Centre Number

Candidate Number

Mathematics

Unit M7 Paper 1
(Non-Calculator)
Higher Tier

[GMC71]   *GMC71*

THURSDAY 2 DECEMBER, 9.15am–10.30am

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of
this page.
You are provided with Higher Tier Additional Support Materials for use with this paper.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page, on blank pages or tracing paper.
Complete in black ink only. **Do not write with a gel pen.**
Answer **all fourteen** questions.
All working should be clearly shown in the spaces provided. Marks may be awarded for
partially correct solutions.
You **must not** use a calculator for this paper.

INFORMATION FOR CANDIDATES

The total mark for this paper is 50.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded
to each question or part question.
You should have a ruler, compasses and a protractor.
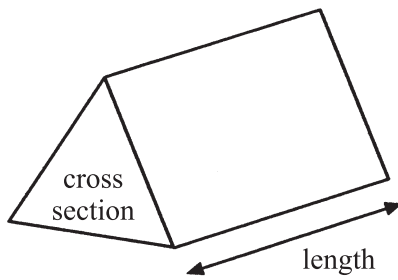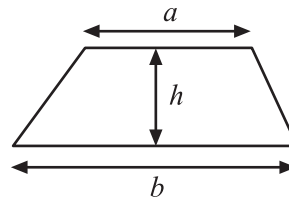The Formula Sheet is on page 2.

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Formula Sheet

Volume of prism = area of cross section × length

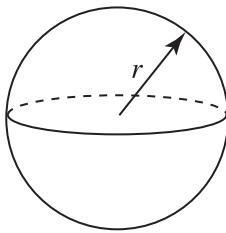cross section

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

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

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

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

Curved surface area of cone $= \pi r l$

In any triangle ABC

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

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

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

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20GMC7102

1 800 students attend Clarendon College.

15% of them are in Year 11

10% of Year 11 students are in the Spanish class.

Of **all** the students in Clarendon College, how many **are not** in the Year 11 Spanish class?

Answer _____ [3]

2   Each new number in a sequence is found using the rule

multiply the previous number by 3 and then subtract 5

Find the next two numbers in this sequence.

2   , _____ , _____

[2]

3 A bag contains five counters, each one a different colour.

The colours are red (R), green (G), blue (B), white (W) and yellow (Y).

Daniel takes a counter at random from the bag.

Daniel now tosses a fair coin.

One possible outcome is (red, heads), which can be written as (R, H).

(a) List all the possible outcomes for this experiment in this way in the two-way table below.

One has already been done for you.

Counter (colour)

		R	G	B	W	Y
Coin	**H**	(R, H)				
	T					

[2]

(b) What is the probability that the outcome is (B, H)?

Answer _____ [1]

(c) What is the probability that the outcome of this experiment contains a green (G) or a tail (T) or both of these?
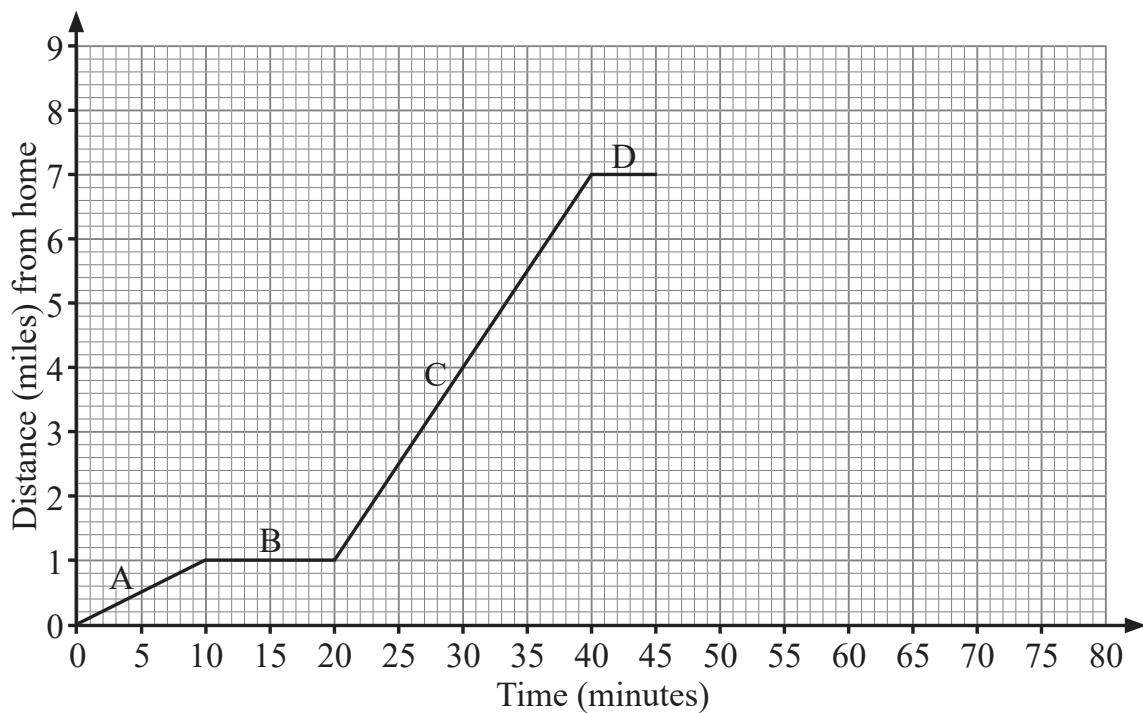
Answer _____ [2]

