A

AQA

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

GCSE
MATHEMATICS

H

Higher Tier Paper 3 Calculator

8300/3H

Tuesday 12 June 2018 Morning

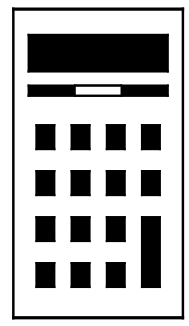
Time allowed: 1 hour 30 minutes

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

[Turn over]

JUN188300 3H 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.**
- **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 decimal that is closest in value to $\frac{11}{20}$ [1 mark]

0.56 **0.6** **0.525** **0.5**

2 Circle the list of ALL the integers that satisfy $-2 < x \leqslant 4$ [1 mark]

$-2, -1, 0, 1, 2, 3$ **$-1, 0, 1, 2, 3$**

$-2, -1, 0, 1, 2, 3, 4$ **$-1, 0, 1, 2, 3, 4$**

3 Circle the largest number. [1 mark]

$3.2\dot{7}$ 3.27 3.277 $3.20\dot{7}$

4 What is the size of an exterior angle of a regular decagon?

Circle your answer. [1 mark]

18° 36° 144° 162°

5 a is a common factor of 72 and 120

b is a common multiple of 6 and 9

Work out the highest possible value of $\frac{a}{b}$

[4 marks]

Answer

8

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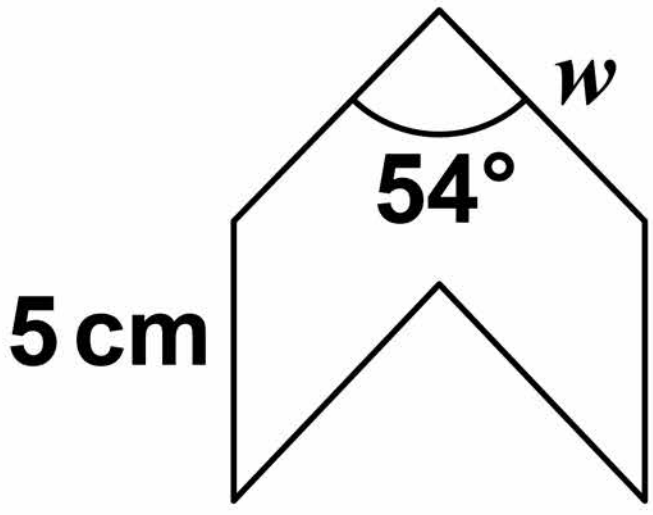
[Turn over]

6 **A and B are similar shapes.**

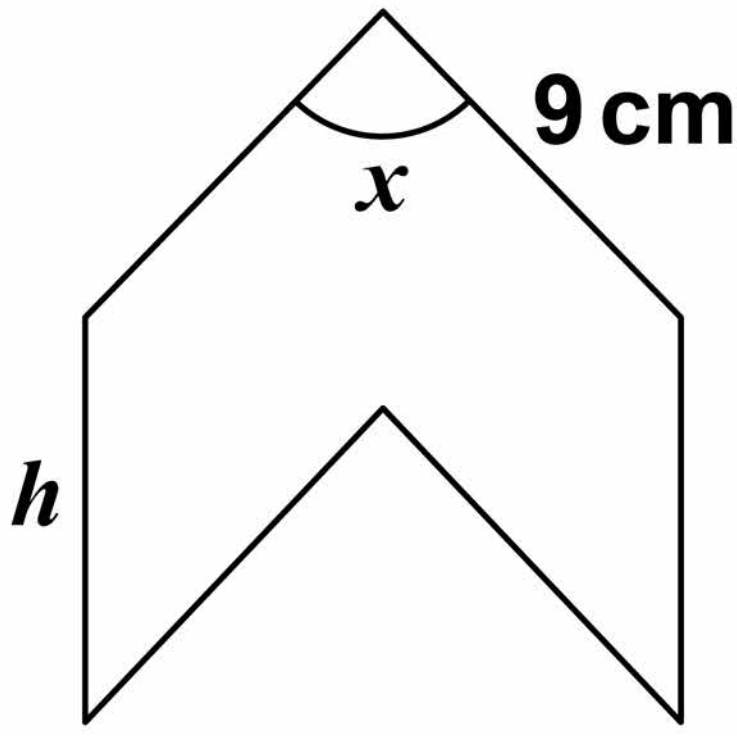
B is an enlargement of A with scale factor 1.5

The diagram is not drawn accurately.

A



B



Work out the values of x, h and w.
[3 marks]

x = _____ **degrees**

h = _____ **cm**

w = _____ **cm**

[Turn over]

7 **Investment A**

Save £150 per month for 2 years.

2.5% interest is added to the total amount saved.

Investment B

Invest £3500

Compound interest is added at 3% per year.

After 2 years, how much MORE is investment B worth than investment A? [4 marks]

Answer £ _____

7

8 (a) Show that the lines $y = 3x + 7$ and $2y - 6x = 8$ are parallel.

Do NOT use a graphical method.

[3 marks]

8(b) **Is the point (–5, –6) above, below or on the line $y = 3x + 7$?**

Tick ONE box.

☐ **Above** ☐ **Below** ☐ **On the line**

You MUST show your working.
Do NOT use a graphical method.
[2 marks]

9 **The cost of a ticket increases by 10% to £19.25**

Work out the original cost.
[3 marks]

Answer £

10 **The nth term of a sequence is**

$12n - 5$

Work out the numbers in the sequence that have two digits and are NOT prime. [3 marks]

Answer

11 $a = \begin{pmatrix} 6 \\ -10 \end{pmatrix}$ $b = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$ $c = \begin{pmatrix} -4 \\ 7 \end{pmatrix}$

11 (a) Work out a + b + c [2 marks]

Answer ( )

11 (b) Show that $\mathbf{a} + 2\mathbf{c}$ is parallel to $\mathbf{b}$ [2 marks]

12 $\text{pressure} = \frac{\text{force}}{\text{area}}$

A force of 40 Newtons is applied to an area of 3.2 square metres.

Work out the pressure.

