



General Certificate of Secondary Education  
2019

Centre Number

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Candidate Number

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## Mathematics

Unit M7 Paper 2  
(With calculator)  
Higher Tier



<b>MV18</b>
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[GMC72]

**THURSDAY 6 JUNE, 10.45am–12 noon**

### Time

1 hour 15 minutes, plus your additional time allowance.

### Instructions to Candidates

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

**You must answer the questions in the spaces provided.**

**Do not write on blank pages or tracing paper.**

Complete in black ink only.

Answer **all sixteen** questions.

All working should be clearly shown in the spaces provided.

Marks may be awarded for partially correct solutions.

You **may** use a calculator for this paper.

### Information for Candidates

The total mark for this paper is 50.

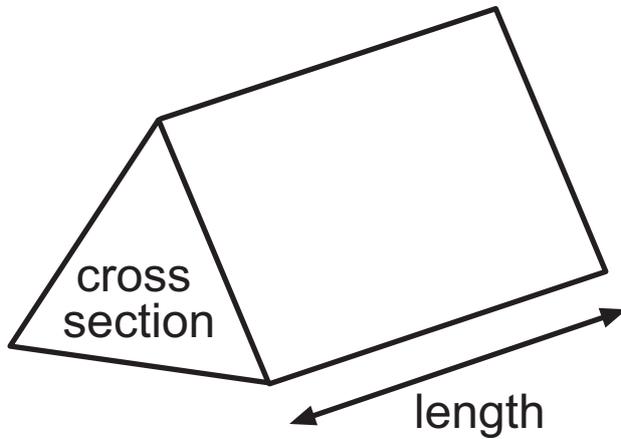
Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.

You should have a calculator, ruler, compasses and a protractor.

The Formula Sheet is on pages 2 and 3.

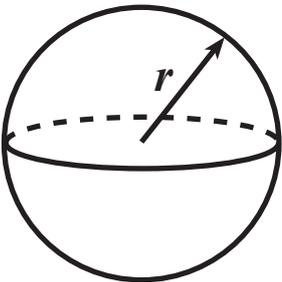
# Formula Sheet

**Volume of prism = area of cross section  $\times$  length**



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

**Surface area of sphere =  $4 \pi r^2$**



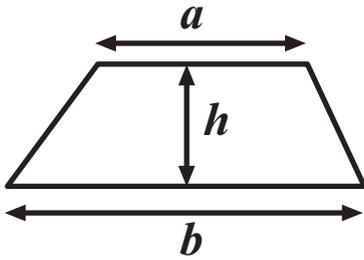
## Quadratic Equation

The solutions of  $ax^2 + bx + c = 0$

where  $a \neq 0$ , are given by

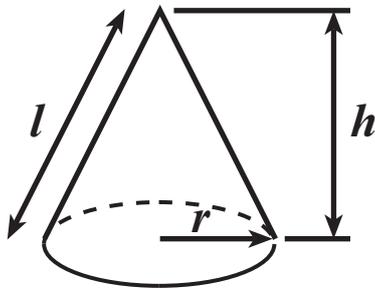
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\text{Area of trapezium} = \frac{1}{2} (a + b)h$$

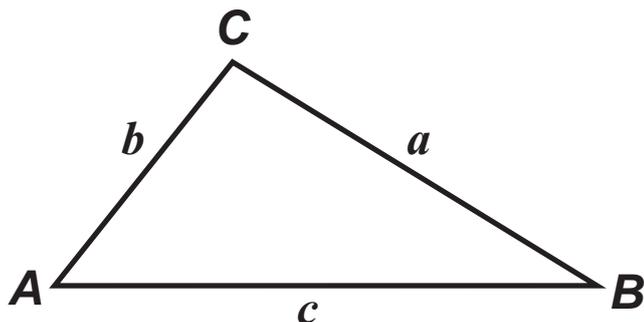


$$\text{Volume of cone} = \frac{1}{3} \pi r^2 h$$

$$\text{Curved surface area of cone} = \pi r l$$



In any triangle **ABC**



$$\text{Sine Rule: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{Cosine Rule: } a^2 = b^2 + c^2 - 2bc \cos A$$

