

Finding Perimeter, Area, Surface Area and Volume

Learning Goals

- review definitions
- use formulas to find perimeter, area, surface area and volume
- practice converting measurements

Define the following:

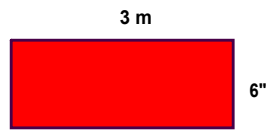
Perimeter - Distance around a shape
- Measured in m , ft , inches , cm...

Area - Number of square units needed to cover the shape
- Measured in m^2 sq ft , cm^2

Surface Area - Total area of the surface of an object
(use a net to help you)
- Measured in m^2

Volume - The amount of space an object takes up
- Measured in m^3

Find the perimeter, give answers in imperial units.



① Convert

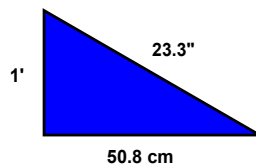
$$3\text{ m} = \underline{118.11} \text{ inches}$$

\downarrow
 300 cm $\uparrow \div 2.54$

② Perimeter

$$\begin{aligned}
 P &= 2l + 2w \\
 &= 2(118.11) + 2(6) \\
 &= 248.2
 \end{aligned}$$

$\therefore P$ is 248.2 inches



① Convert

$$50.8\text{ cm} = \underline{20} \text{ inches}$$

$\div 2.54$

$$1 \text{ foot} = \underline{12} \text{ inches}$$

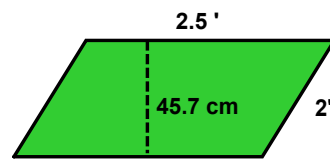
$\times 12$

② Perimeter

$$\begin{aligned}
 P &= a + b + c \\
 &= 12 + 23.3 + 20 \\
 &= 55.3
 \end{aligned}$$

$\therefore P$ is 55.3 inches

Find the area, give answers in imperial units.



① Convert

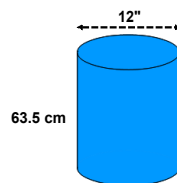
$$45.7 \text{ cm} = \frac{1.5}{\div 30.48} \text{ feet}$$

② Area

$$\begin{aligned} A &= bh \\ &= 2.5 (1.5) \\ &= 3.75 \end{aligned}$$

$\therefore A$ is 3.75 sq ft

Find the surface area, give answers in imperial units.

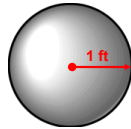


$$\begin{aligned} \text{① Radius} &= \frac{12}{2} \\ &= 6 \text{ inches} \end{aligned}$$

$$\begin{aligned} \text{② Convert} \\ 63.5 \text{ cm} &= \frac{25}{\div 2.54} \text{ inches} \end{aligned}$$

$$\begin{aligned} \text{③ Surface area} \\ &= 2\pi r^2 + 2\pi rh \\ &= 2(3.14)(6)^2 + 2(3.14)(6)(25) \\ &= 1168.08 \\ &\therefore 1168.08 \text{ in}^2 \end{aligned}$$

Find the volume, give answer in metric units.



Some additional conversions:

$$1 \text{ m}^3 = 1'000'000 \text{ cm}^3$$

$$1 \text{ cm}^3 = 1 \text{ mL}$$

$$1 \text{ L} = 0.22 \text{ gallons}$$

$$1 \text{ m}^3 = 220 \text{ gallons}$$

① Convert

$$1 \text{ ft} = \frac{30.48}{\times 30.48} \text{ cm}$$

② Volume = $\frac{4\pi r^3}{3}$

$$= \frac{4(3.14)(30.48)^3}{3}$$

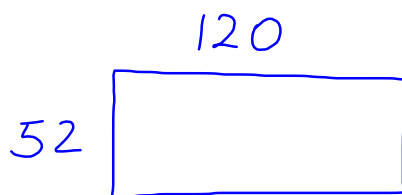
$$= 118553.2$$

118613 \Rightarrow if you used π

\therefore Volume is 118553.2 cm^3
 118553.2 mL
 118.5 L

On the Boards...

2. Determine the perimeter and area of a football field that is 120 yards by 52 yards.



$$P = 2l + 2w$$

$$= 2(120) + 2(52)$$

$$= 344$$

\therefore 344 yards

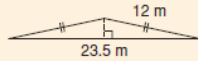
$$A = lw$$

$$= 120(52)$$

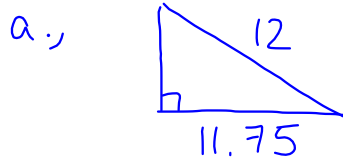
$$= 6240$$

\therefore 6240 yd^2

4. The roof of a house is made from trusses. The frame of each truss is an isosceles triangle, as shown.



- a) Use the Pythagorean Theorem to determine the height of the triangle.
- b) Determine the perimeter of the truss and the area it encloses.
- c) Which measure from part b would be helpful when estimating how much wood will be needed for the trusses? Justify your answer.



$$a^2 + 11.75^2 = 12^2$$

$$a^2 = 5.9$$

$$a = 2.44$$

b.)

$$P = 12 + 12 + 23.5$$

$$= 47.5$$

$$A = \frac{bh}{2}$$

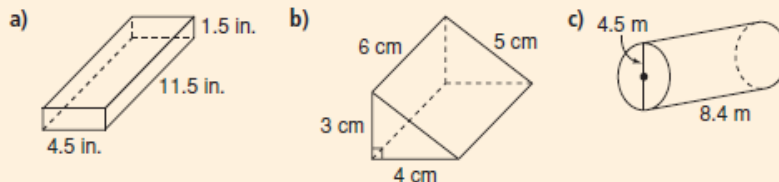
$$= \frac{23.5(2.44)}{2}$$

$$= 28.67$$

c.) perimeter

1. Identify the base of each object and calculate its area.

Use the base area and height to calculate the volume of the object.



$$V = lwh$$

$$= 4.5(1.5)(11.5)$$

$$= 77.625 \text{ in}^3$$

$$V = \frac{bh}{2}(h)$$

$$= \frac{3(4)}{2}(6)$$

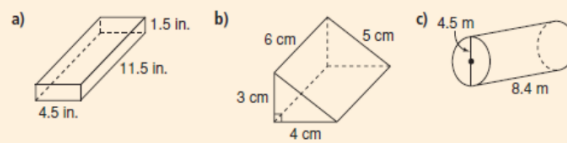
$$= 36 \text{ cm}^3$$

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

$$= \pi \left(\frac{4.5}{2}\right)^2 (8.4)$$

$$= 133.53 \text{ m}^3$$

Calculate the surface area



$$\begin{aligned} \text{a.) } SA &= 2(4.5)(1.5) + 2(4.5)(11.5) \\ &\quad + 2(1.5)(11.5) \\ &= 151.5 \text{ in}^2 \end{aligned}$$

$$\begin{aligned} \text{b.) } SA &= 2\left(\frac{3(4)}{2}\right) + 6(3) + (6)(4) \\ &\quad + (6)(5) \\ &= 84 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{c.) } SA &= 2(\pi r^2) + 2\pi r(8.4) \\ &\quad \uparrow \frac{4.5}{2} \\ &= 31.79 + 118.69 \\ &= 150.48 \text{ m}^2 \end{aligned}$$

If you have finished all the
BOARD work

- have a nice relaxing evening

If you have **NOT** finished the
BOARD work

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- pg. 65 # 1