5-Aug-24

Objective: **Complete iGCSE questions on mensuration problems.**

8/5/2024

Formula List

For the equation $ax^2 + bx + c = 0$ $\quad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Curved surface area, A, of cylinder of radius r, height h. $\quad A = 2\pi rh$

Curved surface area, A, of cone of radius r, sloping edge l. $\quad A = \pi rl$

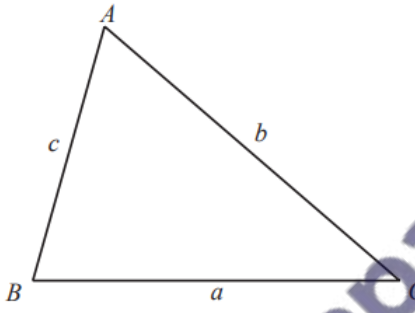
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

Volume, V, of pyramid, base area A, height h. $\quad V = \frac{1}{3}Ah$

Volume, V, of cylinder of radius r, height h. $\quad V = \pi r^2 h$

Volume, V, of cone of radius r, height h. $\quad V = \frac{1}{3}\pi r^2 h$

Volume, V, of sphere of radius r. $\quad V = \frac{4}{3}\pi r^3$

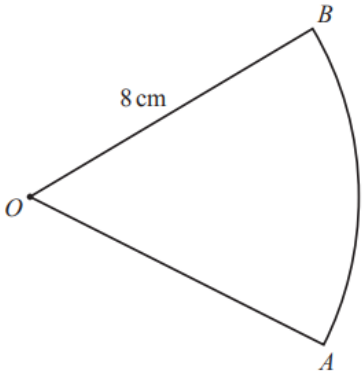


$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

$$\text{Area} = \frac{1}{2}bc\sin A$$

15



NOT TO SCALE

The length of the arc $AB = \frac{4\pi}{3}$ cm.

The area of the sector OAB is $k\pi$ cm^2.

Find the value of k.

$k =$ ..... [3]

$C = 2\pi r$

$A = \pi r^2$

$k \div \frac{4}{3}$

$k \times \frac{3}{4} = \frac{3}{4}k$

$r = 8$

$\theta = k\pi$

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

Area $= \frac{\theta}{360} \times \pi \times 8^2 = k\pi = \frac{\pi\theta}{360} \times 64$

Arc $= \frac{\theta}{360} \times 2 \times \pi \times 8 = \frac{4\pi}{3} = \frac{\pi\theta}{360} \times 16$ ÷

$\frac{k\pi}{\frac{4\pi}{3}} = \frac{\frac{\pi\theta}{360} \times 64}{\frac{\pi\theta}{360} \times 16}$

$\rightarrow \frac{k}{\frac{4}{3}} = 4 \rightarrow \frac{3}{4}k = 4$ ×4/3

$\therefore k = 4 \times \frac{4}{3}$

$= \frac{16}{3}$ ✓

15	$\frac{64}{12}$ oe	**3**	**M1** for $\frac{x}{360}\times\pi\times16=\frac{4\pi}{3}$ oe **M1** for $\frac{y}{360}\times\pi\times8^2=k\pi$ oe OR **M1** for $\frac{\frac{4\pi}{3}}{16\pi}$ oe **M1** for $\frac{k\pi}{8^2\pi}$ or $\frac{x}{360}\times\pi\times8^2=k\pi$ o

