AQA

Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

GCSE MATHEMATICS

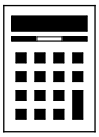
H

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	

Do not write outside the box

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 $3.20\dot{7}$

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

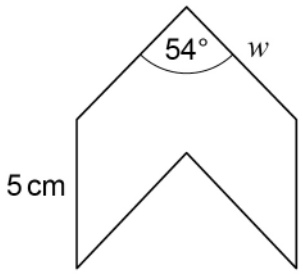
8

6 A and B are similar shapes.

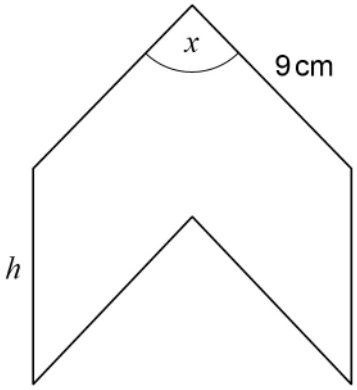
B is an enlargement of A with scale factor 1.5

Not drawn accurately

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

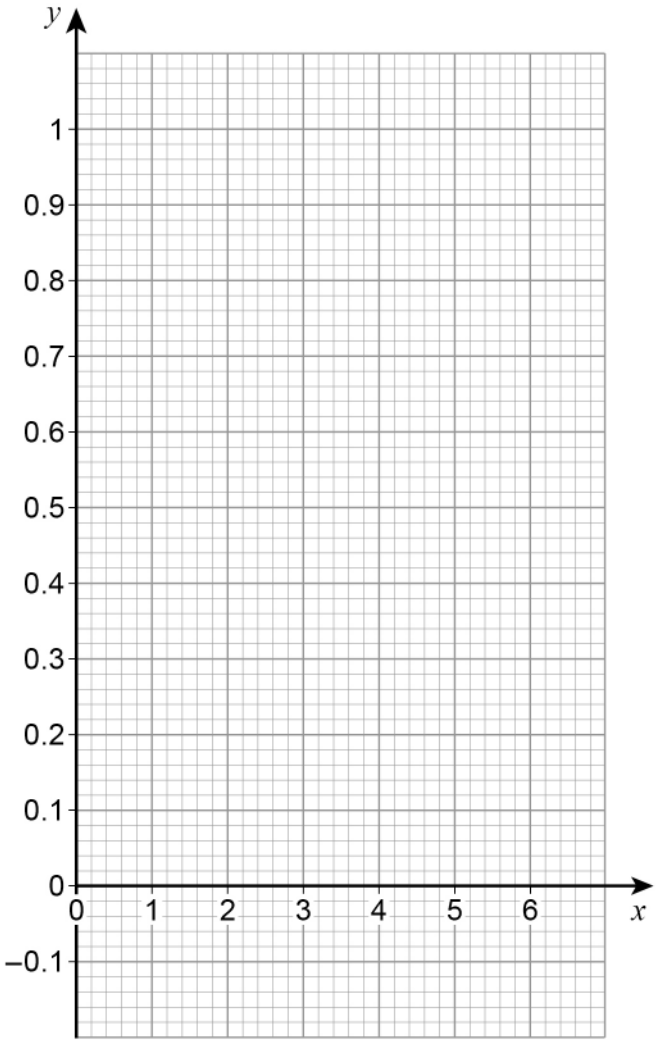
7

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.

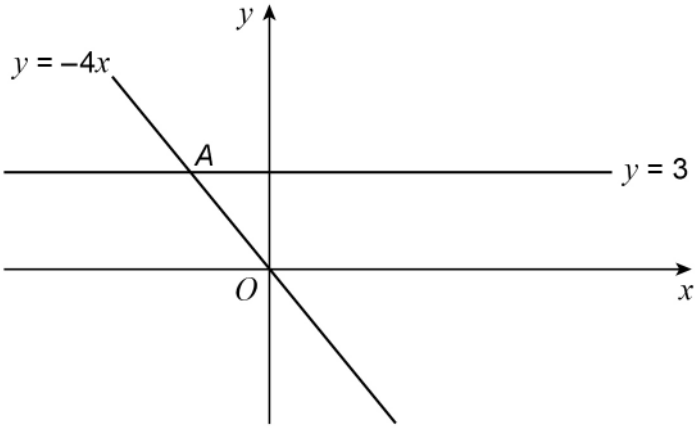
Carly has four times as many beads as Billy.

