

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

GCSE MATHEMATICS

H

Higher Tier

Paper 3 Calculator

Tuesday 12 June 2018

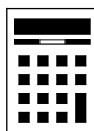
Morning

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	



J U N 1 8 8 3 0 0 3 H 0 1

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 $-2 < x \leq 4$ **[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]**

 $3.\dot{2}7$

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 _____

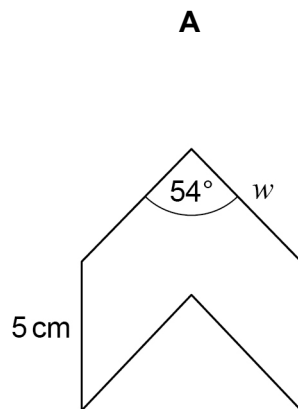
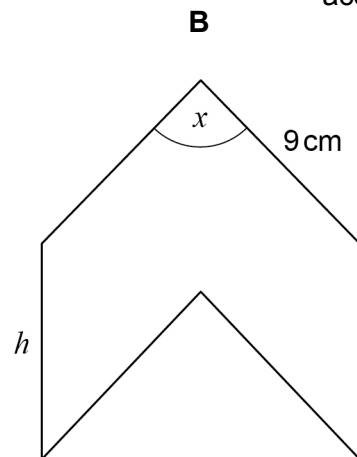
Turn over for the next question



6

A and B are similar shapes.

B is an enlargement of A with scale factor 1.5

Not drawn
accuratelyWork out the values of x , h and w .**[3 marks]**

 $x =$ _____ degrees $h =$ _____ cm $w =$ _____ cm

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



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

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

[2 marks]

