OXFORD

INTERNATIONAL
AQA EXAMINATIONS

Please write clearly in block capitals.

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

Surname _____

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Candidate signature _____

I declare this is my own work.

INTERNATIONAL GCSE

MATHEMATICS EXTENSION

E

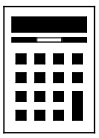
Paper 2E

Wednesday 17 May 2023 07:00 GMT Time allowed: 2 hours

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.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- 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 100.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.
- If your calculator does not have a π button, take the value of π to be 3.142

Advice

- Show all necessary working; otherwise marks for method may be lost.

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	
28–29	
TOTAL	

Do not write outside the box

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

1 Circle the ratio that is equivalent to 2 : 5

[1 mark]

1 : 3 1 : 10 0.4 : 1 2.5 : 1

2 ξ is the set {3, 4, 5, 6, 7, 8, 9}

A is the set of numbers divisible by 3

B is the set of numbers divisible by 2

2 (a) Circle the list of elements of A'

[1 mark]

3, 6, 9 4, 8 4, 5, 7, 8 5, 7

2 (b) Circle the value of $n(A \cup B)$

[1 mark]

1 5 6 7

Do not write outside the box

3 Expand $3x(2x + 1)$

Circle your answer.

[1 mark]

$6x^2 + 1$ $5x^2 + 1$ $5x^2 + 3x$ $6x^2 + 3x$

4 Here are two calculations.

A	**B**
$50^{30} \times 50^{40}$	$50^{75} \div 50^{3}$

Which calculation has the **larger** answer, A or B?

Show working to support your answer.

[2 marks]

Answer _____

6

Turn over ►

Do not write outside the box

5 A shopping centre has two floors.

Here is some information about the number of shops on each floor.

1st floor	72 shops	$\frac{2}{3}$ are open
2nd floor	180 shops	open : closed = 5 : 4

Work out the fraction of the shops in the centre that are **open**.

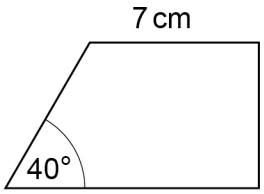
[5 marks]

Answer _____

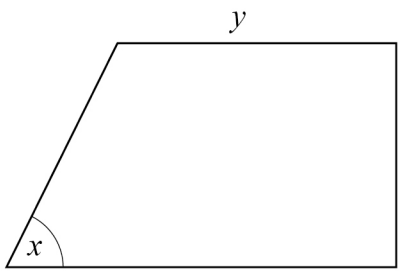
Do not write outside the box

6 Shapes P and Q are similar.

P



Q



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6 (a) Write down the size of angle x.

[1 mark]

$x =$ _____ °

6 (b) Work out the value of y.

[2 marks]

