

A



Surname \_\_\_\_\_

Other Names \_\_\_\_\_

Centre Number \_\_\_\_\_

Candidate Number \_\_\_\_\_

Candidate Signature \_\_\_\_\_

# GCSE MATHEMATICS

# H

Higher Tier      Paper 2 Calculator

## 8300/2H

Thursday 7 June 2018      Morning

Time allowed: 1 hour 30 minutes

For this paper you must have:

- a calculator
- mathematical instruments.



At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]



J U N 1 8 8 3 0 0 2 H 0 1

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## **INSTRUCTIONS**

- **Use black ink or black ball-point pen. Draw diagrams in pencil.**
- **Answer ALL questions.**
- **You must answer the questions in the spaces provided. Do not write on blank pages.**
- **Do all rough work in this book. Cross through any work you do not want to be marked.**

## **INFORMATION**

- **The marks for questions are shown in brackets.**
- **The maximum mark for this paper is 80.**
- **You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.**

## **ADVICE**

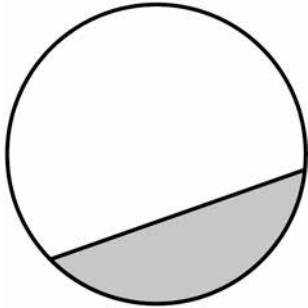
- **In all calculations, show clearly how you work out your answer.**

**DO NOT TURN OVER UNTIL TOLD TO DO SO**



Answer ALL questions in the spaces provided

1 Here is a circle.



Circle the word that describes the shaded part.  
[1 mark]

segment

chord

sector

arc

2 Circle the number that is in standard form.  
[1 mark]

$$0.25 \times 10^4$$

$$6 \times 10^7$$

$$38 \times 10^{-3}$$

$$4 \times 10^{\frac{1}{2}}$$



3  $y$  is  $1\frac{1}{2}$  times  $x$ .

Circle the ratio that is equivalent to  $y : x$

[1 mark]

2 : 5

5 : 2

3 : 2

2 : 3

4 Work out 40 as a percentage of 10

Circle your answer. [1 mark]

4%

25%

300%

400%

[Turn over]

4



5 Match each sequence to its description.

One has been done for you. [4 marks]

1 1 2 3 5 8

1 2 4 8 16 32

1 2 3 4 5 6

1 3 6 10 15 21

1 4 9 16 25 36

1 8 27 64 125 216

Arithmetic  
progression

Geometric  
progression

Fibonacci  
sequence

Triangular  
numbers

Cube numbers

Square numbers



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**[Turn over]**



- 6 The table shows information about the population of a city.

Population in 2001	Population in 2011
420 000	480 000

Liam claims,

“From 2011 to 2021 the population of the city will increase by the same percentage as from 2001 to 2011”

He works out,

population increase from 2001 to 2011

$$= 480\,000 - 420\,000$$

$$= 60\,000$$

population in 2021

$$= 480\,000 + 60\,000$$

$$= 540\,000$$

Does the population of 540 000 match his claim?

You MUST show your working. [3 marks]

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**Answer** \_\_\_\_\_

**[Turn over]**

7



- 7 On three days, Ali throws darts at a target. Here are his results.

	Number of throws	Number of hits	Number of misses
Monday	20	15	5
Tuesday	30	22	8
Wednesday	40	17	23
Total	90	54	36

- 7 (a) Work out TWO different estimates for the probability of Ali hitting the target. [2 marks]

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Answer \_\_\_\_\_ and \_\_\_\_\_



**7 (b) Which of your two answers is the better estimate for the probability of Ali hitting the target?**

**Give a reason for your answer. [1 mark]**

**Answer** \_\_\_\_\_

\_\_\_\_\_

**Reason** \_\_\_\_\_

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\_\_\_\_\_

**[Turn over]**





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**Answer** \_\_\_\_\_

**[Turn over]**

<b>6</b>



9 The length of each side of a regular pentagon is 8.4 cm to 1 decimal place.

9 (a) Complete the error interval for the length of one side. [2 marks]

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ cm  $\leq$  length < \_\_\_\_\_ cm

9 (b) Complete the error interval for the perimeter. [1 mark]

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ cm  $\leq$  perimeter < \_\_\_\_\_ cm



