AQA

Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

GCSE MATHEMATICS (LINEAR)

H

Higher Tier Paper 1

Wednesday 4 November 2015 Morning Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- mathematical instruments.

You must **not** use a calculator.

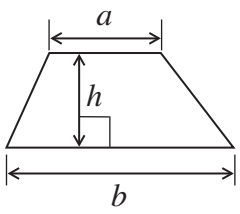
Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 70.
- The quality of your written communication is specifically assessed in Questions 3, 6 and 13. These questions are indicated with an asterisk (*).
- You may ask for more answer paper, tracing paper and graph paper. These must be tagged securely to this answer book.

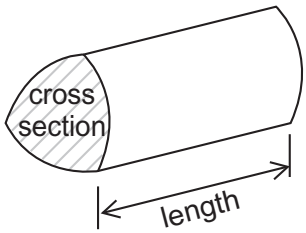
Advice
- In all calculations, show clearly how you work out your answer.

Formulae Sheet: Higher Tier

Area of trapezium = $\frac{1}{2}(a+b)h$

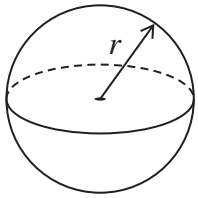


Volume of prism = area of cross section × length



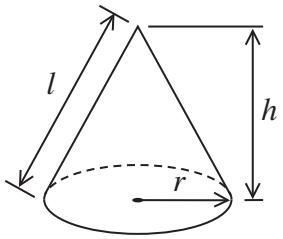
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

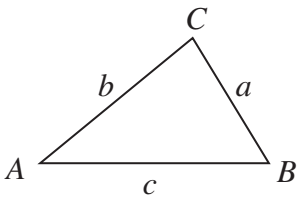
Curved surface area of cone = $\pi r l$



In any triangle ABC

Area of triangle = $\frac{1}{2}ab\sin C$

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$



Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Answer **all** questions in the spaces provided.

1 Divide 270 in the ratio 3 : 2 : 1

[3 marks]

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Answer ..... : ..... : .....

2 Solve $\frac{4x - 1}{7} = 2x$

[3 marks]

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x = ...

Turn over for the next question

6

***3** Three shops sell the same washing machine.

Shop A	**Shop B**	**Shop C**
		
£150 deposit plus £60 a month for 6 months	Usual price £600 20% off	Usual price £720 $\frac{1}{4}$ off

In which shop is the washing machine cheapest?
You **must** show your working.

[5 marks]

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Answer .....

4 A shape is made from a rectangle R and a square S.

Not drawn accurately

The shape has a perimeter of 44 cm
The area of the square is 36 cm^2

Work out the area of the shape.

[4 marks]

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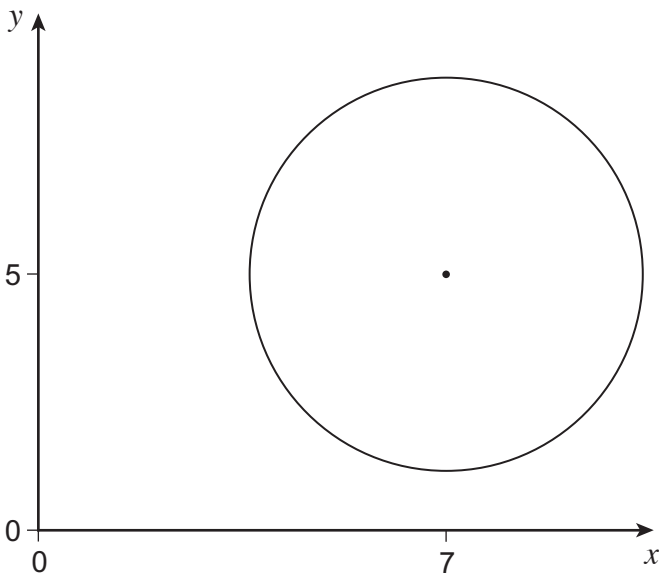
Answer ..... cm^2

Turn over for the next question

9

5 A circle radius 3 units, centre (7, 5) is shown.



Not drawn accurately

Work out the coordinates of **any** point that lies on the circumference of the circle.
You **must** show your working, which may be on the diagram.

[2 marks]

Answer (..... , ...)

6 Fay is testing an ordinary six-sided dice to see if it is biased.

She throws the dice 120 times.

6 (a) Work out the number of times the dice is expected to land on 1

[1 mark]

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Answer .....

