AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

GCSE MATHEMATICS

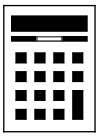
H

Higher Tier Paper 3 Calculator

Tuesday 12 June 2018 Morning Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- a calculator
- mathematical instruments.



Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or 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.

For Examiner's Use	
Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22–23	
24–25	
TOTAL	

Answer **all** questions in the spaces provided

Do not write outside the box

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 $3.20\dot{7}$

Do not write outside the box

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 _____

Turn over for the next question

8

Do not write outside the box

6 A and B are similar shapes.

B is an enlargement of A with scale factor 1.5

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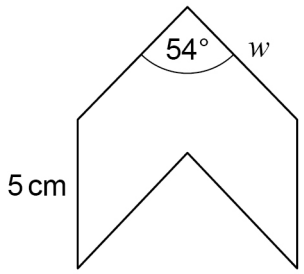
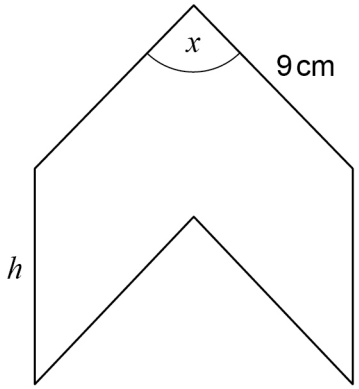
A



B



Work out the values of x, h and w.

[3 marks]

x = _____ degrees

h = _____ cm

w = _____ cm

Do not write outside the box

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 £_____

Turn over for the next question

7

Do not write outside the box

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]

Do not write outside the box

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

Turn over ►

Do not write outside the box

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

11 (a) Work out $\mathbf{a} + \mathbf{b} + \mathbf{c}$

[2 marks]

Answer $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$

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

[2 marks]

Do not write outside the box

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

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 for the next question

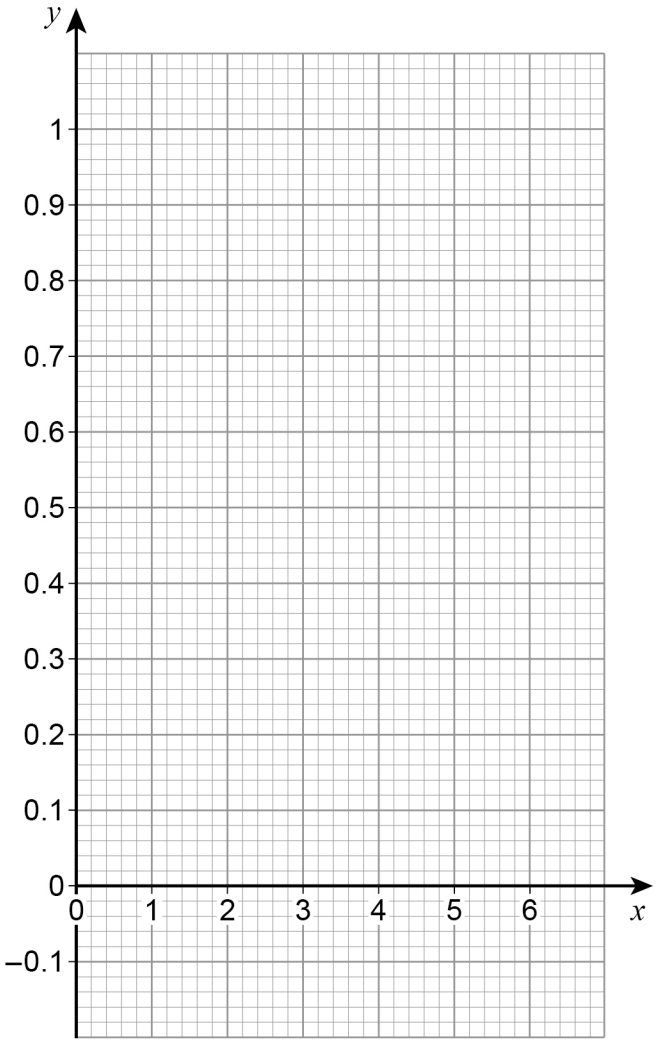
7

Do not write outside the box

14 Draw the graph of $y = 0.8^x$ for values of x from 0 to 6

[3 marks]

x	0	1	2	3	4	5	6
y							



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15 Amy has x beads.

Billy has three more beads than Amy.

