Unit 1 Measurement

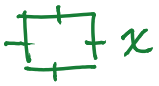
Friday, November 17, 2017 1:52 PM

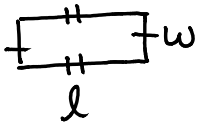
Circumference of a Circle

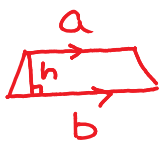
$C = 2\pi r$, $2r = d$

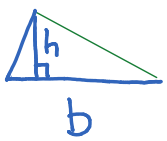
Area

$A_{circle} = \pi r^2$ 

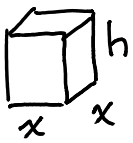
$A_{square} = x^2$ 

$A_{rectangle} = lw$ 

$A_{trapezoid} = \frac{(a+b)h}{2}$ 

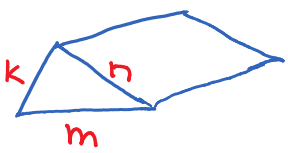
$A_{triangle} = \frac{bh}{2}$ 

Surface Area - Calculate the area of each shape on the surface of the 3-D figure then find the sum

E.g. 

$A_{\text{square-based prism}} = A_{\text{2 squares}} + A_{\text{4 rectangles}}$

$= 2x^2 + 4xh$



$A_{\text{triangular prism}} = A_{\text{2 triangles}} + A_{\text{3 rectangles}}$

* if k, m, n are different then the 3 rectangles have different areas.

$A = 2\pi r^2 + 2\pi rh$

$A_{cylinder} = 2\pi r^2 + 2\pi rh$

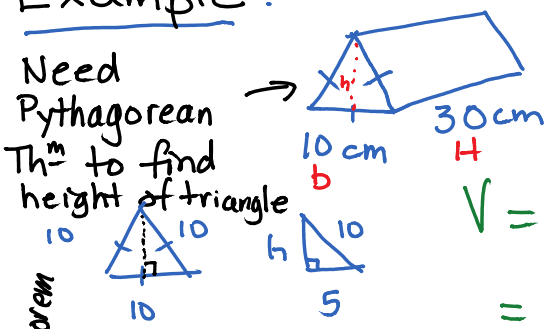
Volume

$V_{prism} = A_{base} \times \text{height}$

$V_{cylinder} = \pi r^2 h$

Example:

Need Pythagorean Thm to find height of triangle



Pythagorean Theorem

$h^2 = 10^2 - 5^2$

$h^2 = 100 - 25$

$h^2 = 75$

$h \doteq 8.66\text{ cm}$ ← height of triagular base

VOLUME

$V = A_{base} \times \text{height}$

$= \frac{bh}{2} \times H$

$= \frac{10(8.66)}{2} \times 30$

$= 1299\text{ cm}^3$

SURFACE AREA

$A_{surface} = A_{2\Delta's} + A_{3\square's}$

$= 2\left(\frac{bh}{2}\right) + 3(b \times H)$

$= 10(8.66) + 3(10)(30)$

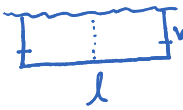
$= 986.6\text{ cm}^2$

Pythagorean Theorem

$a^2 + b^2 = c^2$

$b^2 = c^2 - a^2$

Optimizing Perimeter/Area

- Fencing 4-sides  Optimal is a square.
- Fencing 3-sides  For optimal, $l = 2w$

Optimizing Surface Area/Volume

- Square-Based Prism
  Optimal is a cube 

- Cylinder 

For optimal, $h = d$ or $h = 2r$