Give the units of your answer.
[2 marks]

Answer _____

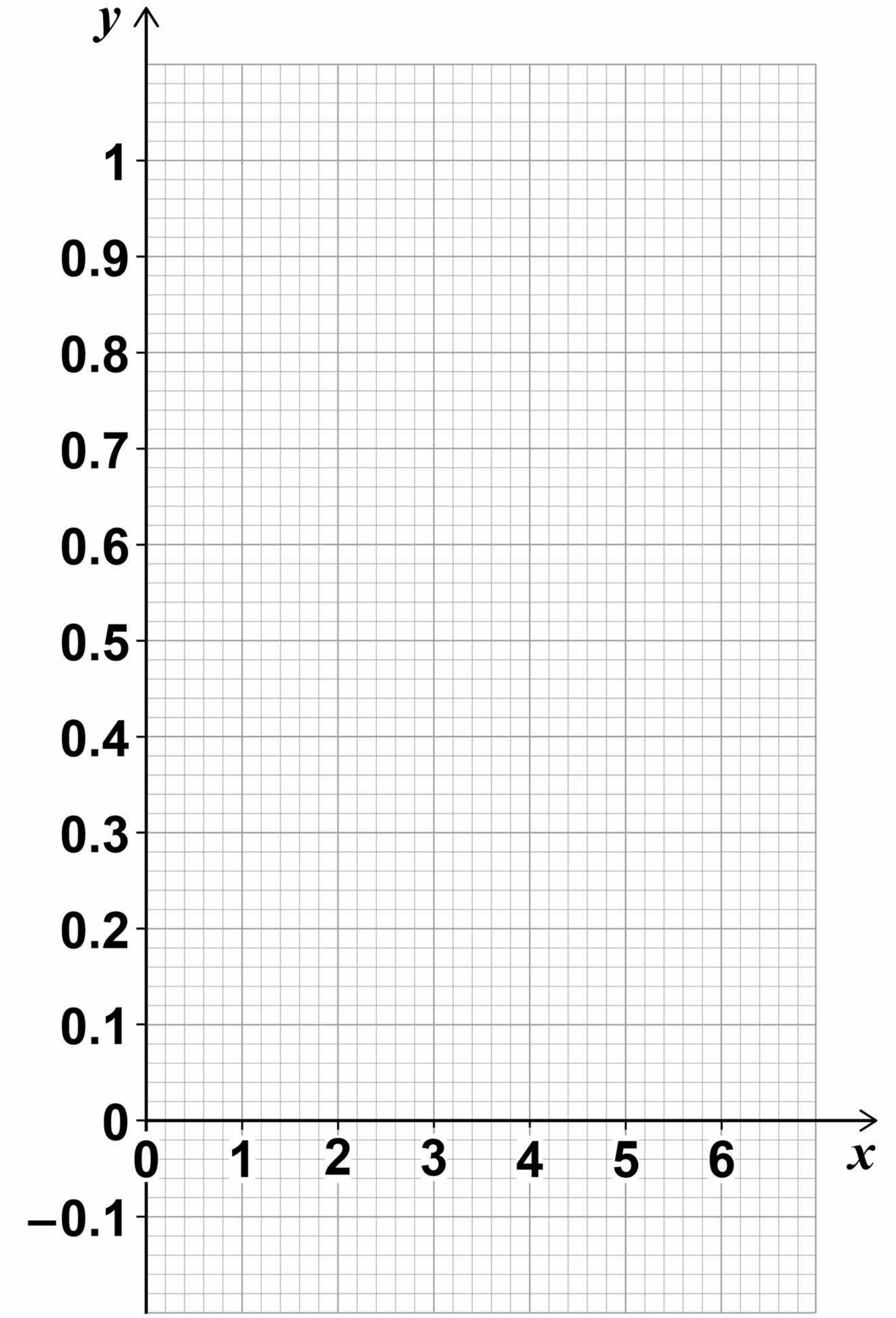
13 **Tick ALL the statements that are true for any rhombus. [1 mark]**

- ☐ The diagonals are lines of symmetry
- ☐ The diagonals bisect each other
- ☐ The diagonals are perpendicular
- ☐ The diagonals are equal in length

7

14 **Draw the graph, on the opposite page, of $y = 0.8^x$ for values of x from 0 to 6 [3 marks]**

x	0	1	2	3	4	5	6
y							



[Turn over]

15 **Amy has x beads.**

Billy has three more beads than Amy.

Carly has four times as many beads as Billy.