[Turn over

4 Mike is out for a bicycle ride. He starts from home.

The graph shows four stages of his ride labelled A, B, C and D.

(a) Which stage of the graph shows Mike repairing an **early** puncture?

Answer _____ [1]

(b) What is Mike's average speed during stage C?

Answer _____ mph [1]

(c) Mike travels home at an average speed of 14 mph.

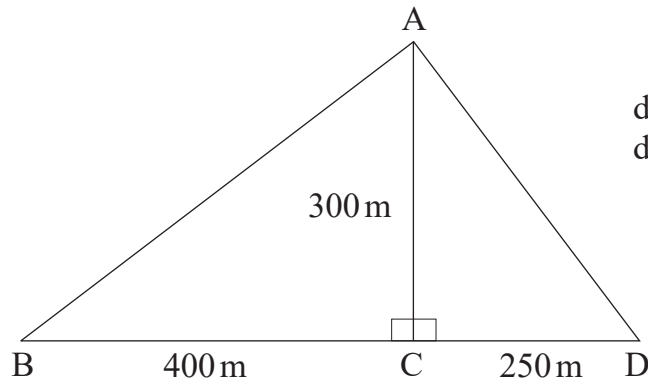Complete the final stage of Mike's bicycle ride on the graph. [2]

5

A

diagram not
drawn accurately

300 m

B   400 m   C   250 m   D

(a) In the space below, make a scale drawing of the diagram ABCD shown above.

Use a scale of 1 cm to 50 m.

B ×

[3]

(b) Use your scale drawing to calculate the actual length of AB.

Answer AB = _____ m [1]

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6　This recipe makes 16 scones with the following ingredients.

Ingredients

- 250 g flour
- 1 tsp baking powder
- 40 g butter
- 25 g sugar
- 1 large egg
- about 100 ml milk

(a) Paul wants to make 20 scones.

How much butter will he need?

Answer _____ g [2]

(b) Paul has 300 g of flour.