_____

_____

$y =$ _____ cm

8

Turn over ►

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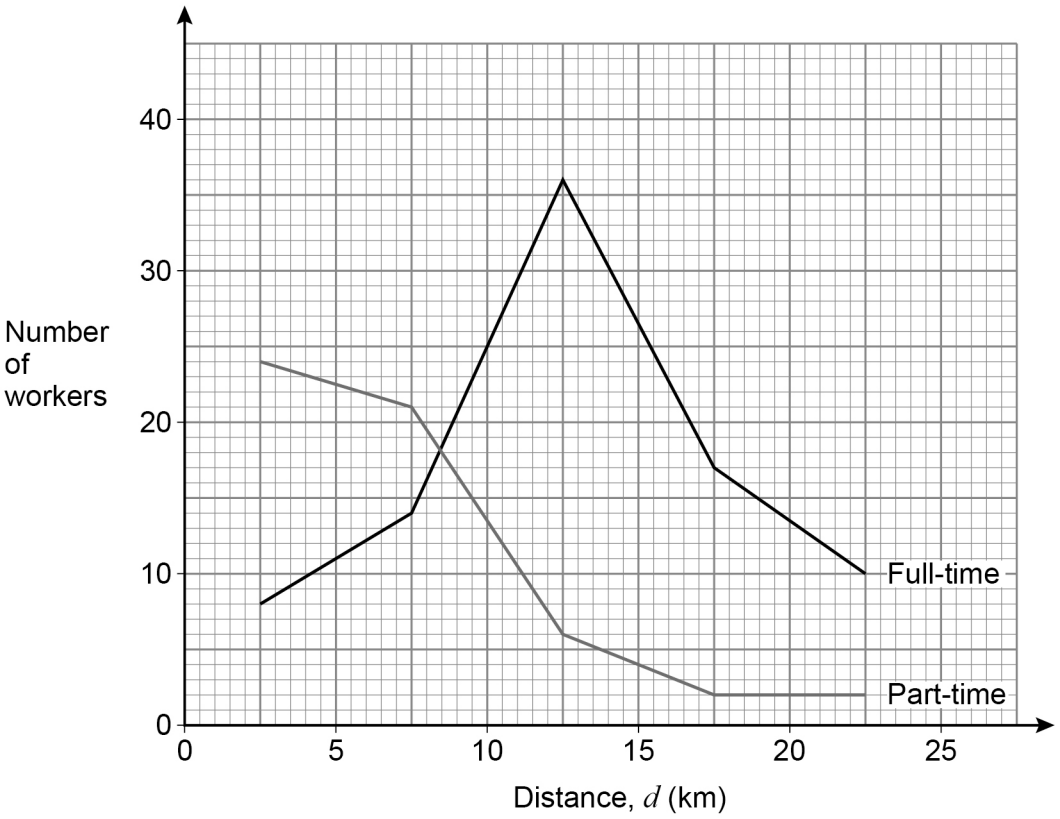
7 A company has part-time workers and full-time workers.

The frequency polygons show the distributions of the distances they travel to work.



7 (a) State **one** difference between the distributions.

[1 mark]

Do not write outside the box

7 (b) Complete the table, using equal class widths, for **all** workers.

[3 marks]

Distance, d (km)	Frequency (all workers)
$0 \leqslant d < 5$	32
____ $\leqslant d <$ ____	
____ $\leqslant d <$ ____	
____ $\leqslant d <$ ____	
____ $\leqslant d <$ ____	

8 Shape P is a regular polygon.

Tick **one** box for each statement about P.

[2 marks]

	True	False
The sum of the exterior angles is 360°	☐	☐
The interior angles are different sizes.	☐	☐
interior angle + exterior angle = 180°	☐	☐

6

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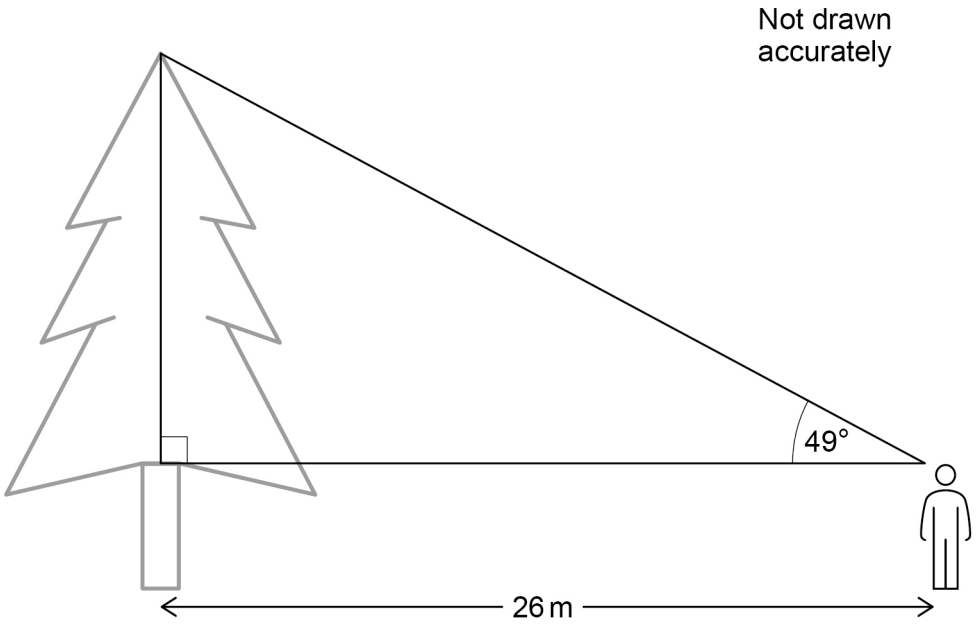
9 The diagram shows a tree and a man on level ground.



