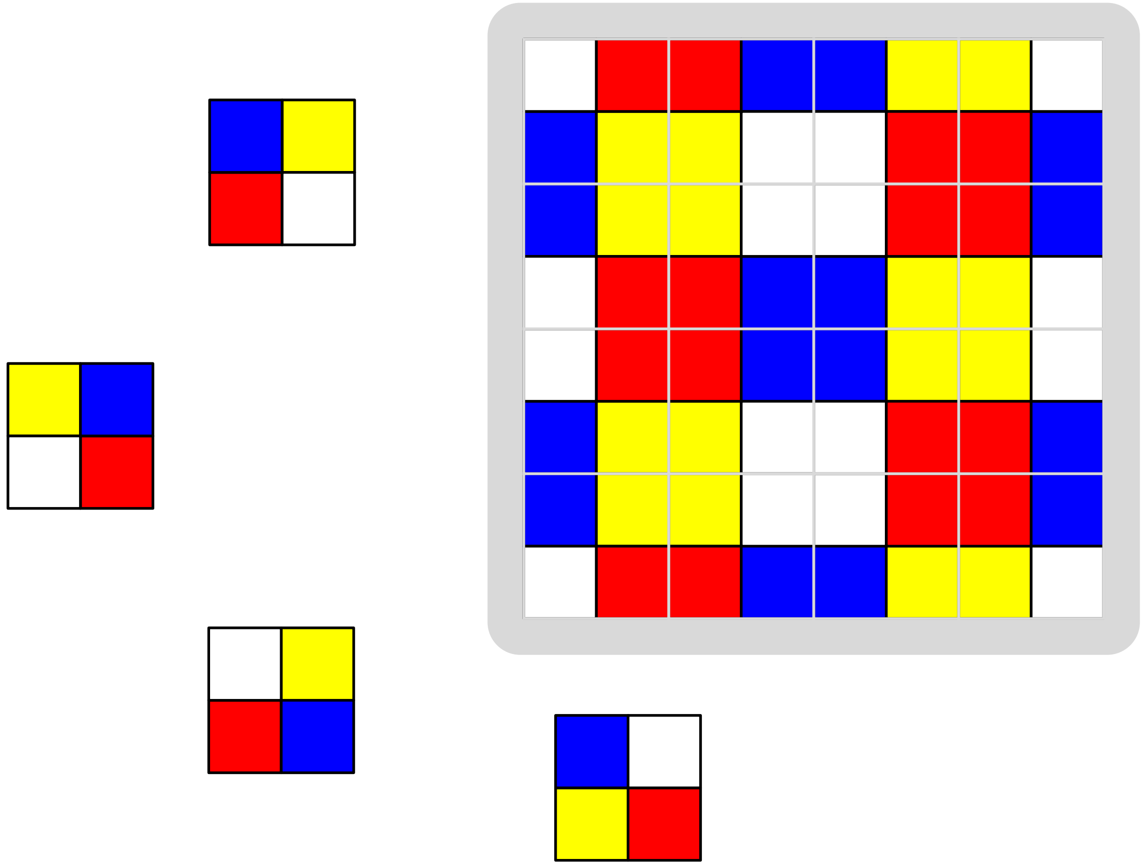


Every of the twenty square tiles includes the cells of four different colors - red, blue, yellow and white.

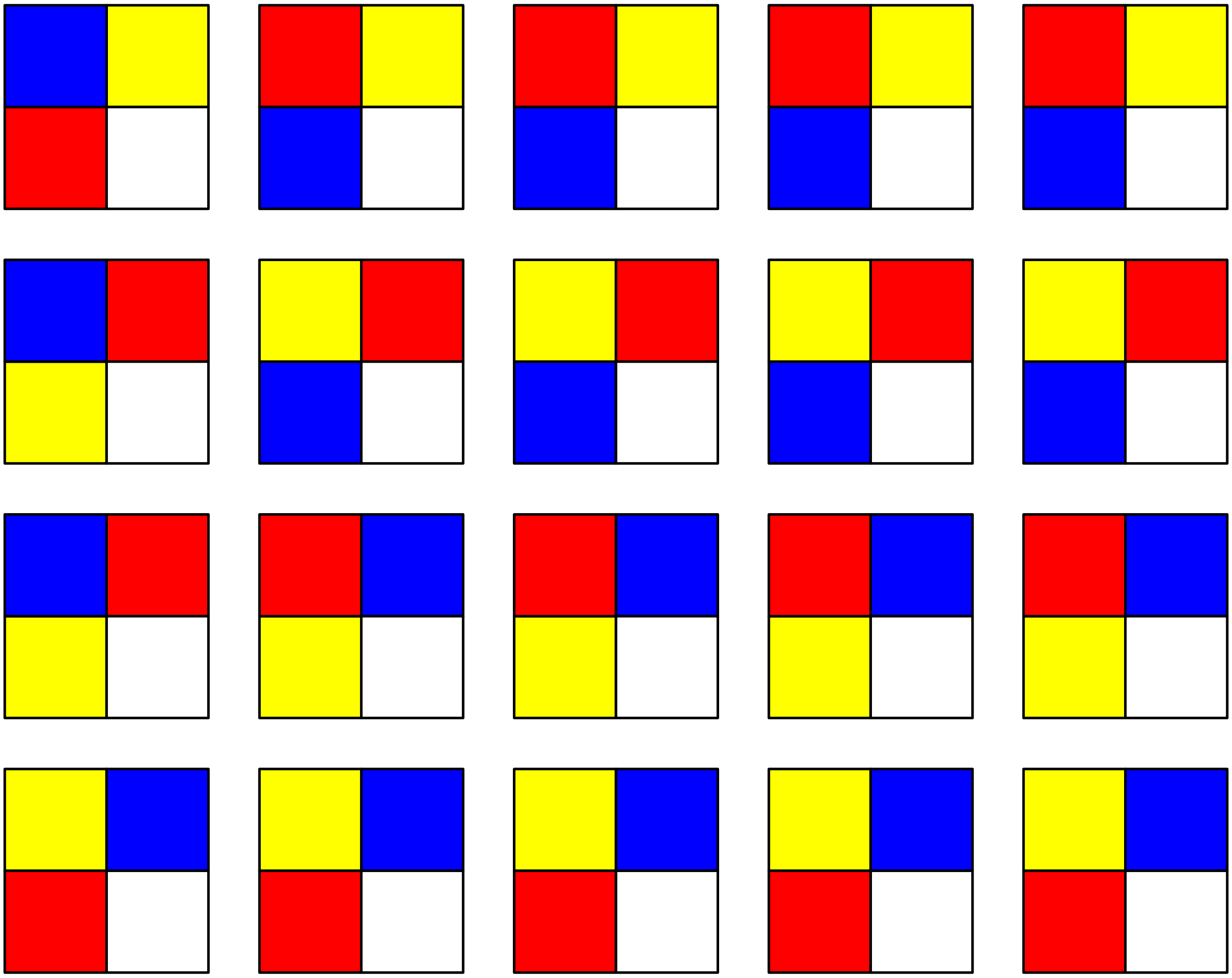
Can you select only 16 tiles from this set and arrange them in a square always placing similar colors together - red to red, blue to blue, and so on? The square outline is shown below the tiles in the top right corner.

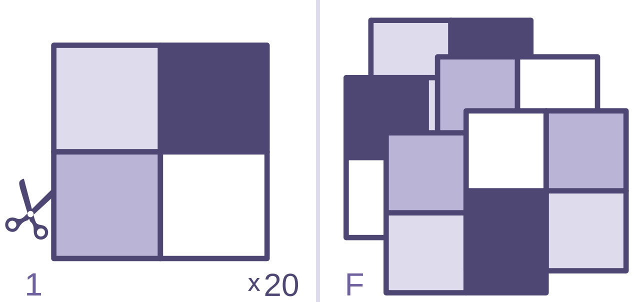
Tessellated Tiles

Solution



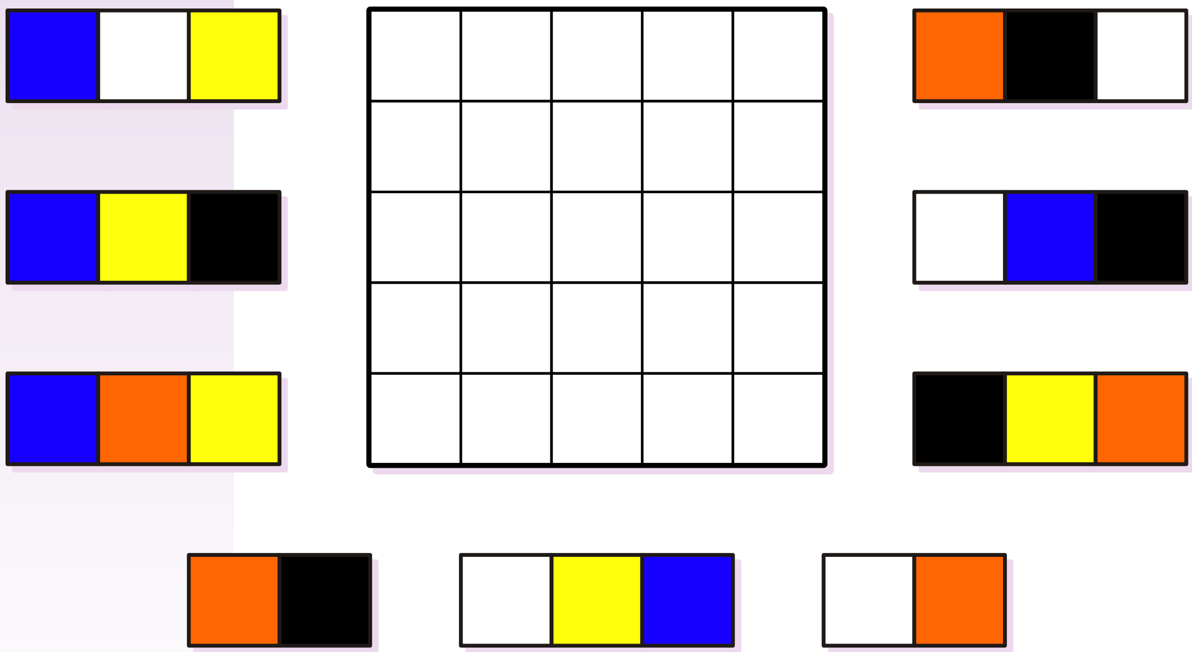
The solution is shown in the illustration.





To produce the pieces first print them out. Then follow the diagram shown above - from step 1 to step F (finish).

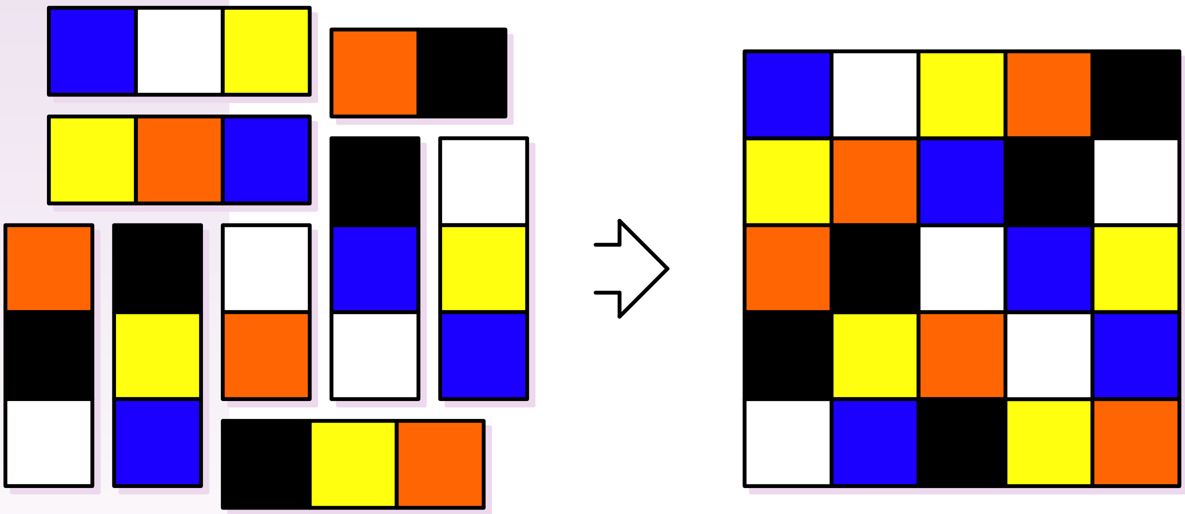
Matching Cards



The Testa

The challenge is to make from all these pieces a 5x5 square with exactly one of each color in every row and column.

Matching Cards



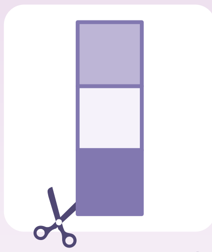
The Testa (solution)

One of the solutions is shown in the illustration.

Treasure of Classic and Modern Puzzles

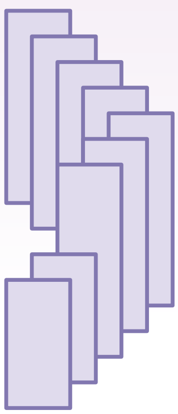
Matching Cards

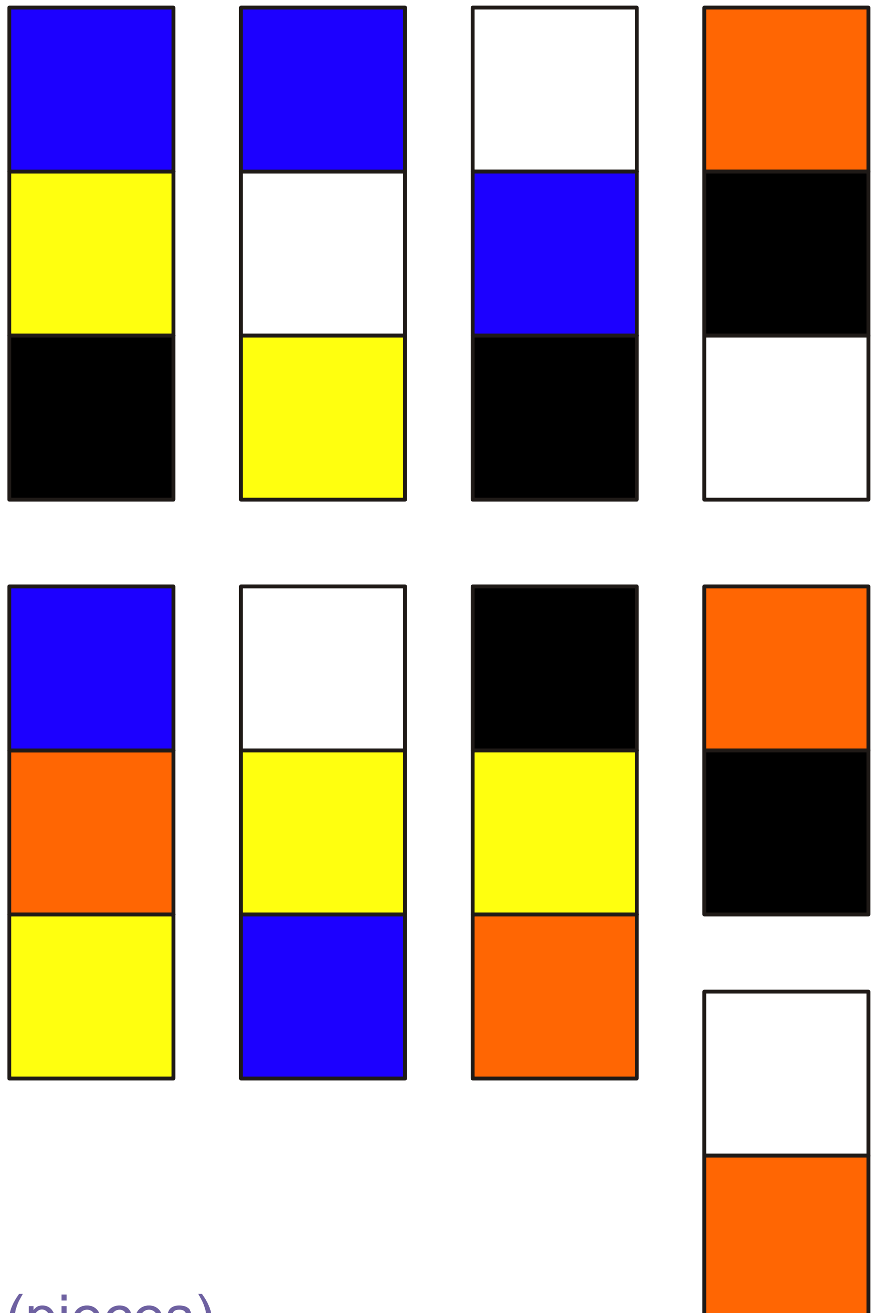
1



x 9

F

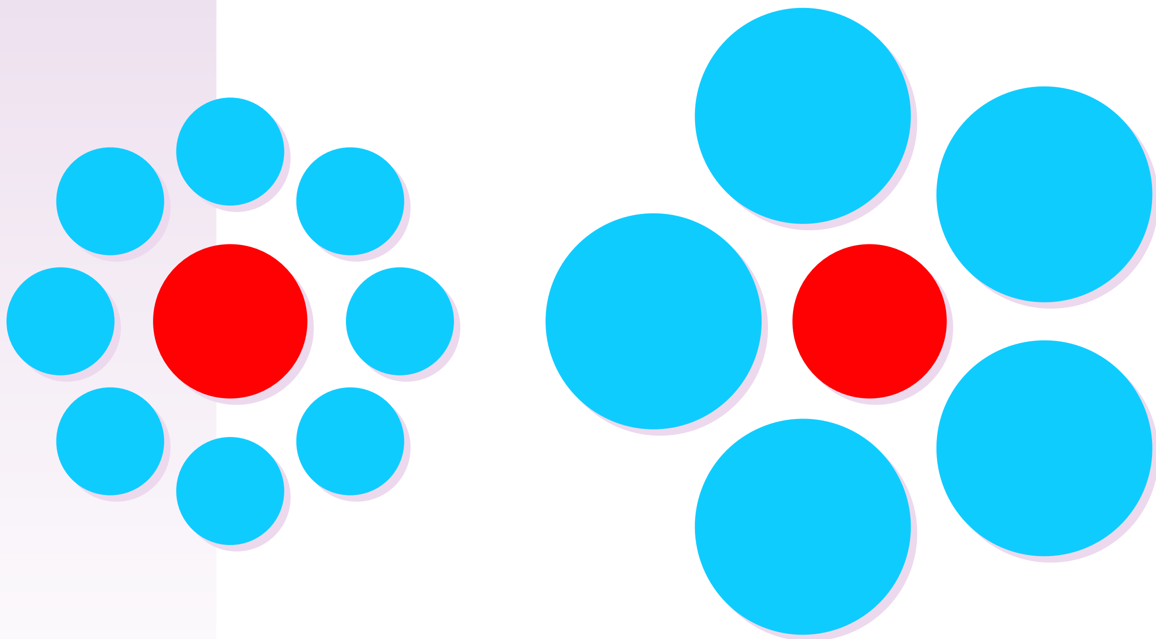




The Testa (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

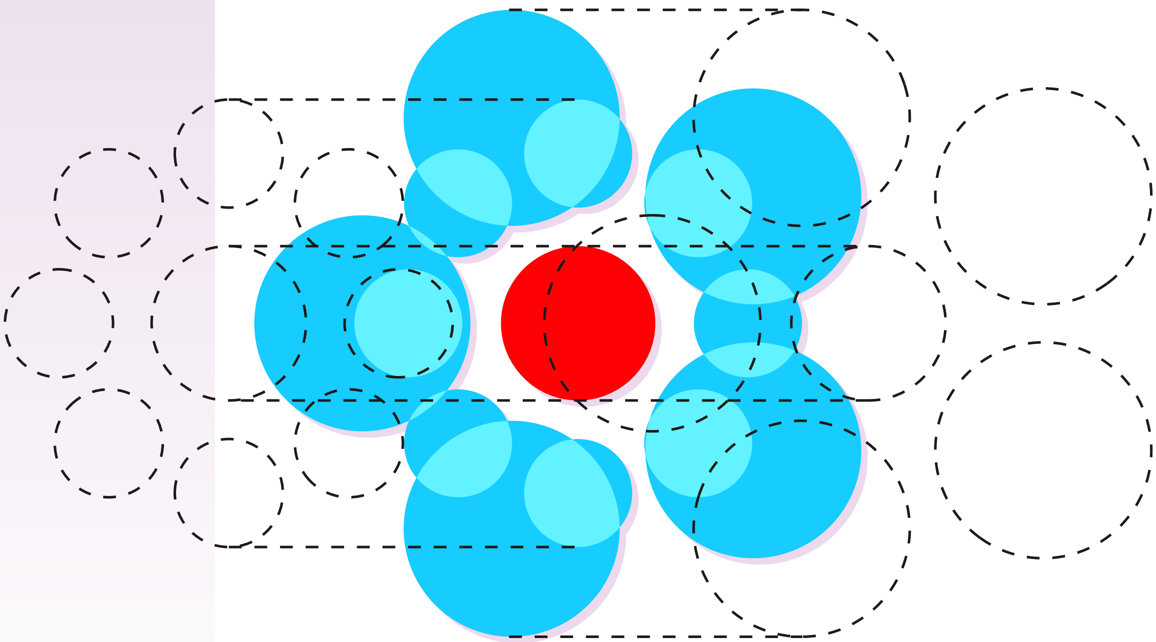
Illusions



The Inner Circle

Which of the two red circles is larger? Are they really different or it's just a pretty good illusion?

Illusions

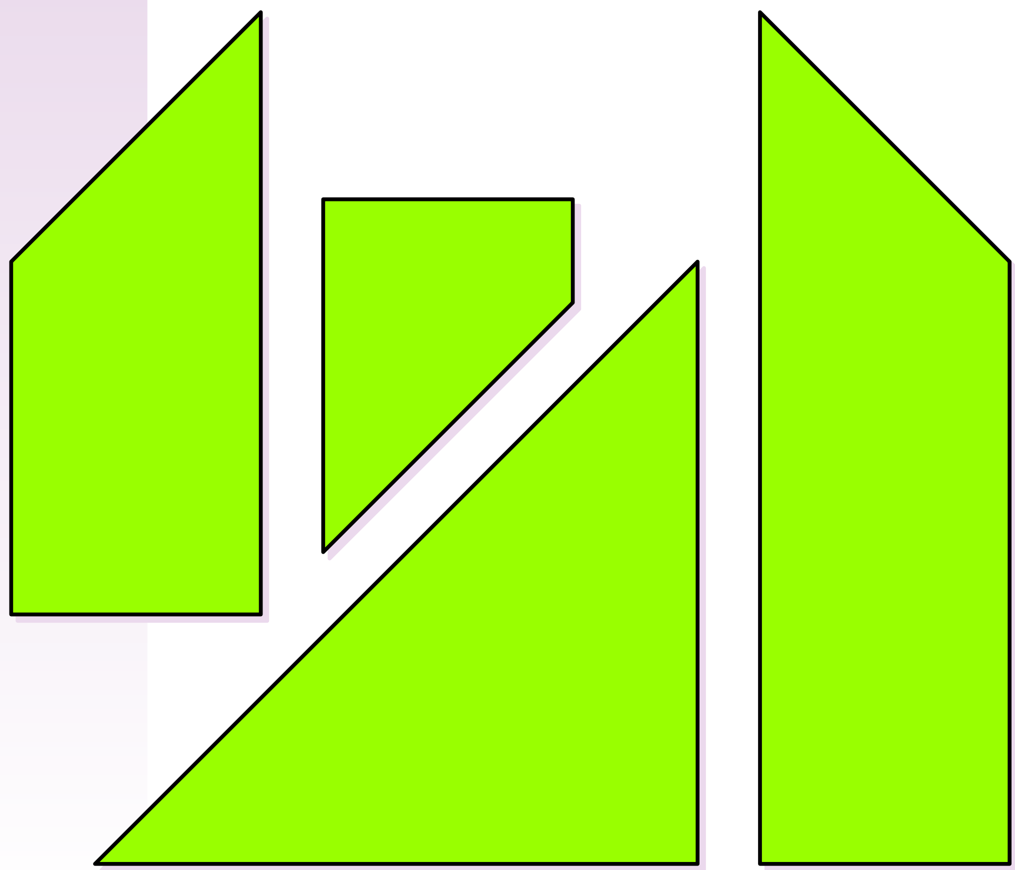


The Inner Circle (explanation)

Both red circles are quite identical - just as shown in the diagram above.

This illusion is based on the shape contrast. Red circles have different surroundings which influence their appearance. Our eyes and brain compare each red circle with the circles surrounding it, and in every group determine the dominant element giving it higher value. In this way the red circle in the left group is getting higher value than exactly the same red one in the right group and vice versa. And so their sizes are interpreted as being different.

Tangrams

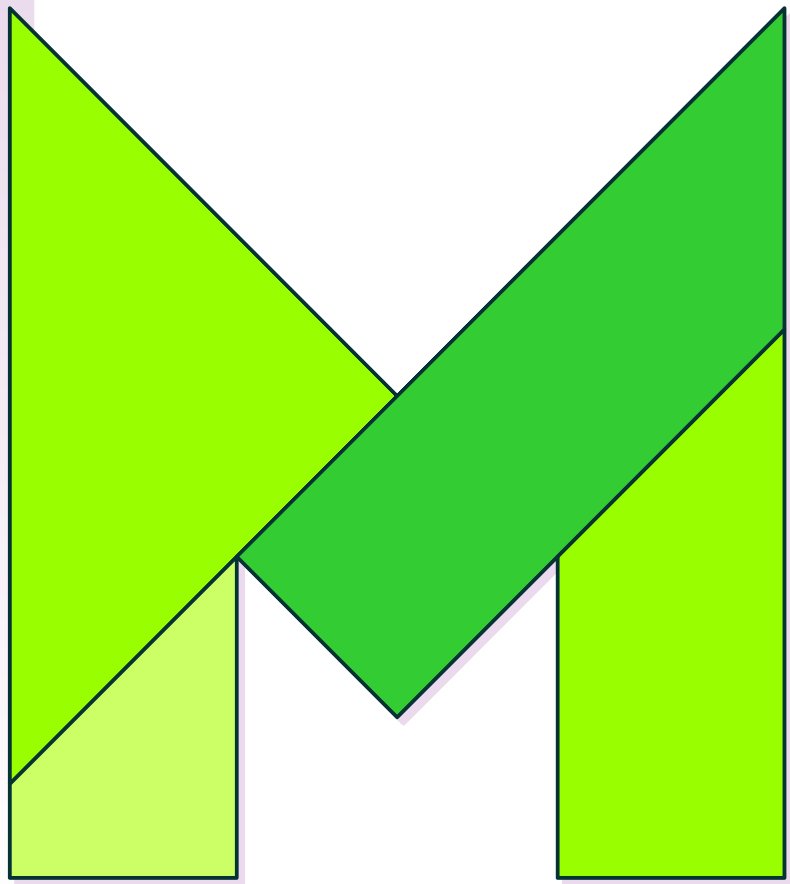


The M Puzzle

The object is to make of these four pieces a symmetric letter M.

The pieces must not overlap each other in the final configuration.

Tangrams

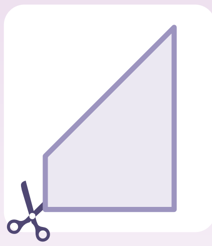


The M Puzzle (solution)

The solution is shown in the illustration.

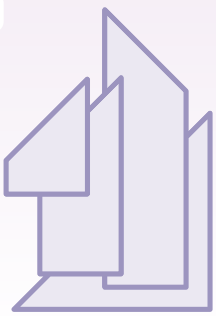
Tangrams

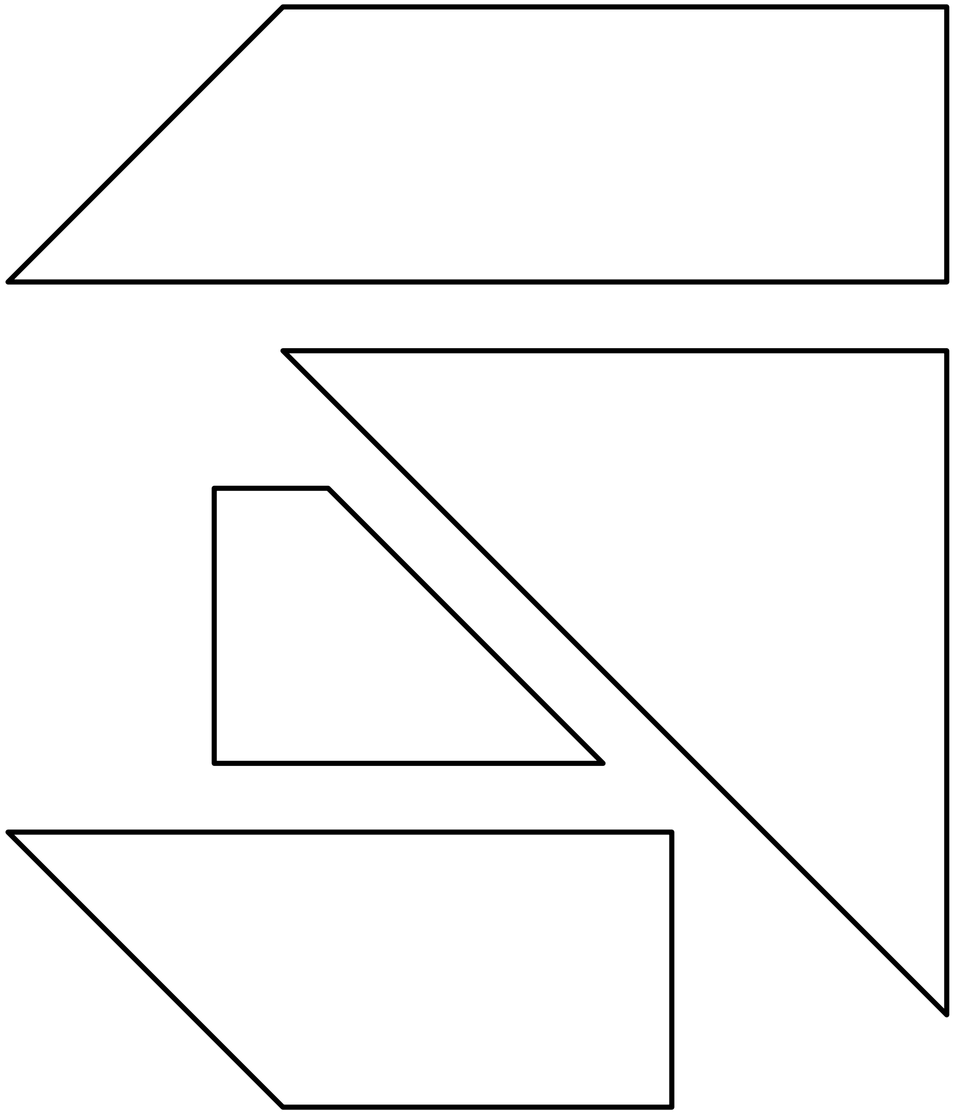
1



x 4

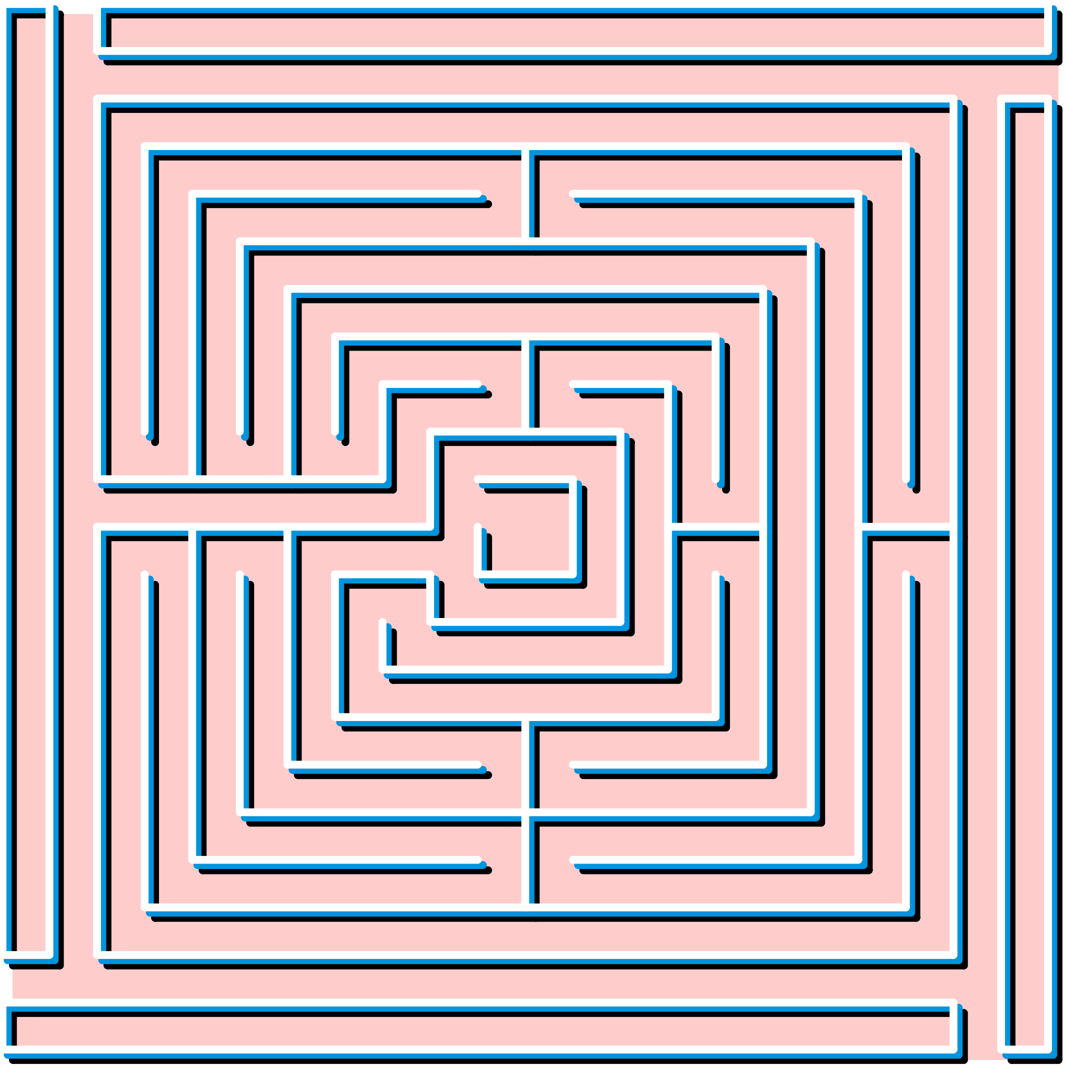
F





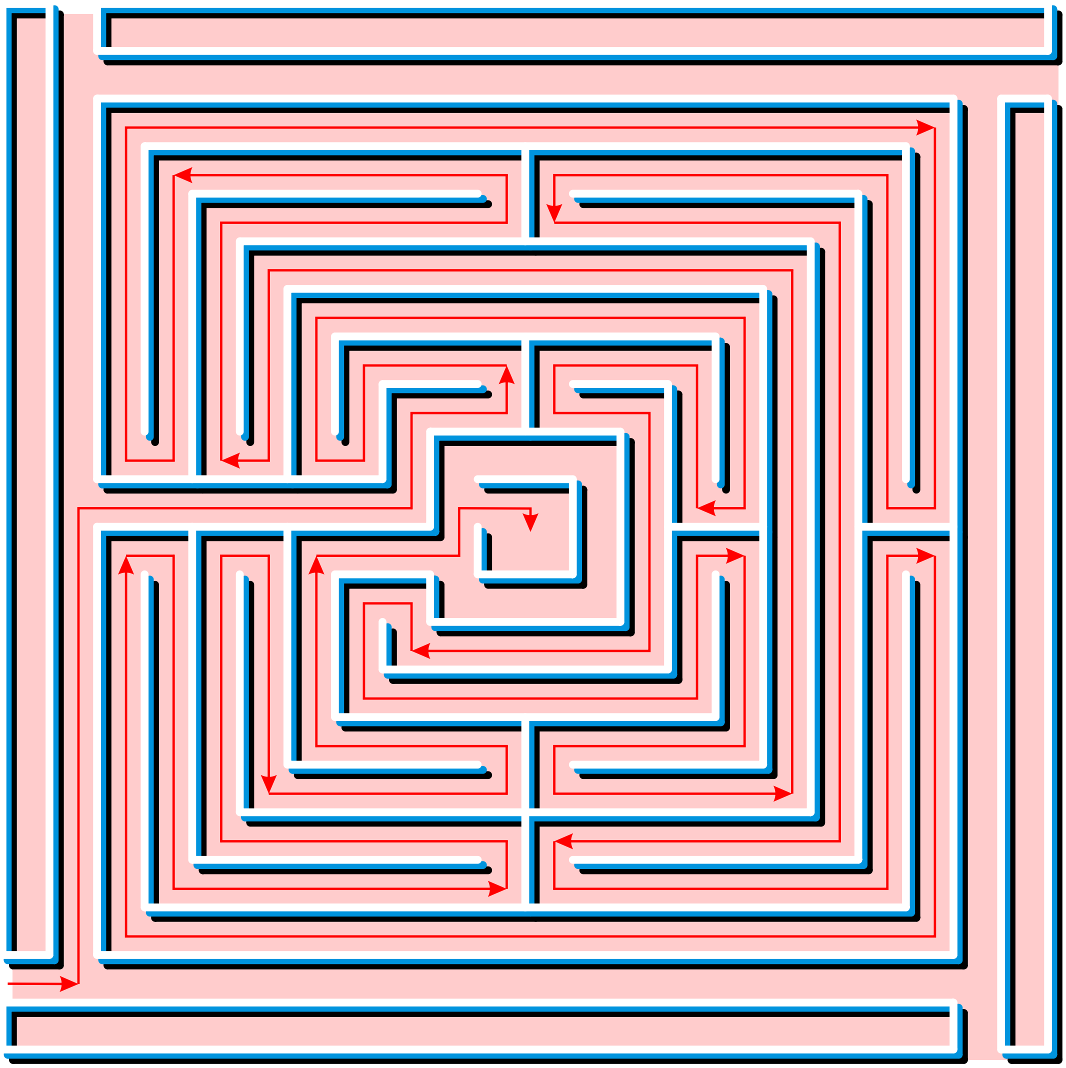
The M Puzzle (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).



