Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

GCSE
MATHEMATICS

H

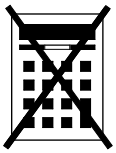
Higher Tier Paper 1 Non-Calculator

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.

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	
26–27	
TOTAL	

Do not write outside the box

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]

800×10^6 8×10^8 8×10^9 0.8×10^{10}

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

[1 mark]

$16a^{10}$ $16a^7$ $8a^{10}$ $8a^7$

Do not write outside the box

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

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

Circle your answer.

[1 mark]

÷ 2 × 2 ÷ 5 × 5

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

[1 mark]

Answer _____

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

[2 marks]

Answer _____

7

Turn over ►

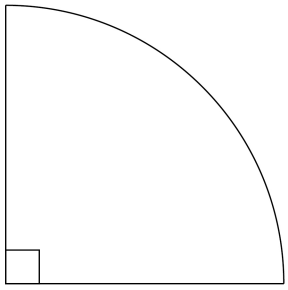
Do not write outside the box

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

[2 marks]

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 π.

[2 marks]

Answer _____ cm^2

Do not write outside the box

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]

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

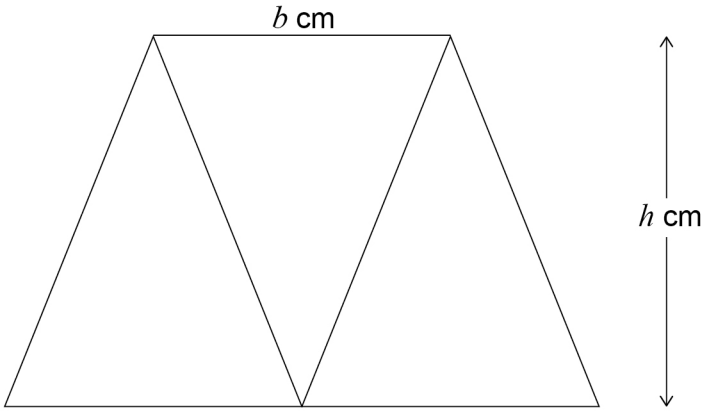
7

Do not write outside the box

10 Three identical isosceles triangles are joined to make this trapezium.

Each triangle has base b cm and perpendicular height h cm

Not drawn accurately



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.

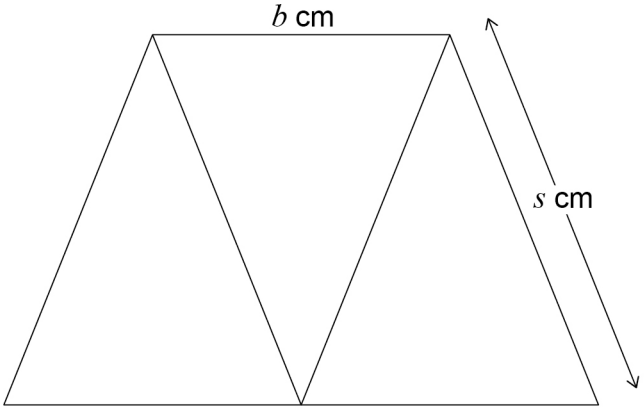
[2 marks]

Answer _____ cm^2

Do not write outside the box

10 (b) This diagram shows the same trapezium.

Not drawn accurately



$b : s = 2 : 3$

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

[2 marks]