The man is 2 metres tall.

Work out the height of the tree.

[3 marks]

Answer _____ m

Do not write outside the box

10 Here is an identity in x.

$$5ax - 11 \equiv 20x + b + 3$$

Work out the values of a and b.

[3 marks]

$a =$ _____ $b =$ _____

11 Work out **all** the integer values of n for which $-5 < 4n + 3 \leqslant 15$

[3 marks]

Answer _____

9

Do not write outside the box

12 A line representing a cycle path is drawn on two maps.

Map A has a scale of 1 : 10 000

Map B has a scale of 1 : 2500

Which of these statements is true?

Tick **one** box.

[1 mark]

The line on map A is 2.5 times longer than the line on map B ☐

The line on map B is 2.5 times longer than the line on map A ☐

The line on map A is 4 times longer than the line on map B ☐

The line on map B is 4 times longer than the line on map A ☐

13 Circle the matrix that represents a rotation, 90° anticlockwise, about (0, 0)

[1 mark]

$\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$ $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$ $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$ $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$

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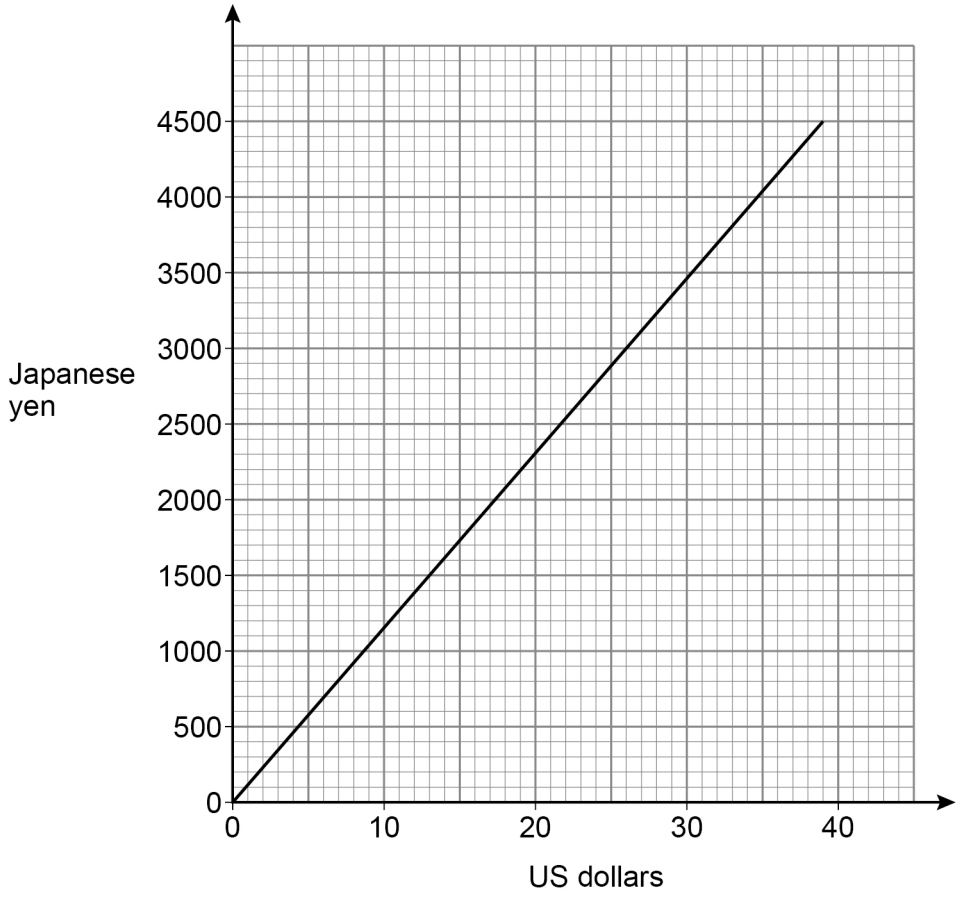
14 Here is a conversion graph for US dollars and Japanese yen.



The conversion rate for GB pounds (£) to US dollars ($) is £1 = $1.3

Convert £200 to Japanese yen.

