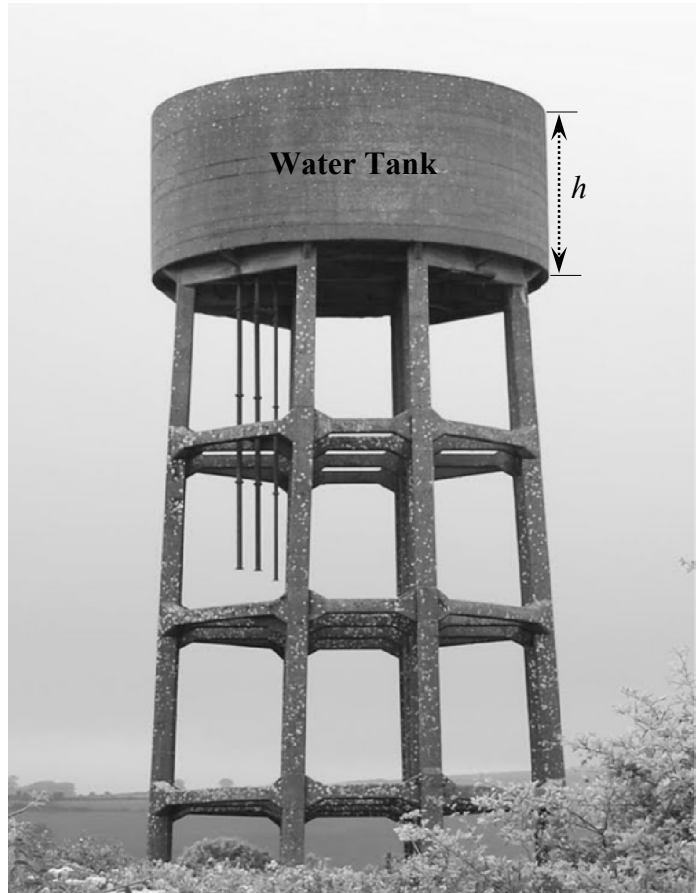
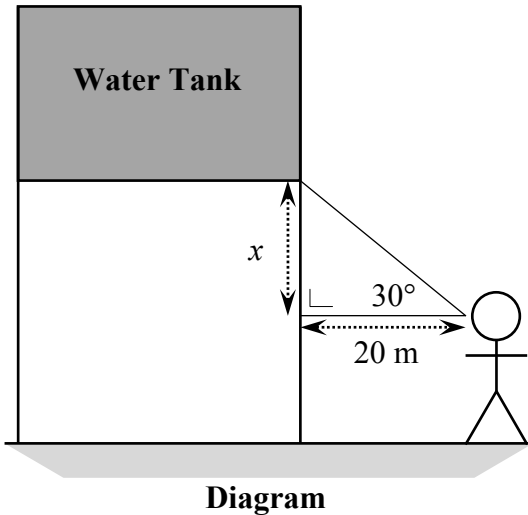


Question 13**35 Marks**

Miriam is trying to find the volume of the water tank shown in the photograph on the right.

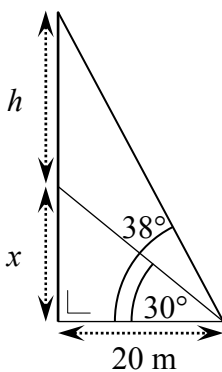
She takes some measurements and draws a diagram. Part of her diagram is shown below.



- (a) Using the diagram, find the value of x . Give your answer in metres, correct to two decimal places.

$$\frac{x}{20} = \tan 30^\circ \quad \Rightarrow \quad x = 11.547 = 11.55 \text{ m (2 decimal places)}$$

- (b) The angle of elevation to the bottom of the water tank is 30° , as shown in the diagram. The angle of elevation to the top of the water tank is 38° . Find the distance marked h on the photograph. Give your answer correct to one decimal place.



$$\begin{aligned} \frac{x+h}{20} &= \tan 38^\circ \\ \Rightarrow x+h &= 20 \tan 38^\circ = 15.626 \\ \Rightarrow h &= 15.63 - 11.55 \\ &= 4.08 = 4.1 \text{ m (1 decimal place)} \end{aligned}$$

- (c) Hugh is also trying to find the volume of the water tank.

He estimates that the height, h , is 4.5 m.

By taking **measurements** from the photograph and performing **calculations**, use Hugh's value of h to estimate the volume of the water tank as accurately as you can.

Give your answer correct to the nearest m^3 .

State clearly what shape you are taking the water tank to be.

<i>Shape of water tank:</i>	
Cylinder	[Step 1]
<i>Measurements from photograph (label each measurement):</i>	
Diameter = 5.2 cm	[\Rightarrow Radius = 2.6 cm]
Height = 2.2 cm	[Step 2]
<i>Calculations:</i>	
$\frac{\text{Actual radius}}{2.6} = \frac{4.5}{2.2} \Rightarrow \text{Actual radius} = 5.318\dots \text{ m}$	[Step 3]
$\text{Volume of cylinder} = \pi \times r^2 \times h$	[Step 4]
$= \pi \times (5.318)^2 \times 4.5$	
$= 399.81\dots$	[Step 5]
<i>Volume of water tank, in m^3:</i>	
400 m^3 (nearest m^3)	