Answer

$$\left(\right)$$

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

Turn over for the next question

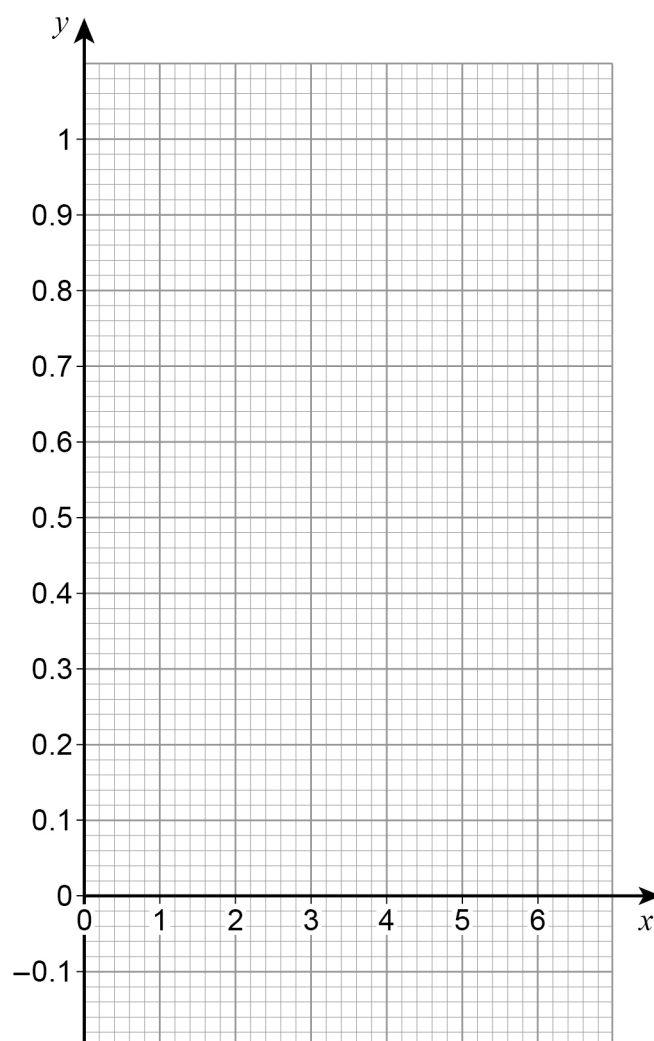
Turn over ►



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							



- 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]**

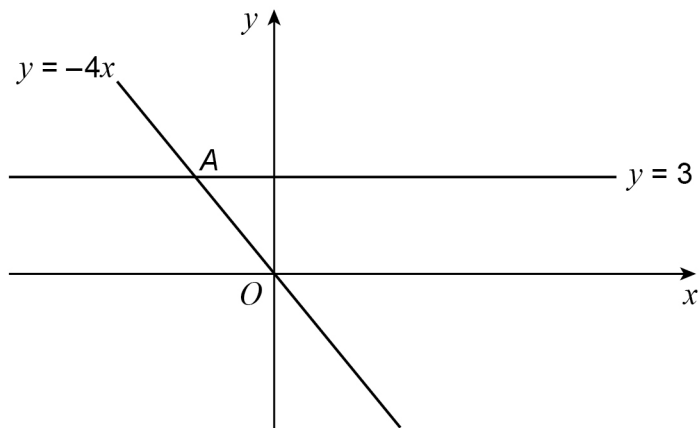
$4x + 3$

$3x + 4$

$4(x + 3)$

$x + 12$

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



Circle the coordinates of A.

[1 mark]

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

$(-4, 3)$

$(-12, 3)$

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



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 _____



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)

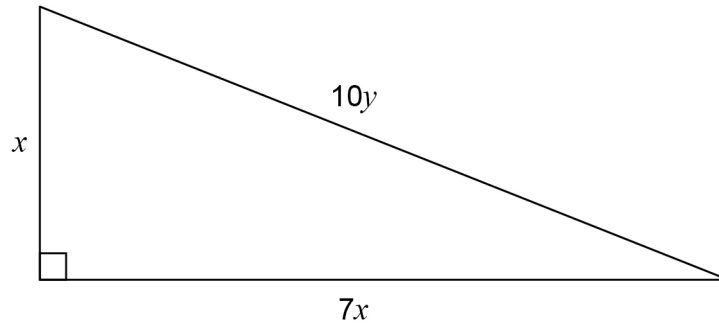
(0, 12)

(8, 0)



20

All dimensions are in centimetres.

Not drawn
accuratelyUse Pythagoras' theorem to work out the exact value of $\frac{x}{y}$ **[3 marks]**

Answer _____



- 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

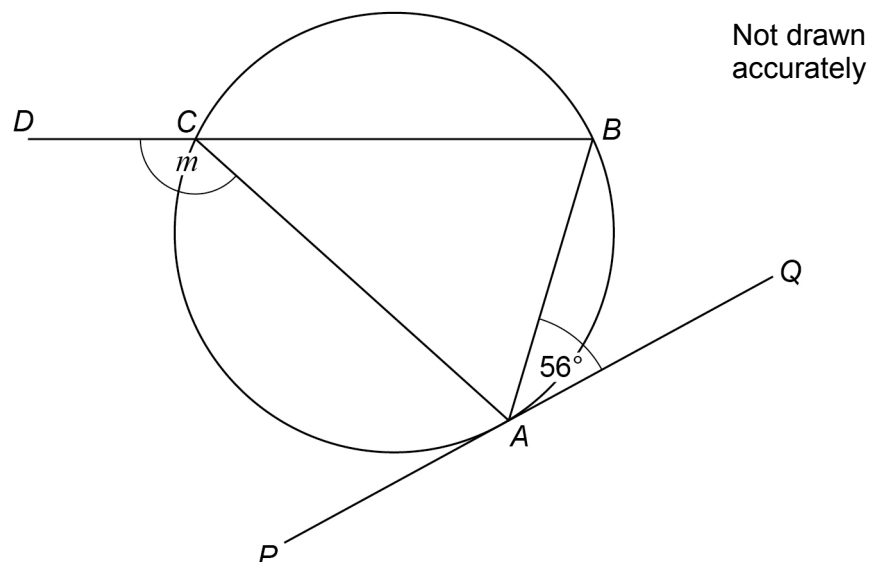


22

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.

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

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]



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]

