

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 (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.

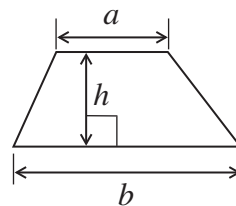
Advice

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

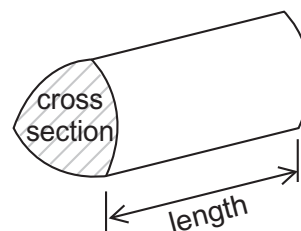


Formulae Sheet: Higher Tier

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

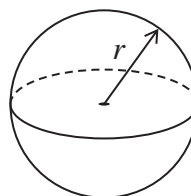


Volume of prism = area of cross section $\times$ length



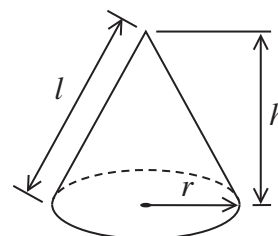
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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

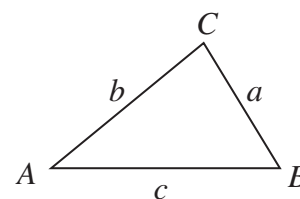


In any triangle ABC

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



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

Shop A



£150 deposit
plus
£60 a month for 6 months

Shop B



Usual price £600
20% off

Shop C



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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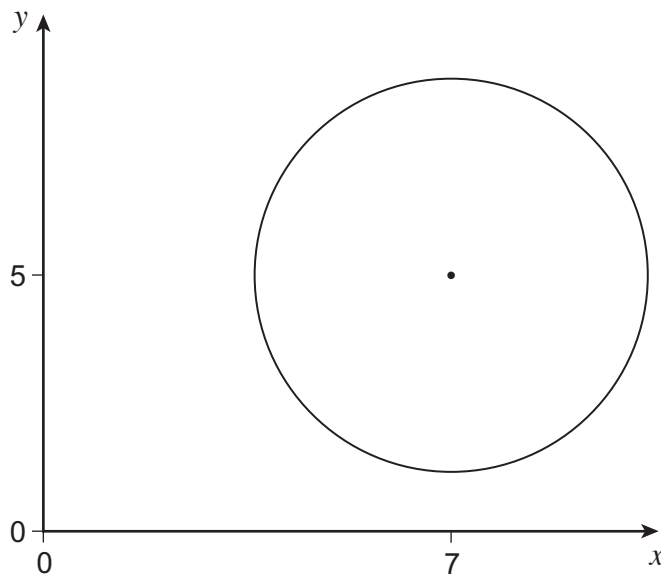
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Answer cm^2

Turn over for the next question



- 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 $\frac{8a^2 + 10ab}{12a + 15b}$

[3 marks]