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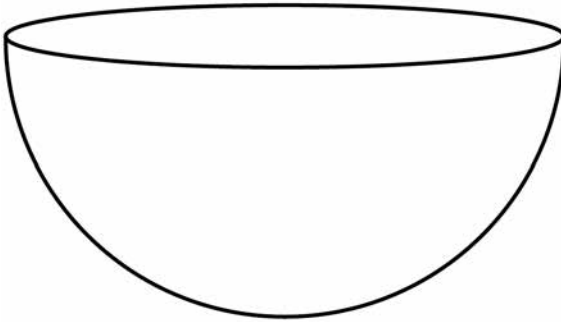
**[Turn over]**



10

Volume of a sphere =  $\frac{4}{3} \pi r^3$  where  $r$  is the radius

A container is a hemisphere of radius 30 cm



Sand fills the container at a rate of  $4000 \text{ cm}^3$  per minute.

Does it take **LESS THAN** a quarter of an hour to fill the container?

You **MUST** show your working. [3 marks]

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**Answer** \_\_\_\_\_

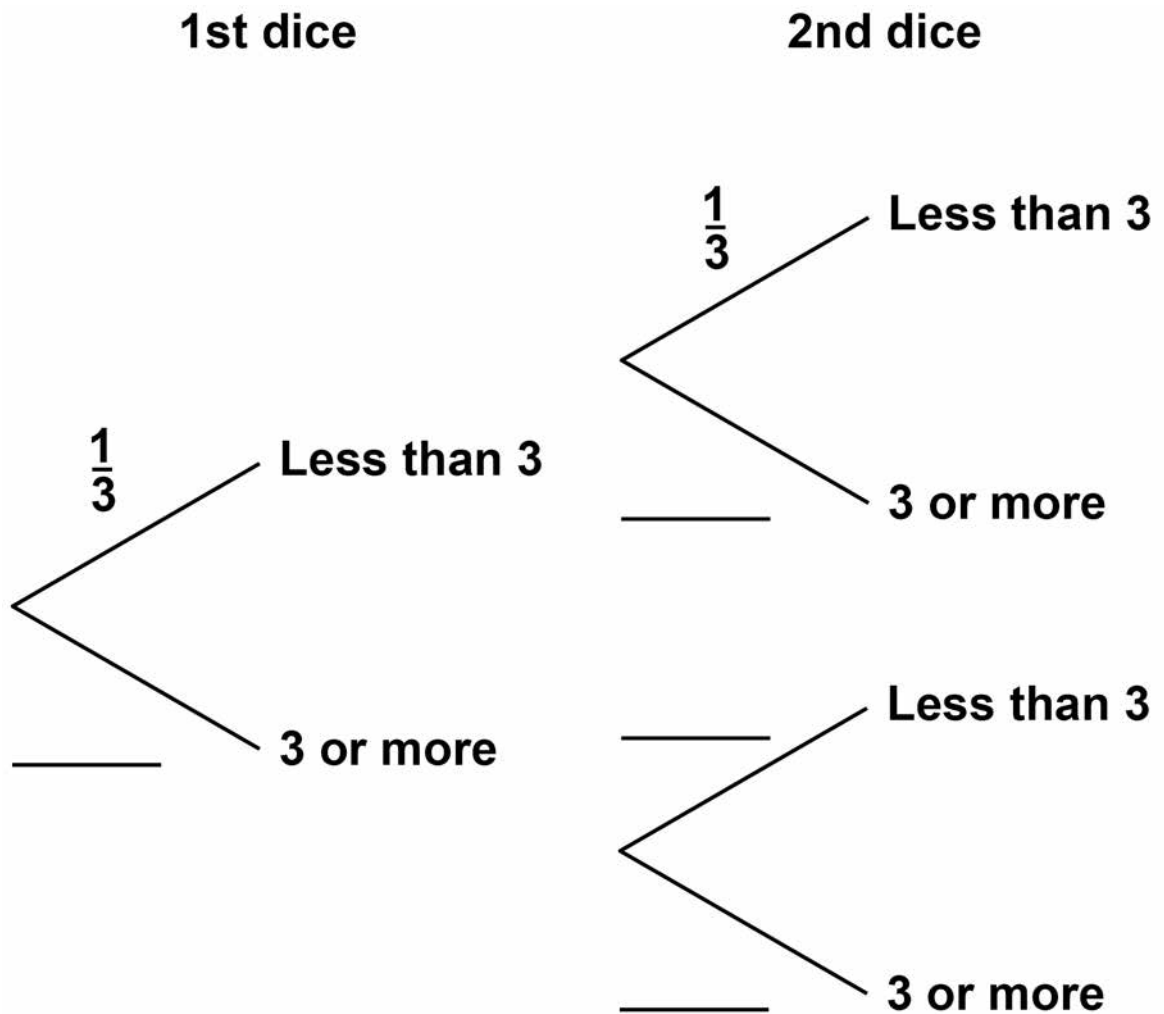
<b>6</b>

**[Turn over]**



11 Two ordinary fair dice are rolled.

11 (a) Complete the tree diagram. [1 mark]



11 (b) Work out the probability that BOTH dice land on a number less than 3  
[1 mark]

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Answer \_\_\_\_\_

11 (c) Work out the probability that EXACTLY ONE of the dice lands on a number less than 3  