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.

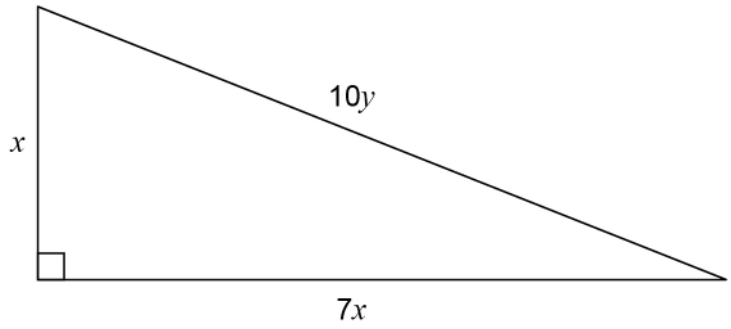
[1 mark]

(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

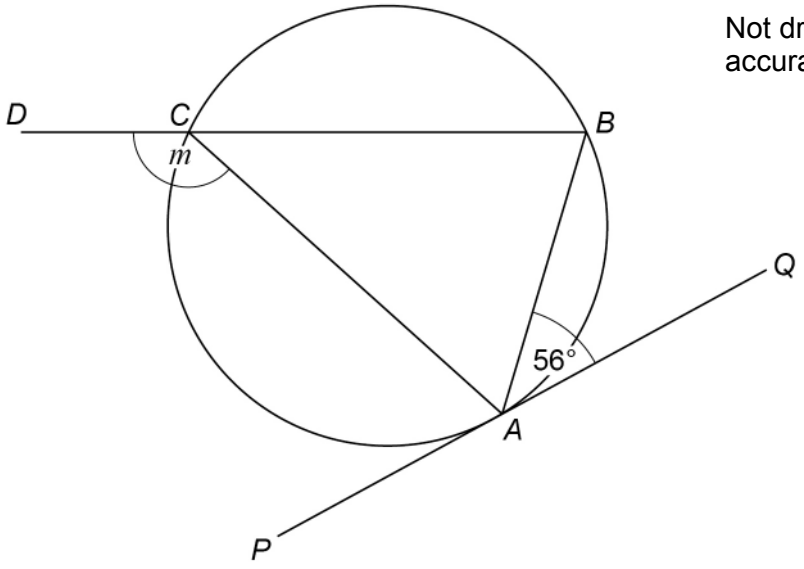
Turn over for the next question

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

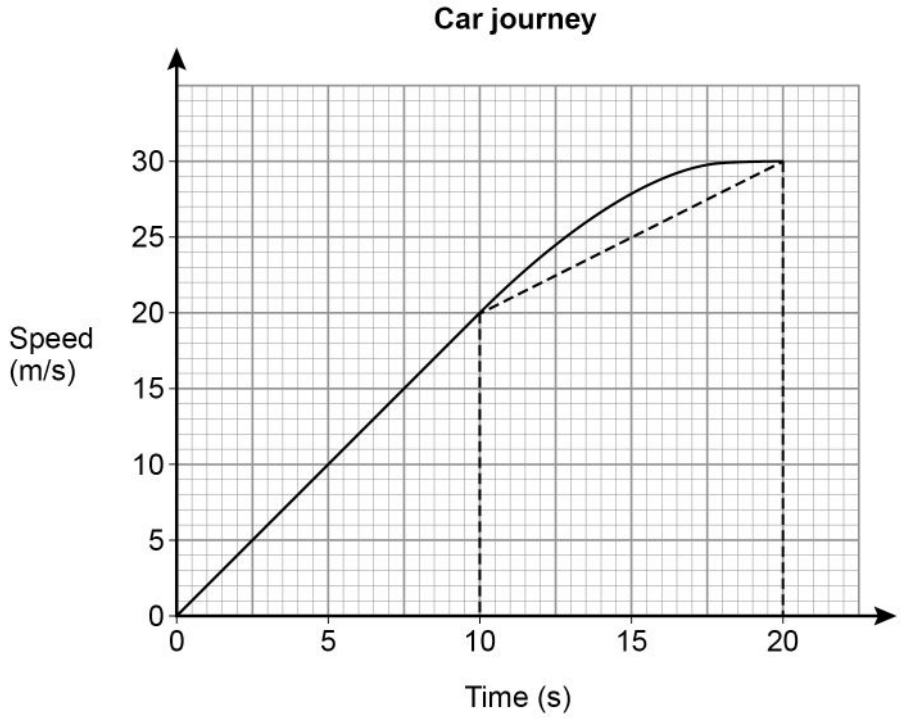
3

