

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

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Forename(s)

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Candidate signature

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# GCSE MATHEMATICS

# H

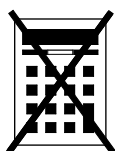
Higher Tier Paper 1 Non-Calculator

Thursday 2 November 2017 Morning Time allowed: 1 hour 30 minutes

## Materials

For this paper you must have:

- mathematical instruments



You must **not** use a calculator.

## 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 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.

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	
26–27	
<b>TOTAL</b>	

## Advice

- In all calculations, show clearly how you work out your answer.



N 0 V 1 7 8 3 0 0 1 H 0 1

Answer **all** questions in the spaces provided

- 1 Work out  $\sqrt{2^6 + 6^2}$   
Circle your answer.

**[1 mark]**

10

14

50

100

- 2 What is 800 million in standard form?  
Circle your answer.

**[1 mark]** $800 \times 10^6$  $8 \times 10^8$  $8 \times 10^9$  $0.8 \times 10^{10}$ 

- 3 Circle the expression that is equivalent to  $(4a^5)^2$

**[1 mark]** $16a^{10}$  $16a^7$  $8a^{10}$  $8a^7$ 

4  $y = \frac{10}{x}$

If the value of  $x$  doubles, what happens to the value of  $y$ ?

Circle your answer.

[1 mark]

$\div 2$

$\times 2$

$\div 5$

$\times 5$

5 (a) Factorise  $x^2 - 100$

[1 mark]

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Answer \_\_\_\_\_

5 (b) Solve  $7x + 6 > 1 + 2x$

[2 marks]

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Answer \_\_\_\_\_

7
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Turn over ►



6 Work out the value of  $(\sqrt{3})^2 \times (\sqrt{2})^2$

[2 marks]

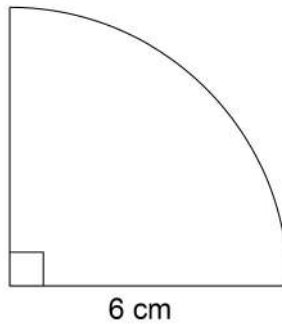
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Answer \_\_\_\_\_

7 Here is a quarter circle of radius 6 cm



Not drawn  
accurately

Work out the area of the quarter circle.

Give your answer in terms of  $\pi$ .

[2 marks]

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Answer \_\_\_\_\_  $\text{cm}^2$



8 Three **whole** numbers are each rounded to the nearest 10

The sum of the rounded numbers is 70

Work out the **maximum** possible sum for the original three numbers.

[2 marks]

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Answer \_\_\_\_\_

9 Circle the expression for the range of  $n$  consecutive integers.

[1 mark]

$$\frac{n+1}{2}$$

$$n-1$$

$$n$$

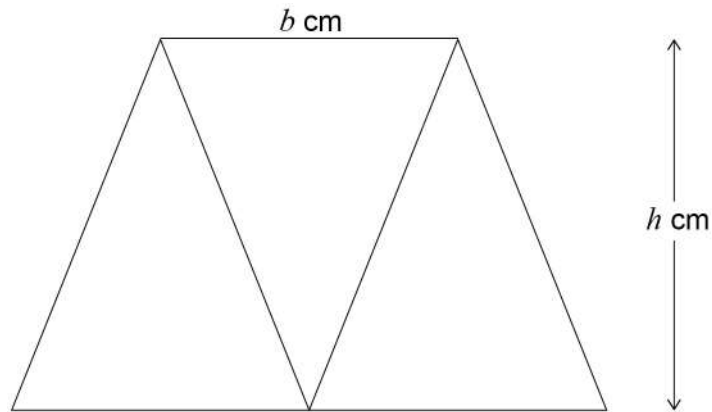
$$n+1$$

Turn over for the next question

Turn over ►



- 10** Three identical isosceles triangles are joined to make this trapezium.  
Each triangle has base  $b$  cm and perpendicular height  $h$  cm



- 10 (a)** Work out an expression, in terms of  $b$  and  $h$ , for the area of the trapezium.  
Give your answer in its simplest form.