[2 marks]

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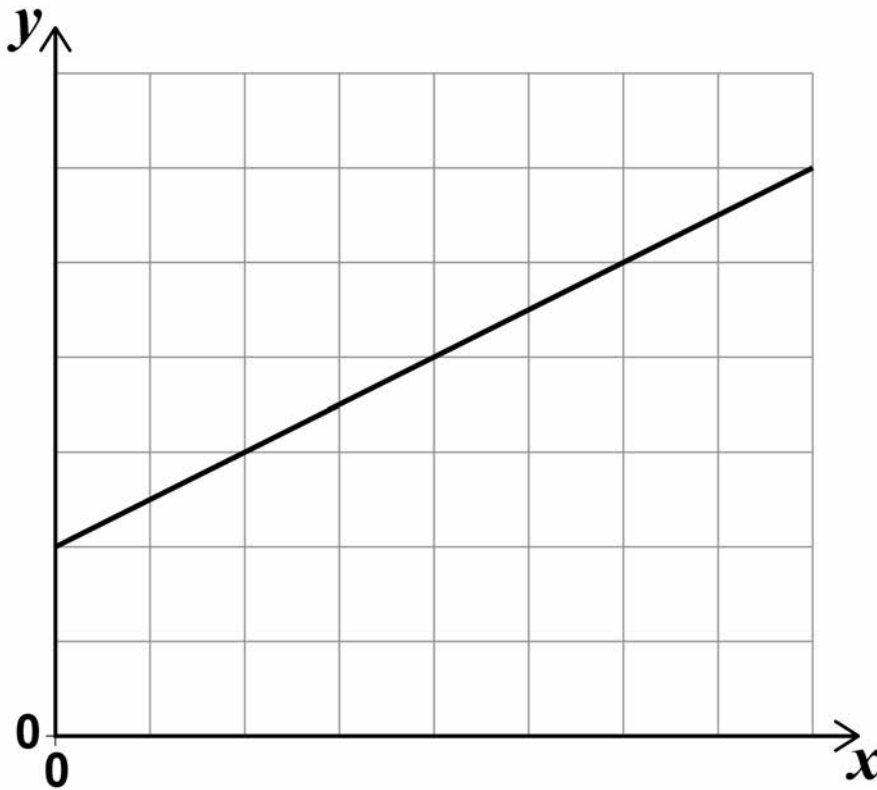
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Answer \_\_\_\_\_

[Turn over]



- 12 Take the sides of all squares of the grid to be 1 cm long.  
A straight line is drawn on the centimetre grid.



Fay assumes that the scale is

1 cm represents 1 unit.

- 12 (a) Use her assumption to work out the gradient of the line. [1 mark]

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Answer \_\_\_\_\_

- 12 (b) In fact, the scale is 1 cm represents 2 units.  
Which statement is correct?  
Tick ONE box. [1 mark]

The answer to part (a) is too big

The answer to part (a) stays the same

The answer to part (a) is too small

[Turn over]

2



13 Show that, for  $x \neq -1$

$\frac{8x^2 - 8}{4x + 4}$  simplifies to the form  $ax + b$  where

$a$  and  $b$  are integers. [3 marks]

