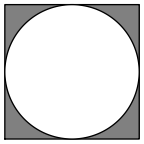
Activity Sheet for the May, 2012, MATHCOUNTS Mini

Warm-Up!

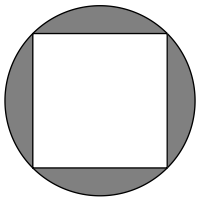
Try these problems before watching the lesson.

1. What is the area of an equilateral triangle with side length 20?

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



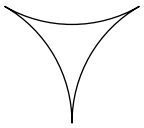
3. The square in the diagram below has side length 10 units. What is the area of the shaded region?



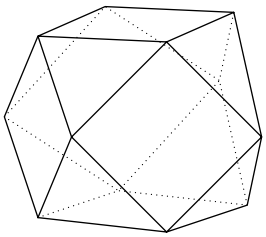
4. Suppose $\overline{AB}$, $\overline{AC}$, and $\overline{AD}$ are edges of a cube that has side length 6 cm. What is the volume of tetrahedron $ABCD$?

The Problem

First Problem: The region shown is bounded by the arcs of circles having radius 4 units, having a central angle measure of 60 degrees and intersecting at points of tangency. What is the area of the region?

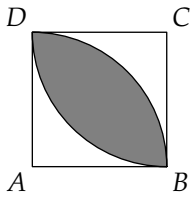


Second Problem: The solid figure shown has six faces that are squares and eight faces that are equilateral triangles. Each of the 24 edges has length 2 cm. What is the volume of the solid?

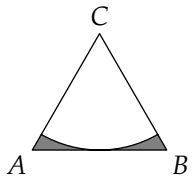


Follow-up Problems

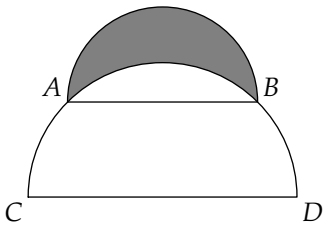
5. $ABCD$ below is a square with side length 8 units. One arc is centered at A and the other is centered at C. What is the area of the shaded region?



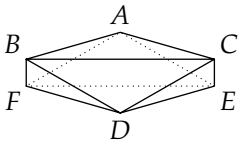
6. Triangle ABC below is equilateral. The arc is centered at point C and is tangent to $\overline{AB}$. IF $AB = 6$, then what is the total area of the shaded regions?



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).