

Name: _____

Maths Genie Stage 10

Test C

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.**

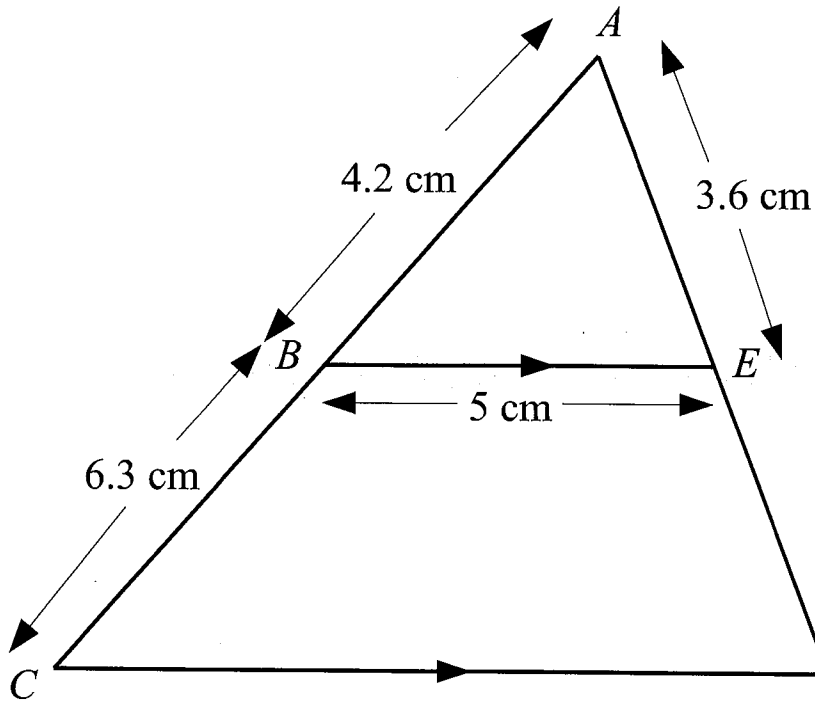
Information

- 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

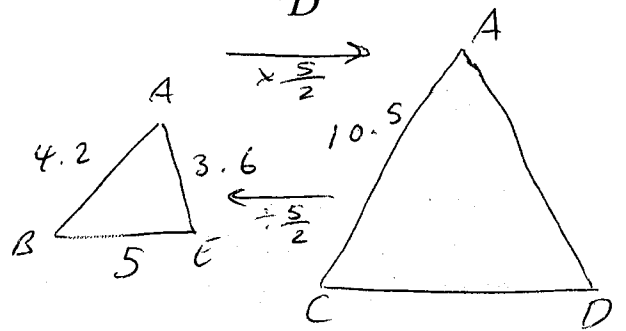
1



BE is parallel to CD .

ABC and AED are straight lines.

$AB = 4$ cm, $BC = 6$ cm, $BE = 5$ cm, $AE = 4.8$ cm.



- (a) Calculate the length of CD .

$$\text{scale factor} = \frac{10.5}{4.2} = \frac{5}{2}$$

$$5 \times \frac{5}{2} = 12.5$$

..... 12.5 cm

(2)

- (b) Calculate the length of ED .

$$AD = 3.6 \times \frac{5}{2} = 9$$

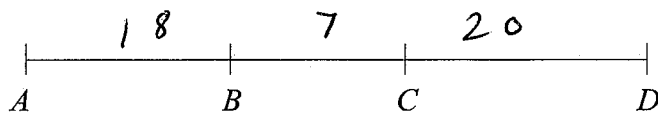
$$9 - 3.6 = 5.4$$

..... 5.4 cm

(2)

(Total for Question 1 is 4 marks)

2 The points A, B, C and D lie in order on a straight line.



$$AB:BD = 2:3 \quad \text{and} \quad AC:CD = 5:4$$

Find $AB:BC:CD$

5 PARTS

9 PARTS

$\times 9$

$\times 5$

$$AB : BD$$

$$AC : CD$$

$$18 : 27$$

$$25 : 20$$

$$AB = 18 \text{ PARTS}$$

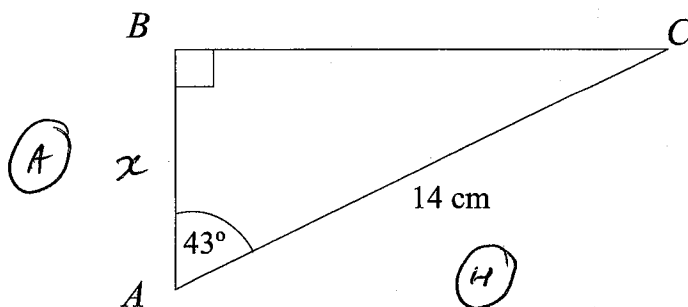
$$BC = 25 - 18 = 7 \text{ PARTS}$$

$$CD = 20 \text{ PARTS}$$

$$\dots\dots\dots 18 : 7 : 20$$

(Total for Question 2 is 3 marks)