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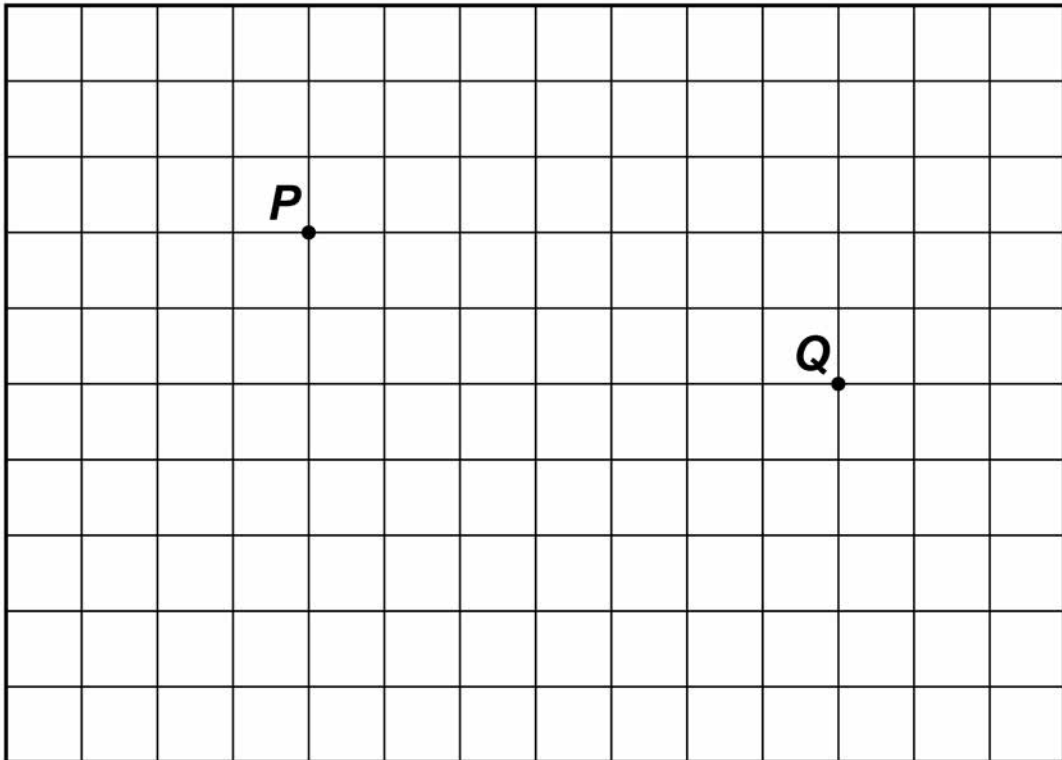
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- 14 The scale drawing represents a garden.  
 Water from a sprinkler at  $P$  reaches up to  
 20 metres from  $P$ .  
 Water from a sprinkler at  $Q$  reaches up to  
 25 metres from  $Q$ .

**SCALE:** 1 cm represents 5 m

Take the sides of all squares of the grid to be 1 cm long.



Using a pair of compasses, show the region that  
 water from BOTH sprinklers reaches. [2 marks]

5

[Turn over]



15 100 men and 100 women took a test.

**SCORES**

	<b>Median</b>	<b>Interquartile range</b>	<b>Range</b>
<b>Men</b>	28	7.5	31
<b>Women</b>	30	9	37

Using this data, which statement **MUST** be true?

Tick **ONE** box. [1 mark]

**Men had a higher average score than women**

**Men had more consistent scores than women**

**A woman had the highest score**

**A man had the lowest score**





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**[Turn over]**



16 Some concrete has volume  $3.8 \text{ m}^3$

16 (a) The density of the concrete is  $2400 \text{ kg/m}^3$

Work out the mass of the concrete. [2 marks]

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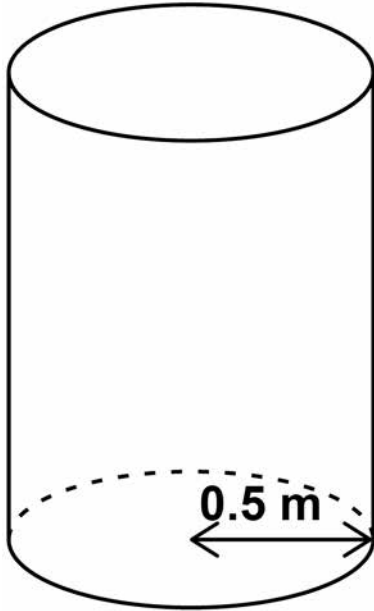
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Answer \_\_\_\_\_ kg



16 (b) The  $3.8 \text{ m}^3$  of concrete is made into the shape of a cylinder.

