

Name: SOLUTIONS

Unit 4 Test: Measurement

50

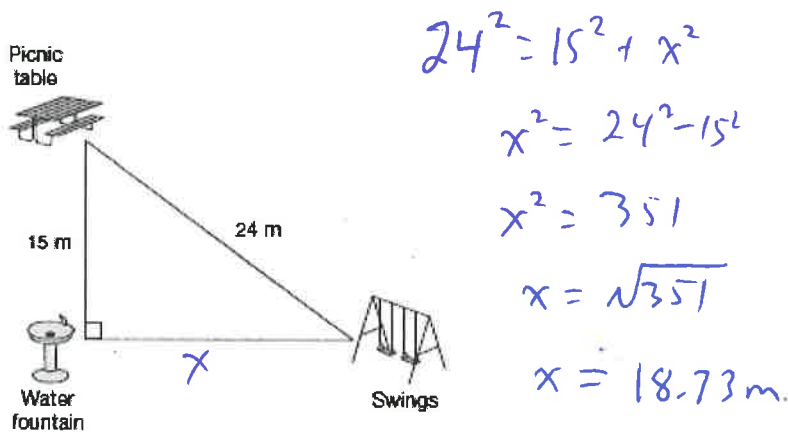
Knowledge/Understanding: #3

Application: #1, 2, 4, 5, 7, 9, 10

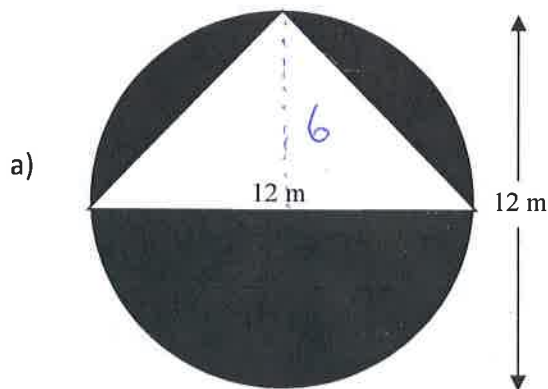
TIPS: #6, 8

Communication: all

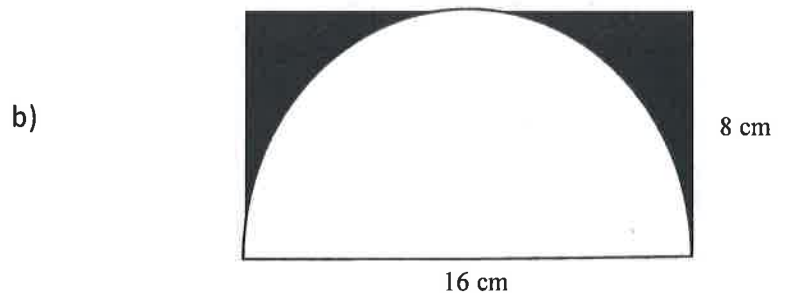
1. The distances in a local park are shown below. How far is the water fountain from the swings? [3 marks]



2. Find the approximate area of the shaded region in each figure below. (round to one decimal place) [6 marks]



$$A = A_{\text{circle}} - A_{\text{triangle}}$$
$$A = \pi(6)^2 - \frac{12(6)}{2}$$
$$A \approx 113.1 \text{ m}^2 - 36 \text{ m}^2$$
$$A \approx 77.1 \text{ m}^2$$



$$A = A_{\text{rect}} - A_{\text{semi-circle}}$$
$$A = 8 \text{ cm}(16 \text{ cm}) - \frac{\pi(8 \text{ cm})^2}{2}$$
$$A = 128 \text{ cm}^2 - 100.5 \text{ cm}^2$$
$$A \approx 27.5 \text{ cm}^2$$

3. A chocolate shaped pyramid is shown below. It has a square base with side length 8 cm and a height of 10 cm. [6 marks]