3



Calculate the length AB .

$$\cos \theta = \frac{A}{H}$$

$$\cos (43) = \frac{x}{14}$$

$$x = 14 \cos (43)$$

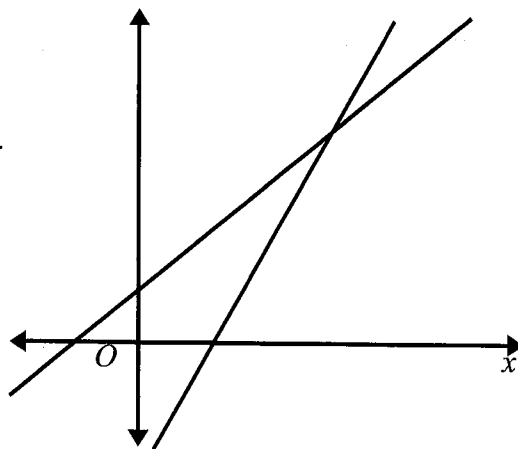
$$= 10.2 \text{ cm (1 dp)}$$

$$\dots\dots\dots 10.2 \text{ cm}$$

(Total for Question 3 is 2 marks)

- 4 The diagram shows two straight lines.
The equation of the lines are $y = 2x + 1$ and $y = 3x - 6$

Work out the coordinates of the point where the lines intersect.



$$2x + 1 = 3x - 6$$

$$\begin{array}{r} -2x \\ \hline 1 = x - 6 \end{array}$$

$$\begin{array}{r} 1 = x - 6 \\ +6 \qquad +6 \\ \hline 7 = x \end{array}$$

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

$$y = 2(7) + 1$$

$$= 14 + 1$$

$$= \underline{\underline{15}}$$

$$\underline{\underline{(7, 15)}}$$

(Total for Question 4 is 3 marks)

- 5 Sweets are sold in small packs and in big packs.
There is a total of 192 sweets in 4 small packs and 3 big packs.
There is a total of 177 sweets in 5 small packs and 2 big packs.

Work out the number of sweets in each small pack and in each big pack.

$$4s + 3b = 192 \quad \times 5$$

$$5s + 2b = 177 \quad \times 4$$

$$\begin{array}{r} 20s + 15b = 960 \\ \hline 20s + 8b = 708 \\ \hline 7b = 252 \end{array}$$

$$7b = 252$$

$$\underline{\underline{b = 36}}$$

$$4s + 3(36) = 192$$

$$4s + 108 = 192$$

$$4s = 84$$

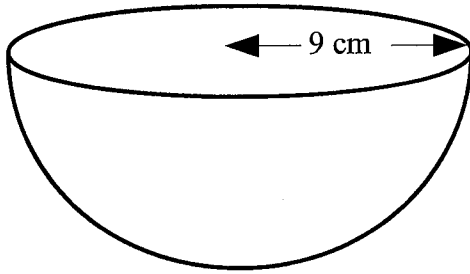
$$\underline{\underline{s = 21}}$$

Small Pack 21

Big Pack 36

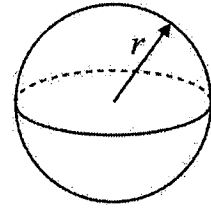
(Total for Question 5 is 3 marks)

- 6 The diagram shows a solid hemisphere with a radius of 9 cm.



$$\text{Volume of sphere} = \frac{4}{3}\pi r^3$$

$$\text{Surface area of sphere} = 4\pi r^2$$



Work out the total surface area of the hemisphere.
Give your answer in terms of π .