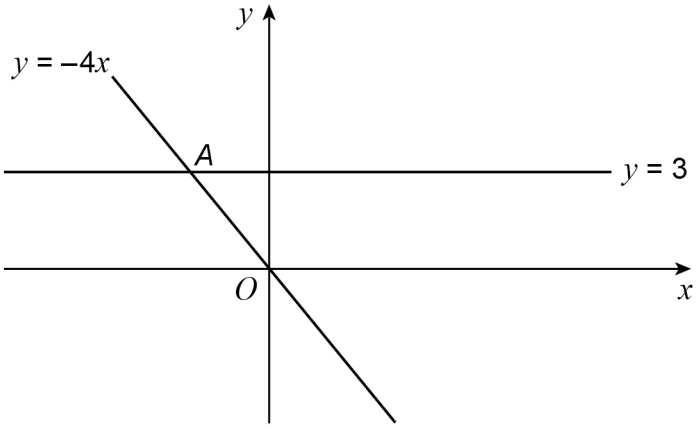
Carly has four times as many beads as Billy.

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*.



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Circle the coordinates of *A*.

[1 mark]

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

5

Turn over ►

Do not write outside the box

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 _____

Do not write outside the box

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.

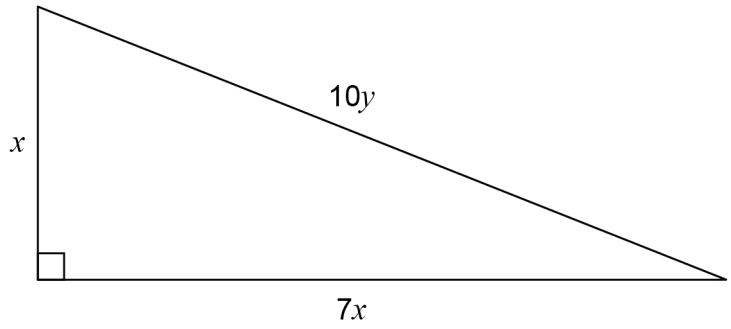
[1 mark]

(0, 8) (12, 0) (0, 12) (8, 0)

7

Do not write outside the box

20 All dimensions are in centimetres.



Not drawn accurately

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

[3 marks]

Answer _____

Do not write outside the box

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

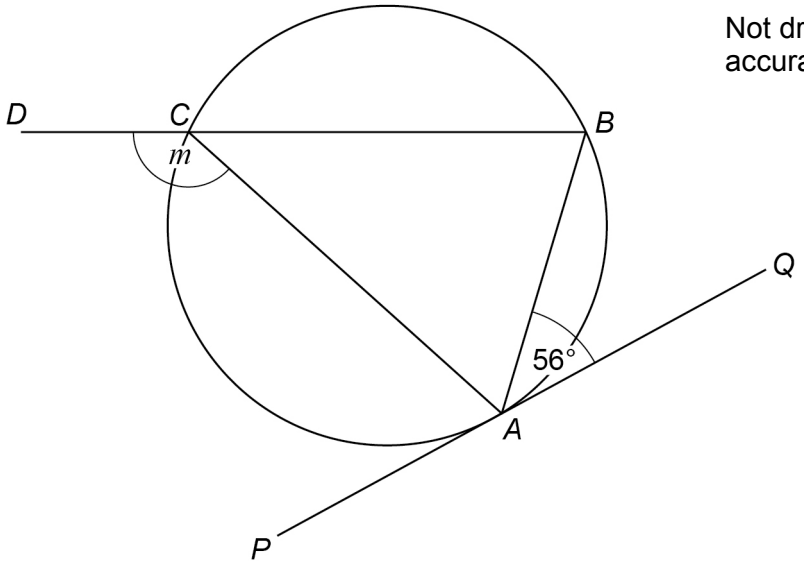
Turn over for the next question

8

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

DCB is a straight line.

PAQ is a tangent to the circle.



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]

Do not write outside the box

23 A sequence of numbers is formed by the iterative process

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

Work out the values of u_2 and u_3

[2 marks]

