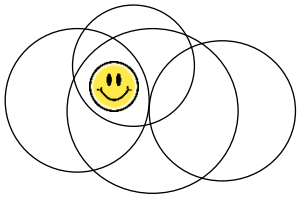
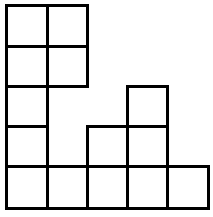
First Name: _____	**Last Name:** _____	**Grade:** _____
Teacher: _____	**Parent's email:** _____	

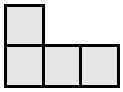
Fun Shapes

Welcome to Math Challenge #12. In this challenge, we will explore 2-dimensional shapes such as circles, squares, rectangles, and hexagons. In geometry, there are regular and irregular shapes, which are also called regular and irregular polygons. A regular polygon has all its sides equal and all its angles equal in measure. Examples of regular polygons are squares, equilateral triangles, regular pentagons, etc. An irregular polygon does not have all its sides equal and not all the angles are equal in measure. Examples of irregular polygons are right triangles, scalene triangles, rectangles and rhombi (when they are not a square), parallelograms irregular hexagons, etc.

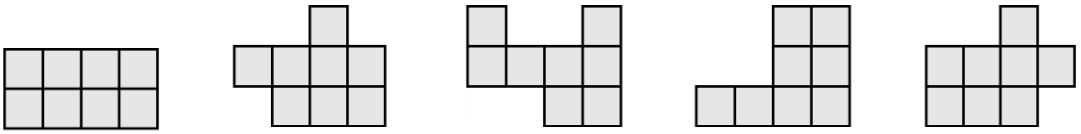
Kinder & First Grade: solve <u>at least</u> 3 problems.
Second & Third Grade: solve <u>at least</u> 7 problems.
Fourth Grade and above: solve <u>at least</u> 12 problems.

		Answer
1.	 The smiley face is inside how many circles?	
2.	When you have 2 identically-shaped cookies that you share equally with a friend, each of you will get 1 cookie. a. If you have 6 small cookies (identical in shape and size) to share equally with another friend, each of you will get ___ cookies. b. If you have one giant cookie to share with your mom equally, you will get ___ of a cookie.	*a.* *b.*
3.	How many of the following pictures have equal part of black and white area? 	
4.	A square was originally made out of 25 small squares. Some of the small squares are missing. How many small squares are missing? 	

5. Diana has a pile of identical tiles that look like this:



How many of the following shapes can Diana make without overlapping any of the pieces?



6. ● + ▲ = 8

▲ + ▲ = 12

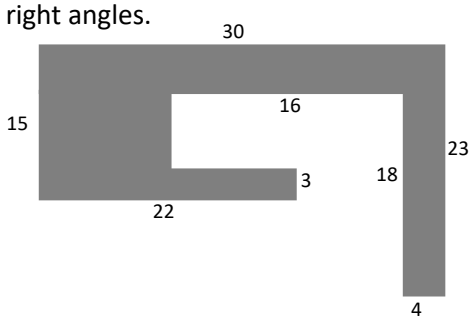
● + ● + ■ = 11

■ + ■ = ?

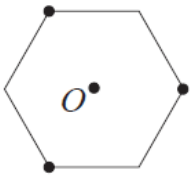
7. In the following shape below, there are 5 rectangles.

How many rectangles are there in this shape?

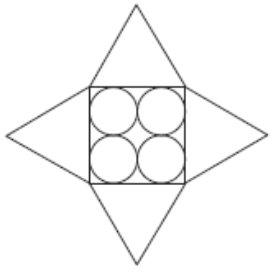
8. Find the perimeter of the figure below. All angles are right angles. Measurements are not to scale.



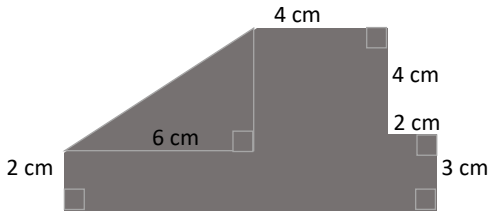
9. A piece of paper in the shape of a regular hexagon, as shown, is folded so that the three marked vertices meet at the center O of the hexagon. What is the shape of the figure that is formed?



