Surname _____

Forename(s) _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

I declare this is my own work.

GCSE
MATHEMATICS

H

Higher Tier Paper 3 Calculator

8300/3H

Monday 11 November 2024 Morning

Time allowed: 1 hour 30 minutes

[Turn over]

N0V248300 3H01

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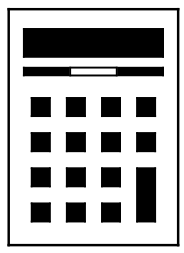
On the front of this book, write your surname and forename(s), your centre number, your candidate number and add your signature.

MATERIALS

For this paper you must have:



- **a calculator**
- **mathematical instruments**
- **the Formulae Sheet (enclosed).**

[Turn over]

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 Work out the reciprocal of $\frac{10}{3}$

Give your answer as a decimal.
[2 marks]

Answer _____

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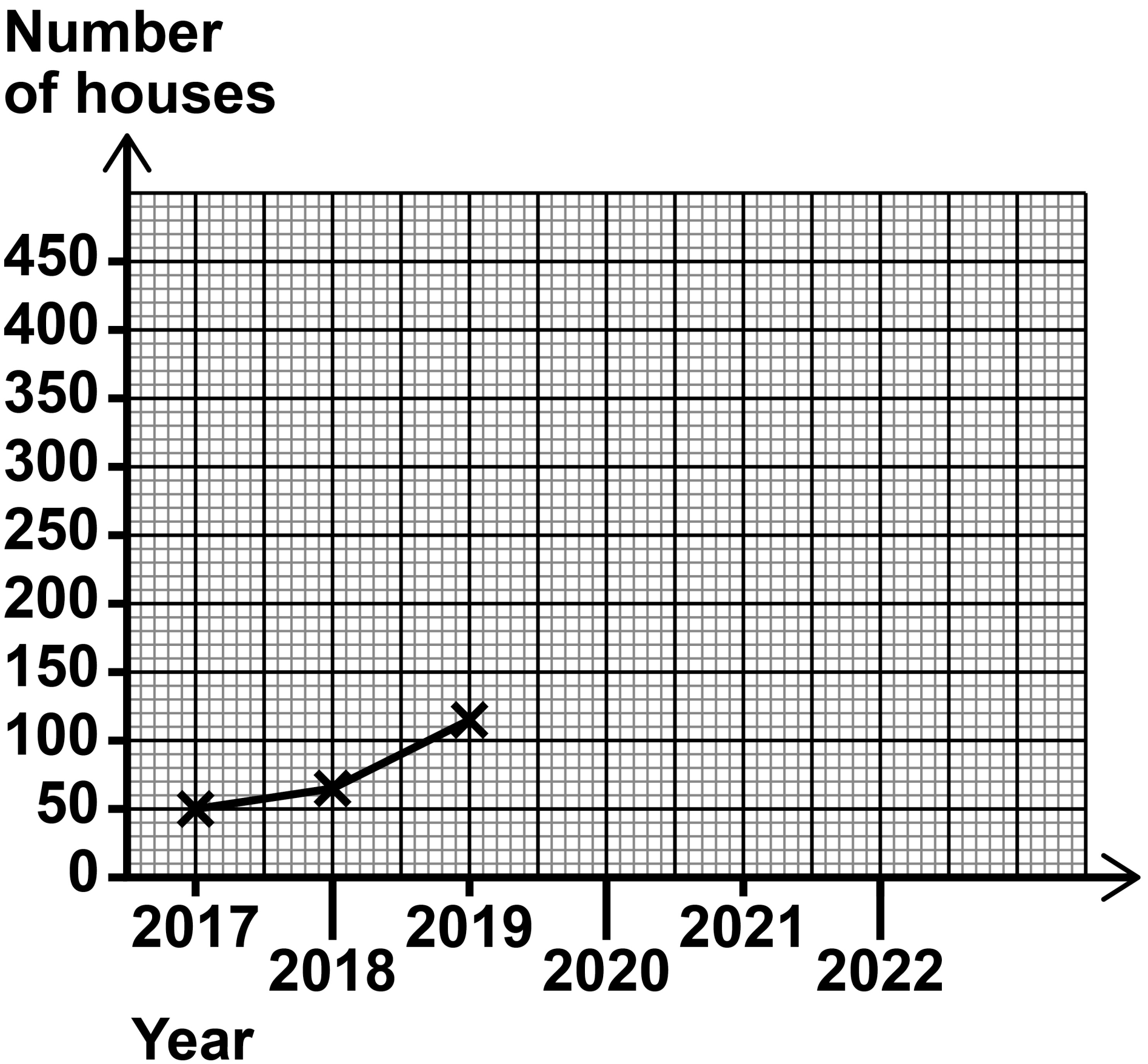
[Turn over]

2 The table shows information about the number of houses with solar panels in a town.

YEAR	NUMBER OF HOUSES
2017	50
2018	65
2019	115
2020	210
2021	275
2022	350

2 (a) Complete the graph, on the opposite page. [2 marks]



2 (b) Use the graph to estimate the number of houses with solar panels in 2023 [1 mark]