Answer _____ cm

Turn over for the next question

4

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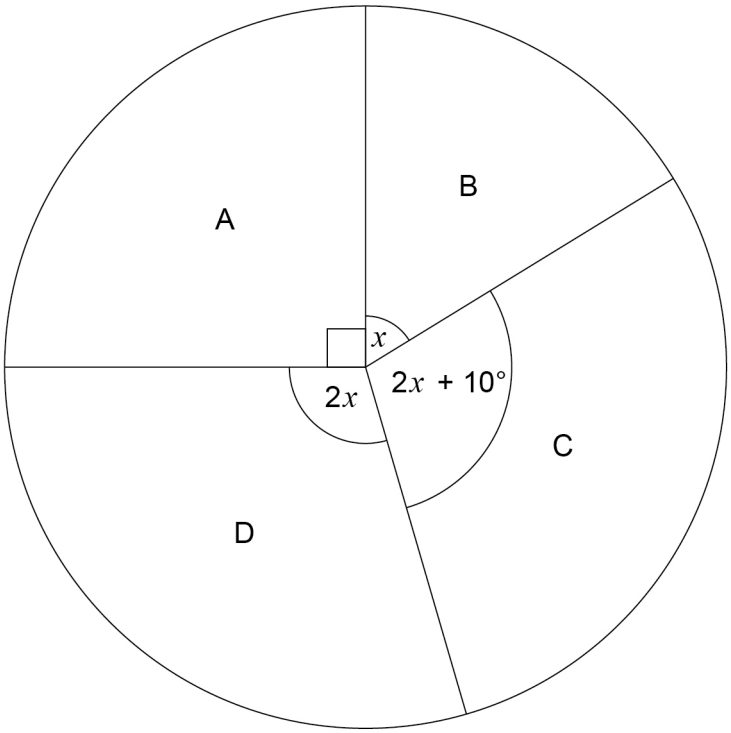
11 The four candidates in an election were A, B, C and D.

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]

Answer _____

Do not write outside the box

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]

Answer _____

Turn over for the next question

7

Do not write outside the box

13 $x : y = 7 : 4$

$x + y = 88$

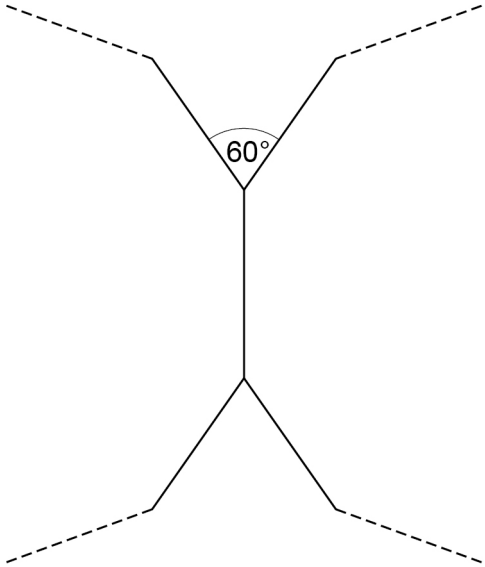
Work out the value of $x - y$

[3 marks]

Answer _____

Do not write outside the box

14 Two congruent regular polygons are joined together.



Not drawn accurately

Work out the number of sides on each polygon.

[3 marks]

Answer _____

Turn over for the next question

6

Do not write outside the box

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]

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.

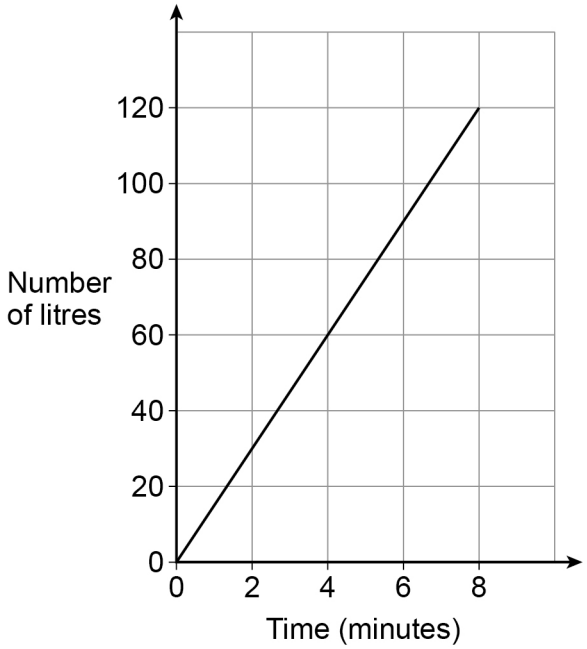
[2 marks]

Answer _____

Do not write outside the box

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

5

Do not write outside the box

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]

