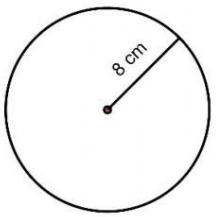
Communication in all questions must include:

- Enough steps shown to clearly demonstrate thinking
- Solutions that are neat and easy to follow
- Proper use of mathematical symbols
- Equal signs aligned
- Units used as required
- Concluding statements for all word problems
- Fractions reduced to lowest terms
- Correct rounding.

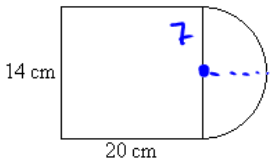
2D Geometry

1. Find the area and perimeter of each shape:



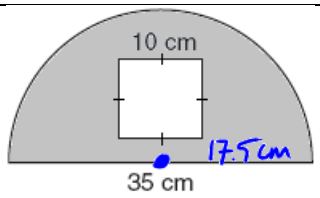
$A = \pi \cdot r^2$
$= \pi \cdot 8^2$
$\approx 201.06 cm^2$

$C = 2\pi r$
$= 2 \cdot \pi \cdot 8$
$= 50.27 cm$



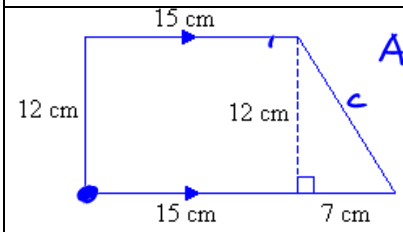
$A_{total} = A_{rectangle} + A_{hemicircle}$
$= 14 \times 20 + \pi \cdot 7^2 \div 2$
$= 356.97 cm$

Perimeter = sum of all exterior sides
$P = 20 + 14 + 20 + \pi \cdot 7$
$\approx 76 cm$



$A_{shaded} = A_{semicircle} - A_{square}$
$= \pi \cdot (17.5)^2 \div 2 - 10^2$
$= 381.06 cm^2$

semicircle diameter
$C = 2\pi r \div 2 + 35$
$= \pi r + 35$
$= \pi \cdot 17.5 + 35$
$= 89.98 cm$

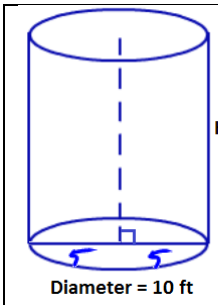


$A = \frac{(22+15)12}{2}$
$= \frac{37 \times 12}{2}$
$= 222 cm^2$

$c^2 = 12^2 + 7^2$
$\sqrt{c^2} = \sqrt{193}$
$c \approx 14 cm$

only exterior sides
$P = 12 + 15 + 14 + 7 + 15$
$= 63 cm$

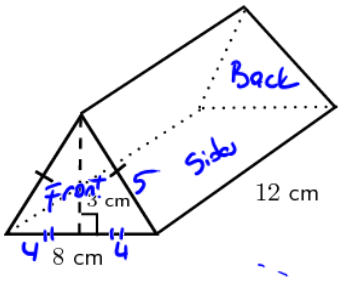
3D Geometry: Find the surface area and volume of each figure:



$S.A = 2 \times \pi r^2 + 2\pi rh$
$= 2\pi(5)^2 + 2\pi(5)21$
$= 816.81\ ft^2$

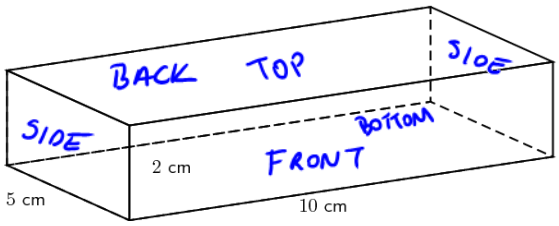
$V = \pi r^2 h$
$= \pi(5)^2 21$
$= 1649.34\ ft^3$

triangle b/c has another parallel triangle



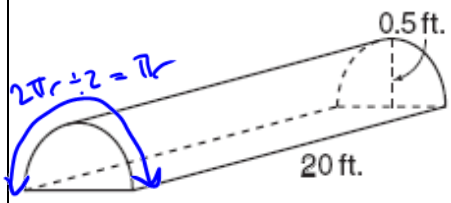
$S.A = Front + Back + 3\,Sides$
$= 2 \times \frac{8 \times 3}{2} + 8 \times 12 + 5 \times 12 + 5 \times 12$
$= 24 + 96 + 60 + 60$
$= 240 cm^2$

$V = Base\ Area \times height$
$= \frac{8 \times 3}{2} \times 12$
$= 144\ cm^3$



$S.A = 2\,Front + 2\,side + 2\,Bottom$
$= 2 \times 2 \times 10 + 2 \times 5 \times 2 + 2 \times 5 \times 10$
$= 40 + 20 + 100$
$= 160 cm^2$

