A

AQA

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

I declare this is my own work.

GCSE MATHEMATICS H

Higher Tier Paper 2 Calculator

8300/2H

Time allowed: 1 hour 30 minutes

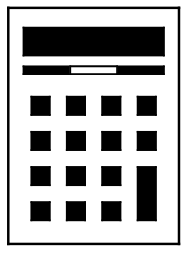
At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]

JUN218300 2H 01

For this paper you must have:

- **a calculator**
- **mathematical instruments.**



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.**
- **If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).**
- **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 Circle the factor of $x^2 - 5x$ [1 mark]

$x - 1$ $-5x$ $x - 5$ $5x$

2 A is half of B.

Work out the ratio $A : B$

Circle your answer. [1 mark]

1 : 2 **2 : 1** **1 : 3** **3 : 1**

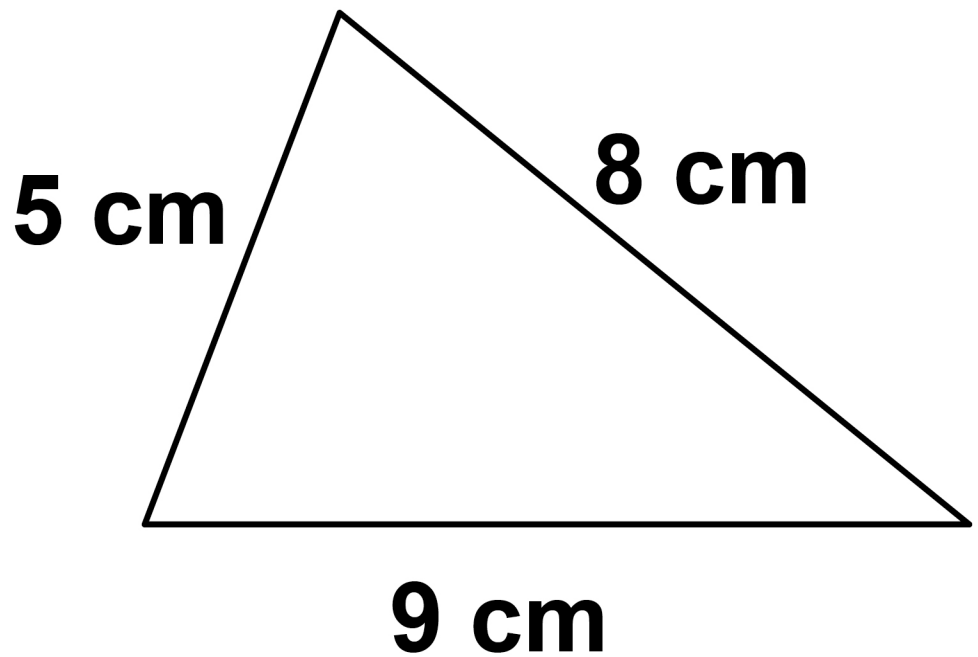
3 The first three terms of a geometric progression are $\frac{2}{3}$ $\frac{4}{9}$ $\frac{8}{27}$

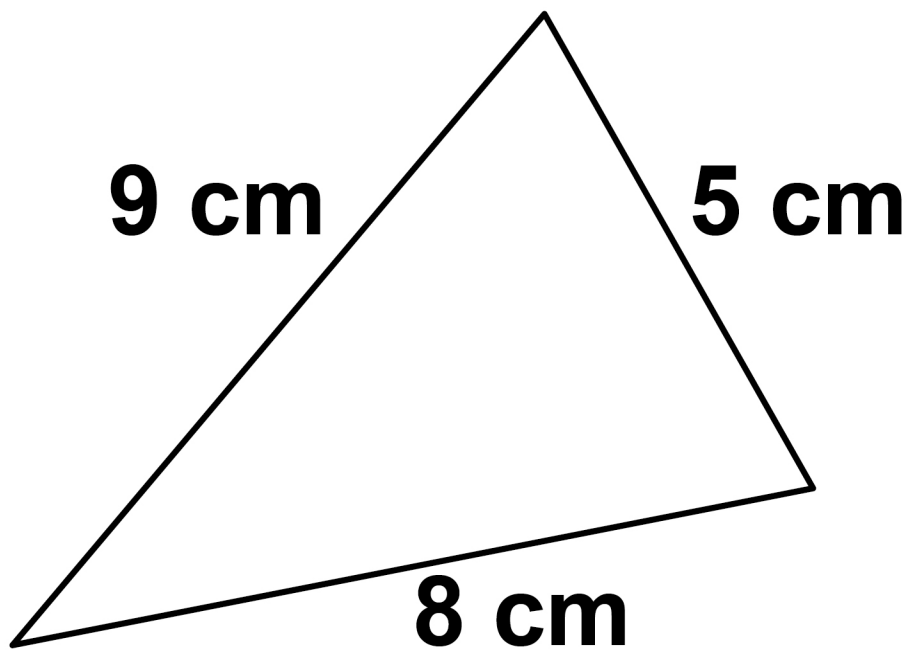
Circle the fourth term. [1 mark]

$\frac{10}{81}$ $\frac{14}{81}$ $\frac{16}{81}$ $\frac{32}{81}$

[Turn over]

4 The diagrams are not drawn accurately.





Circle the reason why these triangles are congruent.
[1 mark]