Enter the maze at one of the four entrances on its perimeter and trace a route to the center of the maze. What is so unusual about this maze?

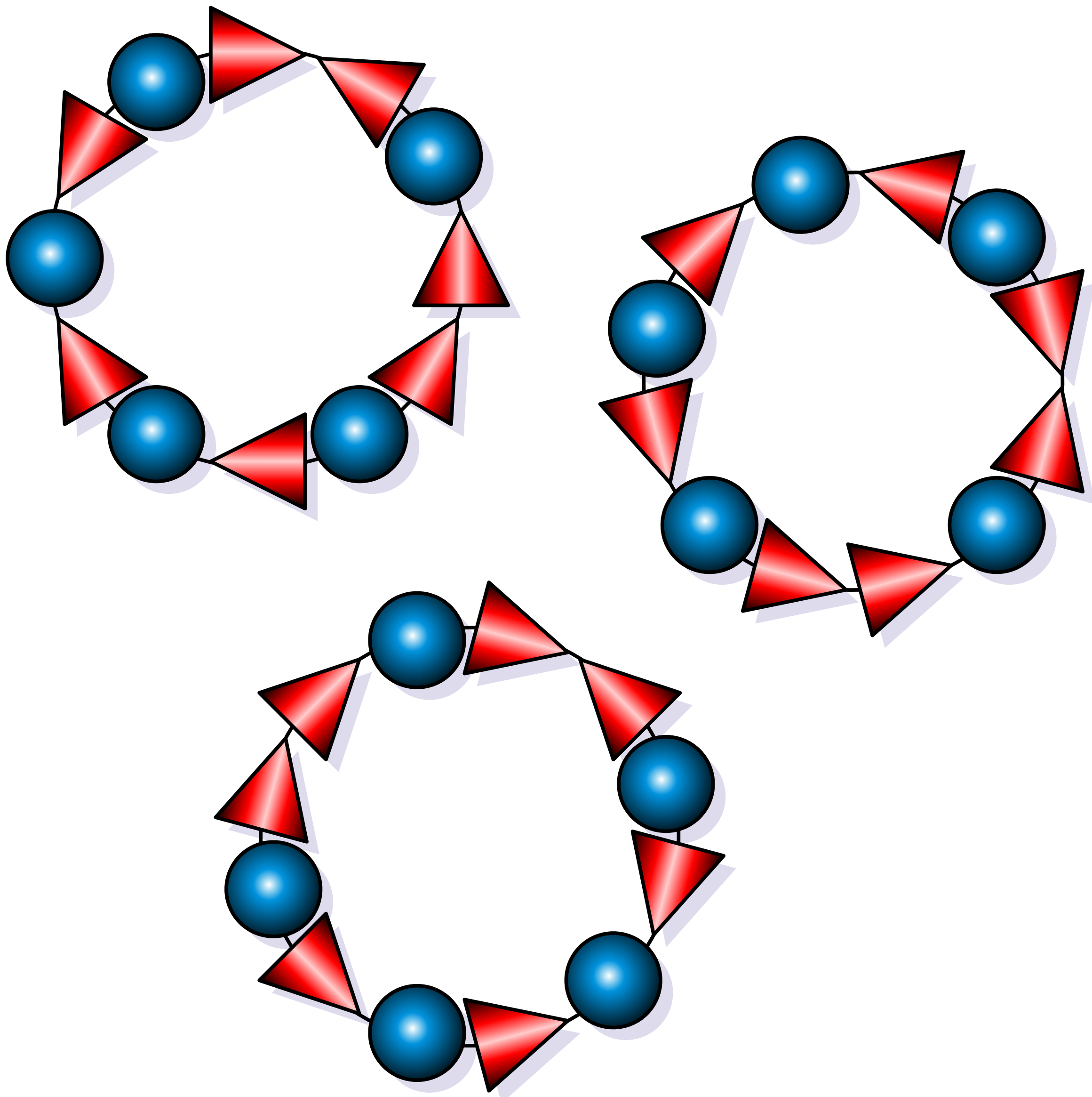
This is the shape of the maze at Theobalds, Hertfordshire, England.



Once entered inside, the maze forces you to take the only route right to the center, passing through all its corridors as shown in the diagram.

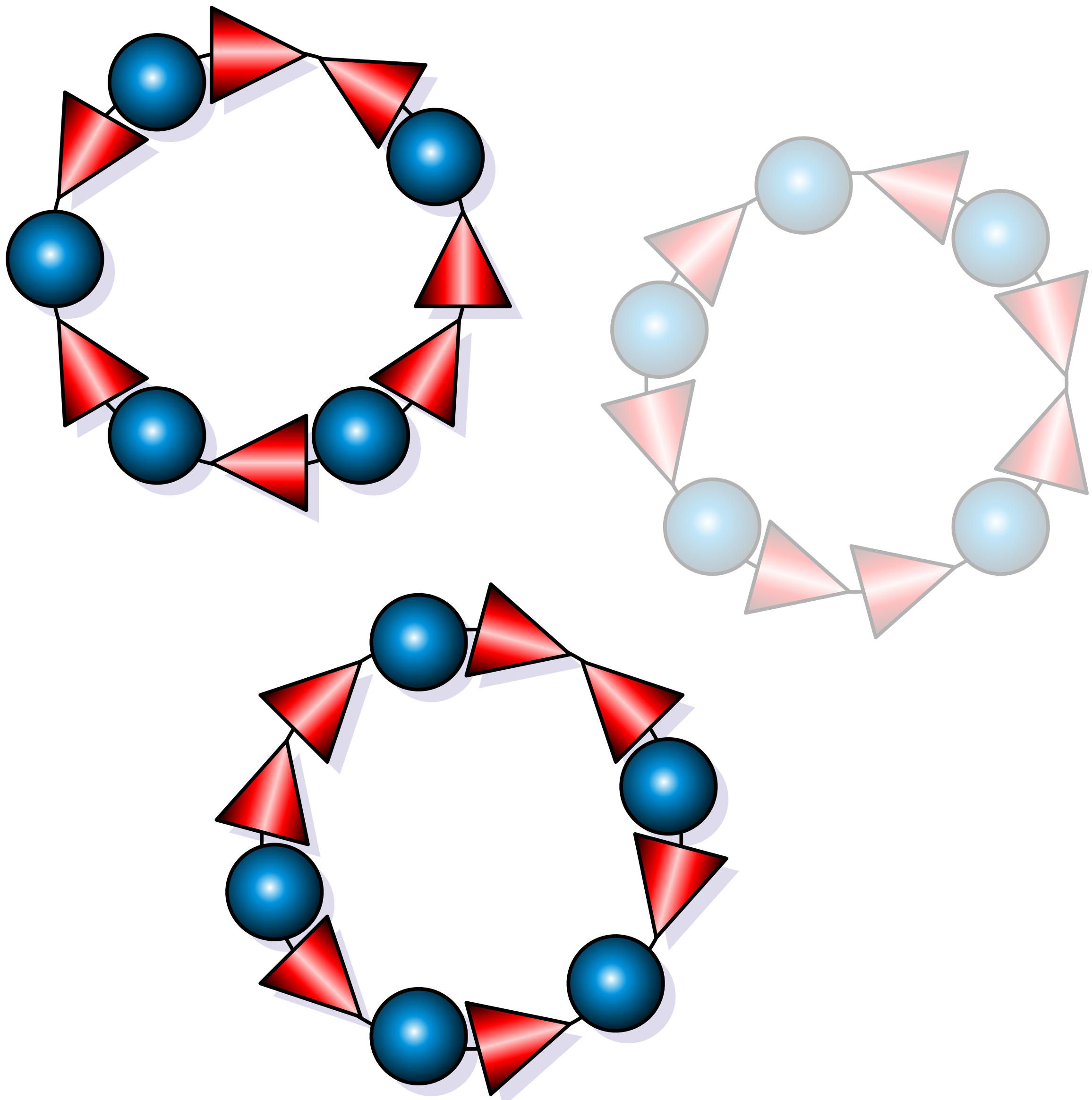
Three Bracelets

by Peter Grabarchuk

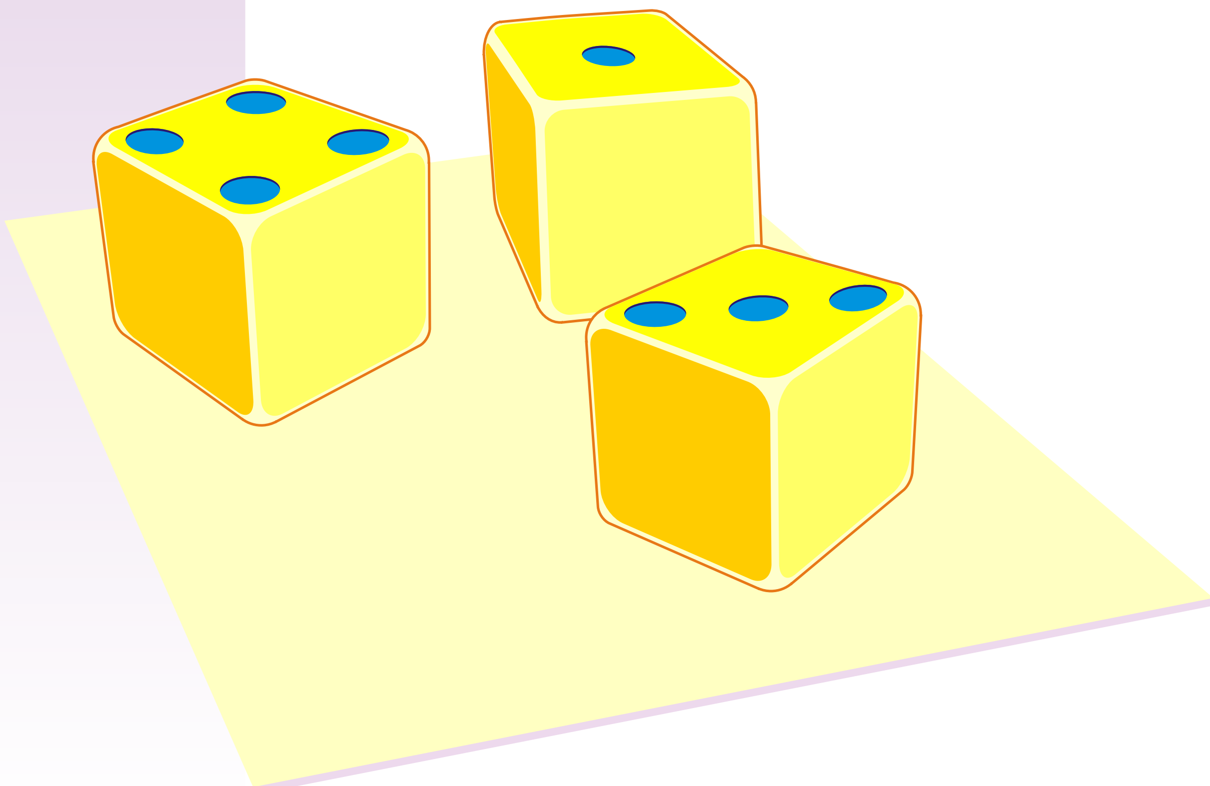


Two of these three bracelets are identical. Can you find them? The bracelets can be symmetrical.

More from the author at PeterPuzzle.com



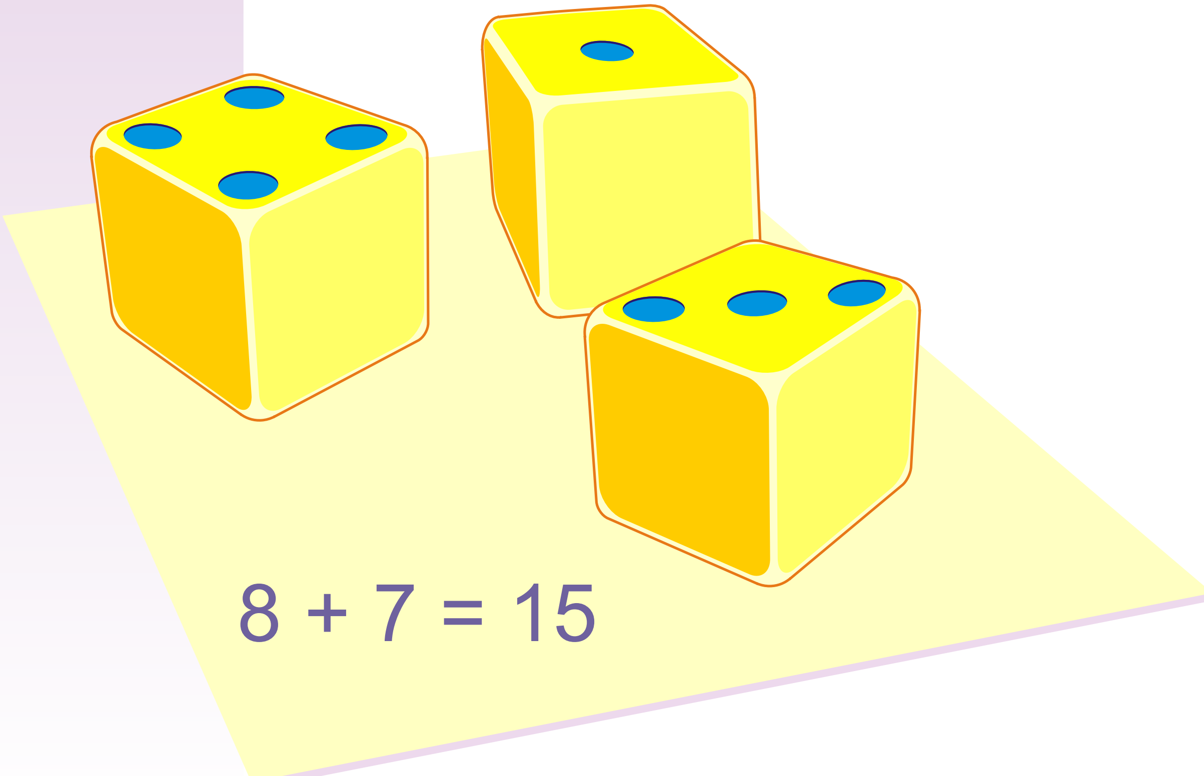
The solution is shown in the illustration.



Three Dice

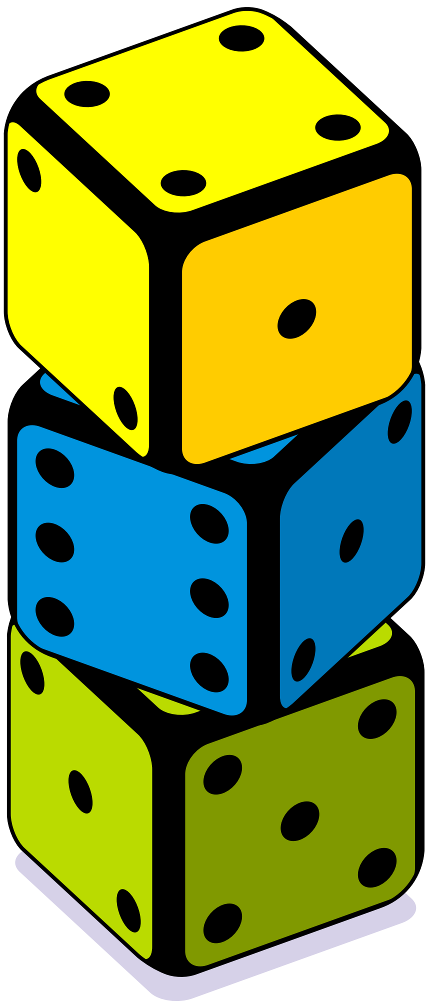
after Martin Gardner

Here is one mathematical trick based on a fact that the sum of the numbers on the opposite sides of a die is always seven. Turn round and ask somebody to throw three dice. Then ask him/her the next:
1) to add all the three numbers;
2) to take one die and add the number on the bottom face to the number he/she already counted;
3) to throw the same die again and add again the number it shows on top to the previous sum.
Now turn round telling your friends you can't know which die was thrown again. Take all the dice, shake them in your hand for a moment and then tell the correct sum. But how will you know that?



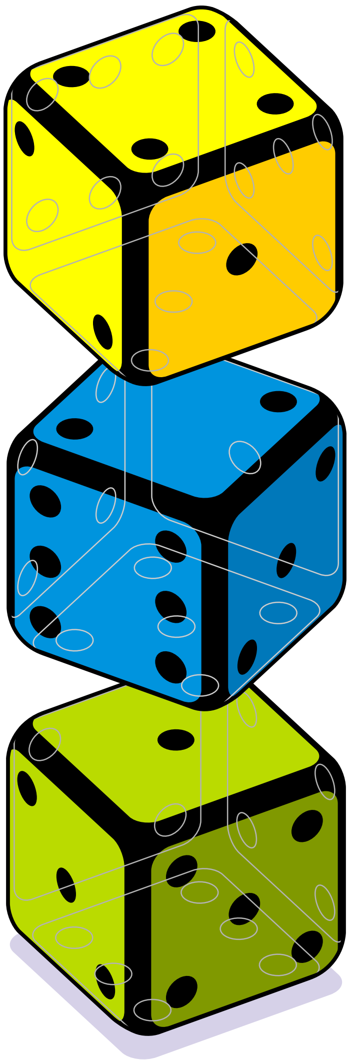
Three Dice (secret)

This trick is quite simple. You have to add the numbers on the top faces of the three dice before you take them in your hand, and add seven. If you think a little, you'll understand why this really works.



In a tower of three dice when you glance at the top face you can say exactly the sum of spots on five horizontal hidden faces: those on the four spaces where two dice touch each other and the face on the bottom of the tower. In this example the sum is 17.

Can you explain what the trick is?



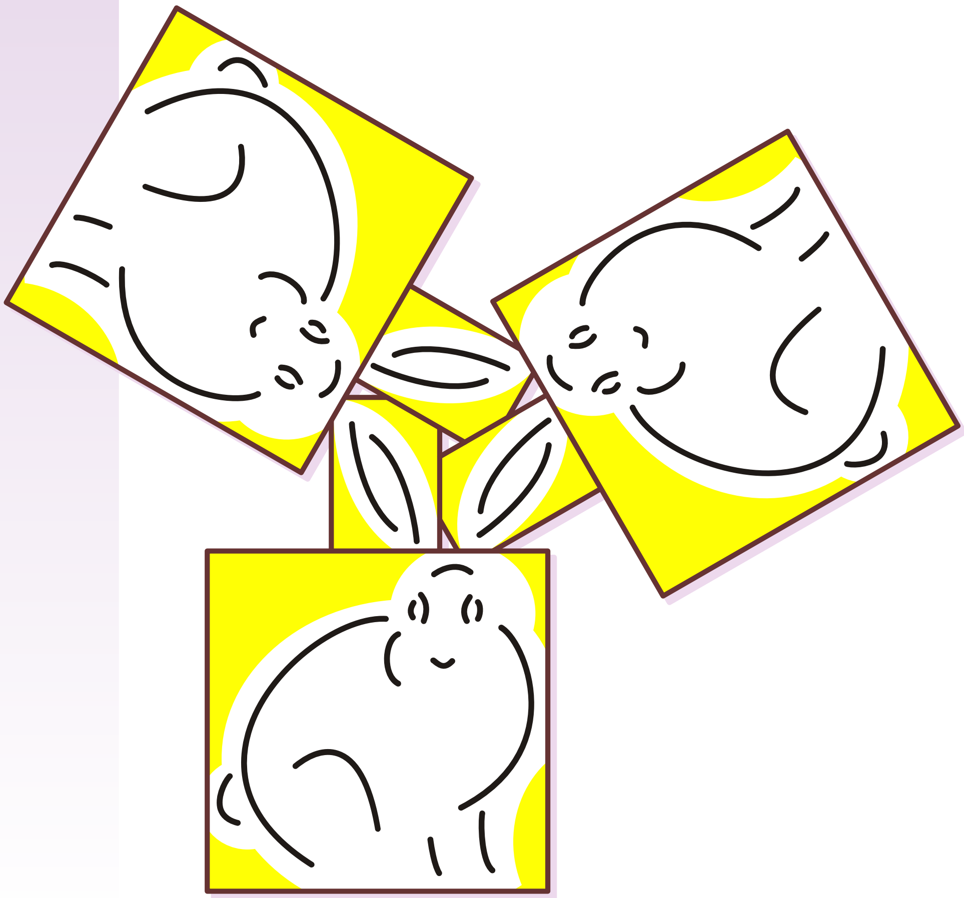
The top and bottom of each die in the tower add to 7, thus, always making 21 in total. Subtracting the number of spots on the top face from 21 you always get the right answer. In our case it is 17 because the number of spots on the top face is 4 (21 - 4 = 17).

Matching Cards

Three Hares

The object is to rearrange the six cards in such a way that every hare has exactly two ears.

Matching Cards

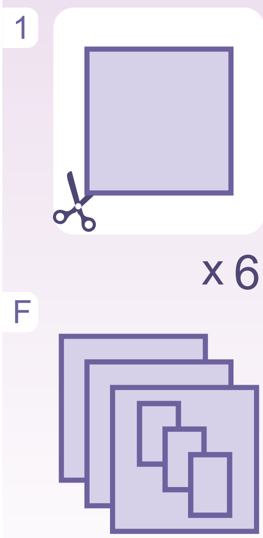


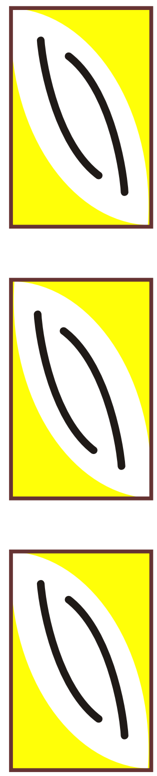
Three Hares (solution)

The solution to this puzzle is shown in the illustration.

Treasure of Classic and Modern Puzzles

Matching Cards

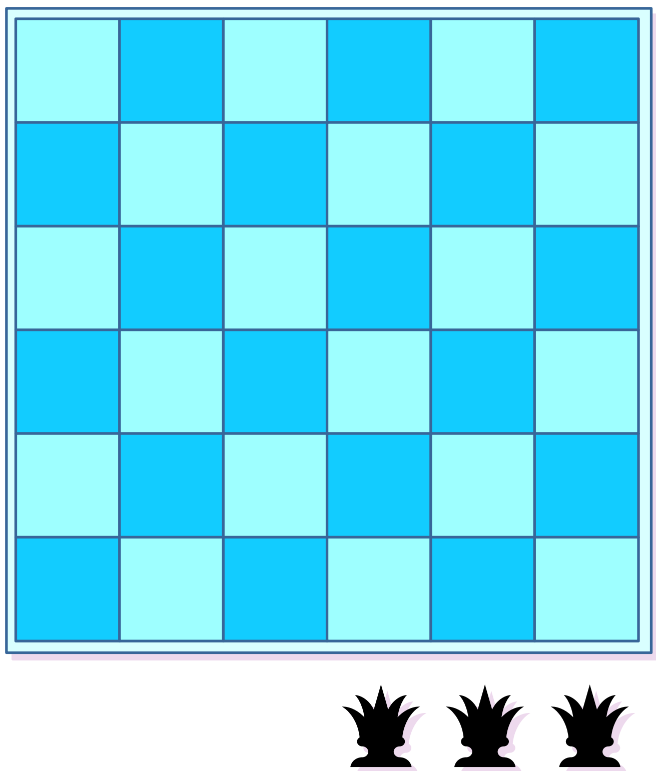




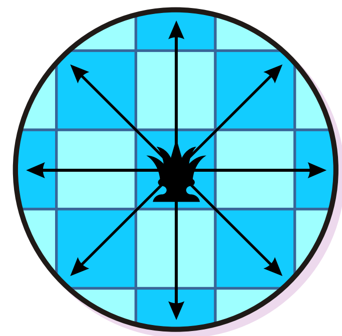
Three Hares (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

Chess 'n' Checkers Puzzles



1



2

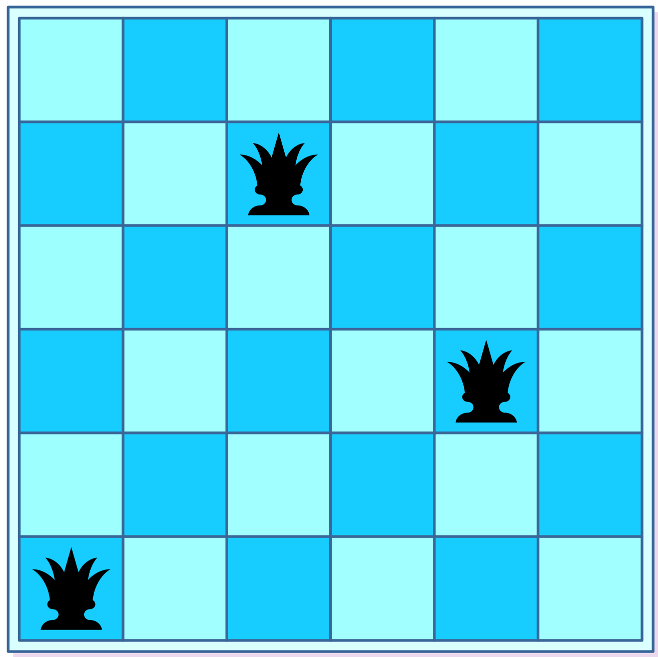
Three Queens

after Martin Gardner

Can you place three chess queens on the 6x6 board shown in Figure 1 above so that all vacant cells are attacked? A vacant cell is considered to be attacked when it is in the same row, column or diagonal with at least one of the queens.

The basic scheme of the chess queen's moves is shown in Figure 2.

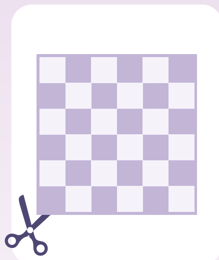
Chess 'n' Checkers Puzzles



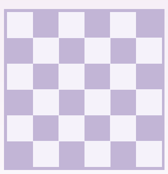
Three Queens (solutions)

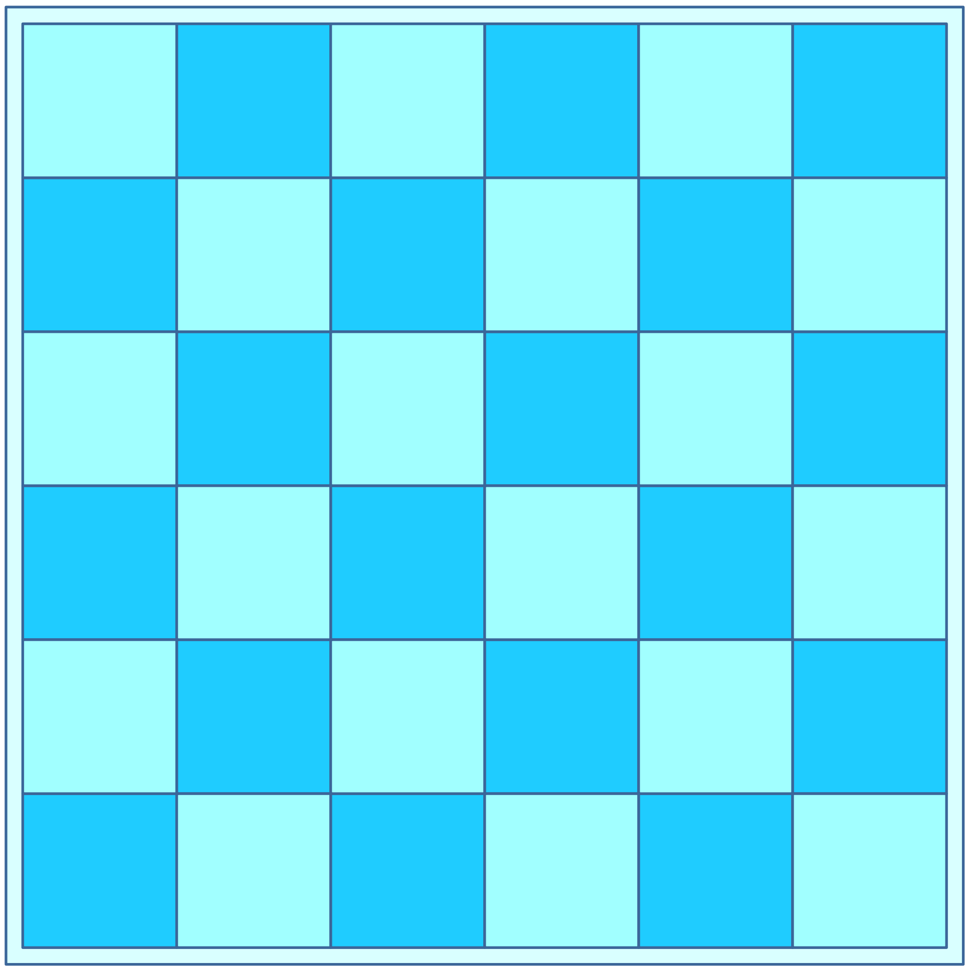
The only basic solution (not counting rotations and reflections) is shown in the illustration.