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

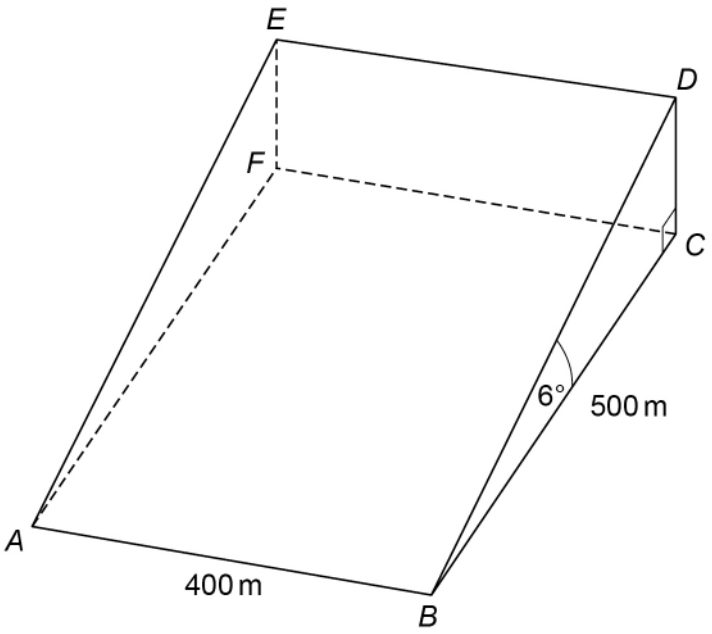
Turn over for the next question

4

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

ABCF is the horizontal rectangular base.

D is vertically above *C*.



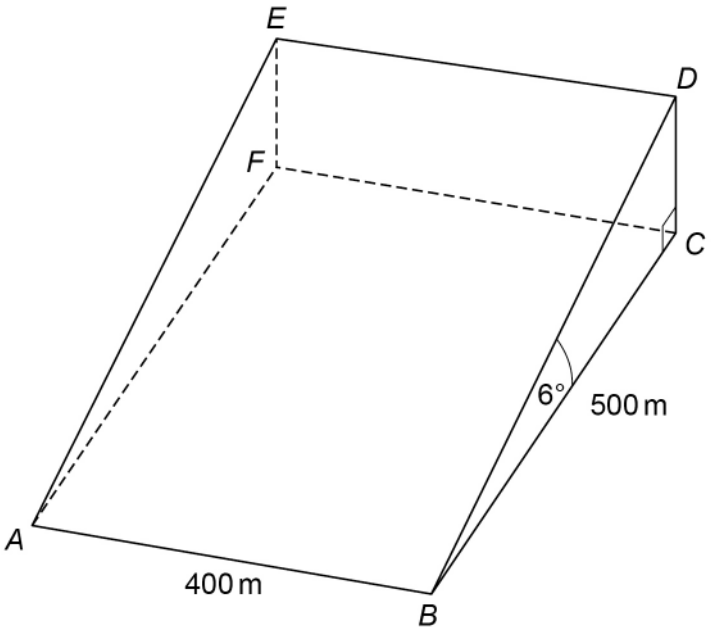
25 (a) Work out the height *CD*.