$V = Base\ Area \times height$
$= 5 \times 10 \times 2$
$= 100\ cm^3$

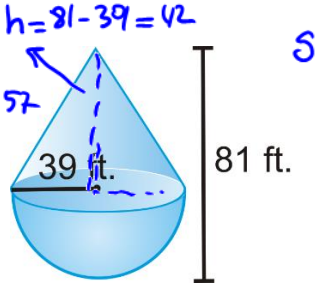


$2\pi r \div 2 = \pi r$

$S.A = Front + Back + Top + Bottom$
$= \pi(0.5)^2 + \pi(0.5)(20) + (1)(20)$
$= 52.20\ ft^2$

Top: $\pi \cdot 0.5 \times 20\ ft$
Bottom: $1\ ft \times 20\ ft$

$V = \pi r^2 h \div 2$
$= \pi(0.5)^2 20 \div 2$
$= 7.85\ ft^3$

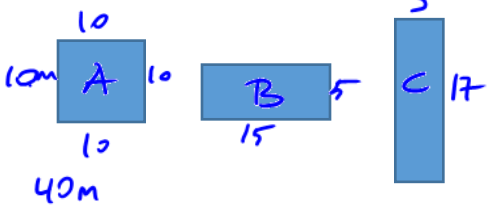


*Slant = 57 ft. long

$S.A = A_{lateral} + A_{hemisphere}$
$= \pi rs + 4\pi r^2 \div 2$
$= \pi(39)(57) + 4\pi(39)^2 \div 2$
$= 15682.83\ ft^2$

$V = V_{cone} + V_{hemisphere}$
$= \pi r^2 h \div 3 + \frac{4}{3} \cdot \pi r^3 \div 2$
$= \pi(39)^2 42 \div 3 + \frac{4}{3}\pi(39)^3 \div 2$
$= 66897.07 + 124237.42$
$= 191134.49\ ft^3$

1. The three rectangles shown all have the same perimeter. Which has the largest ~~volume~~ area. Explain in words how you made your choice.



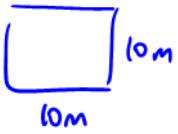
Rectangle A is a square that has the largest area.
$A_A = 10 \times 10$ $A_B = 15 \times 5$ $C = 3 \times 17$
$= 100 cm^2$ $= 75 cm^2$ $= 51 cm^2$

2. A rectangular room needs to have an area of 60 m^2. What are the dimensions of the room with a minimum perimeter, and what is the perimeter?

Square will have the least perimeter
$s^2 = 60$
$s = 7.75m$
$P = 4 \times 7.75$
$\cong 31 m^2$

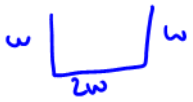
3. You need to build a rectangular enclosure in your backyard. You buy some prebuilt sections of fencing which are each 0.25m long. You buy a total of 40m of fencing. Determine the dimensions (length and width) which will maximize the area of your enclosure

$4s = 40$
$\div 4 \quad \div 4$
$s = 10m$



$\therefore$ It'll be 10m by 10m.

4. 36 m of rope are available to create a rectangular swimming area, using the beach as one side. What is the maximum area that can be produced?



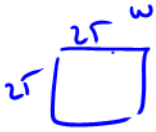
$\div 4 \quad \div 4$
$4w = 36$
$w = 9$
$\Rightarrow$

$Area = 18 \times 9$
$= 162 m^2$

$\therefore$ The maximum area is $162 m^2$.

5. A marine biologist is collecting data. She has 100 m of rope with buoys to outline a rectangular or circular research area on the surface of the water. Which figure will enclose a greater area? Justify your answer by showing all calculations.

$4w = 100$
$w = 25$

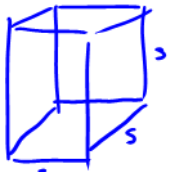


$A = 625 m^2$

$2\pi r = 100$
$6.2832r = 100$
$\div 6.2832 \quad \div 6.2832$
$r \cong 15.9$

$A = \pi(15.9)^2$
$\cong 794.2 m^2$

6. A square-based prism must have a surface area of 96 cm^2 . What are the dimensions of the prism that produce the maximum volume, and what is the volume?



$6s^2 = 96$
$\div 6 \quad \div 6$
$s^2 = 16$
$s = 4$

$V = s^3$
$= 4^3$
$= 64 cm^3$

7. A square-based prism has a volume of 50 in^3 . Determine the minimum surface area.

$s^3 = 50$
$\sqrt[3]{s^3} = \sqrt[3]{50}$
$s \cong 3.68$

$A = 6 \cdot (3.68)^2$
$\cong 81.25 in^2$