1



F





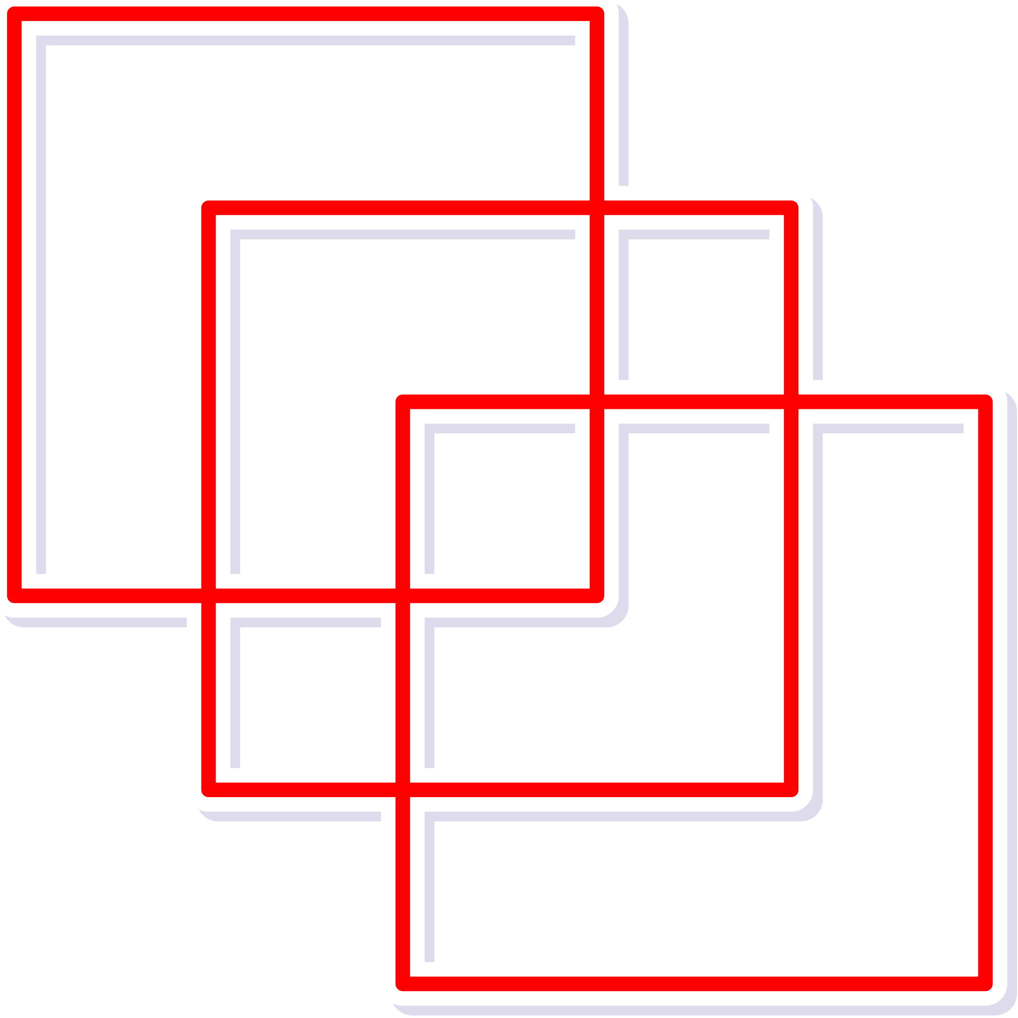
Three Queens (board)

To produce the board first print it out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

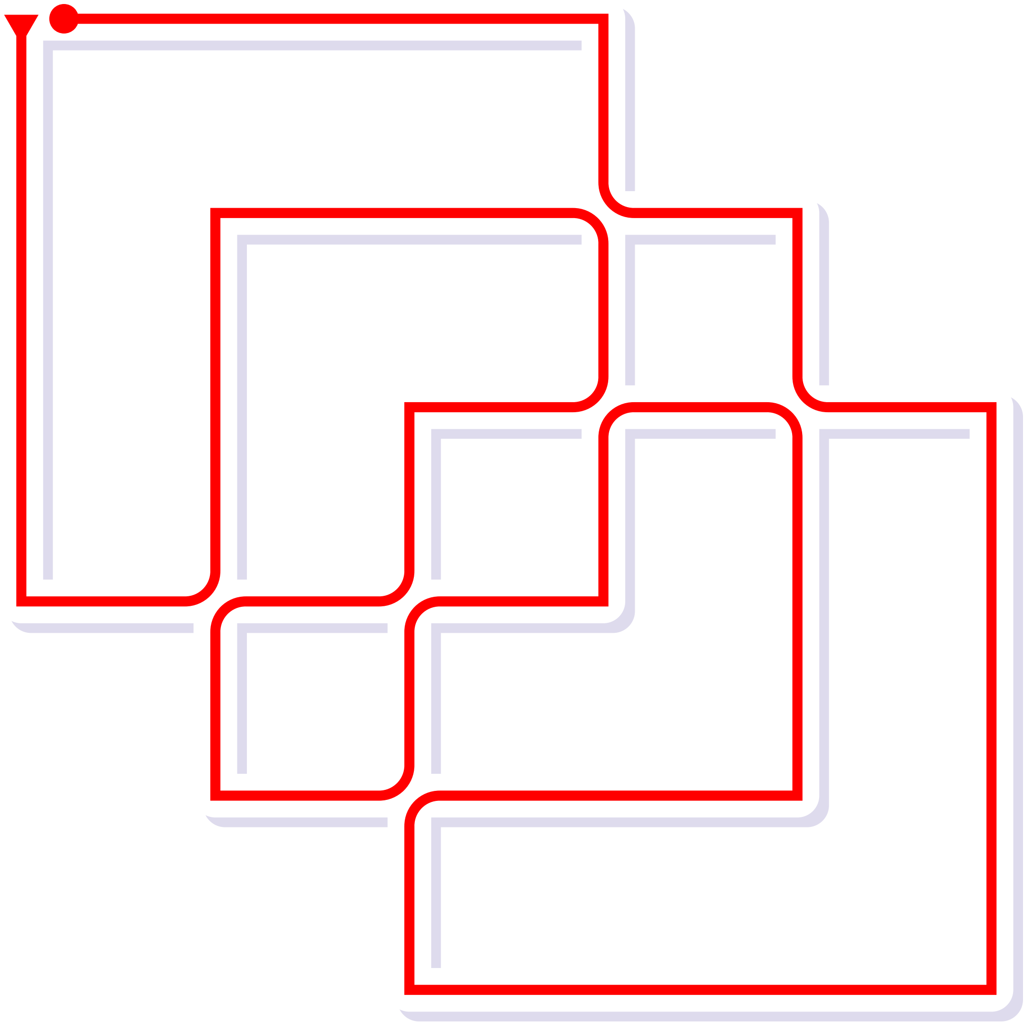
Three Squares 2

by Lewis Carroll

Puzzles.COM

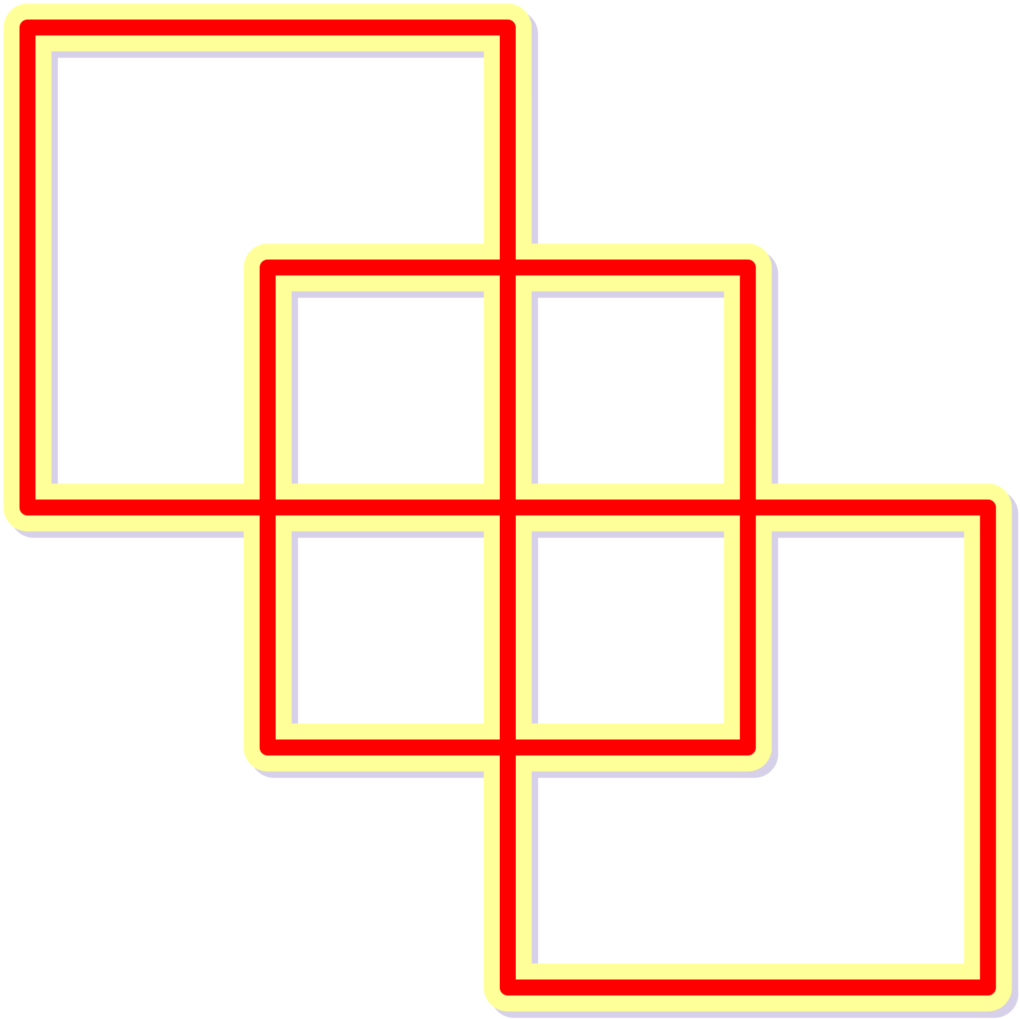


Draw these three interlaced squares without lifting your pencil from the paper and without going over a line twice, and without intersecting any other line.



One of the solutions is shown in the illustration.

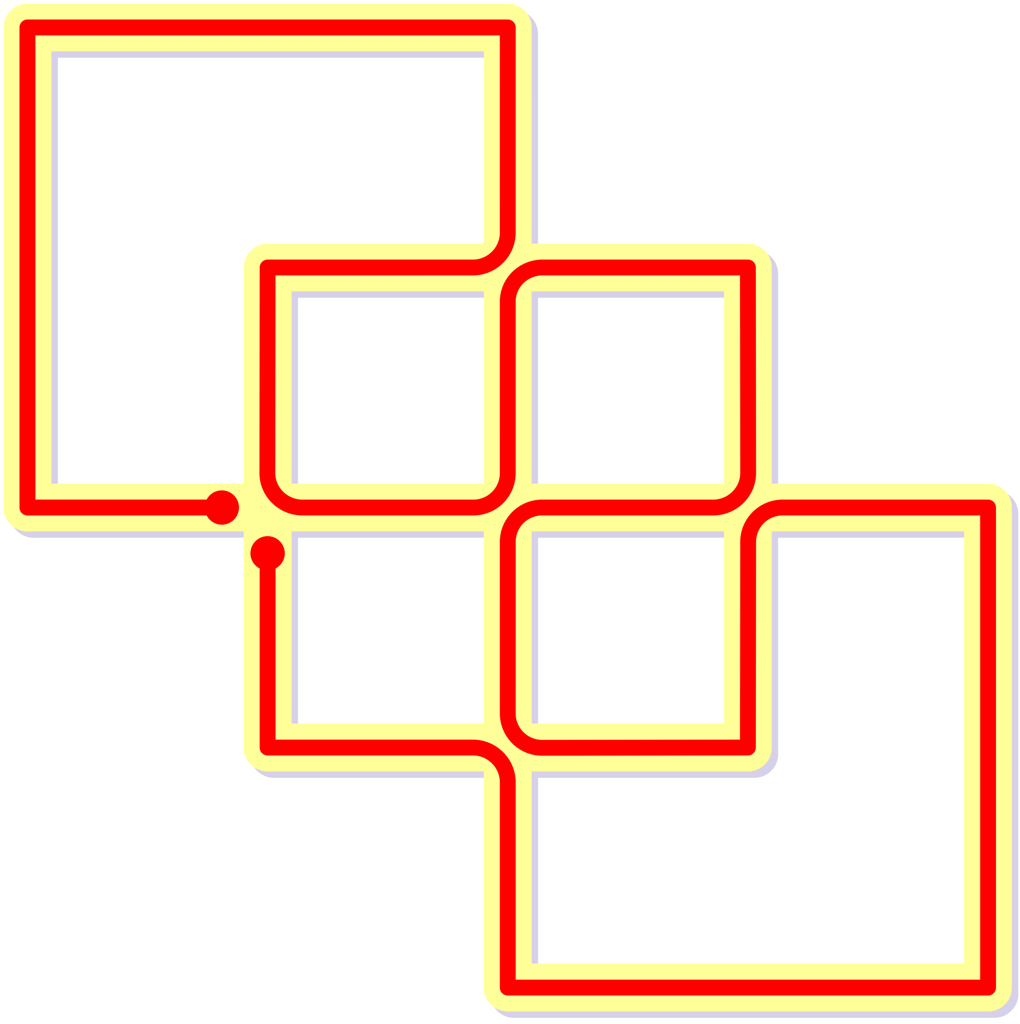
Three Squares
by Lewis Carroll



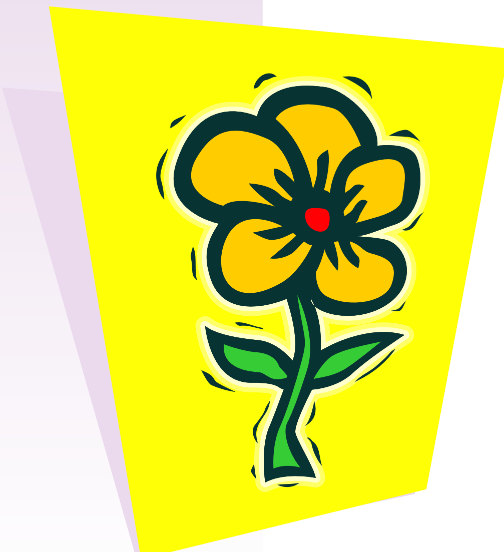
Draw this three crossing square pattern with pencil in one continuous line so that you don't take the pencil point off the paper.

You aren't allowed to go over any part of the line twice, or even cross it.

It may be convenient to print out the pattern and practice directly on it.



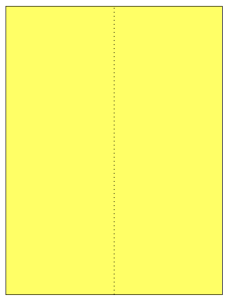
One of the ways to solve this puzzle is shown in the illustration.



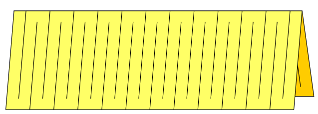
Through the Postcard

after Professor Louis Hoffman

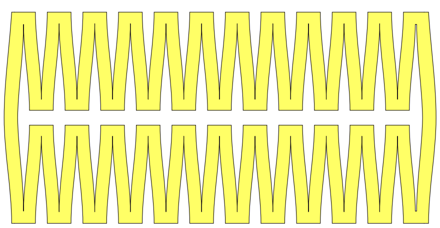
Can you make a hole in a simple postcard so that a person of ordinary stature will be able to pass through it? Do you have any ideas how this may happen?



1



2



3

Through the Postcard (secret)

First get some practice how to perform this cool trick with our printable version of the postcard.

We've prepared both a blank rectangle in size similar to a postcard, and the same rectangle with the appropriate lines to cut along. Print both cards and cut them out.

Now follow the next steps to get the required hole in the postcard.

Step 1. First, we need to make a cut along the line shown on the card in Figure 1. For this fold the postcard along the line in half, and with a pair of scissors cut through the line stopping about a quarter of an inch (approx 6 mm) from each edge.

Step 2. Now make a number of the alternate cuts as shown in Figure 2. The entire pattern of the cuts is shown in the printable version of the rectangle.

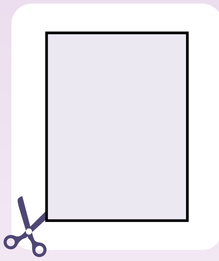
Step 3. Gently open the card; if everything is performed right, you'll see the pattern shown in Figure 3.

Step 4. Open it out still further, until it will form an endless strip of such a size as to pass easily over a person's body.
Make the first try at the rectangle with the lines that show you how to make the cuts. Then take the other, blank, rectangle, and try to repeat all the steps. Practice until you can do the trick very smoothly. Then you're ready to amuse your friends.

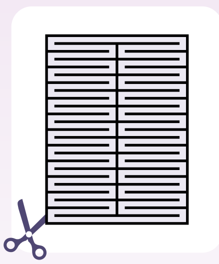
Treasure of Classic and Modern Puzzles

Tricks

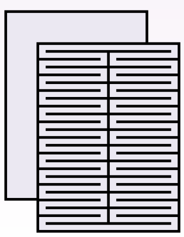
1

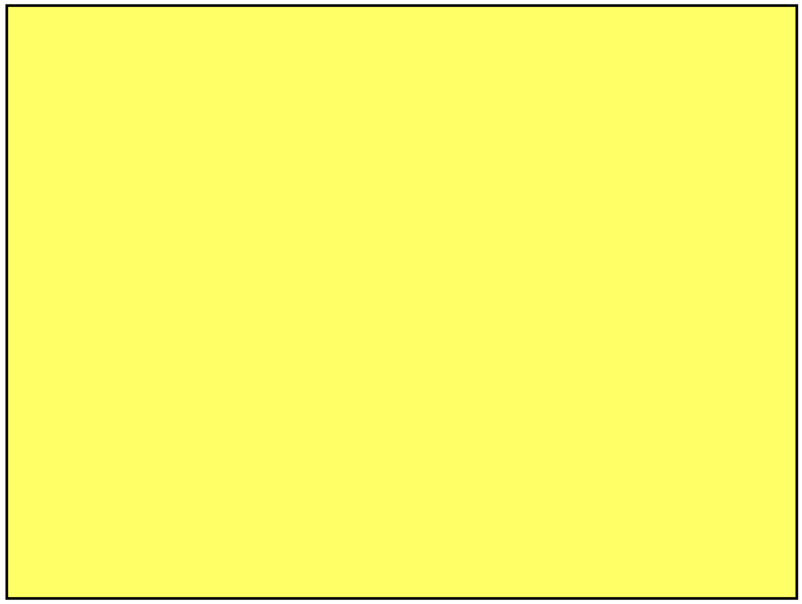


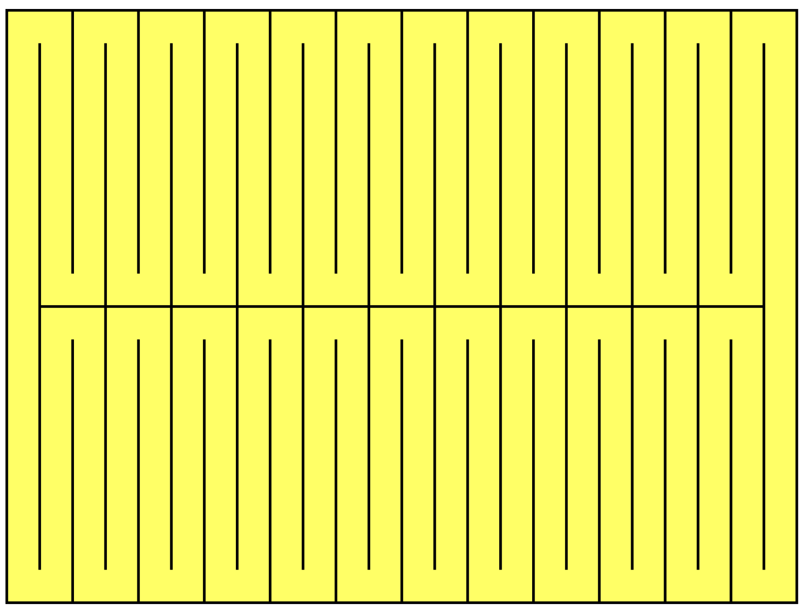
2



F

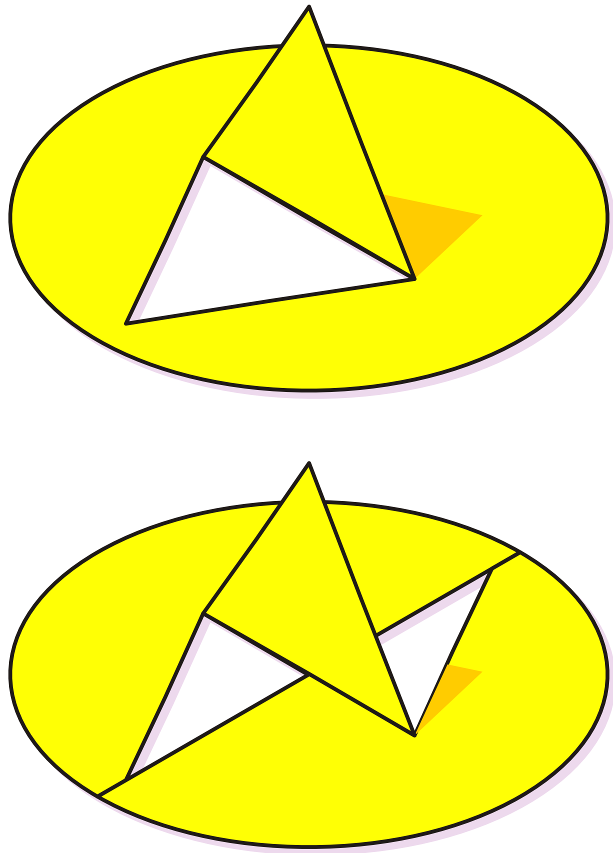






Through the Postcard (postcards)

To produce the postcards first print them out. Then follow the diagram shown in the left column above - from step 1 to step F

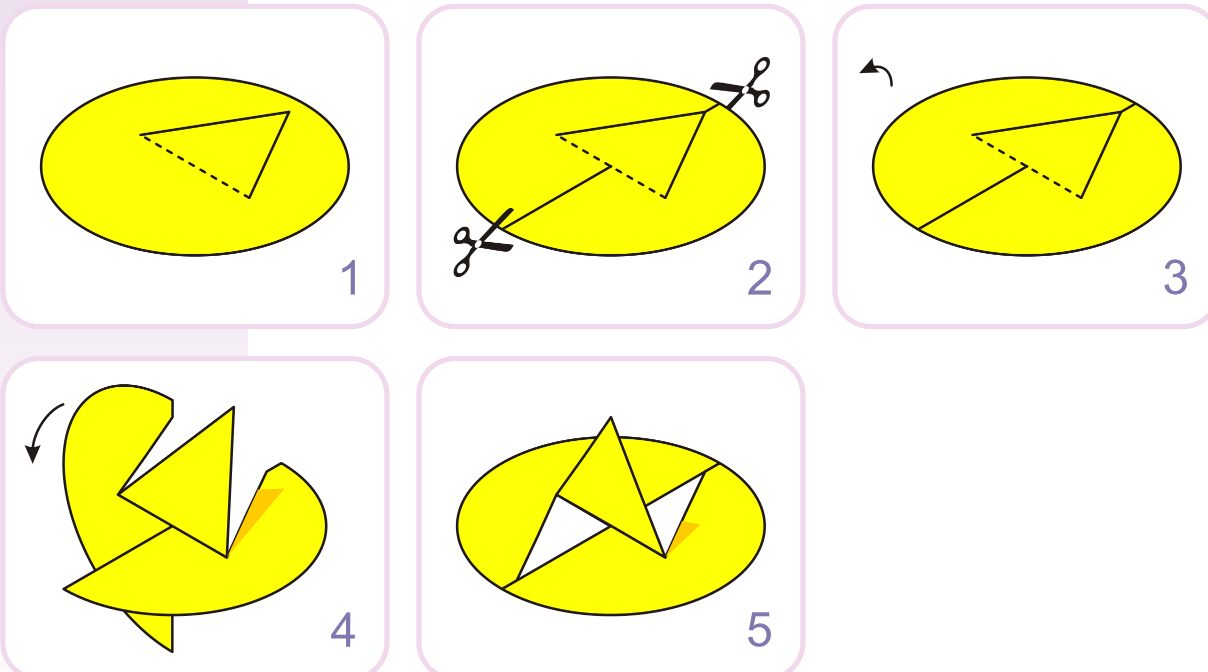


Thumbtacks

by Serhiy Grabarchuk

A well known thumbtack as shown on the top can be obtained from a simple circle and a pattern to it is almost obvious.

But what would you say about a new version shown below it? Do you think it can be also obtained from the same circle? If your answer is "yes", then can you draw a pattern required to make such a thumbtack? Maybe it can be obtained from the pattern of the first one?



Thumbtacks (explanation)

The pattern for the second thumbtack can be obtained from the pattern of the first one with only two extra cuts as shown in Step 2 in the diagram. The additional turnings that have to be done are shown in Steps 3 and 4 with the final thumbtack shown in Step 5.

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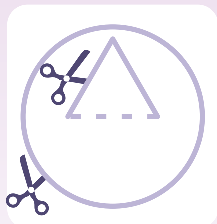
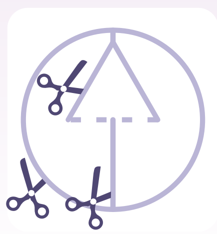
Treasure of Classic and Modern Puzzles

Toys

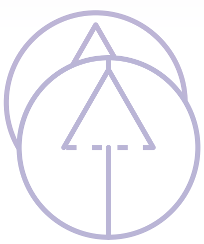
1

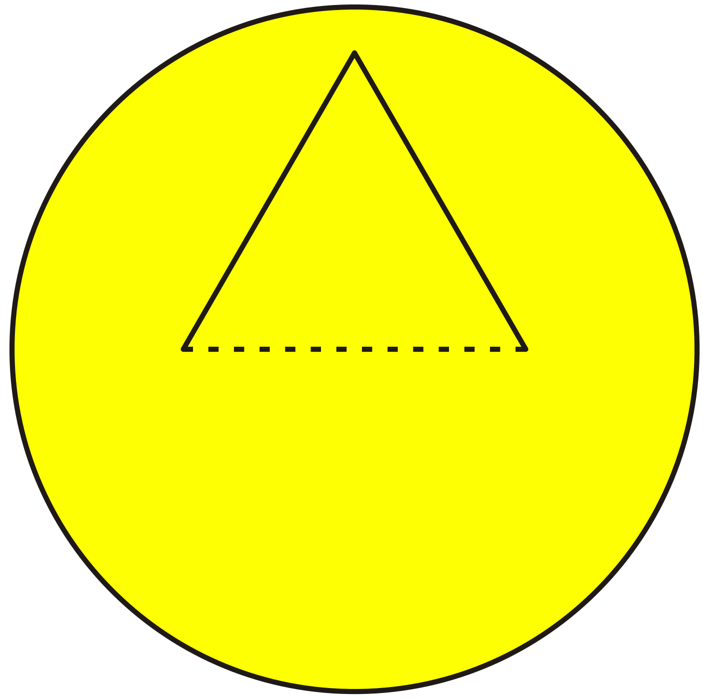


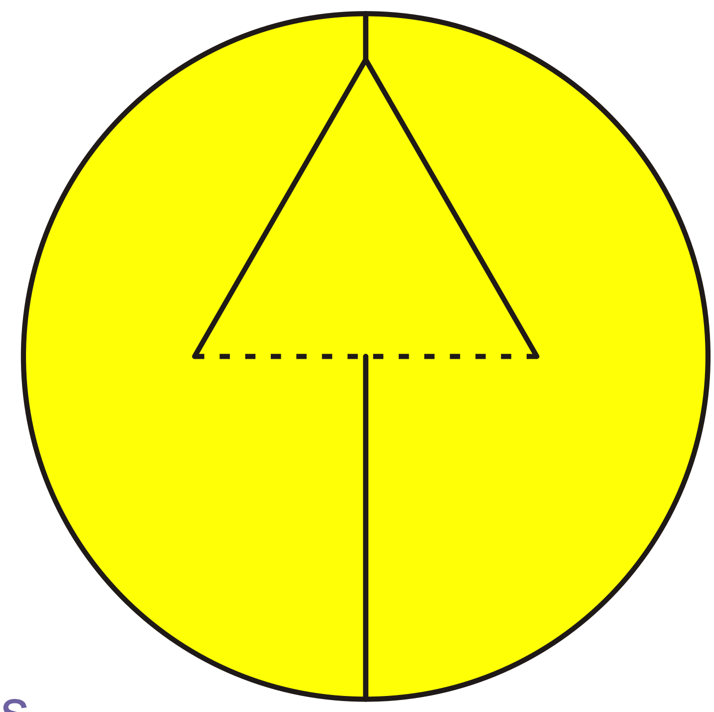
2



F



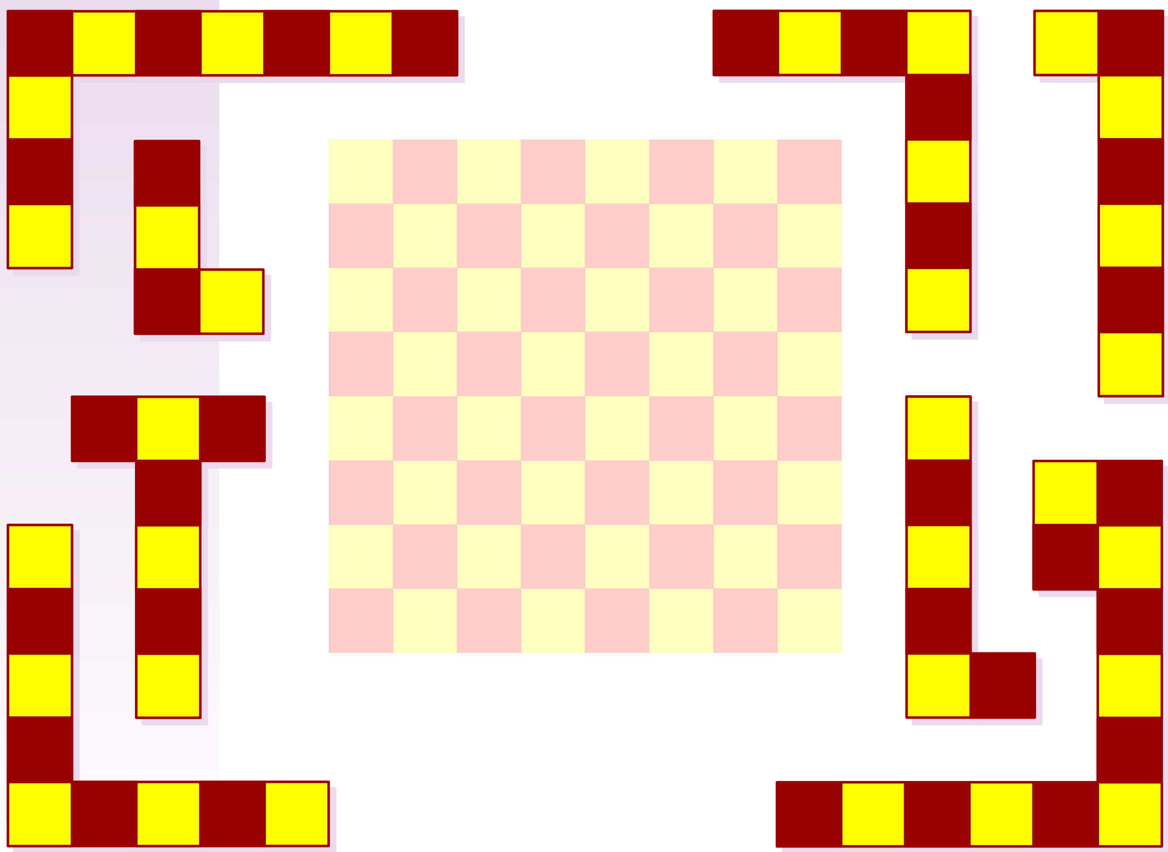




Thumbtacks

To produce the thumbtacks first print them out. Then follow the diagram shown in the left column above - from step 1 to step F

Checkerboard Puzzles

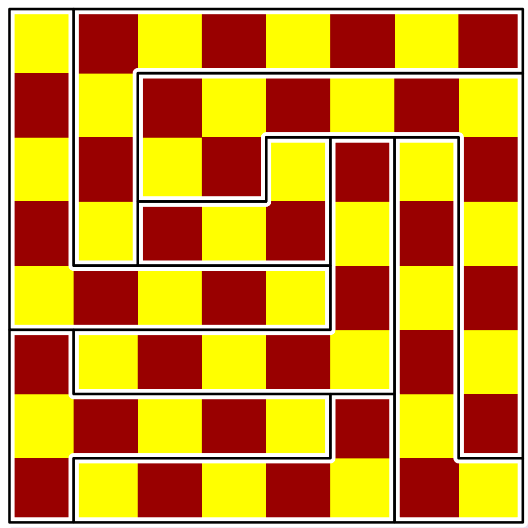


TLs

by Sam Loyd

Rearrange the eight pieces (one T-shape and seven L-shapes) so that to form the 8x8 checkerboard shown in the center of the illustration.

Checkerboard Puzzles

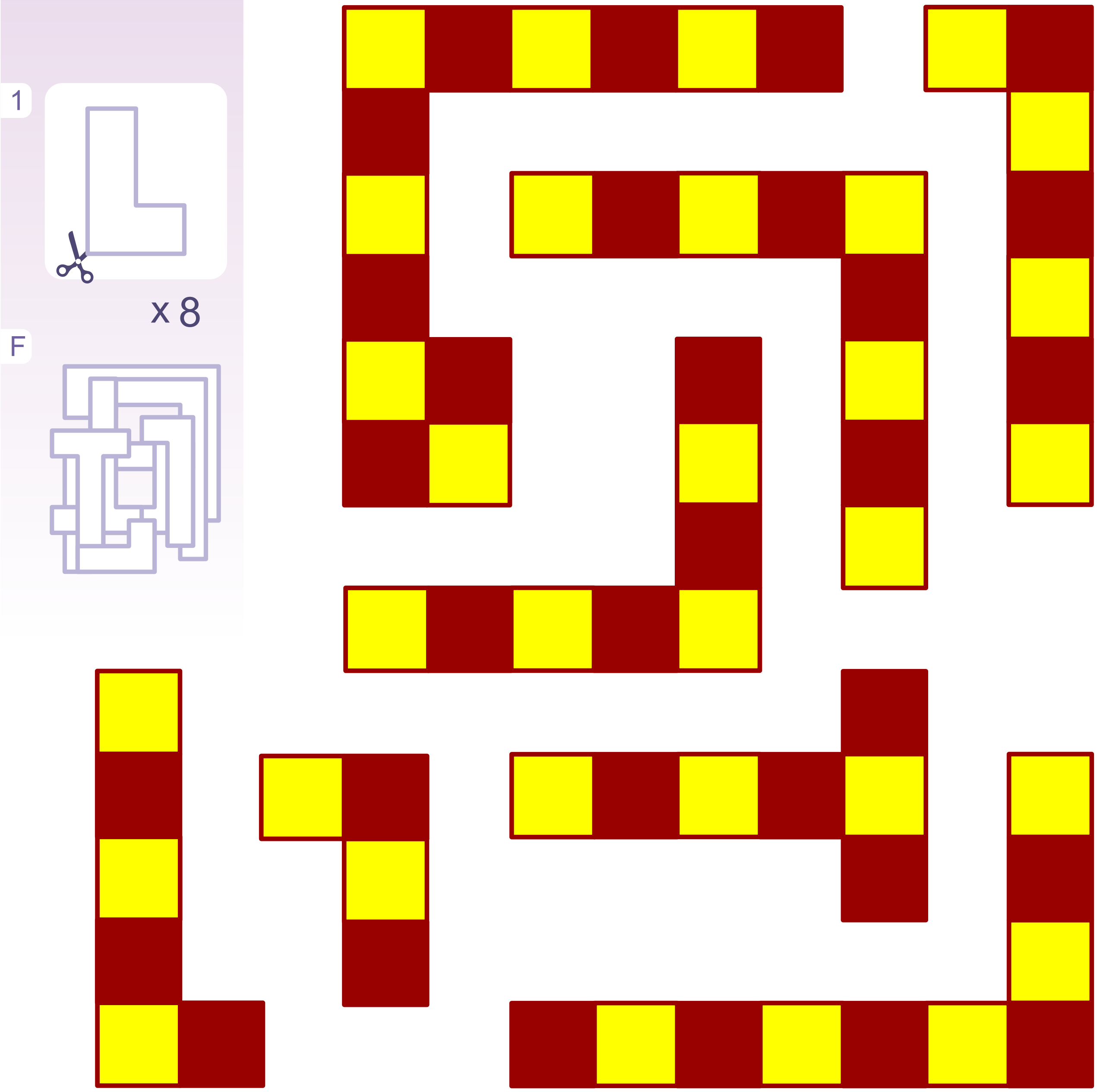


TLs (solution)

The solution is shown in the illustration.

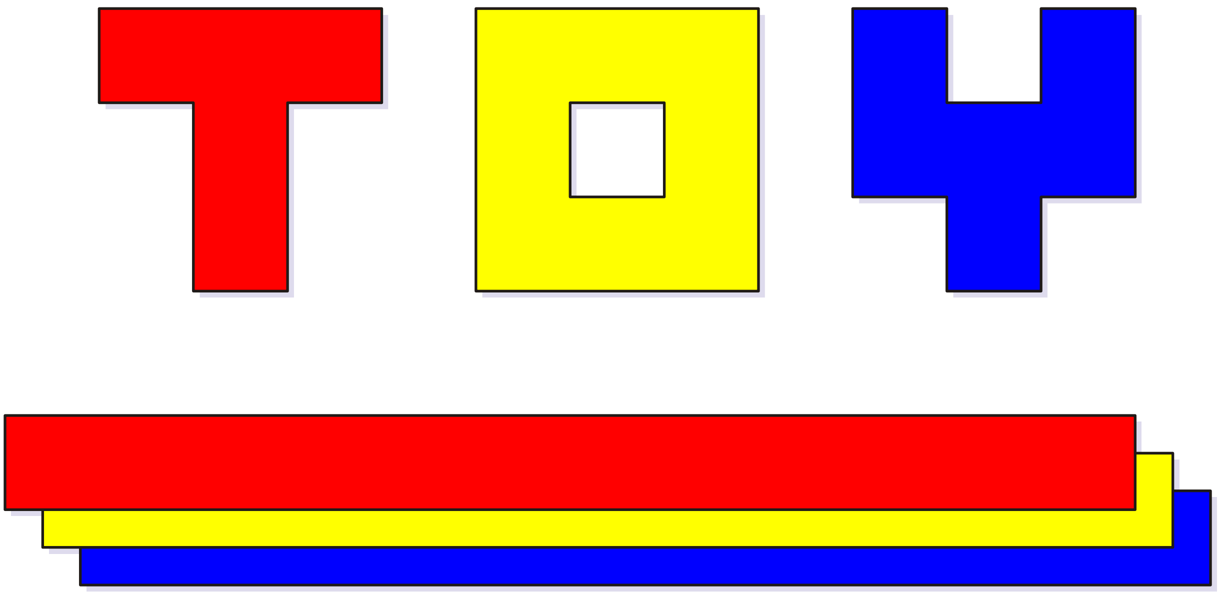
Treasure of Classic and Modern Puzzles

Checkerboard Puzzles



TLs (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

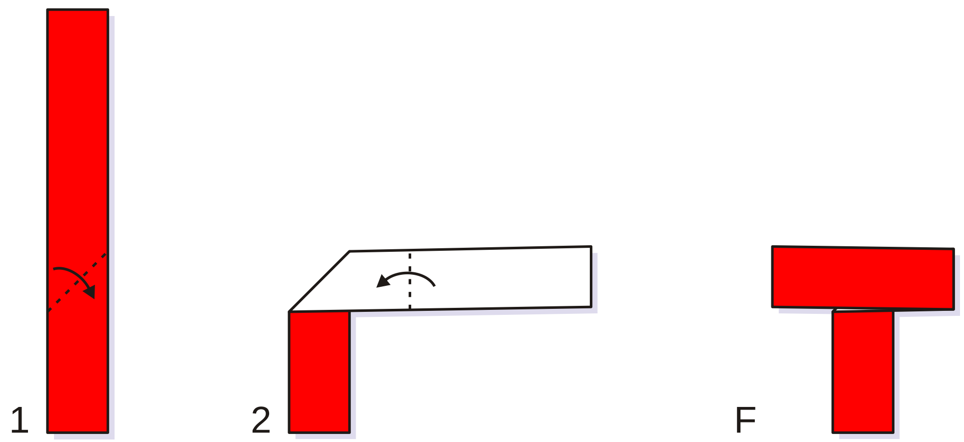


Suppose you have three strips, each colored on one side. The width of each strip is 1 unit and their lengths as long as you need. Using these three Origami strips, can you produce the three letter shapes shown, with their respective proportions, at the top of the illustration, i.e. the "T" letter from the red strip, the "O" letter from the yellow strip and the "Y" letter from the blue one?