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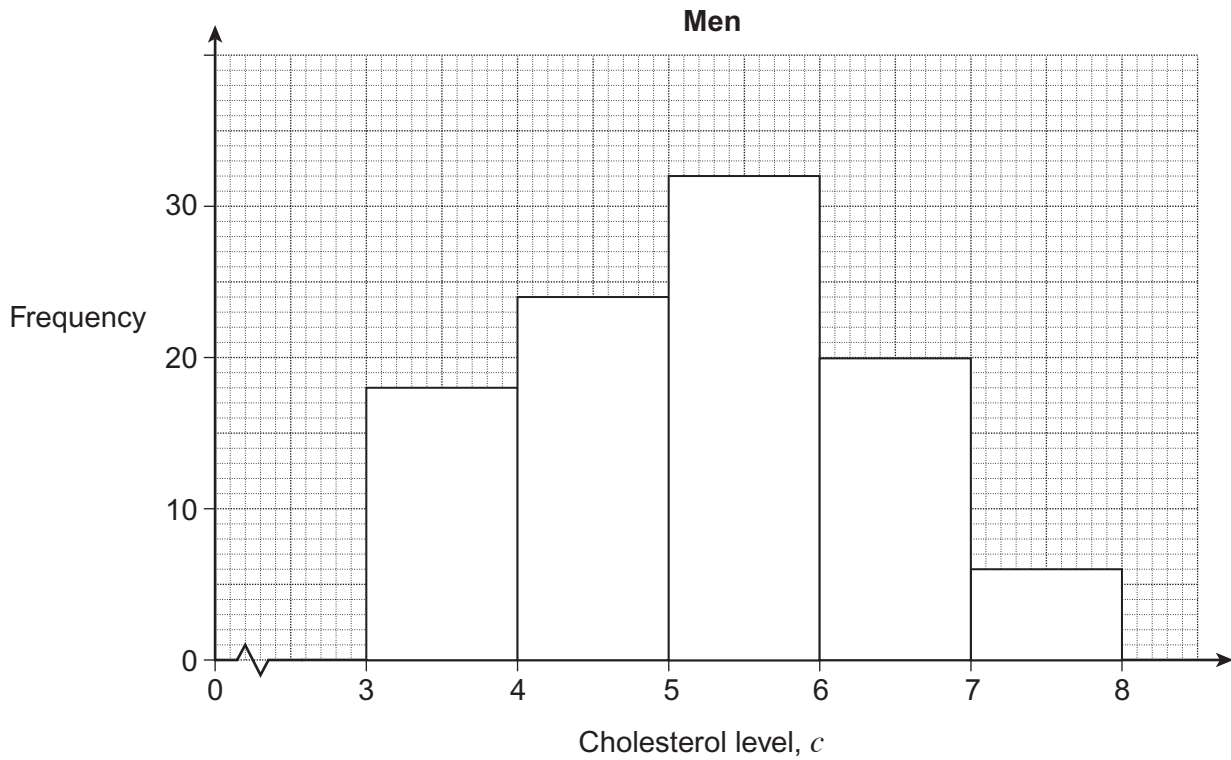
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Answer

Turn over for the next question



- 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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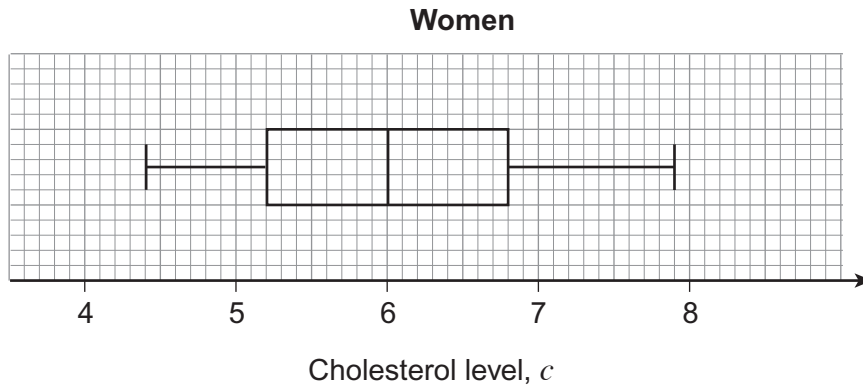
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Answer



- 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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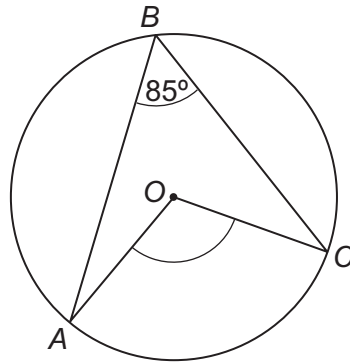
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Answer



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



Not drawn
accurately

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

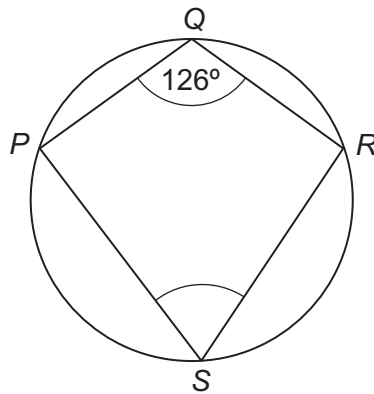
[2 marks]