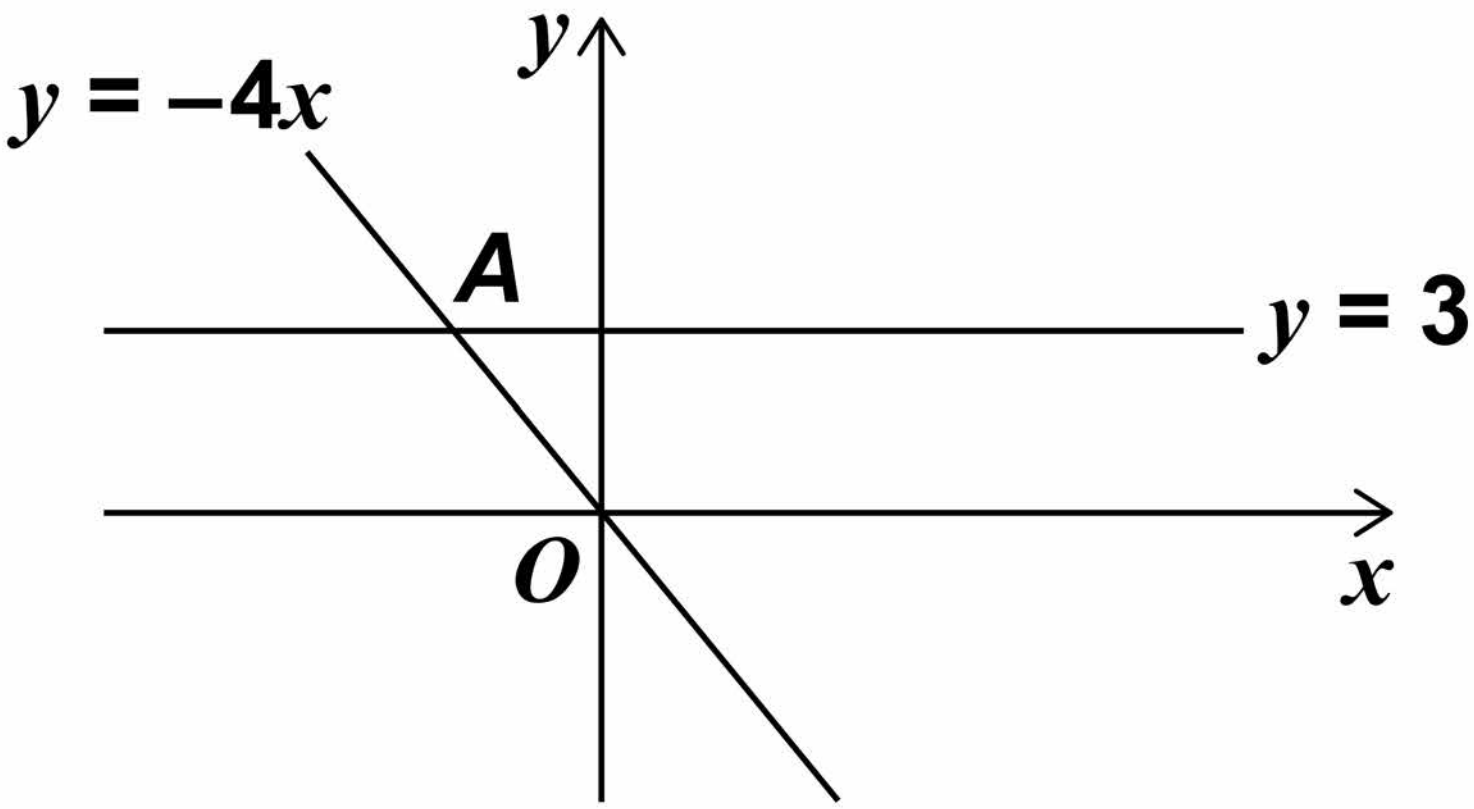
Circle the expression for the number of beads that Carly has.
[1 mark]

$4x + 3$ **$3x + 4$**

$4(x + 3)$ **$x + 12$**

16 **Two straight lines intersect at point *A*.**

The diagram is not drawn accurately.



Circle the coordinates of *A*. [1 mark]

$\left(-\frac{3}{4}, 3\right)$ $(-4, 3)$

$(-12, 3)$ $\left(-\frac{4}{3}, 3\right)$

17 Here are two methods to make a 4-digit code.

Codes can have repeated digits.

METHOD A

For the first two digits use an odd number between 30 and 100

For the last two digits use a multiple of 11

METHOD B

Use four digits in the order

even odd even odd

Do NOT use the digit zero

Which method gives the GREATER number of possible codes?

You MUST show your working.

[3 marks]

Answer

[Turn over]

18 Show that, for $x \neq 0$

$$\frac{x + 4}{3x} - \frac{5}{2x}$$

can be written in the form $\frac{ax + b}{cx}$

where a, b and c are integers.

[3 marks]

Answer _____

19 The equation of a straight line is $3x + 2y = 24$

Circle the point where the line crosses the x-axis. [1 mark]

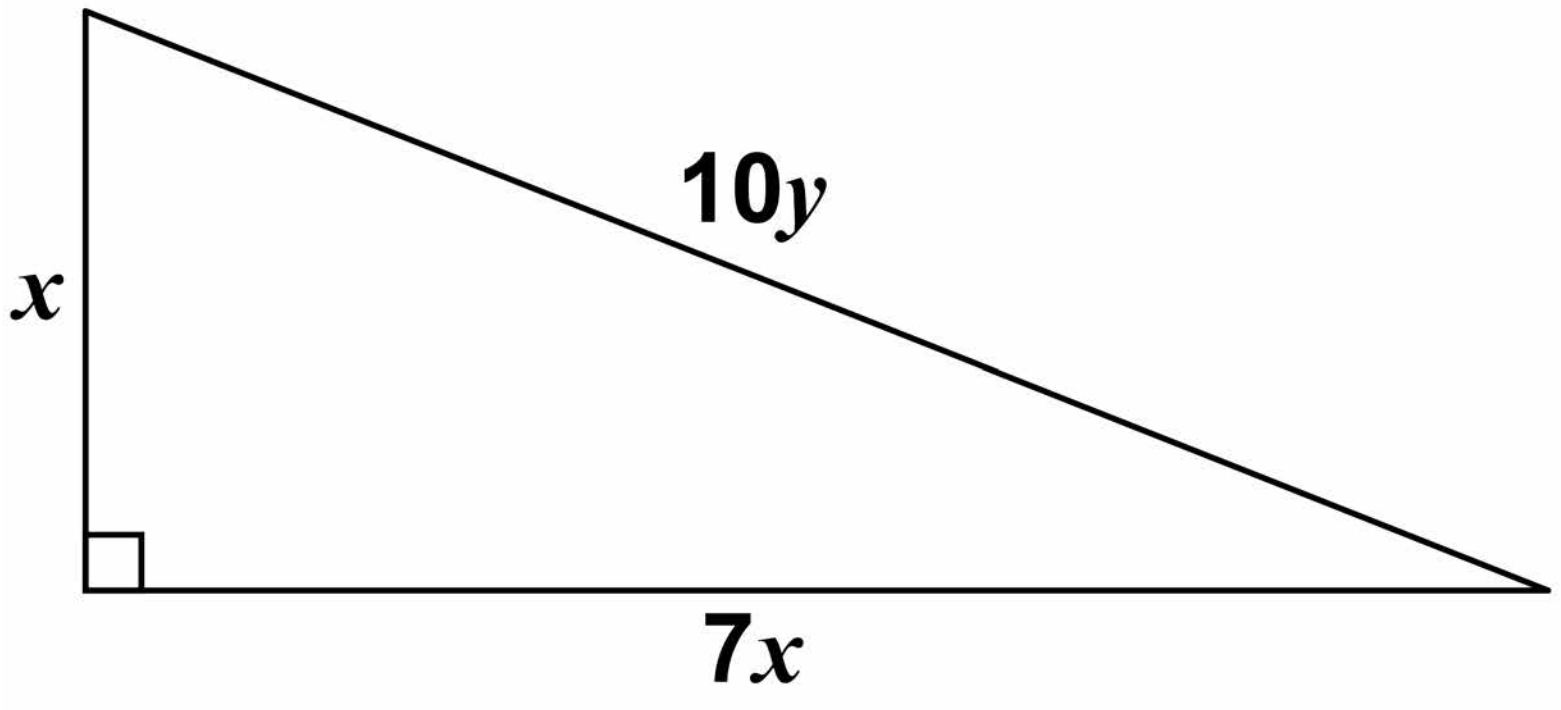
(0, 8) (12, 0)

(0, 12) (8, 0)

7

20 **All dimensions are in centimetres.**

The diagram is not drawn accurately.