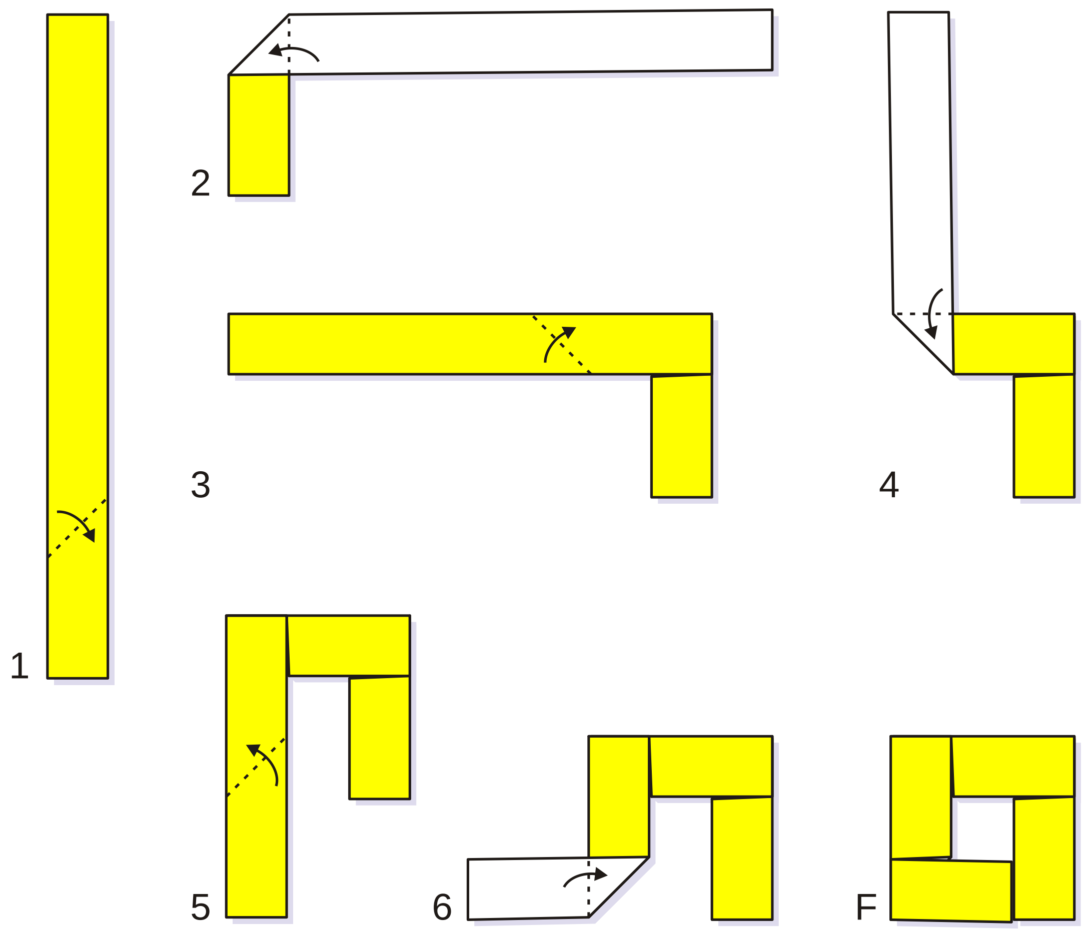
While solving this Origami strip puzzle only simple folds (so-called “book folds”) with no twists or bends are allowed. Note, that during every single fold you can fold only one(!!) single layer of paper at a time. At the same time you can perform such a "single-layered" fold so that after it is done its parts may cover/envelop some other parts of your sign/shape.

Finally, you should see every letter shape as it is shown; its color/white parts may be either plain, or composed of several respective elements.

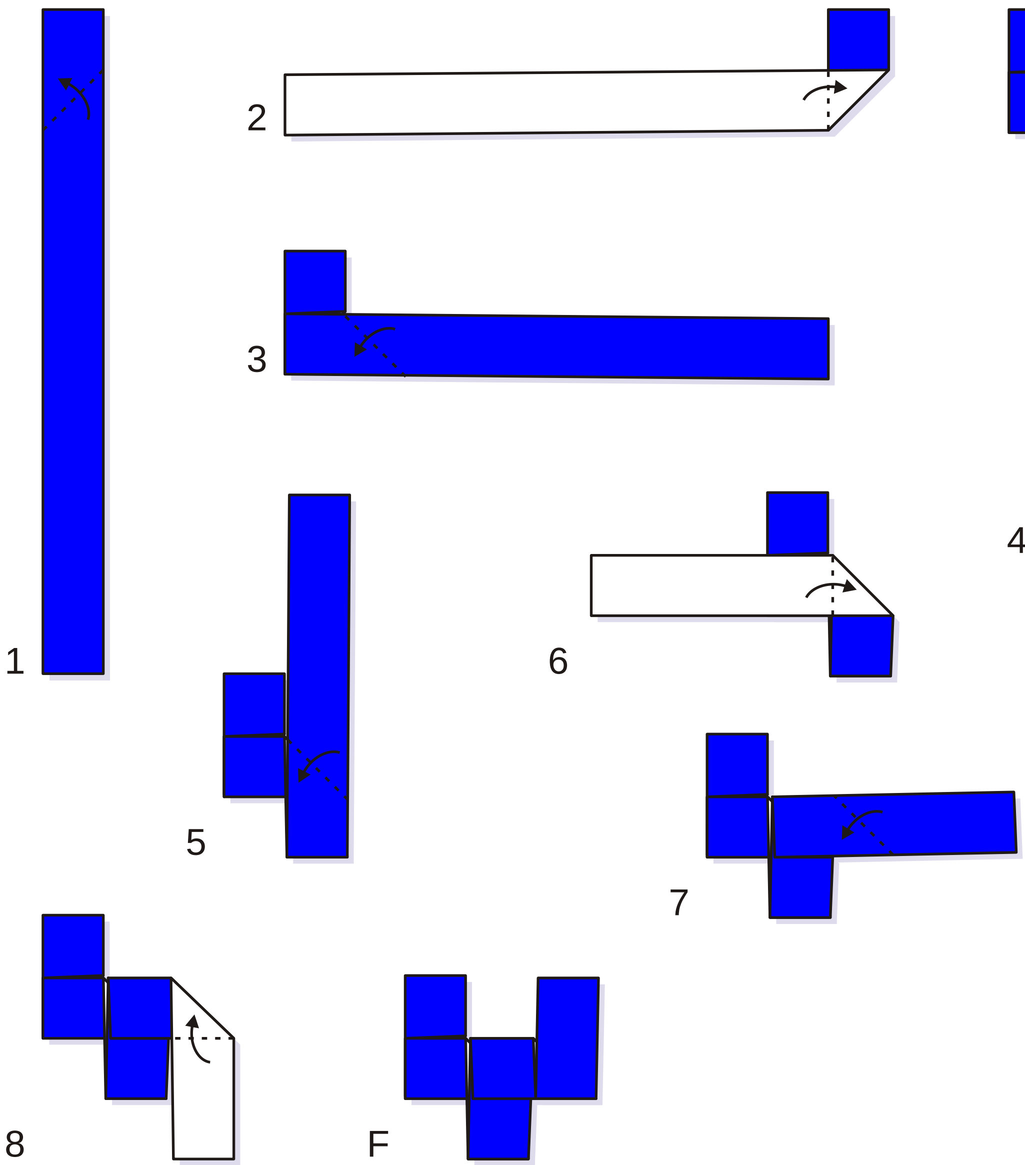
You can mark out, cut off, and precrease your colored paper strips before the final folds as you need, keeping in mind that your main and the only challenge is to achieve each of the three letter shapes in the LEAST number of simple ("single-layered, book") folds. You are not limited in length of used strips, but try to use a strip as short as you can to form every letter. And remember that a strip you use should be always in the form of a narrow rectangle.



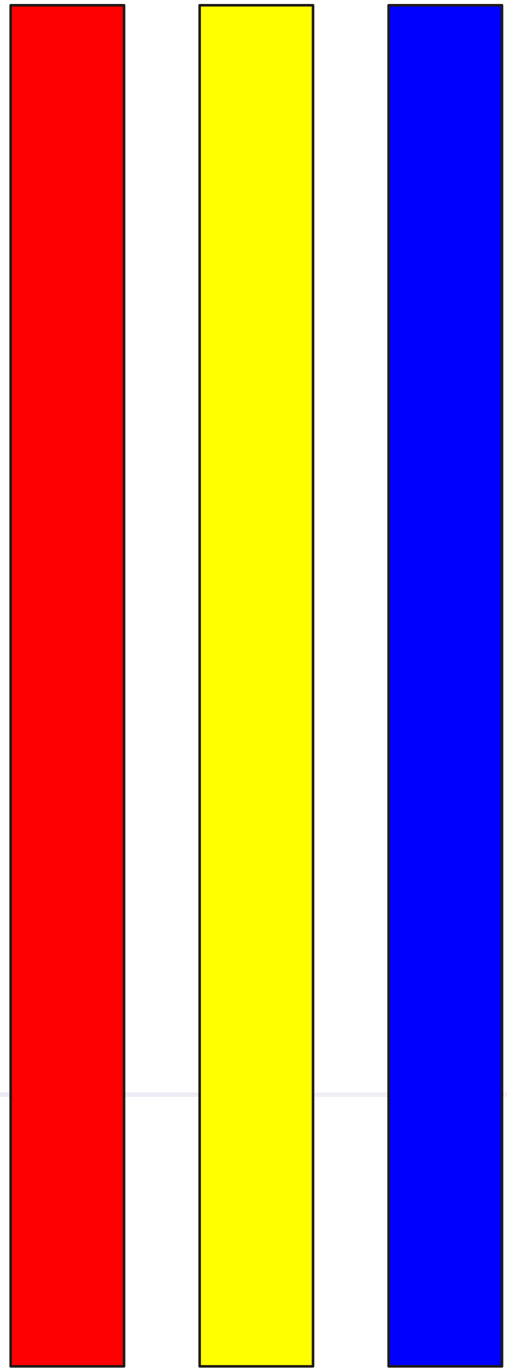
The solution to "T" letter is shown in the illustration.

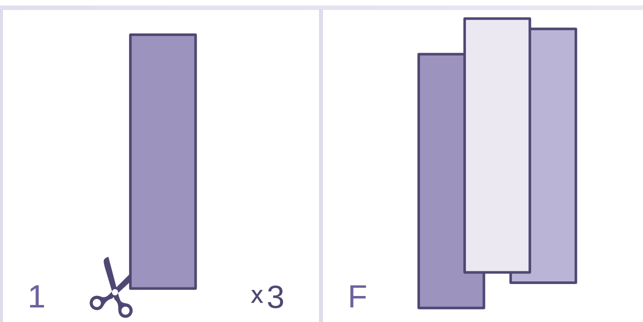


The solution to "O” letter is shown in the illustration.



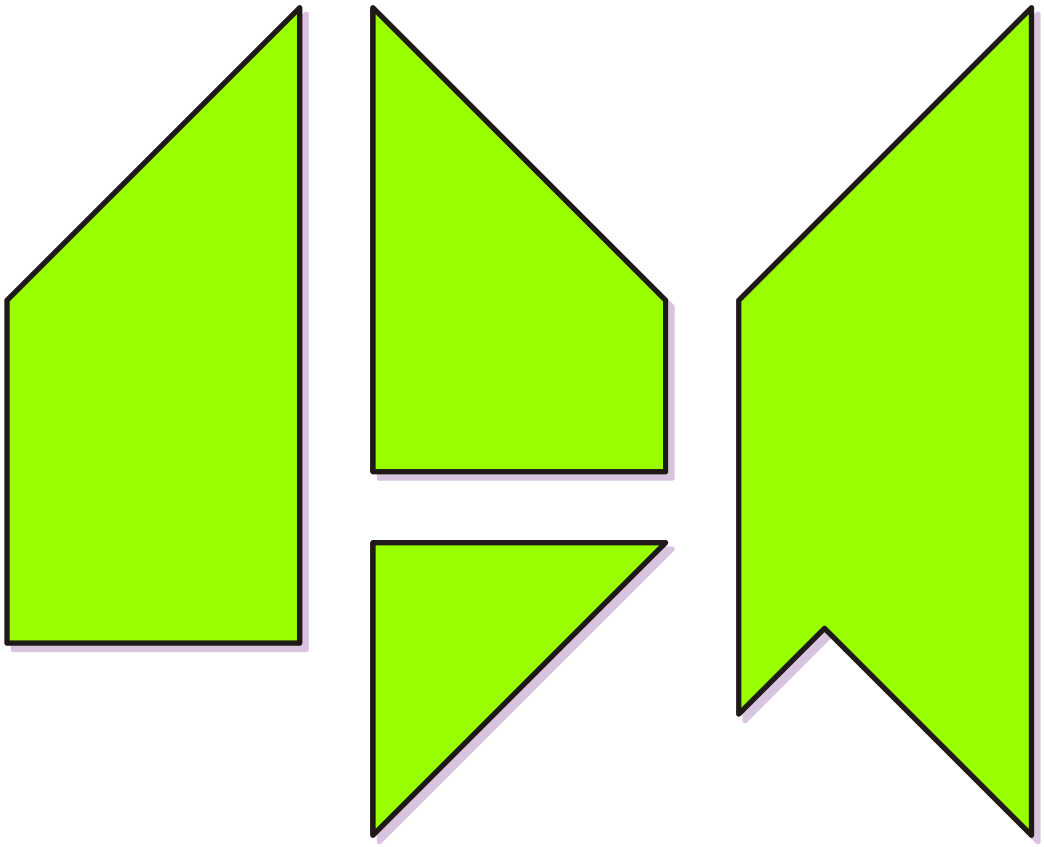
The solution to "Y" letter is shown in the illustration.





To produce the strips first print them out. Then follow the diagram shown above - from step 1 to step F (finish).

Last Updated: January 26, 2006



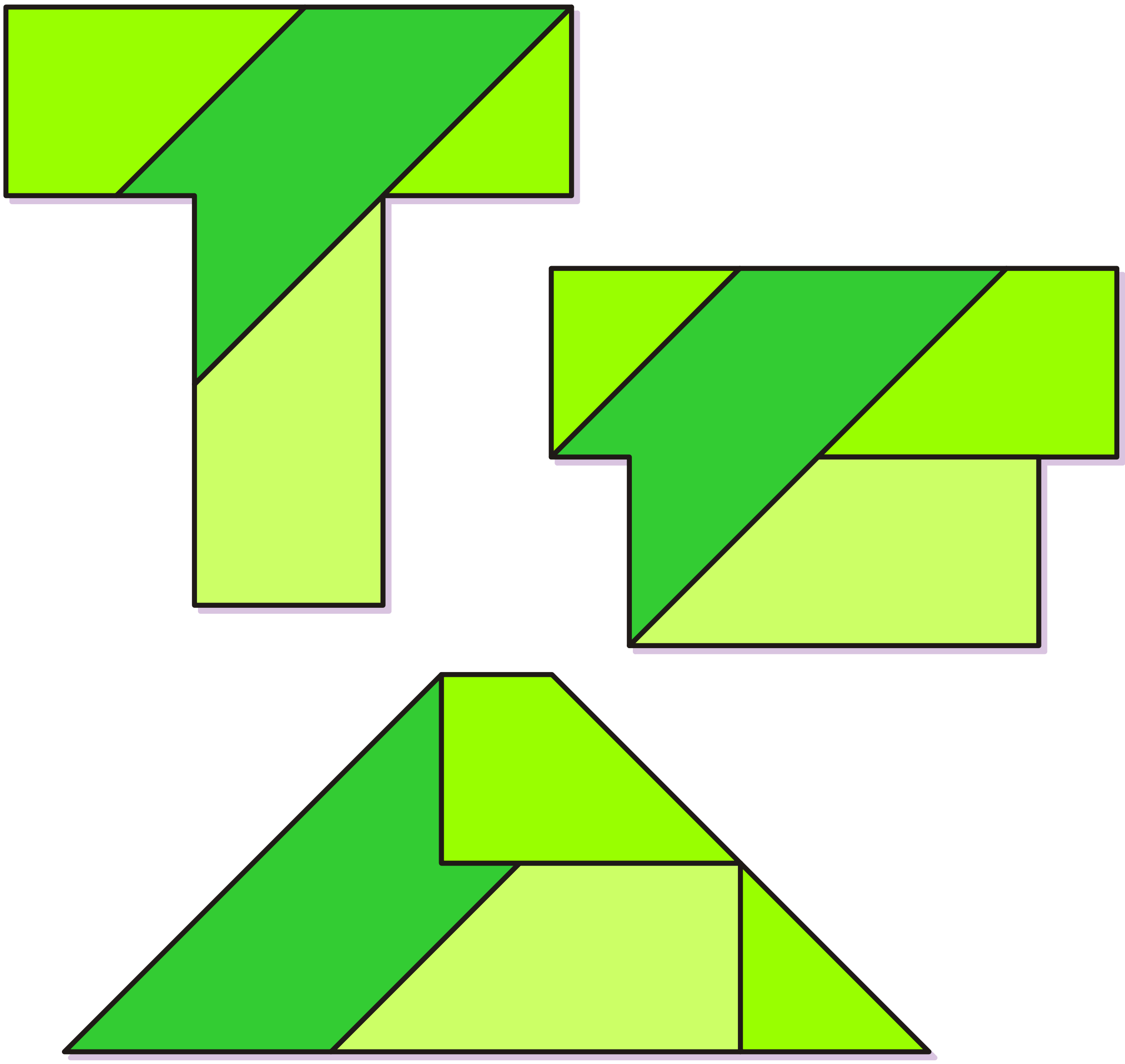
This puzzle dates back to the beginning of the 20th century, and since then it was many times produced as an advertising puzzle.

Print out the four pieces from the last page of this file and then cut them out.

The goal is to make of these four pieces a symmetric capital T. You're allowed to rotate the pieces as you wish and even turn them over, but they must not overlap each other in the final letter.

In fact there are two symmetric capital T letters that you can get from these pieces. Try to find both of them.

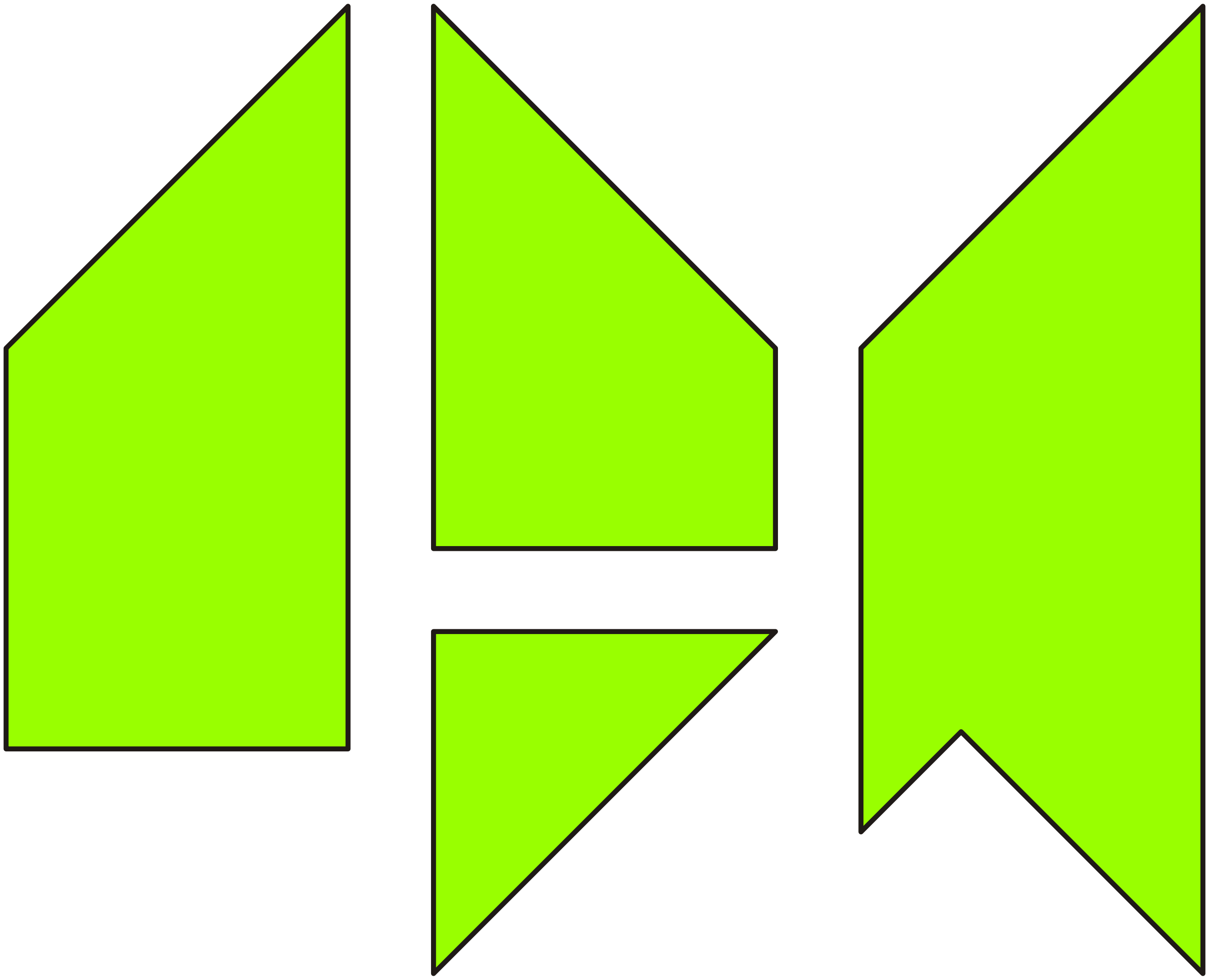
By the way, there is at least one more extra symmetric shape that can be formed from this set - isosceles trapezoid. Can you find it too?

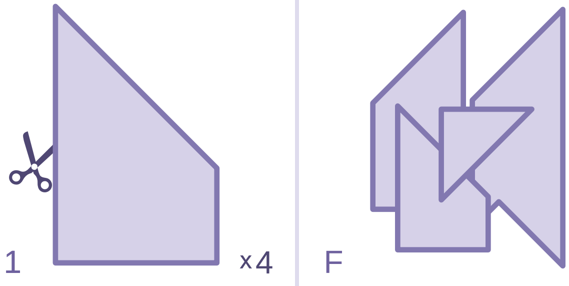


The solutions to all the three shapes are shown in the illustration.

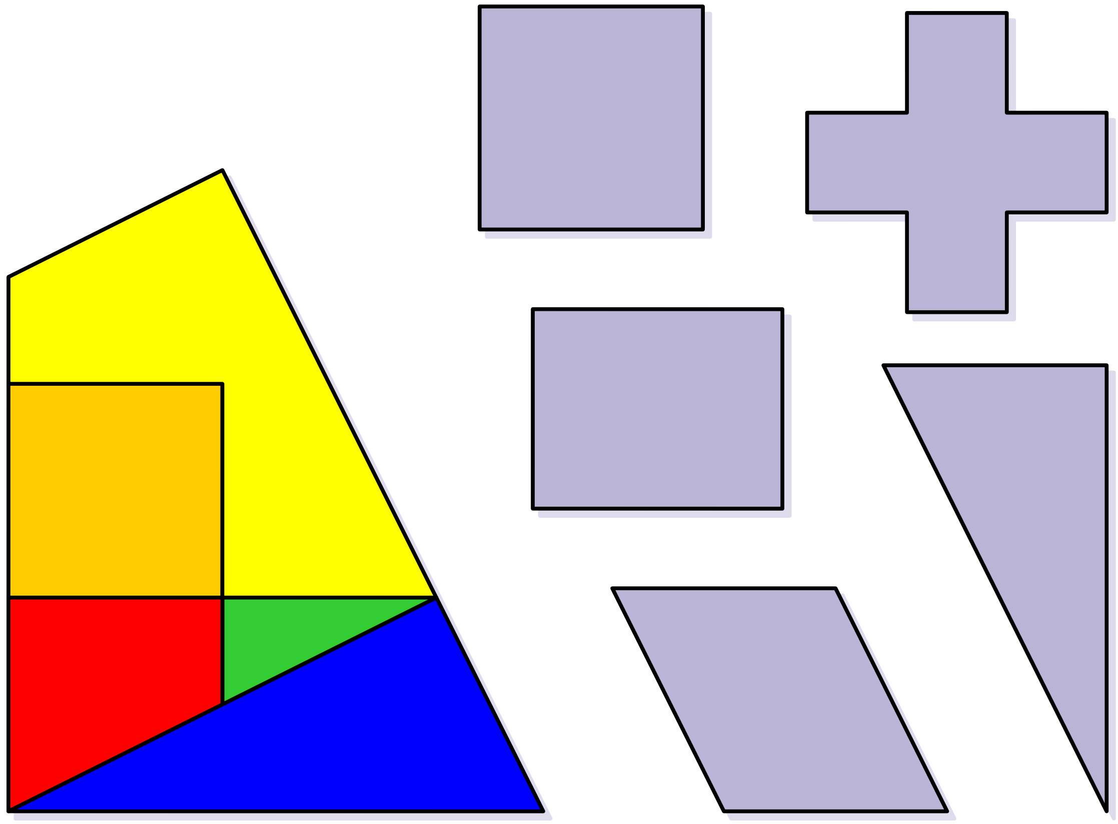
The "Fat" T (top right diagram) was found by Manuel R. Pablo from Washington, D.C. The trapezoid (bottom diagram) known as the "Teezer" puzzle was made in 1975 by Hoi Polloi, New York City.

The "Fat" T and the "Teezer" puzzle were described by Martin Gardner in his famous puzzle column in the Scientific American magazine along with the classic solution.





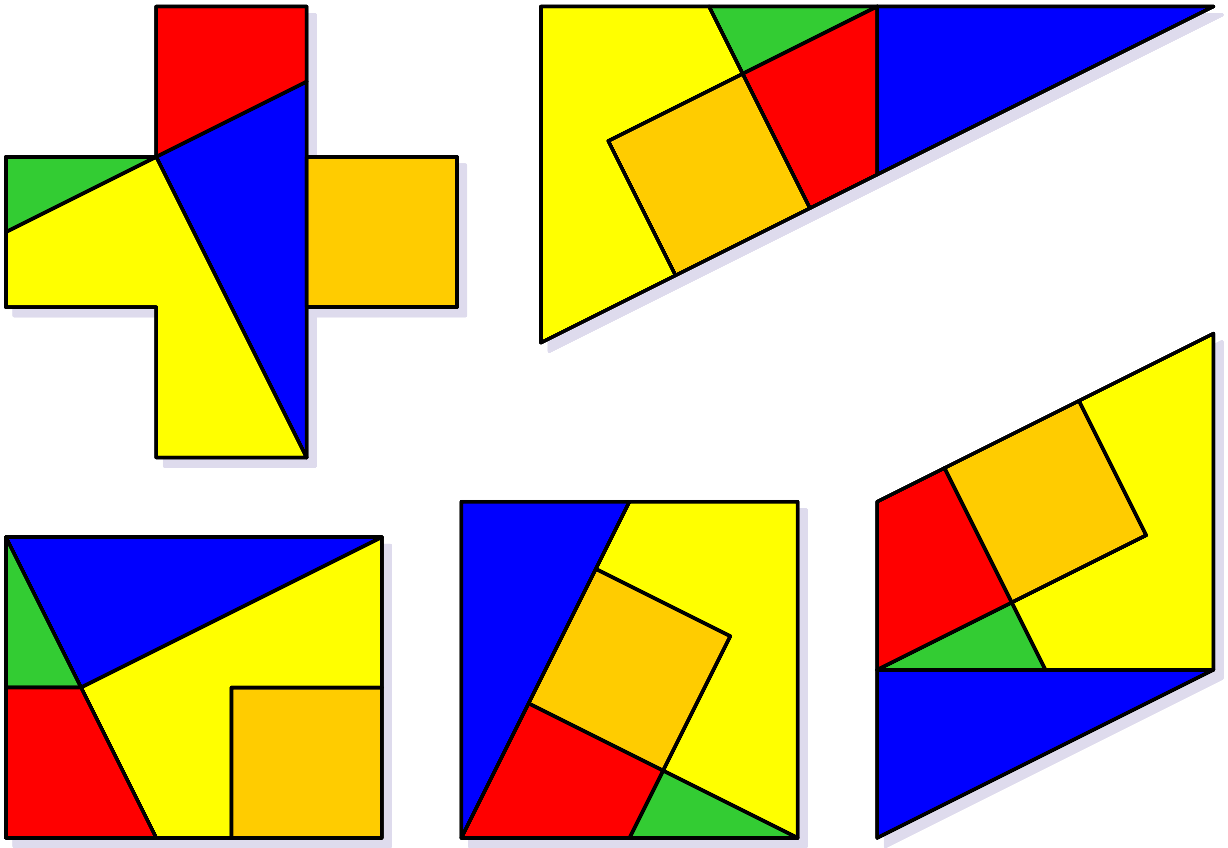
To produce the pieces first print them out. Then follow the diagram shown above - from step 1 to step F (finish).



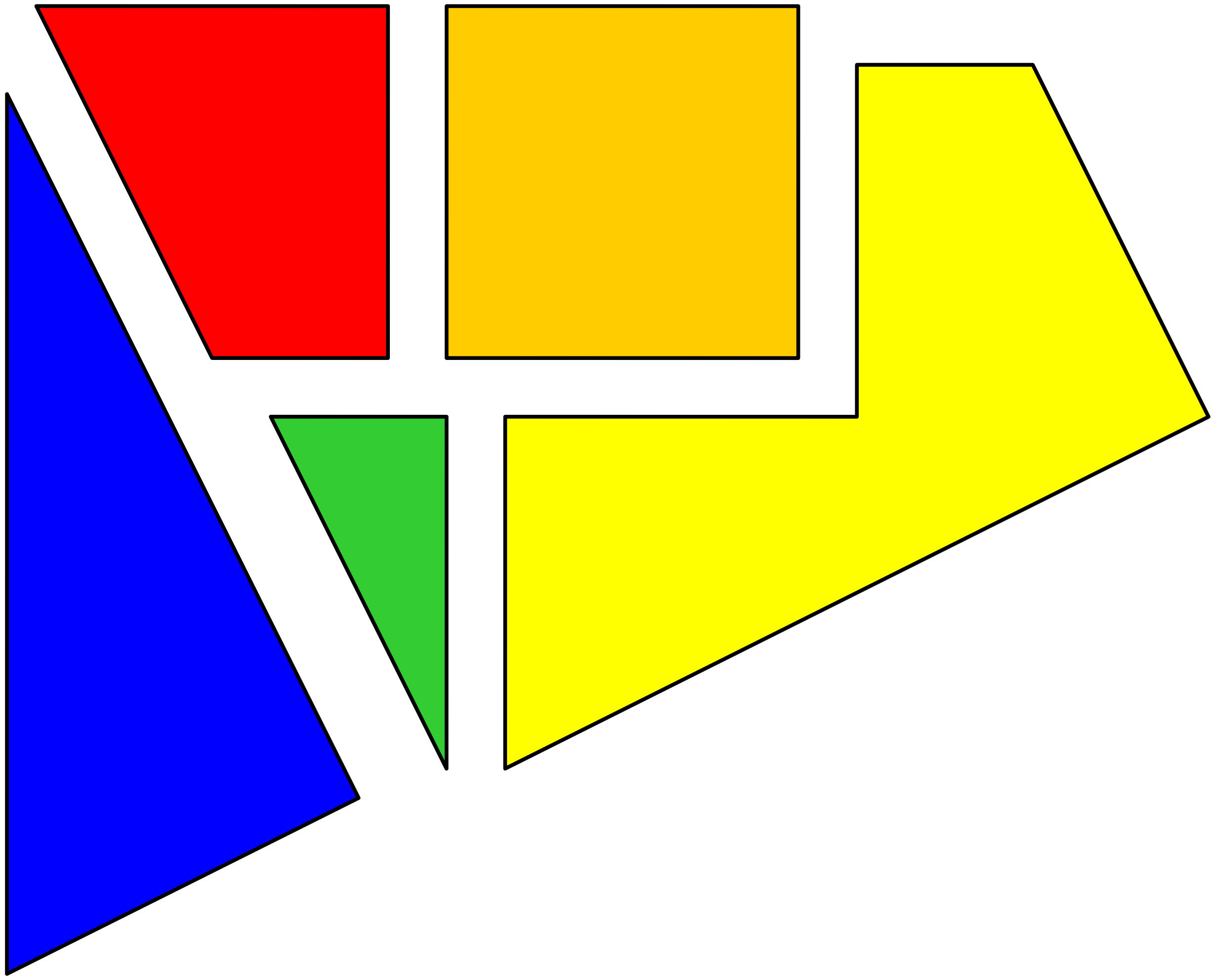
A trapezium shape can be interestingly divided into five pieces as shown in the illustration.

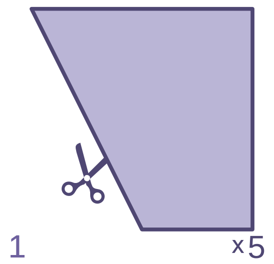
Can you, rearrange the pieces and then put them all together to form:
1. A square.
2. Greek cross.
3. A diamond.
4. A rectangle.
5. A right-angle triangle.

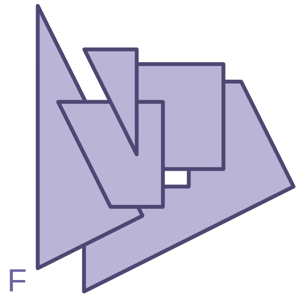
All these five shapes are shown as small silhouettes scattered around the central shape in the illustration. For each shape all pieces have to be used. The pieces can be rotated and/or turned over but not overlapped.



All five solutions are shown in the illustration.

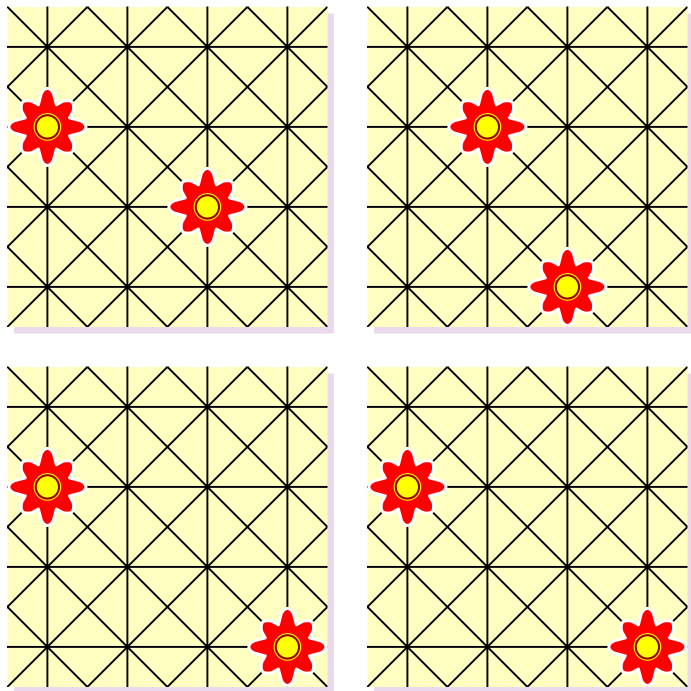






To produce the pieces first print them out. Then follow the diagram shown above - from step 1 to step F (finish).