[4 marks]

Answer _____ Japanese yen

6

Turn over ►

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15 In June the number of visitors to a museum was 25 000

In July and August the number of visitors increased by 14% each month.

In September the number of visitors was 21 600

Work out the percentage decrease from August to September.

[4 marks]

Answer _____ %

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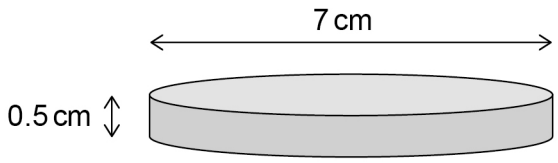
16 A medal made from silver is a solid cylinder.

The cylinder has diameter 7 cm and thickness 0.5 cm



The density of silver is 10.5 g/cm^3

Work out the mass of the medal.

Give your answer as a decimal.

[3 marks]

Answer _____ g

Turn over for the next question

7

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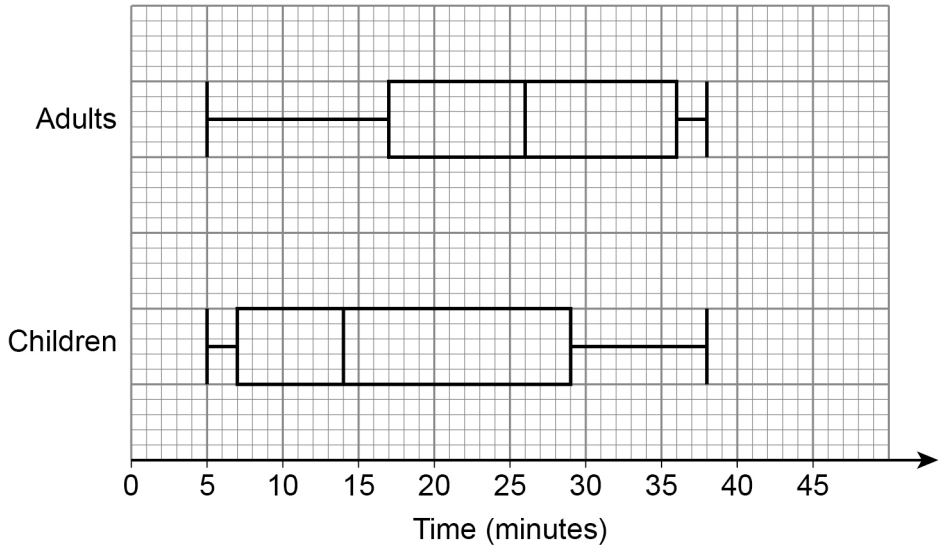
17 Some adults and some children complete a puzzle.

The box plots show information about the time taken to complete the puzzle.



17 (a) On average, who took **less** time to complete the puzzle, adults or children?

Tick a box.

Adults ☐ Children ☐

Give a reason for your answer.

[1 mark]

Do not write outside the box

17 (b) Who recorded the **more consistent** times, adults or children?

Tick a box.

Adults ☐ Children ☐

Show working to support your answer.

[2 marks]

18 The vector that translates shape A to shape B is $\begin{pmatrix} 2 \\ 8 \end{pmatrix}$

The vector that translates shape B to shape C is $\begin{pmatrix} 4 \\ -1 \end{pmatrix}$

Circle the vector that translates shape C to shape A.

[1 mark]

$\begin{pmatrix} 6 \\ 7 \end{pmatrix}$ $\begin{pmatrix} -6 \\ -7 \end{pmatrix}$ $\begin{pmatrix} 2 \\ -9 \end{pmatrix}$ $\begin{pmatrix} -2 \\ 9 \end{pmatrix}$

Turn over for the next question

4

Do not write outside the box

19 Work out the equation of the straight line that passes through the points (1, 3) and (–3, 5)

Give your answer in the form $y = mx + c$

[3 marks]