**[2 marks]**

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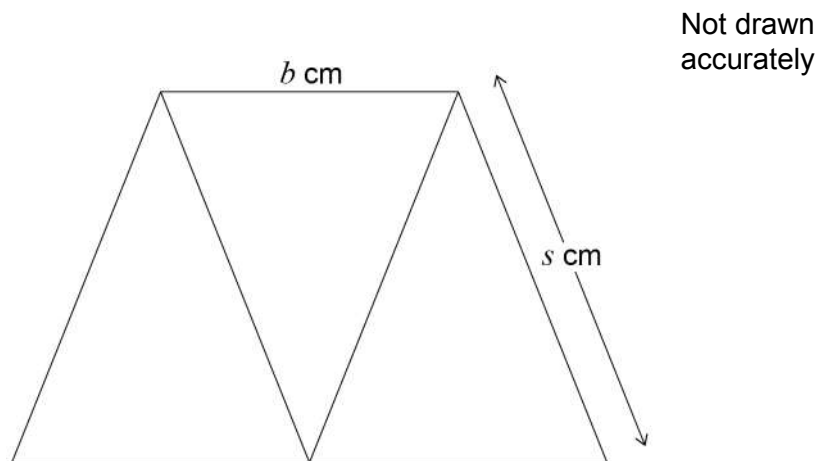
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Answer \_\_\_\_\_  $\text{cm}^2$



10 (b) This diagram shows the same trapezium.



$$b : s = 2 : 3$$

Work out an expression, in terms of  $b$ , for the perimeter of the trapezium.

[2 marks]

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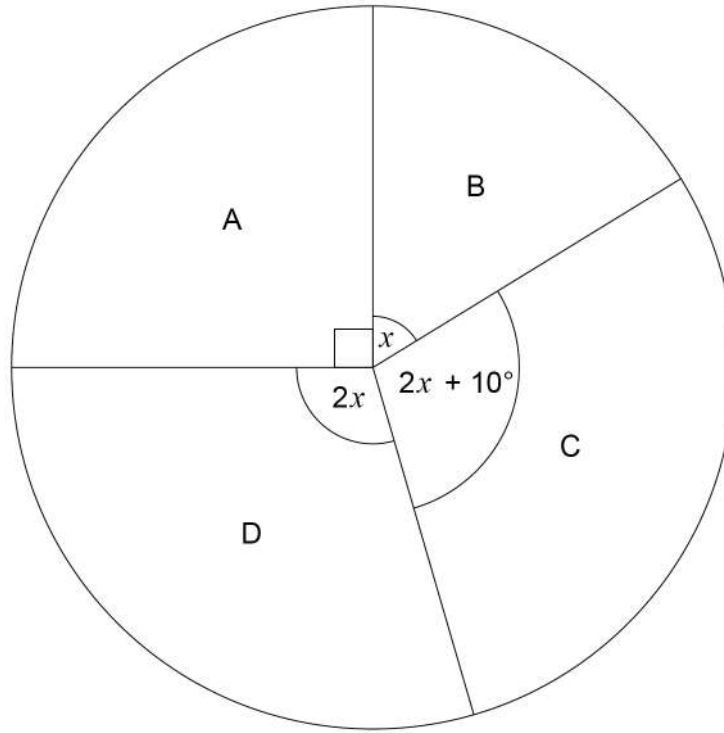
Answer \_\_\_\_\_ cm

Turn over for the next question



- 11 The four candidates in an election were A, B, C and D.  
The pie chart shows the proportion of votes for each candidate.

Proportion of votes

Not drawn  
accurately

Work out the probability that a person who voted, chosen at random, voted for C.

[4 marks]

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Answer \_\_\_\_\_





12 Use approximations to 1 significant figure to estimate the value of

$$\frac{0.526 \times 39.6^2}{\sqrt{97.65}}$$

You **must** show your working.