$$\begin{aligned}\text{Area of circle} &= \pi(9)^2 \\ &= 81\pi\end{aligned}$$

$$\begin{aligned}\text{Curved area} &= 2\pi(9)^2 \\ &= 162\pi\end{aligned}$$

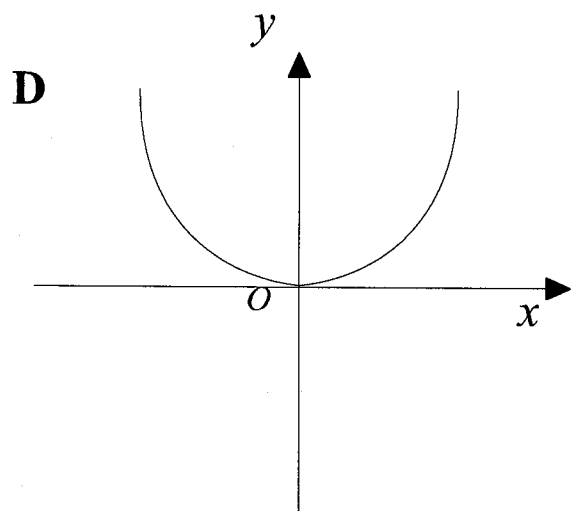
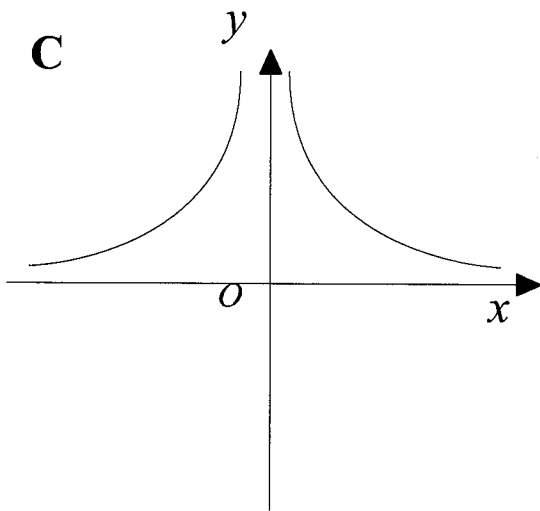
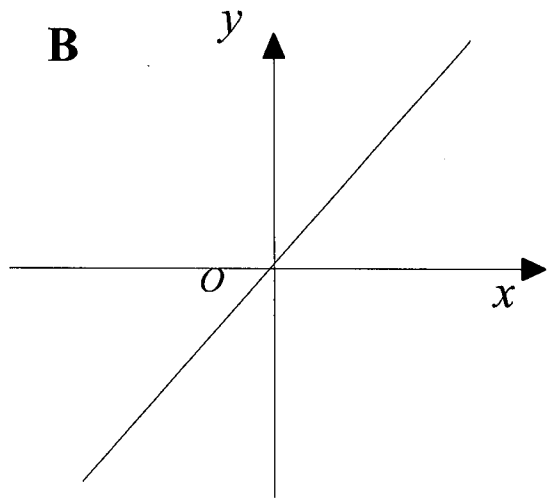
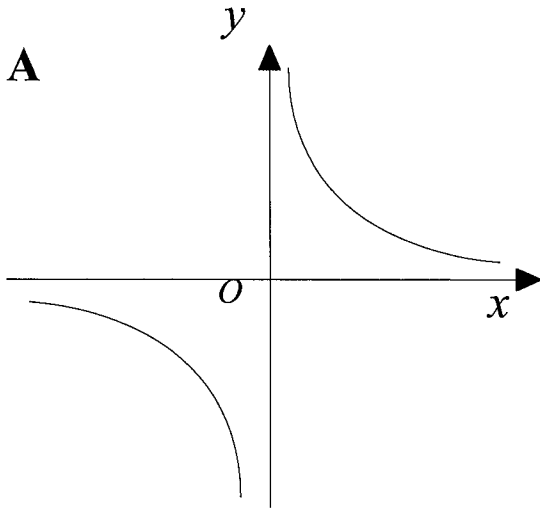
$$\begin{aligned}\text{Total s.a} &= 81\pi + 162\pi \\ &= \underline{\underline{243\pi}}\end{aligned}$$

$$\underline{\underline{243\pi}} \text{ cm}^2$$

(Total for Question 6 is 3 marks)

7

Here are four graphs.



Match each graph with a statement in the table below.

Proportionality relationship	Graph letter
y is directly proportional to x	B
y is inversely proportional to x	A
y is directly proportional to x^2	D
y is inversely proportional to x^2	C

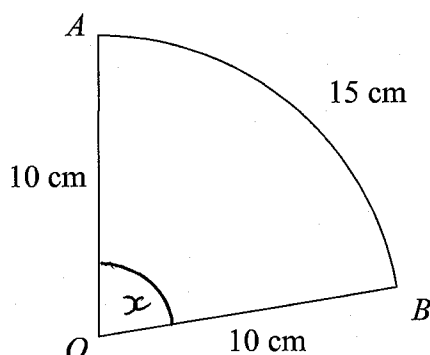
(Total for Question 7 is 2 marks)

8 Write down the exact value of $\tan(30)$

$$\frac{\sqrt{3}}{3}$$

(Total for Question 8 is 1 mark)

9 AOB is a sector of a circle, centre O and radius 10 cm.
The length of arc AB is 15 cm.



Find the area of the sector.

$$\text{Arc length} = \frac{\theta}{360} \times 2\pi r$$

$$15 = \frac{x}{360} \times 2\pi(10)$$

$$15 = \frac{20\pi x}{360}$$

$$5400 = 20\pi x$$

$$x = \frac{5400}{20\pi} = \frac{270}{\pi} = 85.94\dots$$

$$\text{Sector area} = \frac{85.94}{360} \times \pi(10)^2$$

$$= \underline{\underline{75 \text{ cm}^2}}$$

$$\underline{\underline{75}} \text{ cm}^2$$

(Total for Question 9 is 4 marks)