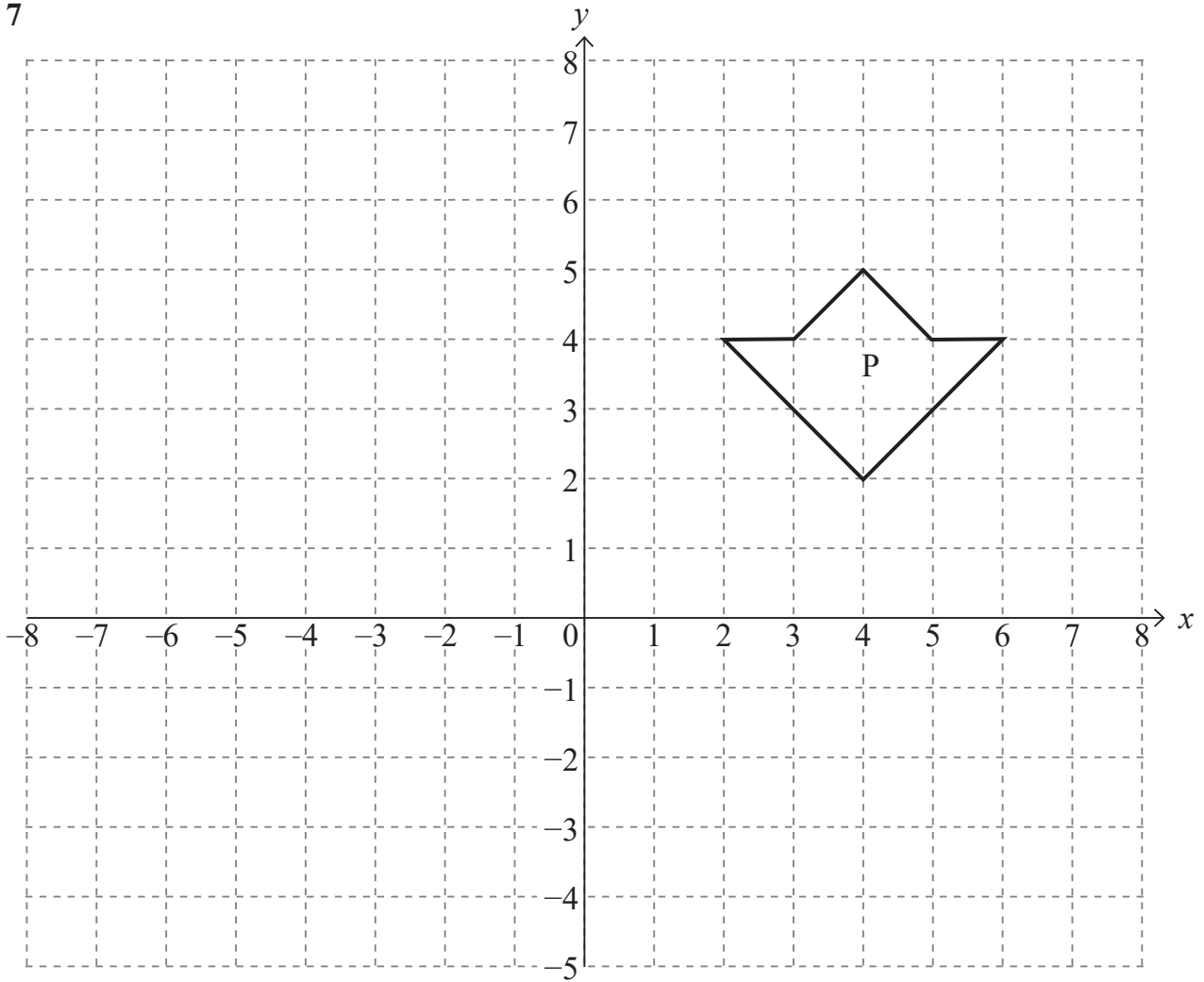Has he enough flour to make 20 scones?

Show all your working.

Answer _____ because _____ [2]

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7

(a) On the grid above translate the shape P
6 units left and 5 units down.

Label the new shape Q. [1]

(b) On the same grid, rotate the shape P
90° anticlockwise about the origin.

Label the new shape R. [3]

[Turn over

8 A 6-sided dice is biased.

The table below gives the probabilities of getting a 1, 2, 3, 4 and 5 when this dice is rolled.

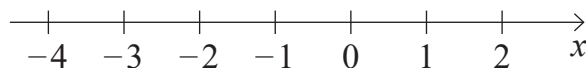| Outcome	1	2	3	4	5	6
Probability	0.13	0.17	0.2	0.11	0.14	

Work out the probability of getting a 6 when this dice is rolled.

Answer _____ [2]

9 **(a)** Solve $2x - 1 \leq -5$

Answer _____ [2]

(b) Show your solution on the number line.