***6 (b)** Here are the actual results.

Number on dice	1	2	3	4	5	6	Total
Frequency	5	19	17	20	21	38	120

Is the dice biased?
Tick a box.

Yes ☐ No ☐ Cannot tell ☐

Give a reason for your answer.

[2 marks]

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7 These expressions represent four numbers.

$2x + 2$	$3x - 1$	$4x - 6$	$5x + 2$

The sum of the first two expressions is 36

Work out the value of the median of the four numbers.

[5 marks]

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Answer .....

8 (a) Expand and simplify fully $4(x - 2) - 2(3 - 5x)$

[3 marks]

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Answer .....

8 (b) Simplify fully $\dfrac{8a^2 + 10ab}{12a + 15b}$

[3 marks]

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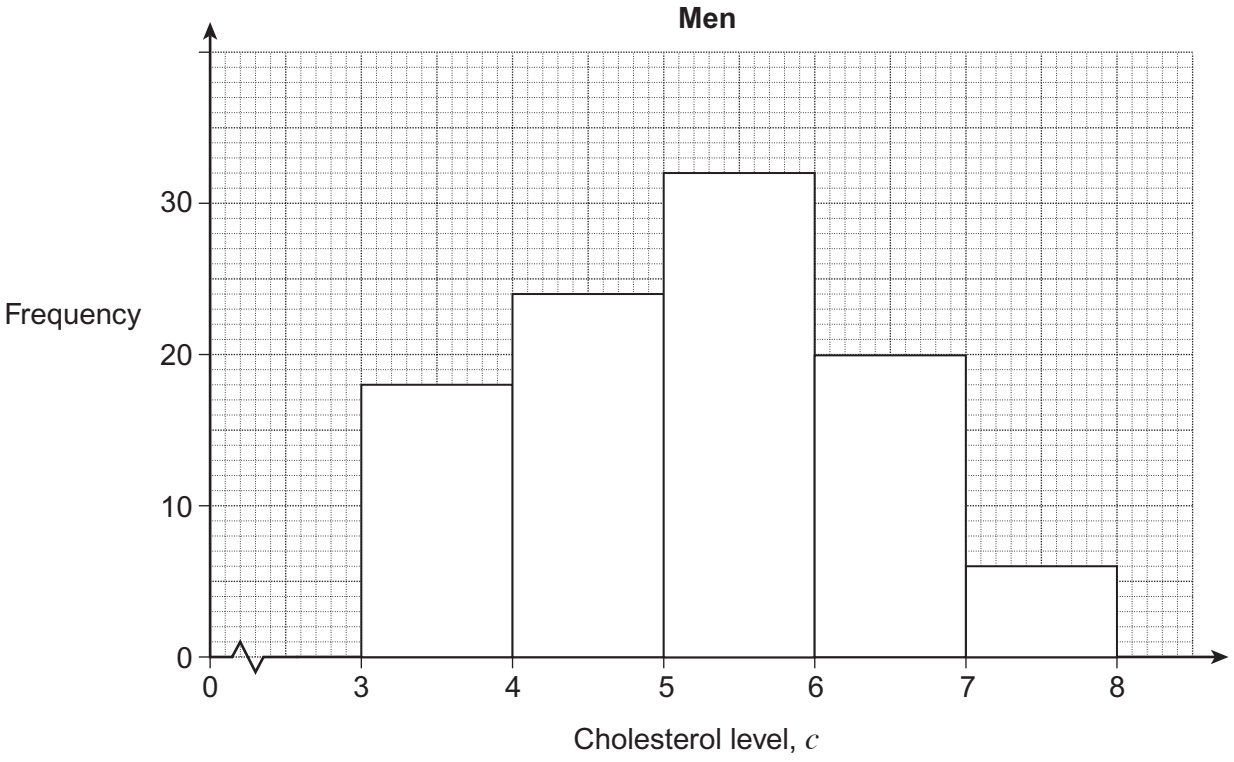
Answer .....

Turn over for the next question

11

9 (a) The frequency diagram shows information about the cholesterol level of 100 men.



Work out an estimate of the median cholesterol level of the men.

