



Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

GCSE

MATHEMATICS

Higher Tier Paper 3 Calculator

H

8300/3H

Tuesday 12 June 2018

Morning

Time allowed: 1 hour 30 minutes

For this paper you must have:

- a calculator
- mathematical instruments.



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

[Turn over]



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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
 $-2 < x \leq 4$ [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]

3.27[.]

3.27

3.277

3.207[.]

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

Circle your answer. [1 mark]

18°

36°

144°

162°

[Turn over]



6

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

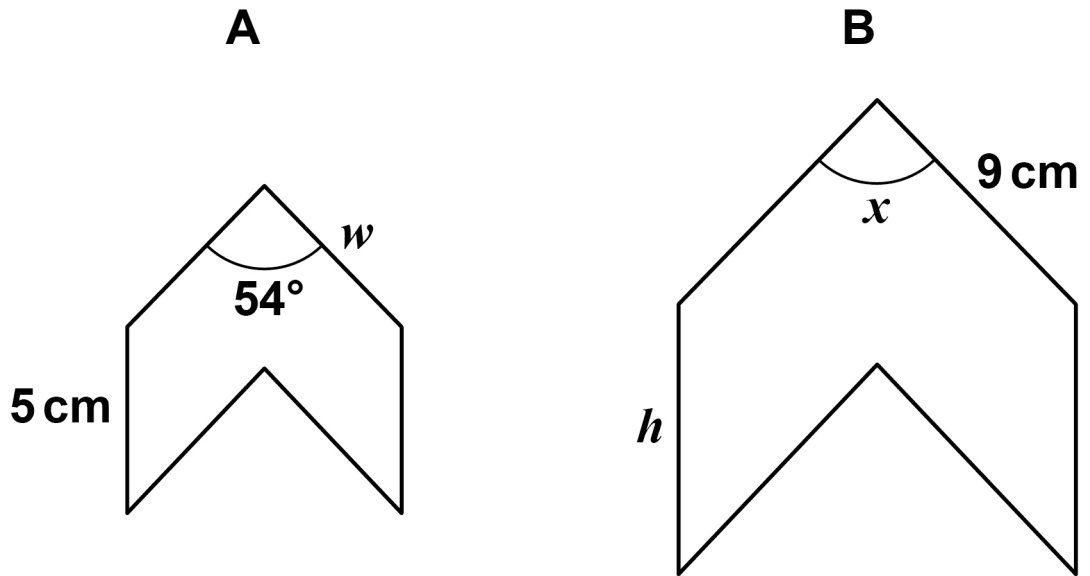


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[Turn over]



- 6 A and B are similar shapes.
B is an enlargement of A with scale factor 1.5
The diagram is not drawn accurately.



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[Turn over]



9 The cost of a ticket increases by 10% to £19.25
Work out the original cost. [3 marks]

Answer £ _____



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

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

Answer $\left(\quad \right)$



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

[Turn over]



12 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

[Turn over]