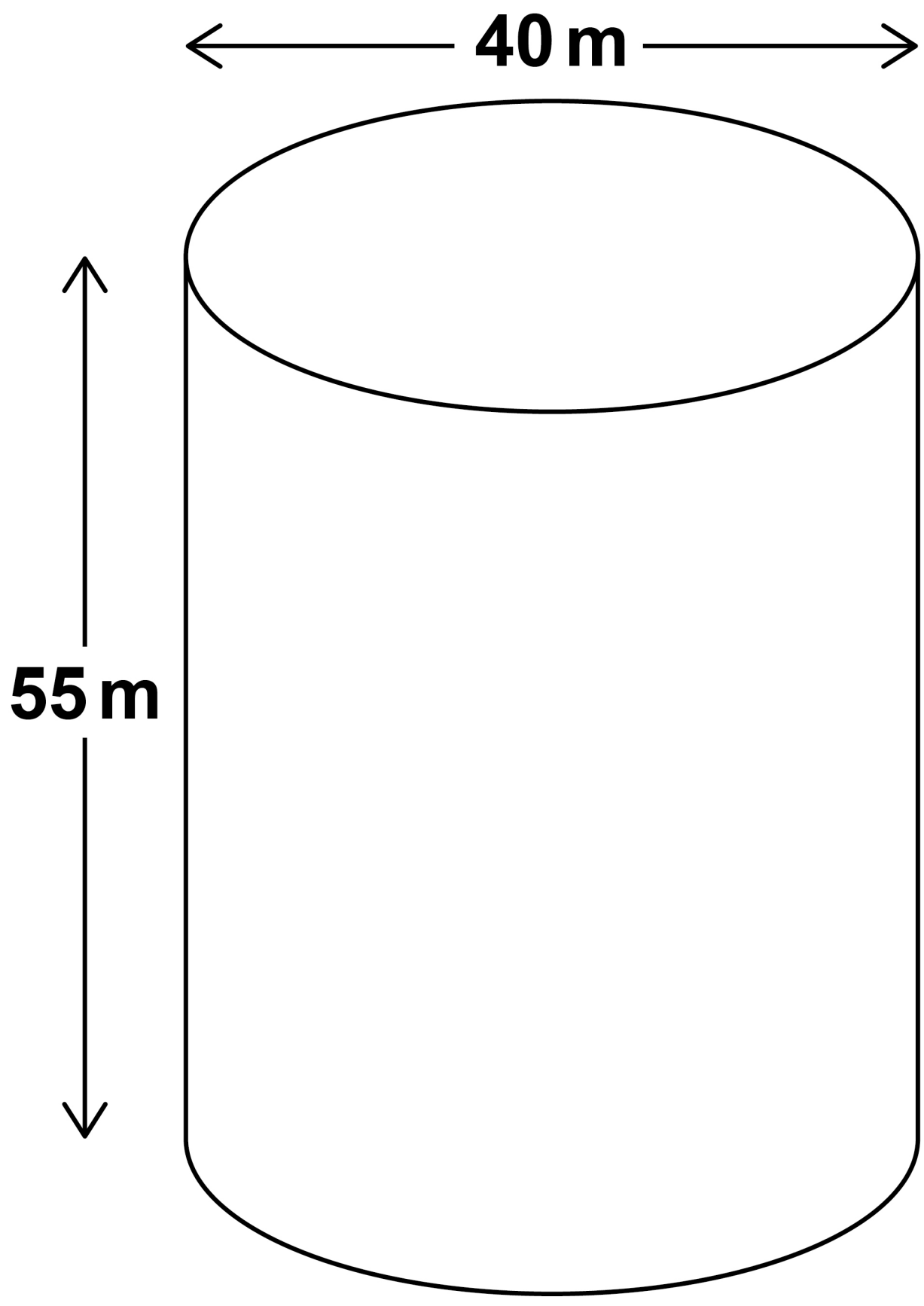
Answer _____

[Turn over]

0 9

5

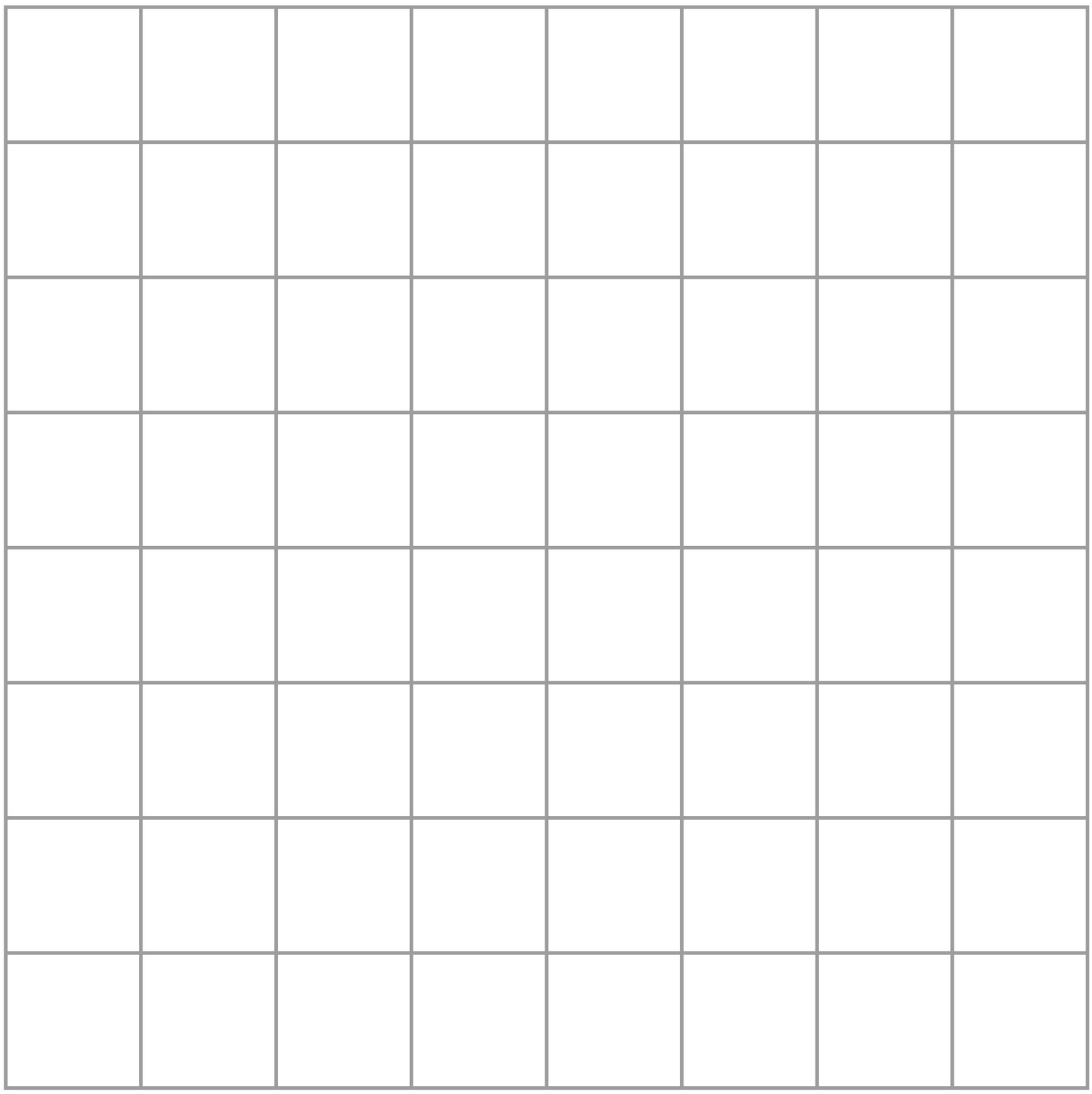
3 A building in the shape of a cylinder has diameter 40 m and height 55 m



3 (a) On the grid, draw a PLAN of the building.

