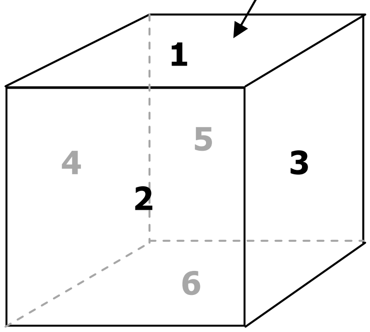
Surface Area

A cube has 6 faces which are squares. (A face is a “side” of a geometric solid.)

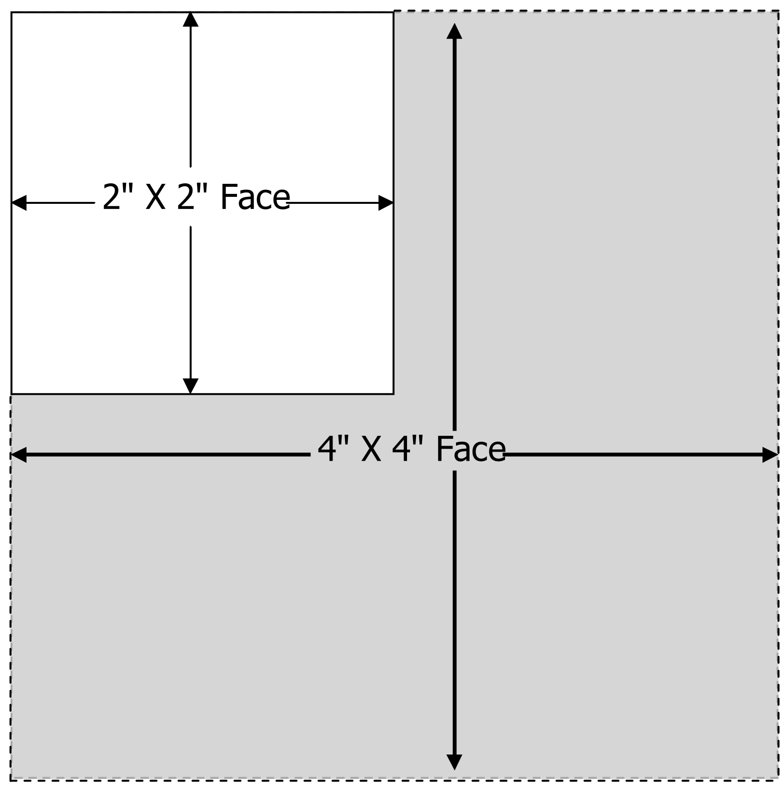


If the measurement of one of the squares on this cube is 2" X 2", what is the ***area*** of one of the faces?

What do you think you would have to do to find the area of the entire surface of the cube? (Clue: Remember there are six faces.)

What do you think happens to the surface area if the measure of one face is increased by two inches, both length and width? Instead of the face being 2" X 2", it is now 4" X 4" ?

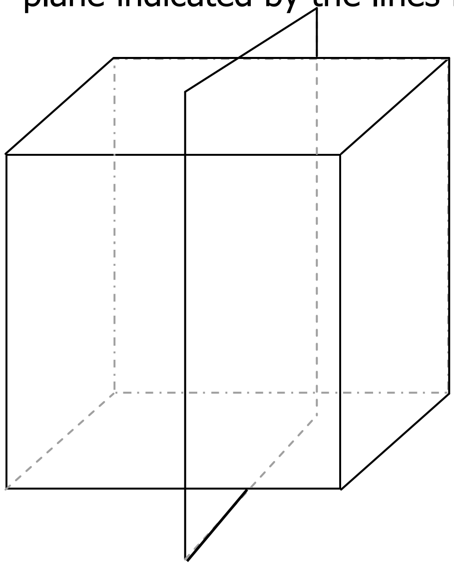
What happens to the ***surface area***?