[3 marks]

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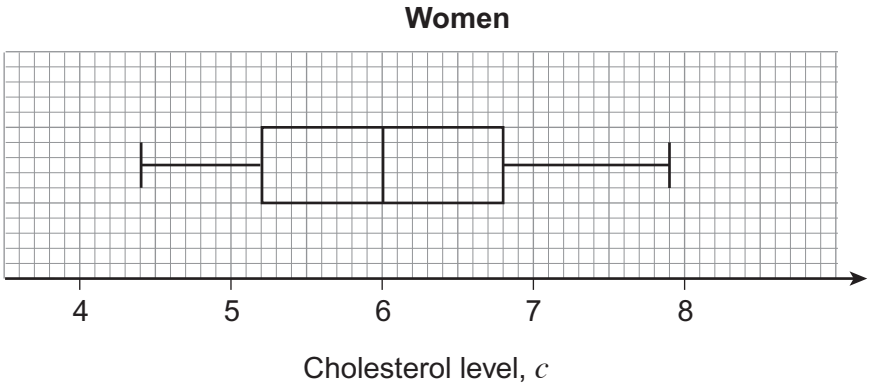
Answer .....

9 (b) The box plot shows information about the cholesterol level of 100 women.



None of these 100 women have a cholesterol level of 6.8

Estimate how many of the **200 people** have a cholesterol level above 6.8
You **must** show your working.

[3 marks]

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Answer .....

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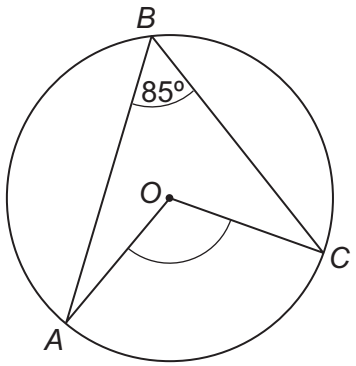
10 (a) The diagram shows a circle, centre *O*.



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Work out the size of angle *AOC*.
Give a reason for your answer.

[2 marks]

Answer ..... degrees

Reason .....

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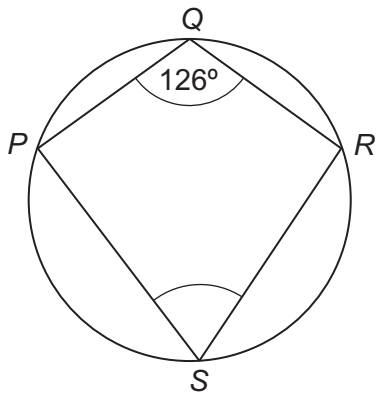
10 (b) *P*, *Q*, *R* and *S* are points on the circumference of a circle.



Not drawn accurately

Work out the size of angle *PSR*.
Give a reason for your answer.

[2 marks]

Answer ..... degrees

Reason .....

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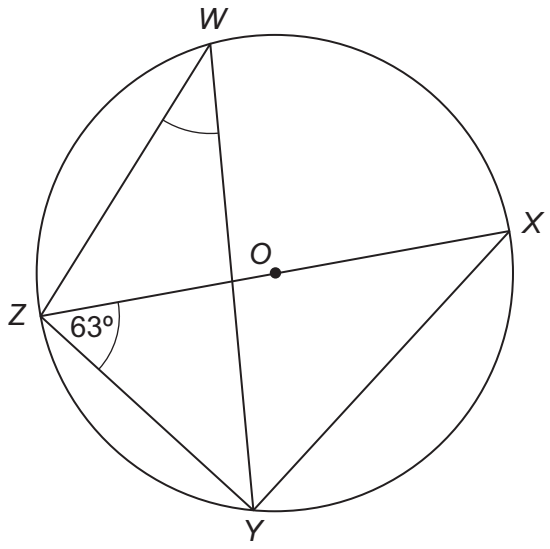
10 (c) *W*, *X*, *Y* and *Z* are points on the circumference of a circle centre *O*.
ZX is a diameter.
Angle *YZX* = 63º



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Work out the size of angle *ZWY*.
You **must** show your working, which may be on the diagram.

[2 marks]

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Answer ..... degrees

Turn over for the next question

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11 Solve $2(7x + 3) < 4x - 1$

[3 marks]

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Answer .....

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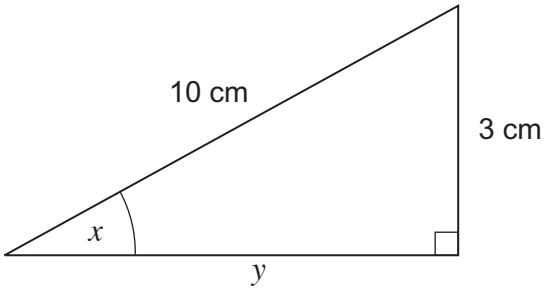

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12 (a) Work out the length y in the form $\sqrt{a}$ where a is an integer.