Use a scale of 1 square = 10 m

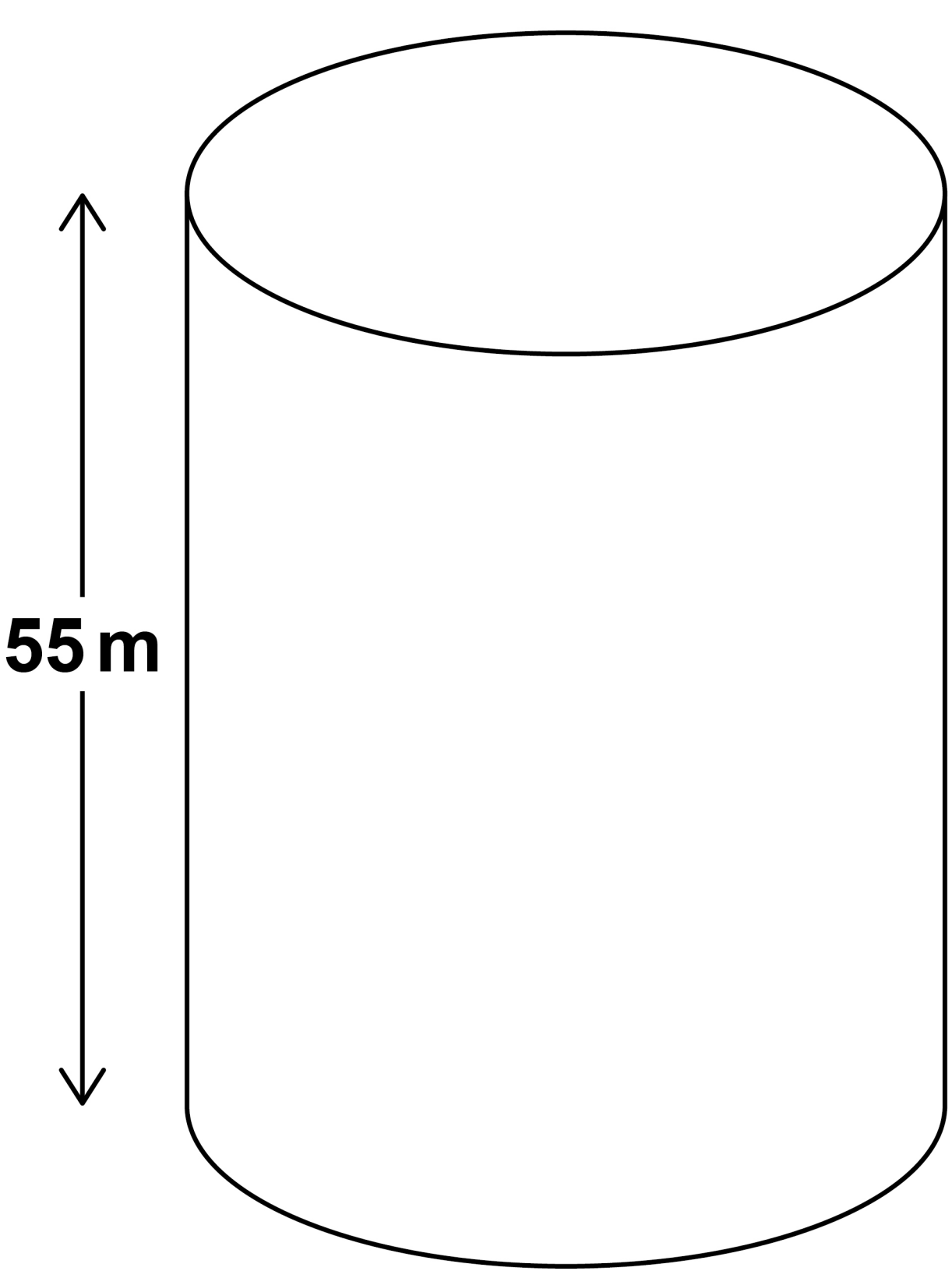
[2 marks]



[Turn over]

REPEAT OF INFORMATION

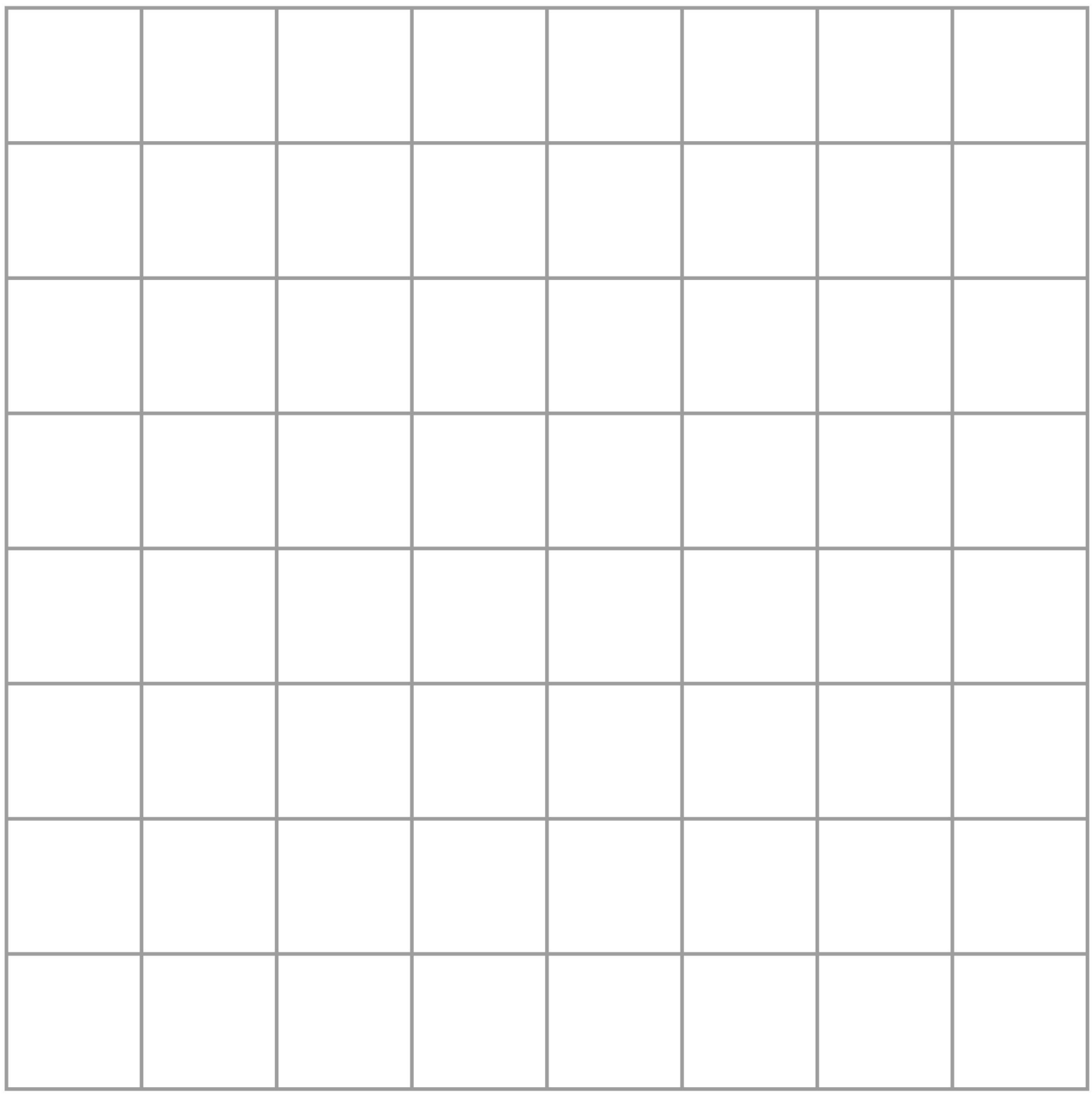
A building in the shape of a cylinder has diameter 40 m and height 55 m