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

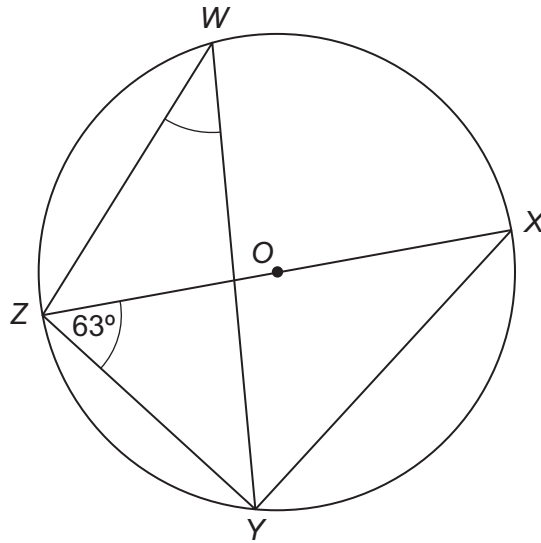
Reason

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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 $YZX = 63^\circ$



Not drawn
accurately

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



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

[3 marks]

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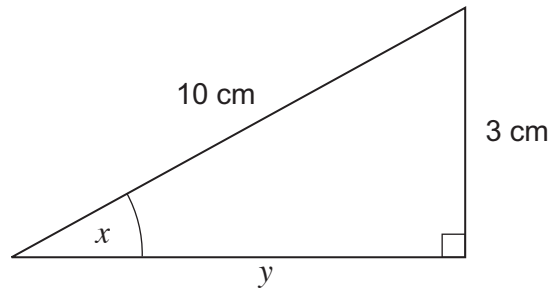
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Answer

12



Not drawn
accurately

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

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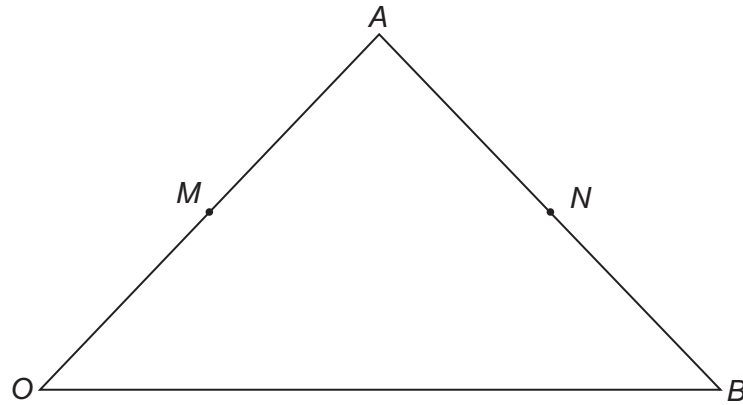
Turn over ►



14In triangle OAB M is the midpoint of OA . N is the midpoint of AB .

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

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

Not drawn
accurately**14 (a)**Write down $\vec{AB}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.**[1 mark]**

Answer

14 (b)Show that $\vec{MN} = \mathbf{b}$ **[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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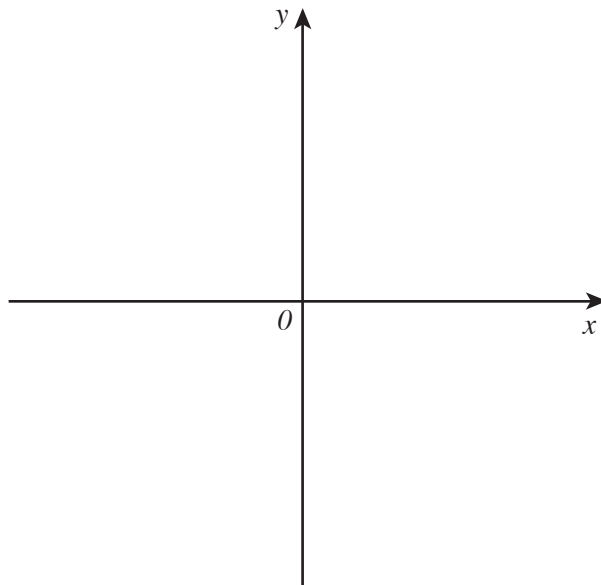
Answer

