# Mathematics II Resources for EOC Remediation

**G-GMD Measurement & Dimension Cluster:**

**G-GMD.A.1**

**G-GMD.A.3**

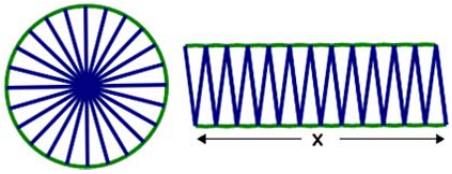
The information in this document is intended to demonstrate the depth and rigor of the Nevada Academic Content Standards. The items are **not** to be interpreted as indicative of items on the EOC exam. These are a collection of standard-based items for students and **only** include those standards selected for the Math II EOC examination.

*Initial Draft: Dec. 2016*

## *G-GMD Measurement & Dimension Cluster*

**G-MD.A.1 Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.** ***Use dissection arguments, Cavalieri's principle, and informal limit arguments.***

1. A circle with a radius of 5 was divided into 24 congruent sectors. The sectors were rearranged, as shown in the diagram below.




To the nearest integer, the value of *x* is:

A. 31 B. 16 C. 12 D. 10

**Answer:** B

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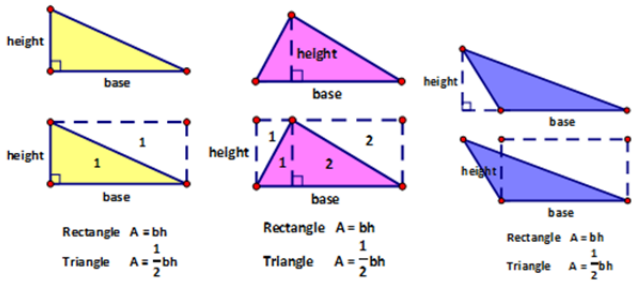
2. **Part A:** Describe how you can derive the formula for the area of a triangle from the rectangle formula.

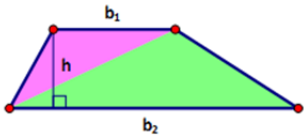
**Part B:** Describe how you can derive the formula for the area of a trapezoid from the triangle formula.

**Part C:** Describe how you can derive the formula for the area of a circle from the parallelogram formula.

**Answer:** Part A:




Part B:

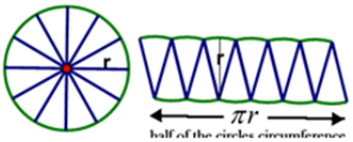



$$Area_{triangle} + Area_{triangle} = Area_{trapezoid}$$

$$\frac{1}{2}b_1h + \frac{1}{2}b_2h = Area_{trapezoid}$$

$$\frac{1}{2}h(b_1 + b_2) = Area_{trapezoid}$$

Part C:




$$Area_{parallelogram} = bh$$

$$Area_{parallelogram} = (\pi r)r$$

$$Area_{parallelogram} = \pi r^2$$

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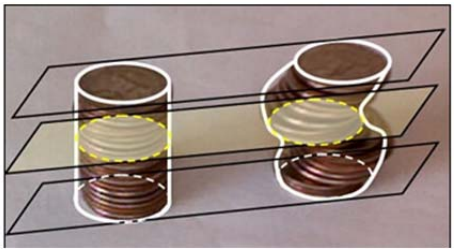
3. Two series of coins are shown below. One is stacked to represent a right circular cylinder and in the other one, the coins are "slid" to represent a distorted cylinder. The same number of congruent coins was used in each stack. Which of the following statements will be TRUE regarding these stacks of coins? Make sure to select **ALL** items that apply.



A. The volume of both stacks will be the same.
B. The area of a cross section parallel to the bases will not be equal due to the distorted nature of the second stack.
C. The height of the distorted stack will be slightly larger than that of the straight stack.
D. Cavalieri's Principle can be used in this situation to verify that the volumes of the stacks are equal.

**Answer:** A and D

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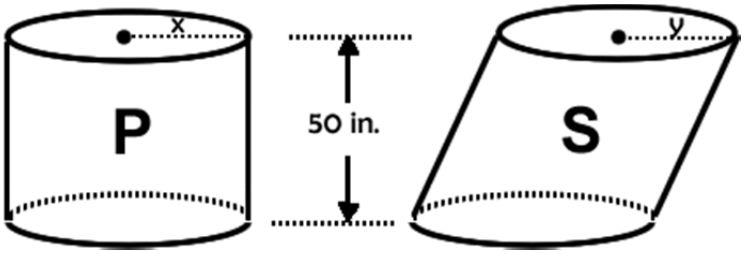
4. Two cylinders each with a height of 50 inches are shown.




Which statements about cylinders *P* and *S* are true?

Select **ALL** that apply.

A. If $x = y$, the volume of cylinder *P* is greater than the volume of cylinder *S*, because cylinder *P* is a right cylinder.

B. If $x = y$, the volume of cylinder *P* is equal to the volume of cylinder *S*, because the cylinders are the same height.

C. If $x = y$, the volume of cylinder *P* is less than the volume of cylinder *S*, because cylinder *S* is slanted.

D. If $x < y$, the area of a horizontal cross section of cylinder *P* is greater than the area of a horizontal cross section of cylinder *S*.