The base has radius 0.5 metres.



Work out the height of the cylinder. [2 marks]

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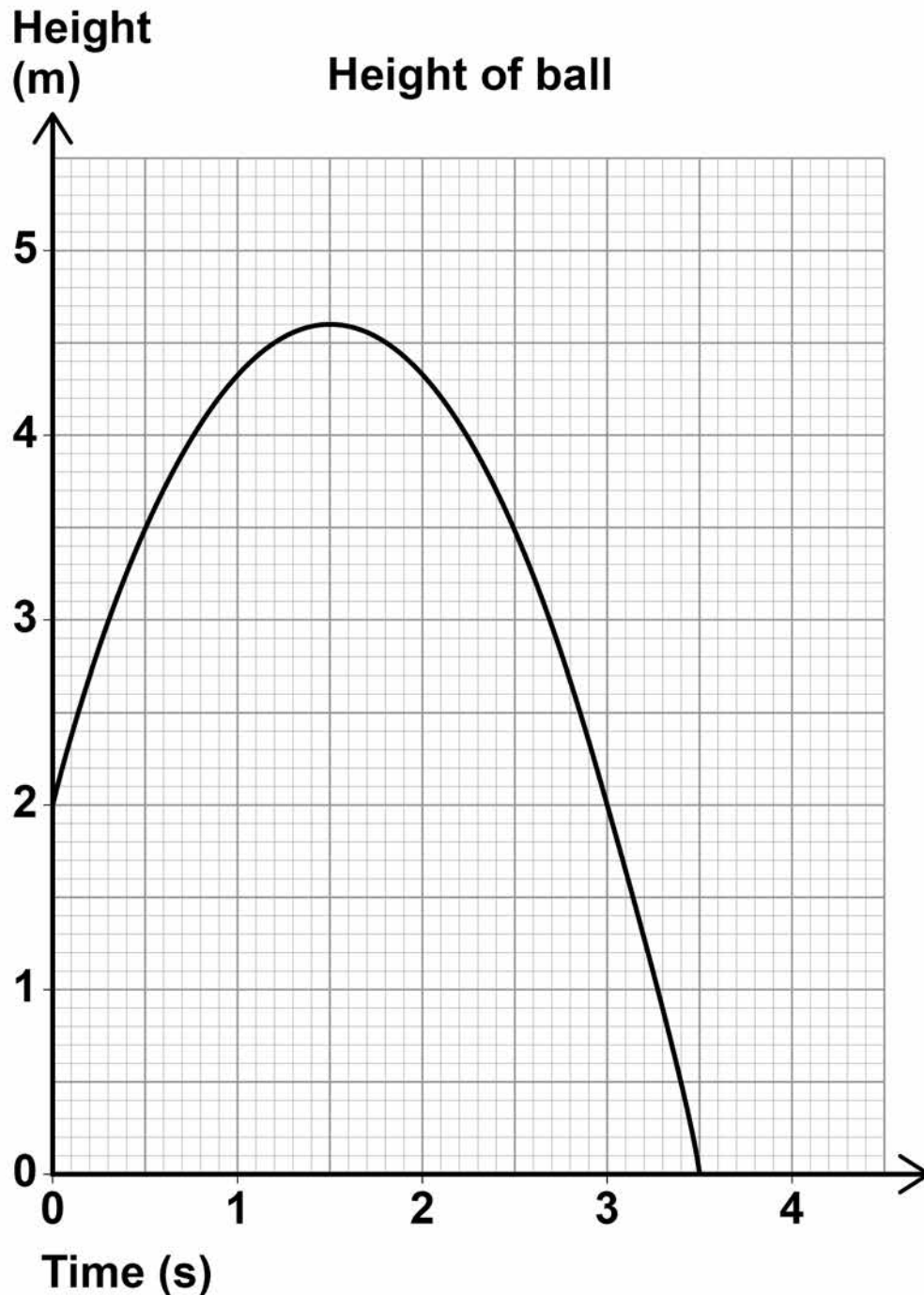
Answer \_\_\_\_\_ m

5

[Turn over]



- 17 A ball is thrown vertically upwards.  
The graph shows the height of the ball above the ground after it is thrown.



