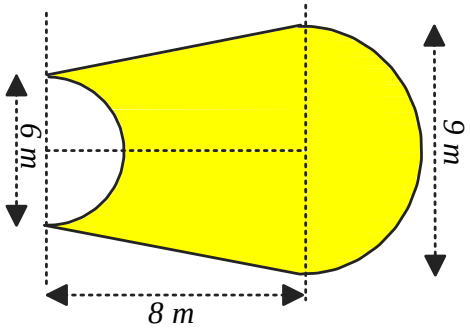
(h)



The shaded area is the area of the trapezium in the centre add the area of the large semi-circle subtract the area of the small semicircle. The trapezium has parallel side lengths 6m and 9m separated by a length 8m.

$$A=\frac{1}{2}(a+b)h+\frac{1}{2}\pi R^2-\frac{1}{2}\pi r^2$$

$$A=\frac{1}{2}(6+9)\times 8+\frac{1}{2}\pi\times 4.5^2-\frac{1}{2}\pi\times 3^2$$

$$A=60+31.8-14.14$$

$$A=77.66m^2$$

Volume

1. Draw a sketch diagram for each and calculate the volume.

(a) A cube with a side length of 20 cm.

$$V=s\times s\times s$$

$$V=20\times 20\times 20$$

$$V=8000cm^3$$

(b) A rectangle prism with length of 0.6m, width of 20cm and height 500mm. (0.6m = 60cm, 500mm = 50cm)

$$V=l\times w\times h$$

$$V=60\times 20\times 50$$

$$V=60\,000cm^3$$

(c) A prism with a base area of 28 m^2 and a height of 2.7m.

$$V=Ah$$

$$V=28\times 2.7$$

$$V=75.6m^3$$

(d) A cylinder with a diameter of 50 cm and a height of 60 cm. Give your answer in mL and L.

$$V=Ah$$

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

$$V=\pi\times 25^2\times 60$$

$$V=117810cm^3$$

$$V=117810mL=117.81L$$

(e) A prism with a semicircular base (radius = 51 cm) and a height of 63cm

$$V=Ah$$

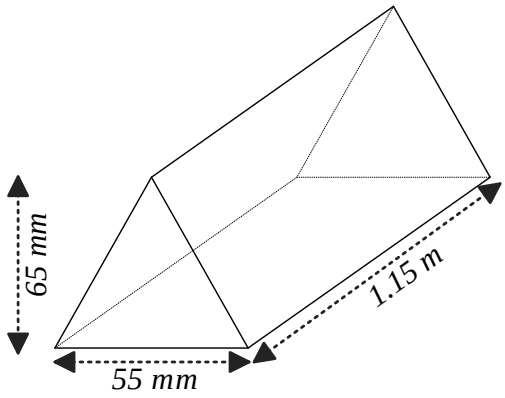
$$V=\frac{1}{2}\pi r^2h$$

$$V=\frac{1}{2}\pi\times 51^2\times 63$$

$$V=257\,395.4cm^3$$

2. Calculate the volume of these solids.

(a)



Express the answer in
(i) mm³ (ii) cm³ (iii) m³

$V = Ah$

$V = \frac{1}{2}bh_{triangle} \times h_{prism}$

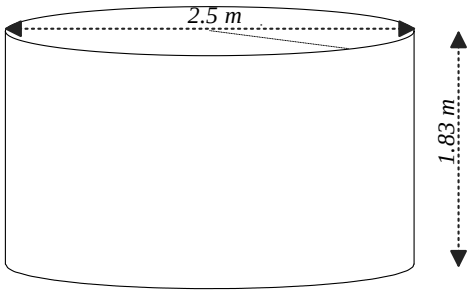
$V = \frac{1}{2} \times 6.5 \times 5.5 \times 115$

$V = 2\,055.625 cm^3$

$V = 2\,055.625 \times 1000 = 2\,055\,625 mm^3$

$V = 2\,055.625 \div 1\,000\,000 = 0.002\,055\,625 m^3$

(b)