3 (b) On this grid, draw the FRONT ELEVATION of the building.

Use a scale of 1 square = 10 m

[2 marks]



[Turn over]

4

4 **To the NEAREST POUND, Rosie has £12**

- **She wants to buy 6 drinks.**
- **Each drink costs £1.89**

Show that Rosie DEFINITELY has enough money to buy the 6 drinks. [3 marks]

5 The total cost of a taxi ride is calculated by adding

a fixed charge of £4

and

a charge of £2 per mile.

Write a formula to work out the total cost, £C, of a journey of m miles. [2 marks]

$C =$ _____

[Turn over]

6 Three shops sell shirts.

SHOP A

Pack of 2 £19.00

SHOP B

One shirt

Was £12.40

Now 25% off

SHOP C

Pack of 3 £37.40

Buy one pack, get another pack half price.

At which shop is it cheapest to buy 6 SHIRTS?

Show working to support your answer. [5 marks]

Answer

[Turn over]

10

7 (a) At a school

- there are 912 students
- the ratio of students to teachers is 15.2 : 1

The number of students stays the same.

The number of teachers increases by 2

Work out the new ratio of students to teachers.

Give your answer in the form n : 1

[3 marks]

Answer _____ : 1

[Turn over]

7 (b) On a school trip, one teacher is needed for every group of 10 or fewer students.

72 students want to go on the trip.

Lexi tries to work out how many teachers are needed.

$72 \div 10 = 7.2$

7 teachers are needed.

What is wrong with her answer?
[1 mark]

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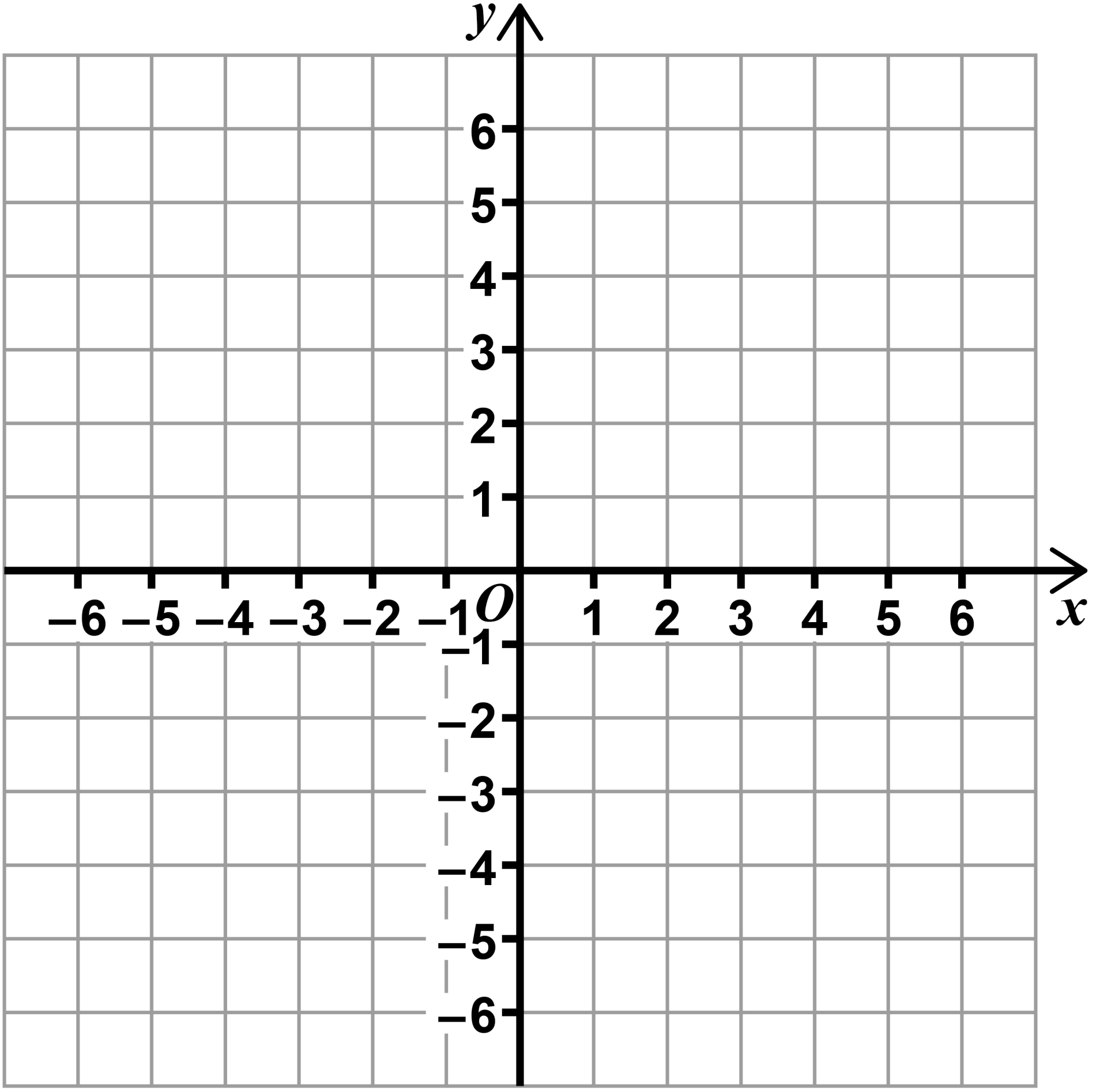
[Turn over]

