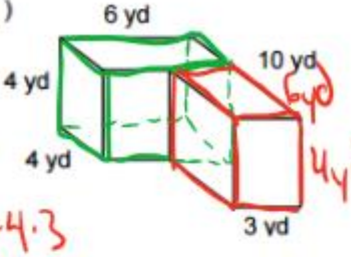
# Review for Volume, Cross sections, and 2D to 3D

You will need a separate sheet of paper to complete the following problems.

$V_{cylinder} = \pi(9)^2 \cdot 3$
$= 243\pi$

Find the volume of the below composite figures. $V_{Total} = 79\pi$

1.)

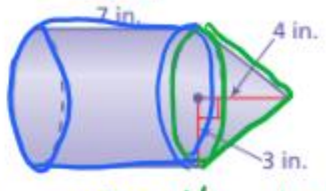



$V_{prism} = 6 \cdot 4 \cdot 4$
$= 96 yd^3$

$V_{prism} = 6 \cdot 4 \cdot 3$
$= 72 yd^3$

$V_{Total} = 178 yd^3$

2.




$V_{cylinder} = \pi(3)^2 \cdot 7$
$= 63\pi$

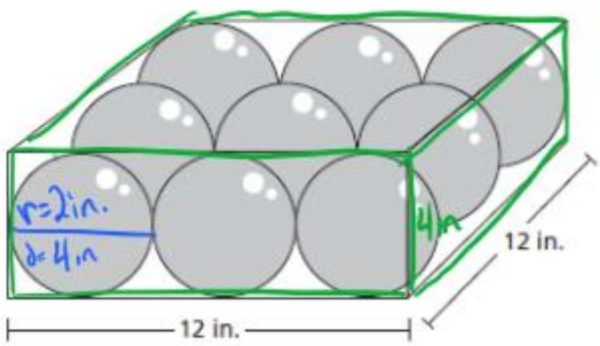
$V_{cone} = \frac{1}{3}\pi(4)^2 \cdot 3$
$= 16\pi$

3.

$V_{cylinder} = \pi(5)^2 \cdot 3$
$= 75\pi$


$V_{Total} = 243\pi - 75\pi$
$= 168\pi\ m^3$

4. A box contains 9 identical glass spheres that are used to make snow globes. The sphere are tightly packed, as shown below.




$V_{prism} = 12 \cdot 12 \cdot 4$
$= 576 in^3$

a. What is the total volume, in cubic inches, of all 9 spheres? Round your answer to the nearest tenth of a cubic inch.

$V_{sphere} = \frac{4}{3}\pi r^3$
$= \frac{4}{3}\pi(2)^3$
$= \frac{32\pi}{3}$

Volume of all 9 spheres.

$9 \cdot \frac{32\pi}{3} = 92\pi\ in^3$

b. The left over space will be filled with packaging. If it costs \$0.06 per cubic inch of packaging home much would a company have to spend on 8 packages?

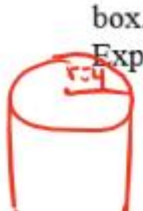
Left over space → $576 in^3 - 92\pi\ in^3 = 286.973 in^3$

cost per container: $286.973 \cdot 0.06 = \$17.22$

Total cost

$17.22 \times 8 = \$137.76$

5. Marge has a cylindrical tin of popcorn that is 18 in. tall and has a radius of 4 in. She wants to use the tin for something else and needs to empty the popcorn into a box. The box is 8 in. long, 8 in. wide and 14 in. tall. Will the popcorn fit in the box? Explain.



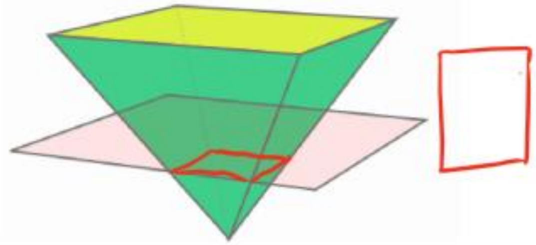

$V = \pi(4)^2 \cdot 18$
$= 288\pi\ in^3$
$\approx 904.779 in^3$


$V = 14 \cdot 8 \cdot 8$
$= 896\ in^3$

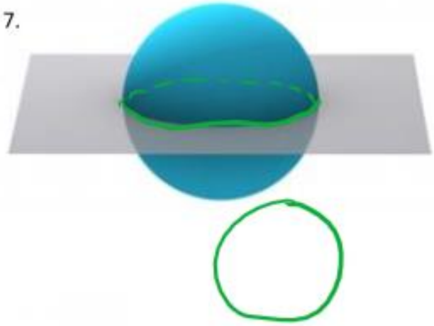
The popcorn will not fit in the box because it has a smaller volume.

Draw the indicated cross section of the below figures.

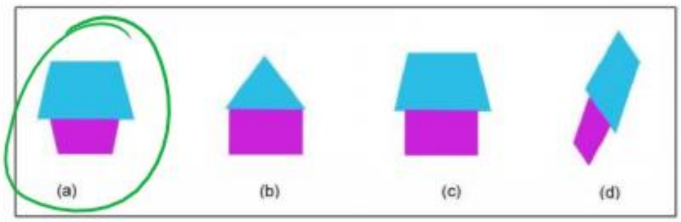
6.



7.



8.




9. Describe in detail the solid formed by rotating a 2 x 2 rectangle with vertices (3, 0), (5, 0), (3, 2) and (5, 2) about the $x$-axis. Include the dimensions of the solid in your description.

A cylinder with a radius of 2 and a height of 2.

10. Describe in detail the solid formed by rotating a 2 x 2 rectangle with vertices (3, 0), (5, 0), (3, 2) and (5, 2) about the $y$-axis. Include the dimensions of the solid in your description.

A cylinder with a hole. The cylinder has a radius of 5 and a height of 2. The hole has a radius of 3 and a height of 2.

11. a. Describe in detail the solid formed by rotating a right triangle with vertices at (0, 0), (4, 0), and (0, 4) about the vertical axis. Include the dimensions of the solid in your description. A cone with a radius of 4 and height of 4.

b. Would these dimensions change if you rotated it around the horizontal axis? Why or why not?

Yes it would because the position of the figure on the coordinate plane.

12. Where does pi come from?

The value of pi comes from the ratio of the circumference divided by the diameter.

13. Explain where the area of a circle came from. Volume of a cone. Volume for a cylinder. Volume from a pyramid.

The area of a circle equation is derived from dividing a circle into congruent infinitely many sectors then use those sectors to for a rectangle. This rectangle has the dimensions where the height is the radius and the base is ½ C which is $\pi r$. The area of this rectangle would then be $A = b \cdot h = \pi r \cdot r = \pi r^2$.

It takes the volume of 3 cones to fill the volume of one cylinder. Thus $3V_{cone} = V_{cylinder}$, then $V_{cone} = \frac{1}{3} V_{cylinder}$, so $V_{cone} = \frac{1}{3}\pi r^2 h$. The same concept applies to $V_{pyramid}$.

The volume of a cylinder is $V_{cylinder} = B \cdot h$. The B represents the area of the base and h, represents the height. This equation would then result in $V_{cylinder} = \pi r^2 \cdot h$.