$$u_2 = \underline{\hspace{10cm}}$$

$$u_3 = \underline{\hspace{10cm}}$$

Turn over for the next question

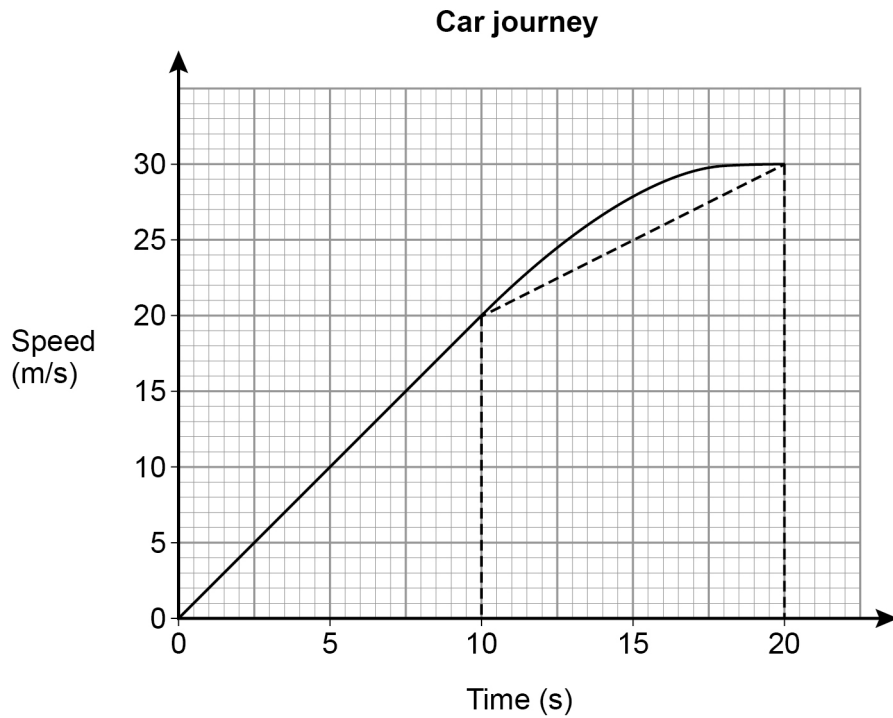


24

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



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

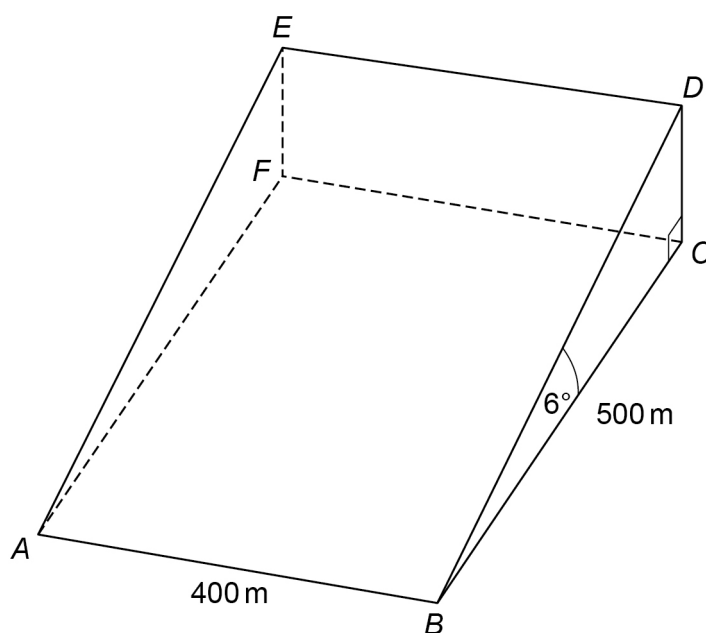
☐

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

Turn over for the next question



- 25** $ABCDEF$ is a triangular prism which represents part of a hill.
 $ABCF$ is the horizontal rectangular base.
 D is vertically above C .



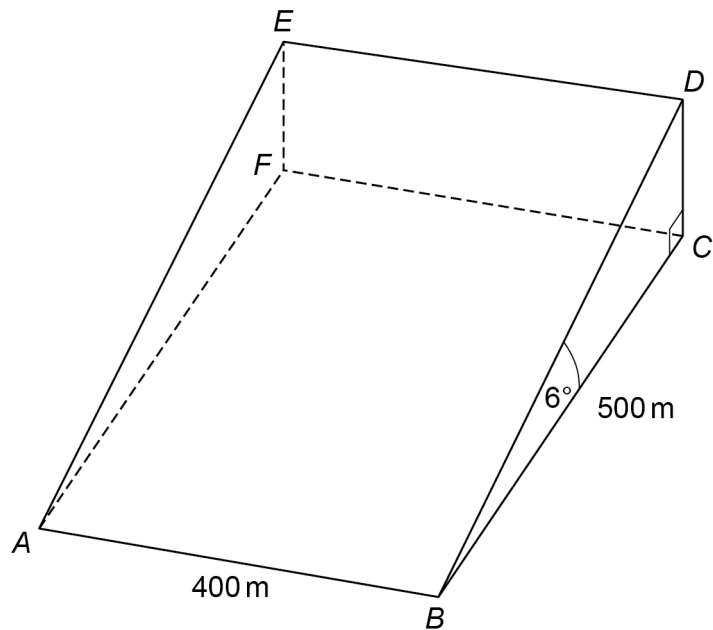
- 25 (a)** Work out the height CD .