8 A triangle is drawn using the lines

- $y = x$
- $x = -2$
- $y = 4$



Work out the coordinates of the THREE vertices of the triangle.
[4 marks]

Answer (_____ , _____)

(_____ , _____)

(_____ , _____)

[Turn over]

8

9 When x is divided by 2 the remainder is 1

When x is divided by 3 the remainder is 1

When x is divided by 4 the remainder is 1

Work out TWO possible values of x.
[2 marks]

x = _____ and x = _____

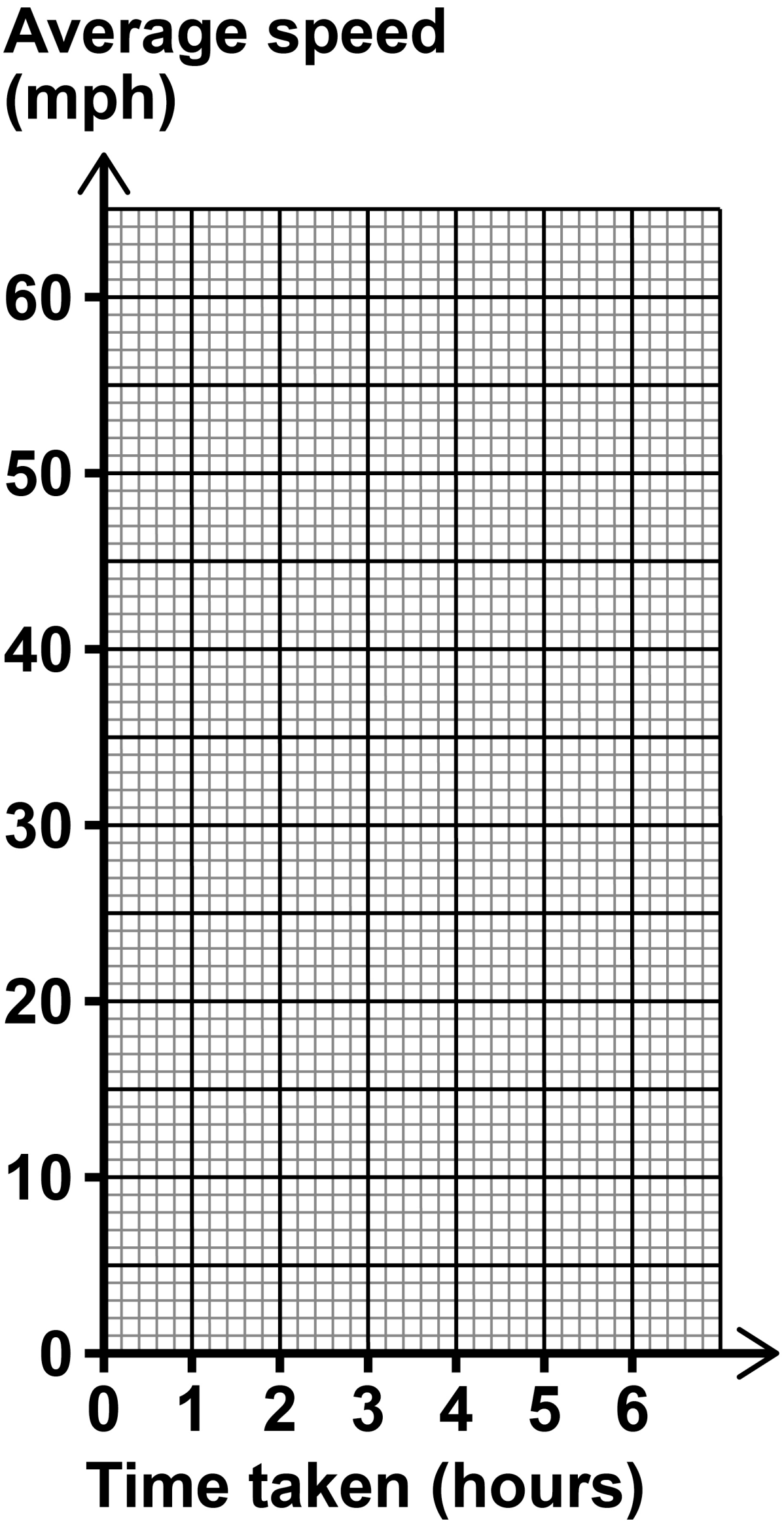
[Turn over]

10 A car will travel 60 miles.

Draw a graph, on the opposite page, to show the AVERAGE SPEED of the car for times taken between 1 hour and 6 hours.

You may use the table to help you.
[3 marks]

TIME TAKEN (hours)	1	2	3	4	5	6
AVERAGE SPEED (mph)	60	30				10



[Turn over]

5

11 **Factorise fully** $12t + 4t^3$

[2 marks]

_____

_____

_____

Answer _____

12 **The population of a country is now 67 200 000**

The population is predicted to

INCREASE by 1% per year for 6 years

and then

DECREASE by 1.2% per year for 2 years.

Work out the predicted population of the country 8 years from now.

Give your answer to 3 significant figures. [4 marks]

Answer

[Turn over]

13 A bag contains one £5 note, one £10 note, one £20 note and one £50 note.

Amaan picks TWO of the notes at random without replacement.