$$\begin{array}{ccccccc} & & & & & & \longrightarrow \\ -4 & -3 & -2 & -1 & 0 & 1 & 2 \quad x \end{array}$$
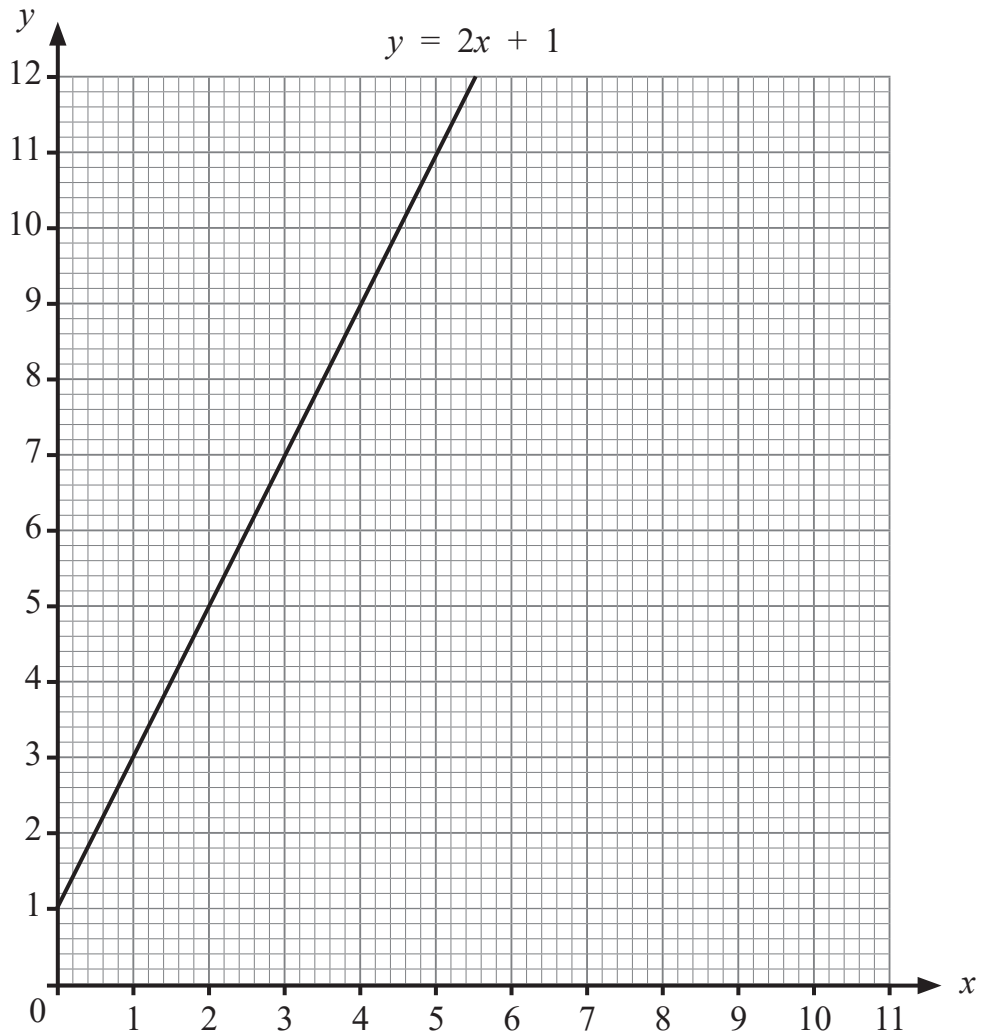
[1]

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10 Use graphs to solve the simultaneous equations

$$y = 2x + 1 \quad \text{and} \quad y = 10 - x$$

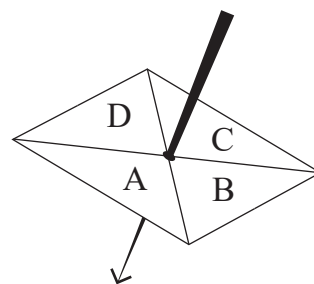The graph of $y = 2x + 1$ has already been drawn for you.

Answer $x =$ _____ and $y =$ _____ [4]

11 A spinner has sections labelled A, B, C and D.

The spinner is spun, and the relative frequency of landing on D is recorded after every 10 spins.

Some of the results are recorded in the table below.

Number of spins	Relative frequency of D
10	0.5
20	0.3
30	0.4
40	0.35
50	
60	0.45

(a) After 50 spins the spinner had landed on D 19 times.

Fill in the missing relative frequency in the table above. [1]

(b) How many times had the spinner landed on D after 60 spins?