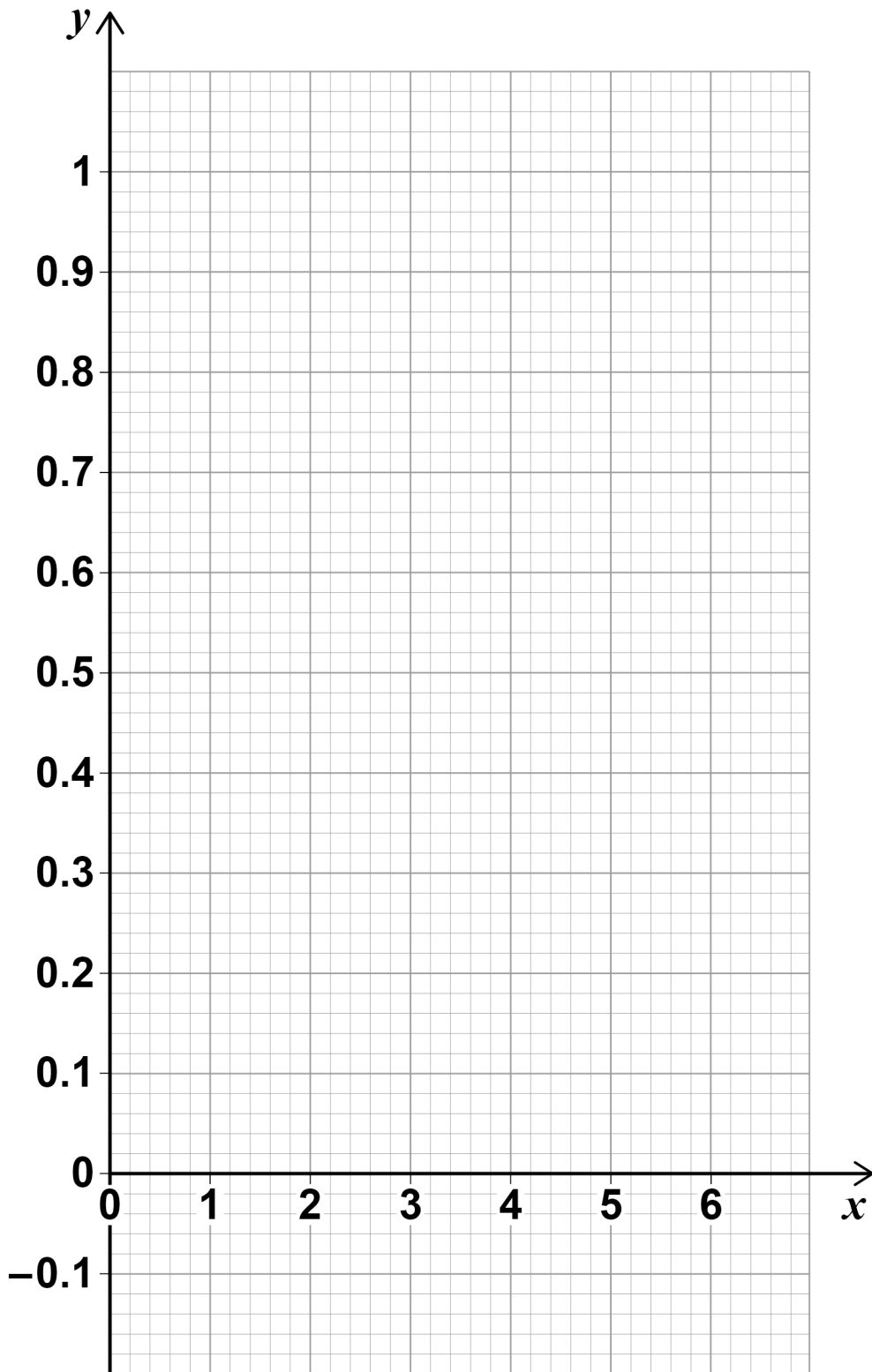
7



- 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]

$4x + 3$

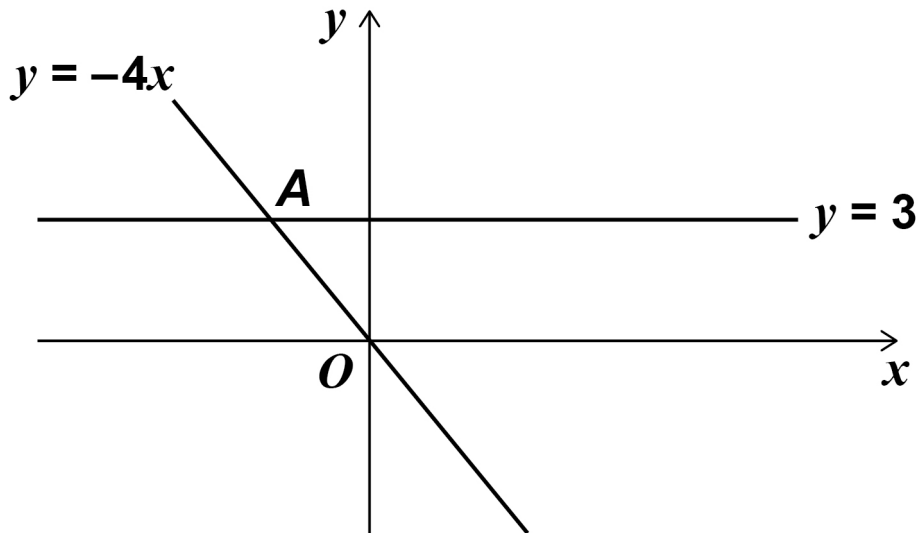
$3x + 4$

$4(x + 3)$

$x + 12$



- 16 Two straight lines intersect at point A.
The diagram is not drawn accurately.