- a) Find the amount of chocolate used to make the pyramid.

$$V = \frac{b^2 h}{3}$$

$$V = 213.3 \text{ cm}^3$$

$$V = \frac{(8 \text{ cm})^2 (10 \text{ cm})}{3}$$

- b) If the pyramid is wrapped in foil, how much foil is needed?

$$SA = b^2 + 2bs$$

$$SA = (8 \text{ cm})^2 + 2(8 \text{ cm})(10.77 \text{ cm})$$

$$SA = 236 \text{ cm}^2$$



$$s^2 = 10^2 + 4^2$$

$$s^2 = 116$$

$$s = \sqrt{116}$$

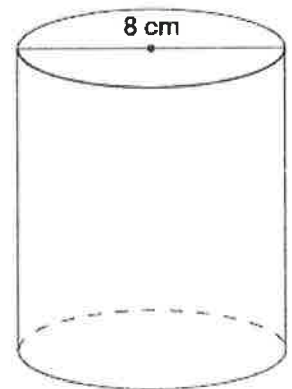
$$s = 10.77$$

4. The cylinder pictured below has a volume of 350 cm³. Find its ^{height} radius. [4 marks]

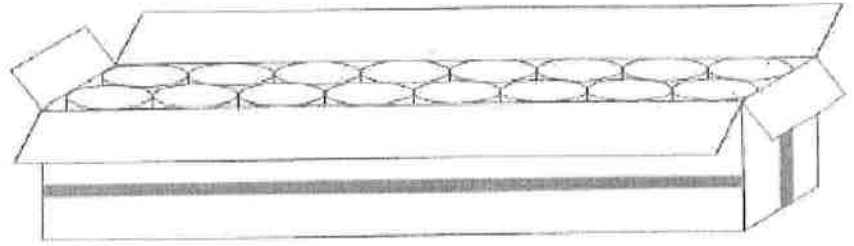
$$350 = \pi (4)^2 h$$

$$h = \frac{350}{16\pi}$$

$$h = 7 \text{ cm}$$



5. Spaghetti sauce is sold in cans that are 10 cm in diameter and 15 cm in height. The cans are packed 2 by 8 in a cardboard box as shown below. [7 marks]



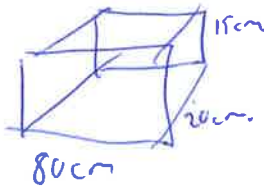
- a) Find the volume of one can.

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

$$V = \pi (5\text{cm})^2 (15\text{cm})$$

$$V \approx 1178.1\text{cm}^3$$

- b) The cans just fit inside the box. Find the amount of cardboard required to make the box (with lid) if no cardboard overlaps.



$$SA = 2lw + 2lh + 2bh$$

$$SA = 2(80\text{cm})(20\text{cm}) + 2(80\text{cm})(15\text{cm}) + 2(20\text{cm})(15\text{cm})$$

$$SA = 6200\text{cm}^2$$

- c) If a box is packed with cans as shown above, how much empty space is in the box?

$$V_{\text{box}} = lwh$$

$$V_{\text{box}} = 80\text{cm} \times 20\text{cm} \times 15\text{cm}$$

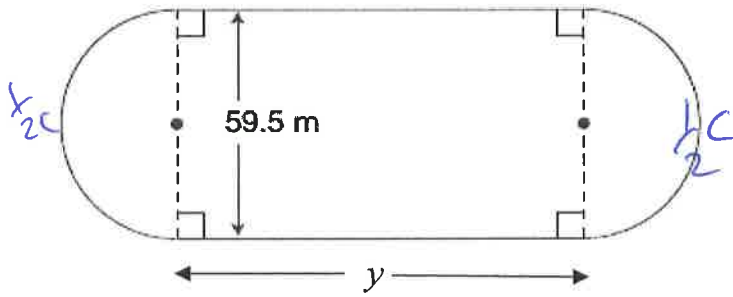
$$V_{\text{box}} = 24000\text{cm}^3$$

$$\text{Empty space} =$$

$$24000\text{cm}^3 - (16 \times 1178.1\text{cm}^3)$$

$$\approx 5150\text{cm}^3$$

6. A diagram of a track with a perimeter of 475 m is shown below. [4 marks]



$$C = \pi(59.5 \times 2)$$

$$C \approx 186.9 \text{ m}$$

Find the length of a side of the rectangular part, y.