Use Pythagoras' theorem to work out the exact value of $\frac{x}{y}$ [3 marks]

Answer _____

[Turn over]

21 The mass of an ornament is m grams.

The height of the ornament is h centimetres.

m is directly proportional to the cube of h.

$m = 1600$ when $h = 8$

21 (a) Work out an equation connecting m and h. **[3 marks]**

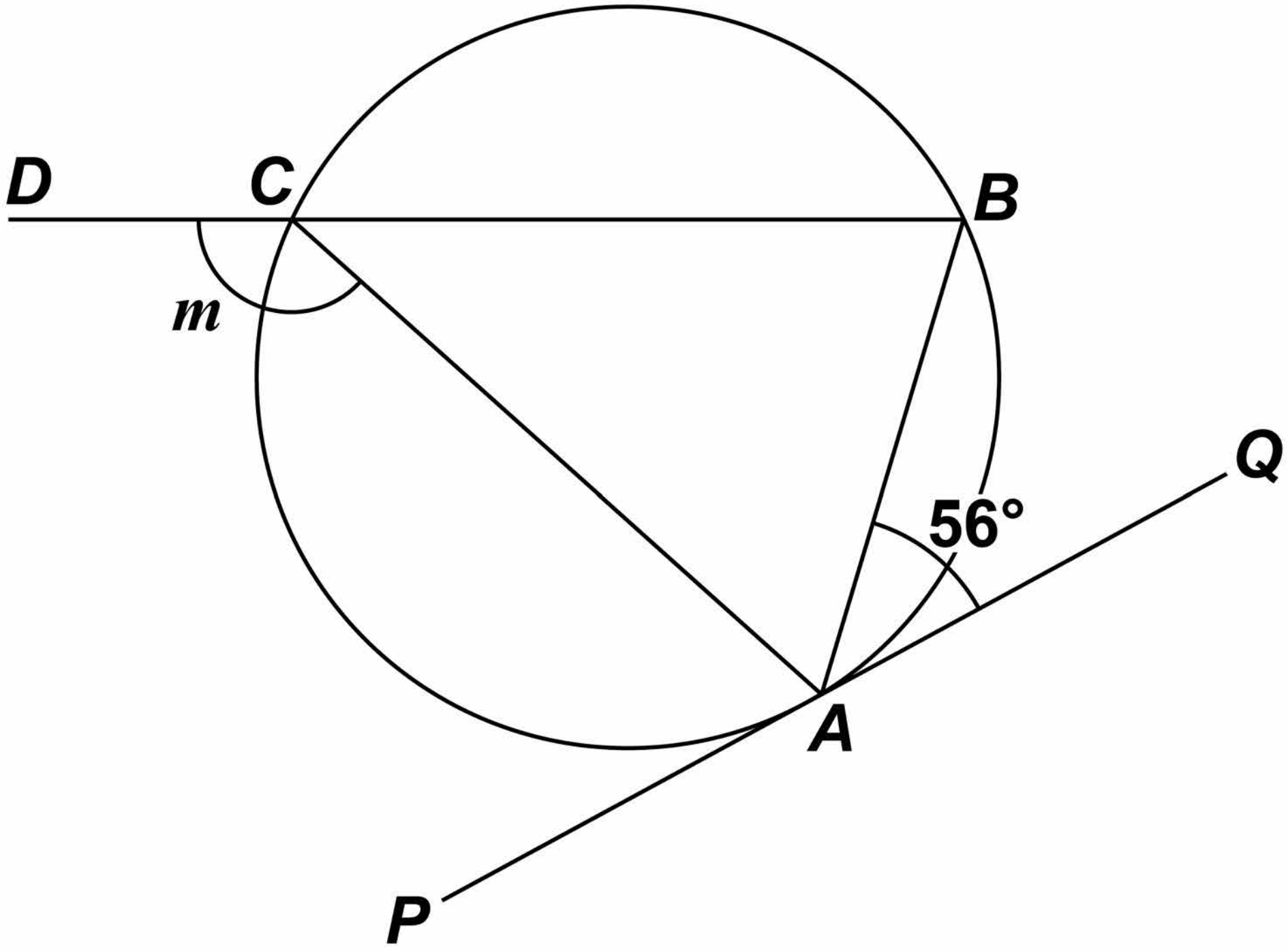
Answer

21 (b) Work out the mass of an ornament of height 12 centimetres. [2 marks]

Answer _____ grams

8

22 ***A*, *B* and *C* are points on a circle.**
***DCB* is a straight line.**
***PAQ* is a tangent to the circle.**
The diagram is not drawn accurately.



Sam is trying to work out the size of angle m.