[2 marks]

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Answer ..... cm

12 (b) Write down the value of tan x

[1 mark]

Answer .....

***13** The square number sequence is

1 4 9 16 25 .....

Prove algebraically that the difference of two consecutive square numbers is an odd number.

[4 marks]

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Turn over for the next question

10

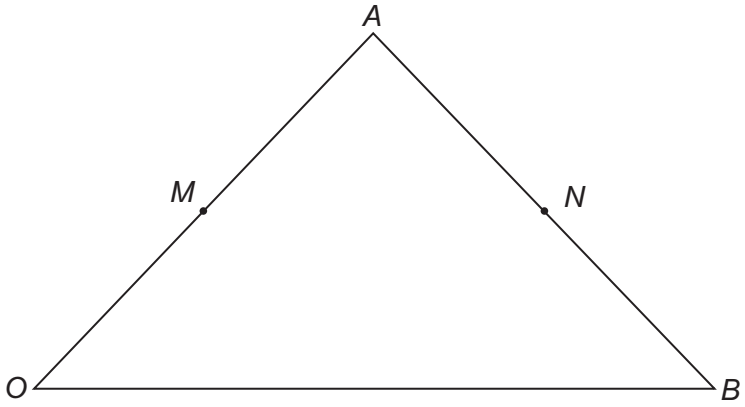
14 In triangle OAB

M is the midpoint of OA.

N is the midpoint of AB.

$\overrightarrow{OA} = 2\mathbf{a}$

$\overrightarrow{OB} = 2\mathbf{b}$



Not drawn accurately

14 (a) Write down $\overrightarrow{AB}$ in terms of **a** and **b**.

[1 mark]

Answer .....

14 (b) Show that $\overrightarrow{MN} = \mathbf{b}$

[2 marks]

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14 (c) Explain why triangles *AMN* and *AOB* are similar.

[2 marks]

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15 (a) Circle the value of $(5\sqrt{3})^2$

[1 mark]

15 $25\sqrt{3}$ 75 225

15 (b) Simplify fully $(16x^4y^{12})^{\frac{3}{4}}$

[3 marks]

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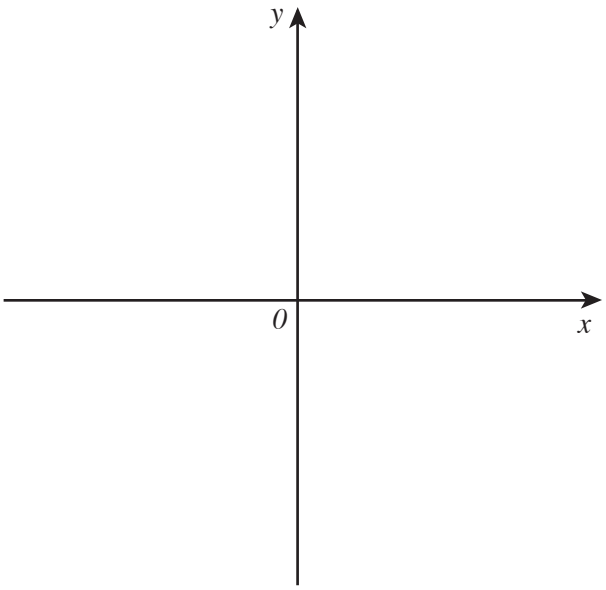
Answer .....

Turn over for the next question

9

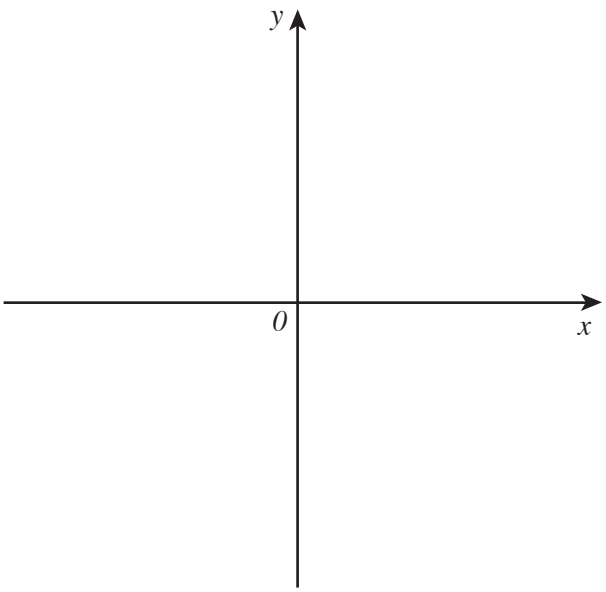
16 (a) Sketch the graph of $y = x^3$

[1 mark]