Matching Cards



The Treasure at Medinet

after Professor Louis Hoffmann

One legend says that there was an Eastern prince, Haroun al Elim, who made a number of roads crossing his kingdom and built eight fortresses so that no two of them were on the same road.

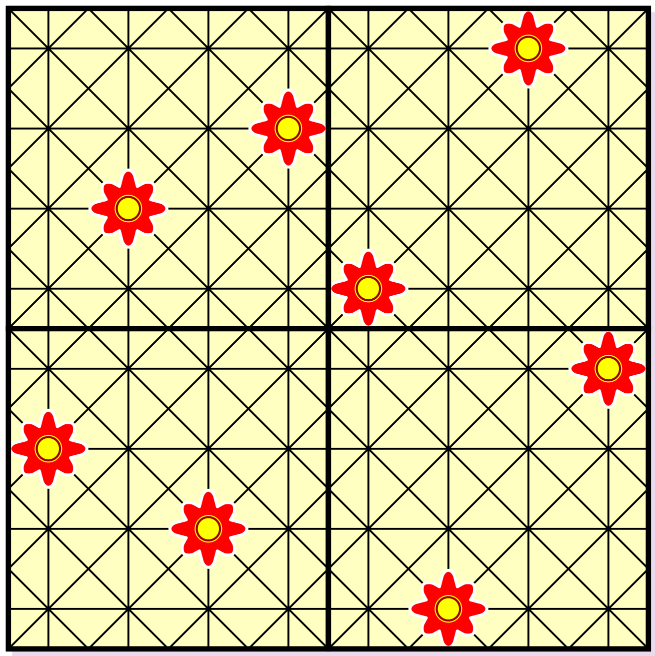
A map of that kingdom - unfortunately, divided into four square fragments - was preserved in the Mosque Al Redin, at Medinet, on the coast of the Red Sea. And there was some reward - a treasure of ancient jewellery - to anyone who will restore the original positions of the fragments.

It's an ancient story. Now those castles are in ruins, and the roads aren't traceable anymore...

But we have copies of all the four square fragments with the roads and the eight fortresses (red marks) - see the illustration above. First print these fragments and cut them out.

Now try to solve that old challenge. The object is to arrange four squares into a bigger one so that no more than one red mark is placed in each line running across the big square horizontally, vertically or diagonally.

Matching Cards



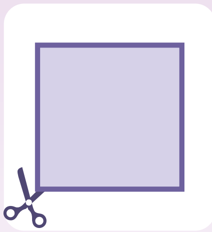
The Treasure at Medinet (solution)

The solution to this puzzle is shown in the illustration.

Treasure of Classic and Modern Puzzles

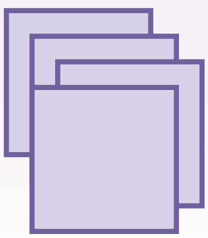
Matching Cards

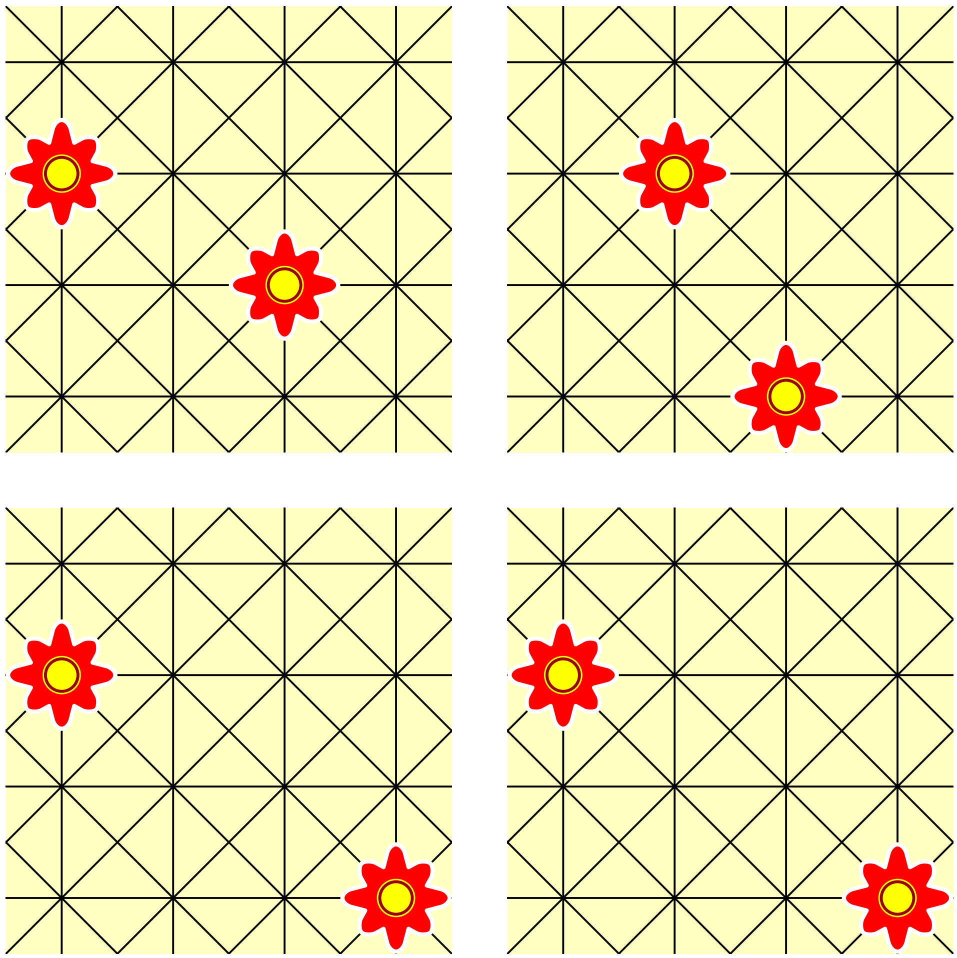
1



x 4

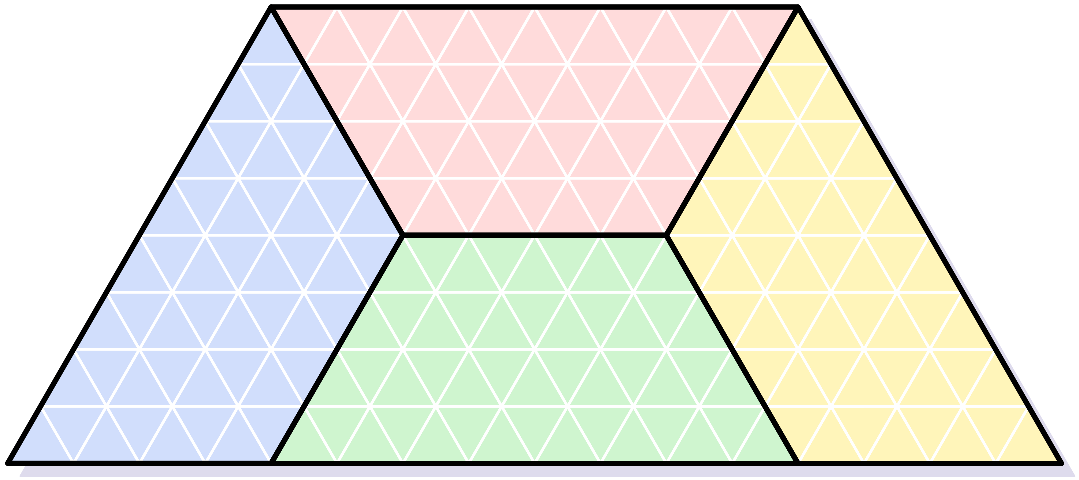
F





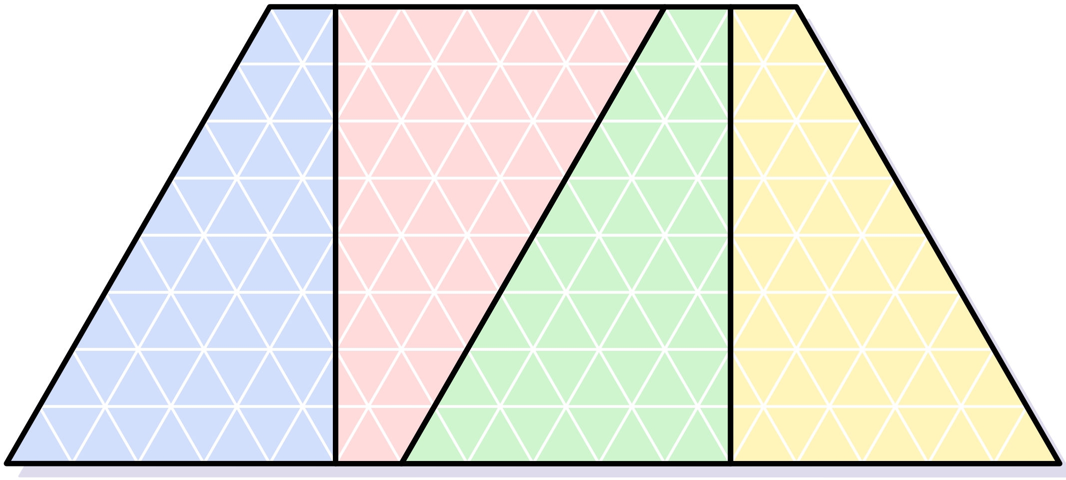
The Treasure at Medinet (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).



The trapezoid shown in the illustration is called a triamond, or an order-three polyiamond, because it can be formed by joining three equilateral triangles.

The challenge is to cut the triamond into four congruent parts. The illustration gives the traditional solution. But it is said there can be different solution found. Though in that solution all four regions do not have the same shape as the larger figure, but they are identical (the parts may be turned over). Can you discover that new solution?

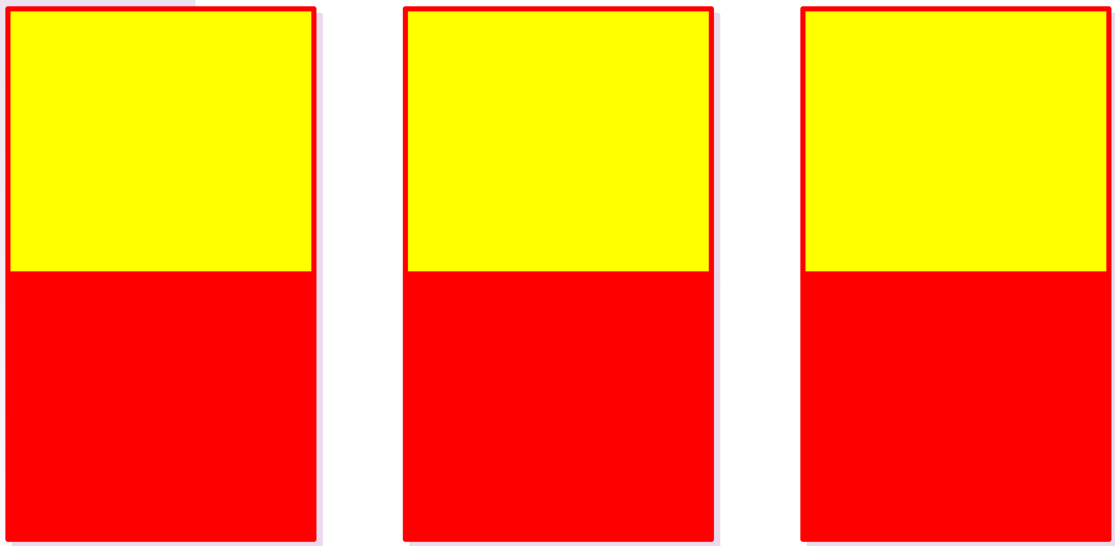


The solution is shown in the illustration.

The original solution with four trapeziums is from Harold R. Jacobs' Geometry (W. H. Freeman and Company, 1974, page 188).

The new solution had been found by Andrew Miller.

Folding Puzzles



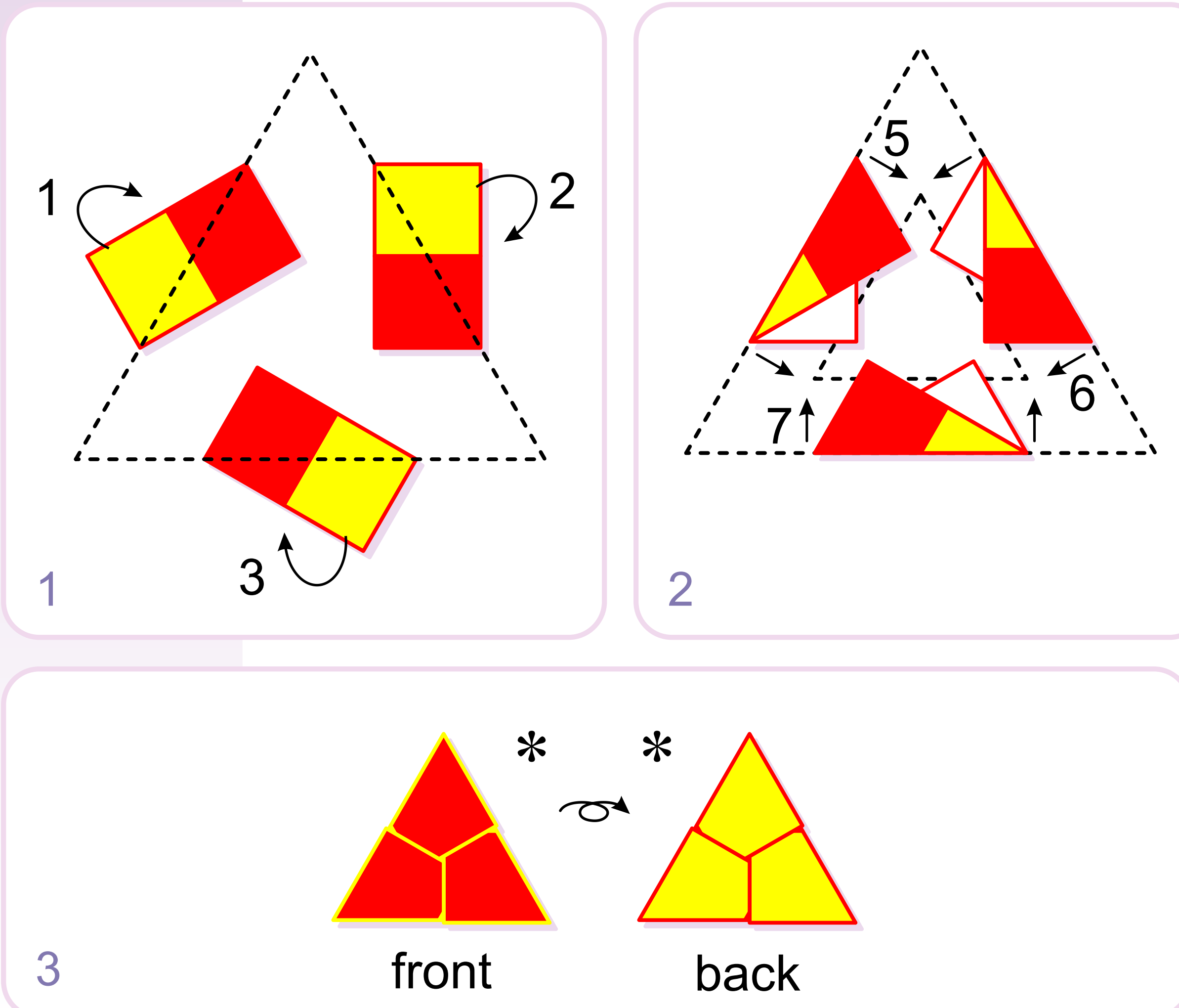
Triangle Folds

by Serhiy Grabarchuk

The object of the puzzle is to make of these rectangles an equilateral triangle colored fully in red on one side and fully in yellow - on the other.

One additional rule is that you're allowed to make just one simple fold for each rectangle.

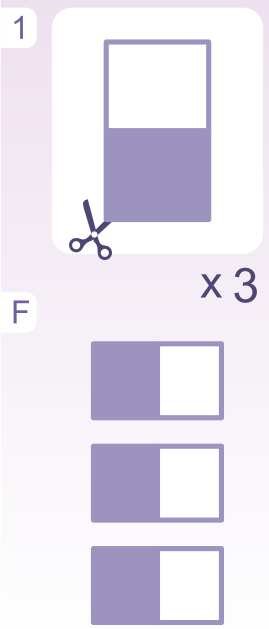
Folding Puzzles

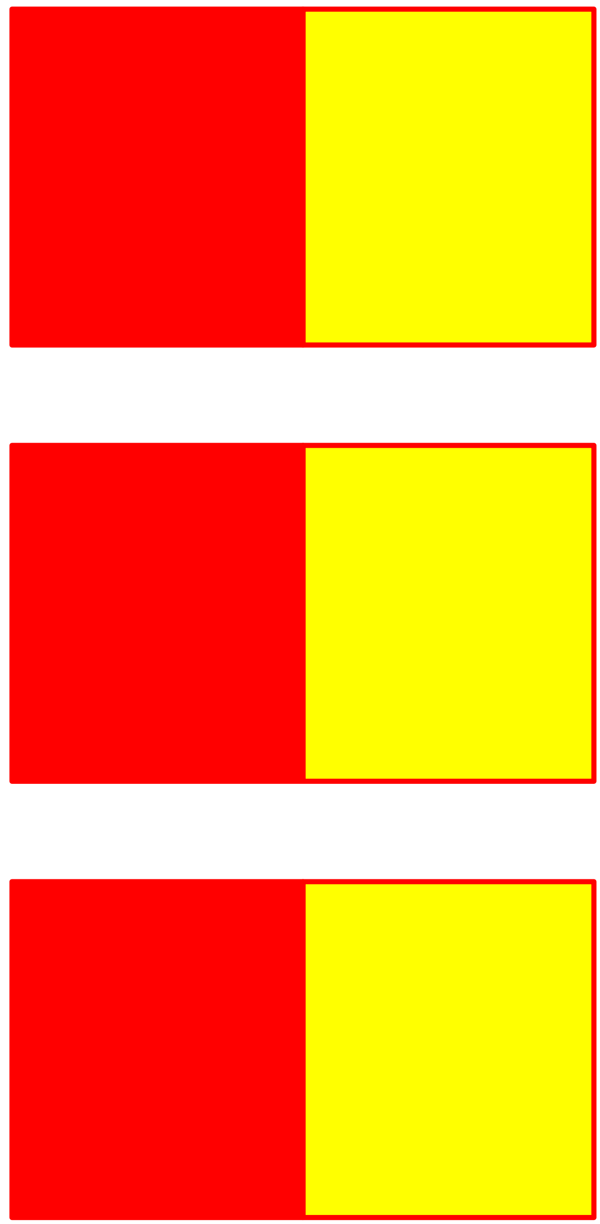


Triangle Folds (solution)

The scheme of the solution is shown in the illustration.

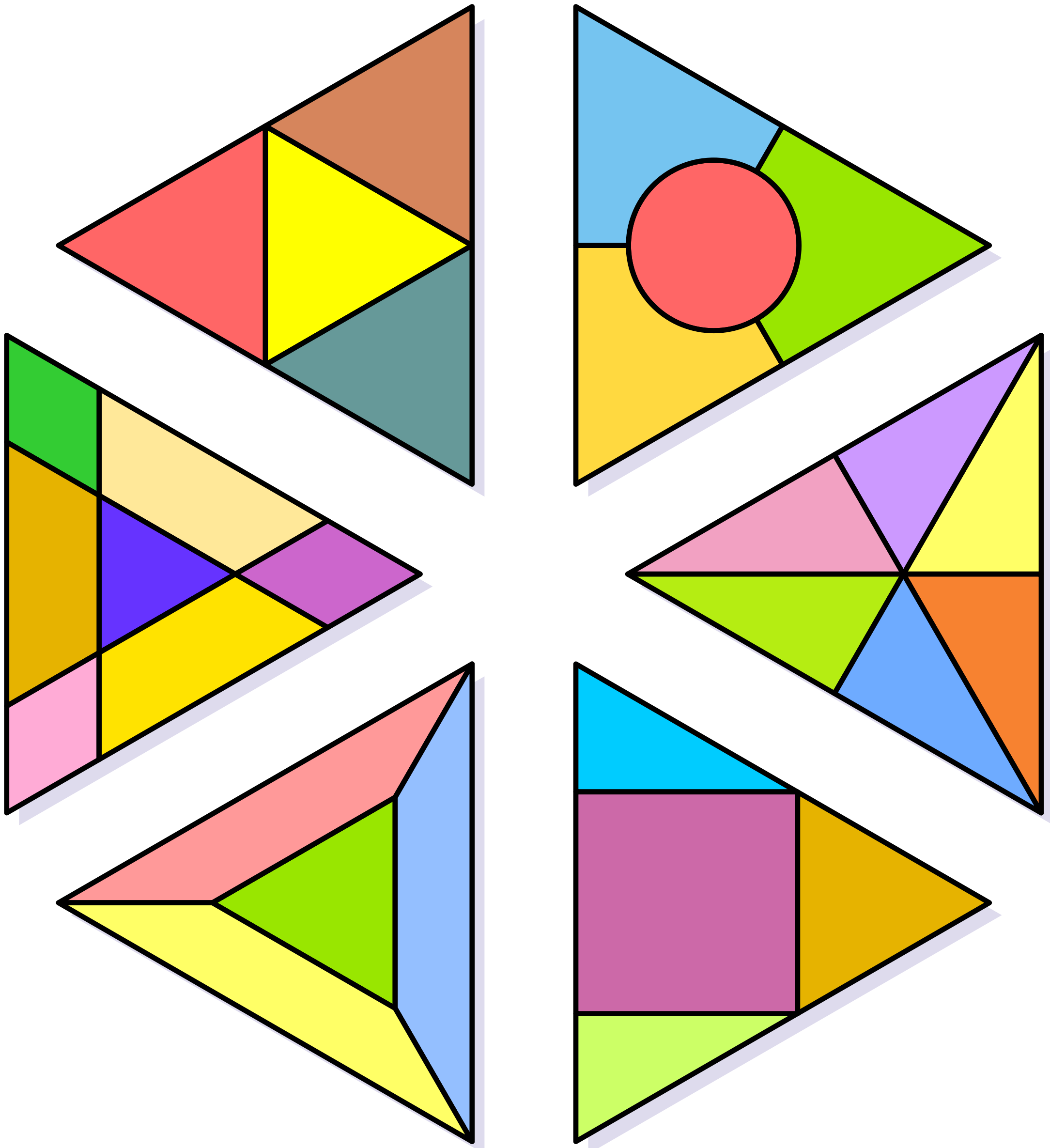
Folding Puzzles





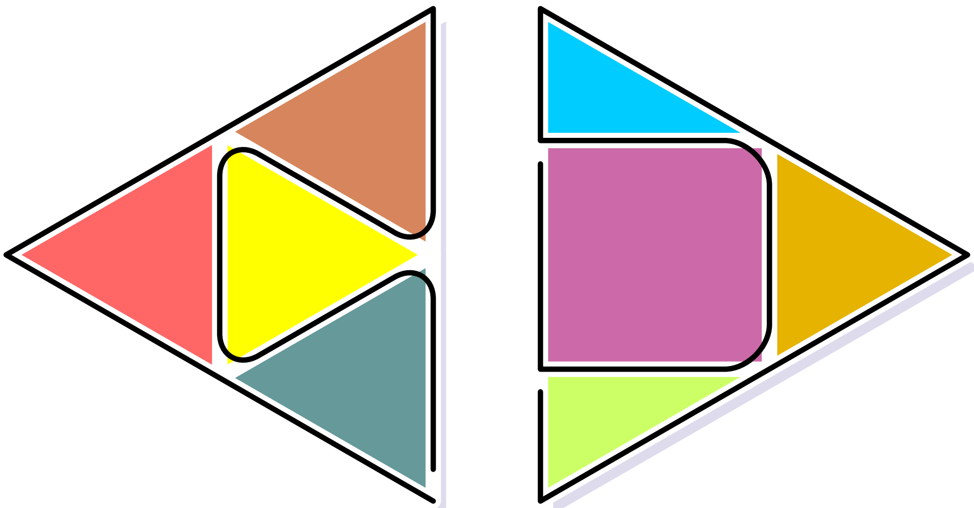
Triangle Folds (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).



These are six triangular stained-glass windows. Which of these windows can be drawn without taking your pencil off the paper or going along the same line twice?

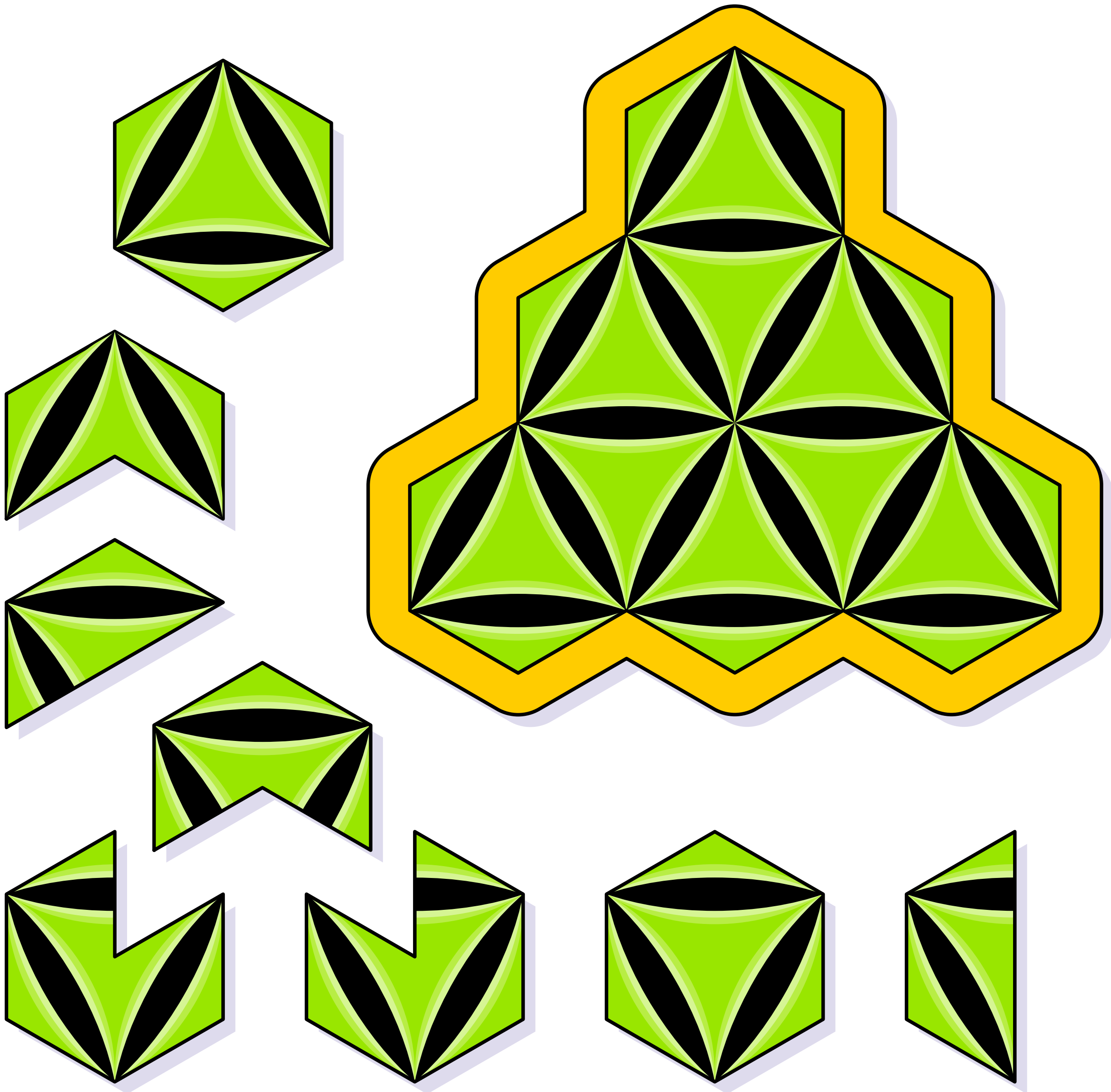
More from the author at PeterPuzzle.com



Only two windows can be drawn in that way. They are shown in the illustration.

The Triangular Grid

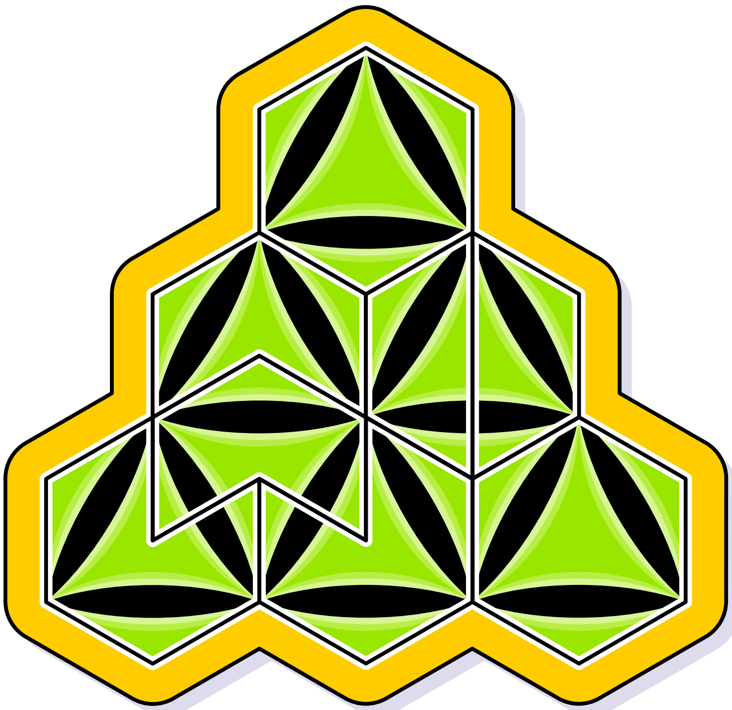
by Peter Grabarchuk



Using all the eight tiles, assemble the shape with the triangular grid shown above.

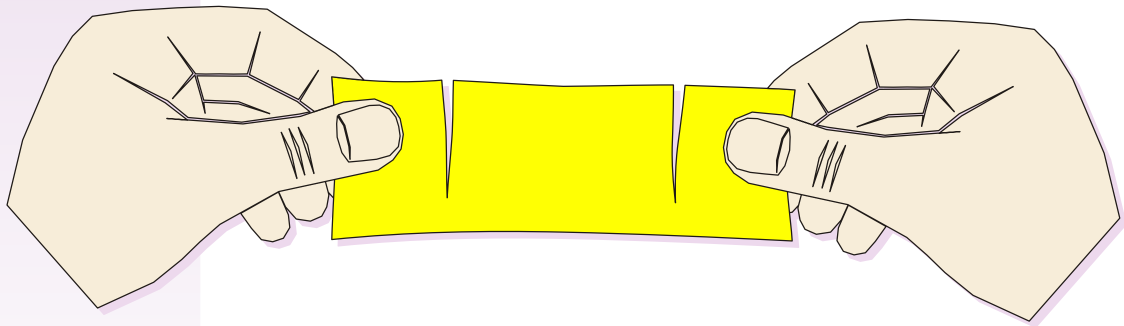
More from the author at PeterPuzzle.com

Posted: February 23, 2008



The solution is shown in the illustration.

Toys

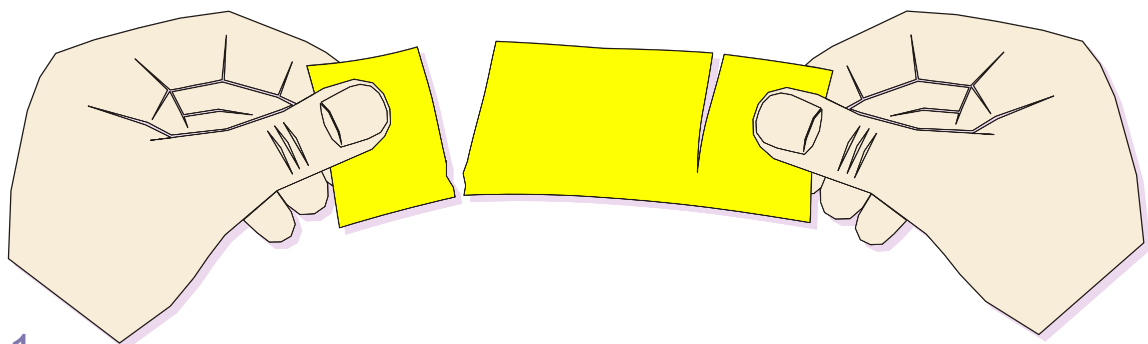


Try to Tear

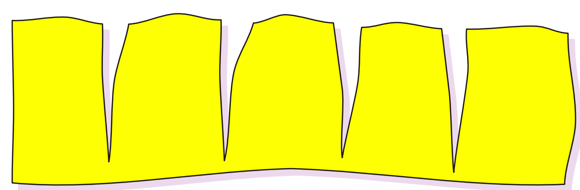
Take the paper strip and tear it in two places almost to the rim.

Now holding it with your hands as shown in the figure try to pull it to get three separate pieces of paper.

Do you think you will be able to do this?



1



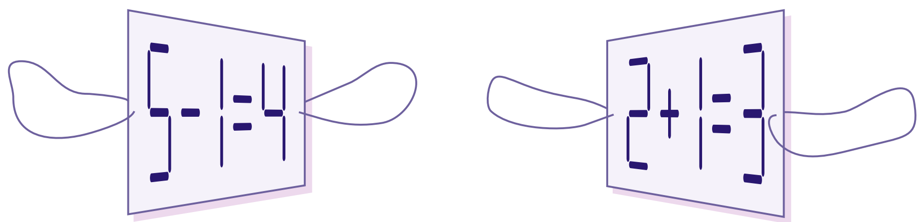
2

Try to Tear (explanation)

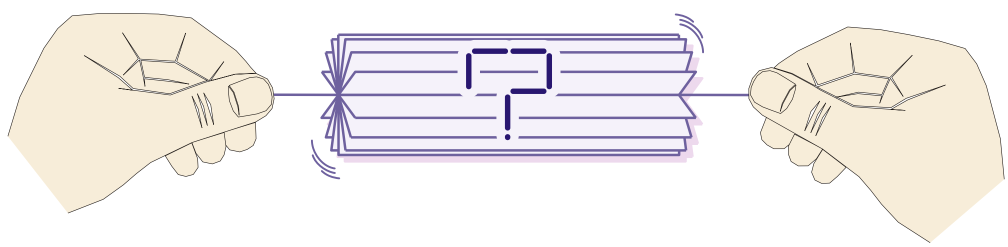
Can't get three separate pieces in one try? Can reach only two? (see Figure 1).

Never mind. In fact nobody can do this. You can make the tears more then in two places of the strip as shown in Figure 2, and you still will not be able to tear it into more than two separate pieces in one try. And very often it's hard to say along which tear the strip will be torn.

Suggest this toy to your friends and see their reactions. Let them pull as strong as they can. You can even offer the prize, if someone of your friends tear the strip into three pieces in one try. Are you still doubted that your prize will stay always with you?



