JP Maths Revision

Attempt the paper before watching the solutions https://www.youtube.com/@JPMathsRevision

Foundation / Higher Tier

Cylinders

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- You must **show all your working.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The marks for **each** question are shown in brackets- *use this as a guide as to how much time to spend on each question.*

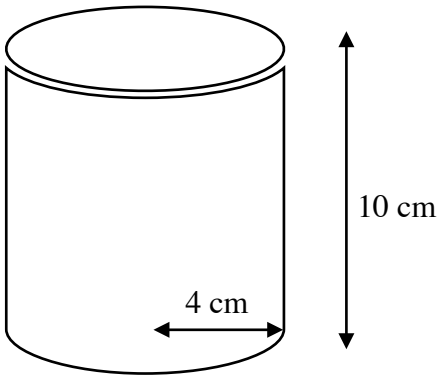
Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

1. A cylinder has radius 4 cm and height 10 cm.

Find the volume of the cylinder.

Give your answer in terms of π.



$V = \pi r^2 h$

$= \pi \times 4^2 \times 10$

$= 160\pi$

160π cm³

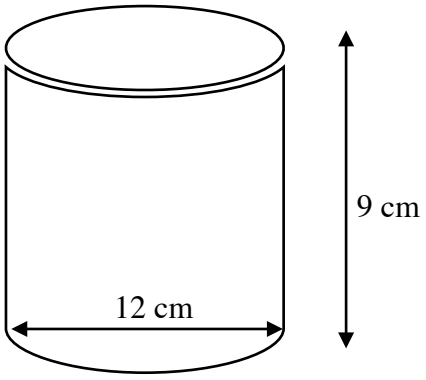
(Total for Question 1 is 3 marks)

---

2. A cylinder has diameter 12 cm and height 9 cm.

Find the volume of the cylinder.

Give your answer in terms of π.



$V = \pi r^2 h$

$= \pi (6)^2 \times 9$

$= \pi \times 36 \times 9$

$= 324\pi$

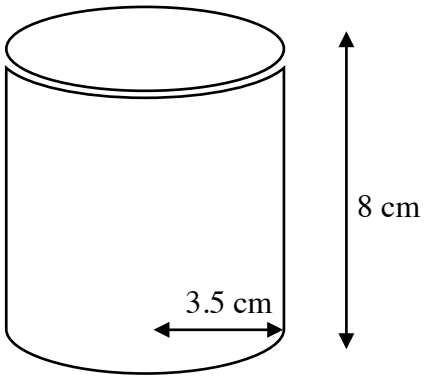
324π cm³

(Total for Question 2 is 3 marks)

3. A cylinder has radius 3.5 cm and height 8 cm.

Find the volume of the cylinder.

Give your answer correct to 3 significant figures.



$V = \pi r^2 h$

$= \pi (3.5)^2 \times 8$

$= 307.876$

$= 308 \text{ cm}^3$

308 cm³

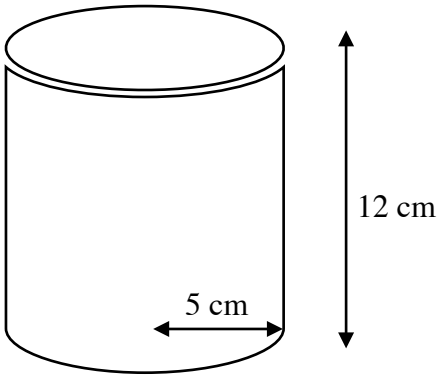
(Total for Question 3 is 3 marks)

---

4. A cylinder has radius 5 cm and height 12 cm.

Find the total surface area of the cylinder.

Give your answer in terms of π



$SA = 2\pi r^2 + 2\pi r h$

$= 2\pi (5)^2 + 2\pi (5)(12)$

$= 50\pi + 120\pi$

$= 170\pi$

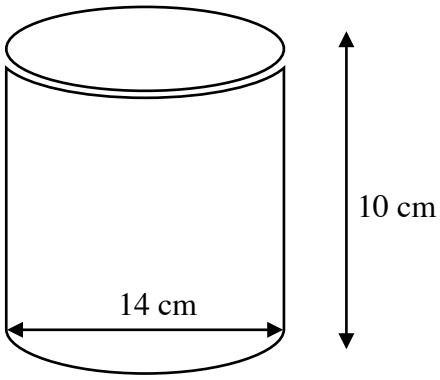
170π cm²

(Total for Question 4 is 3 marks)

5. A cylinder has diameter 14 cm and height 10 cm.

Find the total surface area of the cylinder.

Give your answer correct to 3 significant figures.



$SA = 2\pi r^2 + 2\pi rh$

$= 2\pi(7)^2 + 2\pi(7)(10)$

$= 98\pi + 140\pi$

$= 238\pi$

$= 741.415$

741 cm²

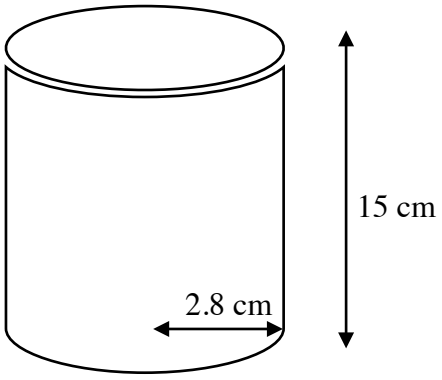
(Total for Question 5 is 3 marks)

---

6. A cylinder has radius 2.8 cm and height 15 cm.

Find the total surface area of the cylinder.