ASA **RHS** **SAS** **SSS**

5 **Solve** $10x = 62.4 - 3x$ **[2 marks]**

$x =$ _____

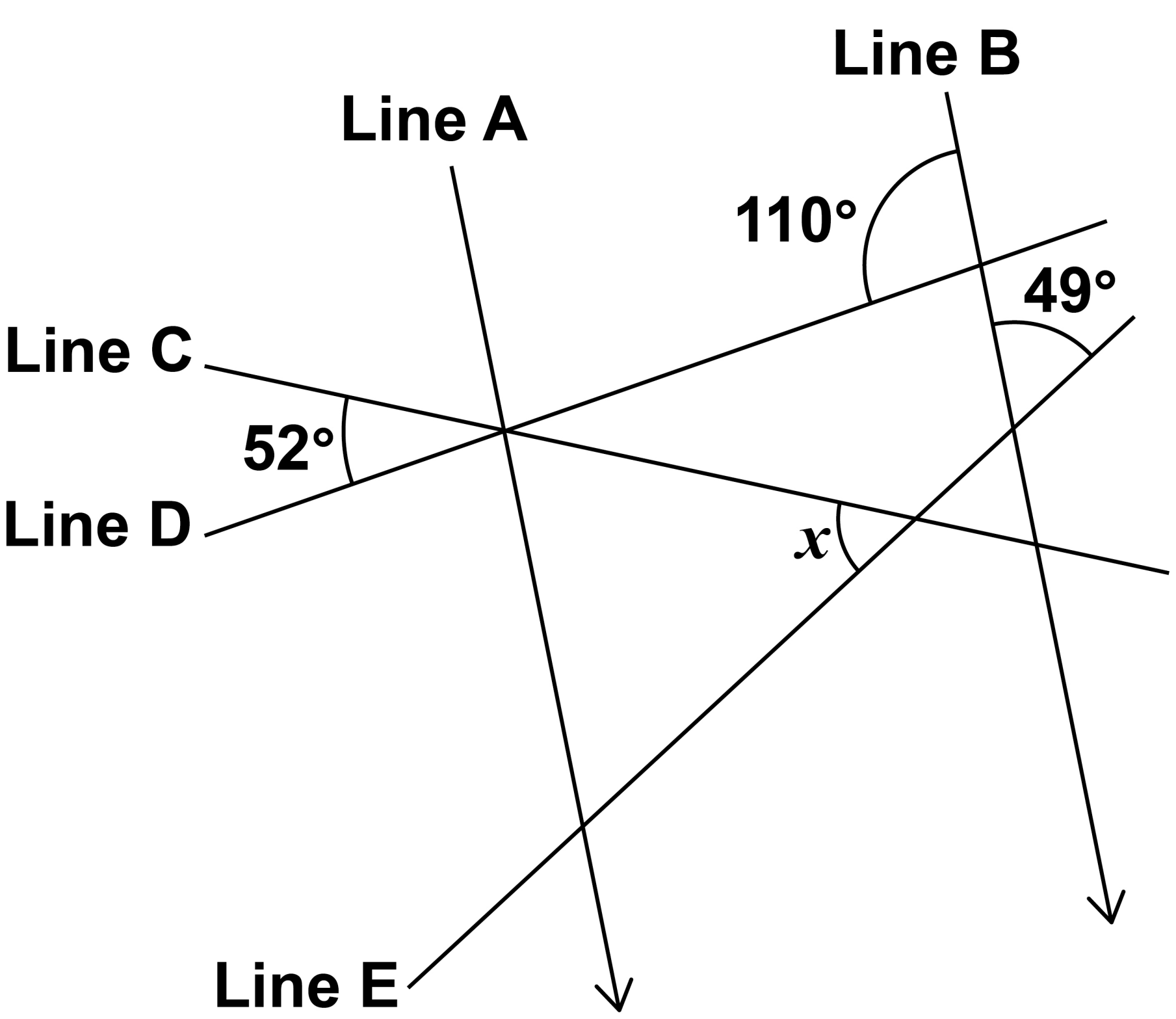
[Turn over]

6

6 Lines A, B, C, D and E intersect as shown.

Lines A and B are parallel.

The diagram is not drawn accurately.



Work out the size of angle x. [3 marks]

Answer _____ **degrees**

7 **102 boys and 85 girls took a test.**

The table shows information about the mean marks.