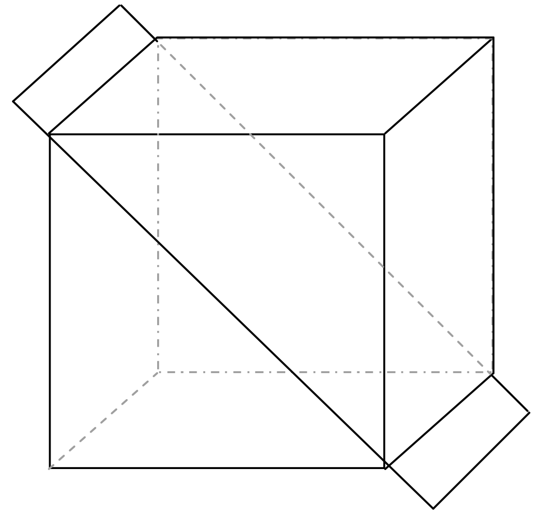


Make a table to show the relationship between the area of the cube’s face and the surface area of a cube.

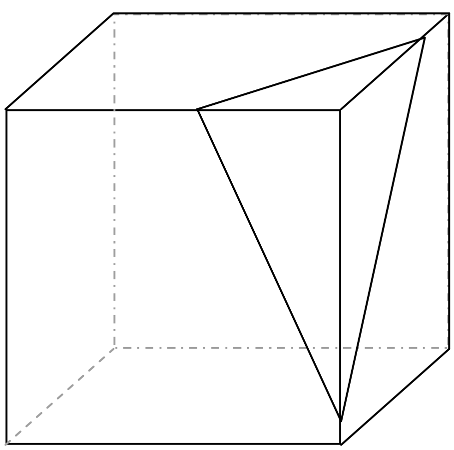
Cross Sections

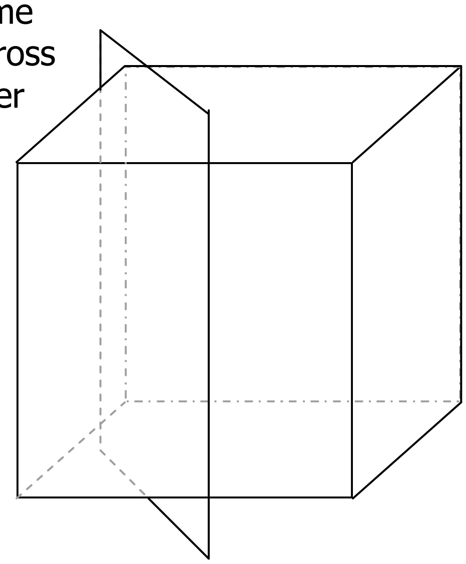
For each of the solids (cubes) below, draw the cross section formed when the plane indicated by the lines intersects the cube.





See if you can come up with another cross section. What other geometric figures might result from slicing a cube?

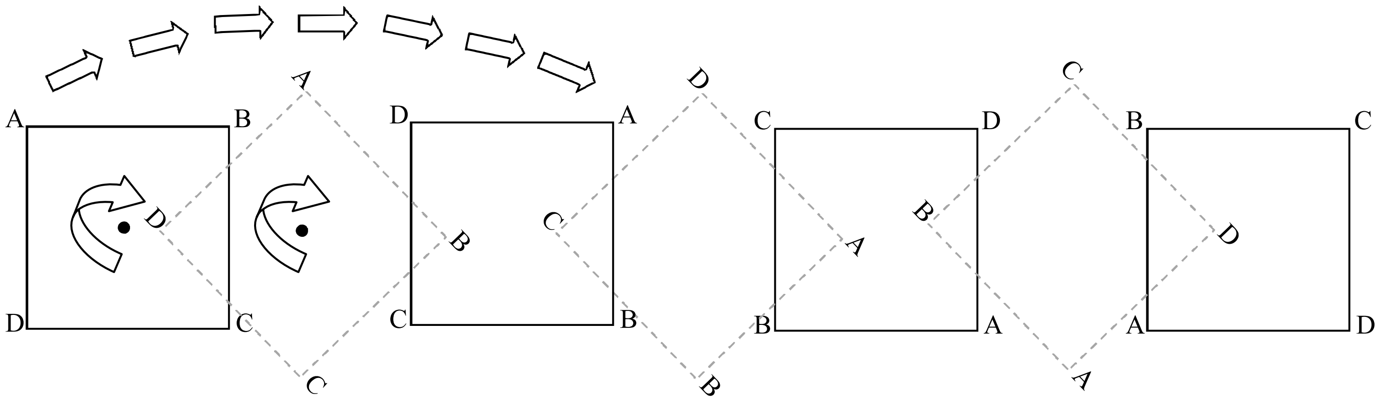




Navigating through Geometry in Grades 6-8, NCTM; ***Geometry to Go***, Great Source

Rotational Symmetry

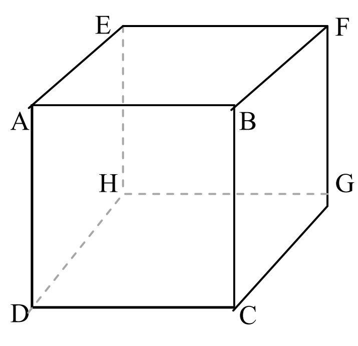
If you can rotate a figure and it “maps” onto itself, that figure displays rotational symmetry. The face of a cube is a square. If you rotate a square 90°around an axis point, it will look just like it did before you rotated it.