Turn over for the next question



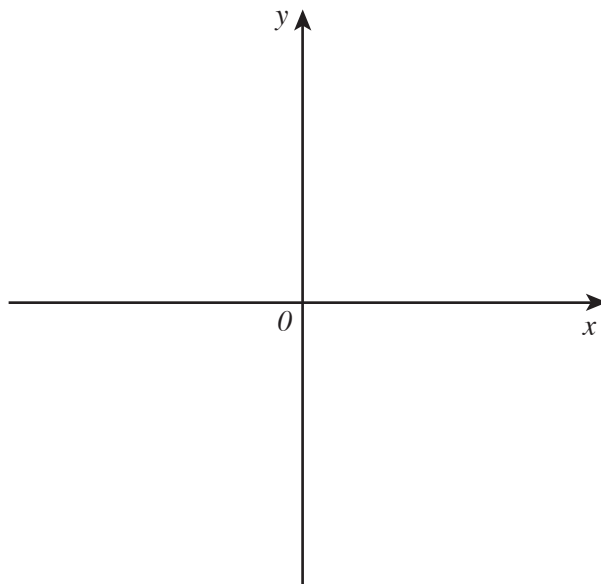
16 (a) Sketch the graph of $y = x^3$

[1 mark]



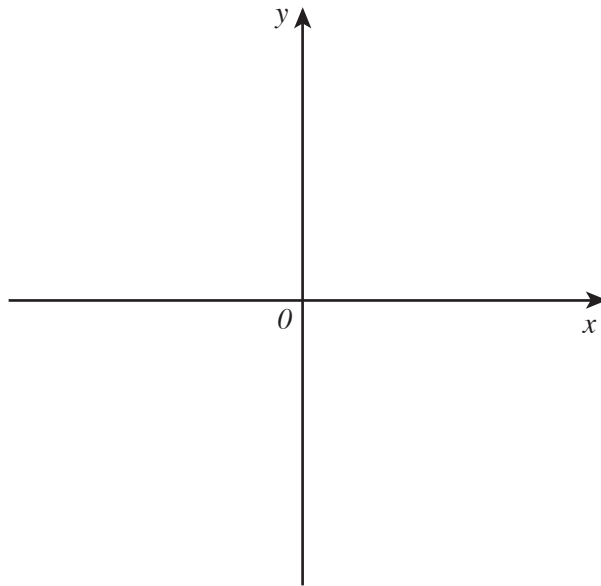
16 (b) Sketch the graph of $y = x^2 + 3$

[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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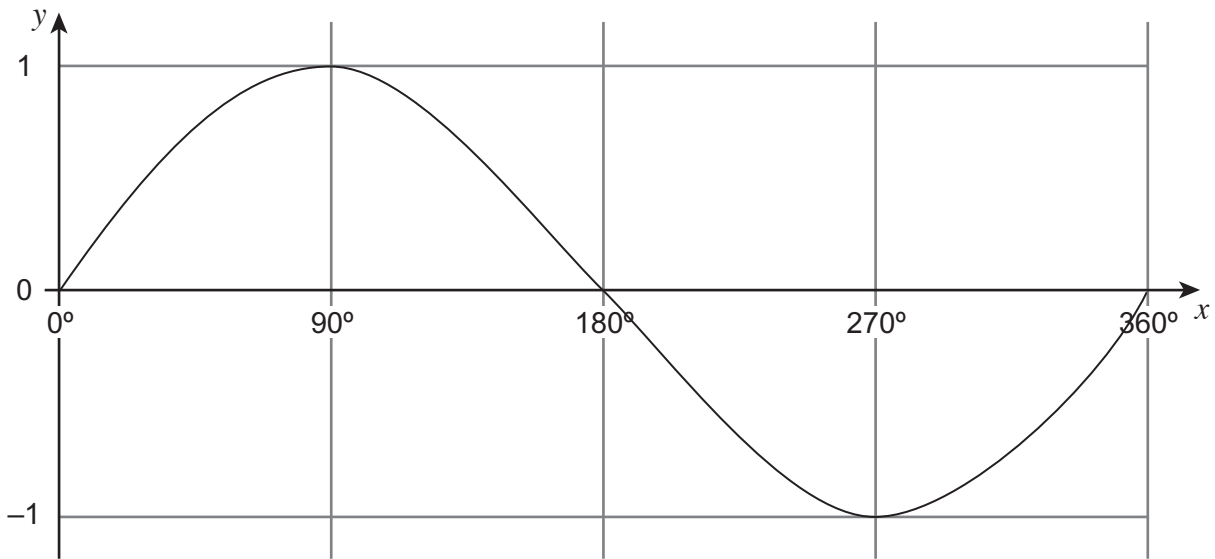
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Answer



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



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

[1 mark]

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Answer

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

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

[1 mark]

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Answer

END OF QUESTIONS