[3 marks]

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Answer \_\_\_\_\_

Turn over for the next question

7

Turn over ►



13

$$x : y = 7 : 4$$

$$x + y = 88$$

Work out the value of  $x - y$

**[3 marks]**

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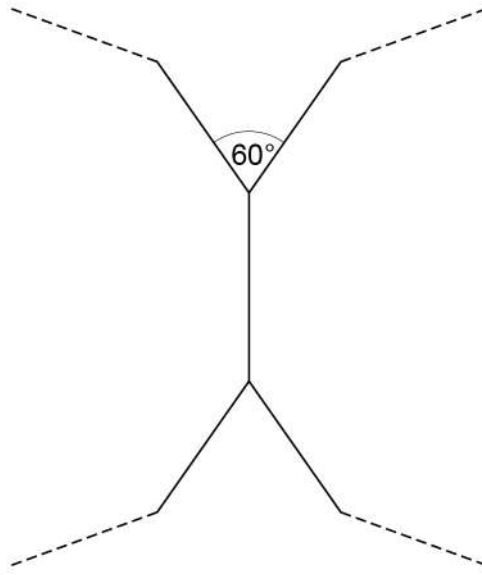
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Answer \_\_\_\_\_



- 14** Two congruent regular polygons are joined together.



Not drawn  
accurately

Work out the number of sides on each polygon.

**[3 marks]**

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Answer \_\_\_\_\_

**Turn over for the next question**



15

**Meal Deal**

Choose one sandwich, one drink and one snack

There are

7 different sandwiches

5 different drinks

and

3 different snacks.

**15 (a)** How many different Meal Deal combinations are there?**[2 marks]**

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Answer \_\_\_\_\_

**15 (b)** Two of the sandwiches have cheese in them.

Three of the drinks are fizzy.

Eva picks a Meal Deal at random.

Work out the probability that the sandwich has cheese in it **and** the drink is fizzy.

Give your answer as a fraction.

**[2 marks]**

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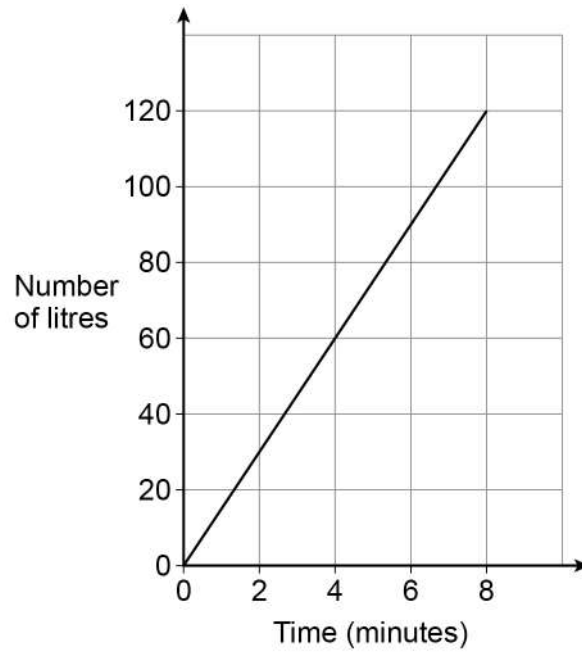
Answer \_\_\_\_\_



16

Water is poured into a tank.

The graph shows the number of litres of water in the tank.



How much water is poured into the tank each minute?

Circle your answer.

[1 mark]

1.5 litres

15 litres

30 litres

120 litres

Turn over for the next question

Turn over ►



17 A and B are **similar** solids.

Solid	length (cm)
A	$l$
B	$2l$

Alex says,

“The volume of B is double the volume of A  
because the length of B is double the length of A.”

Is he correct?

Tick a box.

Yes

No

Give a reason for your answer.