$\frac{16}{3}$ ✓

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$6\overline{)144}$ → 24

1
4 ✓
9 ×
16 ×
25 ×

Area Sector $= \frac{60}{360}\times\pi\times12^2$

Area Circle $= \pi r^2$

$\Rightarrow \frac{1}{6}\times\pi\times144=\pi r^2$

$\frac{144}{6}=r^2$

$\sqrt{24}=r^2\downarrow\sqrt{}$

$r=\sqrt{24}$

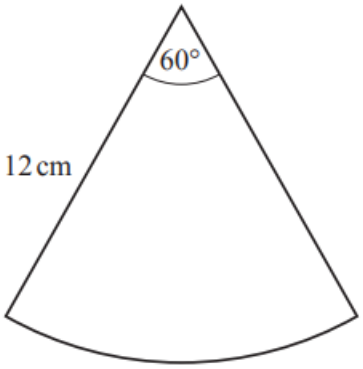
$r=\sqrt{4\times6}$

$=\sqrt{4}\times\sqrt{6}$

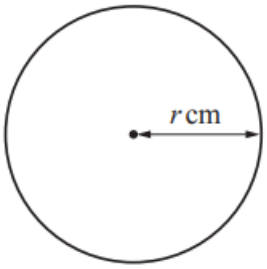
$r=2\sqrt{6}$

$2\sqrt{6}$

12



NOT TO SCALE



The sector and the circle have the same area.
The angle of the sector is 60°.
The radius of the sector is 12 cm and the radius of the circle is r cm.

Work out the value of r.
Give your answer as a surd in its simplest form.

$r =$ ..... [3]

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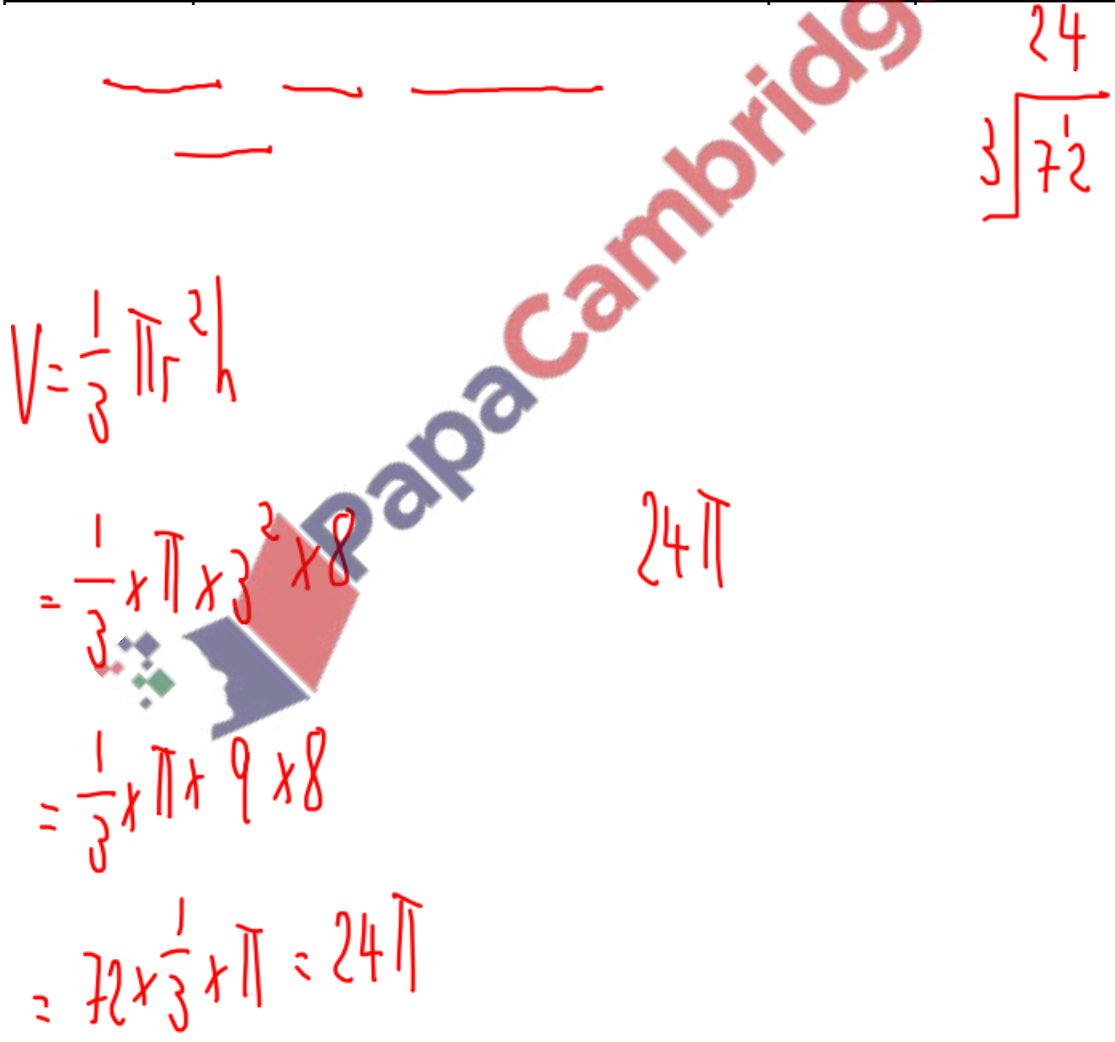
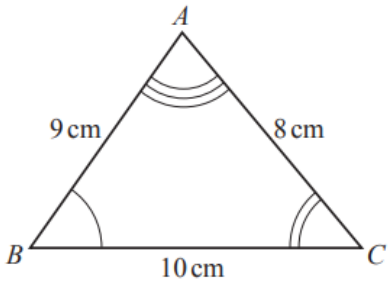
5 Find the volume of a cone with radius 3 cm and perpendicular height 8 cm.
Give your answer in terms of π.