$$2y = 475 - 186.9$$

$$2y = 288.1$$

$$y = 144 \text{ m}$$

7. A can of corn has a volume of 376 cm^3 and is designed in the shape of a cylinder. Find the dimensions of the cylinder that will minimize the amount of aluminum used to make the can. [5 marks]

optimal cylinder: $h = 2r$

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

$$r \approx 3.91 \text{ cm}$$

$$h = 2r$$

$$V = \pi r^2 (2r)$$

$$h \approx 7.82 \text{ cm}$$

$$V = 2\pi r^3$$

$$376 = 2\pi r^3$$

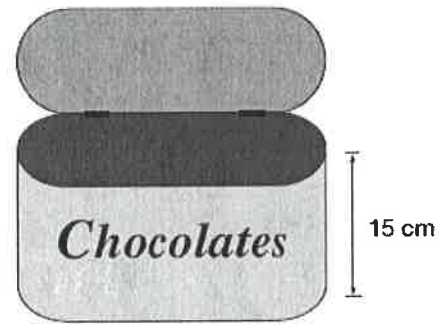
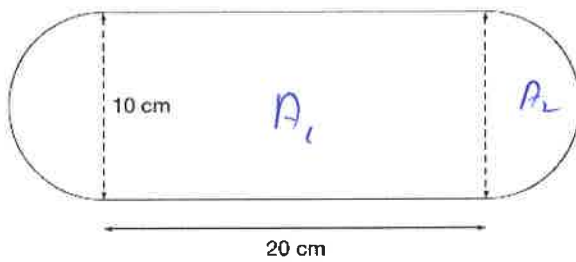
$$r^3 = \frac{376}{2\pi}$$

$$r = \sqrt[3]{\frac{376}{2\pi}}$$



8. Sweet Shapes is a company that makes chocolate. The company produces a new can (shown below to the right) to hold chocolates. The can is 15 cm high. [7 marks]

A sketch of the base of the can is shown below to the left.



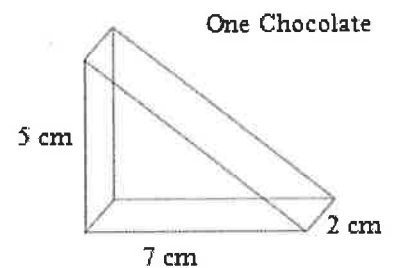
- a) Find the volume of the can.

$$\begin{aligned}
 A_{\text{base}} &= A_1 + A_2 \\
 &= 20\text{cm}(10\text{cm}) + \pi(5\text{cm})^2 \\
 &= 278.5\text{cm}^2
 \end{aligned}$$

$$\begin{aligned}
 V &= 278.5\text{cm}^2 \times 15\text{cm} \\
 V &= 4178\text{cm}^3
 \end{aligned}$$

- b) Suppose the design of each chocolate is shown. If the can contains 45 chocolates, then what percent of the container do the chocolates take up?

$$\begin{aligned}
 45 \times 35\text{cm}^3 &= 1575\text{cm}^3 \\
 \frac{1575\text{cm}^3}{4178\text{cm}^3} &= 37.7\%
 \end{aligned}$$



$$\begin{aligned}
 V &= \frac{bh}{2} \\
 V &= \frac{7\text{cm}(5\text{cm})(2\text{cm})}{2} \\
 V &= 35\text{cm}^3
 \end{aligned}$$