Here is his working.

angle ACB = 56°

angles in the same segment are equal

m = 180° – 56°

angles at a point on a straight line add up to 180°

m = 124°

Make a criticism of his working.
[1 mark]

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23 A sequence of numbers is formed by the iterative process

$$u_{n+1} = \frac{3}{u_n + 1}, \quad u_1 = 4$$

Work out the values of u_2 and u_3

[2 marks]

$u_2 =$

$u_3 =$

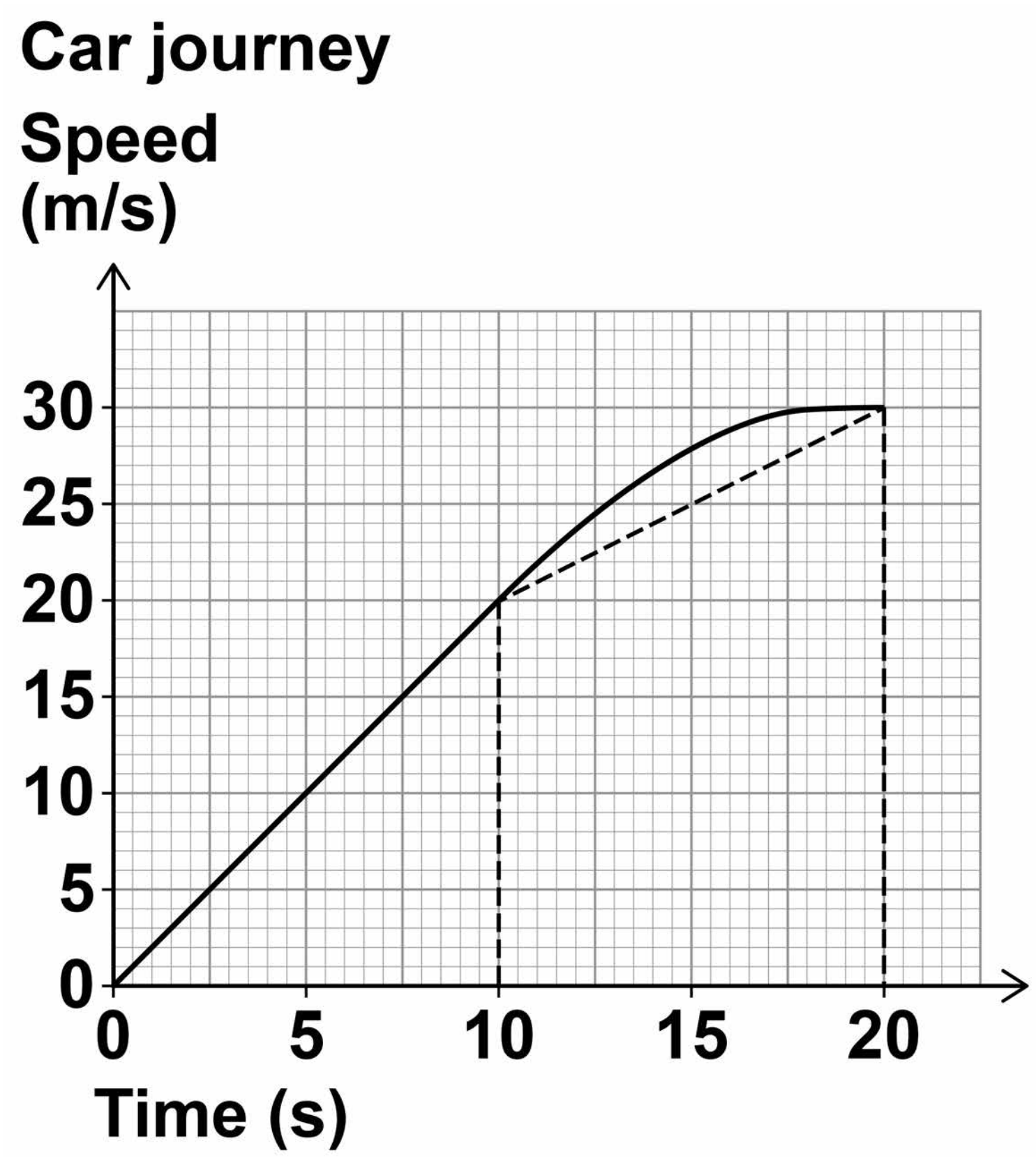
3

[Turn over]

24 **The speed-time graph shows 20 seconds of a car journey.**

Harry wants to estimate the distance the car travels in this time.

He uses a triangle and a trapezium, as shown, to estimate the area under the graph.



24 (a) Complete Harry's method to estimate the distance the car travels. [3 marks]

Answer **m**

BLANK PAGE

24 (b) For this journey, which of these is true for Harry's method?

Tick ONE box. [1 mark]

☐ It works out an overestimate of the distance

☐ It works out an underestimate of the distance

☐ It could work out an overestimate or an underestimate of the distance

4

[Turn over]