$u_2 =$ _____

$u_3 =$ _____

Turn over for the next question

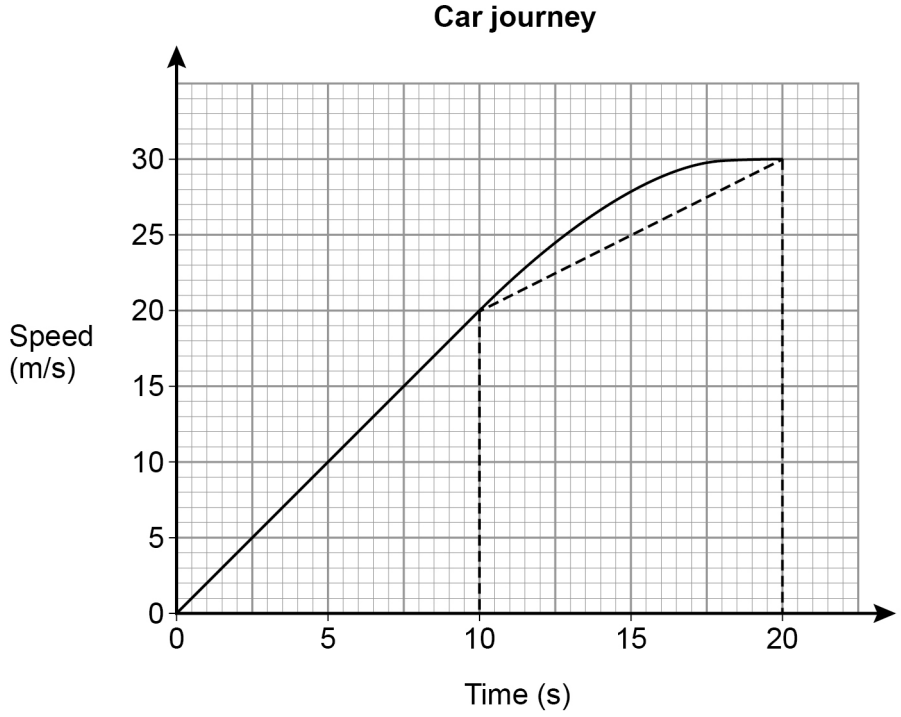
3

Do not write outside the box

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

Do not write outside the box

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 for the next question

4

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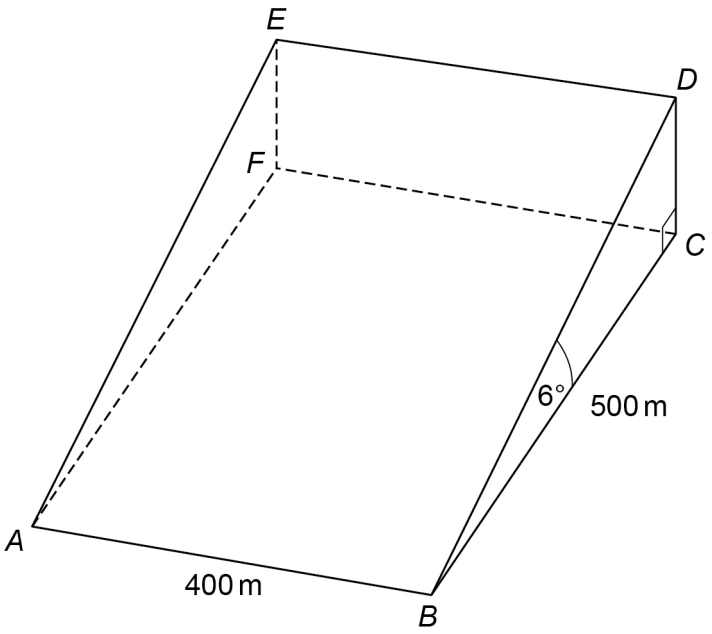
25 *ABCDEF* is a triangular prism which represents part of a hill.

ABCF is the horizontal rectangular base.

D is vertically above *C*.



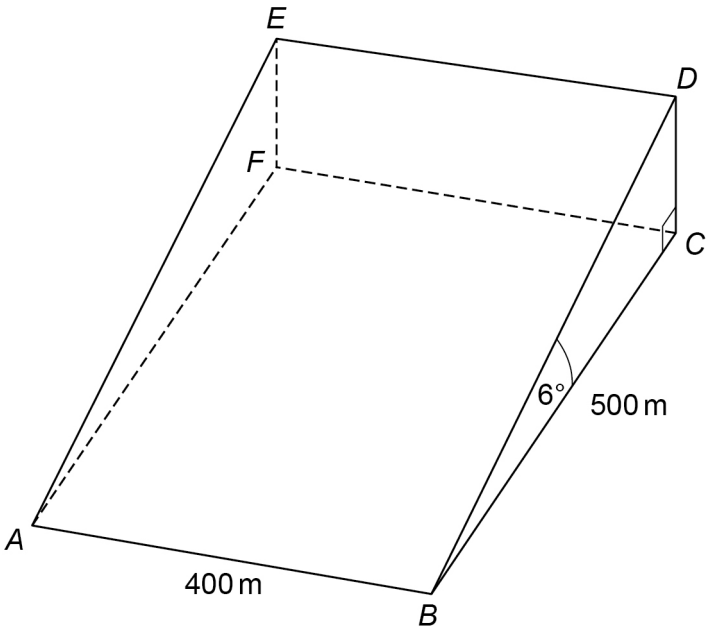
25 (a) Work out the height *CD*.