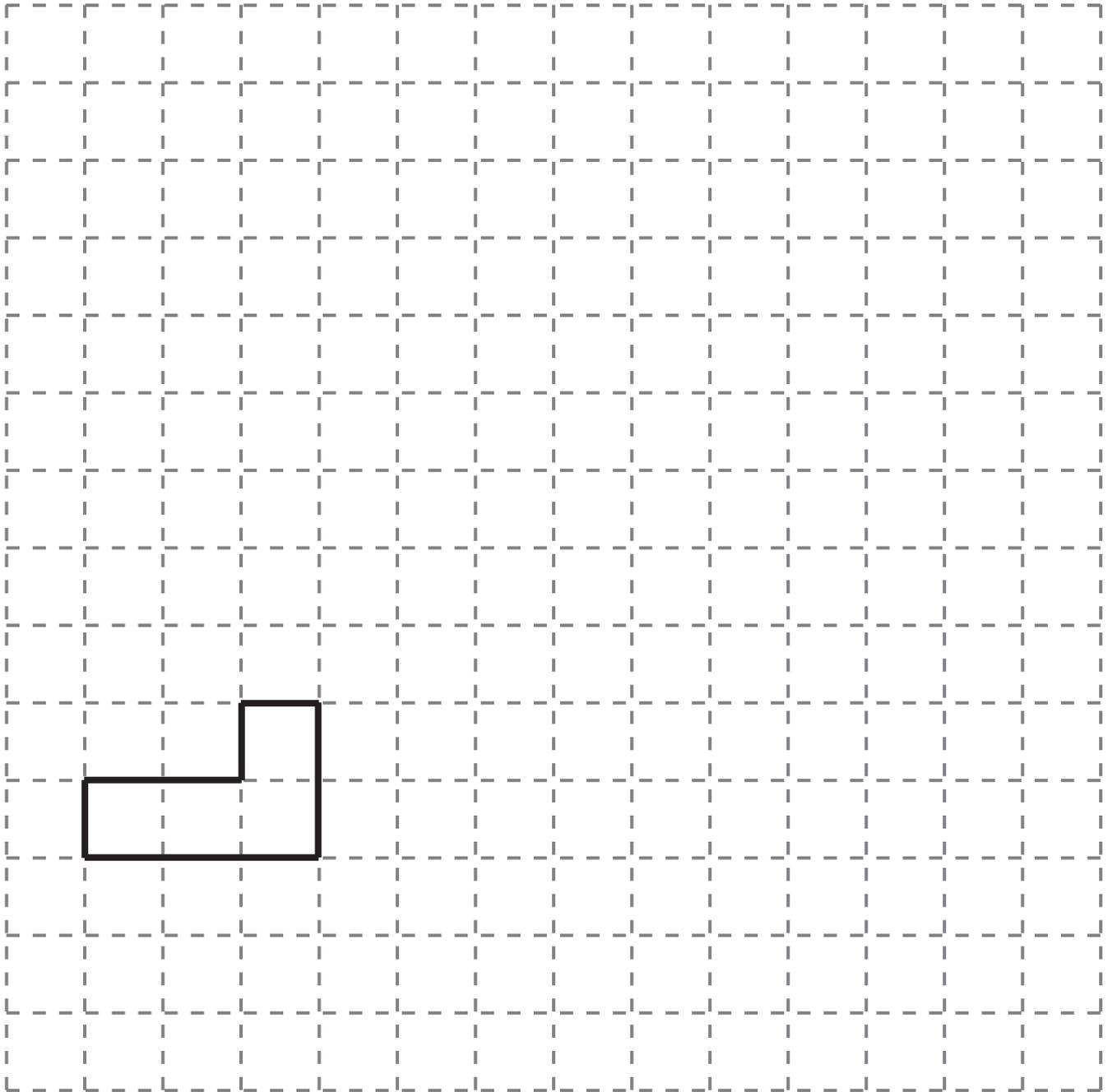
$$\text{Area of triangle} = \frac{1}{2} ab \sin C$$