E. If $x < y$, the area of a horizontal cross section of cylinder *P* is equal to the area of a horizontal cross section of cylinder *S*.

F. If $x < y$, the area of a horizontal cross section of cylinder *P* is less than the area of a horizontal cross section of cylinder *S*.

**Answer:** B and F

**G-MD.A.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.***

1. A carpenter made a storage container in the shape of a rectangular prism. It is 5 feet high and has a volume of 720 cubic feet. He wants to make a second container with the same height and volume as the first one, but in the shape of a triangular pyramid. What will be the number of square feet in the area of the base of the new container?

A. 48 B. 144 C. 240 D. 432

**Answer:** D

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2. The radius of sphere *Y* is twice the radius of the sphere *X*. A student claims that the volume of sphere *Y* must be exactly twice the volume of sphere *X*. Given that the radius of sphere *X* is *r*, determine if this conjecture is true, false or cannot be determined. Show your work.

**Answer:** $\frac{4}{3}\pi r^3 \Rightarrow \frac{4}{3}\pi(2r)^3 = \frac{4}{3}\pi(8)^3 \Rightarrow \frac{4}{3}\pi r^3 : \frac{4}{3}\pi(8)r^3$ $1:8$. The answer is false.

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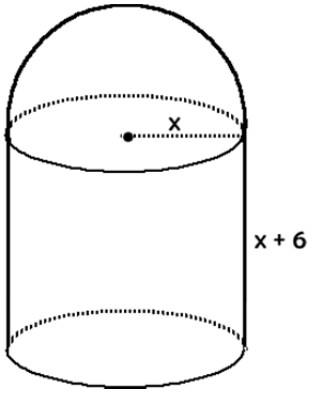
3. Determine an expression in terms of *x* that represents the volume of the given solid.




**Answer:** $\frac{5}{3}\pi x^3 + 6\pi x^2$ or any equivalent expressions

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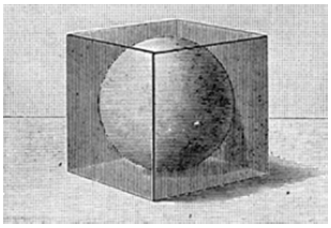

4. Bill has a signed baseball that just fits inside a clear cube display. The diagonal of one side of the cube is $3\sqrt{2}$ inches.

**Part A:** If the ball just touches all 6 faces of the cube perfectly, determine the volume of the baseball. (round to the nearest cubic inch)

**Part B:** What is the approximate difference in volumes between the cube and the baseball? (round to the nearest cubic inch)

**Answer:** Part A: 14 $in^3$, Part B: 13 $in^3$

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5. Max wants to design a right cylindrical container with volume 90 $in^3$. The height has to be 3.5 times the radius. (Part A, B and C are connected questions and answers carry from one to the other.)

**Part A:** What is the radius of the cylinder? (round to the nearest tenth)

**Part B:** Max wants to place an Egyptian rectangular pyramid model inside the cylinder. Below is some information about the pyramid. What is the volume of the pyramid? (round to the nearest tenth)

The width is $\frac{1}{2}$ the diameter of the cylinder.

The length is 1.5 times the width.

The height of the pyramid is $\frac{5}{7}$ of the height of the cylinder.

**Part C:** What is the fraction of the volume of the rectangular pyramid compared to the cylinder?

**Answer:** Part A: $r$ = 2.0 in, Part B: 10 $units^2$, Part C: $\frac{1}{9}$

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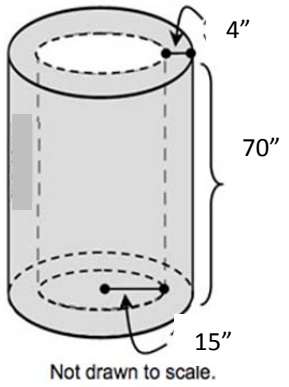
6. An insulating blanket is used to wrap the lateral surface of a water heater to help improve efficiency. The hot water tank is a cylinder with a 15 inch radius and a 70 inch height. The blanket is 4 inches thick. The material inside the insulating blank is a fiberglass composite. How many cubic **feet** of fiberglass composite are needed to create the blanket?




**Answer:** 17.3 $ft^3$

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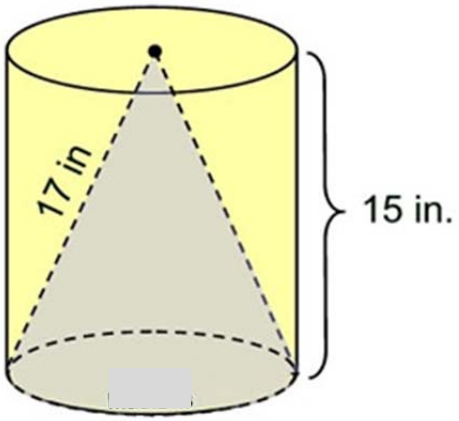
7. The diagram at the right shows a right circular cylinder and a right circular cone with congruent bases and equal heights. If the cone section is removed from the cylinder, find the volume of the remaining section of the cylinder.

A. $320\pi$ $in^3$ B. $640\pi$ $in^3$ C. $960\pi$ $in^3$ D. $1280\pi$ $in^3$




**Answer:** B

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