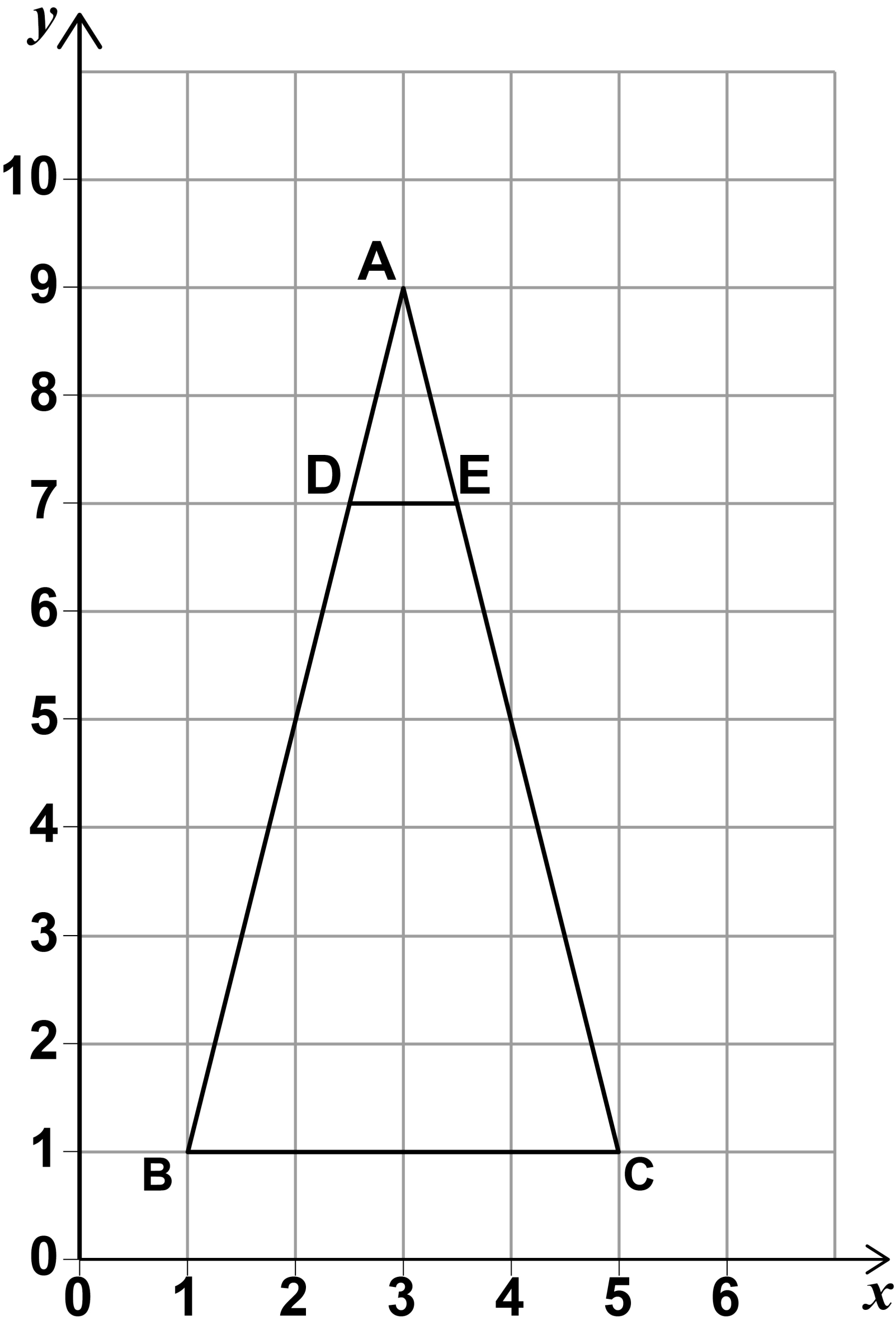
	Boys	Girls
Number of students	102	85
Mean mark	68.5	72.4

The pass mark for the test was 70

Was the mean mark for ALL of these students greater than the pass mark?

You MUST show your working.
[3 marks]

8

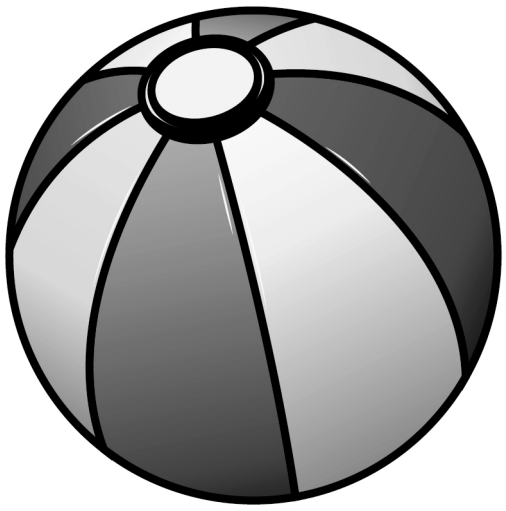


Describe fully the SINGLE transformation that maps triangle *ABC* to triangle *ADE*. [3 marks]

9 A ball contains 5000 cm^3 of air.

More air is pumped into the ball at a rate of 160 cm^3 per second.

The ball is full of air when it becomes a sphere with radius 15 cm



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

Does it take LESS THAN 1 minute to fill the ball?

You MUST show your working.
[4 marks]

[Turn over]

16

7

16

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[Turn over]

10 p **is a positive number.**

n **is a negative number.**

For each statement, tick the correct box. [4 marks]

	Always true	Sometimes true	Never true
$p + n$ **is positive**	☐	☐	☐
$p - n$ **is positive**	☐	☐	☐
$p^2 + n^2$ **is positive**	☐	☐	☐
$p^3 \div n^3$ **is positive**	☐	☐	☐

[Turn over]