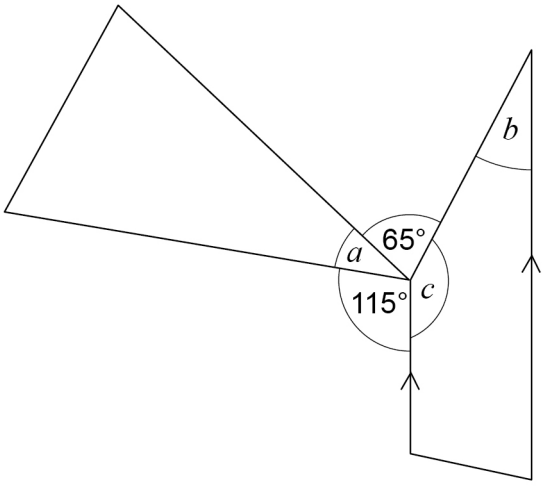
18 Circle the **two** roots of $(2x + 3)(5x - 2) = 0$

[1 mark]

$-\frac{3}{2}$ $-\frac{2}{5}$ $\frac{2}{5}$ $\frac{3}{2}$

Do not write outside the box

19 The diagram shows a triangle and a trapezium.



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Prove that $a = b$

[3 marks]

Turn over for the next question

5

Do not write outside the box

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 _____

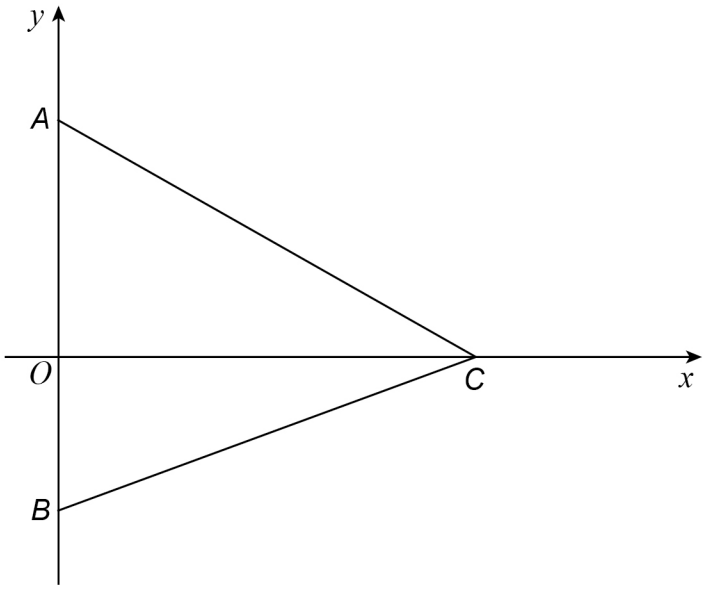
_____

Reason 2 _____

_____

Do not write outside the box

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



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

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

[2 marks]

_____

_____

_____

_____

A (_____ , _____) *B* (_____ , _____) *C* (_____ , _____)