This is a water tank. Express your answer in L. $(r = 2.5 \div 2 = 1.25m)$

$V = Ah$

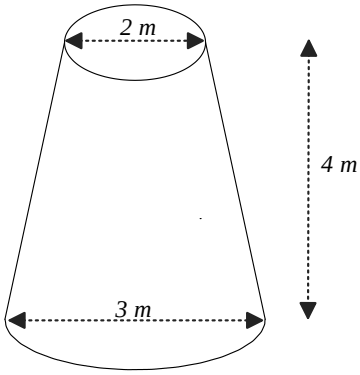
$V = \pi r^2 h$

$V = \pi \times 1.25^2 \times 1.83$

$V = 8.983 m^3$

$V = 8.983 kL = 8\,983 L$

(c)



Volume of large cone (h=12m, d=3m) subtract the volume of small cone (h=8m, d=2m).

$V = \frac{1}{3}\pi R^2 H - \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}\pi \times 1.5^2 \times 12 - \frac{1}{3}\pi \times 1^2 \times 8$

$V = 28.27 - 8.38$

$V = 19.89 m^3$

(e) A farmer has a large dam covering 3 ha of land. The average depth when full is 3m. Calculate the volume of water in dam in kL and ML.
(3 ha = 30 000m²)

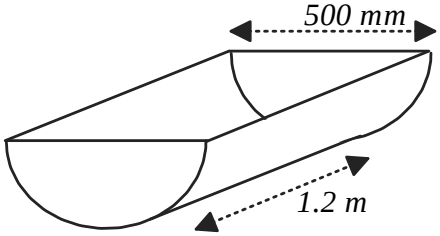
$V = Ah$

$V = 30\,000 m^2 \times 3m$

$V = 90\,000 m^3$

$V = 90\,000 kL = 90 ML$

(f)



A farmer has built these troughs to hold water for livestock. How many litres of water will each trough hold?

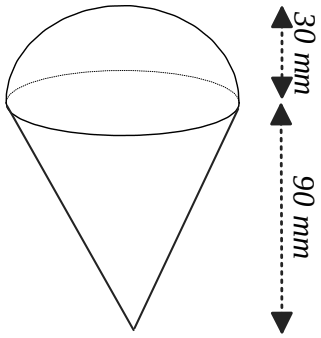
$$V = \frac{1}{2}\pi r^2 h$$

$$V = \frac{1}{2}\pi \times 0.25^2 \times 1.2$$

$$V = 0.118m^3$$

$$V = 0.118kL = 118L$$

(g)



This is an ice-cream cone. Calculate the volume of soft serve ice cream that would fill the cone and a semi-spherical amount on top of the cone. Using cm,

$$V_T = V_{cone} + V_{hemisphere}$$

$$V_T = \frac{1}{3}\pi r^2 h + \frac{1}{\cancel{2}} \times \frac{4}{3}\pi r^3$$

$$V_T = \frac{1}{3}\pi \times 3^2 \times 9 + \frac{2}{3}\pi \times 3^3$$

$$V_T = 84.8 + 56.5$$

$$V_T = 141.3cm^3$$

(h) A garden hose has an internal diameter of 15 mm and a length of 5 m. What volume of water fills the hose?

The hose is a cylinder
r=7.5mm=0.75cm, h=500cm

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

$$V = \pi \times 0.75^2 \times 500$$

$$V = 883.6cm^3$$

$$V = 883.6cm^3$$

$$V = 883.6mL$$

(i) A can contains 375 mL of soft drink and must have a height of 120 mm. What will the diameter need to be? (375 mL=375cm^3) (120mm=12cm)

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

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

$$\sqrt{\frac{V}{\pi h}} = r$$

$$r = \sqrt{\frac{V}{\pi h}}$$

$$r = \sqrt{\frac{375}{\pi \times 12}}$$

$$r = 3.154cm$$

$$\rightarrow d = 6.31cm$$