[1 mark]

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18 Circle the **two** roots of  $(2x + 3)(5x - 2) = 0$

[1 mark]

$$-\frac{3}{2}$$

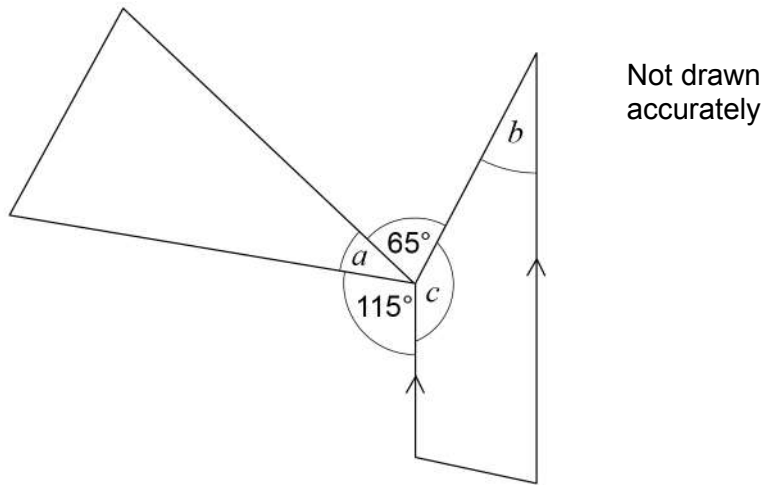
$$-\frac{2}{5}$$

$$\frac{2}{5}$$

$$\frac{3}{2}$$



- 19 The diagram shows a triangle and a trapezium.



Prove that  $a = b$

[3 marks]

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Turn over for the next question

Turn over ►



20

In one month, the number of hours of exercise taken by 10 people are

4 7 2 8 6 5 1 82 3 9

Which is the appropriate average to use in this situation?

Tick a box.

Mean

Median

Mode

Give one reason for each of the other two averages as to why they are **not** appropriate.

[2 marks]

Reason 1 \_\_\_\_\_

\_\_\_\_\_

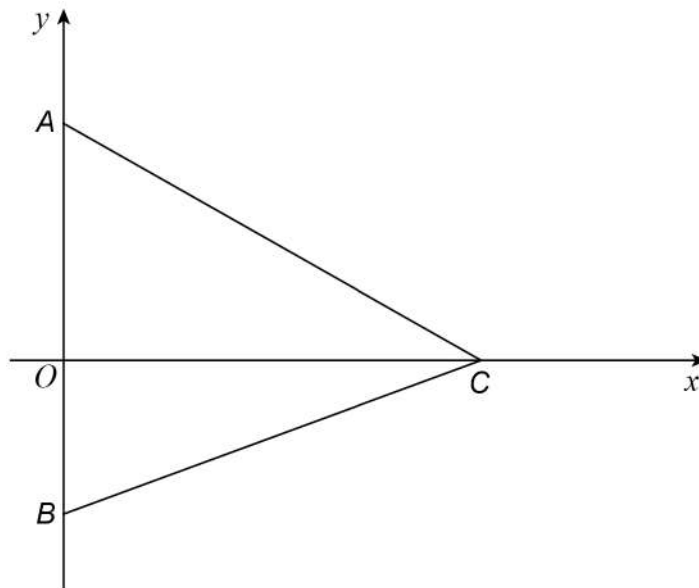
Reason 2 \_\_\_\_\_

\_\_\_\_\_





21  $A$ ,  $B$  and  $C$  are points on the axes as shown.



Not drawn  
accurately

The area of triangle  $ABC$  is 28 square units.

Work out possible coordinates for  $A$ ,  $B$  and  $C$ .