Give your answer correct to 3 significant figures.



$SA = 2\pi r^2 + 2\pi rh$

$= 2\pi(2.8)^2 + 2\pi(2.8)(15)$

$= 15.68\pi + 84\pi$

$= 99.68\pi$

$= 313.1539$

$= 313\text{ cm}^2$

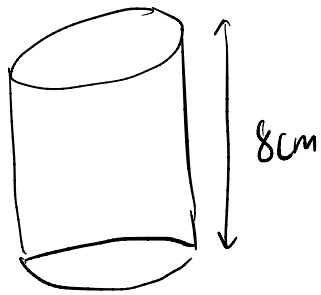
313 cm²

(Total for Question 6 is 3 marks)

7. The volume of a cylinder is 200 π cm^3

The height of the cylinder is 8 cm.

Find the radius of the cylinder.



$V = \pi r^2 h$

$200\pi = \pi r^2 \times 8$

$25 = r^2 \Rightarrow r = \sqrt{25}$

$= 5$

5 cm

(Total for Question 7 is 4 marks)

---

8. The total surface area of a cylinder is 162 π cm^2

The height of the cylinder is 24 cm.

Find the diameter of the cylinder.

$SA = 2\pi r^2 + 2\pi r h$

$162\pi = 2\pi r^2 + 2\pi r(24)$

$162\pi = 2\pi r^2 + 48\pi r$

$81 = r^2 + 24r$

$r^2 + 24r - 81 = 0$

$(r + 27)(r - 3) = 0$

$r = -27, 3$

$r = 3$

So $D = 6$

6 cm

(Total for Question 8 is 4 marks)

9. A cylinder has a volume of 500 cm^3 and a height of 10 cm.

Find the total surface area of the cylinder.

Give your final answer correct to 3 significant figures.

$V = \pi r^2 h$

$500 = \pi r^2 (10)$

$50 = \pi r^2$

$r = \sqrt{\frac{50}{\pi}}$

$SA = 2\pi r^2 + 2\pi r h$

$= 2\pi \left(\sqrt{\frac{50}{\pi}}\right)^2 + 2\pi \left(\sqrt{\frac{50}{\pi}}\right)(10) = 350.66$

351 cm^2

(Total for Question 9 is 4 marks)

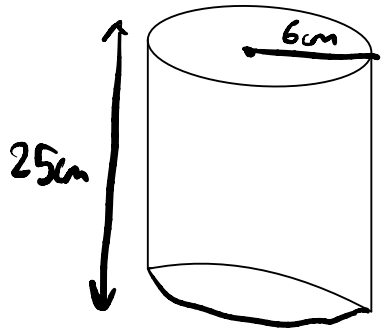
---

10. A cylindrical container has radius 6 cm and height 25 cm.

It is completely filled with water.

The water is poured into smaller cylindrical cups, each with radius 3 cm and height 10 cm.

Calculate the maximum number of cups that can be completely filled.

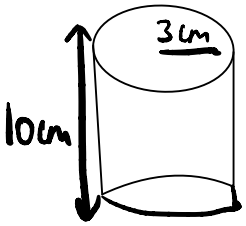


$V = \pi r^2 h$

$= \pi \times 6^2 \times 25$

$= \pi \times 36 \times 25$

$= 900\pi$



$V = \pi \times 3^2 \times 10$

$= 90\pi$

$\frac{900\pi}{90\pi} = 10$ cups

10

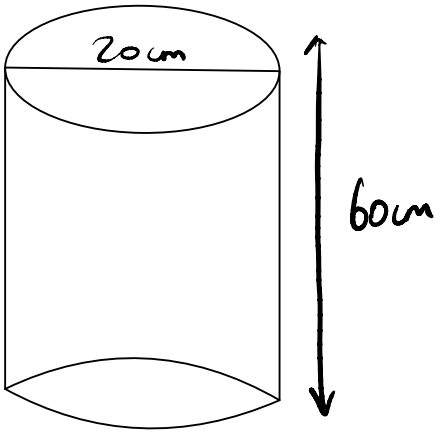
(Total for Question 10 is 4 marks)

11. A cylindrical tank has diameter 20 cm and height 60 cm.

Water flows into the tank at a rate of 1.5 litres per minute.

Calculate how long it takes to fill three-quarters of the tank.

Give your answer to the nearest minute.



$V = \pi r^2 h$

$= \pi \times 10^2 \times 60$

$= 6000\pi \text{ cm}^3$

$1 \text{ litre} = 1000 \text{cm}^3$

So $6000\pi \text{cm}^3 = 6\pi$ litres

$\frac{3}{4} \times 6\pi = 4.5\pi$

$4.5\pi \div 1.5 = 3\pi$ mins

$= 9.4247$ mins

9 Minutes

(Total for Question 11 is 4 marks)

---

12. A cylindrical tank has radius 12 cm and height 30 cm.

The outside of the tank (including top and bottom) is painted.

1 tin of paint covers 500 cm^2.

Each tin costs £6.50.

Calculate the total cost of the paint needed.

Give your answer correct to 2 decimal places.

$SA = 2\pi r^2 + 2\pi r^2 h$

$= 2\pi(12)^2 + 2\pi(12)(30)$

$= 288\pi + 720\pi$

$= 1008\pi \text{ cm}^2$

$1008\pi \div 500 = 6.333$ tins

7 tins needed

7×6.50

$= £45.50$

£ 45.50

(Total for Question 12 is 4 marks)