Work out the probability that he has picked AT LEAST £30
[2 marks]

Answer _____

[Turn over]

8

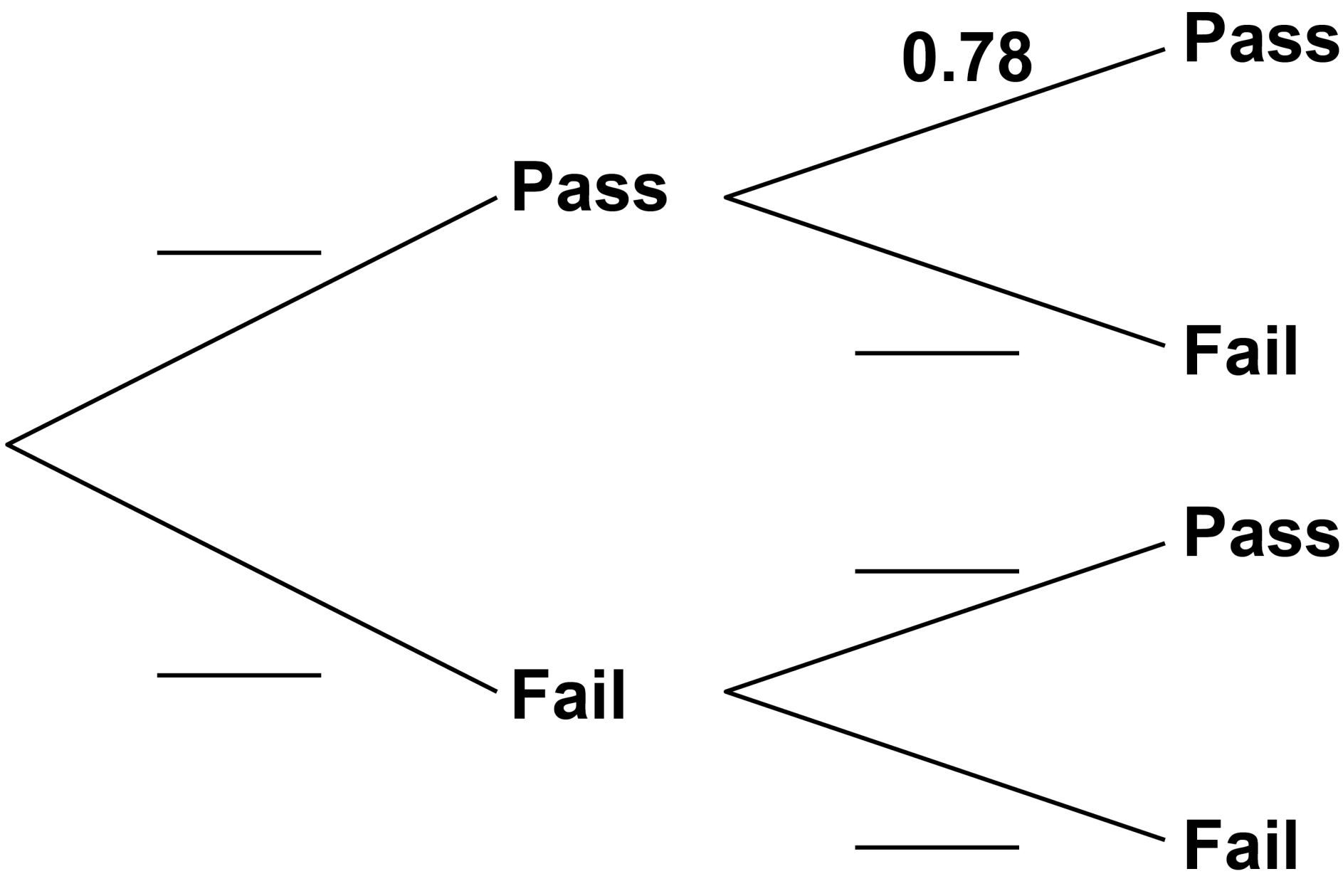
14 A test consists of two sections, A and B.

- 85% of people pass section A.
- 78% of people who PASS section A also PASS section B.
- 36% of people who FAIL section A also FAIL section B.

14 (a) Complete the tree diagram.
[2 marks]

SECTION A

SECTION B



14 (b) **40% of people who fail AT LEAST one section take the test again.**

5000 people take the test.

How many of these 5000 people are expected to take the test again? [4 marks]

Answer _____

[Turn over]

6

15 **Match each equation, on the opposite page, to a statement to show what happens when the value of x is doubled.**

One has been done for you.

[3 marks]

EQUATION	WHAT HAPPENS WHEN THE VALUE OF x IS DOUBLED
$y = \frac{1}{x^2}$	The value of y is divided by 4
$y = 8x$	It is not possible to say what happens to the value of y
$y = \frac{10}{x}$	The value of y is multiplied by 4
$y = 3x^2$	The value of y is halved

[Turn over]

16 Rearrange $y = \sqrt{\left(\frac{x}{2}+1\right)}$ to make x the subject. [3 marks]

Answer

BLANK PAGE

[Turn over]

17 **A stone falls vertically from 300 metres above ground.**

- **The stone falls d metres in t seconds.**
- **d is directly proportional to the square of t.**
- **The stone falls 20 metres in the first 2 seconds.**

Work out the TOTAL time taken for the stone to reach the ground.
[4 marks]

