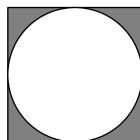


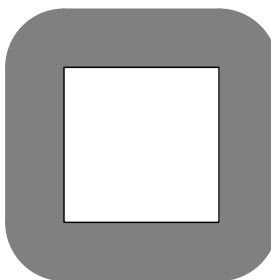


Try these problems before watching the lesson.

1. The square in the diagram below has side length 10 units. What is the area of the shaded region?



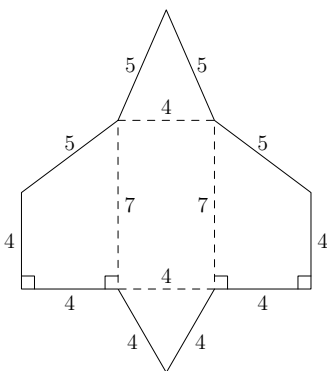
2. A 4-in. x 4-in. square is surrounded by a border consisting of all points in the plane of the square that are within 1.5 inches of the square and not in the square. In square inches, what is the area of the border? Express your answer as a decimal to the nearest tenth.



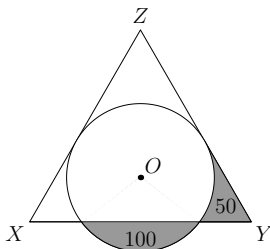
3. One face of a particular cube has an area of 81 square units. What is the volume of the cube in cubic units?
4. Suppose \overline{AB} , \overline{AC} , and \overline{AD} are edges of a cube that has side length 6 cm. What is the volume of tetrahedron $ABCD$?

 *The Problems*

First Problem: The shape below can be folded along the dashed lines and taped together along the edges to form a three-dimensional polyhedron. All lengths in the diagram are given in inches. What is the volume of the resulting polyhedron?

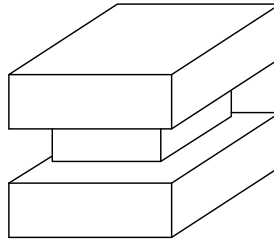


Second Problem: Circle O is tangent to two sides of equilateral triangle XYZ . If the two shaded regions have areas 50 cm^2 and 100 cm^2 as indicated, what is the ratio of the area of triangle XYZ to the area of circle O ?

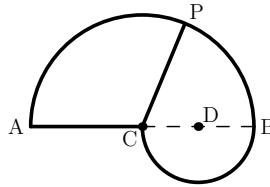


 → *Follow-up Problems*

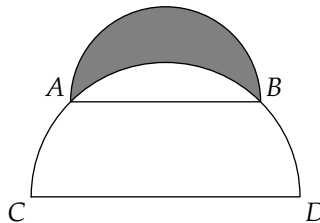
5. Twenty-two unit cubes are arranged in two square layers of nine cubes with a square layer of four cubes between them, as shown in the figure. What is the surface area of the resulting solid, in square units?



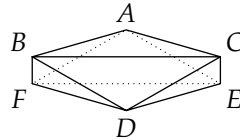
6. Segment AB has midpoint C , and segment BC has midpoint D . Semi-circles are constructed with diameters \overline{AB} and \overline{BC} to form the entire region shown. Segment CP splits the region into two sections of equal area. What is the degree measure of angle ACP ? Express your answer as a decimal to the nearest tenth.



7. The shaded shape in the diagram below is called a lune. The two arcs in the diagram are semicircles with diameters $AB = 1$ and $CD = \sqrt{2}$. What is the area of the lune?



8. Faces ABC and DEF of the polyhedron below are parallel equilateral triangles with side length $4\sqrt{2}$ units. Each of the other edges in the polyhedron has length 4 units (i.e. $AE = EC = CD = DB = BF = FA = 4$). Find the volume of the polyhedron.



Share Your Thoughts

Have some thoughts about the video? Want to discuss the problems on the Activity Sheet? Visit the MATHCOUNTS Facebook page or the Art of Problem Solving Online Community (www.artofproblemsolving.com).