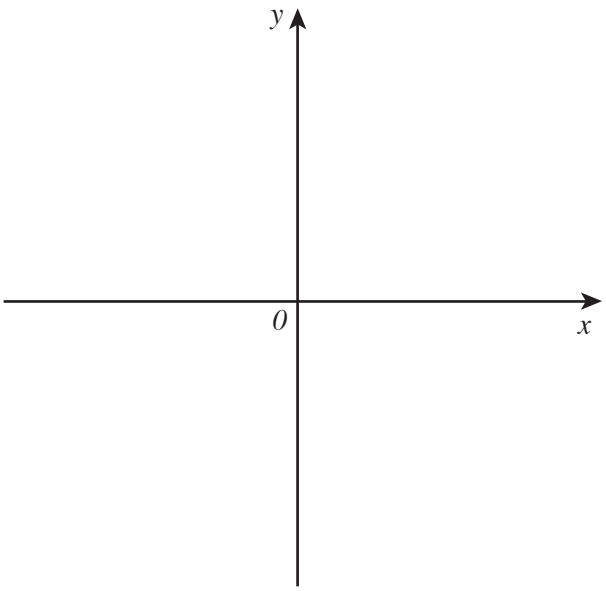
16 (b) Sketch the graph of $y = x^2 + 3$

[1 mark]



16 (c) Sketch the graph of $y = \frac{1}{x}$

[1 mark]



17 y is inversely proportional to x.
When $y = 2$, $x = 5$

Work out an equation connecting y and x.

[3 marks]

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Answer .....

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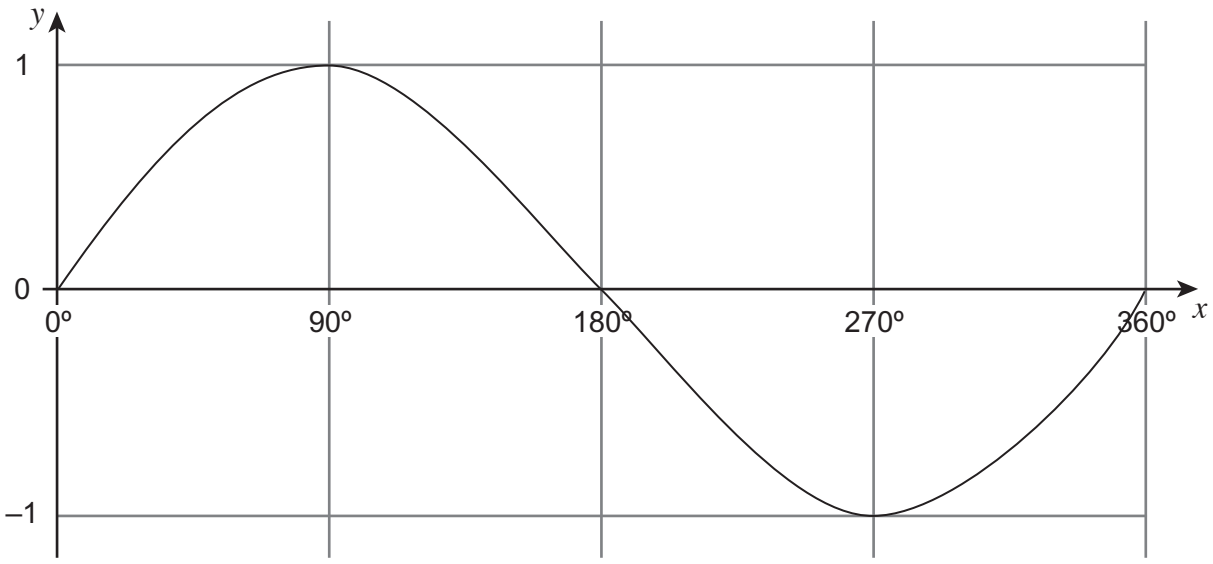
18 This is a sketch graph of $y = \sin x$ for $0^\circ \leqslant x \leqslant 360^\circ$



18 (a) Write down the number of solutions for $\sin x = 0.5$ for $0^\circ \leqslant x \leqslant 360^\circ$

[1 mark]

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Answer .....

18 (b) $\sin x = \sin 10$

Write down the value of x for $90^\circ \leqslant x \leqslant 180^\circ$

[1 mark]

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Answer .....

END OF QUESTIONS

2