Answer _____ seconds

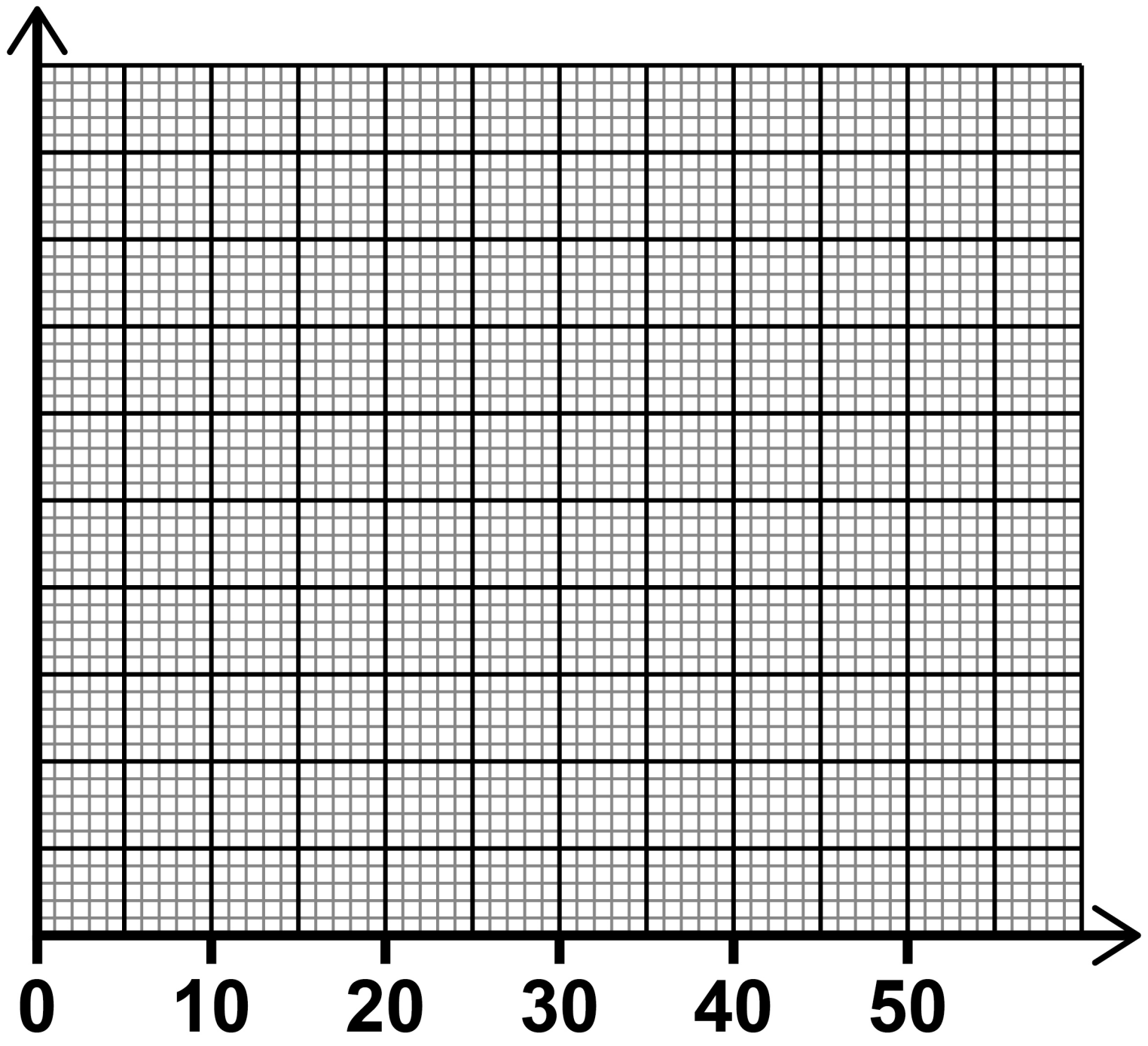
[Turn over]

10

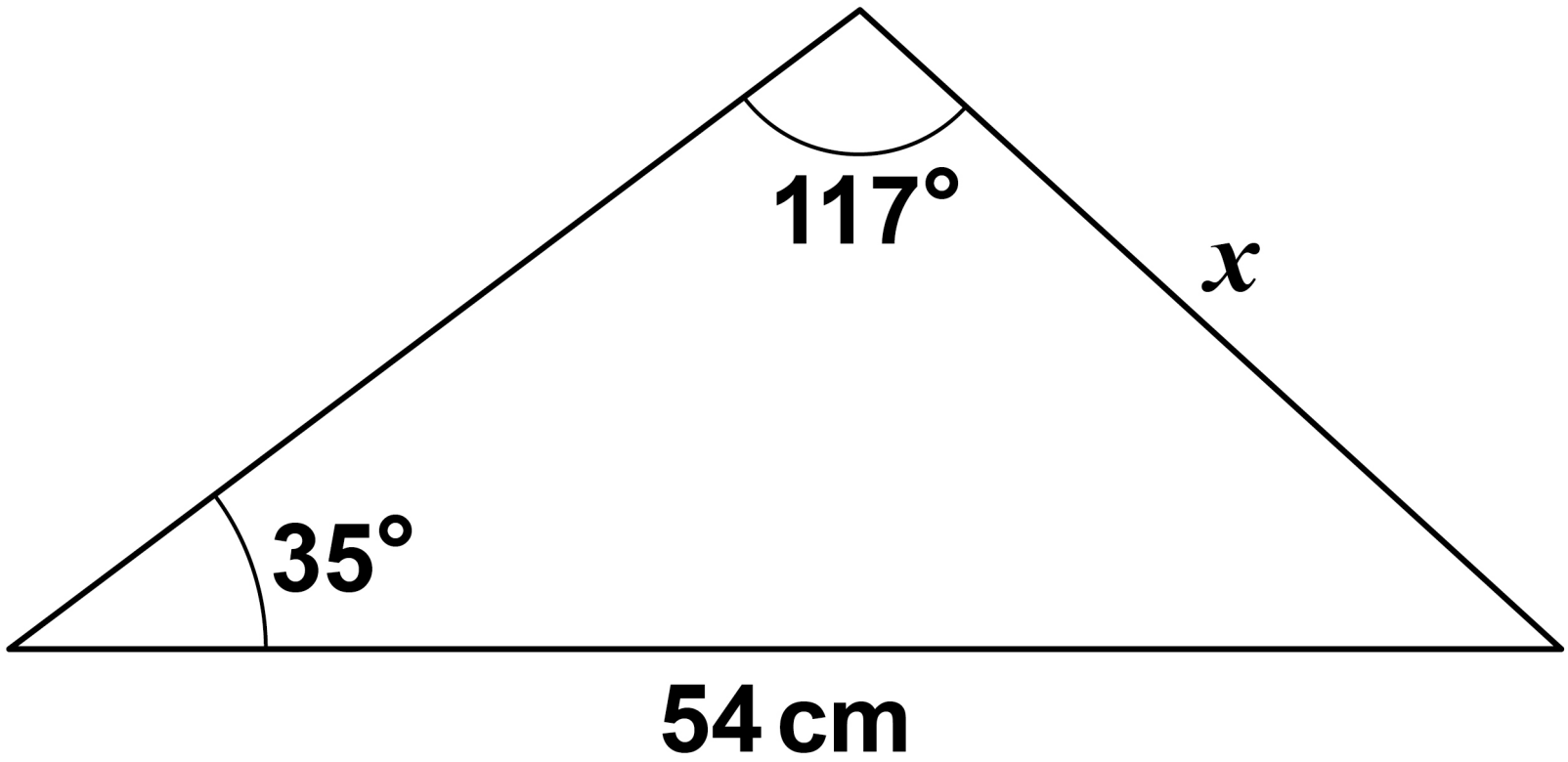
18 The table shows information about the height of 40 plants.

