Day 4: Volume Applications

Date_____

Answer the questions that follow for the given description of a 3D object.

1) You have a rectangular pyramid with a base that measures 8 in by 7 in and has a height of 6 in.

What is the volume of this pyramid?

$V = \frac{1}{3}Bh$

$V = \frac{1}{3}(B)h$

$B = \frac{1}{2}\ell w$

$B = \ell w$

$B = \frac{1}{2} \cdot b \cdot a$ #6

If the height of the pyramid is doubled, then what is the new volume?

$V = \frac{1}{3} \cdot \ell \cdot w \cdot h \cdot 2$

$V = \ell \cdot \frac{1}{3} \cdot h \cdot w \cdot 2$

$V = w \cdot \ell \cdot h \cdot \frac{1}{3} \cdot 2$

multiplication is commutative; order doesn't matter

What about doubling the longest side of the base, then what is the new volume?

Double the volume.

Which affected the volume more? Doubling the height or the longest side of the base? Why?

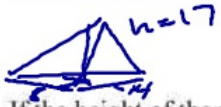
_____

_____

_____

2) You have a triangular pyramid with a height of 17 cm. The triangular base has a base length of 14 cm and a base height of 8 cm.

What is the volume of this pyramid?



$V = \frac{1}{3}(\frac{1}{2}\ell \cdot w)h \cdot 2$

$= \frac{1}{3}(\frac{1}{2} \cdot 14 \cdot 8)(17 \cdot 2)$

34

If the height of the pyramid is doubled, then what is the new volume?

$= \frac{1}{3}(\frac{1}{2} \cdot 14 \cdot 8)(34)$

Does doubling the height, double the volume of the pyramid? Why? _____

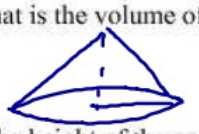
_____

_____

_____

3) You have a cone with a height of 11 cm and a radius of 3 cm.

What is the volume of the cone?



$V = \frac{1}{3}\pi(r^2)h$

If the height of the cone doubles, then what is the new volume?

$V = \frac{1}{3}\pi r^2 \cdot 2h$

If the radius of the cone is doubled, then what is the new volume?

$V = \frac{1}{3}\pi (2r)^2 h$

$= \frac{1}{3}\pi (4r^2) h$

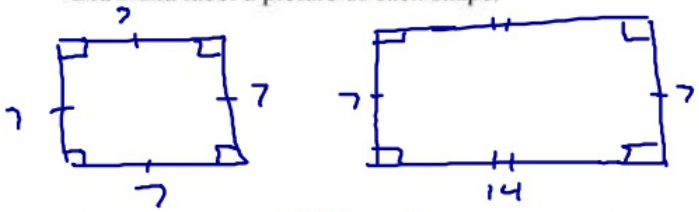
Which affects the volume more? Doubling the height or doubling the radius? Why? _____

_____

_____

_____

4) A square has a side length of 7 units and a rectangle has a length of 14 units and width of 7 units. Draw and label a picture of each shape.



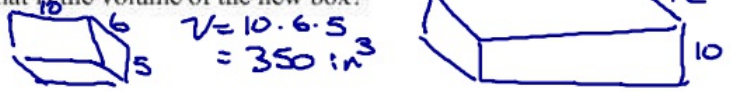
Area of square: 49 units Area of rectangle: 98 units

Which of the following is true:

a. The area of the square is twice the area of the rectangle
b. The area of the square is one-half the area of the rectangle
c. The area of the square is one-third the area of the rectangle
d. The area of the square is one-fourth the area of the rectangle

5) A company was trying to find a better box to hold more of their product when shipping it to the local stores. The original box had a width of 6 inches, a length of 10 inches, and a height of 5 inches. The designers of the new box decided to double all the dimensions.

What is the volume of the new box?



$V = 10 \cdot 6 \cdot 5$

$= 350 \text{ in}^3$

$V = 20 \cdot 12 \cdot 10$

$= 2400 \text{ in}^3$

How much larger is the new box than the original box? Why?

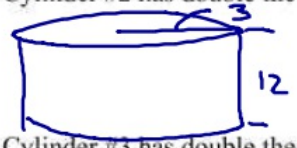
$\frac{2400}{350} = \frac{8}{1}$

6) Cylinder #1 has a radius of 3 feet and a height of 6 feet. Calculate the volume of cylinder #1.

$V = \pi (3)^2 \cdot 6$

$= 169.56 \text{ ft}^3$

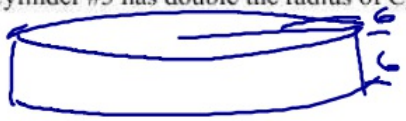
Cylinder #2 has double the height of Cylinder #1. How does that change the volume?



$V = \pi (3)^2 \cdot 12$

$= 339.12 \text{ ft}^3$

Cylinder #3 has double the radius of Cylinder #1. How does that change the volume?



$V = \pi (6)^2 \cdot 6$

$= 678.24 \text{ ft}^3$

Why is it different when you double the height versus doubling the radius? _____

_____

_____

_____

Cylinder #4 has double the radius AND triple the height of Cylinder #1. How does that change the volume? Why?

7) Jimmy has a tennis ball that has a diameter of 2.7 inches. What is the volume?

Jimmy's dog has a toy tennis ball that has a diameter 2 times as big as Jimmy's tennis ball. What is the volume of the toy tennis ball?

How does the volume of Jimmy's tennis ball relate to his dog's?