Circle the coordinates of A. [1 mark]

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

[Turn over]

5



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]



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)

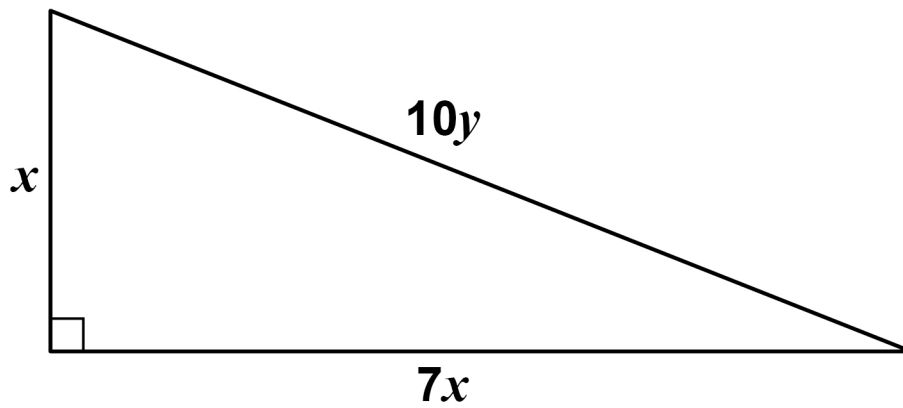
[Turn over]

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]

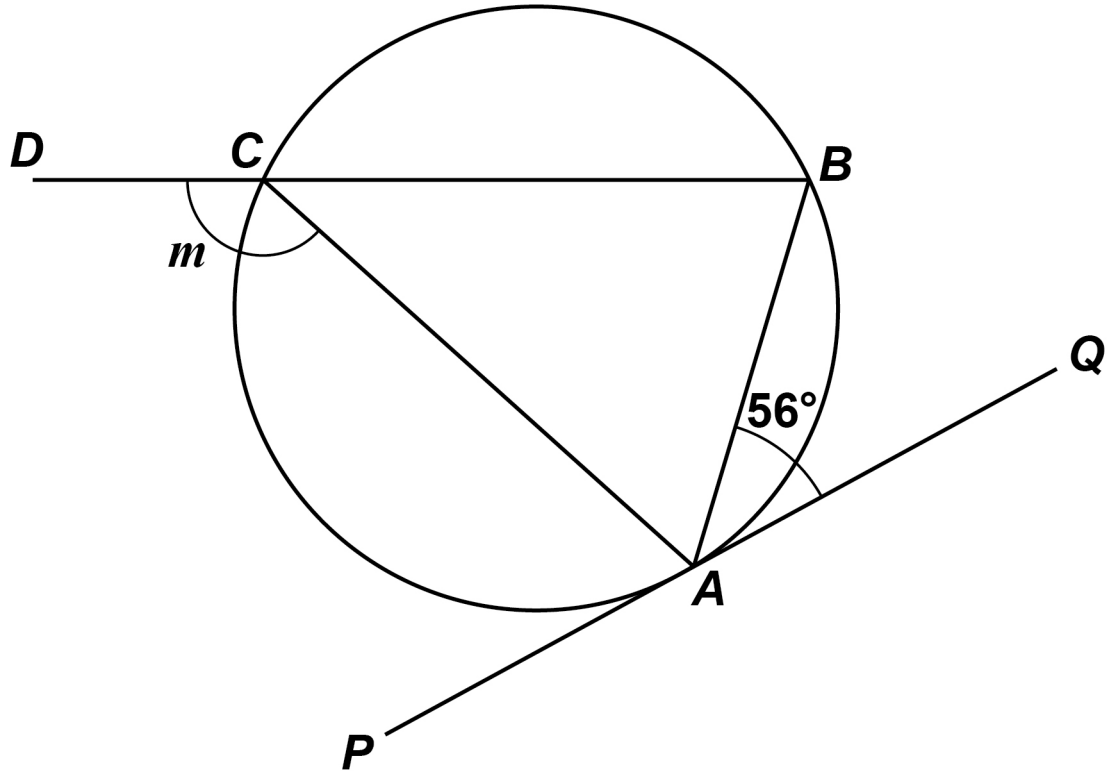
Answer _____ grams

[Turn over]

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.

$$\text{angle } ACB = 56^\circ$$

angles in the same segment are equal

$$m = 180^\circ - 56^\circ$$

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

$$m = 124^\circ$$



Make a criticism of his working. [1 mark]

