QUANTITATIVE AND SYMBOLIC REASONING CENTER
HAMILTON COLLEGE

Mathematical Review:
Geometry

Formulas For Area, Surface Area, Perimeter, Circumference, and Volume

Square
Area: $A = s^2$
Perimeter: $P = 4s$

Cube
Volume: $V = s^3$
Surface Area: $S = 6s^2$

Rectangle
Area: $A = LW$
Perimeter: $P = 2L + 2W$

Parallelogram
Area: $A = bh$

Triangle
Area: $A = \frac{1}{2}bh$

Right Triangle
Pythagorean Theorem: $c^2 = a^2 + b^2$

Circle
Area: $A = \pi r^2$
Circumference: $C = 2\pi r$

Sphere
Volume: $V = \frac{4}{3}\pi r^3$
Surface Area: $S = 4\pi r^2$

Right Circular Cylinder
Volume: $V = \pi r^2 h$
Area: $2\pi rh + 2\pi r^2$

Cone
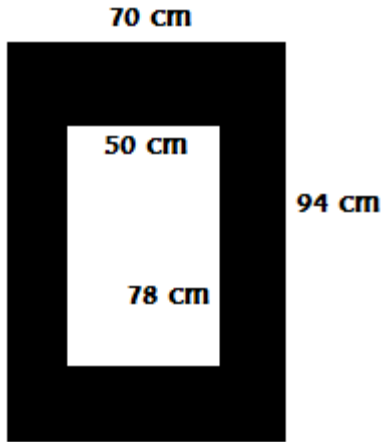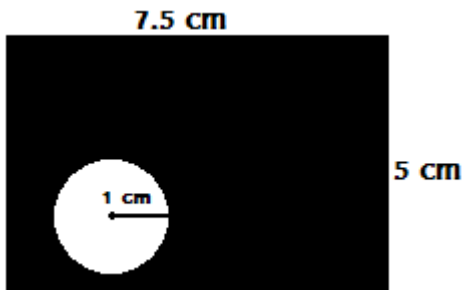Volume: $V = \frac{1}{3}\pi r^2 h$

Box
Volume: $V = lwh$

Practice:

I. Find the area of the shaded parts of the following shapes. In many cases you will find the desired area by subtracting the area of an inner figure from the area of an outer figure.
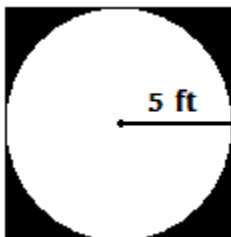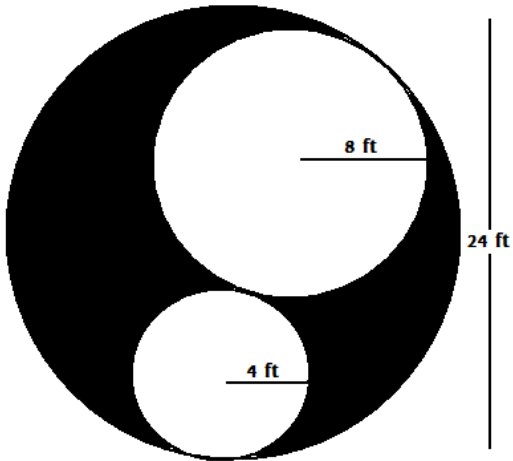
a.

70 cm

50 cm

94 cm

78 cm
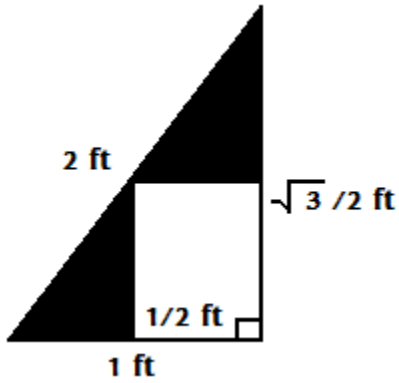
b.

7.5 cm

5 cm

1 cm

c.

5 ft

d.

e.

II. Suppose you take a wire coat hanger and straighten it out into a strip of wire 40 inches long. Now you want to bend it into the shape of a rectangle in such a way that the enclosed area will be the largest rectangular area that can be enclosed by this piece of wire.

Remember that the wire is 40 inches long; this means that the perimeter of the rectangle must equal 40! Suggest 5 different possible pairs of values for L and W, and calculate the areas of each. What dimensions do you think will produce the maximum area?

Length (L)	Width (W)	Area (A)

III. Which cereal container can contain the greater volume of contents: a cylindrical container of Quaker Oats that is 9" high with a radius of 2.5", or a box of Lucky Charms that is 2.25" x 7" x 11"?

IV. The community farm is putting a fence up around their garden. If they have 100 feet of fencing, what dimensions will provide a garden with the maximum enclosed area?

V. Suppose we took the 40 inches of wire from previously and cut it into two pieces, bending one into a circle and the other into a square. What should the dimensions of the circle and the square be so that the resulting combined enclosed areas are as large as possible?

VI. Physical Plant is putting a 2-inch layer of topsoil over the entire backyard of Roger's before planting grass. However, the company that Physical Plant ordered the soil from left it in a big pile (cone) in the driveway. Is there enough topsoil to do the job?

18 ft

8 ft

20 ft

36 ft

6 ft

Circumference = 25 ft
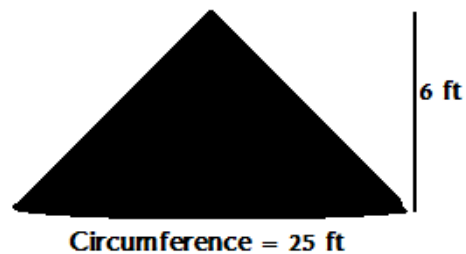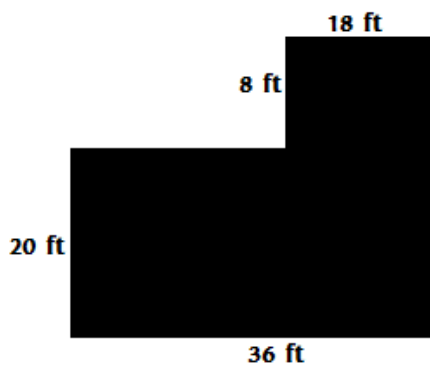
VII. What happens to the area of a rectangle if you
- double its length?
- double both its length and width?
- triple both it length and width?

VIII. Look at the formulas for the volume of a box and the volume of a cylinder. How can you think of the volume as the product of an area times a length? Make up a rule that describes the result of your thinking. Does this rule apply to the volume of a cone? Explain.

IX. Student Activities has some money left over in their budget this year, so they have decided to build an outdoor swimming pool in front of Dunham. The pool is to be 30 feet wide and 45 feet long. When full, it will be 2 feet deep at the shallow end and 7 feet deep at the deep end. The bottom will be an inclined plane.

a. How many cubic feet of water will be necessary to fill the pool?
b. How much will it cost to fill up the pool if water costs $0.003342 per gallon?