If you rotate the square 90°, you will be able to see where the original vertices are located. The square maps itself. You could lay the rotated figure on top of the original and they would match exactly.

If you rotate the square 180°, you will be able to see where the original vertices are located. The square maps itself.

What is the degree of rotation before you return to the original position?



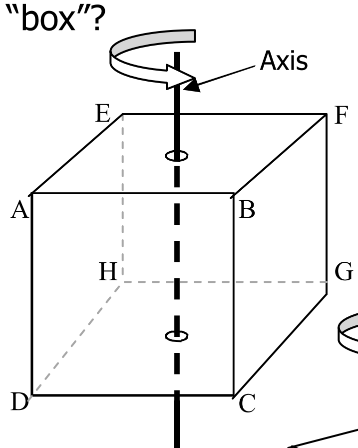
So...what happens if you rotate a cube? Does this figure have rotational symmetry? Does it map itself when you rotate the figure 90°? Are there any axis around which to turn a cube and still demonstrate rotational symmetry?

Geometry to Go, Great Source

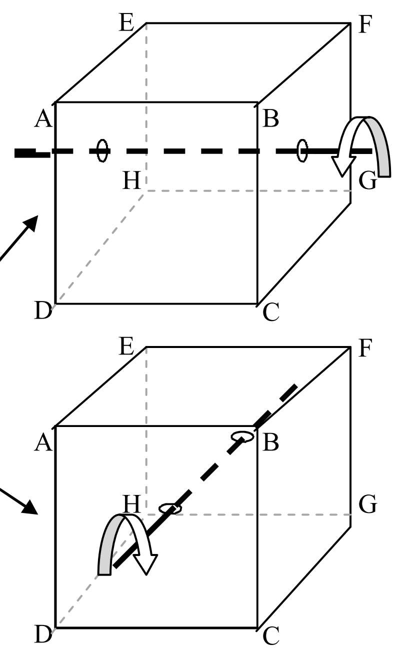
Rotational Symmetry

“A good way to understand rotational symmetry is to take a shape with rotational symmetry, such as a square, and trace around it on a piece of paper. Call this tracing the shape’s ‘box’. The order of rotational symmetry will be the number of ways that the shape can fit into its box without flipping it over. A square has rotational symmetry of *order* 4, whereas an equilateral triangle has rotational symmetry of *order* 3...Some books would call *order* 2 symmetry 180-degree symmetry. The number of degrees refers to the smallest angle of rotation required before the shape matches itself or fits into its box. A square has 90-degree rotational symmetry.” *(Van de Walle, p.210)*

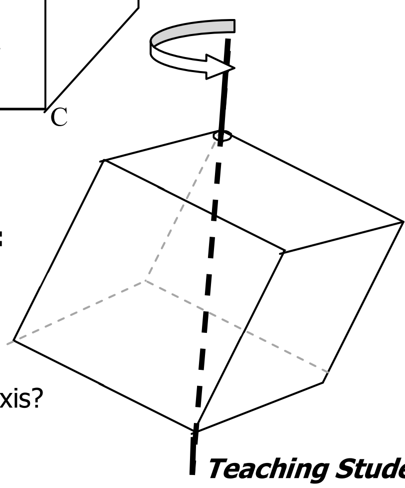
Plane figures have point symmetry; they rotate around a point. Solid figures rotate around an axis. How many times could you rotate this cube on its axis and have the solid return to its “box”?



With face AEFB on top, this cube can be rotated four times. Through this axis the order of rotational symmetry is *order* 4.