Answer _____ [1]

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(c) Do you think that the spinner is biased? Give a reason for your answer.
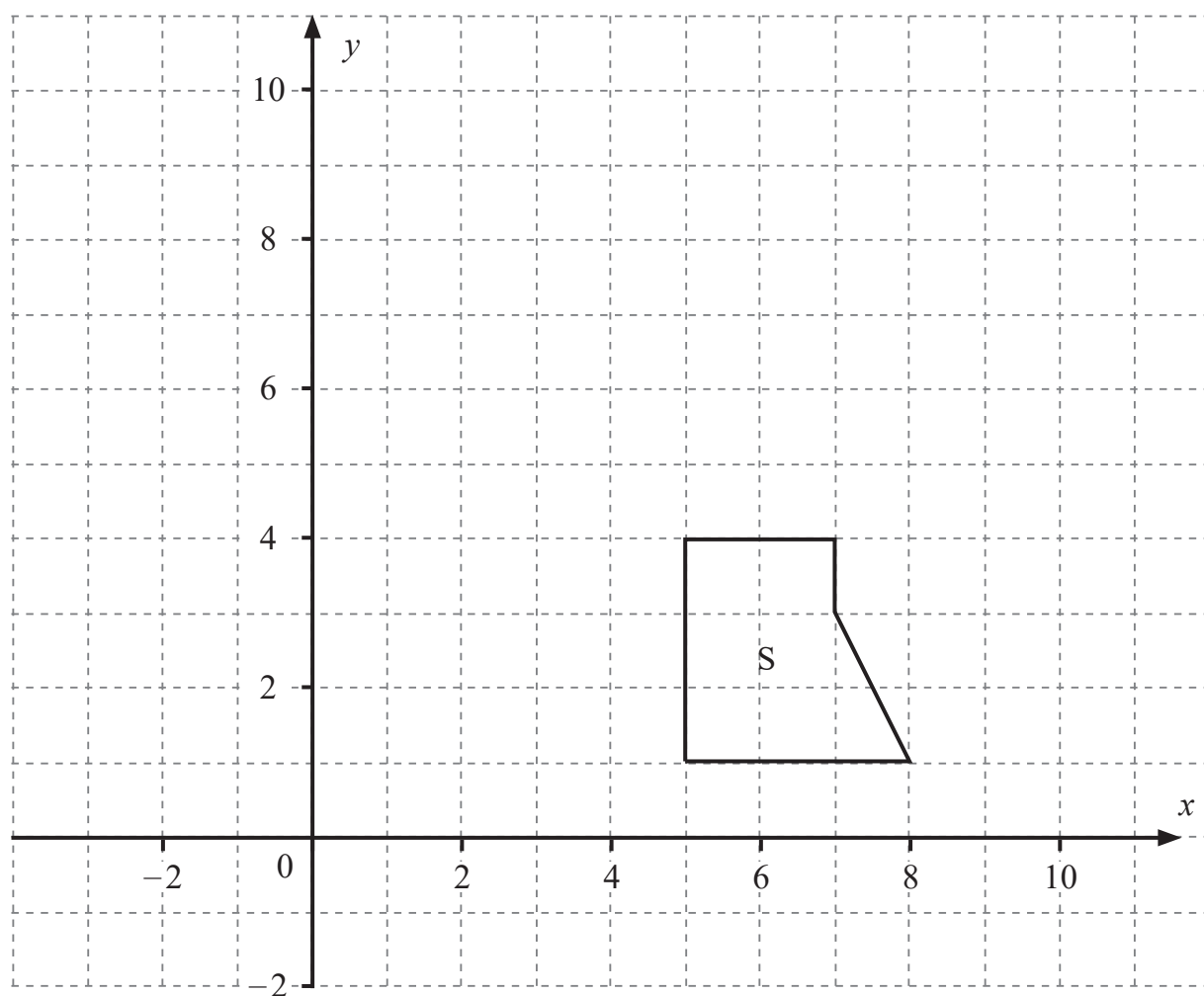
Answer _____ because _____

_____ [2]

(d) If the spinner is spun 400 times how many times would you expect it to land on D?

Answer _____ [2]

20GMC7113

12 On the grid reflect shape S in the line $y = x$

[2]

13 Andy and Zoe have the same rates of pay.

Andy worked 12 hours normal time and 8 hours overtime and earned £238

Zoe worked 10 hours normal time and 15 hours overtime and earned £315

Calculate the rates of pay for normal time and overtime.

A solution by trial and improvement will not be accepted.

Answer normal £ _____ per hour; overtime £ _____ per hour

[5]

14 $1\,000\,000\,\text{cm}^3$ of gas has mass of $1.5 \times 10^4\,\text{g}$.

Giving your answer in standard form, calculate the mass of one cubic centimetre of the gas.

Answer _____ g [2]

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