17 (a) For how many seconds is the ball at a height of MORE THAN 2 metres? [1 mark]

Answer \_\_\_\_\_ s

17 (b) After how many seconds is the ball at instantaneous rest when it is in the air? [1 mark]

Answer \_\_\_\_\_ s

17 (c) Work out the average speed of the ball when it is moving downwards. [2 marks]

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Answer \_\_\_\_\_ m/s

[Turn over]



- 18 The solution of  $3^x = 300$  lies between two consecutive integers.

Work out the two integers. [1 mark]

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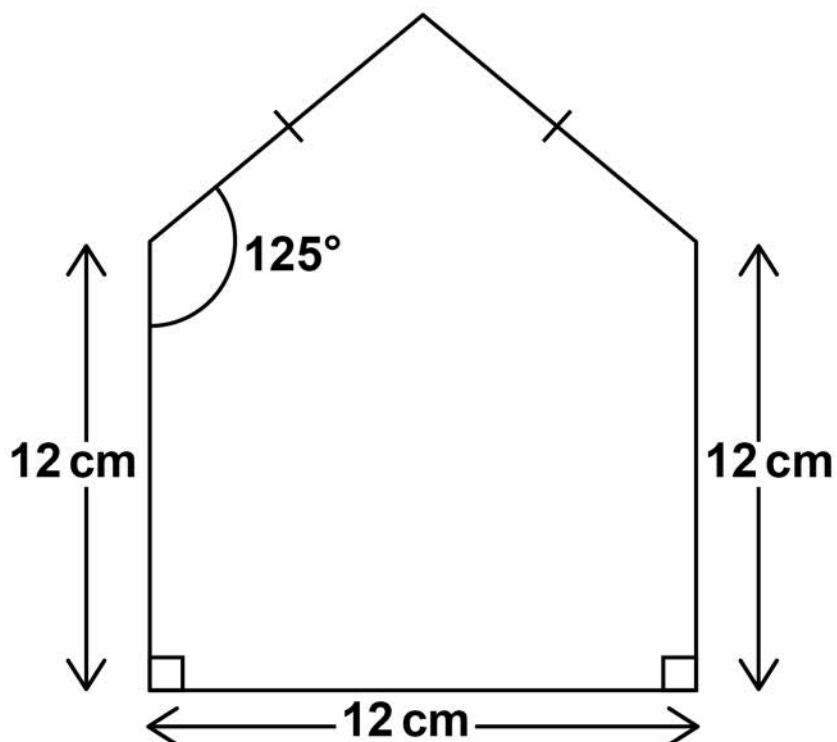
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Answer \_\_\_\_\_ and \_\_\_\_\_

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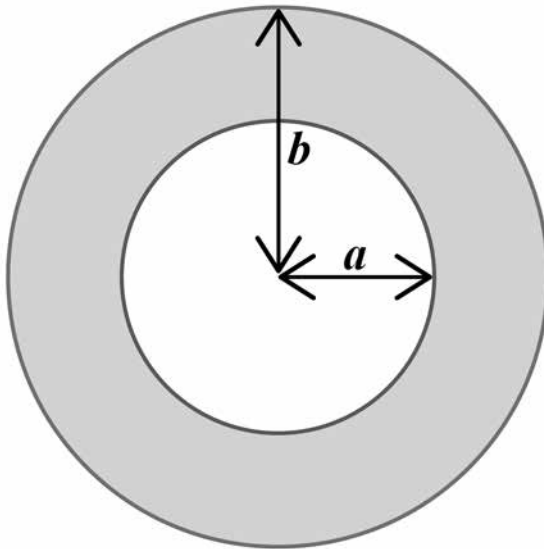
- 19 A pentagon is made from a square and an isosceles triangle.

The diagram is not drawn accurately.





- 20 Here is an inflated swimming ring with dimensions in centimetres.



The volume of the ring,  $V \text{ cm}^3$ , is given by

$$V = 0.25\pi^2 (b - a)^2 (b + a)$$

Work out the volume when  $a = 20$  and  $b = 30$

Give your answer to 3 significant figures.