1 In a choir there are 36 female and 24 male singers.

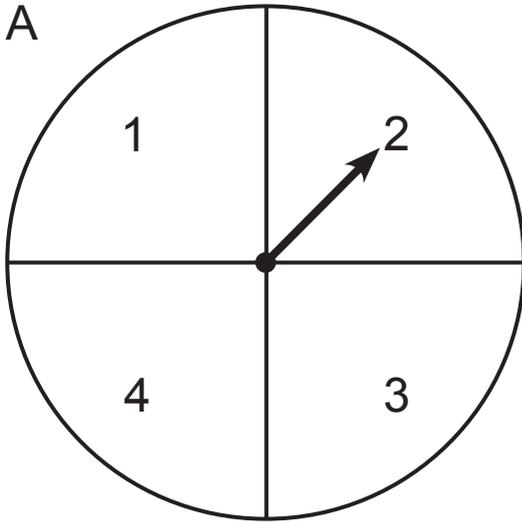
Write down the ratio of female to male singers in its simplest form. [2 marks]

Answer \_\_\_\_\_

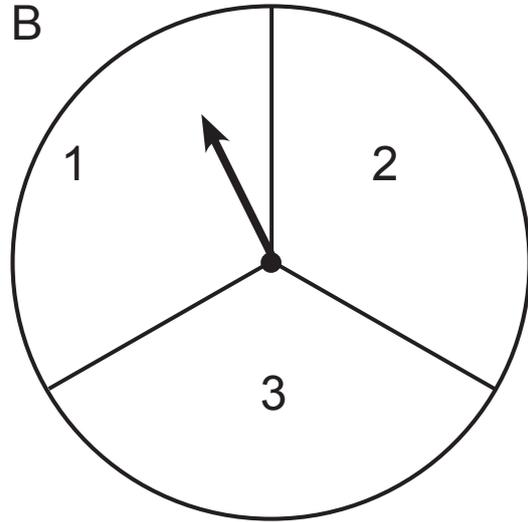
2 Enlarge the shape by scale factor 3 [2 marks]



3 A



B



Spinners A and B are each spun once.

- (a) Complete the table to show all the possible outcomes.  
[1 mark]

		Spinner B		
		1	2	3
Spinner A	1	1, 1	1, 2	1, 3
	2	2, 1	2, 2	
	3	3, 1		
	4			

- (b) What is the probability of getting the same number on each spinner? [1 mark]

Answer \_\_\_\_\_

(c) What is the probability of getting a bigger number on A than B? [1 mark]

Answer \_\_\_\_\_

- 4 There are 32 pupils in a class and all were present on Monday.

On Monday the teacher asked each pupil their favourite colour.

She recorded the results for green, blue and yellow accurately in a table.

	Green	Blue	Yellow	Total
Girls	3	5	4	12
Boys	4	7	2	13
Total	7	12	6	25

- (a) Give a reason why the total number of boys and girls in the table is not 32 [1 mark]

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- (b) There are 18 girls in the class.

