

Name: _____

Maths Genie Stage 10

Test A

Instructions

- Use **black** ink or ball-point pen.
- Answer all questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**
- **Calculators may be used.**

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

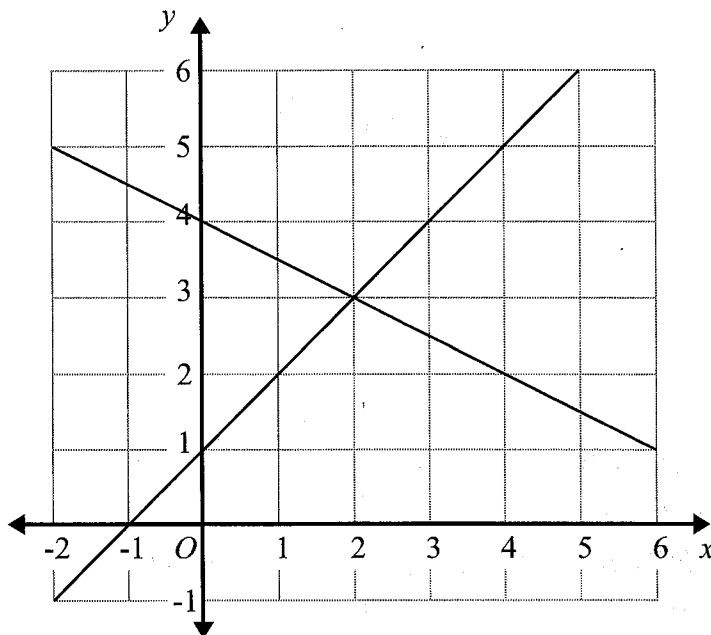
- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end

1 Write down the exact value of $\sin(30^\circ)$

$$\frac{1}{2}$$

(Total for Question 1 is 1 mark)

2 The graphs of the straight lines with equations $y = x + 1$ and $2y = 8 - x$ have been drawn on the grid.



Use the graphs to solve the simultaneous equations

$$\begin{aligned}y &= x + 1 \\ 2y &= 8 - x\end{aligned}$$

$$x = 2 \quad y = 3$$

(Total for Question 2 is 2 marks)

3 Given that $a : b = 5 : 4$ and $a : c = 4 : 3$

Find the ratio $a : b : c$

Give your answer in its simplest form.

$$\begin{array}{ll} a : b & a : c \\ 5 : 4 & 4 : 3 \\ \times 4 & \times 5 \\ 20 : 16 & 20 : 15 \end{array}$$

$$\begin{array}{l} a : b : c \\ 20 : 16 : 15 \end{array}$$

$$\underline{\underline{20 : 16 : 15}}$$

(Total for Question 3 is 2 marks)

4 It takes 5 painters 6 days to complete a job.

Work out how many days it would take 3 painters to complete the same job.

$$5 \times 6 = 30 \text{ days of work needed}$$

$$\frac{30}{3} = 10 \text{ days}$$

$$\underline{\underline{10}} \text{ days}$$

(Total for Question 4 is 2 marks)

5 Solve the simultaneous equations

$$\begin{aligned}3x + 5y &= -4 \\ 3x - 2y &= 31\end{aligned}$$

$$7y = -35$$

$$\underline{\underline{y = -5}}$$

$$3x + 5(-5) = -4$$

$$3x - 25 = -4$$

$$3x = 21$$

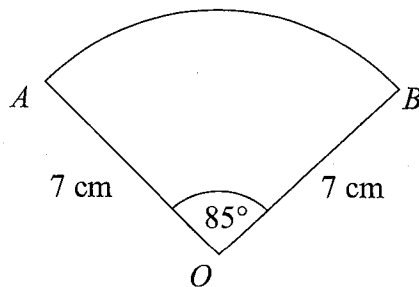
$$\underline{\underline{x = 7}}$$

$$x = \dots \underline{7} \dots$$

$$y = \dots \underline{-5} \dots$$

(Total for Question 5 is 3 marks)