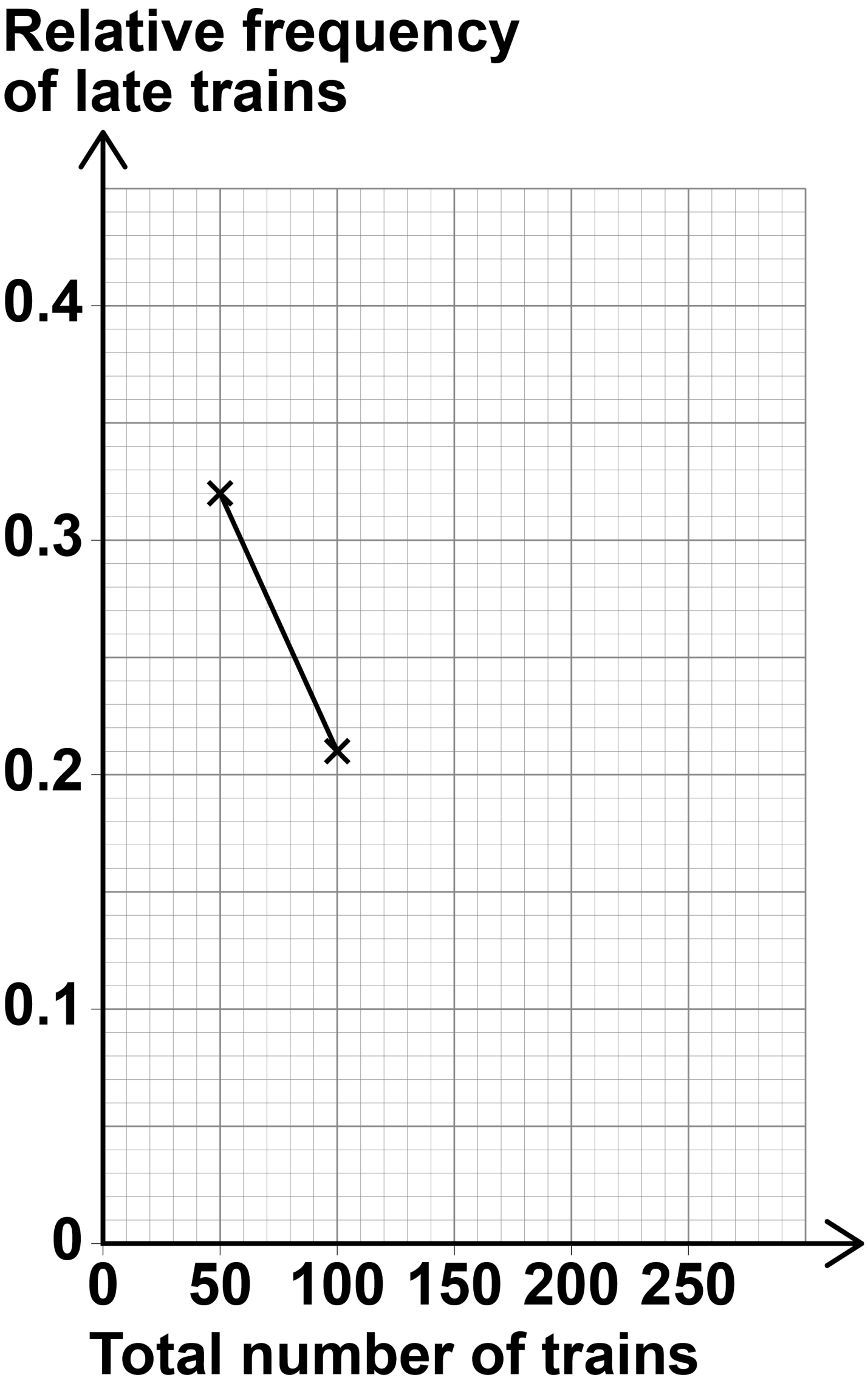
11 250 trains arrived at a station.

The number of trains that were late was recorded after every 50 trains.

The table shows some information about the results.

Total number of trains	50	100	150	200	250
Total number of late trains	16	21	36	38	55
Relative frequency of late trains	0.32	0.21			

11(a) On the opposite page, complete the relative frequency graph. [3 marks]


Relative frequency of late trains
0.4
0.3
0.2
0.1
0
0
50
100
150
200
250
Total number of trains

[Turn over]

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11(b) Write down the best estimate of the probability that a train arriving at the station is late. [1 mark]