HEIGHT, h cm	FREQUENCY	CLASS WIDTH	
$0 \leqslant h < 5$	6		
$5 \leqslant h < 15$	15		
$15 \leqslant h < 25$	9		
$25 \leqslant h < 50$	10		

Draw a histogram, on the opposite page, to represent the heights. [4 marks]


Frequency density
0
10
20
30
40
50
Height, h cm

19 **The diagram is not drawn accurately.**



Use the sine rule to work out length x.

You MUST show your working.

[3 marks]

x = _____ cm

[Turn over]

20 **Factorise fully** $3x^2 + 23x + 30$

[2 marks]

Answer

9

BLANK PAGE

[Turn over]

21 **A bag contains 25 discs.**

11 are red, 9 are blue and 5 are yellow.

Ashley picks three of the discs at random without replacement.

Ashley's first disc is red.

Work out the probability that all three discs are different colours.
[3 marks]

Answer

[Turn over]

22 The metal used to make a sphere costs £4320

- The metal costs £3.60 per gram.
- Each cubic centimetre of metal has a mass of 17.3 grams.

Work out the radius, r, of the sphere.

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

[4 marks]

r = _____ cm

[Turn over]

7

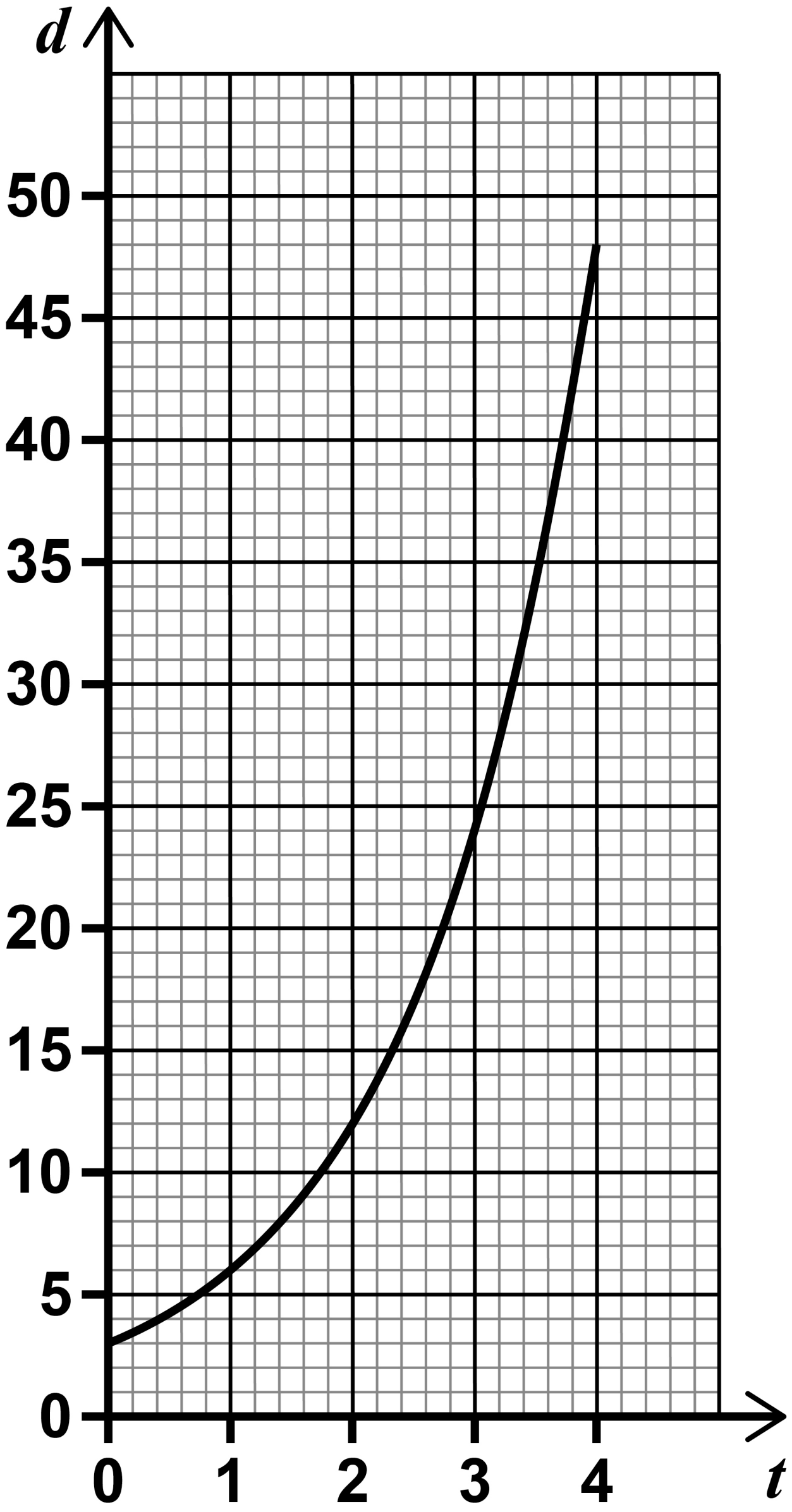
23 The distance of a particle from a point is d metres after t seconds.

$d = a \times b^t$ where a and b are constants

Using the graph on the opposite page, work out the values of a and b. [3 marks]

$a =$ _____

$b =$ _____



[Turn over]

24 A curve has the equation

$y = x^2 + 4x - 4$

A straight line has the equation

$y = 3x - 2$

Work out the TWO points of intersection of the curve and the straight line. [5 marks]

Answer

(____ , ____) and (____ , ____)

END OF QUESTIONS

8

Additional page, if required.

Write the question numbers in the left-hand margin.

Additional page, if required.

Write the question numbers in the left-hand margin.

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For Examiner's Use	
Pages	Mark
6–9	
10–13	
14–17	
18–23	
24–27	
28–31	
32–35	
36–41	
42–46	
48–51	
52–55	
TOTAL	