[3 marks]

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Answer \_\_\_\_\_ cm<sup>3</sup>

[Turn over]

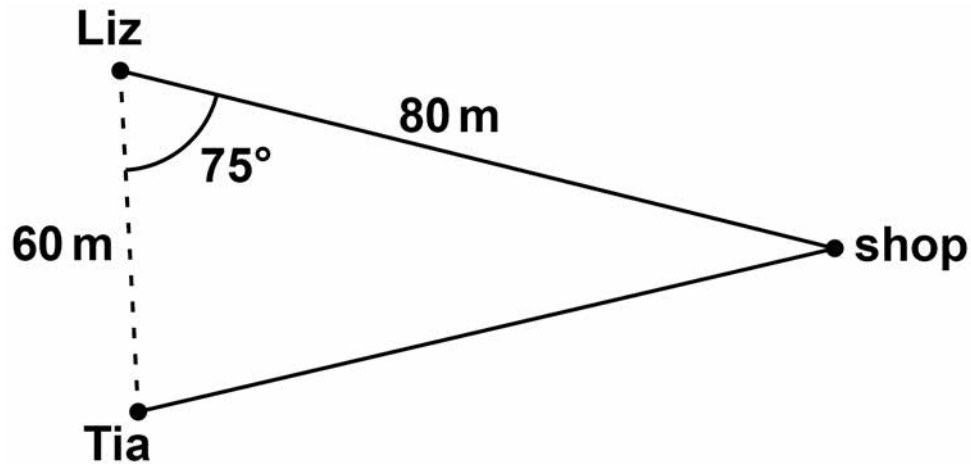
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21 Liz and Tia are walking towards a shop along different straight paths.

The diagram shows their positions at 2 pm

The diagram is not drawn accurately.



21 (a) Assume they walk at the same speed.

Who will arrive at the shop first?

You MUST show your working. [3 marks]

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**Answer** \_\_\_\_\_

**21 (b) In fact, Liz walks at a faster speed than Tia.  
How does this affect the answer to part (a)?  
[1 mark]**

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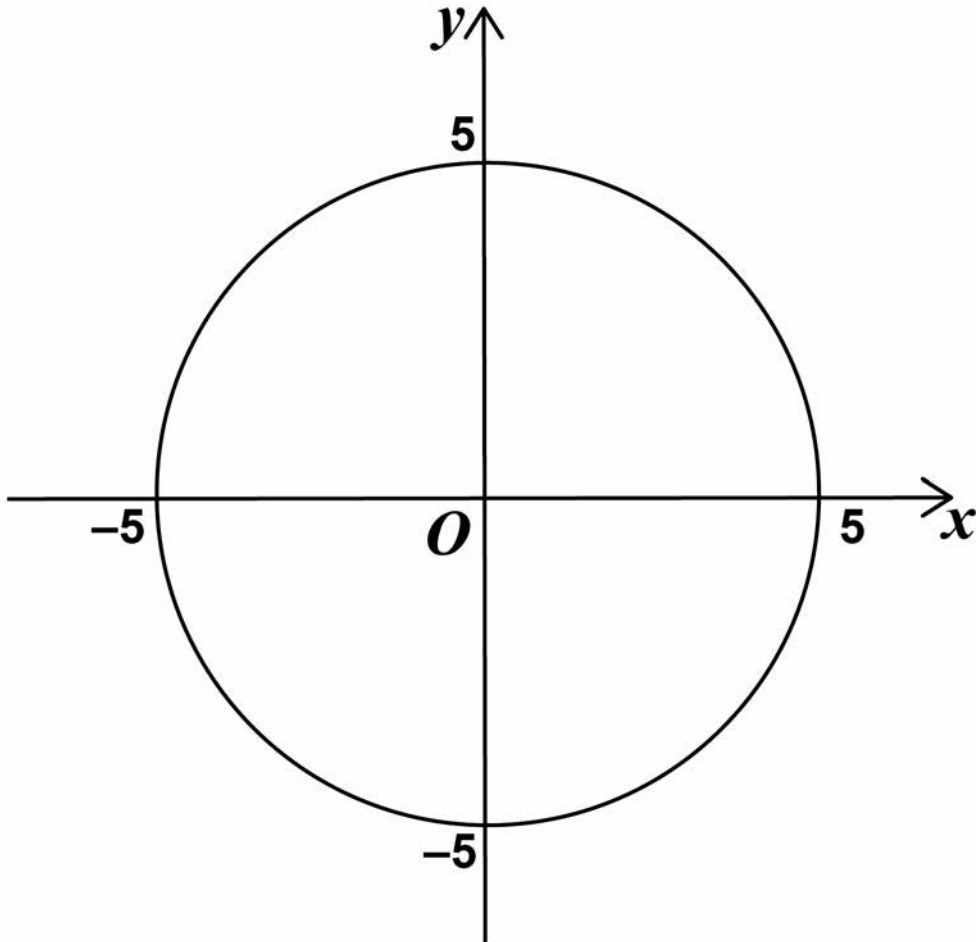
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**[Turn over]**