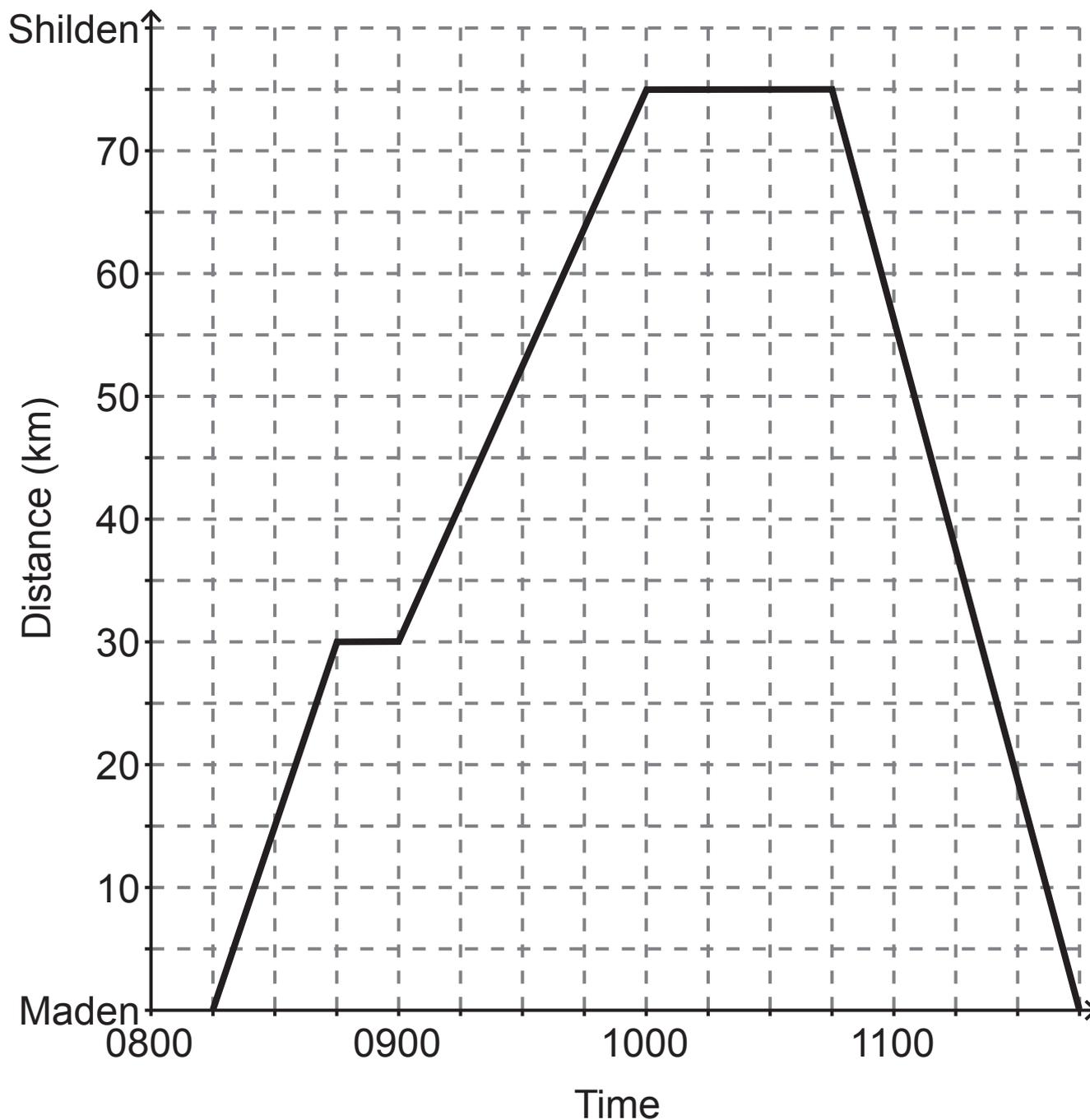
What is the probability that a girl said the colour blue?  
[1 mark]

Answer \_\_\_\_\_

(c) What is the probability that a pupil in the class **did not** say green? [1 mark]