1



2

Turning Digits

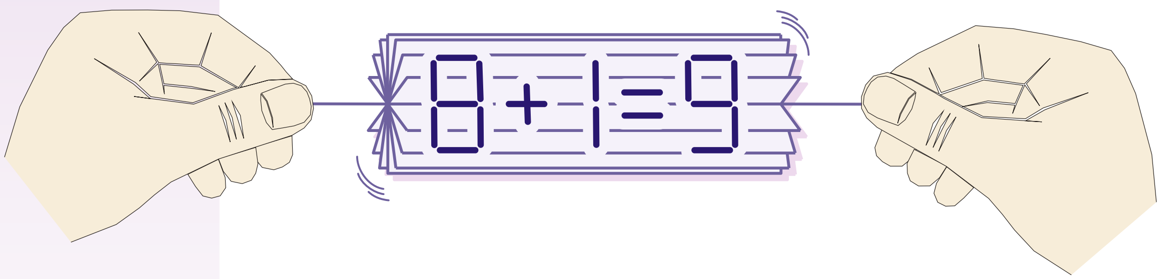
by Peter Grabarchuk

To demonstrate this illusion make a simple device. Its two sides are shown in Figure 1. The pieces and the diagram how to produce the device are shown in the last page of this Print 'n' Play version.

Take the device in such a way that to hold the pieces of string between your fingers as shown in Figure 2. Now turn the pieces of string very quickly to make the rectangle turning.

How do you think, what image will you see instead of the question mark?

Illusions



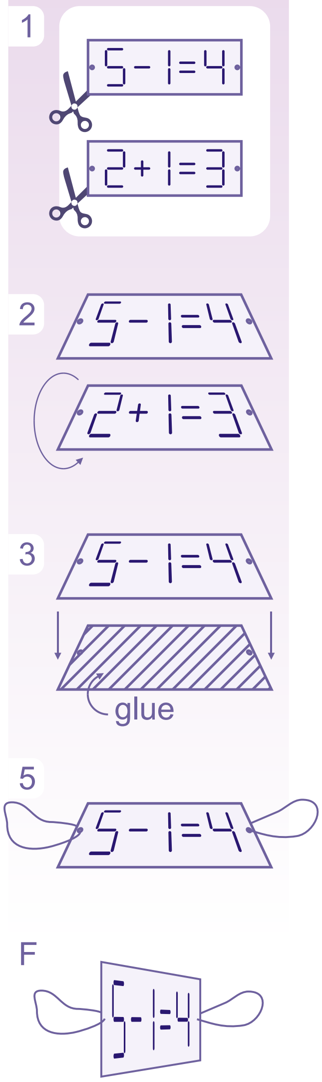
Turning Digits (explanation)

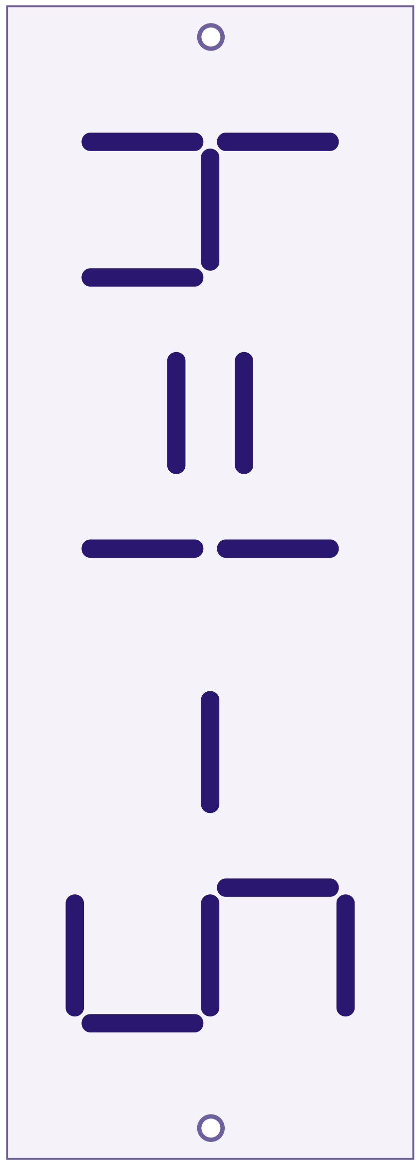
If you made everything properly the image that has to appear instead of the question mark is the equation 8+1=9.

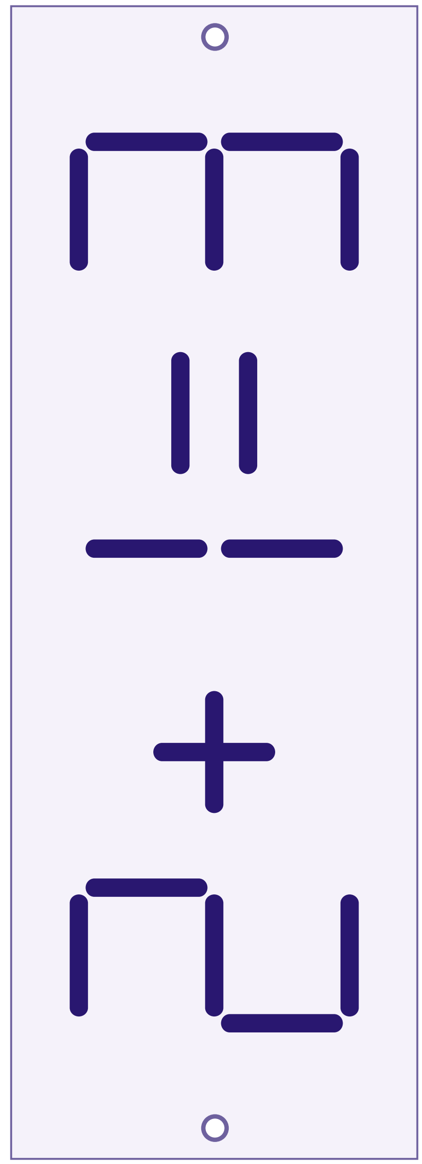
This type of illusions (and such devices) is famous enough and is based on the principle that your eye can keep an image for half a second after you have taken that image away.

Treasure of Classic and Modern Puzzles

Illusions



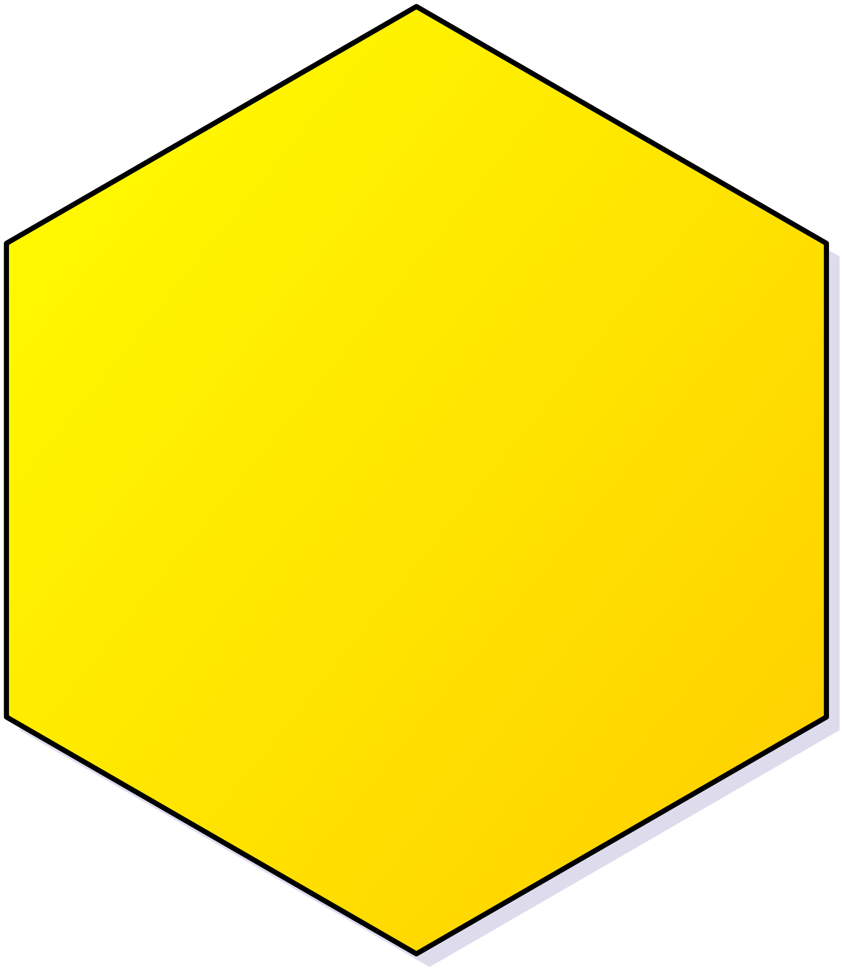




Turning Digits (pieces)

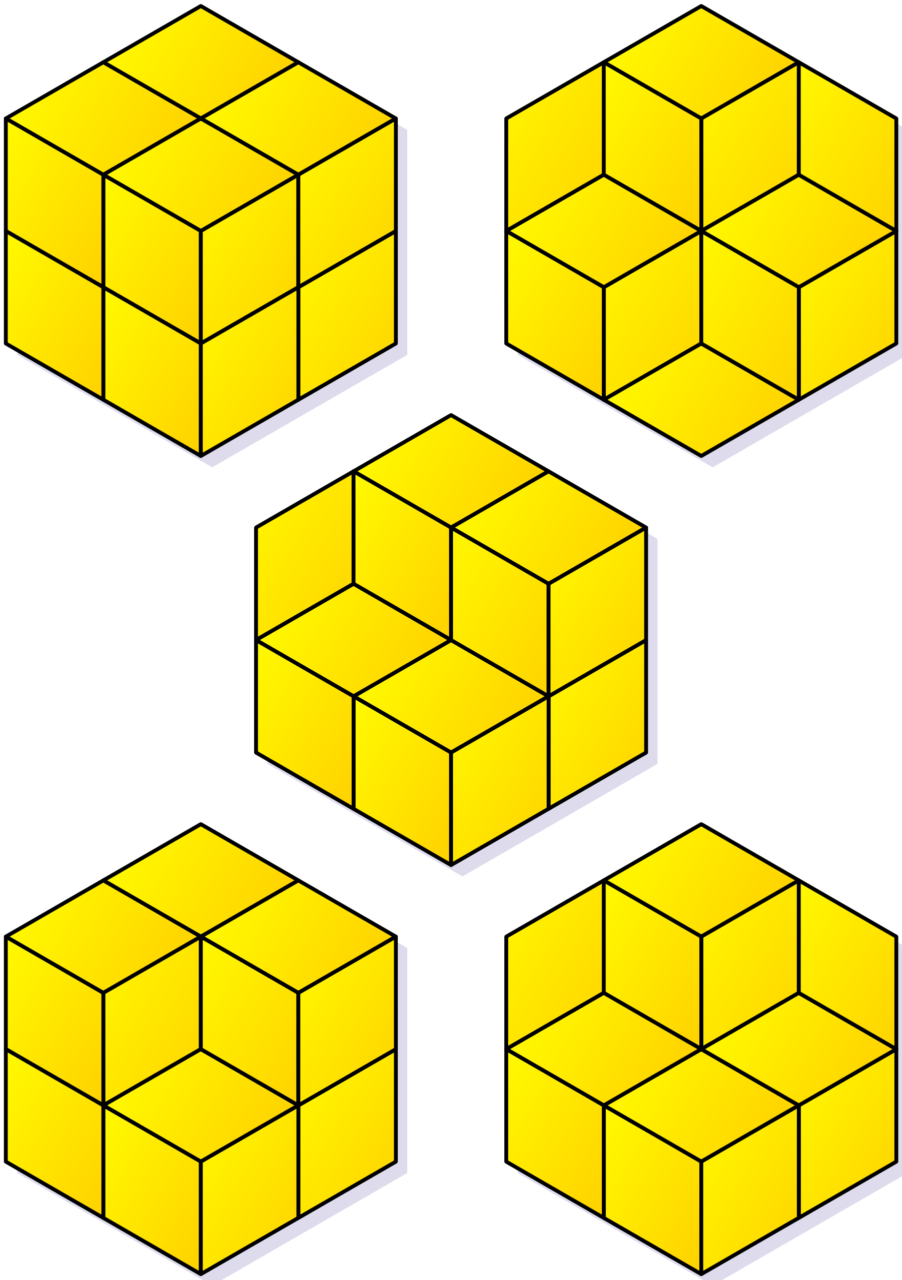
To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

October 26, 2003 www.puzzles.com

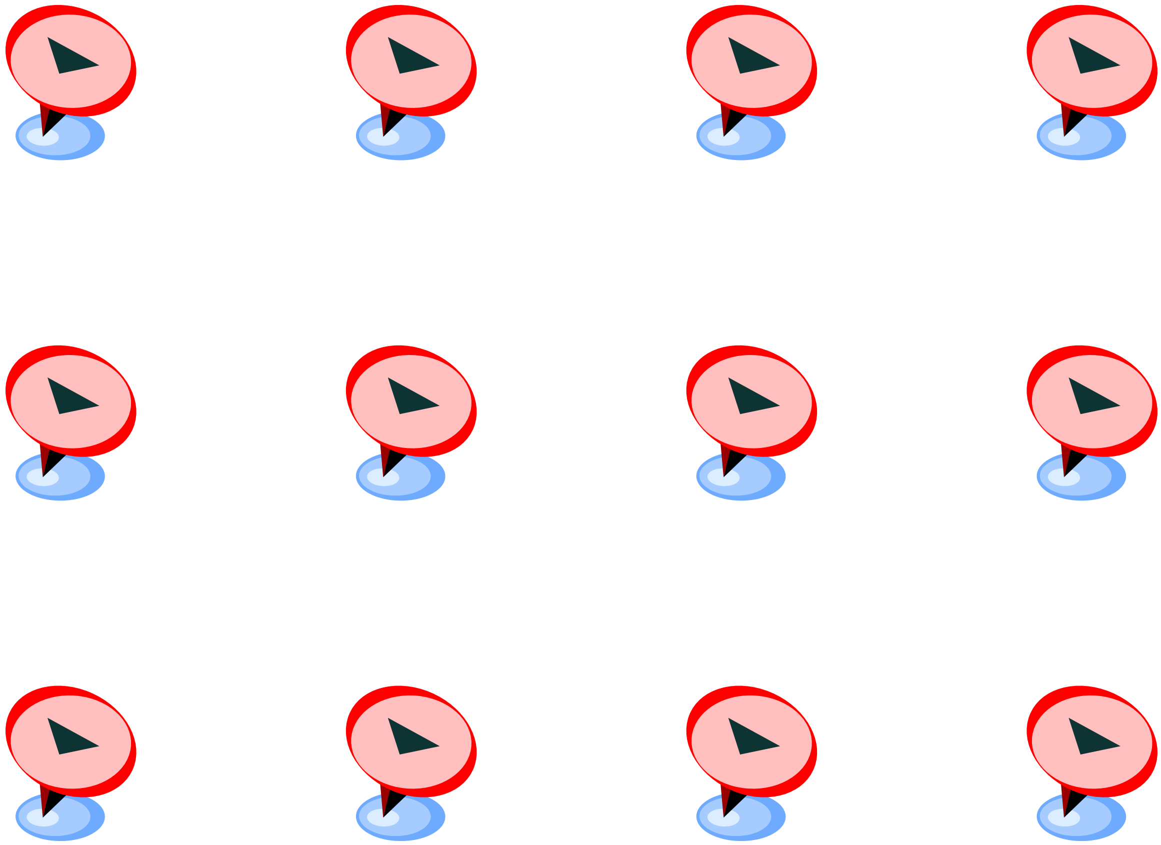


A polygon whose interior angles are equal and whose sides are equal is a regular polygon.

Can you cat the regular hexagon shown in the diagram into 12 congruent quadrilaterals?

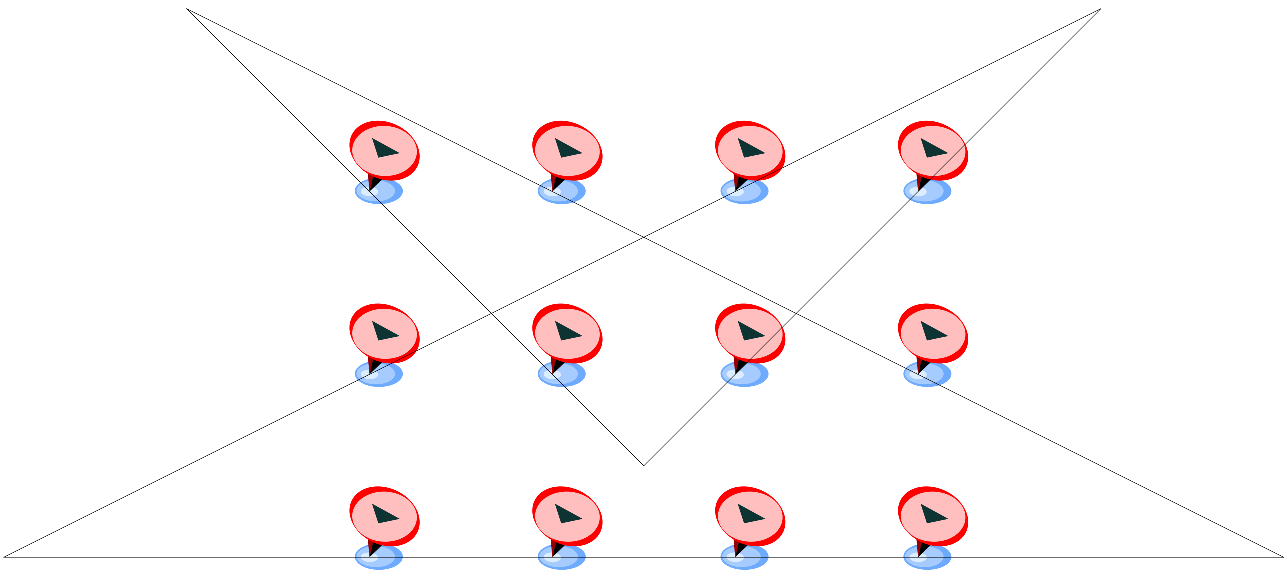


Five different solutions are shown in the illustration.

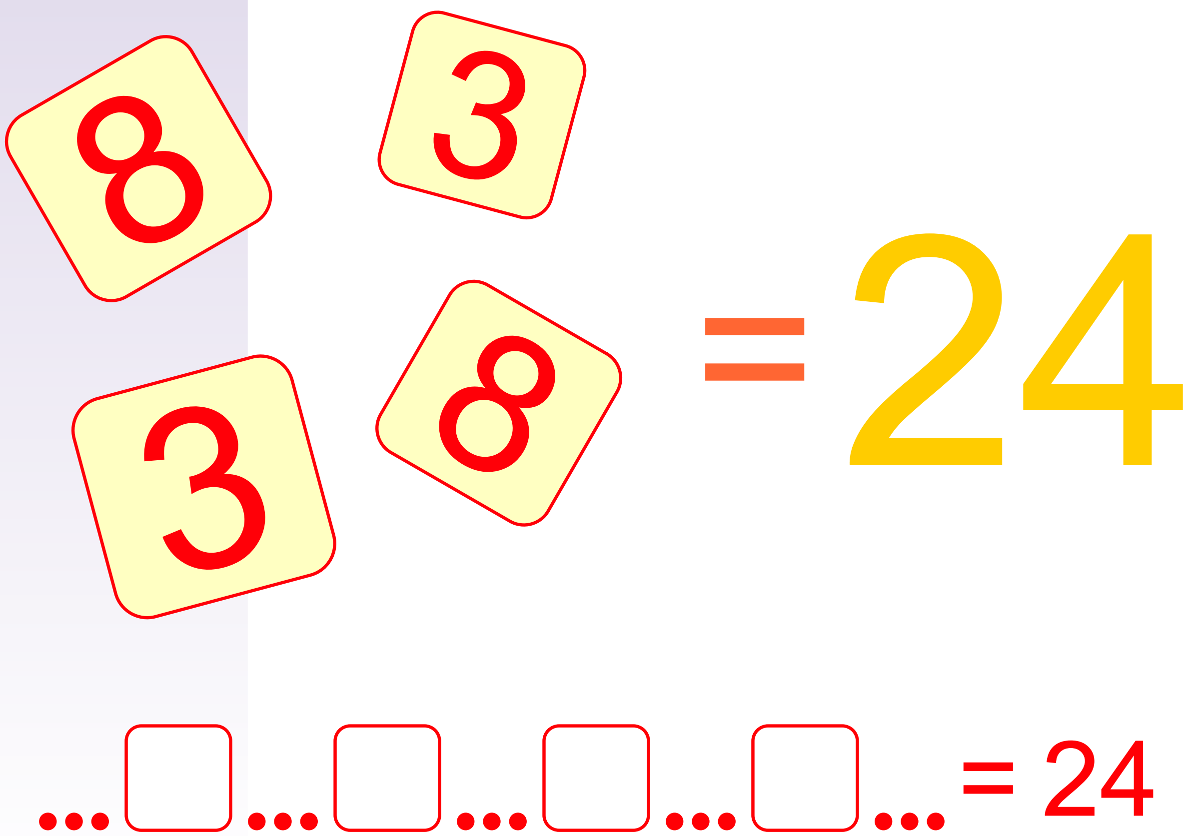


Connect all the twelve points with exactly 5 connected straight lines without lifting your pencil off the paper.

*This puzzle was inspired to the publication on our site by the message from Meeki L.



The solution is shown in the illustration.



Twenty4 puzzle*

by Wei-Hwa Huang

The object of this puzzle is using the four numbers 3,3,8, and 8 as shown in the illustration and the usual arithmetic operations (plus, minus, multiply and divide) make exactly 24. Of course, you can use brackets, but no tricks like powers, cube roots, or putting 8 and 3 to make 83 are allowed. Just pure maths.

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*This puzzle was inspired to the publication on our site by a message from Kim C.

$$\boxed{8} / \left(\boxed{3} - \boxed{8} / \boxed{3} \right) = 24$$

8/(3-8/3)=24

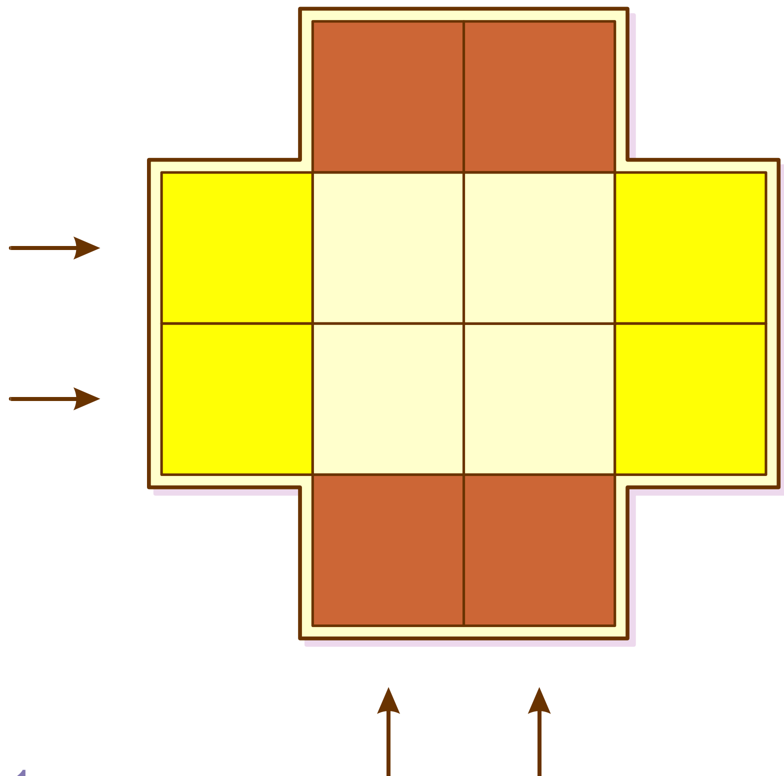
Twenty4 puzzle (solution)

The solution is shown in the illustration.

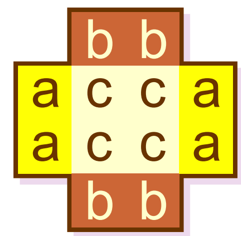
The first operation within the brackets gives you exactly 1/3 because 3 could be written as 9/3, and 9/3 minus 8/3 equals exactly 1/3.

The second operation (8/ 1/3) could be written in another way as 8 x 3 (according to mathematical rules) which is exactly 24.

Puzzles with Numbers



1

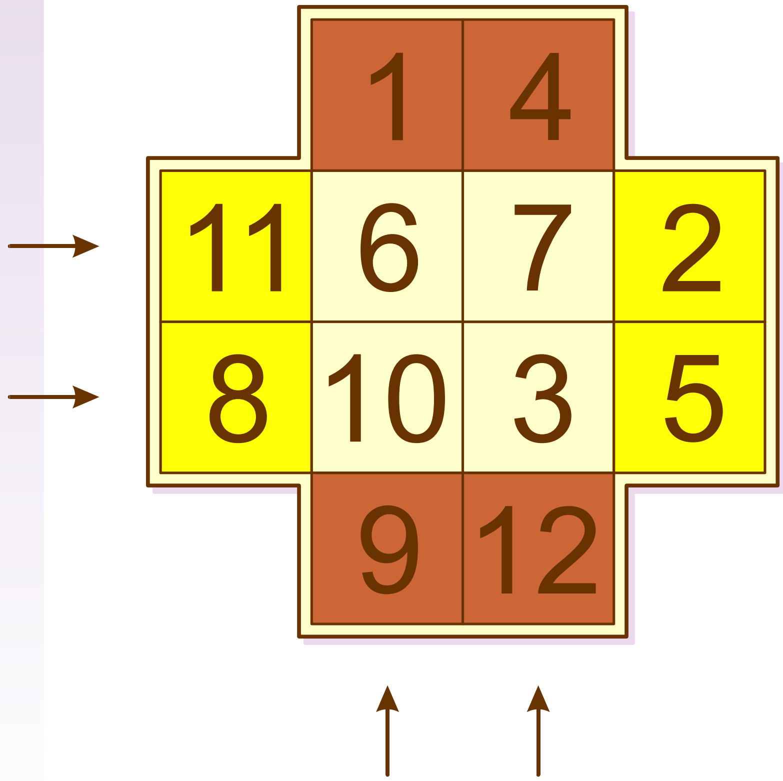


2

The "Twenty-Six" Puzzle

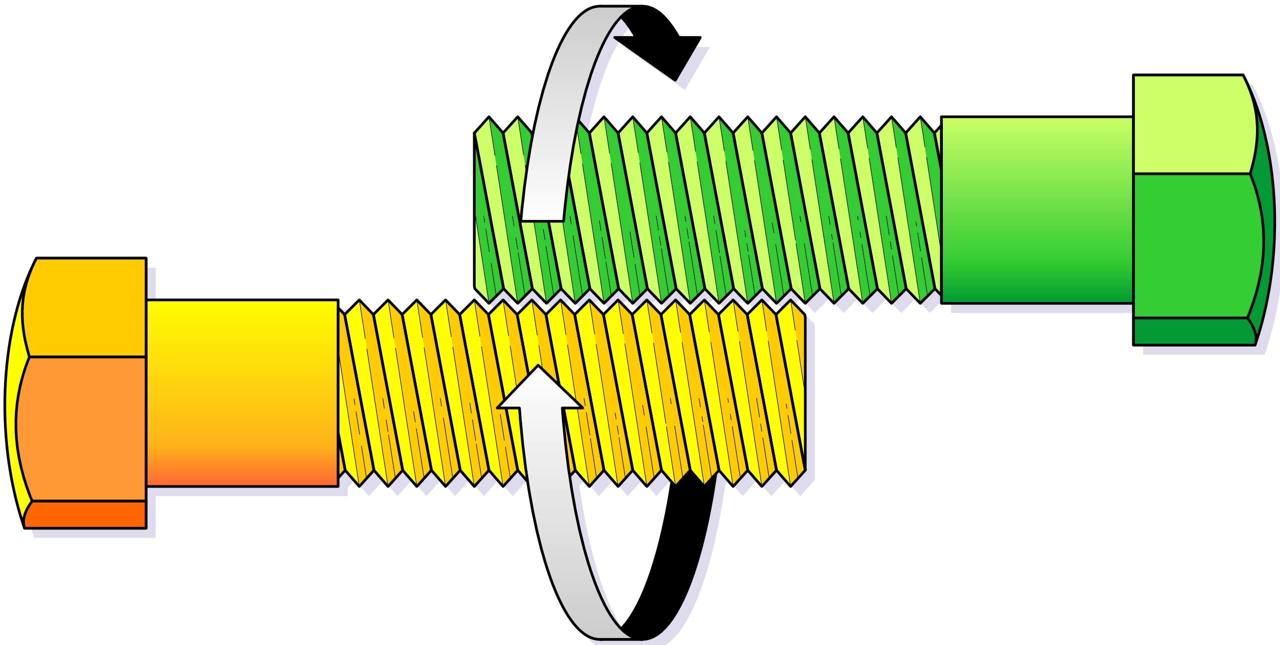
after Professor Louis Hoffman

The object of the puzzle is to place in the cross shown in Figure 1 the numbers 1 through 12 - exactly one number per cell - so that to make the magic sum of 26 in seven areas of the cross containing four cells each:
– in two horizontal and two vertical rows as pointed by respective arrows in the left illustration;
-- in the three groups of squares - marked a-a-a-a, b-b-b-b, and c-c-c-c, respective - all as shown in Figure 2.

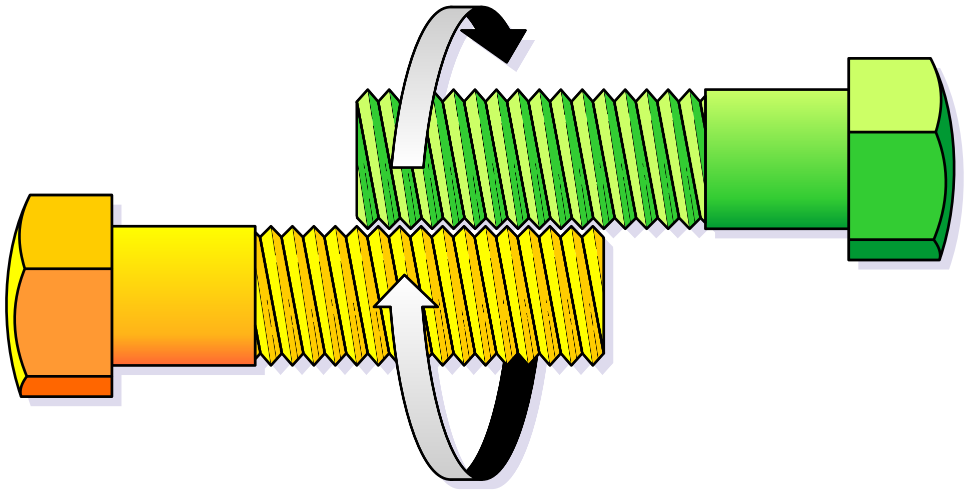


The "Twenty-Six" Puzzle (solution)

One of the solutions is shown in the illustration.



Two identical bolts are placed together so that their helical grooves intermesh as shown in the illustration. If you move the bolts around each other as you would twiddle your thumbs, holding each bolt firmly by the head so that it does not rotate and twiddling them in the direction shown, will the heads (a) move inward, (b) move outward, or (c) remain the same distance from each other?

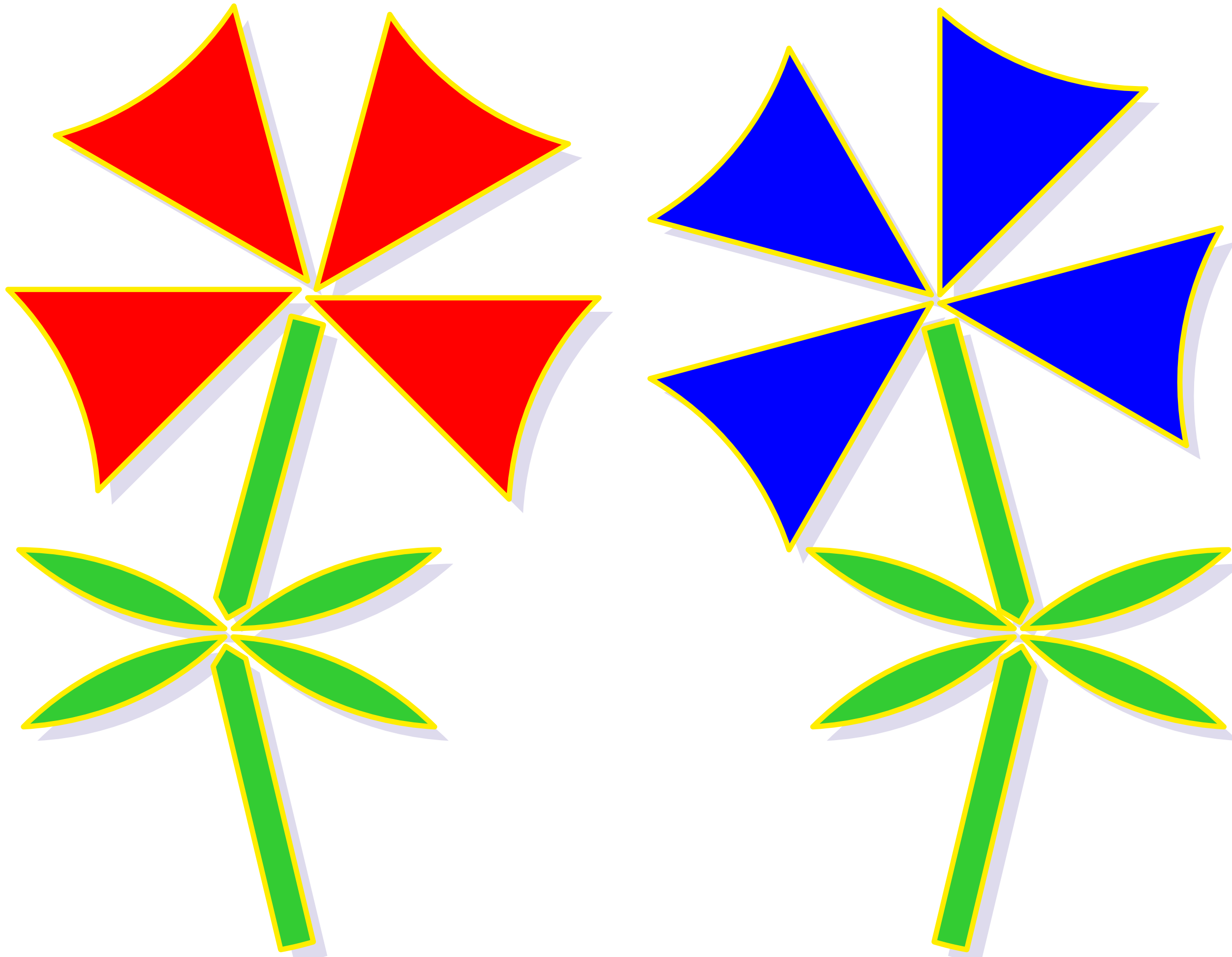


The heads of the twiddled bolts move neither inward nor outward. The situation is comparable to that of a person walking up an escalator at the same rate that it is moving down.

The problem has been brought to Martin Gardner's attention by Theodore A. Kalin.