22 A circle, centre  $O$ , passes through  $(5, 0)$ .



What is the equation of the circle?

Circle your answer. [1 mark]

$$x^2 + y^2 = 25$$

$$x^2 + y^2 = 5$$

$$x^2 + y^2 = 10$$

$$x^2 + y^2 = 100$$



23 Solids X and Y are similar.  
X has volume  $64 \text{ cm}^3$   
Y has volume  $343 \text{ cm}^3$   
The surface area of X is  $176 \text{ cm}^2$

Work out the surface area of Y. [3 marks]

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Answer \_\_\_\_\_  $\text{cm}^2$

[Turn over]



24 A tank is a cuboid measuring 50 cm by 35 cm by 20 cm

All lengths are to the NEAREST CENTIMETRE.

A container has a capacity of EXACTLY 34 litres.

1 litre = 1000 cm<sup>3</sup>

Which has the greater capacity?

Tick ONE box.

Tank

Container

Cannot tell

Show working to support your answer. [4 marks]

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[Turn over]

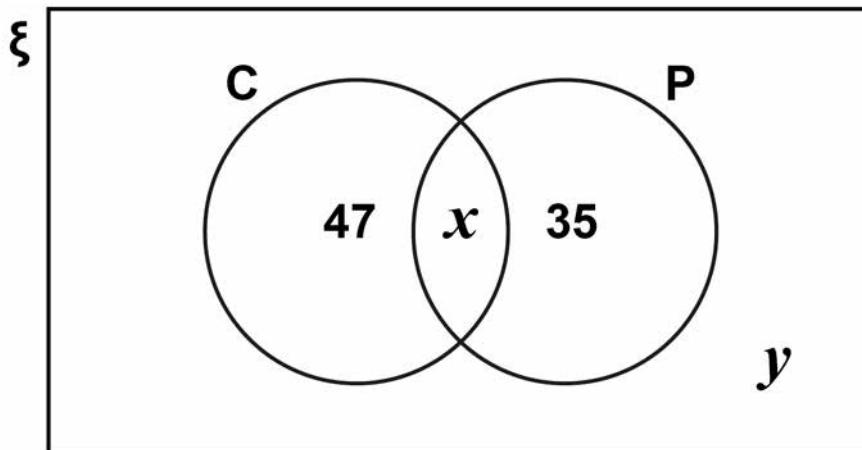


- 25 The Venn diagram shows some information about 150 students.

$\xi = 150$  students

C = students who study Chemistry

P = students who study Physics



The probability that a Physics student, chosen at random, also studies Chemistry is  $\frac{5}{12}$

One of the 150 students is chosen at random.

Work out the probability that the student does NOT study either Chemistry or Physics. [4 marks]

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**Answer** \_\_\_\_\_

**[Turn over]**



- 26 A curve has equation  $y = 4x^2 + 5x + 3$   
A line has equation  $y = x + 2$

Show that the curve and the line have EXACTLY one point of intersection.

Do NOT use a graphical method. [4 marks]

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27 Prove algebraically that  $2.\dot{7}5$  converts to the fraction  $\frac{124}{45}$

[3 marks]

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[Turn over]



28  $f(x) = 5 - x$  and  $g(x) = 3x + 7$

28 (a) Simplify  $f(2x) + g(x - 1)$   
[3 marks]

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Answer \_\_\_\_\_



28 (b) Solve  $g^{-1}(x) = 2x$   
[3 marks]

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$x =$  \_\_\_\_\_

**END OF QUESTIONS**

9



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For Examiner's Use	
Pages	Mark
4–5	
6–9	
10–13	
14–17	
18–19	
20–21	
22–23	
24–27	
28–30	
30–33	
34–36	
37–39	
40–42	
43–45	
<b>TOTAL</b>	

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