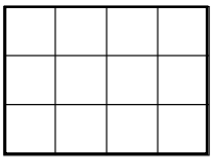
10. Four circles of radius 5 cm touch the sides of a square and each other, as shown in the diagram. On each side of the square, an equilateral triangle is drawn to form a four-pointed star. What is the perimeter of the star?



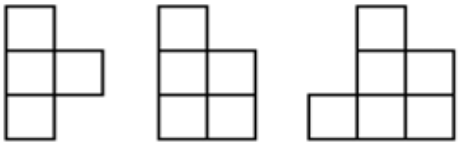
11. What is the area of the polygon shown in the figure? (Figure is not to scale)



12. The rectangle shown is divided evenly into twelve squares. Each of the twelve squares has an area of 25 square inches. What is the perimeter of the rectangle?

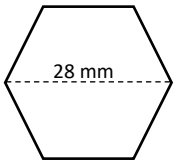


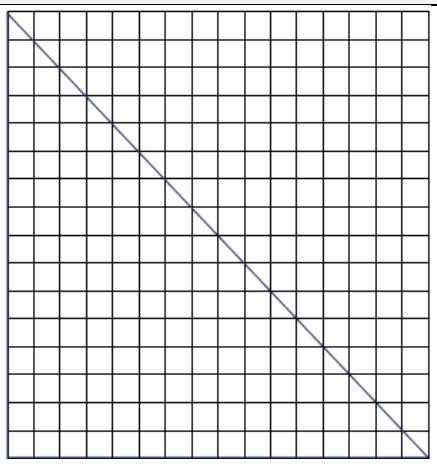
13. A three-dimensional object can be represented by different perspectives: from above (Top view), from the front (Front view), and from the side (typically, Right Side view). This figure shows you an arrangement of cubes. What is the greatest number of cubes that could be in the arrangement shown?



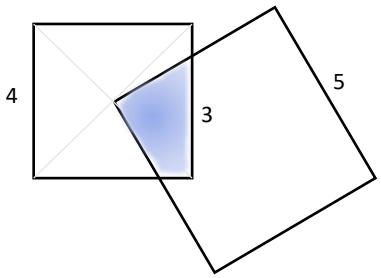
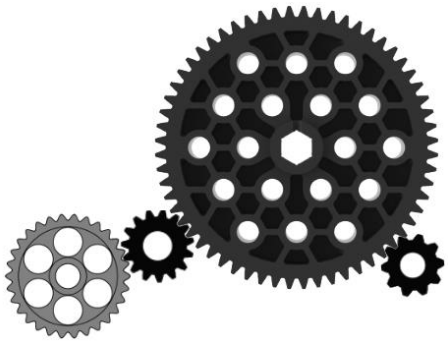
Top **Front** **Right Side**

14. The long diagonal of a regular hexagon from vertex to opposite vertex measures 28 mm. How many millimeters are in the perimeter of the hexagon?



15. 

A 16 in x 16 in square piece of paper is folded in half to form a triangle. That triangle is folded in half again three more times. If the original paper has a side length of 16 inches, what is the area of the last triangle after folding?

16.	A regular hexagon and a regular octagon, both with whole number side lengths, have the same perimeter which is between 80 cm and 100 cm. What is the number of square centimeters in the area of a square that has the same perimeter as the octagon and the hexagon?	
17.	A square with a side length of 5 is positioned with its corner in the center of another square with a side length of 4, as seen below. One side of the overlapping region is equal to 3. Find the area of overlap between the two squares. 	
18.	Four gear wheels on fixed axles are next to each other. The first wheel has 30 teeth, the second one has 15 teeth, the third one has 60 teeth, and the last one has 10 teeth. How many revolutions does the last gear wheel make when the first one turns through one revolution? 	

Solution is available on March 29, 2024
www.mathinaction.org