Turn over for the next question

4

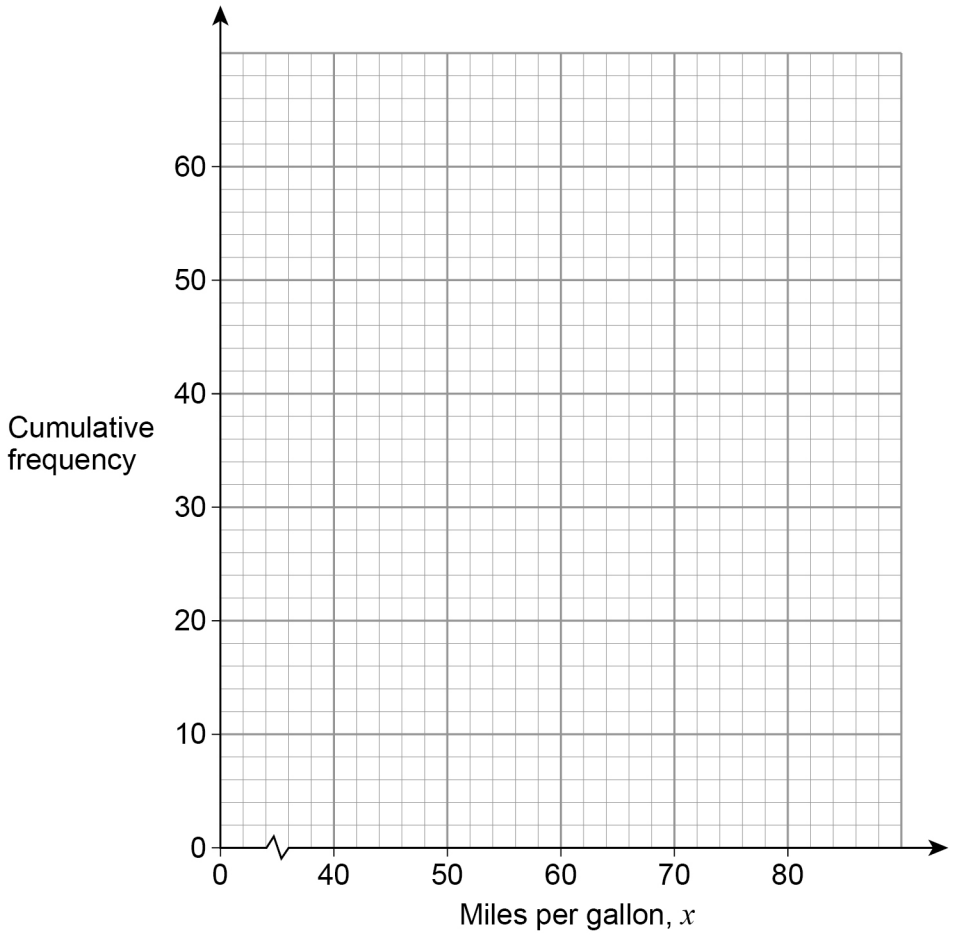
Do not write outside the box

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

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

22 (a) Draw a cumulative frequency graph.

[3 marks]



Do not write outside the box

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

[2 marks]

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]

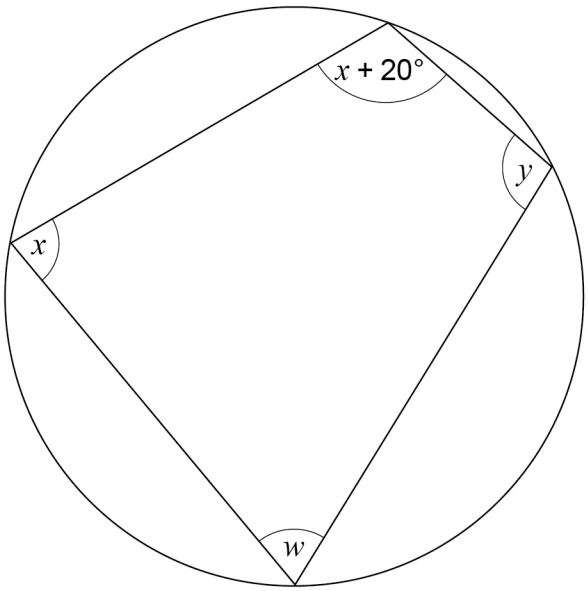
(5, 3) (5, –3) (3, 5) (–3, 5)

Turn over for the next question

6

Do not write outside the box

24 Here is a cyclic quadrilateral.



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$x : y = 5 : 7$

Work out the size of angle w.

[4 marks]

Answer _____ degrees

Do not write outside the box

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]

Answer _____ hours

Turn over for the next question

7

Do not write outside the box

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

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

[1 mark]

26 (b) Using part (a) or otherwise, convert $0.2\dot{7}$ to a fraction.

Give your answer in its simplest form.

[3 marks]

Answer _____

Do not write outside the box

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]

