

Math Challenge #13



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

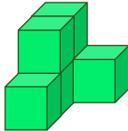
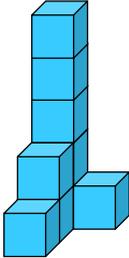
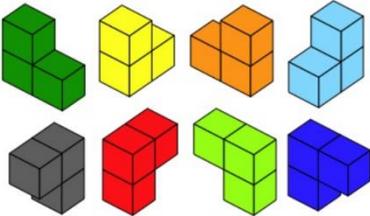
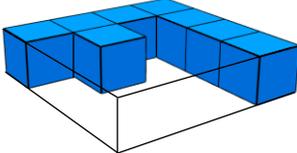
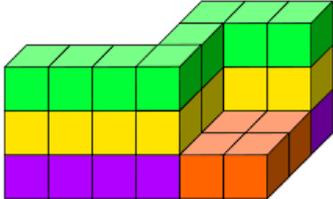
Cubes and Cuboids

Welcome to the Math Challenge #13. In this challenge, you will stretch your spatial skills as you solve problems involving cubes and cuboids. Enjoy!

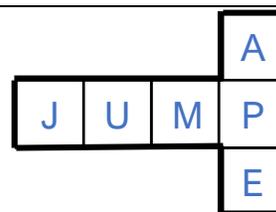
Cubes and cuboids are three-dimensional shapes that consist of six faces, eight vertices and twelve edges. The primary difference between them is **a cube has all its edges equal whereas the length, width and height of a cuboid are different.**

**Kinder & First Grade: solve at least 3 problems.
 Second & Third Grade: solve at least 7 problems.
 Fourth Grade and above: solve at least 12 problems.**

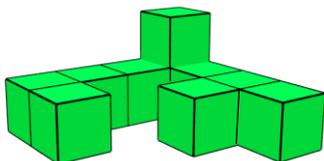
Answer

1.	Hailey stacked some cubes (see picture on the right). How many cubes did she use?		
2.	Damien would like to stack cubes to make a tower like in the picture on the right. He has only 5 cubes. How many more cubes does he need?		
3.	What is the total number of cubes needed to make all 8 figures?		
4.	How many more cubes are needed to complete this one layer of cubes?		
5.	How many cubes are needed to make the figure on the right?		

6. The figure at the right is cut out along the thick lines and folded on the thin inner lines to form a cube. Which letter will be on the face of the cube opposite the letter P?



7. How many more cubes are needed to make a large cube measuring 4 by 4 by 4 cubes?



8. At first, Dylan built figure A using all the cubes he has. Each layer had the same color cubes. He then took it apart and exchanged 2 of his red cubes for 2 green cubes and received 1 blue cube from Lisa. He then built figure B, in which each layer has the same color cubes. Find the number and the color of cubes that are not being used.

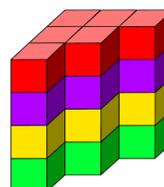


Fig. A

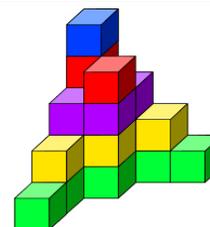
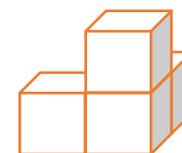
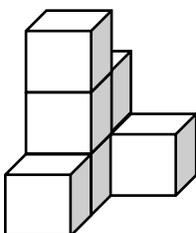


Fig. B

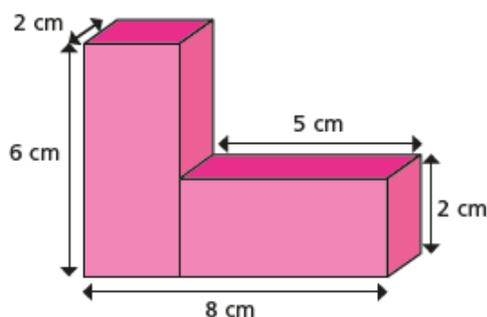
9. A cube has 6 faces. The diagram below shows a solid made by gluing four cubes together. How many square faces are there, including the bottom of the figure?



10. The figure below is made of 7 cubes glued together. If the figure is dipped in a bucket of blue paint and allowed to dry, how many square faces will have paint on them?

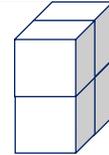


11. Calculate the total volume of the shape.



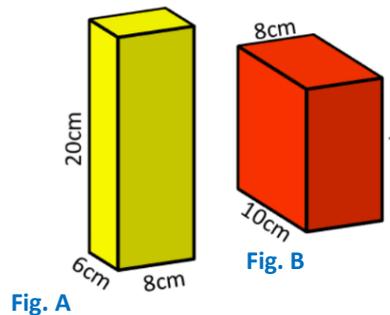
12. Tommy has a 4 by 4 by 4 cube hanging in front of him with just the front face facing him. The cube is made up of 64 cubes. Tommy drills a hole through the four corner cubes, that are facing him, all the way through the back. He then looks down on the cube, and from above he drills four holes through their four corner cubes all the way to the bottom. How many of the cubes will not have holes drilled through them?

13. Four cubes, each with a surface area of 24 cm^2 , are glued together to make a cuboid as shown. What is the surface area of this cuboid, in cm^2 ?

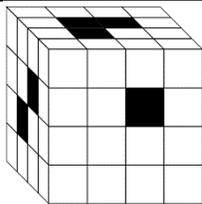


14. Oleg has a brick. The lengths of the edges, measuring in inches, are three different integers. The sum of the length of all edges is 36 inches. How many different values are possible for the volume of the brick?

15. These two cuboids have the same volume. Find the height of the red cuboid (Fig. B).



16. A rectangular solid consists of small white cubes. A number of the cubes are removed by punching out all the cubes in the designated columns from front to back, top to bottom, and side to side. Find the number of removed cubes.



17. On each face of a cube there is a different number from 1 to 6. If one of the faces is at the bottom of the cube, then the sum of the numbers on all the faces except the top and bottom is 13. But if another face is at the bottom, then the sum of the numbers on all the faces except the top and bottom is 12. What is the number written on the opposite side of the number 1?
Hint: the sum of the numbers of all the faces is 21.

18. If the figure shown is folded to form a cube, then three faces meet at every vertex. The numbers on the three faces meeting at any vertex can be multiplied together. What is the largest such product for the vertices of the cube?

