OXFORD

INTERNATIONAL
AQA EXAMINATIONS

Please write clearly in block capitals.

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

Surname _____

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I declare this is my own work.

INTERNATIONAL GCSE

MATHEMATICS EXTENSION

E

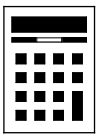
Paper 1E

Monday 8 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	
30	
TOTAL	

Do not write outside the box

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

1 Work out 100 as a percentage of 20

Circle your answer.

[1 mark]

20% 80% 400% 500%

2 Here are the first three terms of a linear sequence.

$\frac{1}{2}$ $\frac{5}{2}$ $\frac{9}{2}$

Circle an expression for the nth term.

[1 mark]

$n - \frac{1}{2}$ $n + 2$ $2n - \frac{3}{2}$ $2n + \frac{1}{2}$

3 The number of people at a concert is 600 to the nearest 50

Circle the maximum possible number of people.

[1 mark]

624 625 649 650

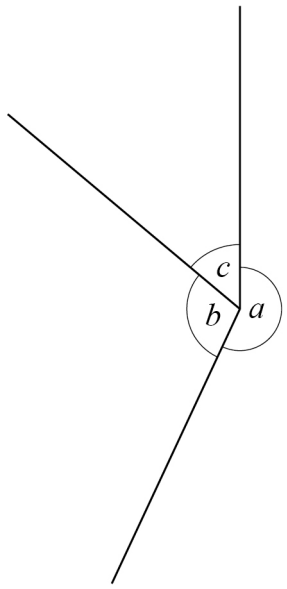
Do not write outside the box

4 Circle the fraction equivalent to $\frac{x}{3} + \frac{y}{4}$

[1 mark]

$\frac{x+y}{12}$ $\frac{x+y}{7}$ $\frac{4x+3y}{12}$ $\frac{4x+3y}{7}$

5 Three lines meet at a point.



Not drawn accurately

$a : b : c = 11 : 5 : 2$

Work out the size of the **smallest** angle.

[2 marks]

Answer _____ °

6

Turn over ►

Do not write outside the box

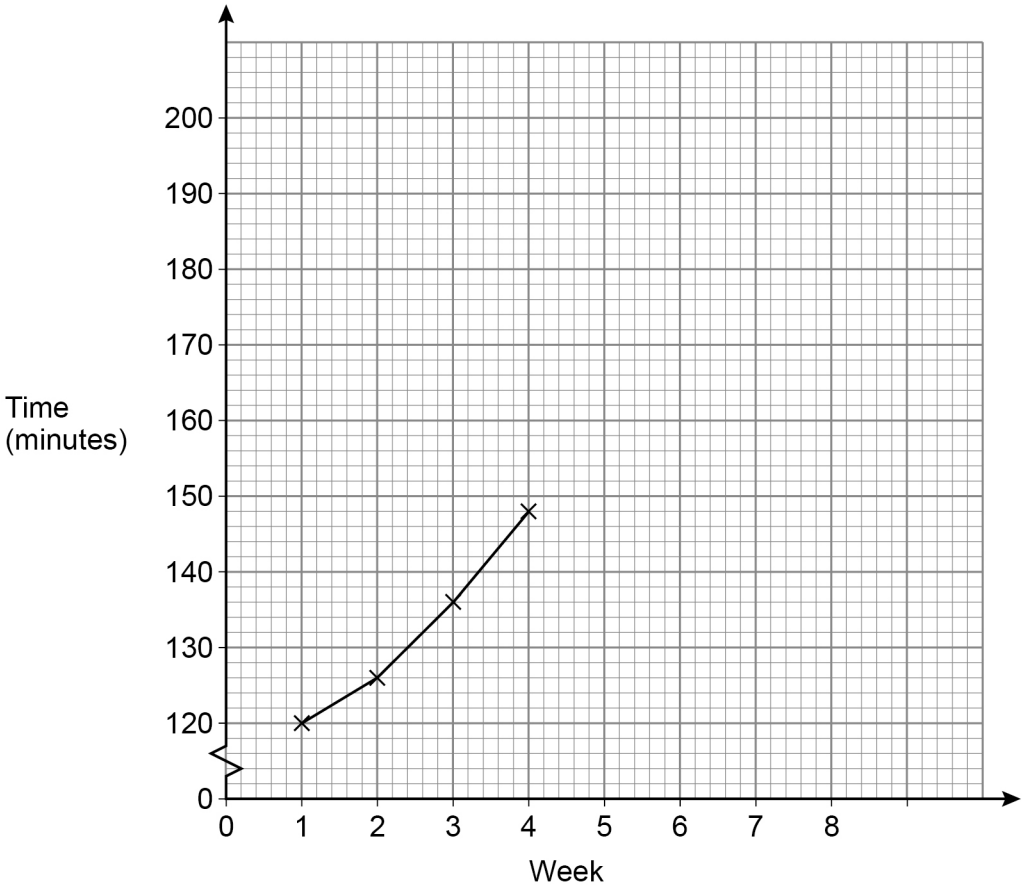
6 Laura joined a running club.