Answer _____

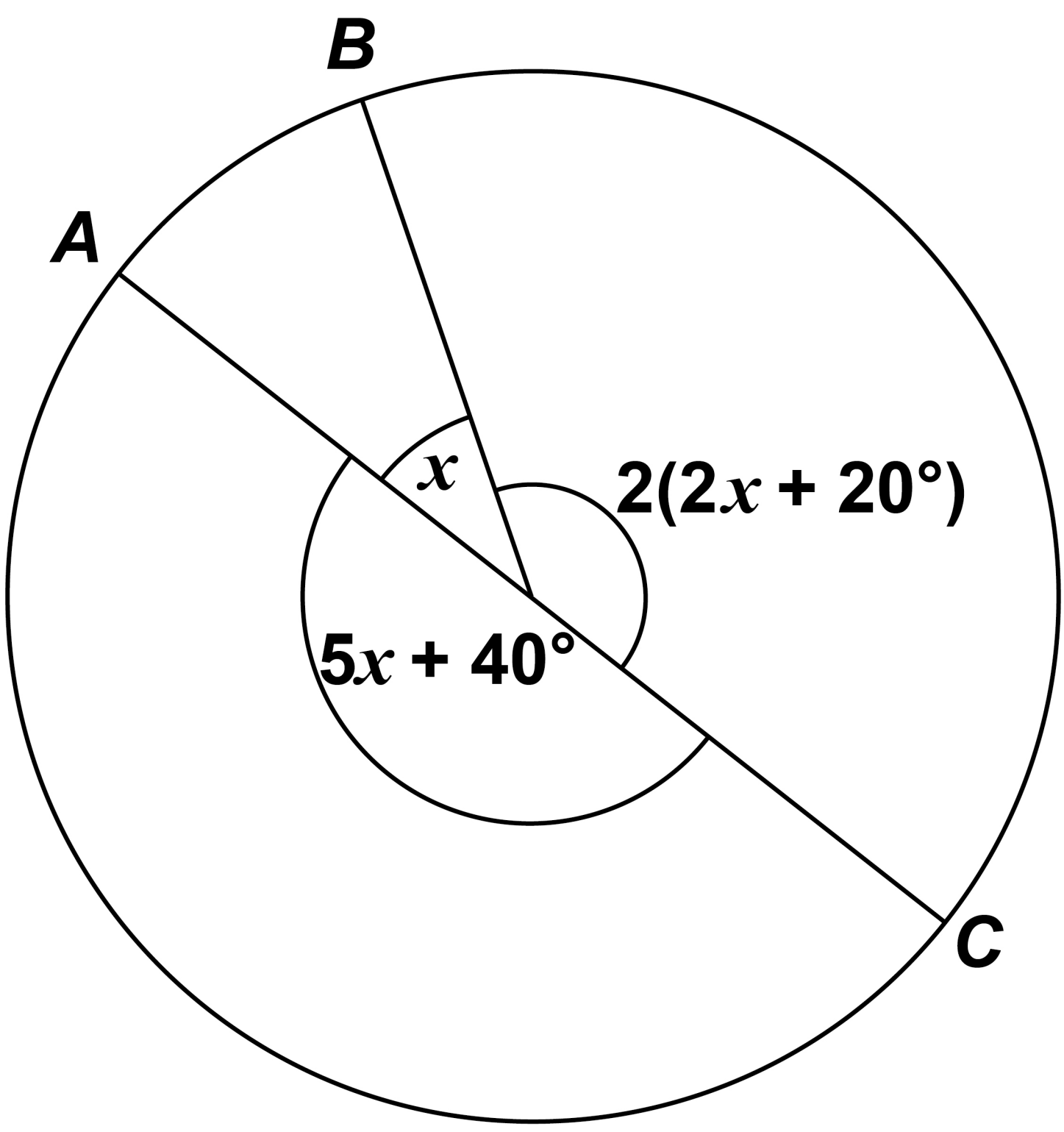
[Turn over]

8

12 ***A*, *B* and *C* are three points on a circle.**

The radii from *A*, *B* and *C* are shown.

The diagram is not drawn accurately.



Is AC a diameter of the circle?

You MUST show your working.
[3 marks]

13 A straight line
has gradient 6
and
passes through the point (3, 19)

Work out the equation of the line.

Give your answer in the form
$y = mx + c$ [3 marks]

Answer

[Turn over]

6

14 **The population of butterflies in a park is 4200**

14(a) **Assume that the population increases by 12% each day.**

Show that after 20 days the population would be greater than 40 000 [2 marks]

14(b) In fact, the population

increases by 13% each day for 19 days

then

DECREASES by 8% for 1 day.

After the 20 days, is the actual population greater than 40 000 ?

Tick a box.

☐ Yes

☐ No

Show working to support your answer. [2 marks]

14(c) The expected number of visitors to the park each day depends on the temperature.

Temperature	Expected number of visitors each day
Less than 21°C	700
21°C or more	900

On each of the 30 days in June

the park is open

the probability that the temperature is less than 21°C is 0.4

Work out the TOTAL number of expected visitors to the park in June. [3 marks]

Answer

7

15 L is directly proportional to D^2

$L = 85$ when $D = 10$

15(a) Work out an equation connecting L and D. [3 marks]