[Turn over]



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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]



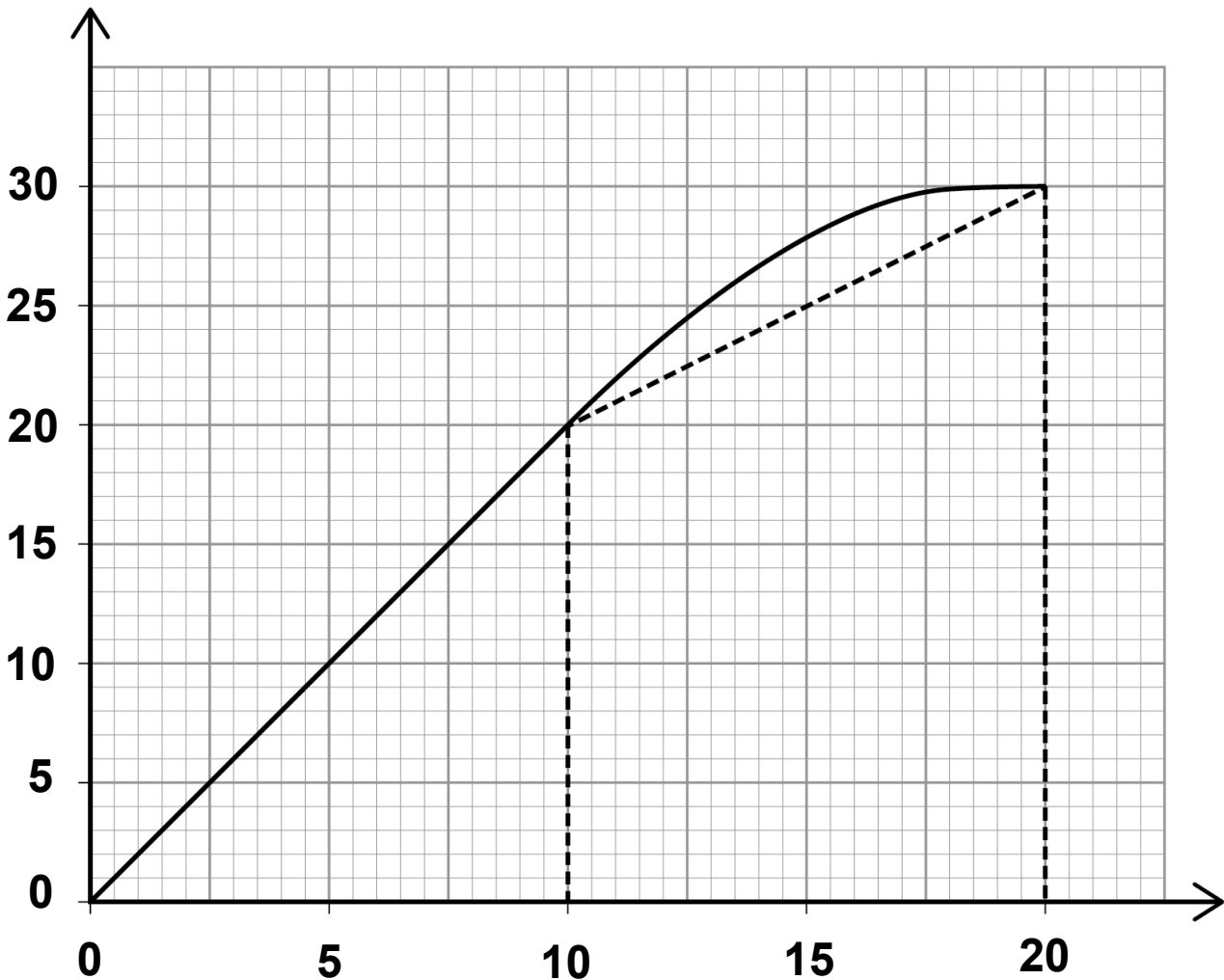
24 The speed-time graph shows 20 seconds of a car journey.

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.

Car journey

Speed
(m/s)



Time (s)



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

Answer _____ m

[Turn over]



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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

[Turn over]

4



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

ABCF is the horizontal rectangular base.