The table shows the time she spent running for the first eight weeks.

Week	1	2	3	4	5	6	7	8
Time (minutes)	120	126	136	148	156	170	176	180

A time-series graph is drawn to represent the data.

The first four points have been plotted.



6 (a) Complete the graph.

[2 marks]

6 (b) Use the graph to estimate the time Laura spent running in week 9

[1 mark]

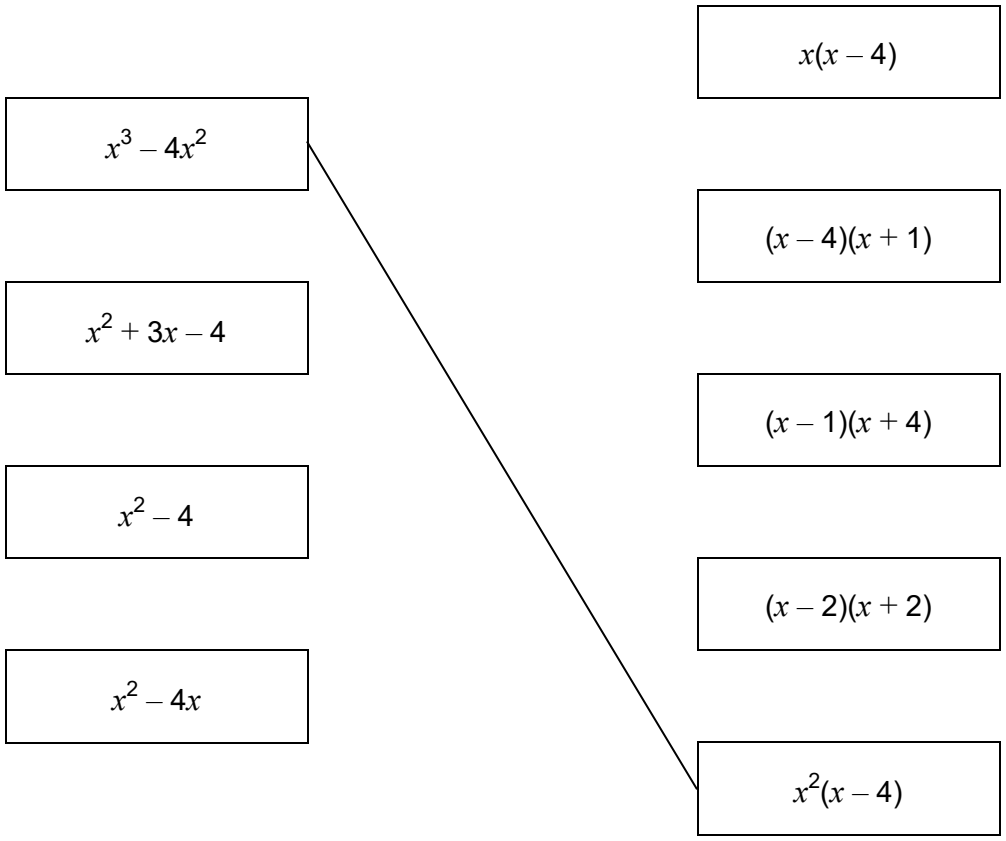
Answer _____ minutes

Do not write outside the box

7 Match each expression to its factorised form.

One has been done for you.