Two Flowers

after Boris Kordemsky

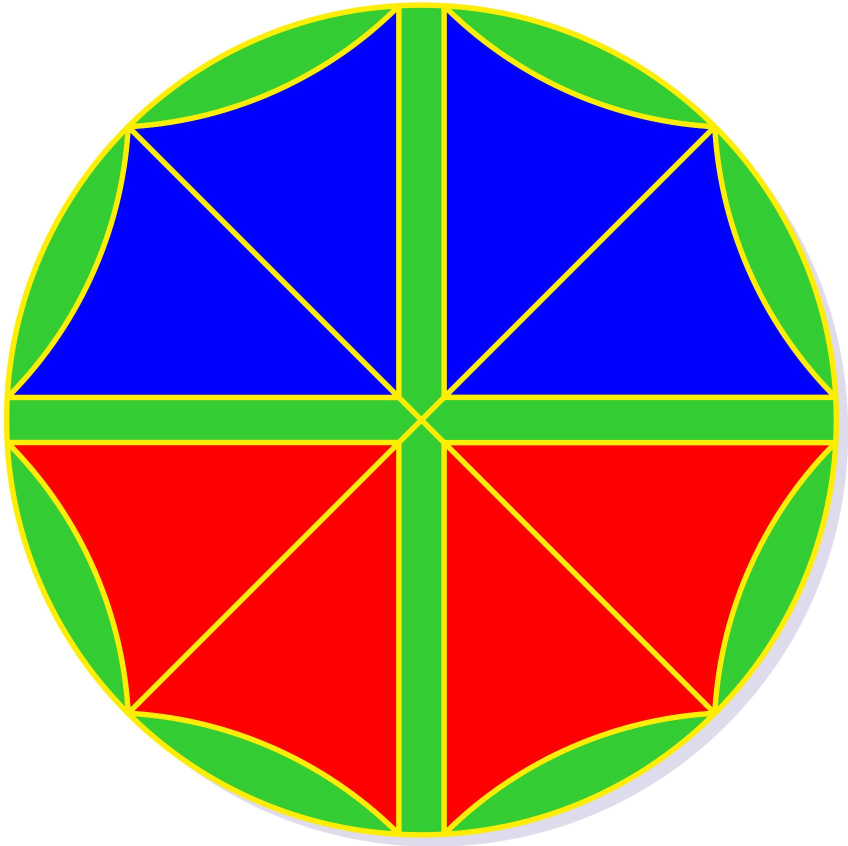


This story comes from the Urals, Russia. It says a local boy Danila while still an apprentice took semiprecious Ural stones and chiseled two flowers whose leaves, stems and petals could be separated - something like that shown in the diagram. From the parts of these flowers it was possible to make a circular disk.

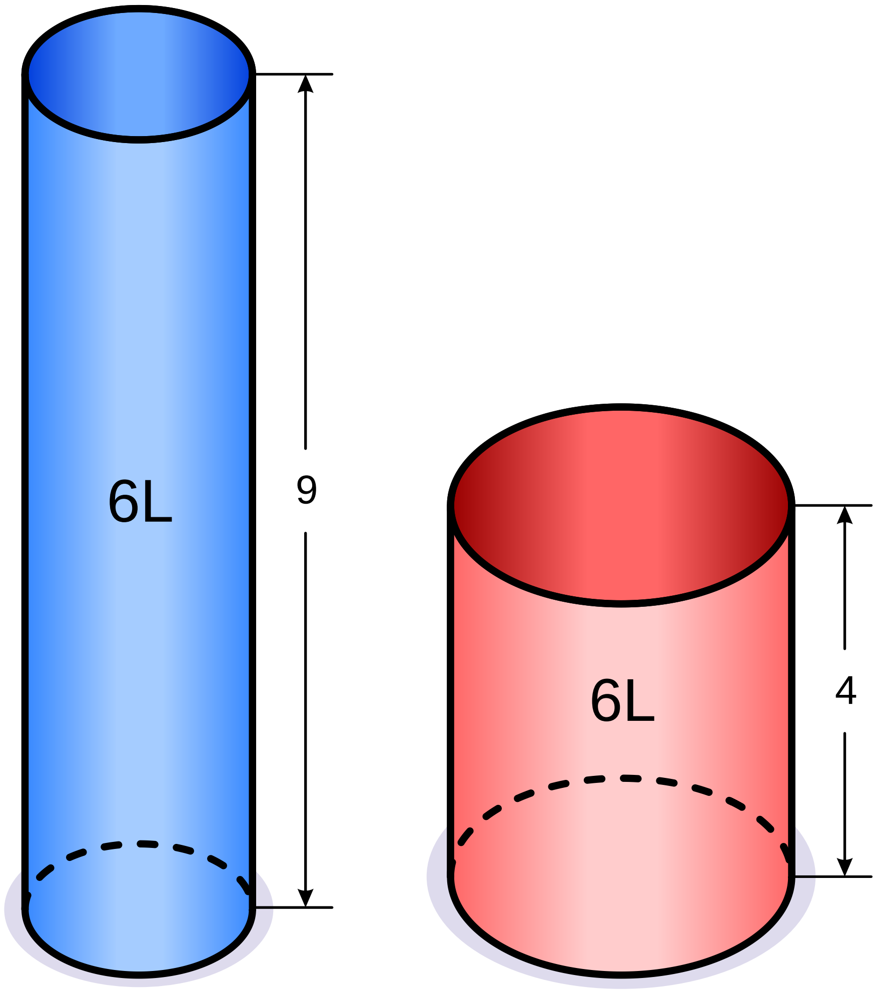
Can you put the petals, stems and leaves together so that to make a circle? It is allowed to rotate the parts but not overlap them.

*This is a very slight modification of the original puzzle presented by Boris Kordemsky.

Posted: December 6, 2009



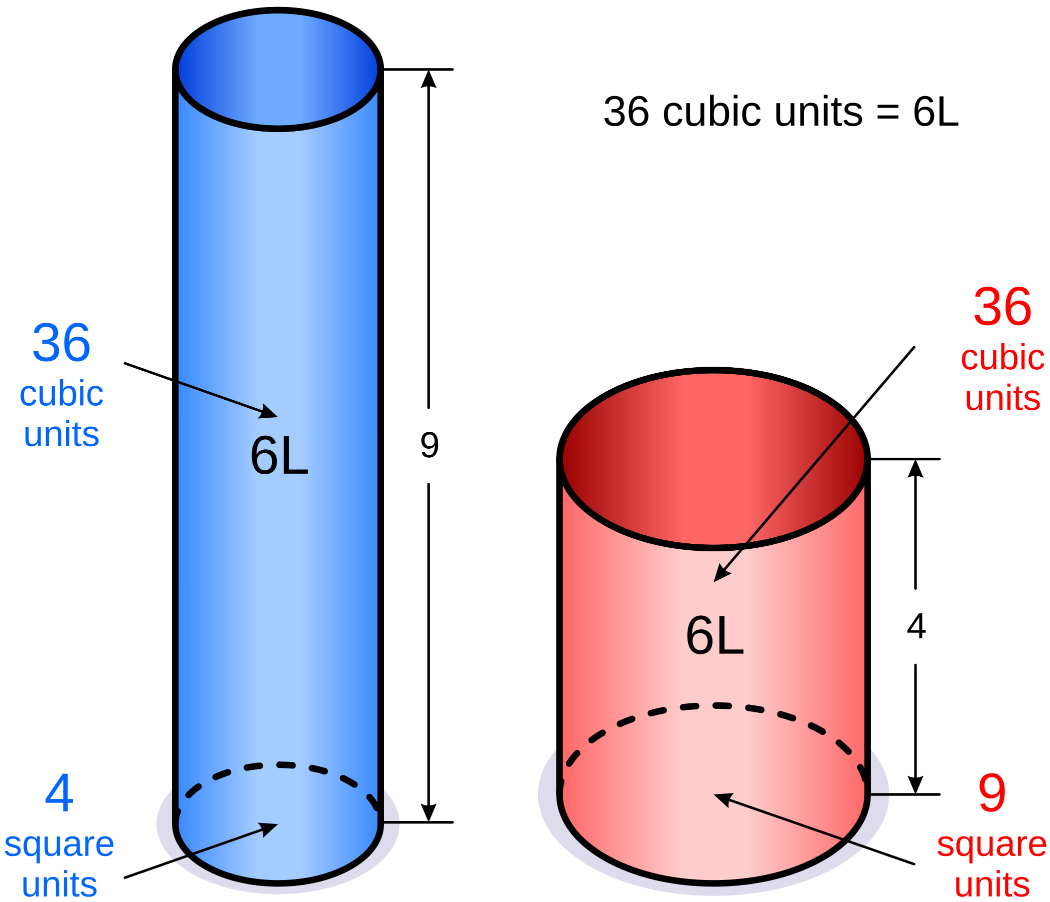
The solution is shown in the illustration.



Two jars made of very fine glass are shown in the illustration. They both have the same capacity–6L. Each jar is of the round profile, but since they are also of the same capacity, the left jar with the smaller profile is higher – 9 units, while the right jar with the bigger profile is lower–only 4 units high.

Having an immense supply of water the object is to measure 4L of water with the help of these jars.

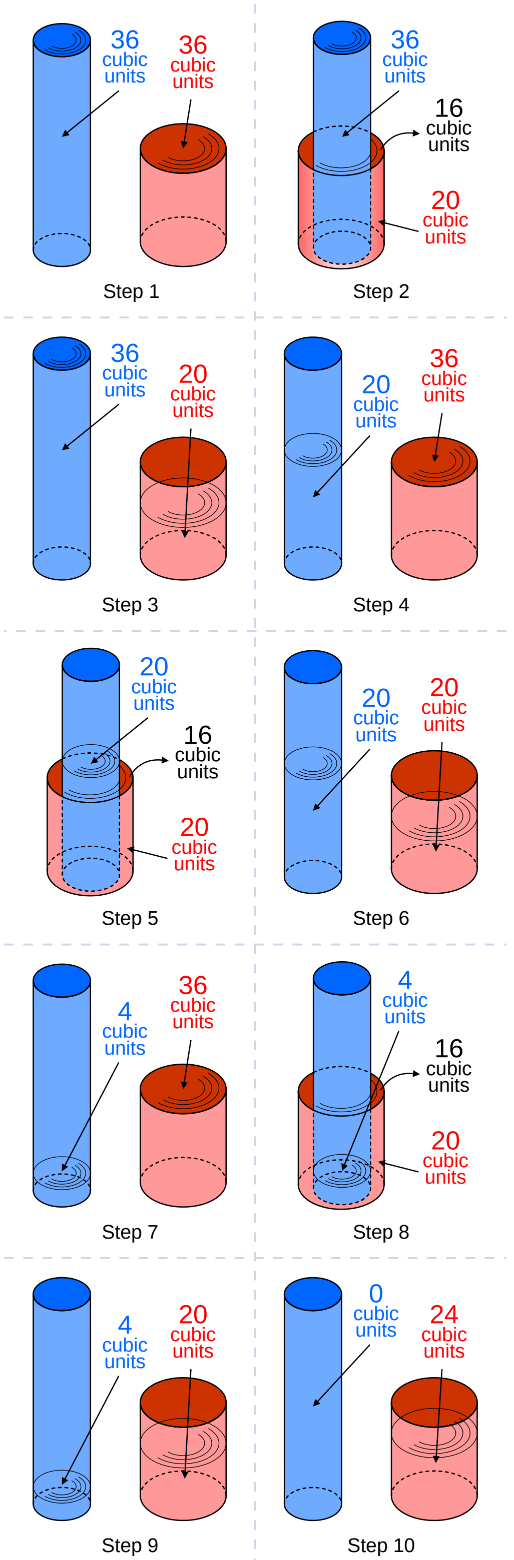
More from the author at UniPuzzle.com



Both jars are the circular cylinders. The volume of a circular cylinder is $\pi r^2 h$, where r is the radius of the bases, and h is the perpendicular distance between the planes that contain the bases. In our case h is the height of a jar. Since the volume of each jar is identical, but their heights are different, then, obviously the radii of their respective bases are also different. Thus, the bases' areas of each jar are:
higher jar: $\pi r^2 = 6/9$.
lower jar: $\pi r^2 = 6/4$.

Let's multiply both decimals by 6:
higher jar: $6/9 \times 6 = 36/9 = 4$ (the area of the higher jar's base in square units).
lower jar: $6/4 \times 6 = 36/4 = 9$ (the area of the lower jar's base in square units).

Since we've multiplied both decimals by 6 we can describe the volumes of the jars as 36 cubic units each. That means 1 liter equals 6 cubic units. In order to measure 4 liters we have to get 24 cubic units of water in one of the jars.



Step 1. Fill out both jars - 36 cubis units of water in each.

Step 2. Place the higher jar into the lower. Such a procedure will displace a certain volume of water from the lower jar. Ignoring the thikness of the jar's glass, the volume left in the lower jar will be equal the product of the jar's height (i.e. 4) and the difference between the areas of both jars' bases (i.e. 9-4). In other words the volume of water left in the lower jar equals 4 x (9-4) = 4 x 5 = 20 cubic units.

Step 3. Get the higher jar out of the lower one.

Step 4. Pour the water from the higher jar into the lower one until the latter is brimful again. Since the lower jar contains 20 cubic units of water already, the 16 cubic units will be poured into it from the higher jar. Now there are 20 cubic units of water in the higher jar and 36 - in the lower.

Step 5. Place the higher jar once again into the lower one. The procedure like in the step 2 will leave in the lower jar 20 cubic units, displacing 16 cubic units of water.

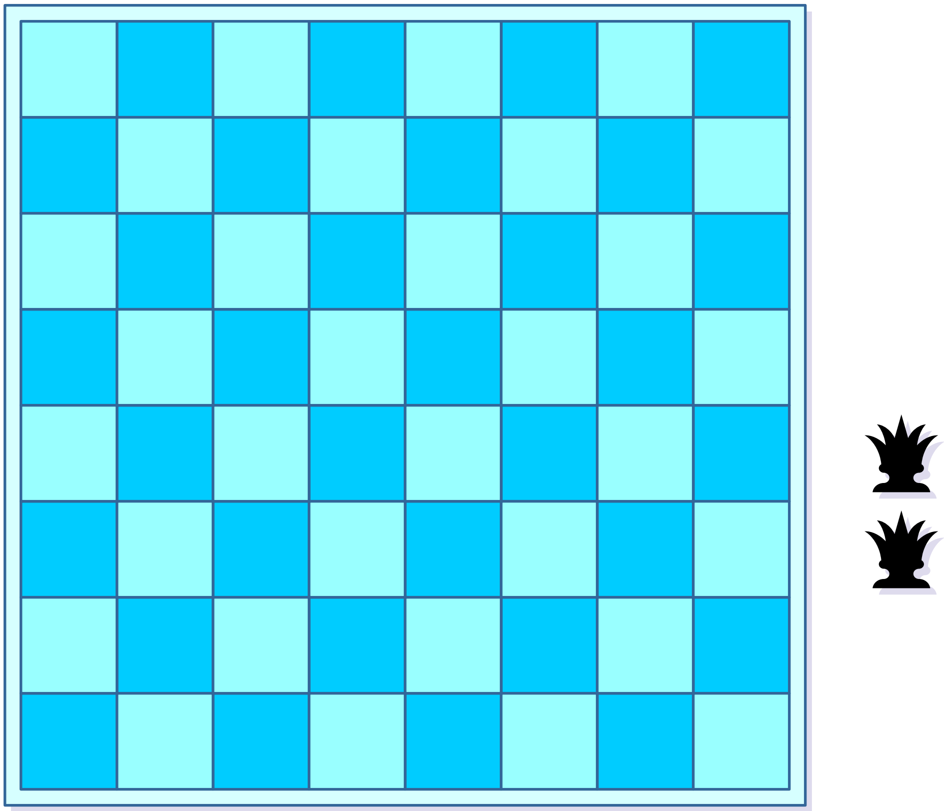
Step 6. Get the higher jar out of the lower one.

Step 7. Pour the water from the higher jar into the lower one until the latter is brimful again. Like in step 4 this will add 16 cubic units to the lower jar and thus, 4 cubic units are left now in the higher jar.

Step 8. Place the higher jar once again into the lower one. The procedure like in the steps 2 and 5 will leave in the lower jar 20 cubic units, displacing 16 cubic units of water from it.

Step 9. Once again get the higher jar out of the lower one. Now the total volume of the water in both jars is 24 cubic units - 4 in the higher and 20 in the lower one.

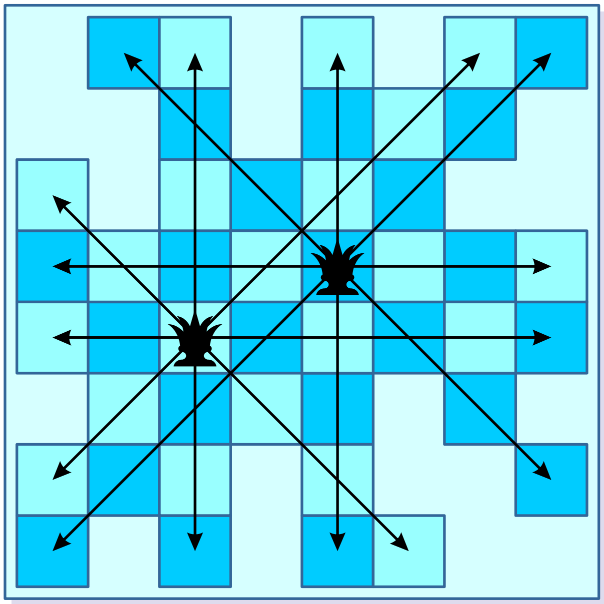
Step 10. Pour all the water either from the higher one into the lower or vice versa - from the lower into the higher. Now one of the jars holds the volume of the water which has been sought for, i.e. 24 cubic units or 4 liters.



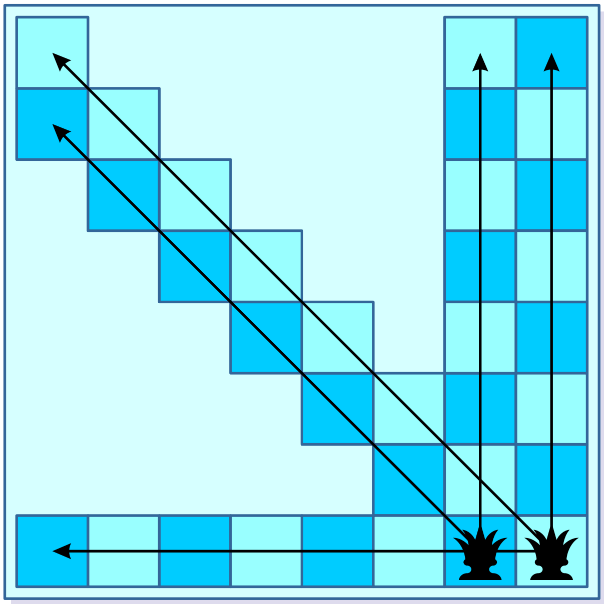
Puzzle 1. Place two chess queens on an 8x8 chessboard so that they both attack the maximum possible number of vacant cells of the board.

Puzzle 2. Place two chess queens on an 8x8 chessboard so that they both attack the minimum possible number of vacant cells.

A vacant cell is under attack if it is in the same horizontal, vertical or diagonal with at least one of the queens. If a cell is under attack of both queens it's considered as being attacked only once.



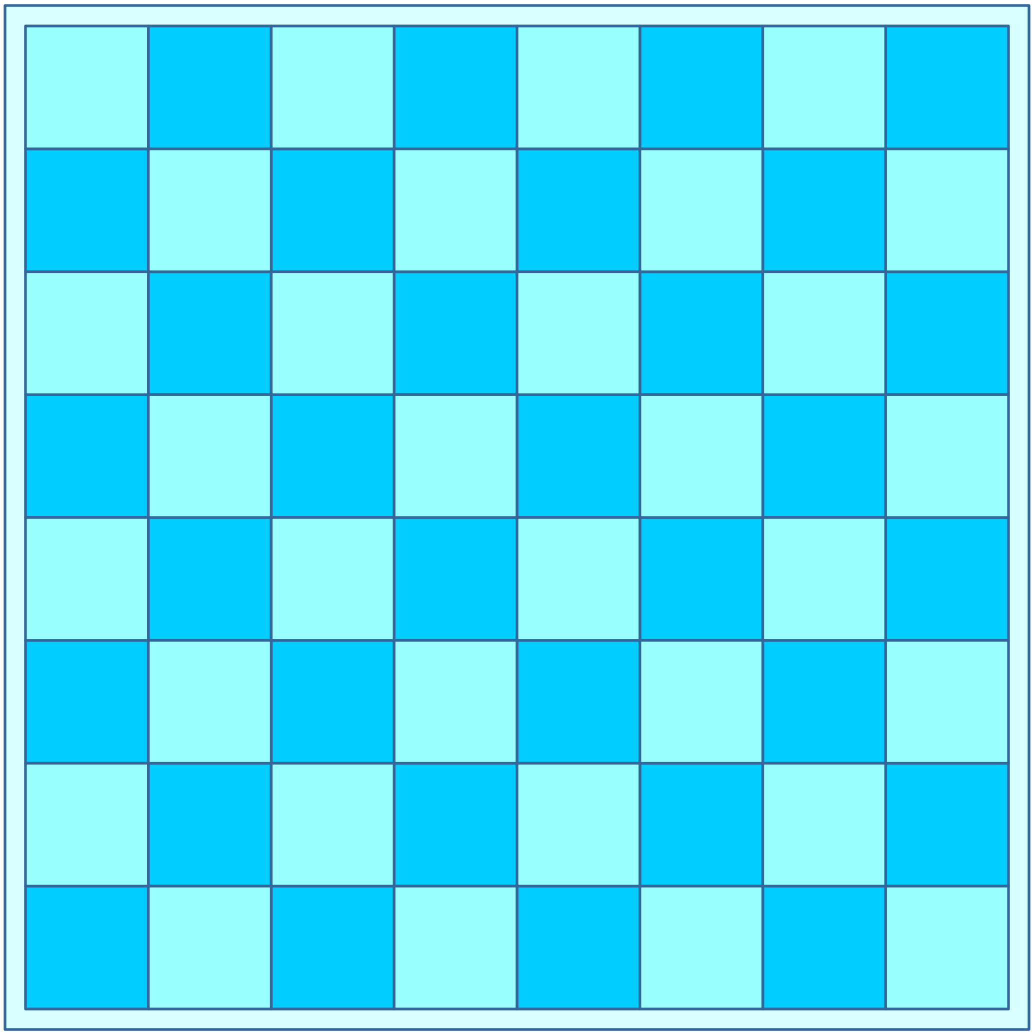
Solution A

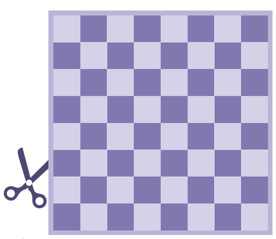


Solution B

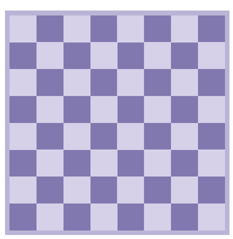
Solution to Puzzle 1. To attack the maximum possible number of vacant cells two chess queens should be placed in the center of the chessboard as shown in Solution A. In this case 42 vacant cells are under attack.

Solution to Puzzle 2. To attack the minimum possible number of empty squares two chess queens should be placed in any of the four corners of the chessboard in two adjacent squares - as shown in Solution B. In this case total number of vacant cells under attack is 32.





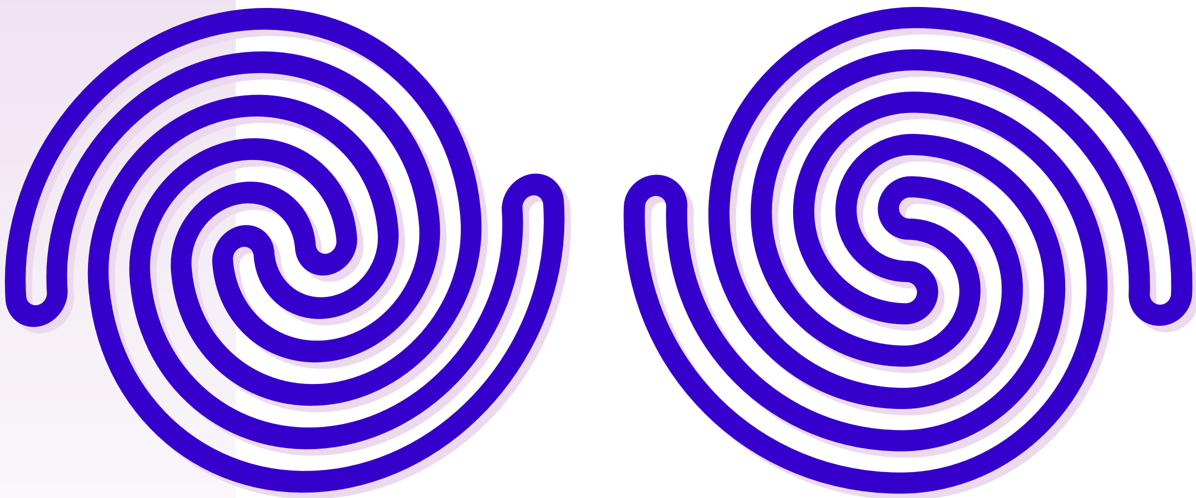
1



F

To produce the board first print it out. Then follow the diagram shown above - from step 1 to step F (finish).

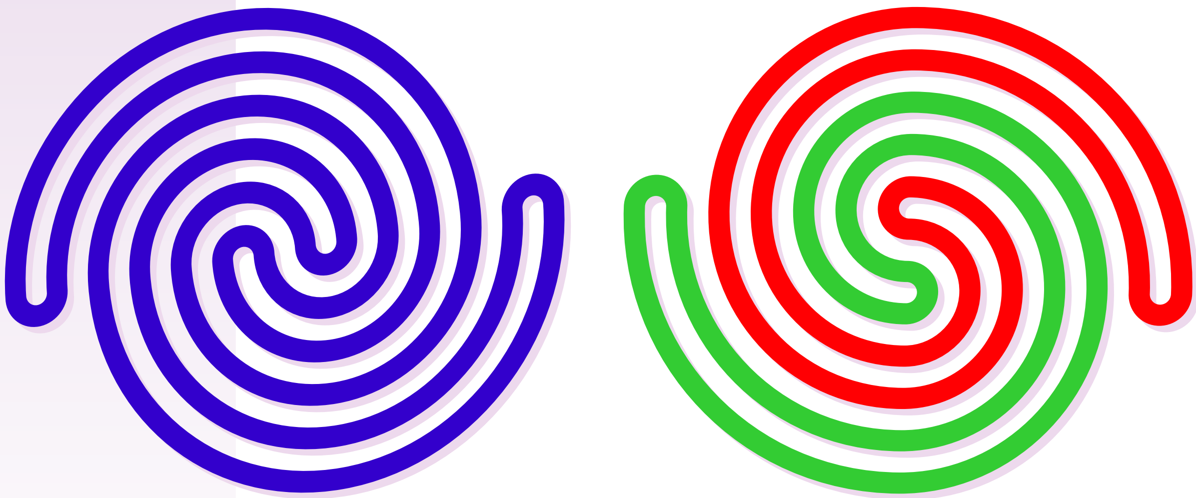
Visual Puzzles



The Two Spirals

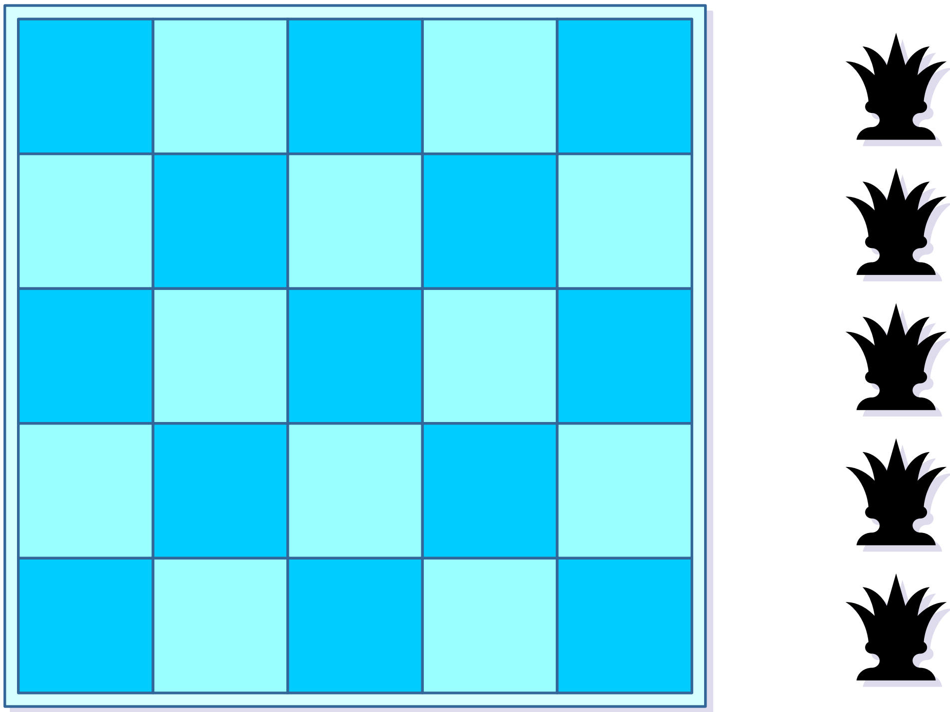
by Martin Gardner

One of the two spirals in the illustration consists of a single piece of rope that has its ends joined. The other spiral consists of two separate pieces of rope, each with joined ends. Can you identify which is which using only your eyes?

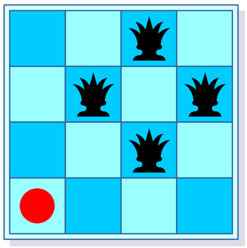


The Two Spirals (solution)

The spiral with the single rope is the left one as shown in the illustration. The right spiral consists of two pieces of rope.

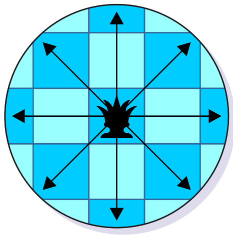


It's quite easy to place four chess queens on a 4x4 board to leave one unattacked vacant cell - see the diagram at right. The only unattacked cell is marked with a red dot. This cell can't be reached by any of the queens according to their allowed moves.

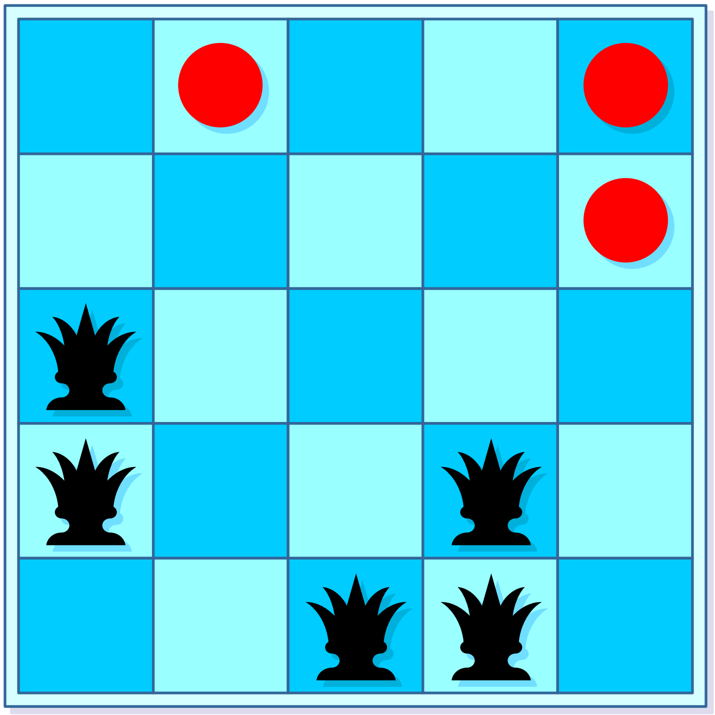


Your task is to place five chess queens on a 5x5 board in such a way that a maximum number of vacant cells are unattacked.

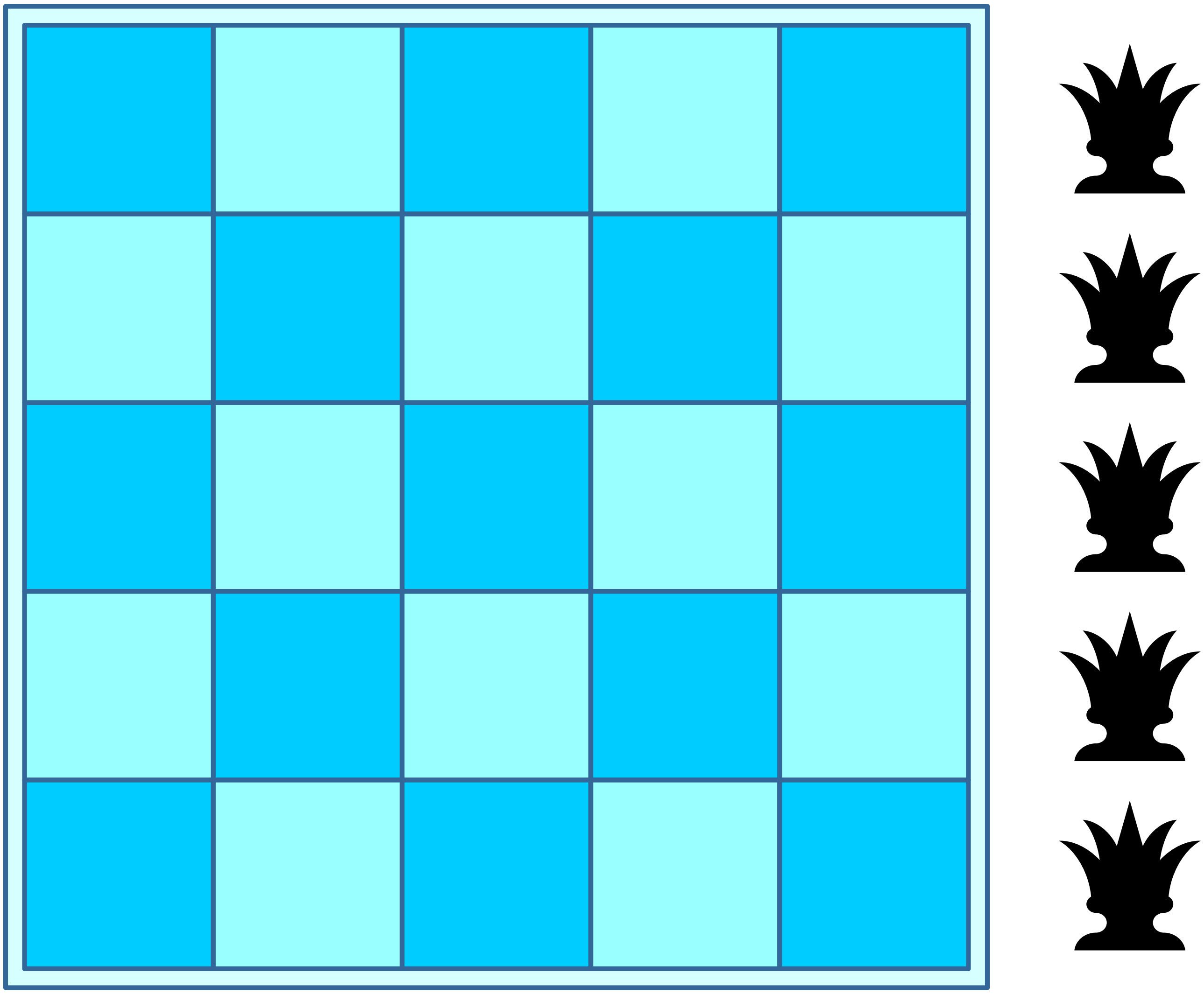
By the way, if you've forgotten the chess queen's moves the diagram at left will remind it to you. It shows that you may move the queen in any of the eight directions and on any number of the vacant cells.

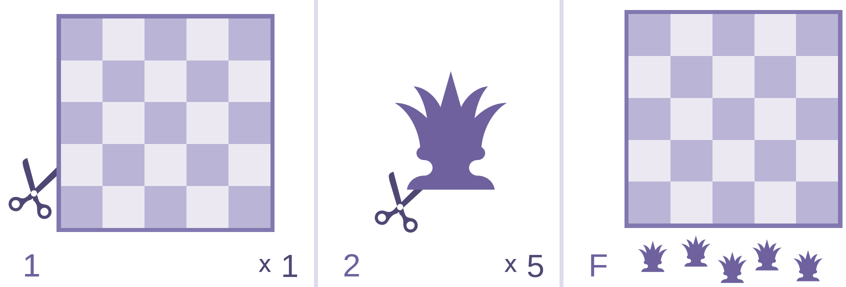


For more convenient solving you may print out the board, and use five quarters as queens and some pennies to mark the unattacked vacant cells.