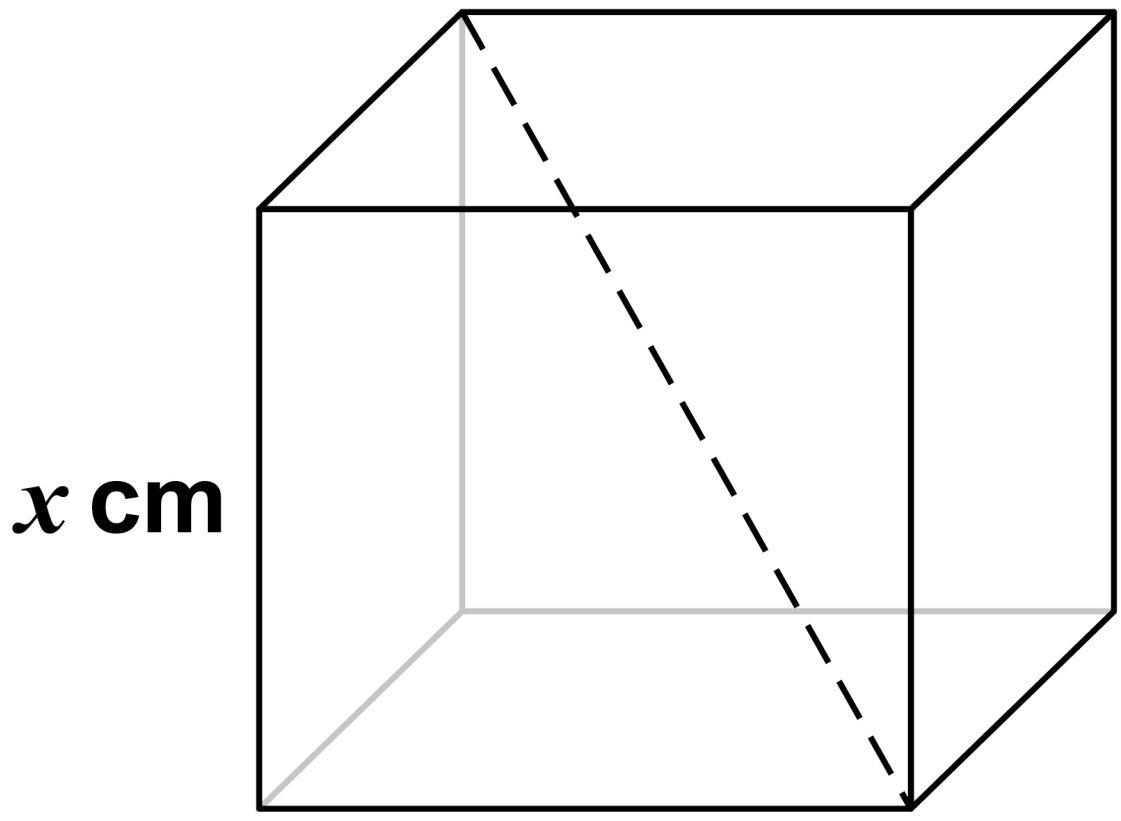
Answer

15(b) Work out the value of L when $D = 5$
[2 marks]

Answer

16 Here is a cube with edge length x cm

One diagonal is shown.



16(a) Circle the length, in centimetres, of the diagonal. [1 mark]

$\sqrt{3}x$ $\sqrt[3]{3x^2}$ $\sqrt{x^3}$ $\sqrt[3]{3}x$

16(b) The total length, in centimetres, of the edges of the cube is a multiple of 18

Circle the correct statement.
[1 mark]

x is a whole number

x is not a whole number

x might be a whole number

17 20 people were asked which device they used more often, laptop or phone.

The table shows the results.

	Laptop	Phone
Male	2	9
Female	4	5

17(a) One male and one female are chosen at random.

Work out the probability that EXACTLY one of them said laptop.
[3 marks]

Answer _____

17(b) Two males are chosen at random.

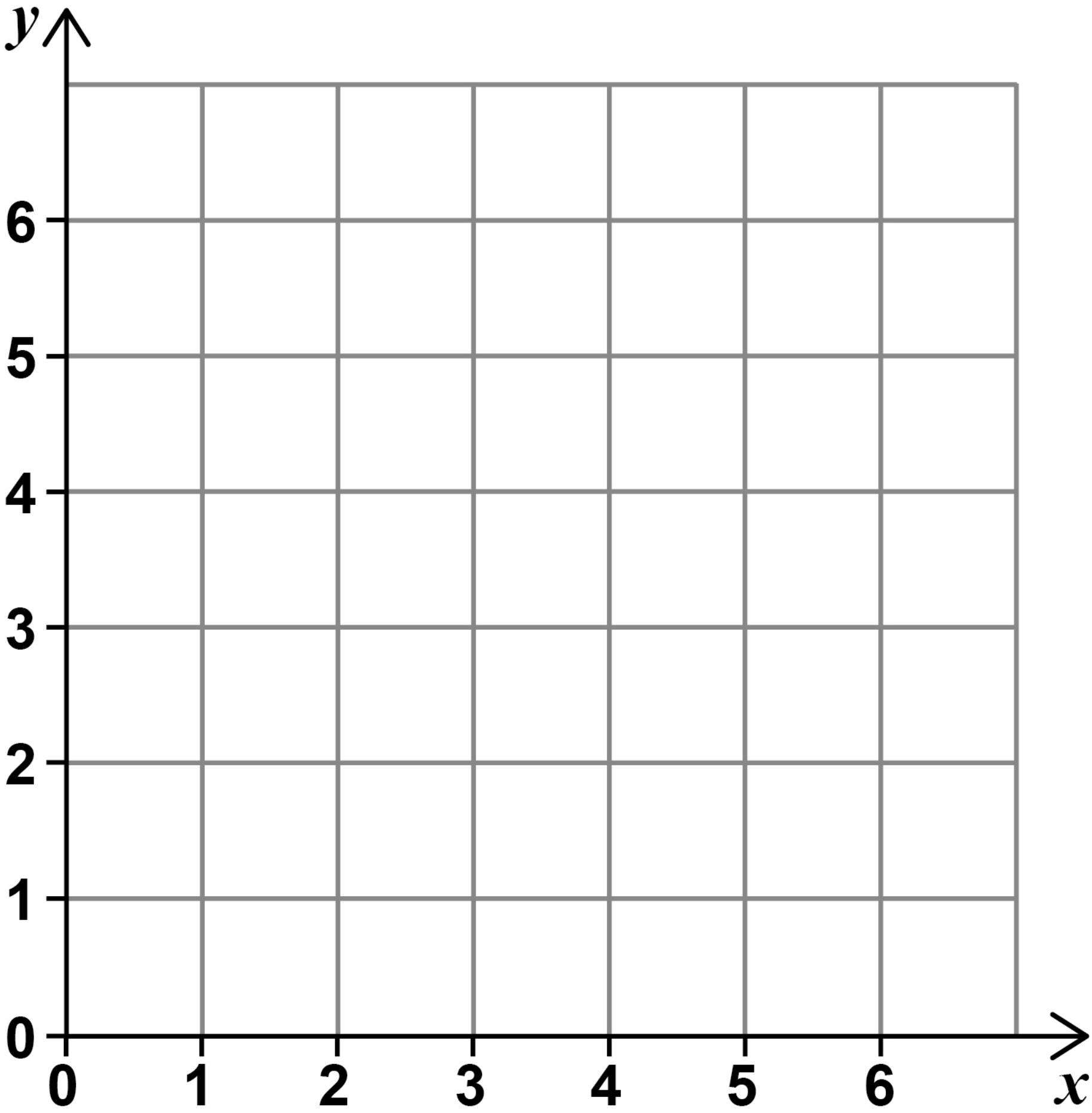
Work out the probability that they BOTH said phone. [2 marks]