Answer \_\_\_\_\_

5 The graph shows Ryan's journey from Maden to Shilden and back to Maden.

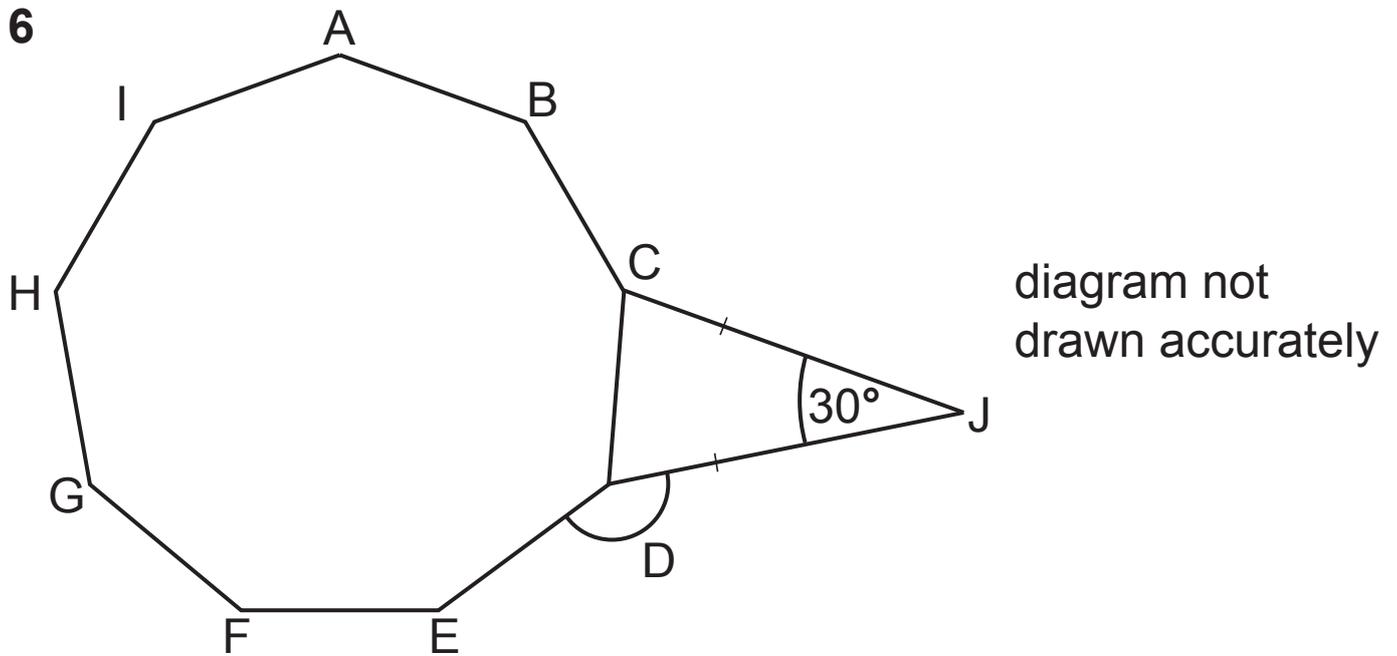


(a) How far is Ryan from Maden at 0930? [1 mark]

Answer \_\_\_\_\_ km

(b) Calculate the average speed for the whole journey.  
[2 marks]

Answer \_\_\_\_\_ km/h



The diagram shows a regular nonagon ABCDEFGHI with an isosceles triangle DCJ attached.

The angle  $DJC = 30^\circ$

Calculate the size of the angle EDJ. [4 marks]

**Show your working clearly.**

Answer \_\_\_\_\_<sup>o</sup>

7 Sue bought 100 ml of suncream for £5.40 in Belfast.

While in Spain she bought 150 ml of suncream for 8.80 euro.

The exchange rate was £1 = 1.07 euro.

Was it better value in Belfast or in Spain? [5 marks]

Show your working.

Answer \_\_\_\_\_

8 There are four possible results from a music examination.

Result	Fail	Pass	Credit	Distinction
Probability		$\frac{1}{2}$	$\frac{3}{10}$	$\frac{1}{20}$

The probabilities of some results are recorded in the table.