25 ***ABCDEF*** **is a triangular prism which represents part of a hill.**

ABCF **is the horizontal rectangular base.**

D **is vertically above** ***C***

BC **= 500 m**
AB **= 400 m**
Angle ***DBC*** **= 6°**

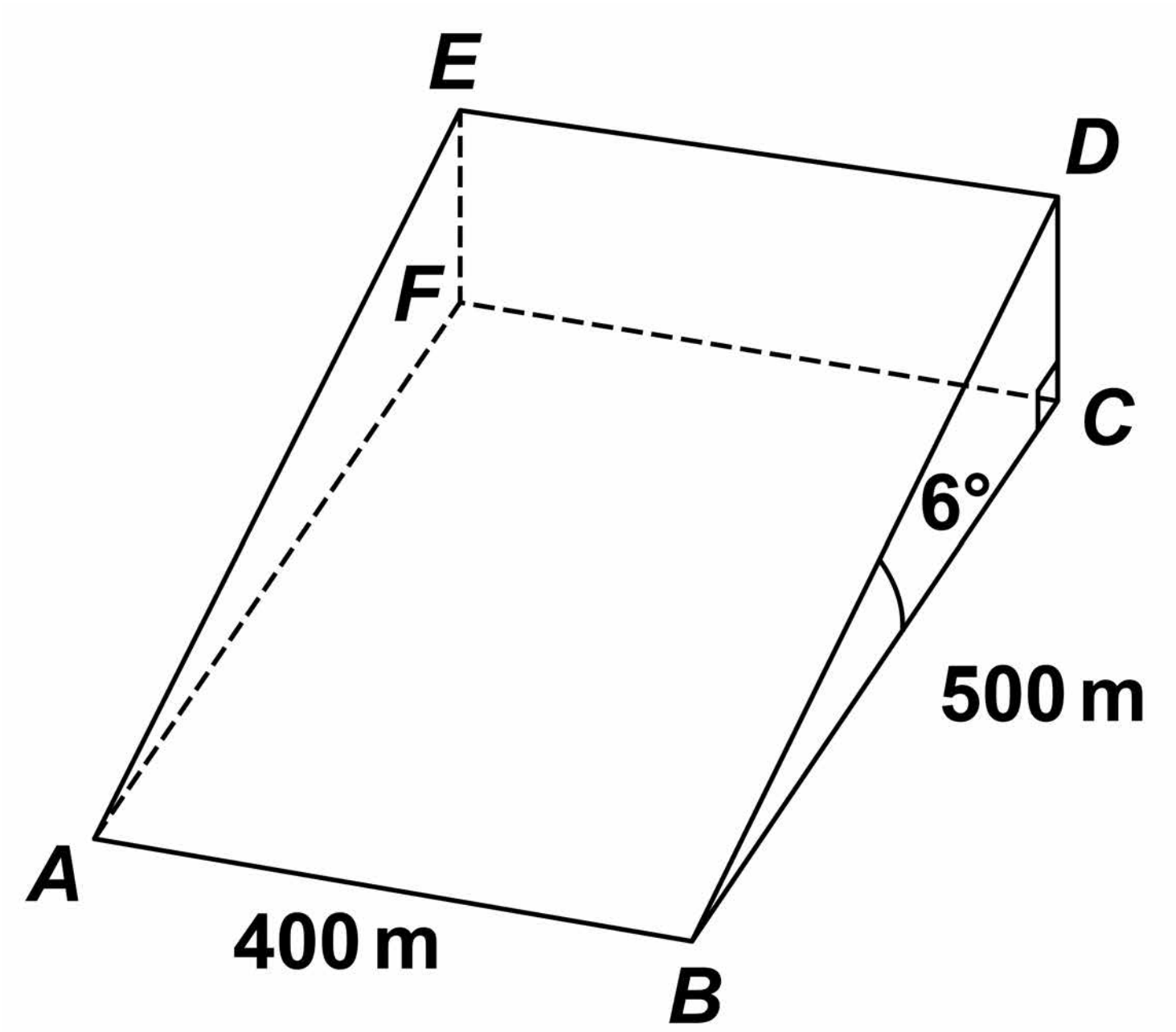
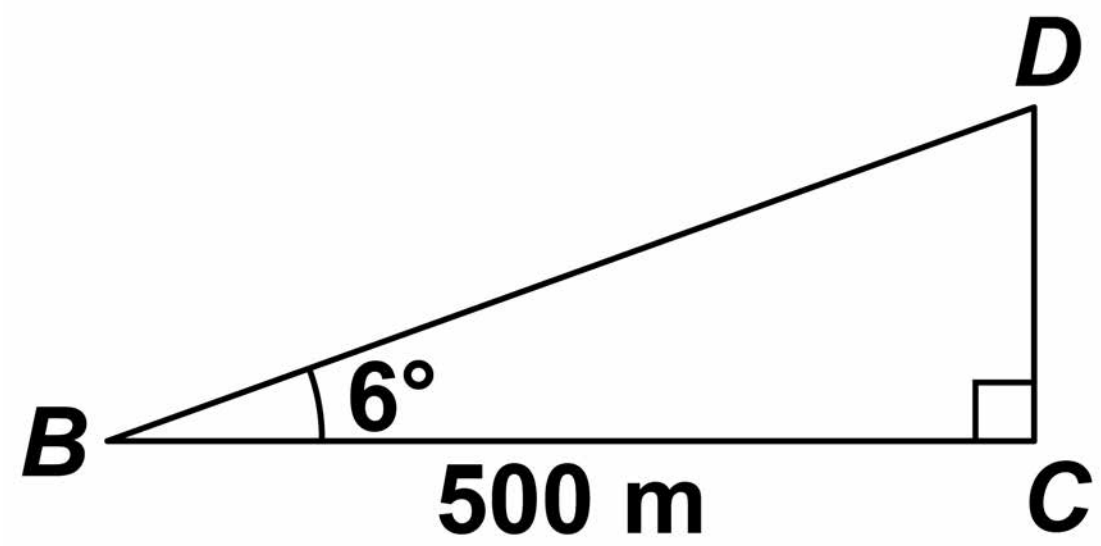


Diagram i. The diagram below shows the triangle *BCD*.

It is not drawn to scale.



25 (a) Work out the height *CD*.
[2 marks]

Answer _____ m

[Turn over]

25 (b) Jamil walks in a straight line from *A* to *D*.

Diagram ii. The diagram shows a plan view of the base of the triangular prism.