[2 marks]

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$A$  ( \_\_\_\_\_ , \_\_\_\_\_ )     $B$  ( \_\_\_\_\_ , \_\_\_\_\_ )     $C$  ( \_\_\_\_\_ , \_\_\_\_\_ )

Turn over for the next question

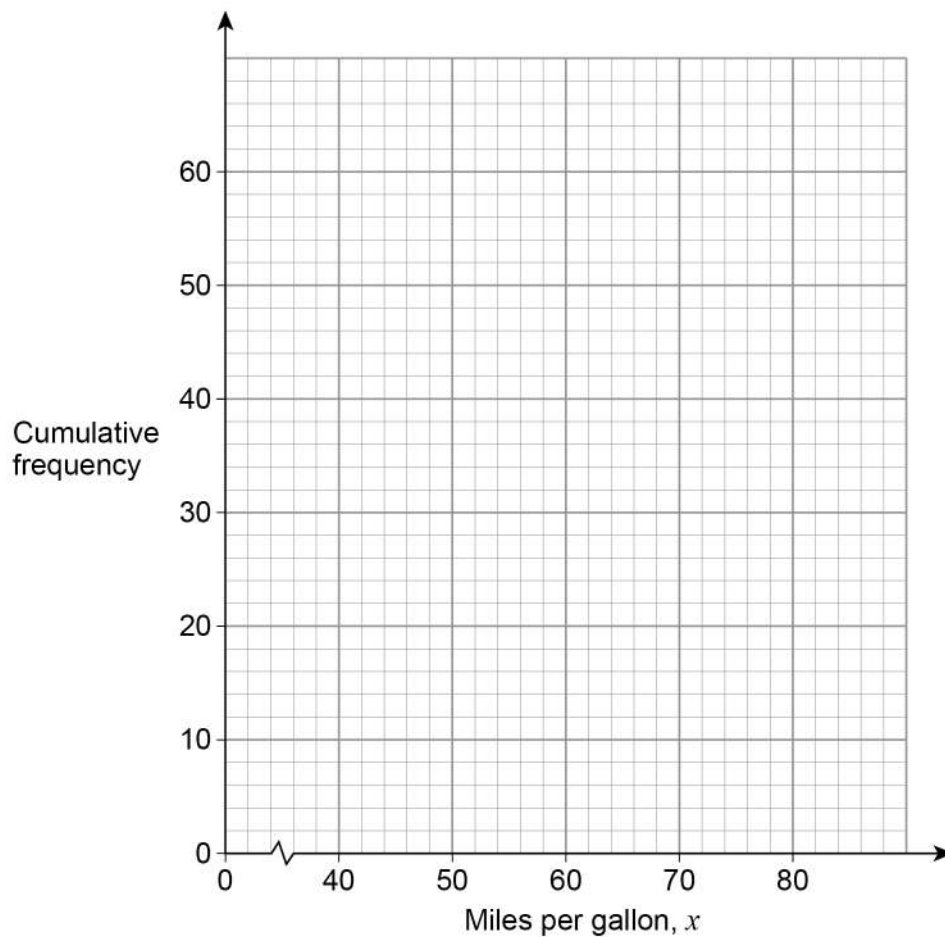


**22** Here is some information about the miles per gallon of 60 cars.

Miles per gallon, $x$	Frequency		
$40 < x \leq 50$	6		
$50 < x \leq 60$	16		
$60 < x \leq 70$	28		
$70 < x \leq 80$	10		

**22 (a)** Draw a cumulative frequency graph.

**[3 marks]**



22 (b) Use the graph to work out the interquartile range.

[2 marks]

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Answer \_\_\_\_\_ miles per gallon

23 The equation of a curve is  $y = (x + 3)^2 + 5$

Circle the coordinates of the turning point.