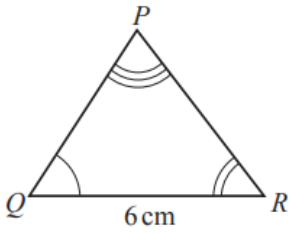
..... cm^3

12	$2\sqrt{6}$	**3**	**M1** for $\frac{60}{360} \times \pi \times 12^2 = \pi r^2$ oe **A1** for $r^2 = 24$ or better



13





NOT TO SCALE

The diagram shows two similar triangles, *ABC* and *PQR*.

(a) Find the length of *PR*.

PR = ... cm [2]

(b) The triangles are the cross-sections of mathematically similar prisms.
The volume of the larger prism is 500 cm^3.

Find the volume of the smaller prism.

..... cm^3 [2]

5	24π	**2**	**M1** for $\frac{1}{3}\times\pi\times3^2\times8$

Big → Smaller

— ◇

— — → Scale Factor

— |

Length SF = $\frac{10}{6} = \frac{5}{3}$

PR = $8 \div \frac{5}{3} = 8 \times \frac{3}{5} = \rightarrow$ 4 8

— — — Volume SF

Volume SF = $\left(\frac{5}{3}\right)^3 = \frac{5^3}{3^3} = \frac{125}{27}$

Volume Smaller = $500 \div \frac{125}{27}$ 1 0 8

$= 4 \times 27$

$8 \times \frac{3}{5}$

$= \frac{24}{5}$

$= 4.8$

$500 \times \frac{27}{128}$

1

27
×4
108

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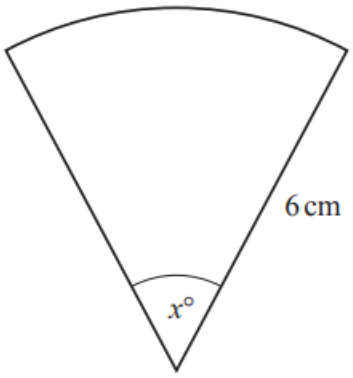
12



NOT TO SCALE

The area of this sector is $5\pi\,\text{cm}^2$.

Find the value of x.

$x =$ ..... [3]

13(a)	4.8	**2**	**M1** for $\frac{10}{6}=\frac{8}{PR}$ oe
13(b)	108	**2**	**M1** for $\left(\frac{6}{10}\right)^3$ or $\left(\frac{10}{6}\right)^3$ oe se

12	50	**3**	**M2** for $\frac{x}{360}\times\pi\times6^2=5\pi$ oe or **M1** for $\frac{x}{360}$