6 AOB is a sector of a circle, centre O and radius 7 cm.
The angle of the sector is 85° .



Find the **perimeter** of the sector.
Give your answer correct to 3 significant figures.

$$\text{Arc length} = \frac{85}{360} \times 2\pi(7)$$

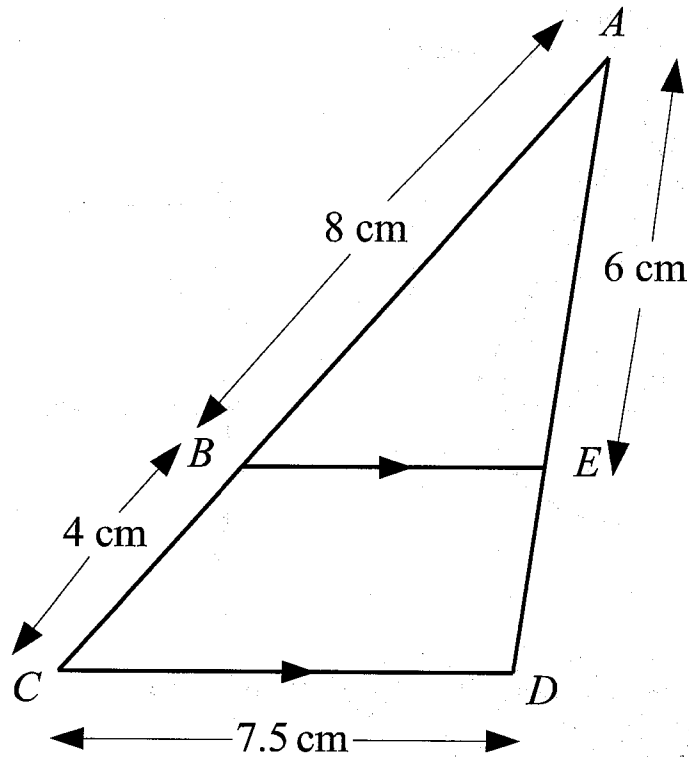
$$= 10.4 \text{ cm}$$

$$\text{Perimeter} = 2(7) + 10.4$$

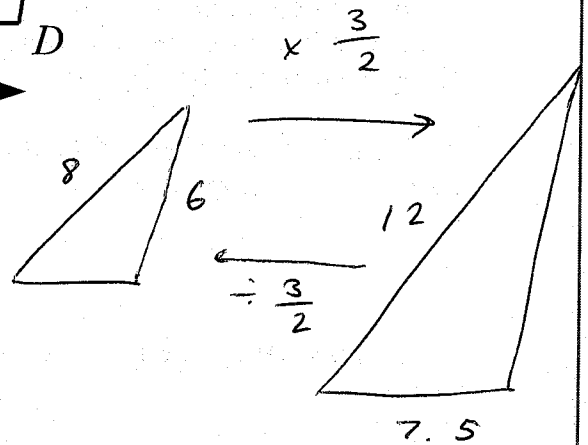
$$= \underline{\underline{24.4 \text{ cm}}}$$

$$\dots \underline{24.4} \dots \text{ cm}$$

(Total for Question 6 is 3 marks)



$$\text{Scale factor} = \frac{12}{8} = \frac{3}{2}$$



BE is parallel to CD .
 $AB = 8$ cm, $BC = 4$ cm, $CD = 7.5$ cm, $AE = 6$ cm.

