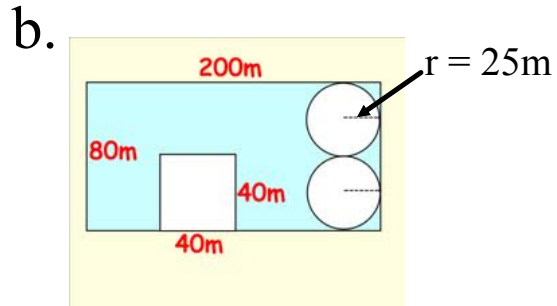
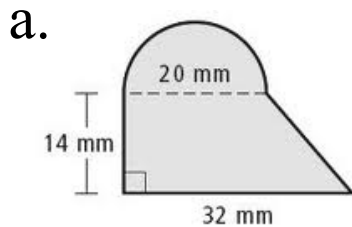


## Measurement Review

Area and Perimeter: Determine the area of the shapes below.



a) semi-circle + tri + rec.

$$A = \frac{\pi r^2}{2} + \frac{bh}{2} + lw \quad \checkmark$$

$$= \frac{\pi (10)^2}{2} + \frac{12 \times 14}{2} + 14 \times 20$$

$$= 157.1 + 84 + 280$$

$$= 521.1 \text{ mm}^2$$

b) Rec - Square - 2 circles

$$A = l \times w - s^2 - 2\pi r^2$$

$$= 200 \times 80 - 40^2 - 2\pi (25)^2$$

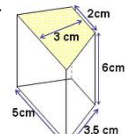
$$= 16000 - 1600 - 3927$$

$$= 10473 \text{ m}^2$$

Volume and surface area Questions

2. Determine the surface area and volume of the objects below:

a.



Tri. prism + Rec. Prism

$$V = \frac{bh}{2} \times l + lwh$$

$$= \frac{3 \times 2 \times 6}{2} + 2 \times 3 \times 6$$

$$= 27 + 36$$

$$= 63 \text{ cm}^3$$

OR

$$V = \frac{h(a+b)}{2} \times l$$

$$= \frac{3(2+5)}{2} \times 6$$

$$= 63 \text{ cm}^3$$

Trapezoid x 2

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

$$= \frac{3(2+5)}{2} \times 2$$

$$= 21$$

Front Rec

$$A = l \times w$$

$$= 3.5 \times 6$$

$$= 21$$

Back Rec

$$A = l \times w$$

$$= 3 \times 6$$

$$= 18$$

Right Rec

$$A = l \times w$$

$$= 2 \times 6 = 12$$

Left Rec

$$A = l \times w$$

$$= 5 \times 6$$

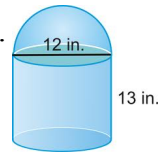
$$= 30$$

TOTAL AREA

$$= 18 + 12 + 30 + 21$$

$$= 81 \text{ cm}^2$$

b.



$\frac{1}{2}$  sphere + cyl

$$V = \frac{\frac{4}{3}\pi r^3}{2} + \pi r^2 h$$

$$= \frac{\frac{4}{3}\pi (6)^3}{2} + \pi (6)^2 (13)$$

$$= \frac{904.77}{2} + 1470$$

$$= 452 + 1470$$

$$= 1922 \text{ cubic inches}$$

S.A.

$\frac{1}{2}$  sphere

$$A = \frac{4\pi r^2}{2}$$

$$= \frac{4\pi (6)^2}{2}$$

$$= 226 \text{ sq. inches}$$

Cylinder

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

$$= 2\pi (6)^2 + 2\pi (6)(13)$$

$$= 226 + 490$$

$$= 716$$

Circle

$$A = \pi r^2$$

$$= \pi (6)^2$$

$$= 113$$

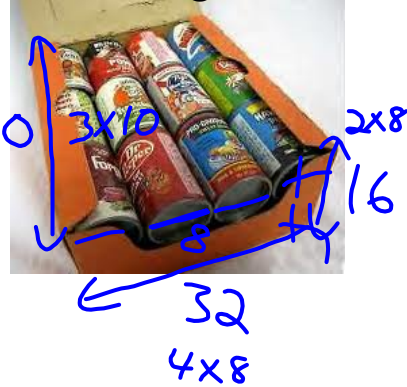
TOTAL S.A.

$$= 716 + 226 - 113$$

$$= 829 \text{ sq. inches}$$

Volume and Surface area Questions:

Cans are packed tightly within a box as shown. There are 3 rows of 4 cans and 2 layers of cans in the box. How much empty space is in the box if each can has a diameter of 8 cm and a height of 10 cm.