D is vertically above *C*

$$BC = 500 \text{ m}$$

$$AB = 400 \text{ m}$$

$$\text{Angle } DBC = 6^\circ$$

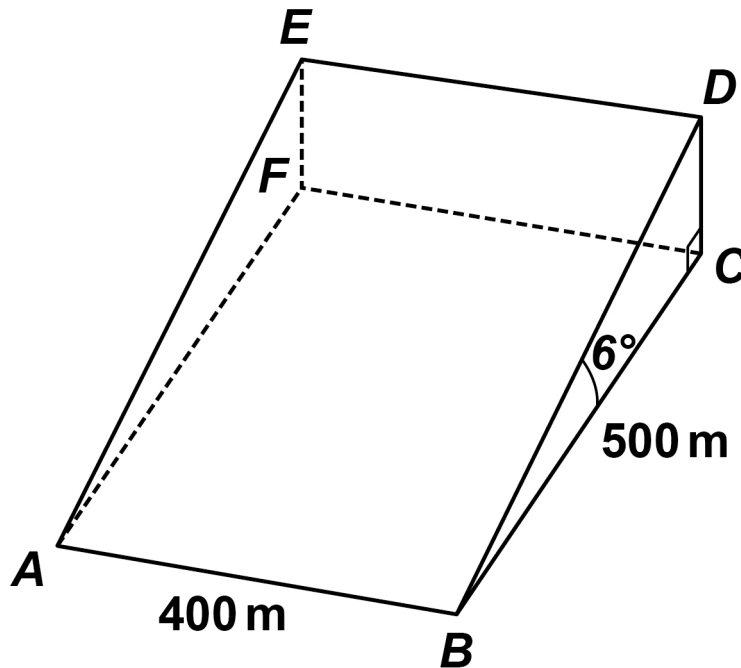
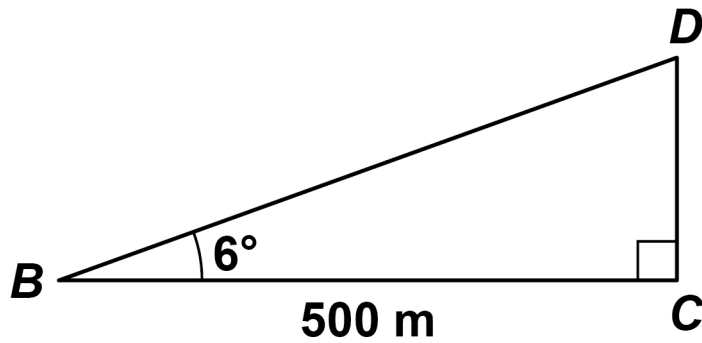


Diagram i. The diagram below shows the triangle BCD .

It is not drawn to scale.



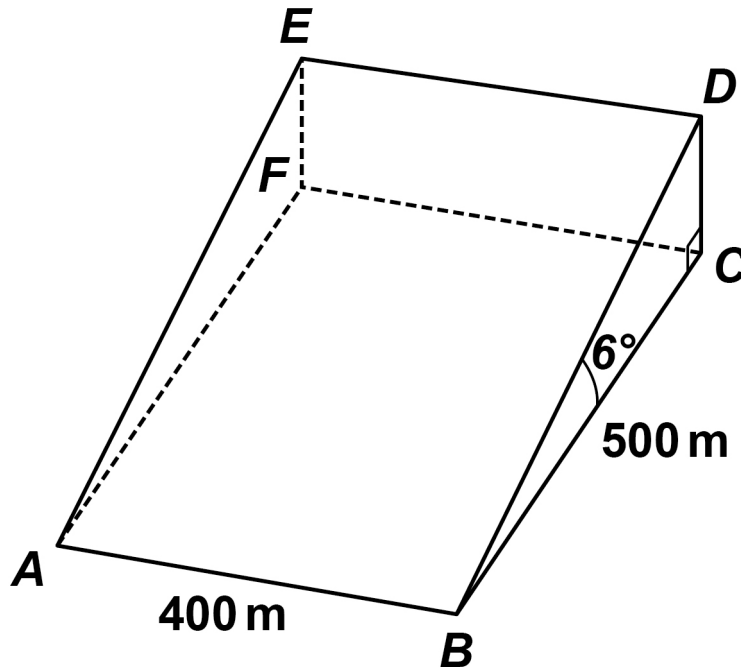
- 25 (a) Work out the height CD .
[2 marks]

Answer _____ m

[Turn over]



The diagram of the triangular prism is repeated from page 40.



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.