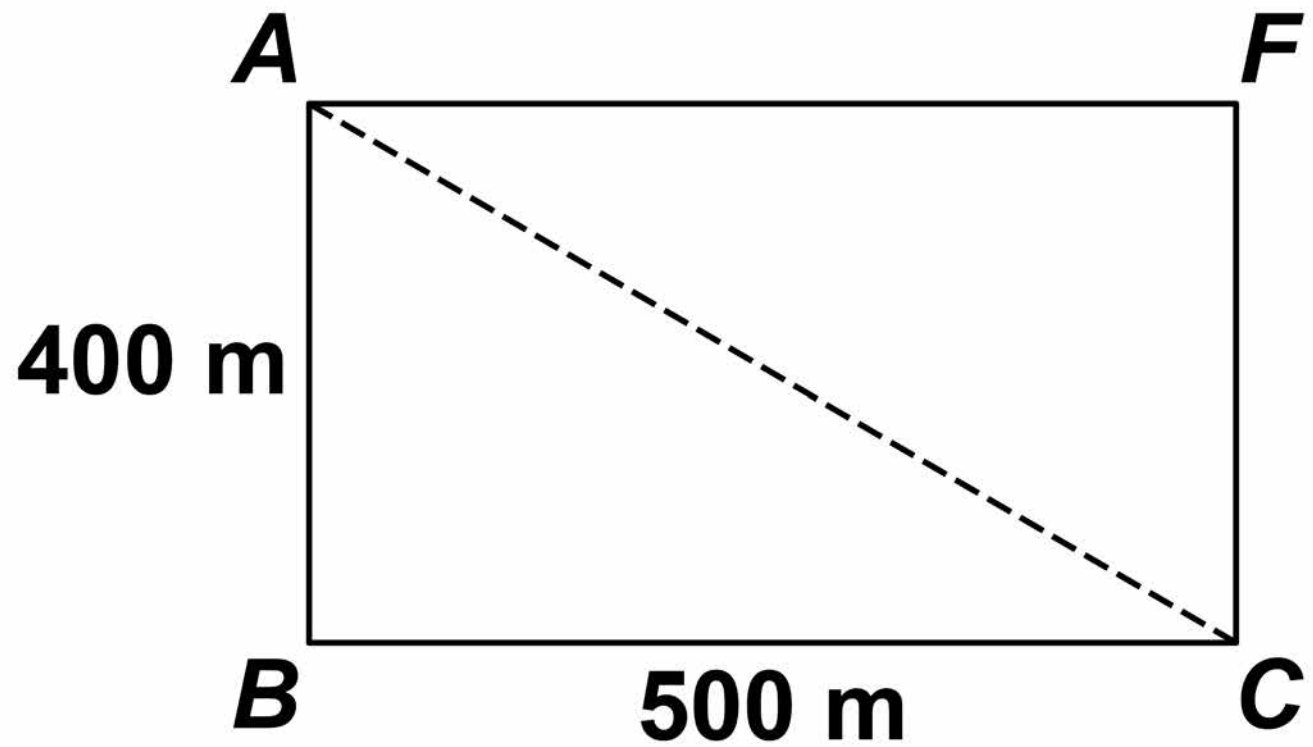
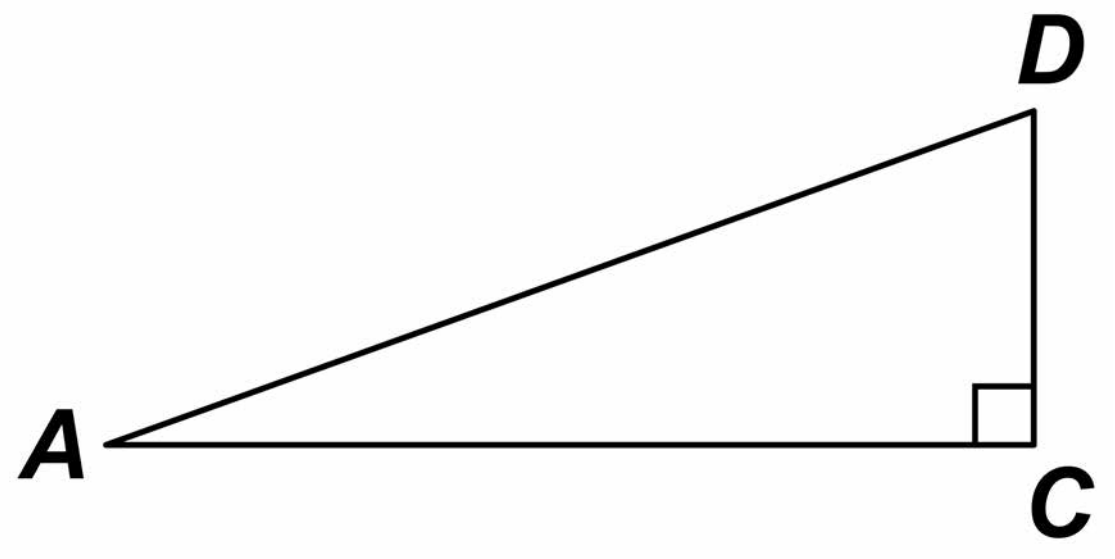


Diagram iii. The diagram below shows the triangle *DAC*.

It is not drawn to scale.



Work out the size of angle *DAC*.

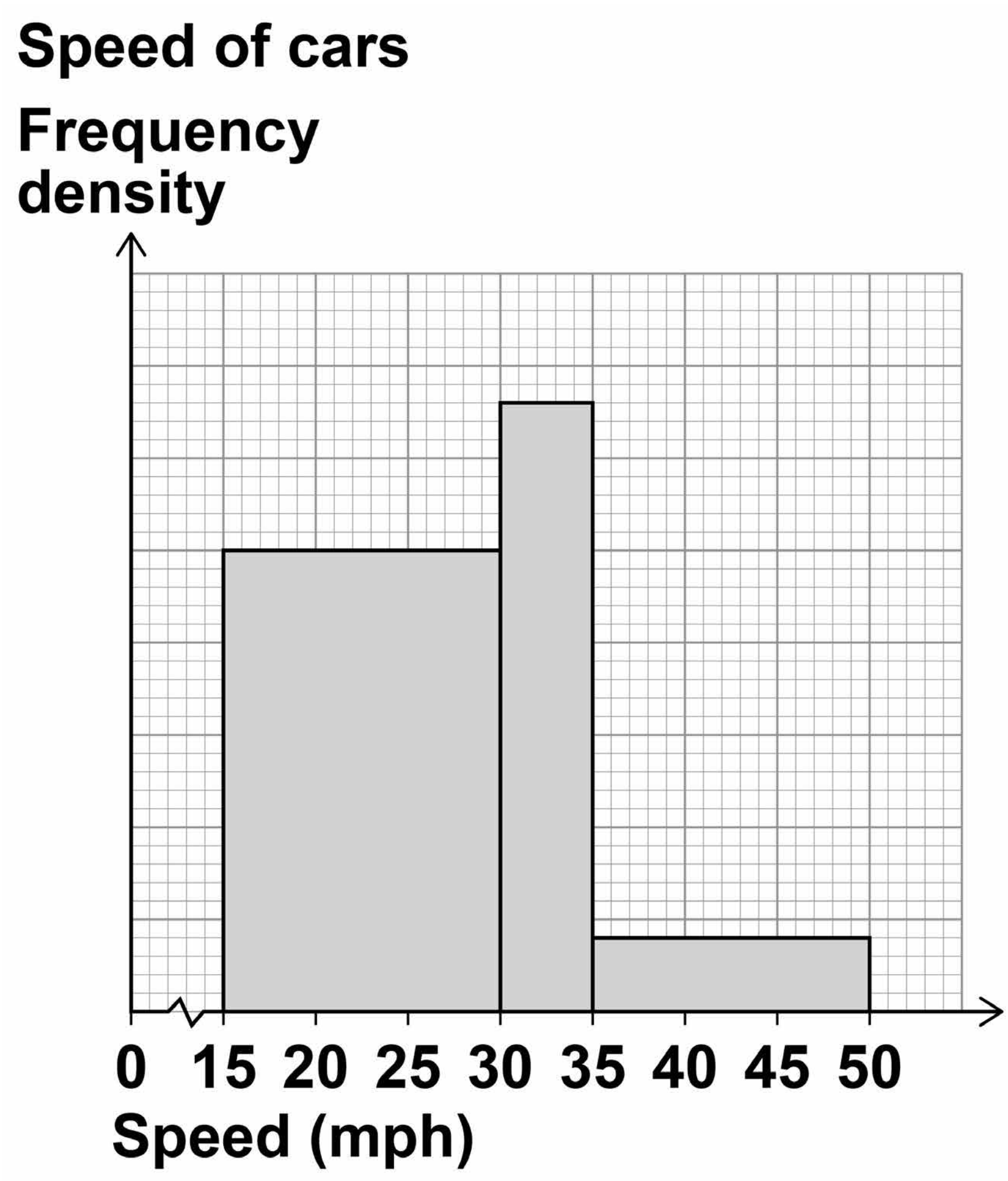
You MUST show your working.
[4 marks]