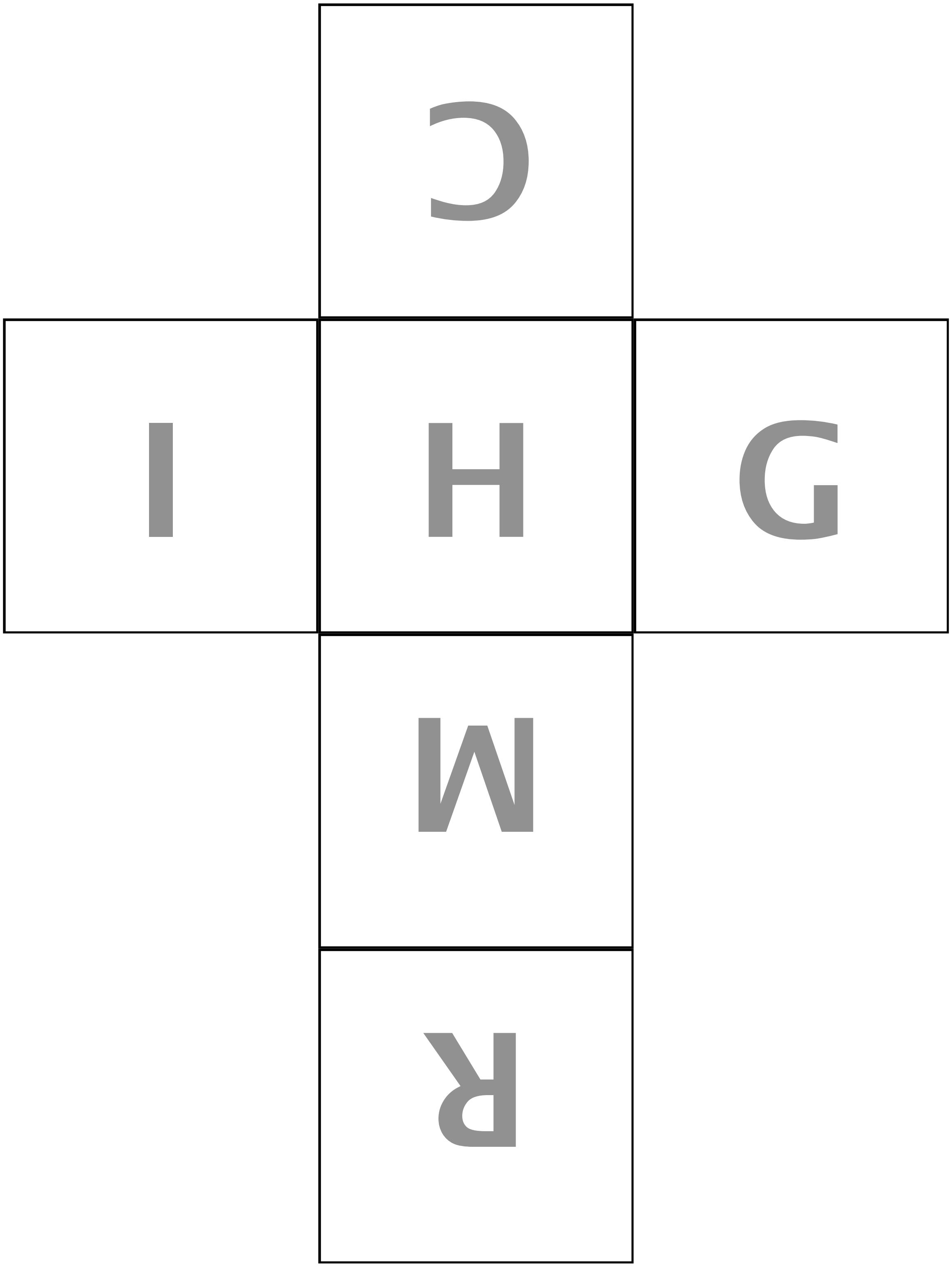
What about the order of rotational symmetry in these cubes?



