

Unit 11

Q1)
$$\frac{900 \text{ Newtons}}{60 \text{ cm}^2}$$

$$= \frac{900 \text{ Newtons}}{0.006 \text{ m}^2}$$

$$= \frac{900}{0.006}$$

$$= \frac{900\,000}{6}$$

$$= 150\,000 \frac{\text{Newtons}}{\text{m}^2}$$

(AI)

(M1)
for
conversion

$$\text{cm} \xrightarrow{\div 100} \text{m}$$

$$\text{cm}^2 \xrightarrow{\div 100^2} \text{m}^2$$

OR

$$\text{OR } 60 \text{ cm}^2$$

$$= 60 \text{ cm} \times 1 \text{ cm}$$

$$= 0.6 \text{ m} \times 0.01 \text{ m}$$

$$= 0.006 \text{ m}^2$$

Q2)
$$\frac{66-6}{2} = 30 \text{ (M1)}$$

Pete = 30 years old

Tim = 36 years old

(AI) for
Both age

or
5=6

Pete:

$$£770 \times \frac{30}{66}$$

$$= \underline{\underline{£350}}$$

(M1)

(AI)

Tim

$$£770 \times \frac{36}{66}$$

$$= \underline{\underline{£420}}$$

(M1)

Q5) End of First year: ($\boxed{\text{or}} 3\% \times 80\% = 2.4\%$)

$$\text{Interest earned: } £5000 \times 3\% \quad (\text{PI})$$
$$= £150$$

$$\text{tax on interest} = £150 \times 20\%$$
$$= £30$$

$$\text{net interest} = £150 - £30 = £120$$

$$\text{End of First year, remains } £5000 + £120$$
$$= £5120 \quad (\text{PI})$$

~~Start of~~ Second year:

$$£5120 \times 3\% = £153.60$$
$$\text{interest after tax } £153.60 \times 80\% = £122.88 \quad (\text{PI})$$

$$\text{Total: } £5120 + £122.88 = \underline{\underline{£5242.88}} \quad (\text{A1})$$

Q6)

Bonus Saver

$$£20000 \times 104\%$$
$$= £20800 \quad (\text{M1})$$

$$£20800 \times \left(1 + \frac{1.5}{100}\right)$$
$$= £21112.00 \quad (\text{M1})$$

Fixed Rate

$$£20000 \times \left(1 + \frac{2.5}{100}\right)^2 \quad (\text{M1})$$
$$= £20000 \times (1.025)^2$$
$$= £21012.50$$

OR

(C1) He should choose Bonus Saver

Q9)

$$T \propto \frac{l}{d^2} \quad \text{(M1)}$$

$$T = \frac{k}{d^2}$$

$$T = \frac{10240}{0.5^2}$$

$$T = \underline{\underline{40960}} \quad \text{(A1)}$$

$$160 = \frac{k}{8^2}$$

$$160 = \frac{k}{64} \quad \text{(M1)}$$

$$k = 10240$$

Q11)

$$\frac{1}{3} \pi r^2 h - \frac{1}{3} \pi r^2 h$$

$$= \frac{1}{3} \pi (6)^2 \times 15 - \frac{1}{3} \pi (2)^2 \times 5$$

$$= \frac{1}{3} \pi (36)(15) - \frac{1}{3} \pi (4)(5)$$

$$= 180\pi - \frac{20}{3}\pi \quad \leftarrow \text{(P1) volume of 1 cone.}$$

$$= 544.54 \text{ cm}^3 \quad \leftarrow \text{(P1) (volume of frustum)}$$

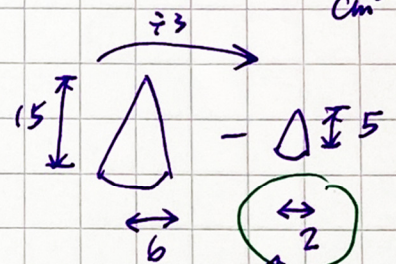
$$2.5 = \frac{\text{mass}}{544.54} \quad \leftarrow \text{(P1)}$$

$$\text{mass} = 2.5 \times 544.54$$

$$= \underline{\underline{1361 \text{ g}}} \quad \text{(A1)}$$

$$\text{Density} = \frac{g}{\text{cm}^3}$$

$$2.5 = \frac{? \text{ g}}{\text{cm}^3}$$



(P1) use similar shape to find radius.

Q10)

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

$$6.6 = \frac{\text{mass}}{450}$$

$$\text{mass} = 450 \times 6.6 \text{ (M1)}$$

$$= \underline{2970 \text{ g}} \text{ (A1)}$$

$$\begin{aligned} \text{Volume} &= \\ \text{(M1)} \quad & \frac{12 \times 5}{2} \times 15 \\ &= 30 \times 15 \\ &= 450 \end{aligned}$$

Q12)

volume of sphere:

$$\frac{4}{3} \pi r^3$$

$$= \frac{4}{3} \pi (2)^3 \text{ (M1)}$$

$$= \frac{32}{3} \pi$$

$$= 33.5103 \text{ cm}^3$$

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

$$= \frac{45 \text{ g}}{33.5103 \text{ cm}^3} \text{ (M1)}$$

$$= 1.343 \text{ g/cm}^3 \text{ (A1)}$$

\therefore No, 1.343 g/cm^3 is more than 1.24 g/cm^3

(C1)

$$\text{Q6)} \quad \frac{18 \text{ km}}{1 \text{ h}} = \frac{18000 \text{ m}}{1 \text{ h}} = \frac{18000 \text{ m}}{60 \text{ min}} = \frac{18000 \text{ m}}{60 \times 60 \text{ sec}}$$

$$= 18000 \text{ m/h} = 300 \text{ m/min} = 5 \text{ m/sec}$$

$$\frac{0.01 \text{ km}}{\frac{1}{3600} \text{ h}} = \frac{10 \text{ m}}{\frac{1}{3600} \text{ h}} = \frac{10 \text{ m}}{\frac{1}{60} \text{ min}} = \frac{10 \text{ m}}{1 \text{ s}}$$

$$36 \frac{\text{km}}{\text{h}} = 36000 \frac{\text{m}}{\text{h}} \quad 600 \frac{\text{m}}{\text{min}}$$