Answer _____ degrees

6

26 **The histogram shows information about the speed of cars as they pass a checkpoint.**

The scale on the frequency density axis is missing.



The histogram shows information about 480 cars.

26 (a) How many cars does the first bar represent? [4 marks]

Answer

[Turn over]

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26 (b) Cars with a speed greater than 40 mph are over the speed limit.

Use the histogram to estimate the number of cars that are over the speed limit. [2 marks]

Answer

[Turn over]

6

27 **A bag contains 30 discs.**

10 are red and 20 are blue.

One disc is taken out at random and replaced by TWO of the other colour.

Another disc is then taken out at random and replaced by TWO of the other colour.

Another disc is then taken out at random.

Work out the probability that all three discs taken out are RED.
[3 marks]

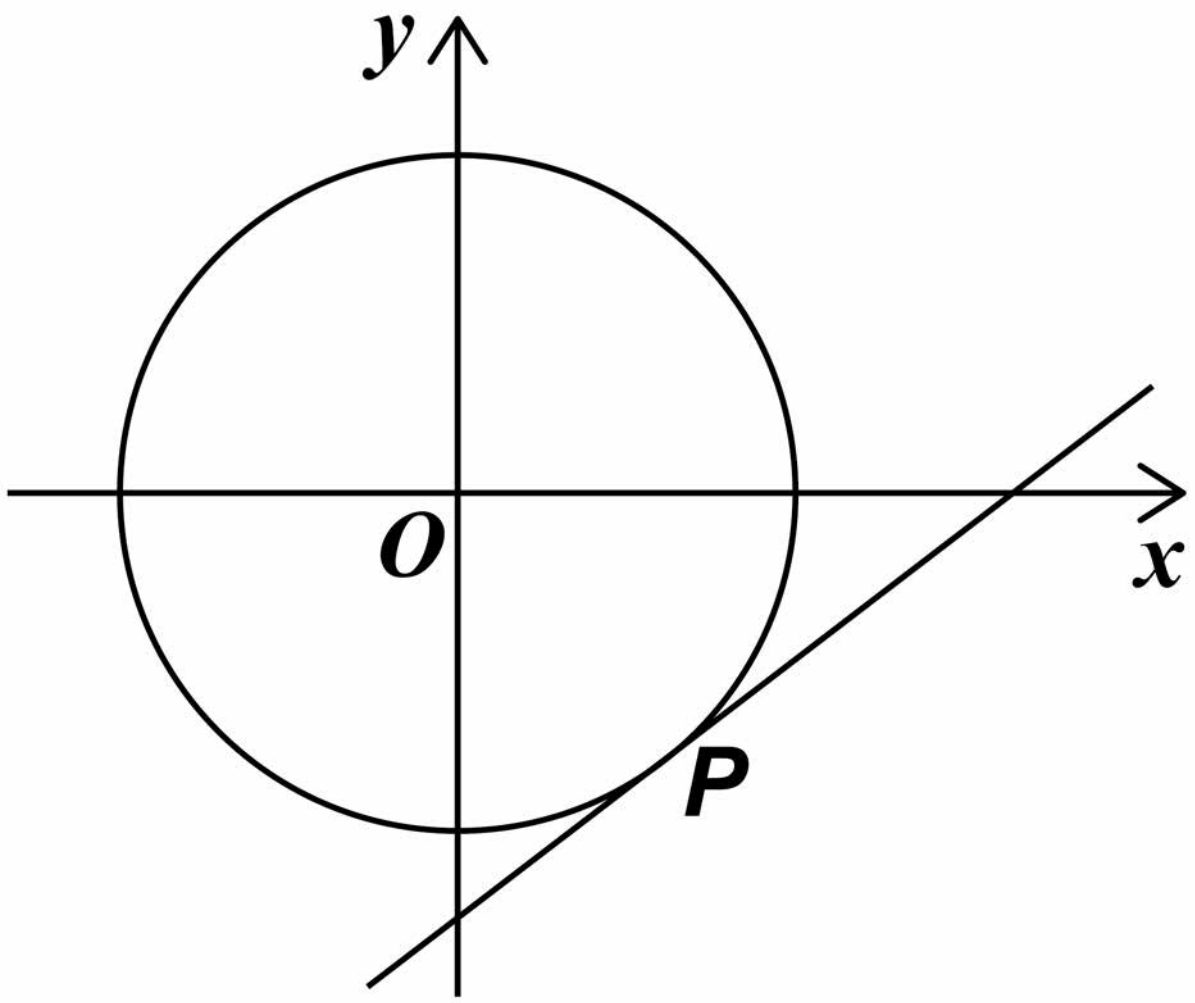
Answer _____

[Turn over]

28 ***P*** **is a point on the circle with equation** $x^2 + y^2 = 80$

P **has** x**-coordinate 4 and is below the** x**-axis.**

The diagram is not drawn accurately.



Work out the equation of the tangent to the circle at ***P*****.**
[5 marks]

Answer

END OF QUESTIONS

8

There are no questions printed on this page

For Examiner's Use	
Pages	Mark
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40–43	
44–46	
47–51	
TOTAL	

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