Workplace Math 10 – Notes Name: _____

Volume of Prisms

Volume is the space inside the object

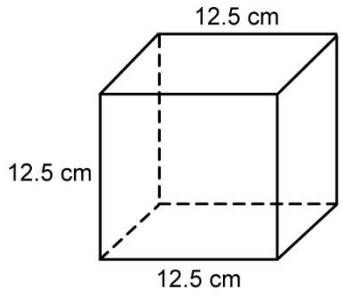
To find the volume of **ANY** prism, multiply the area of the base by the height.

The only catch is to figure out what part is the height!

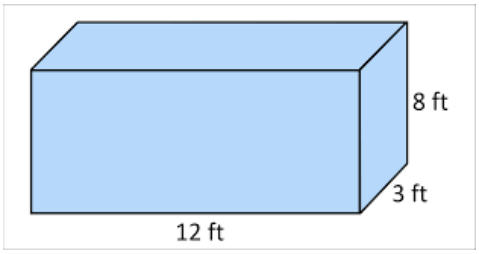
The height of a prism is the length separating the two rectangles, squares, triangles or circles.

	Area of Base	Volume
Cube 	$A = s^2$	$V = s^3$
Rectangular prism 	$A = lw$	$V = lwh$
Triangular prism 	$A = bh \div 2$	$V = bh \div 2 \times h$
Cylinder 	$A = \pi r^2$	$V = \pi r^2 \times h$

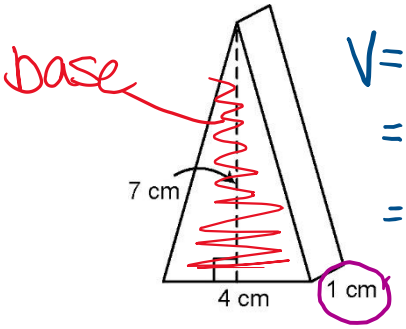
Determine the volume of each prism.



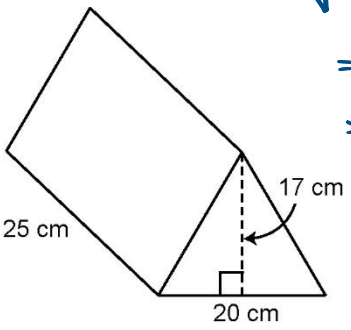
$V = s^3$
$= 12.5^3$
$= 1953.13\ cm^3$



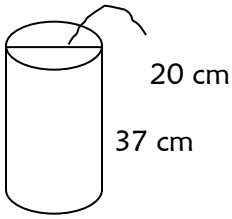
$V = l \times w \times h$
$= 12 \times 3 \times 8$
$= 288\ ft^3$



$V = bh \div 2 \times h$
$= 4 \times 7 \div 2 \times 1$
$= 14\ cm^3$



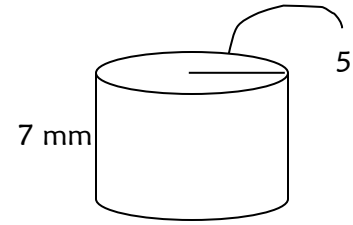
$V = bh \div 2 \times h$
$= 20 \times 17 \div 2 \times 25$
$= 4250\ cm^3$



$V = \pi r^2 \times h$

$= \pi \times 10^2 \times 37$

$= 11\,623.89\ cm^3$



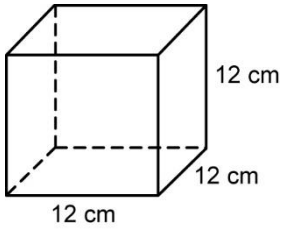
$V = \pi r^2 h$

$= \pi \times 5.5^2 \times 7$

$= 665.23\ mm^3$

What if …

a. ¾ full — $3 \div 4 = 0.75$



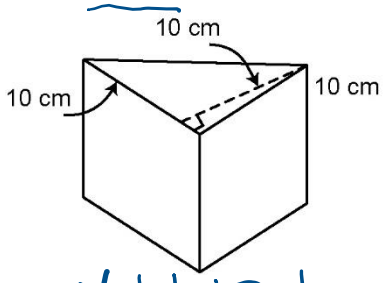
$V = s^3$

$= 12^3$

$= 1728\ cm^3$

$1728 \times 0.75 = 1296\ cm^3$

b. ½ full — $1 \div 2 = 0.5$



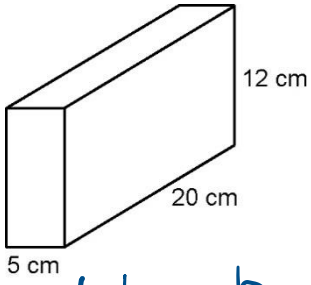
$V = bh \div 2 \times h$

$= 10 \times 10 \div 2 \times 10$

$= 500\ cm^3$

$500 \times 0.5 = 250\ cm^3$

c. $\frac{2}{5}$ full — $2 \div 5 = 0.4$



$V = l \times w \times h$

$= 20 \times 5 \times 12$

$= 1200\ cm^3$

$1200 \times 0.4 = 480\ cm^3$

Or ….

Find the volume of a cylinder with a diameter of 2 cm and a height of 5 cm.

$V = \pi r^2 h$

$= \pi\, 1^2 \times 5$

$= 15.71\ cm^3$

And …

The volume of a rectangular prism is 26 m^3. What is the area of the base if the height is 2 m?

$V = l \times w \times h$

$\frac{26}{2} = \frac{l \times w \times 2}{2}$

$13 = (l \times w)$ — area of the base

$13\ m^2$

Mark is making a small display consisting of 4 boxes of Prism Chocolates on the counter next to the cash register. What is the volume of his display? Show your thinking.

$V = bh \div 2 \times h$

$= 5.6 \times 5 \div 2 \times 20$

$= 280\ cm^3$

$280 \times 4 = \boxed{1120\ cm^3}$

Mark's display was a huge success! He has decided to build a much larger version on the end of an aisle. This one consists of 64 packages which form a triangular prism. The bottom row of his display contains 8 packages. What is the volume of the display? Show your thinking.

$1 = 280\ cm^3$

$280 \times 64 = 17\,920\ cm^3$

Engineers have designed rectangular culverts to carry water under a new highway. They estimate that the distance under the highway is 45m. Determine the volume of concrete they need to make the required number of culvert pieces. Give your answer to the nearest tenth of a cubic meter.

$V = \pi r^2 h$

$= \pi\ 0.5^2 \times 15$

$= 11.78\ m^3$

$11.78 \times 3 = 35.34 m^3$

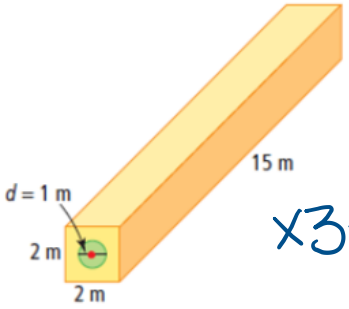
$V = l \times w \times h$

$= 15 \times 2 \times 2$

$= 60\ m^3$

$60 \times 3 = 180 m^3$

$180 - 35.34 = \boxed{144.66 m^3}$



x3 to get to 45m