[2 marks]

Answer _____ m



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



Work out the size of angle DAC .

You **must** show your working.

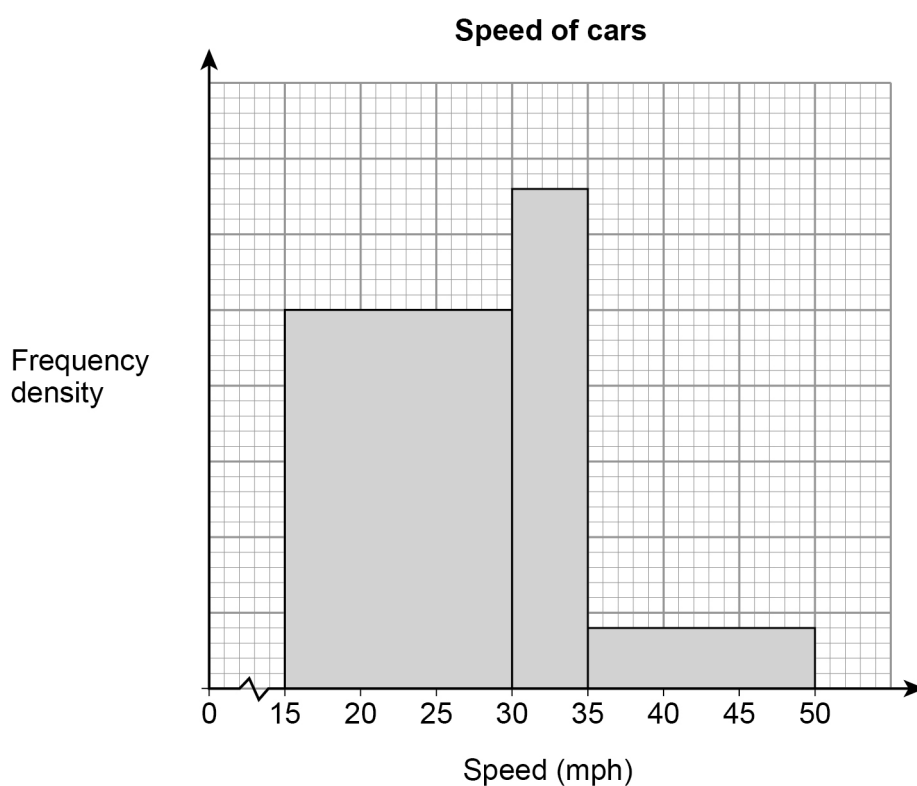
[4 marks]

Answer _____ degrees



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 _____



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



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 _____

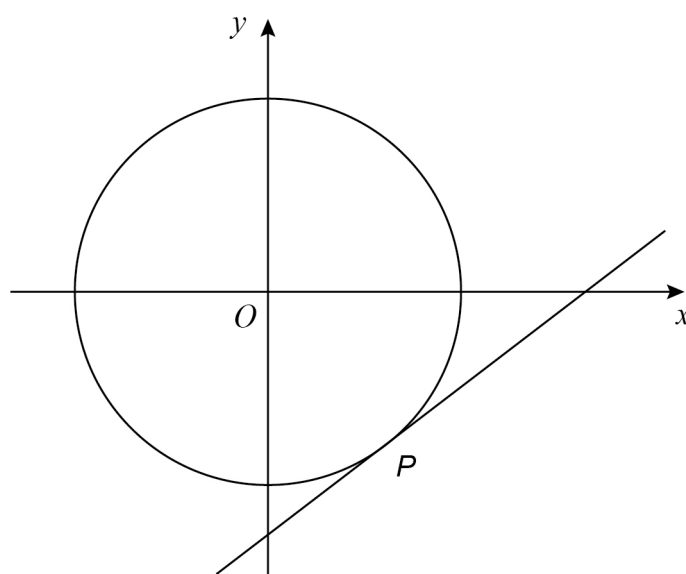


28

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



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