Answer _____

8

Do not write outside the box

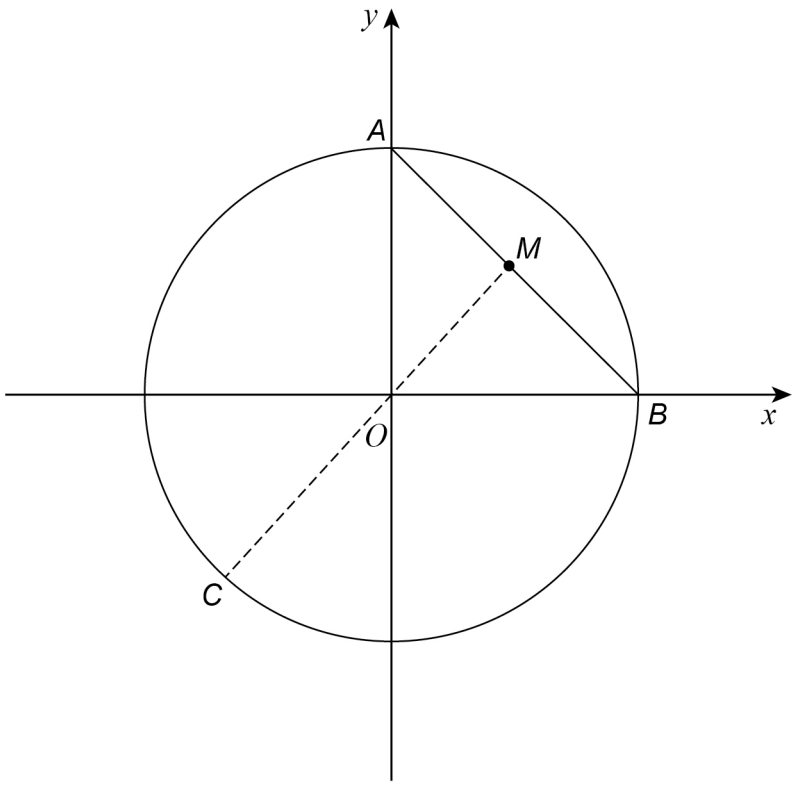
28 *A, B* and *C* are points on the circle $x^2 + y^2 = 36$ as shown.

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]

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

[1 mark]

Answer (_____ , _____)

Do not write outside the box

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

[2 marks]

28 (d) Work out the coordinates of C.

Give your answers in surd form.

[3 marks]

Answer (_____ , _____)

Turn over for the next question

7

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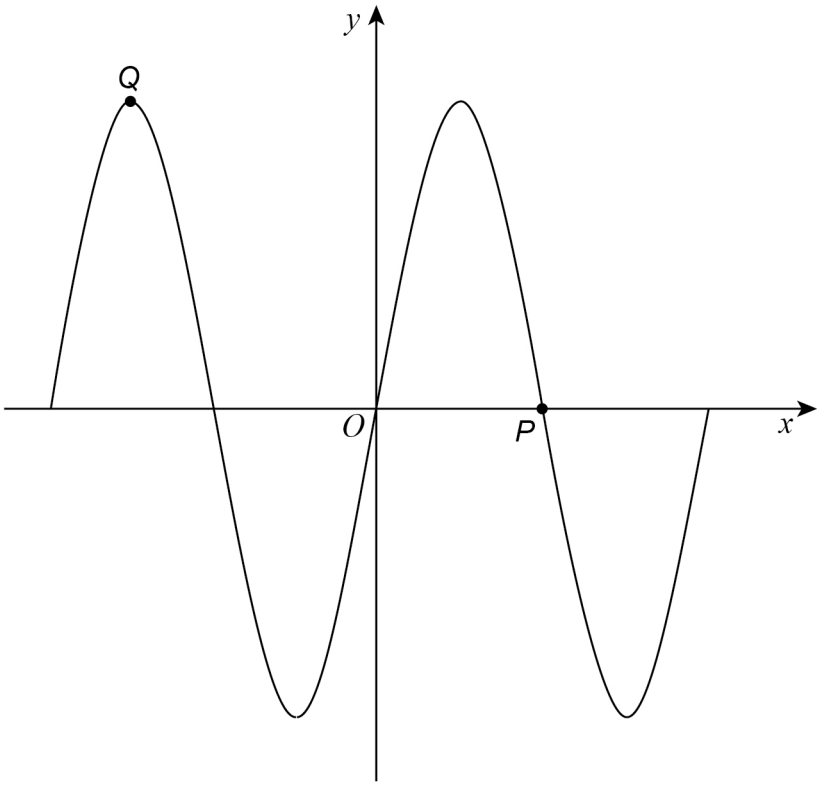
29 Here is a sketch of $y = \sin x°$ for $-360 \leqslant x \leqslant 360$



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

[1 mark]

Answer (_____ , _____)

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

[1 mark]

Answer (_____ , _____)

Do not write outside the box

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

[2 marks]

Answer _____

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

[3 marks]

Answer _____

END OF QUESTIONS

7

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There are no questions printed on this page

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