Answer _____

18 On the grid on the opposite page, identify the region represented by

$x \leqslant 5$ $y \leqslant 4$ $x + y > 6$

Label the region R. [3 marks]



[Turn over]

8

19 The graph, on the opposite page, shows the height above ground of a toy rocket for 10 seconds.

19(a) For how long is the rocket in the air?

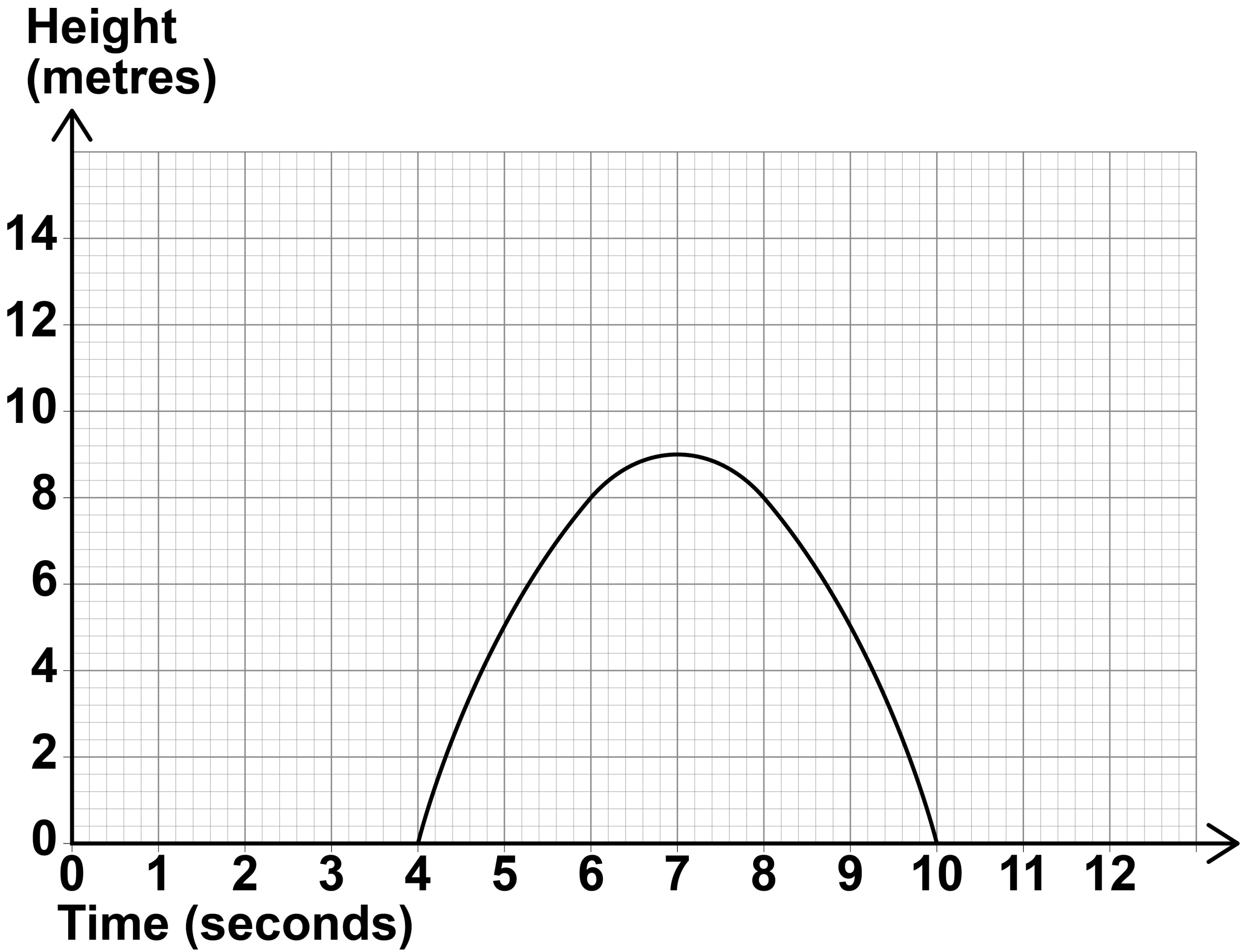
Circle your answer. [1 mark]

10 seconds

9 seconds

6 seconds

4 seconds


Height
(metres)
14
12
10
8
6
4
2
0
0
1
2
3
4
5
6
7
8
9
10
11
12
Time (seconds)

[Turn over]

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19(b) Using the graph on page 41, estimate the speed of the rocket after 6 seconds.

State the units of your answer. [3 marks]

Answer _____

20 **A square has an area of 0.25 square metres.**

Circle the length, in CENTIMETRES, of one side of the square. [1 mark]

0.5 cm **5 cm** **50 cm** **500 cm**

5

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[Turn over]

21 x **is an integer.**

Prove that $35 + (3x + 1)^2 - 2x(4x - 3)$ **is a square number. [4 marks]**

[Turn over]

22 Liam is trying to remember a 3-digit code.

He knows the rule that

the first digit is a cube number

the second digit is a factor of 16

the third digit is an odd number.