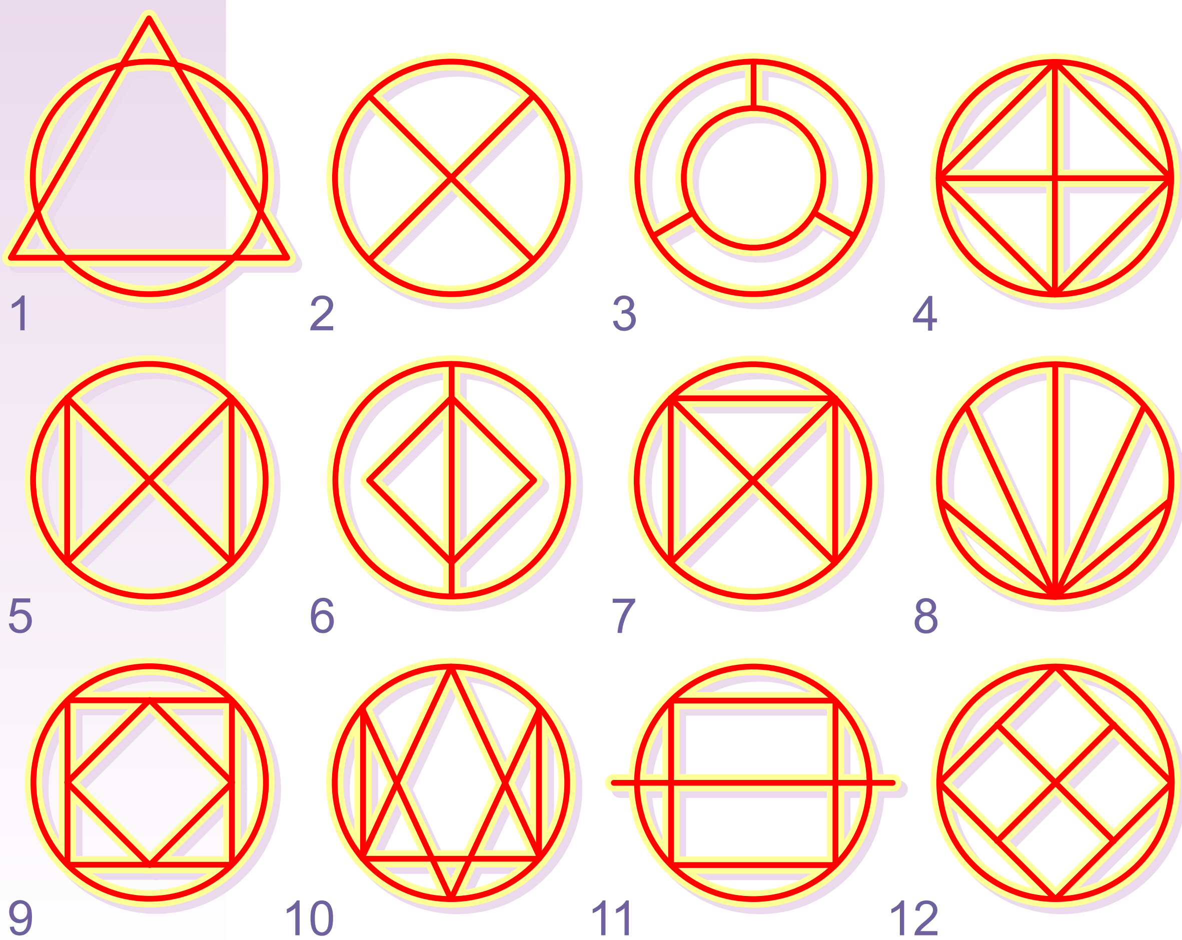
The maximum number of unattacked vacant cells that can be reached for five queens on a 5x5 board is three. The unique solution (except for rotations and reflections) is shown in the illustration. The unattacked vacant cells are marked with red dots.





To produce the pieces first print them out. Then follow the diagram shown above - from step 1 to step F (finish).

Pencil 'n' Paper Puzzles

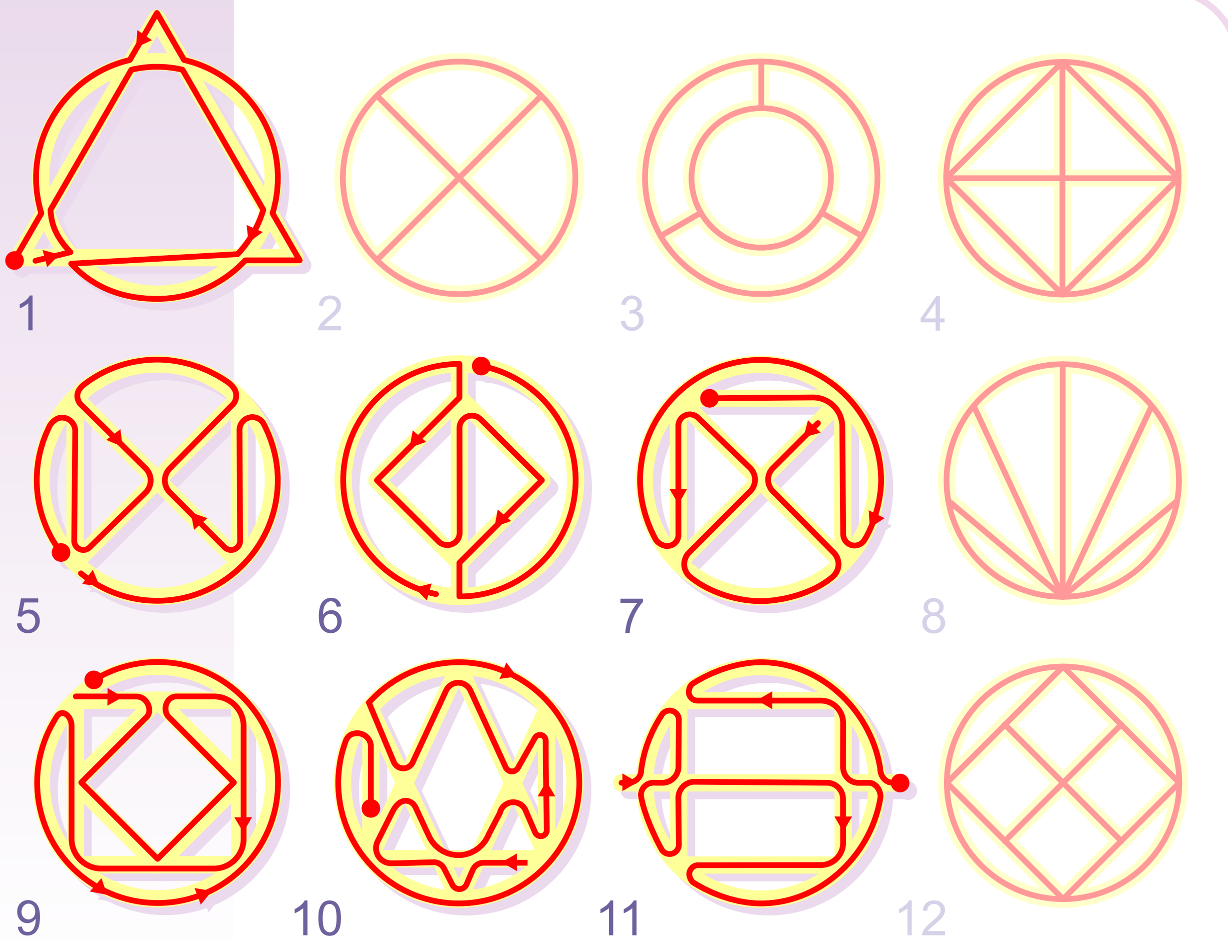


The Unicursal Marathon

by Serhiy Grabarchuk

The object of this puzzle is to figure out which of the 12 patterns above can't be drawn with pencil in one continuous line so that you don't take the pencil point off the paper.

You are not allowed to go over any part of the line twice, or cross it.



The Unicursal Marathon (solution)

The only patterns which can't be drawn with pencil in one continuous line so that you don't take the pencil point off the paper are as follows: 2, 3, 4, 8, 12.

Possible solutions to the remaining patterns are shown in the illustration above.

Pencil 'n' Paper Puzzles

The Unicursal Marathon (solution)

Now using Figure 4 we'd like to explain why it's impossible to draw it with pencil in one continuous line so that you don't take the pencil point off the paper, or why it isn't unicursal.

Figure 4 has exactly four points (nodes) where an odd number of lines are branching out (5 at each), and one node in the center of the pattern with an even number of branches (4).

Every time you go through a node not stopping at it you must of necessity use a pair of its branches. Therefore at each of the four nodes on the periphery of the pattern one branch in any case will be alone. When we use this alone branch this means that our line either starts from this node or just finishes at it. Thus we have FOUR points (nodes) where the line has to start (or finish) doesn't matter how to draw it. But a continuous line has only TWO ends, so the puzzle can't be solved.

Same proof is true and for the rest of "impossible" figures in our set - 2, 3, 8 and 12.

ANY figure that has only TWO points (nodes) where an odd number of lines are branching out, and ANY number of its nodes with an even number of branches, CAN BE DRAWN in one continuous line. You just have to start at one "odd" point and finish at the other. See Figures 6, 7, 10 and 11 (figure 11 has two "free" ends which are "odd" nodes too, but just with one branch each).

And finally an excellent thing about all unicursal figures is that you ALWAYS can draw in one continuous (and even closed in loop!) line ANY pattern if ALL its nodes are "even." See Figures 1, 5 and 9.

1 2 3 4 5 6 7 8 9 = 100

9 8 7 6 5 4 3 2 1 = 100

Example:

1 + 2 + 34 - 5 + 67 - 8 + 9 = 100

Up to 100

by Henry E. Dudeney and Martin Gardner

The nine digits 1 through 9 are written out in a row in ascending order as shown in the upper row of the illustration. The object is to insert between the digits, without changing their positions in the row, several arithmetical signs so that to get exactly a hundred as the result. From the four arithmetical signs you can use only plus (+) and minus (-). The solution with six signs is shown as an example in the lower right corner of the illustration. But can you find a solution where three signs are used only?

No less interesting and harder is the "reverse" puzzle when the digits are in descending order as shown in the lower row of the illustration. The same rules as to the previous puzzle are applied, except that this time the four signs (again + and - only) have to be used. Can you find this solution as well?

$$123 - 45 - 67 + 89 = 100$$

$$98 - 76 + 54 + 3 + 21 = 100$$

Up to 100 (solution)

The solutions to both puzzles are shown in the illustration.

The first puzzle was proposed by Henry E. Dudeney many years ago and was a little bit modified by Martin Gardner decades later. We've chosen only that its version where it is required to use the minimum number of signs.

The second puzzle was proposed by Martin Gardner as the logical development to the original one.

Word Puzzles

What Animal?

after Martin Gardner

Can you arrange the five pieces with letters on them so that to spell the name of an animal?

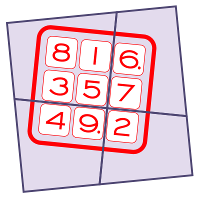
Word Puzzles

What Animal? (solution)

Turning the piece with W upside down gives us an M. Now we are able to produce CAMEL from the letters.

Where Is the 5?*

by Serhiy Grabarchuk



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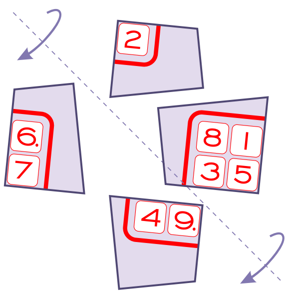

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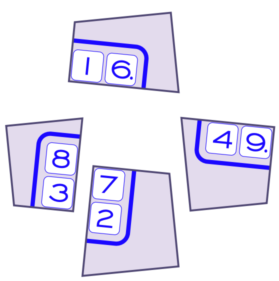

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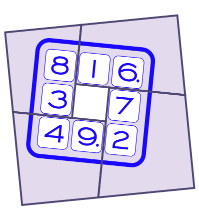

4

To demonstrate this trick first produce the four pieces for it. The pieces themselves and the diagram how to produce them are provided in the last page of this Print 'n' Play version.

As soon as you've got the pieces ready arrange them into the square with the red magic square 3x3 on it as shown in the Illustration 1. The magic constant is 15 (each row, column and both main diagonals add up to 15). After that shuffle the pieces (Illustration 2) and then flip them all over (Illustration 3). Now put the pieces into a square again, this time with the blue magic square on it. To make the task easier just follow the blue outline of the magic square (Illustration 4).

Have you noticed something odd in the new square? Can you say where did the little square with the number 5 disappear, and thus why did the hole appear in the new square?

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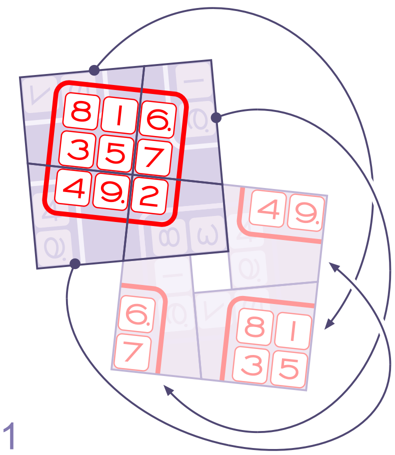
*This puzzle trick is based on the classic Four-piece Squares paradox described in Martin Gardner's *Mathematics, Magic and Mystery* book.



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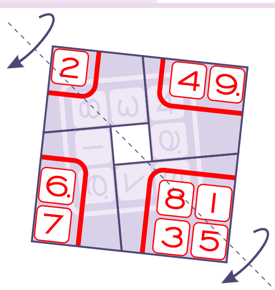
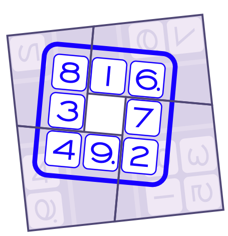
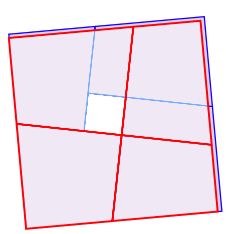


2



3



4

Where Is the 5? (secret)

This trick is based on a well-known 4-piece paradox which idea is that its pieces can be arranged into a square in two different ways as shown in Illustration 1. One way provides us with a complete square, while the second gives us a square with a little hole in it.

The first way was employed to complete the front view of our trick and then the pattern of the red magic square was depicted on it. Then the second way to form a square was employed. After that all the pieces were simultaneously flipped over and the blue magic square was drawn around the hole in the square. Surely, the number 5, which should go over the hole, is missing in the new magic square. Both front and back views of the square with the hole in it and the mutual positions of the red and blue patterns on both of its sides are shown in Illustrations 2 and 3.

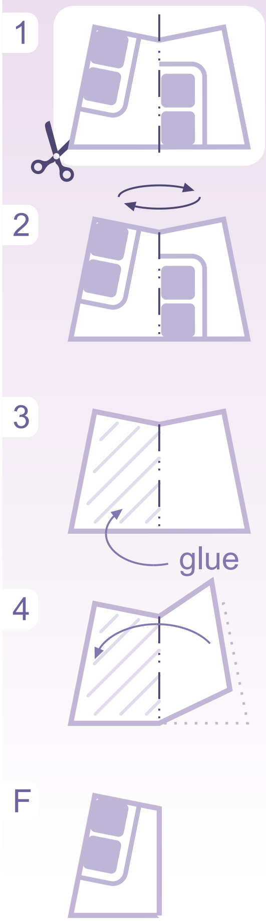
Now you can see that, in fact, in the course of this trick the 5 doesn't disappear; simply, there is no 5 on the back side of the square at all!

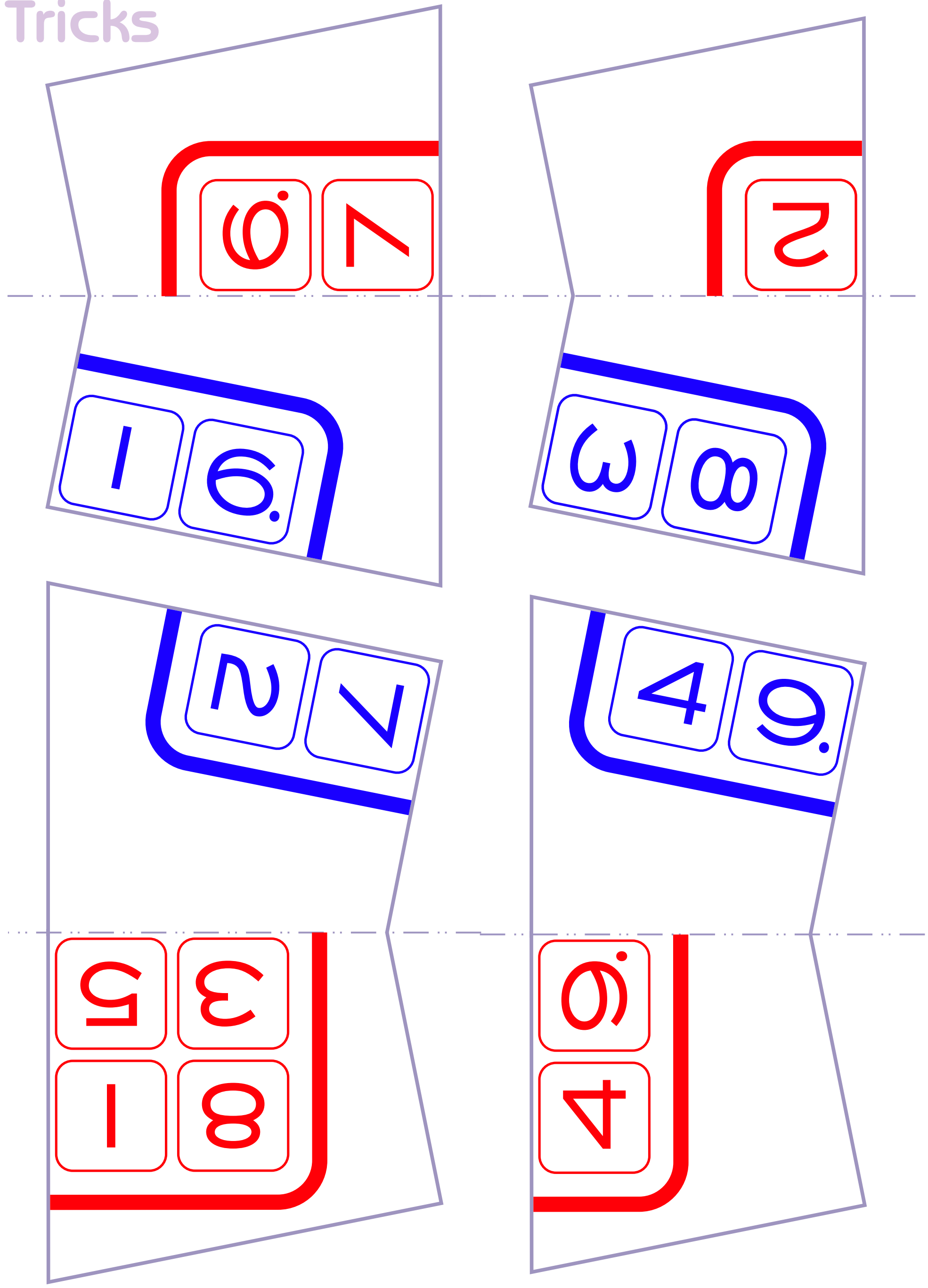
What really happens is that completing the second magic square (the blue one) on the back side of the trick we, in fact, are making another square of the same set of the four pieces, but now with a hole in it.

Since the pieces have the same area in both cases - face and back - it's obvious the square with the inner hole must have a little bigger size. The difference between the squares assembled in both ways is shown in Illustration 4.

Treasure of Classic and Modern Puzzles

Tricks





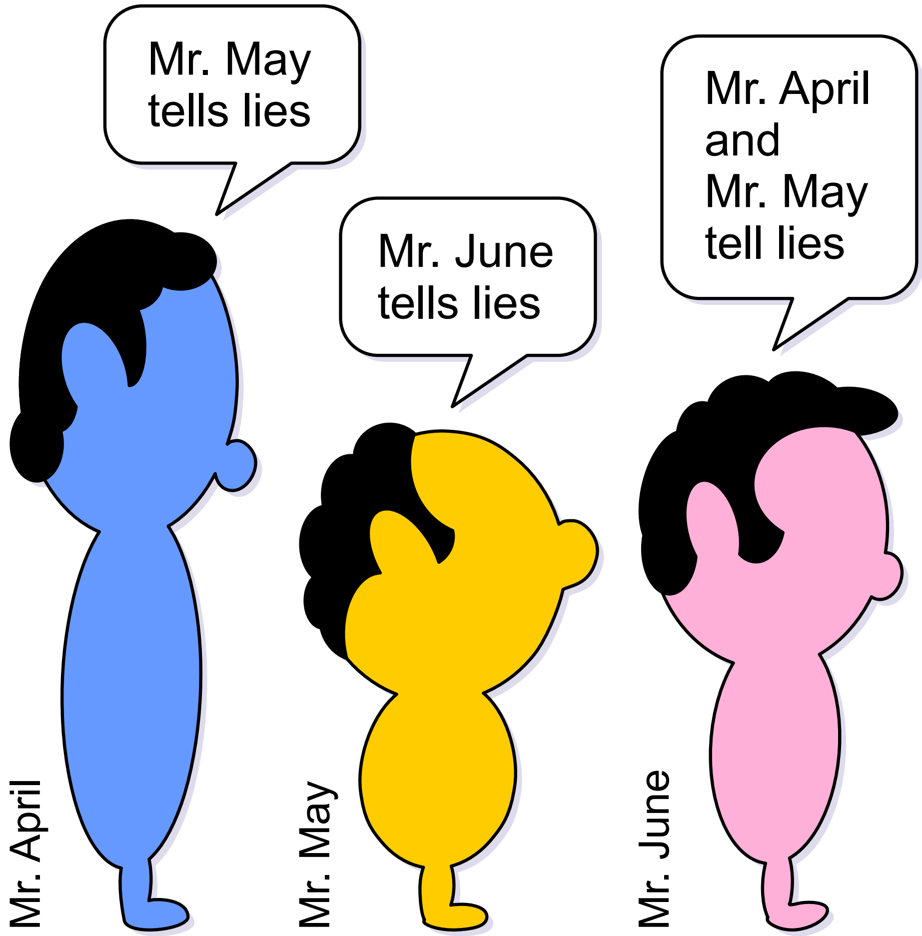
Where Is the 5? (pieces)

To produce the pieces first print them out. Then follow the diagram shown in the left column above - from step 1 to step F (finish).

Who's Telling the Truth?

after Lewis Carroll

Puzzles.COM



It is known only one character is telling the truth.

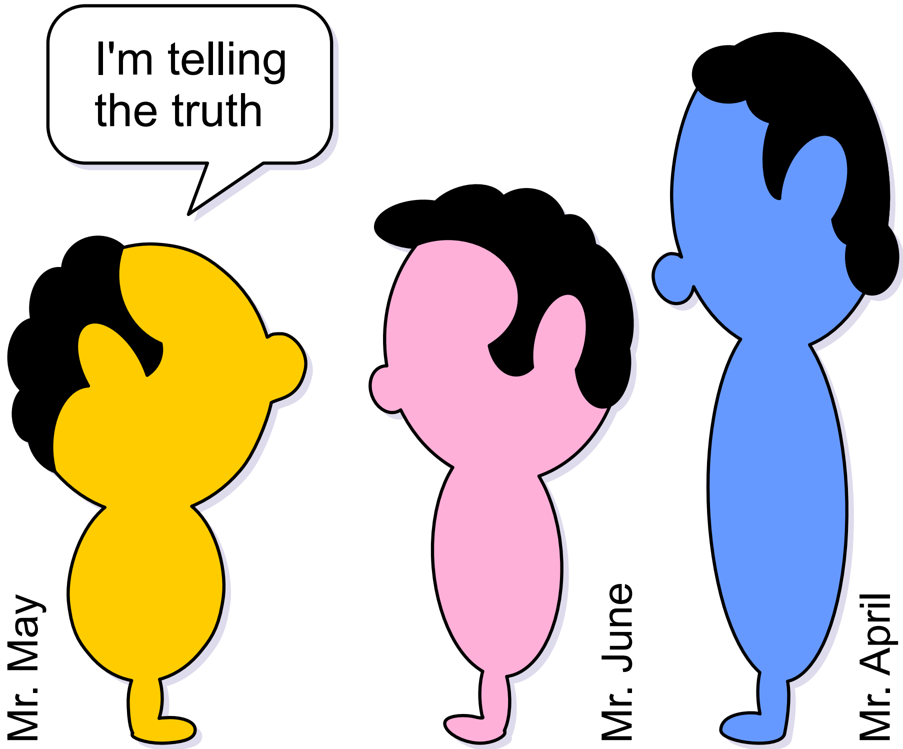
Mr. April says that Mr. May tells lies.
Mr. May says that Mr. June tells lies.
Mr. June says that both Mr. April and Mr. May tell lies.

Who is telling the truth?

Explain your answer.

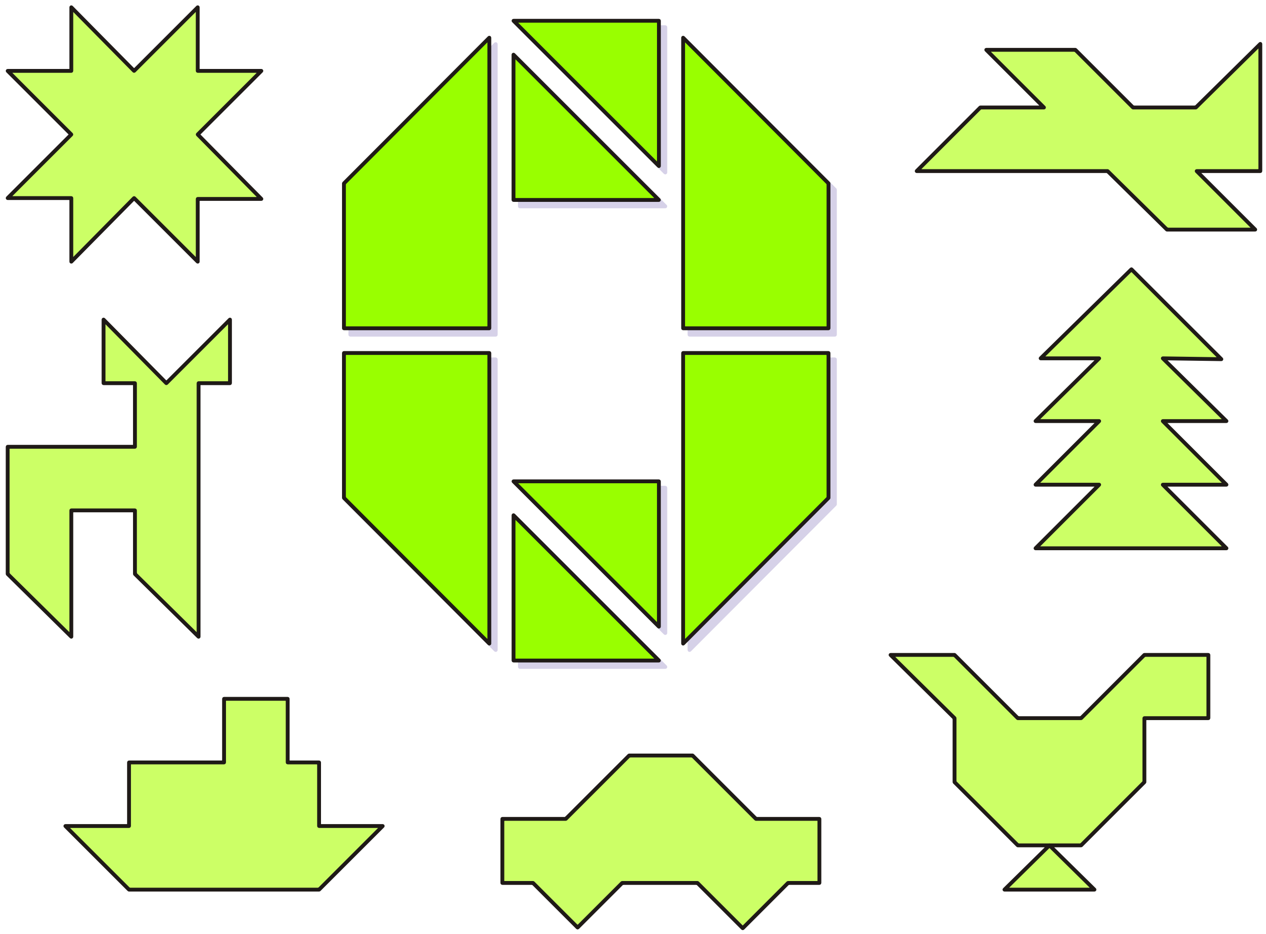
Hint: Consider whether each character in turn is telling the truth; you will end up with only one possible solution.

Posted: August 2, 2009



Mr. May is telling the truth.

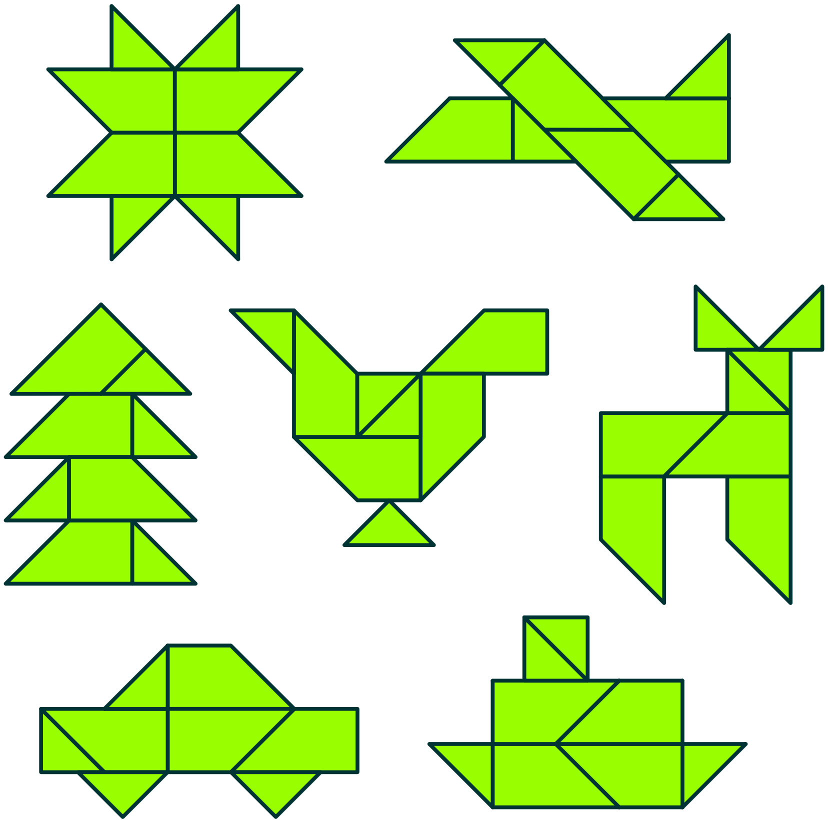
Mr. April lies when he says that Mr. May is lying. Mr. May is telling the truth when he says that Mr. June is lying. Mr. June is lying when he says both Mr. April and Mr. May are lying since one is telling the truth.



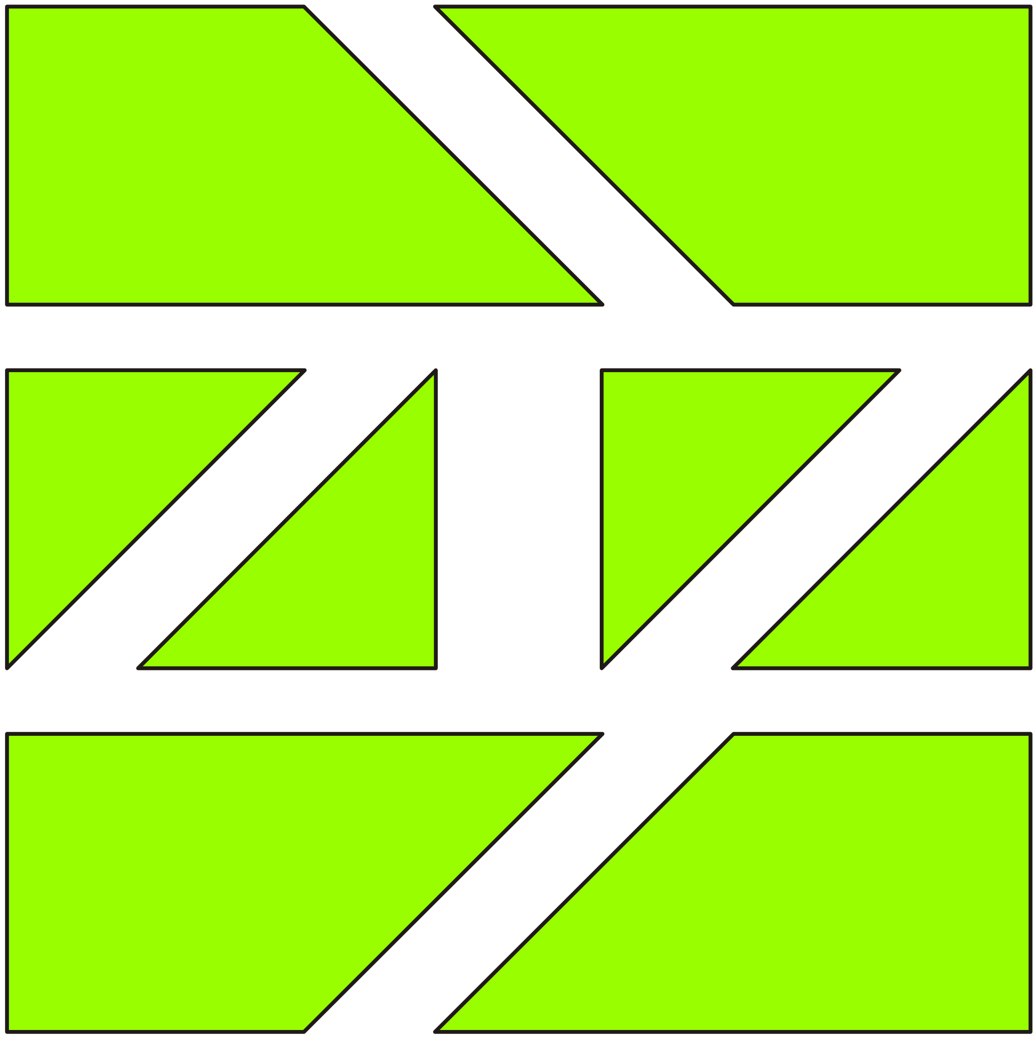
This puzzle consists of eight pieces. The pieces are designed in such a way that any small piece combined with any big one creates an 1x2 rectangle.

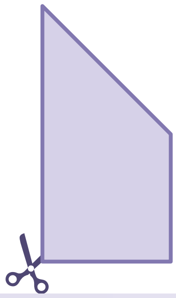
Print the pieces from the last page of this file, cut them out, and you're ready to play with this funny puzzle.

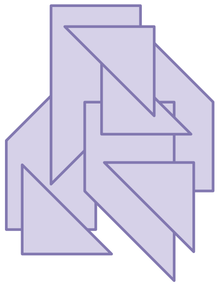
First try to assemble the shapes shown in the illustration on the left, using all the eight pieces for each of them. Then try to form new nice shapes on your own.



The solutions to all the figures are shown in the illustration.



1  x8

F 

To produce the pieces first print them out. Then follow the diagram shown above - from step 1 to step F (finish).