[1 mark]

(5, 3)

(5, -3)

(3, 5)

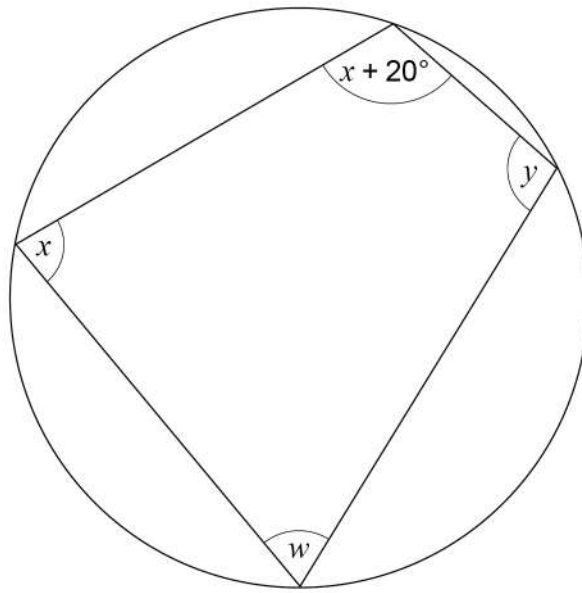
(-3, 5)

Turn over for the next question



24

Here is a cyclic quadrilateral.

Not drawn  
accurately

$$x : y = 5 : 7$$

Work out the size of angle  $w$ .**[4 marks]**

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Answer \_\_\_\_\_ degrees



**25**

15 machines work at the same rate.

Together, the 15 machines can complete an order in 8 hours.

3 of the machines break down after working for 6 hours.

The other machines carry on working until the order is complete.

In total, how many hours does **each** of the other machines work?

**[3 marks]**

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Answer \_\_\_\_\_ hours

**Turn over for the next question**

7

**Turn over ►**



**26 (a)**  $0.\dot{7} = \frac{7}{9}$

Use this fact to show that  $0.0\dot{7} = \frac{7}{90}$

**[1 mark]**

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**26 (b)** Using part (a) or otherwise, convert  $0.2\dot{7}$  to a fraction.  
Give your answer in its simplest form.

**[3 marks]**

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Answer \_\_\_\_\_



27

There are 11 pens in a box.

8 are black and 3 are red.

Two pens are taken out at random **without** replacement.

Work out the probability that the two pens are the **same** colour.

**[4 marks]**

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Answer \_\_\_\_\_

8
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**Turn over ►**

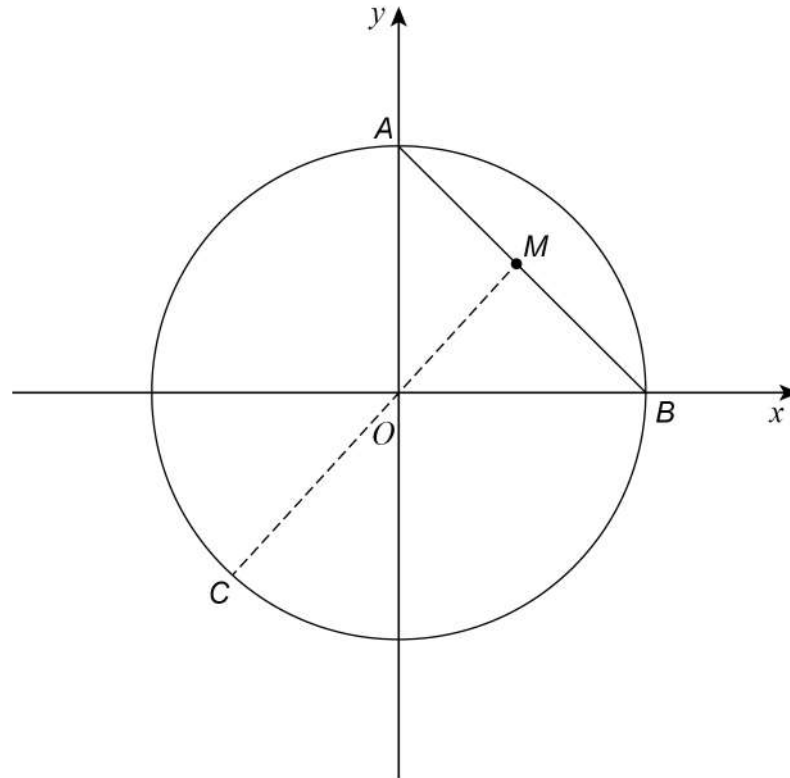
**28**  $A$ ,  $B$  and  $C$  are points on the circle  $x^2 + y^2 = 36$  as shown.