Liam tries at random a code that matches the rule.

Work out the probability that this is the correct code. [4 marks]

Answer

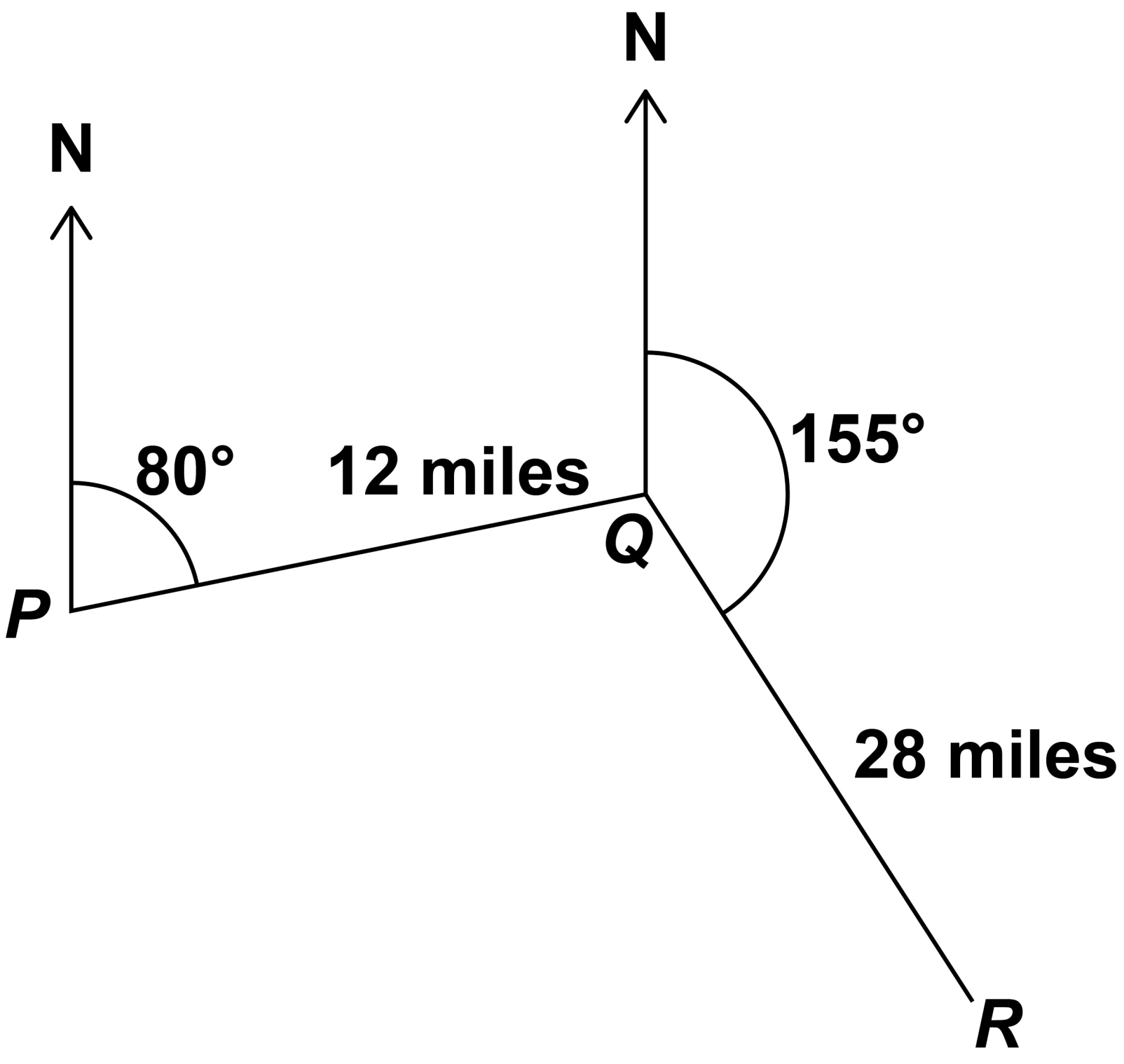
8

23 **A ship sails from *P* to *Q* and then from *Q* to *R*.**

***Q* is 12 miles from *P*, on a bearing of 080°**

***R* is 28 miles from *Q*, on a bearing of 155°**

The diagram is not drawn accurately.



Work out the direct distance from *P* to *R*. [4 marks]

_____

_____

_____

Answer _____ **miles**

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[Turn over]

24 The flight of a plane was in two stages.

The table shows information about the flight.

	Distance (miles)	Speed (mph)	Time (hours)
1st stage	731	x	$\frac{731}{x}$
2nd stage	287	$x - 24$	$\frac{287}{x - 24}$

In total, the flight lasted 2 hours.

Work out the value of x. [5 marks]

Answer _____

25 The equation of a curve is

$y = x^2 + 14x + 52$

By completing the square, work out the coordinates of the turning point.

You MUST show your working.

[3 marks]

Answer (_____, _____)

END OF QUESTIONS

3

Additional page, if required.

Write the question numbers in the left-hand margin.

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For Examiner's Use	
Pages	Mark
4–7	
8–11	
12–16	
18–23	
24–27	
28–31	
32–35	
36–39	
40–44	
46–49	
50–55	
56	
TOTAL	