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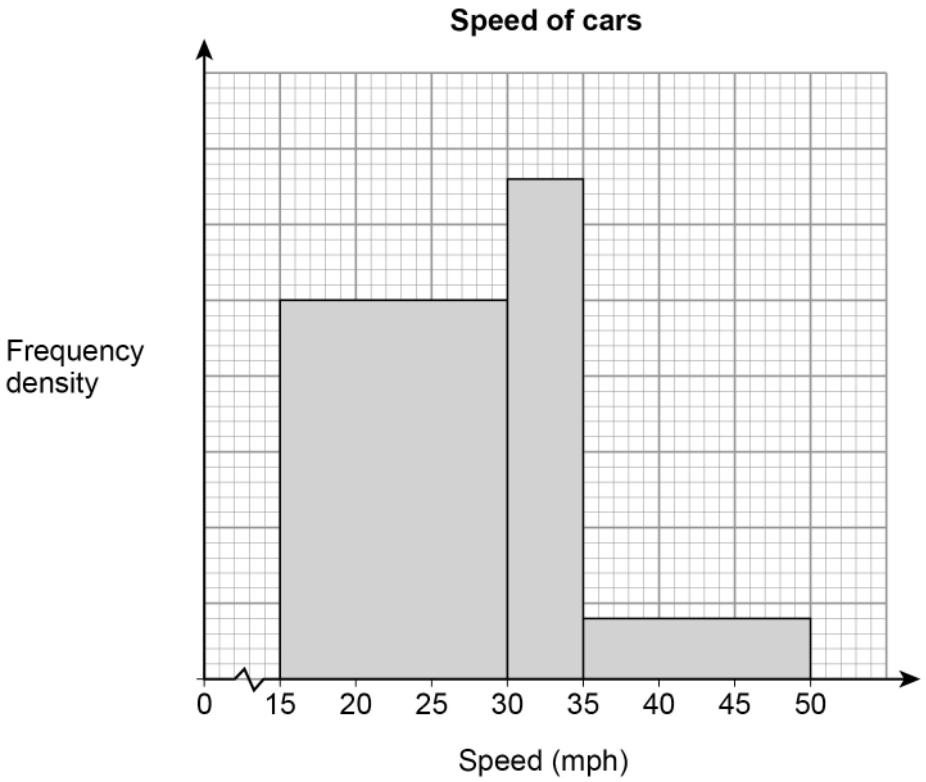
26 The histogram shows information about the speed of cars as they pass a checkpoint.

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]

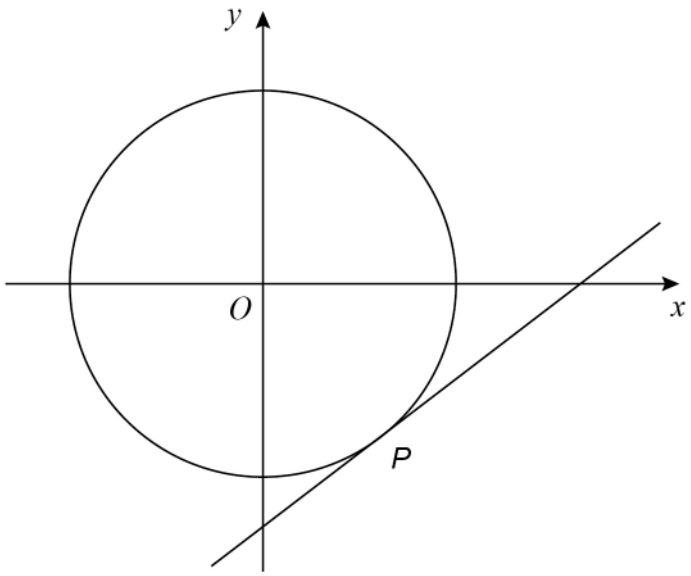
Answer _____

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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