Answer _____

20 Circle the vector that is parallel to $6\mathbf{a} + 4\mathbf{b}$

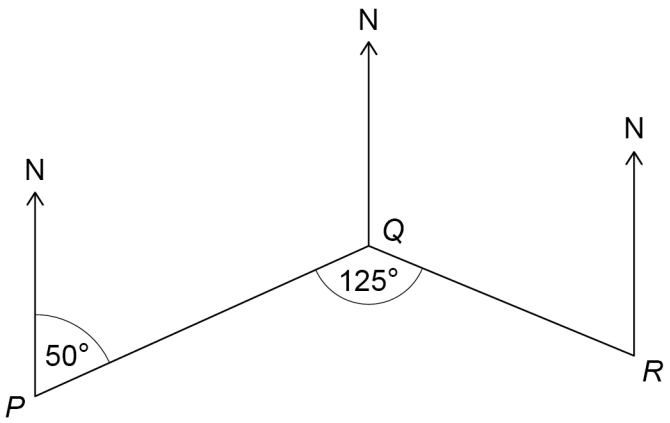
[1 mark]

$6\mathbf{a} - 4\mathbf{b}$ $4\mathbf{a} + 6\mathbf{b}$ $2\mathbf{a} - 3\mathbf{b}$ $3\mathbf{a} + 2\mathbf{b}$

Do not write outside the box

21 The bearing of Q from P is 050°

Not drawn accurately



Work out the bearing of Q from R.

[3 marks]

Answer _____ °

Turn over for the next question

7

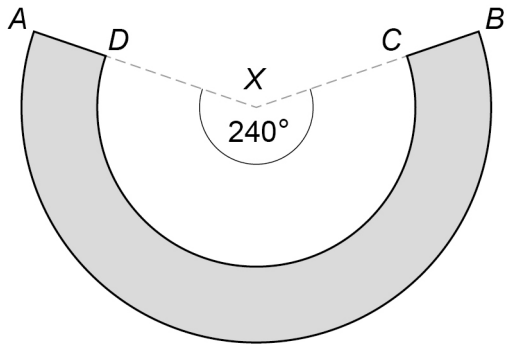
Do not write outside the box

22 *AB* is an arc of a circle, centre *X*, radius 15 cm

DC is an arc of a circle, centre *X*, radius 12 cm

ADX and *BCX* are straight lines.

Not drawn accurately



Work out the **perimeter** of the shaded shape.

[3 marks]

Answer _____ cm

Do not write outside the box

23 $j : k = 7 : 3$ and $k : m = 4 : 9$

Work out $(m - k) : (j + 2k)$

[3 marks]

Answer _____ : _____

24 Simplify fully $\sqrt{18ab} \times 2\sqrt{2a}$

[2 marks]

Answer _____

8

Turn over ►

Do not write outside the box

25 Rearrange $\frac{y}{x} = \frac{8}{1-x}$ to make x the subject.

[4 marks]

Answer _____

Do not write outside the box

26 An expression for the nth triangular number is $\frac{1}{2}(n^2 + n)$

26 (a) Work out the 32nd triangular number.

[1 mark]

Answer _____

26 (b) How many triangular numbers have a value of **less than** 10 000 ?

[3 marks]