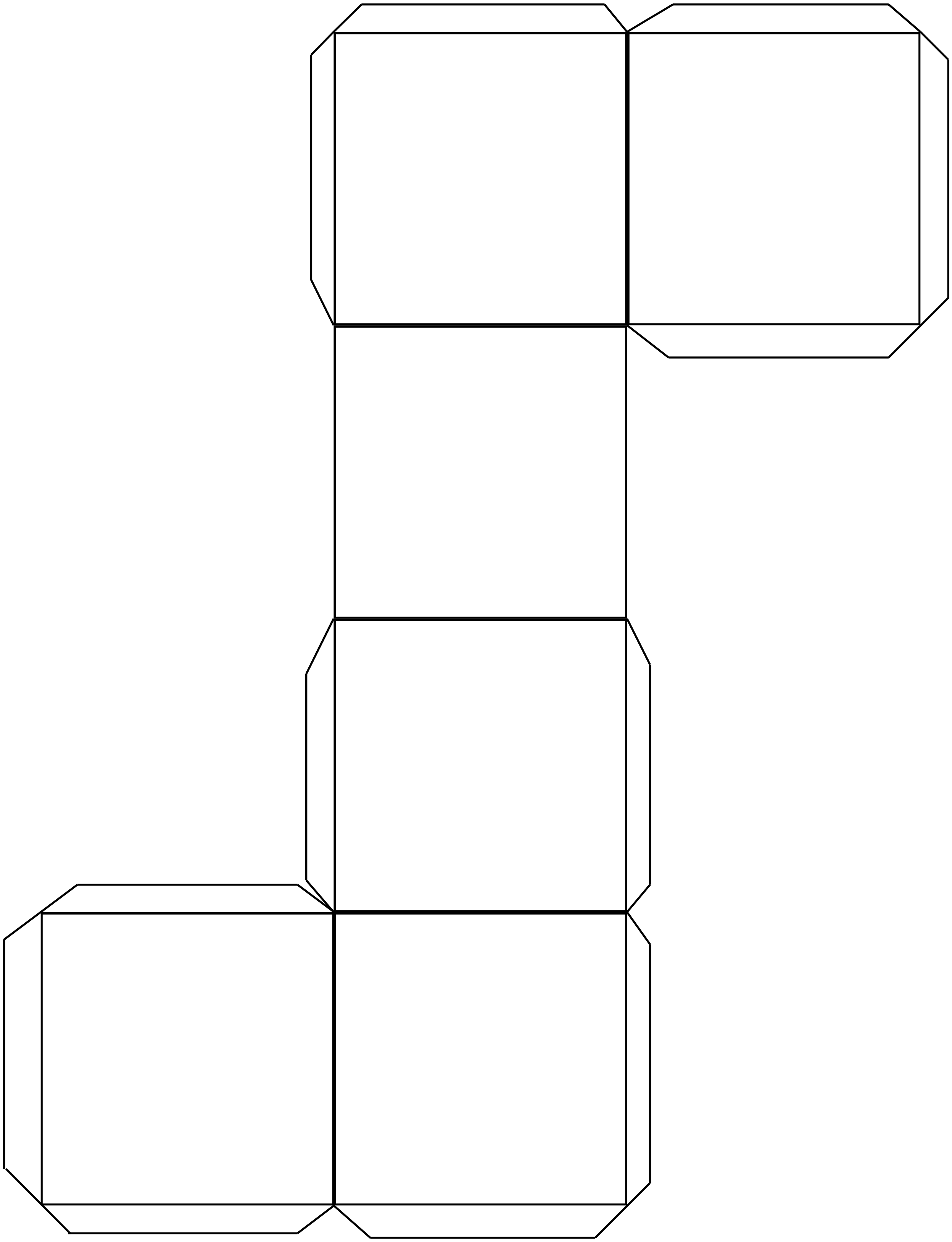
CHALLENGE:
What is the rotational symmetry of this cube through this axis?

Teaching Student-Centered Mathematics Grades 5-8, John A. Van de Walle

Cube Net



Cube Net



Source Citations

In this packet you will find copies of the bulletin board display activities, as well as copies of the sources used to create them.

Activity	Source	Pages
Nets for Cubes	Harcourt School Publishers Website: http://www.learner.org ***Geometry to Go***, Great Source (Handbook) ***Geometry to Go***, Great Source (Teacher Resource)	 p. 336 pp. 188-189
Cross Sections	***Navigating Through Geometry***, NCTM ***Geometry to Go***, Great Source (Handbook) ***Geometry to Go***, Great Source (Teacher Resource)	pp. 67-68, 115 p. 337 p. 185
Rotational Symmetry	***Geometry to Go***, Great Source (Handbook) ***Geometry to Go***, Great Source (Teacher Resource) ***Navigating Through Geometry***, NCTM ***Teaching Student-Centered Mathematics, Grades 5-8***, J.A. Van de Walle and L. H. Lovin	p. 285 p. 167 pp. 52-55, 110-111 p. 211