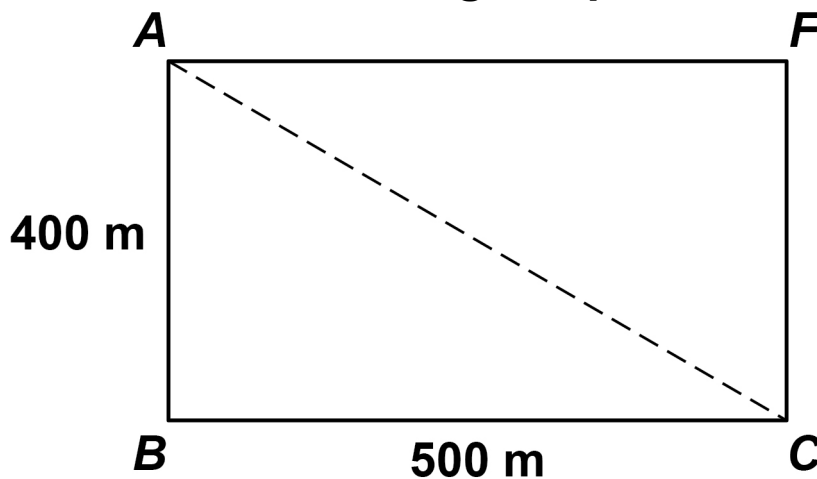
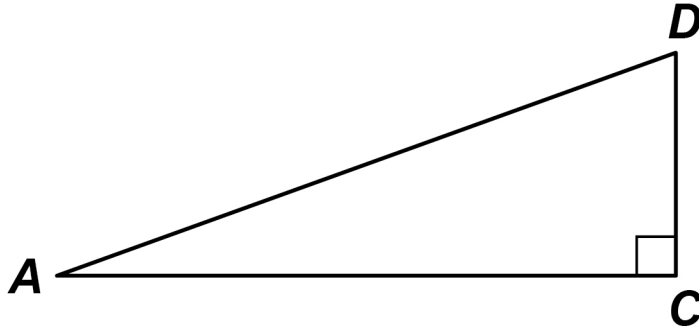


Diagram iii. The diagram below shows the triangle DAC .

It is not drawn to scale.



Work out the size of angle DAC .

You **MUST** show your working. [4 marks]

Answer _____ degrees

[Turn over]