① V of Box

② V of 1 can  
x 24

① - ②

Box

$$V = 32 \times 16 \times 30$$

$$= 15360$$

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

$$= \pi (4)^2 10$$

$$= 502.6$$

Volume of 24 cans

$$= 502.6 \times 24$$

$$= 12063.7 \text{ cm}^3$$

Empty Space

$$= 15360 - 12063.7$$

$$= 3296.3 \text{ cm}^3$$

### Optimization Questions

You are given 1500 m of flexible fencing. Jesse is trying to make a coral for her horses. She is trying to decide whether to create a circular or rectangular area. Which shape would give her the largest area?

Rec (Square)?

$$P = 4s$$

$$1500 = 4s$$

$$\frac{1500}{4} = s$$

$$375 = s$$

$$A = s^2$$

$$A = (375)^2$$

$$= 140625 \text{ m}^2$$

Circle?

$$C = 2\pi r$$

$$1500 = 2\pi r$$

$$\frac{1500}{2\pi} = r$$

$$239 = r$$

$$A = \pi r^2$$

$$= 179451 \text{ m}^2$$

∴ The circle has more area.

A container holds 250 mL of water. What are the dimensions of the rectangular prism that would require the least amount of cardboard? What is the amount of cardboard needed?

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

$$V = s^3$$

$$250 = s^3$$

$$\sqrt[3]{250} = s$$

$$= 6.3$$

$\therefore$  The dimensions are  
 $6.3 \times 6.3 \times 6.3 \text{ cm}$

$$S.A. = 6s^2$$

$$= 6(6.3)^2$$

$$= 238.14 \text{ cm}^2$$

$\therefore$   $238.14 \text{ cm}^2$  of cardboard is needed.

A cylinder has a surface area of  $600\text{m}^2$ . What are the dimensions of the cylinder with the maximum volume? What is the maximum volume?

$$\begin{aligned}
 S. A. &= 2\pi r^2 + 2\pi r h && \text{Recall:} \\
 &= 2\pi r^2 + 2\pi r(2r) && h = 2r \\
 &= 2\pi r^2 + 4\pi r^2 && \uparrow \\
 &= 6\pi r^2 && \text{For max} \\
 &&& \text{and min} \\
 &&& \text{questions}
 \end{aligned}$$

START:

$$600 = 6\pi r^2$$

$$\frac{600}{6\pi} = r^2$$

$$31.8 = r^2$$

$$5.6 = r$$

Dimensions are radius is 5.6m

and

$$\begin{aligned}
 * h &= 2r \\
 &= 2 \times 5.6 \\
 &= 11.3 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 V &= 2\pi r^3 \\
 &= 2\pi(5.6)^3 \\
 &= 1103.4\text{m}^3
 \end{aligned}$$

Conversion Questions

$$15 \text{ inches} = \underline{1.25} \text{ ft}$$

$$25.35 \text{ m} = \underline{2535} \text{ cm}$$


$$12 \text{ yards} = \underline{10.97} \text{ metres}$$

$$400 \text{ km} = \underline{\hspace{2cm}} \text{ feet}$$

In question 1a convert the answer in  $\text{mm}^2$  to square inches.

$$521 \text{ mm}^2 = \underline{0.8} \text{ sq. inches}$$


$$1 \text{ inch} = 25.4 \text{ mm}$$

$$1 \text{ sq. in.} = 645 \text{ mm}^2$$


In Question 1a convert the answer in  $\text{m}^2$  to square feet.

$$10473 \text{ m}^2 = \underline{\hspace{2cm}} \text{ sq. ft.}$$

$$1 \text{ yard} = 0.9144 \text{ m}$$

$$1 \text{ sq. yd.} = 0.836 \text{ m}^2$$


$$10473 \text{ m}^2 = 12527.5 \text{ sq. yds.}$$

$$1 \text{ yard} = 3 \text{ ft}$$

$$1 \text{ sq. yd.} = 9 \text{ sq. ft.}$$


$$12527.5 \text{ sq. yds.} = \boxed{112748 \text{ sq. ft.}}$$

~~Convert your answer from 2a for volume from  $\text{cm}^3$  to cubic inches.~~ Try this

$$63 \text{ cubic inches} = \underline{1\,032\,381} \text{ mm}^3$$

$$1 \text{ inch} = 25.4 \text{ mm}$$

$$1 \text{ cubic inch} = 16387 \text{ mm}^3$$

~~Convert your answer from 2b for volume from cubic inches to  $\text{mm}^3$ .~~