- (a) Calculate the length of BE .

$$7.5 \div \frac{3}{2} = 5$$

..... 5 cm
 (2)

- (b) Calculate the length of ED .

$$AD = 6 \times \frac{3}{2} = 9$$

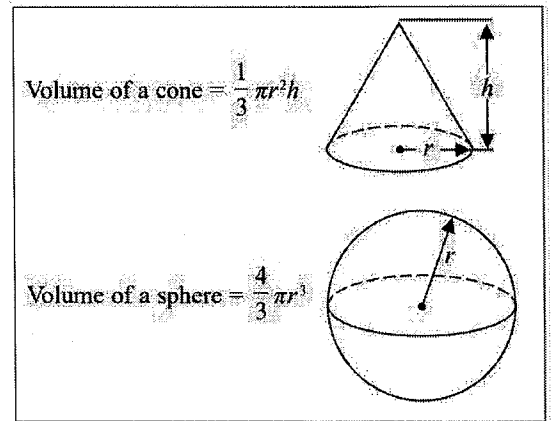
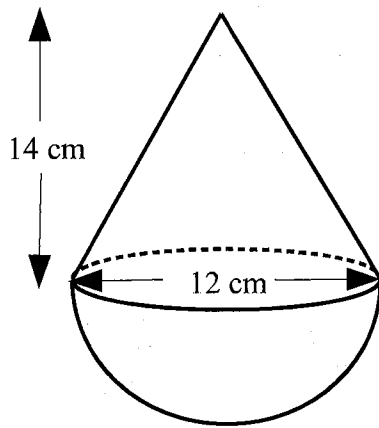
$$9 - 6 = 3 \text{ cm}$$

..... 3 cm
 (2)

(Total for Question 7 is 4 marks)

8

The diagram shows a solid shape.
The shape is a cone on top of a hemisphere.



The height of the cone is 14 cm.

The base of the cone has a diameter of 12 cm. $r = 6 \text{ cm}$

The diameter of the hemisphere is 12 cm.

Work out the total volume of the solid shape.
Give your answer in terms of π .

$$\begin{aligned} \text{volume of cone} &= \frac{1}{3} \pi (6)^2 (14) \\ &= 168 \pi \text{ cm}^3 \end{aligned}$$

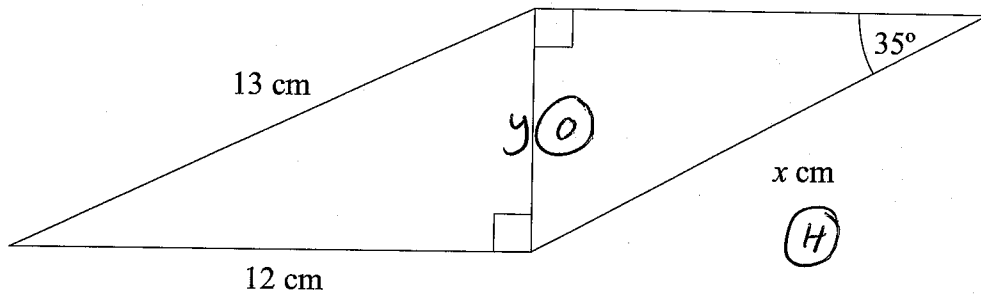
$$\begin{aligned} \text{volume of hemisphere} &= \frac{2}{3} \pi (6)^3 \\ &= 144 \pi \end{aligned}$$

$$\begin{aligned} \text{Total volume} &= 168 \pi + 144 \pi \\ &= 312 \pi \end{aligned}$$

$$\underline{\hspace{10em} 312 \pi \hspace{10em}} \text{ cm}^3$$

(Total for Question 8 is 4 marks)

9



Work out the value of x .
Give your answer to 1 decimal place.

$$12^2 + y^2 = 13^2$$

$$y^2 = 13^2 - 12^2$$

$$y^2 = 25$$

$$y = \sqrt{25}$$

$$= 5 \text{ cm}$$

$$\sin \theta = \frac{O}{H}$$

$$\sin(35) = \frac{5}{x}$$

$$x \sin 35 = 5$$

$$x = \frac{5}{\sin(35)}$$

$$= \underline{\underline{8.7 \text{ cm}}} \text{ 1dp}$$

8.7

(Total for Question 9 is 4 marks)