$A$  is on the  $y$ -axis.

$B$  is on the  $x$ -axis.

$M$  is the midpoint of  $AB$ .

$COM$  is a straight line.



**28 (a)** Show that the coordinates of  $A$  are  $(0, 6)$

[1 mark]

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**28 (b)** Work out the coordinates of  $B$ .

[1 mark]

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Answer ( \_\_\_\_\_ , \_\_\_\_\_ )





**28 (c)** Show that the equation of the straight line passing through  $C$ ,  $O$  and  $M$  is  $y = x$

**[2 marks]**

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**28 (d)** Work out the coordinates of  $C$ .  
Give your answers in surd form.

**[3 marks]**

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Answer ( \_\_\_\_\_ , \_\_\_\_\_ )

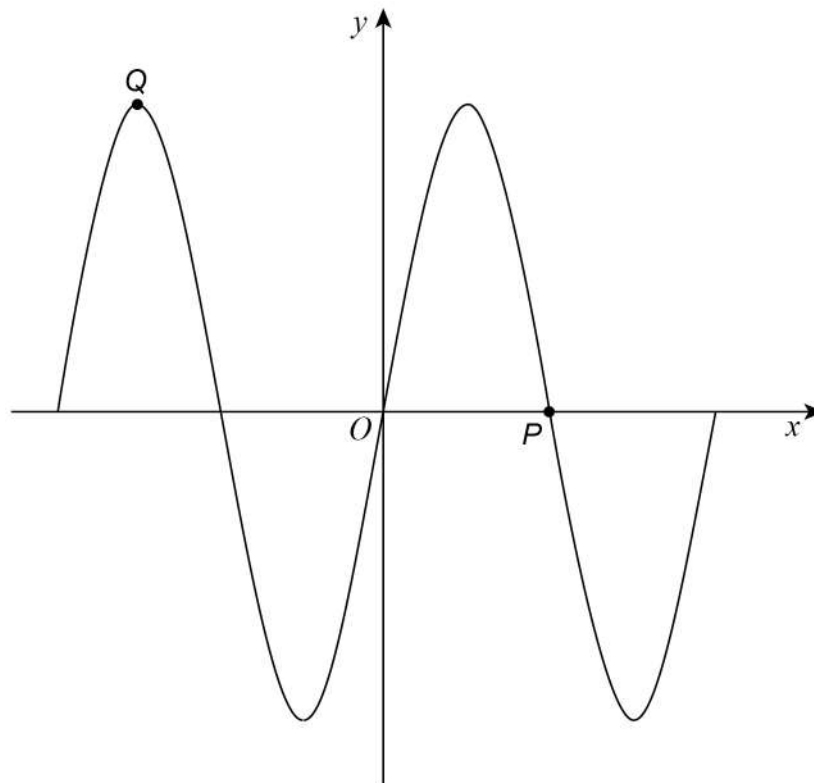
**Turn over for the next question**

7

**Turn over ►**



29 Here is a sketch of  $y = \sin x^\circ$  for  $-360 \leq x \leq 360$



29 (a) Write down the coordinates of  $P$ .

[1 mark]

Answer ( \_\_\_\_\_ , \_\_\_\_\_ )

29 (b) Write down the coordinates of  $Q$ .

[1 mark]

Answer ( \_\_\_\_\_ , \_\_\_\_\_ )



30 (a) Work out the value of  $81^{-\frac{1}{4}}$

[2 marks]

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Answer \_\_\_\_\_

30 (b) Write  $16 \times 8^{2x}$  as a power of 2 in terms of  $x$ .

[3 marks]

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Answer \_\_\_\_\_

**END OF QUESTIONS**



**There are no questions printed on this page**

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