Answer _____

8

Turn over ►

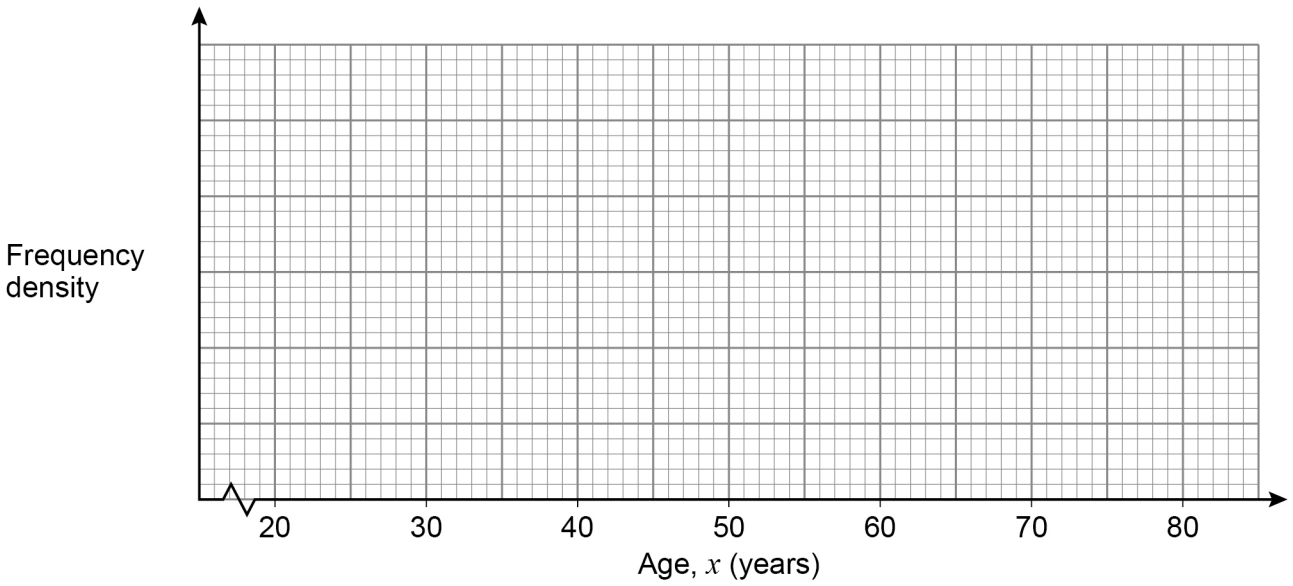
Do not write outside the box

27 The table shows information about the ages of the 70 people in a choir.

Age, x (years)	**Frequency**
$25 \leqslant x < 30$	12
$30 \leqslant x < 40$	17
$40 \leqslant x < 55$	15
$55 \leqslant x < 75$	26

27 (a) Draw a histogram to represent the data.

[3 marks]



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27 (b) Two people from the choir are chosen at random.

Work out the probability that they are **both** less than 40 years of age.

[2 marks]

Answer _____

28 Simplify fully $(m + 2)^3 - m^2(m + 6)$

[4 marks]

Answer _____

9

Do not write outside the box

29 Prove algebraically that $1.2\dot{4}$ converts to the fraction $\frac{56}{45}$

[3 marks]

Do not write outside the box

30 The equation of a curve is $y = (2x - 1)(x + 3)$

Work out the gradient of the tangent to the curve at the point where $x = 2$

[3 marks]

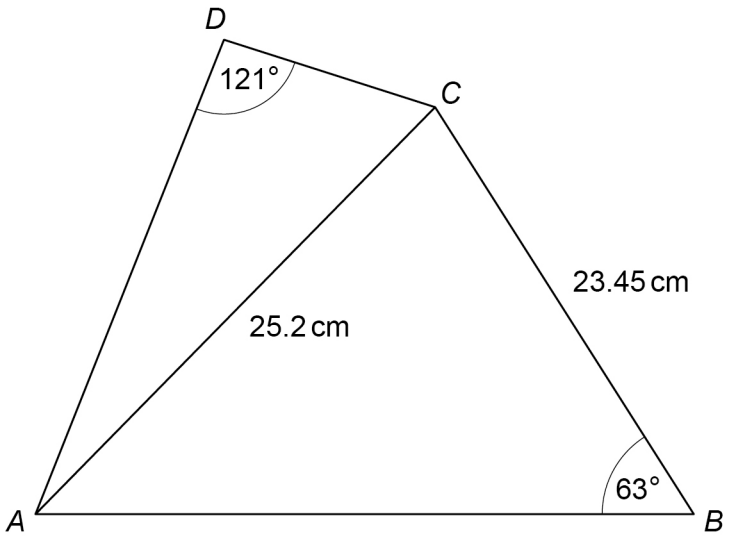
Answer _____

Turn over for the next question

6

Do not write outside the box

31 *ABCD* is a quadrilateral.