(a) What is the probability of fail? [2 marks]

Answer \_\_\_\_\_

(b) What is the probability of credit or distinction?  
[2 marks]

Answer \_\_\_\_\_

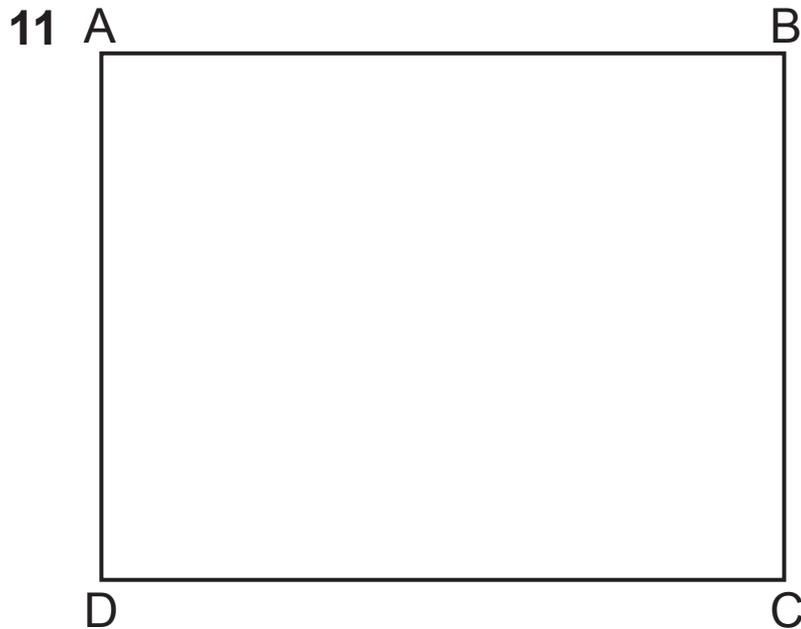
9 Simplify  $\frac{m^5 \times m^3}{m^2}$  [1 mark]

Answer \_\_\_\_\_

10 Work out the  $n^{\text{th}}$  term of the sequence

6, 3, 0, -3, ... [2 marks]

Answer \_\_\_\_\_



ABCD is a rectangle, with  $AB = 9\text{ cm}$  and  $BC = 7\text{ cm}$ .

Shade the region inside the rectangle which is the locus of all points that are

(i) greater than  $4.5\text{ cm}$  from C

and

(ii) nearer to B than D. [3 marks]