[2 marks]

Answer _____ m

Do not write outside the box

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



Work out the size of angle *DAC*.

You **must** show your working.

[4 marks]

Answer _____ degrees

6

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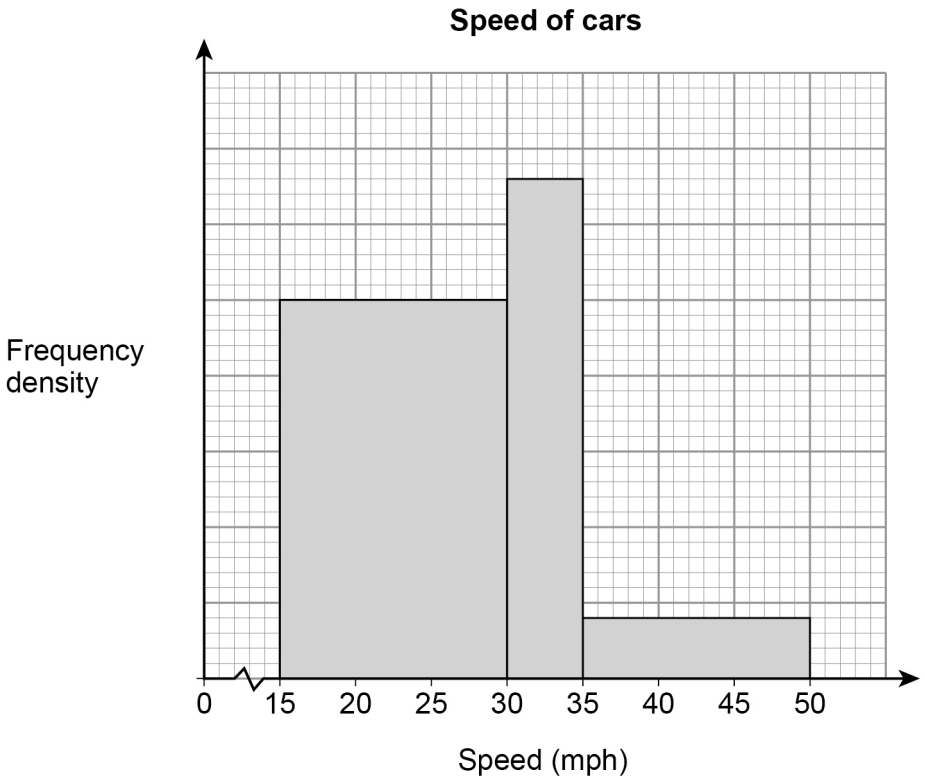
26 The histogram shows information about the speed of cars as they pass a checkpoint.

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 _____

Do not write outside the box

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 for the next question

6

Do not write outside the box

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]

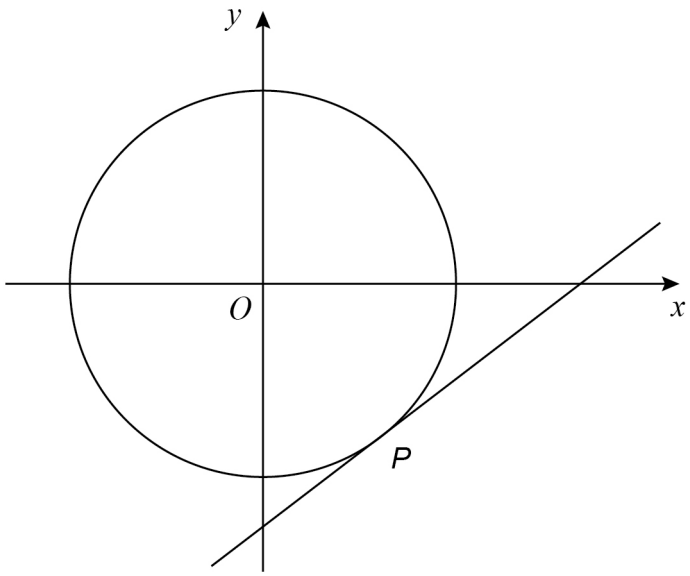
Answer _____

Do not write outside the box

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.

Not drawn accurately



Work out the equation of the tangent to the circle at *P*.

[5 marks]

Answer _____

END OF QUESTIONS

8

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