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Angle *DAB* is 75°

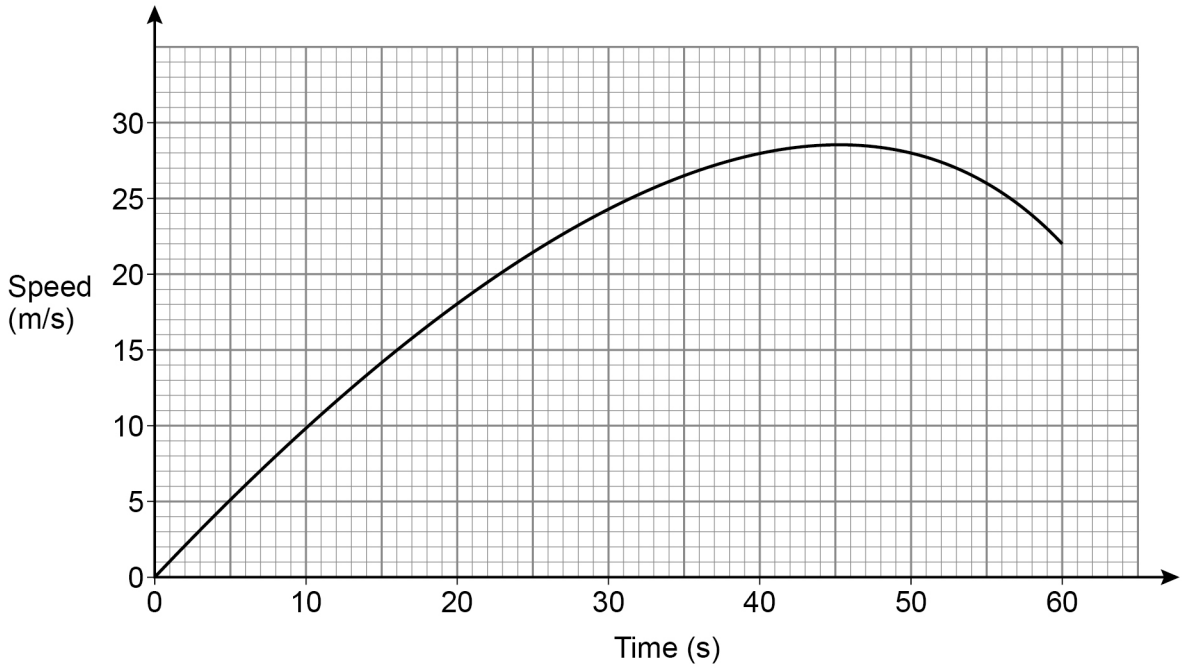
Work out the length of *DC*.

[5 marks]

Answer _____ cm

Do not write outside the box

32 The graph shows the speed of a car for 60 seconds.



By dividing the area under the curve into **three sections** of equal width, estimate the distance travelled in the 60 seconds.

[3 marks]

Answer _____ m

8

Turn over ►

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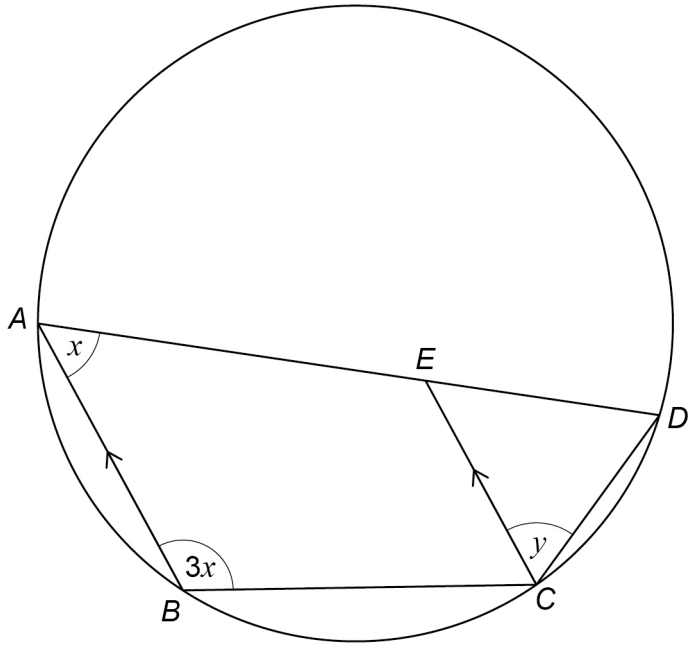
33 *A, B, C* and *D* are points on a circle.

AED is a straight line.

BA is parallel to *CE*.



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Prove that $y = 2x$

[3 marks]

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34 Work out the coordinates of the two points of intersection of the graphs

$$y^2 = 5x + 39 \quad \text{and} \quad y = x + 3$$

[5 marks]

Answer (_____ , _____) and (_____ , _____)

END OF QUESTIONS

8

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ANSWER IN THE SPACES PROVIDED

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