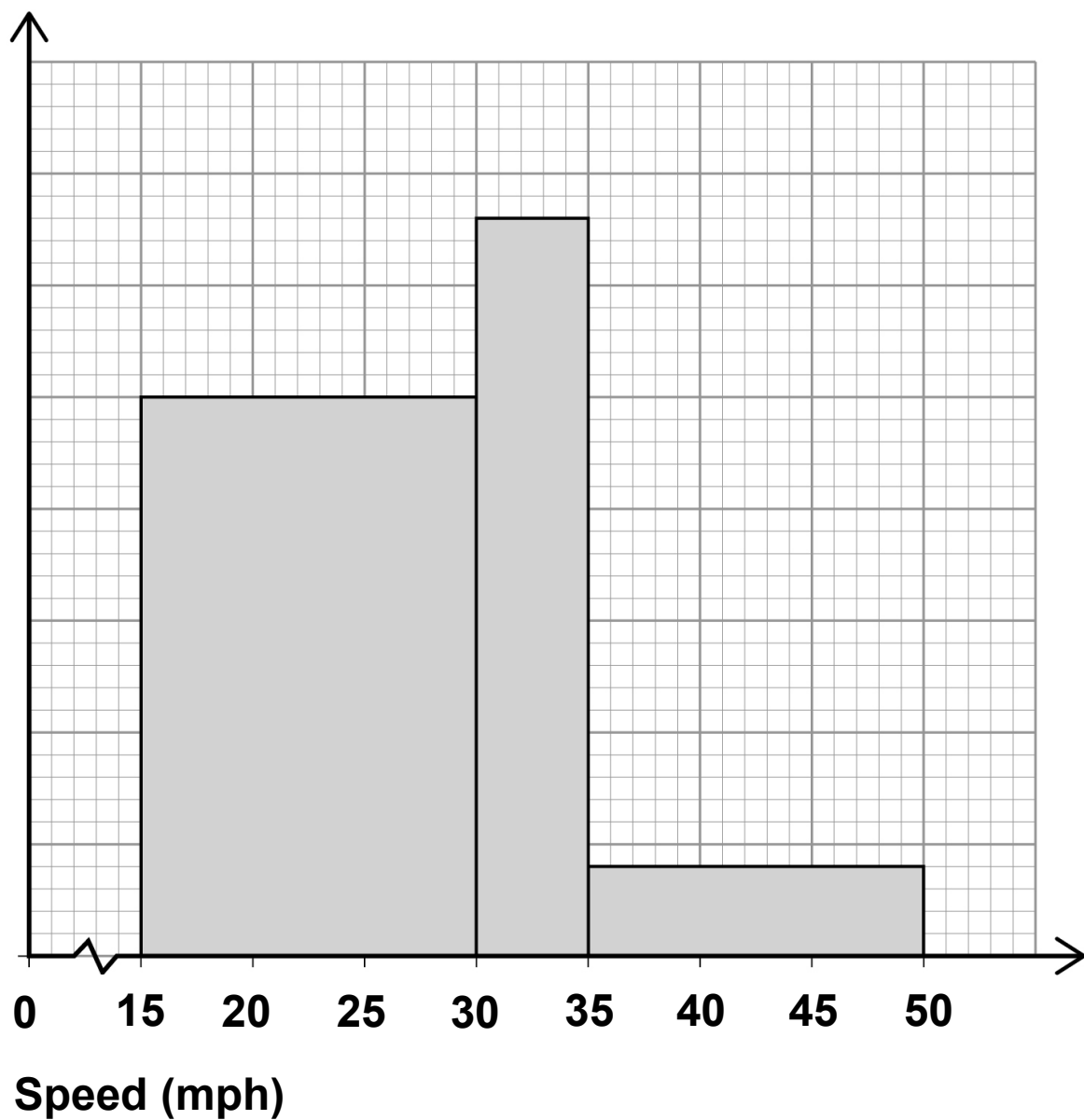
6



- 26 The histogram shows information about the speed of cars as they pass a checkpoint. The scale on the frequency density axis is missing.

Speed of cars

Frequency density



The histogram shows information about 480 cars.



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

Answer _____

[Turn over]



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 _____

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.

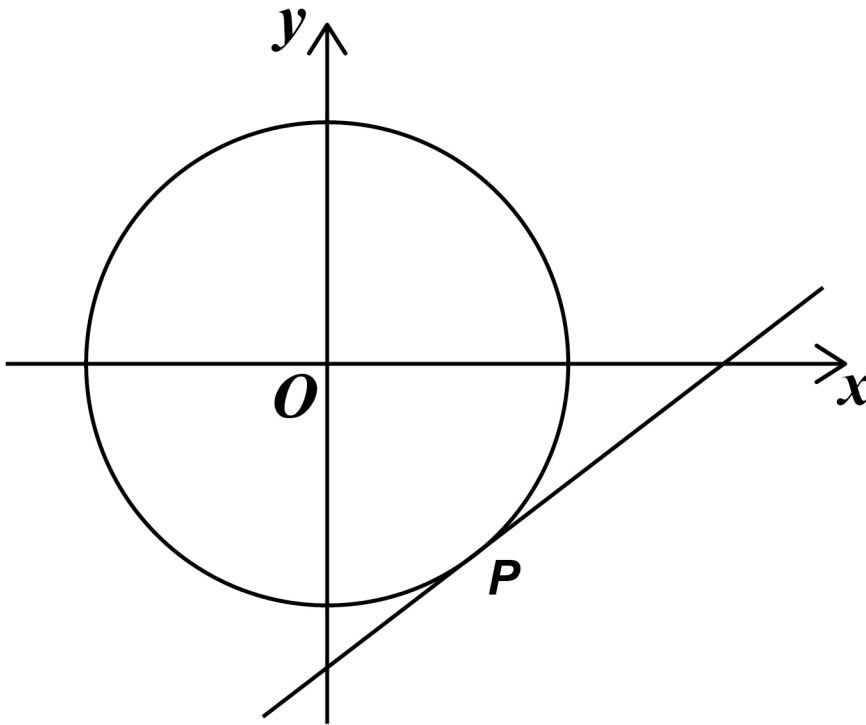
Work out the probability that all three discs taken out are RED. [3 marks]

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.



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



There are no questions printed on this page

For Examiner's Use	
Pages	Mark
4–6	
8–10	
12–15	
16–19	
20–23	
24–27	
28–31	
32–35	
36–39	
40–43	
44–46	
47–49	
TOTAL	

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