

1. The density of apple juice is  $1.05$  grams per  $\text{cm}^3$ .

The density of fruit syrup is  $1.4$  grams per  $\text{cm}^3$ .

The density of carbonated water is  $0.99$  grams per  $\text{cm}^3$ .

$25 \text{ cm}^3$  of apple juice are mixed with  $15 \text{ cm}^3$  of fruit syrup and  $280 \text{ cm}^3$  of carbonated water to make a drink with a volume of  $320 \text{ cm}^3$ .

Work out the density of the drink.

Give your answer correct to 2 decimal places.

$$\text{density} = \frac{\text{mass}}{\text{Volume}}$$

APPLE JUICE:

$$\begin{array}{l} 1.05 \text{ g} = 1 \text{ cm}^3 \\ \times 25 \quad \quad \quad \times 25 \\ \hline 26.25 \text{ g} = 25 \text{ cm}^3 \end{array}$$

FRUIT SYRUP: ①

$$\begin{array}{l} 1.4 \text{ g} = 1 \text{ cm}^3 \\ \times 15 \quad \quad \quad \times 15 \\ \hline 21 \text{ g} \quad 15 \text{ cm}^3 \end{array}$$

CARBONATED WATER:

$$\begin{array}{l} 0.99 \text{ g} = 1 \text{ cm}^3 \\ \times 280 \quad \quad \quad \times 280 \\ \hline 277.2 \text{ g} = 280 \text{ cm}^3 \end{array}$$

Total mass of drink:

$$26.25 + 21 + 277.2 = 324.45 \text{ g} \quad \text{①}$$

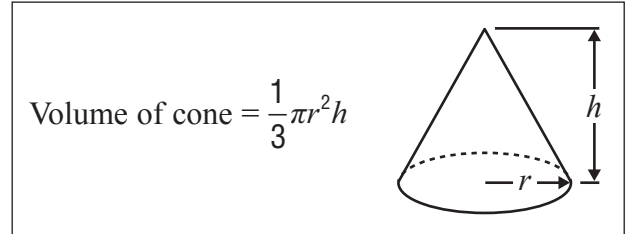
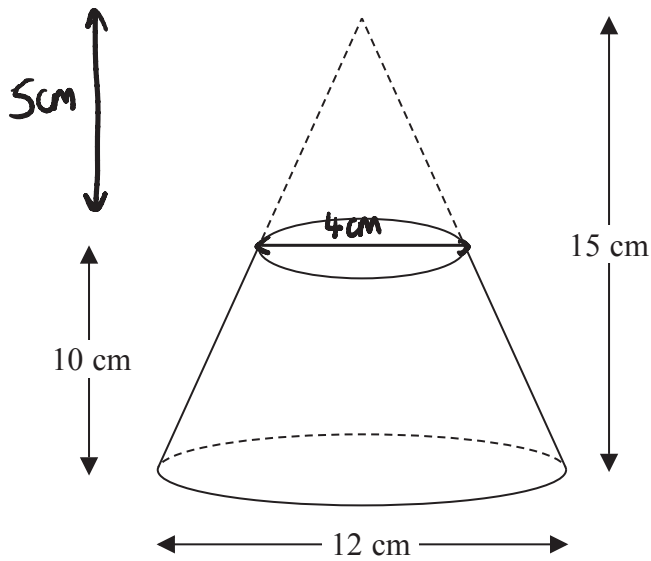
Density of drink:

$$\begin{aligned} \text{density} &= \frac{324.45}{320} \quad \text{①} \\ &= 1.013906... = \underline{\underline{1.01 \text{ g/cm}^3}} \quad \text{①} \end{aligned}$$

..... 1.01 .....  $\text{g/cm}^3$

(Total for Question is 4 marks)

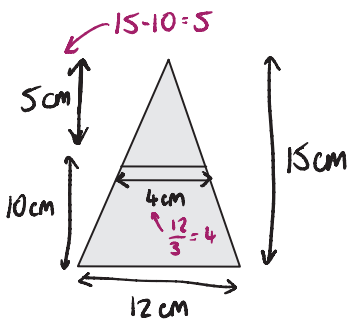
2. A frustum is made by removing a small cone from a large cone as shown in the diagram.



The frustum is made from glass.  
The glass has a density of  $2.5 \text{ g/cm}^3$

Work out the mass of the frustum.  
Give your answer to an appropriate degree of accuracy.

Can now work out volume of cones



$\frac{15}{5} = 3$   $\therefore$  The big triangle is 3 times the size of the small triangle

Use this to work out width of small triangle

large cone volume  $= \frac{1}{3}\pi(6)^2(15) = 180\pi \text{ cm}^3$

Small cone volume  $= \frac{1}{3}\pi(2)^2(5) = \frac{20}{3}\pi \text{ cm}^3$

Volume of the frustum  $= 180\pi - \frac{20}{3}\pi = \frac{520}{3}\pi \text{ cm}^3$

density =  $\frac{\text{mass}}{\text{volume}}$

$2.5 = \frac{\text{mass}}{(\frac{520}{3}\pi)} \Rightarrow \text{mass} = 2.5 \times (\frac{520}{3}\pi) = 1361.36 \text{ g (2dp)}$

1361..... g