12 Use trial and improvement to solve the equation

$$x^3 - 3x = 11$$

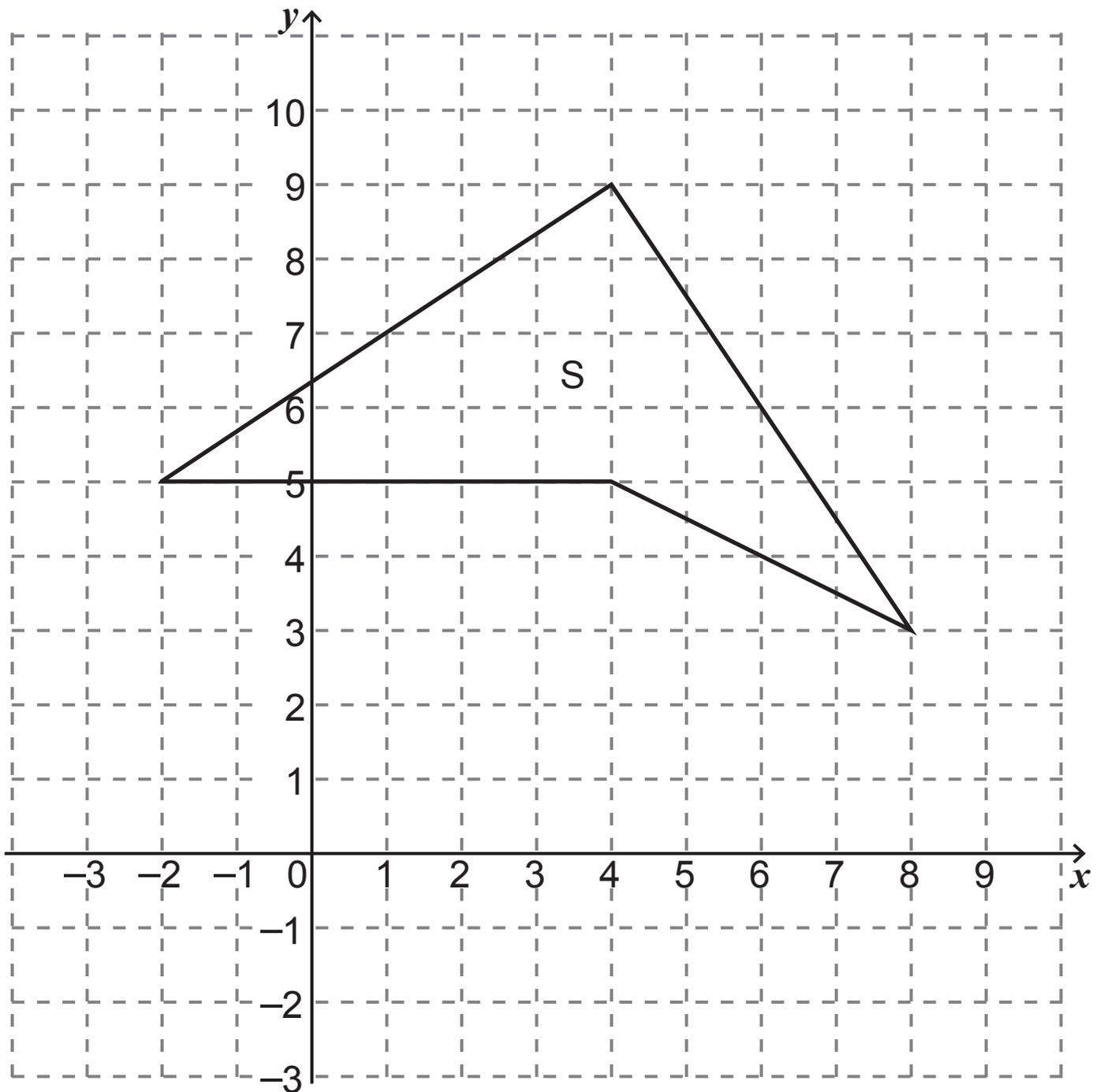
Give your answer correct to one decimal place. [4 marks]

**You must show your working**

$x$	$x^3 - 3x$	

Answer \_\_\_\_\_

13



- (a) On the grid above, draw an enlargement of the shape S, using a scale factor of  $\frac{1}{2}$  and centre  $(0, -1)$ .  
[3 marks]

(b) If the shape S has an area of  $20 \text{ cm}^2$ , what is the area of the enlarged shape? [1 mark]

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

**14**  $s$  is directly proportional to the square of  $v$ .

When  $v = 20$ ,  $s = 250$

Express  $s$  in terms of  $v$ . [3 marks]

Answer \_\_\_\_\_

**15** A bag contains 60 coins.

Each coin in the bag is either a 20p coin or a 50p coin.

The total value of the coins in the bag is £22.80

Work out how many of each coin is in the bag. [5 marks]

A solution by trial and improvement will not be accepted.

Answer \_\_\_\_\_ 20p coins  
\_\_\_\_\_ 50p coins

16 Make T the subject of  $J = \sqrt{TR}$  [2 marks]

Answer \_\_\_\_\_

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**THIS IS THE END OF THE QUESTION PAPER**

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For Examiner's use only	
Question Number	Marks
1	
2	
3	
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8	
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10	
11	
12	
13	
14	
15	
16	
<b>Total Marks</b>	

Examiner Number

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