[3 marks]



Turn over for the next question

6

Do not write outside the box

8 (a) Work out $(9.6 \times 10^{12}) \div (8 \times 10^{7})$

Give your answer in standard form.

[2 marks]

Answer _____

8 (b) Write these numbers in order of size.

Start with the smallest.

8.5×10^{-4} 3.9×10^{-4} 6.2×10^{-5}

[2 marks]

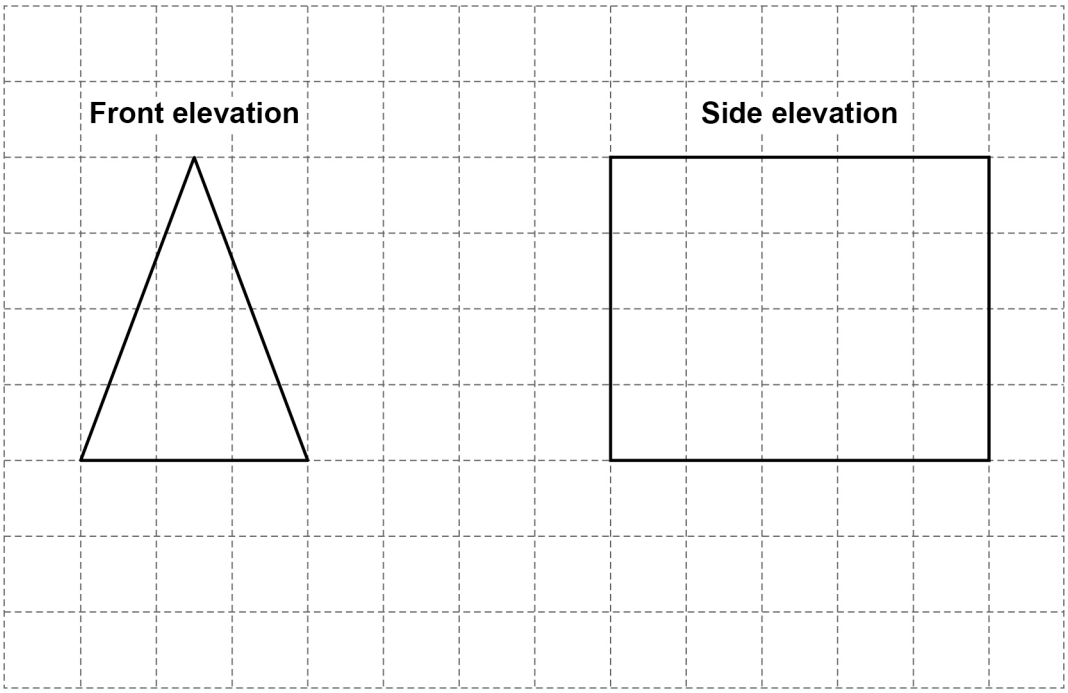
smallest _____

_____

largest _____

Do not write outside the box

9 The front elevation and side elevation of a prism are shown on a centimetre grid.



Work out the volume of the prism.

[2 marks]

Answer _____ cm^3

Turn over for the next question

6

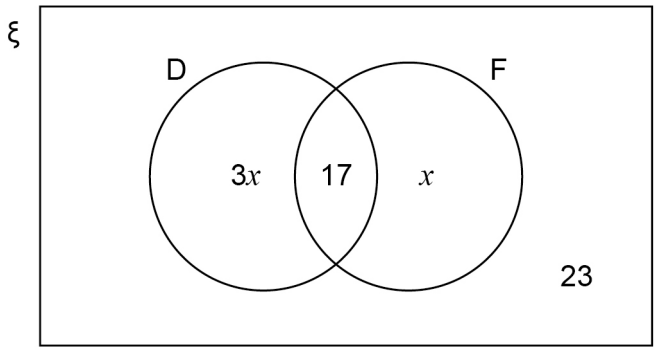
Do not write outside the box

10 (a) Here is a Venn diagram.

ξ = 100 students who visited a cafe

D = students who bought a drink

F = students who bought food



One of the students is chosen at random.

Work out the probability that the student bought a drink.

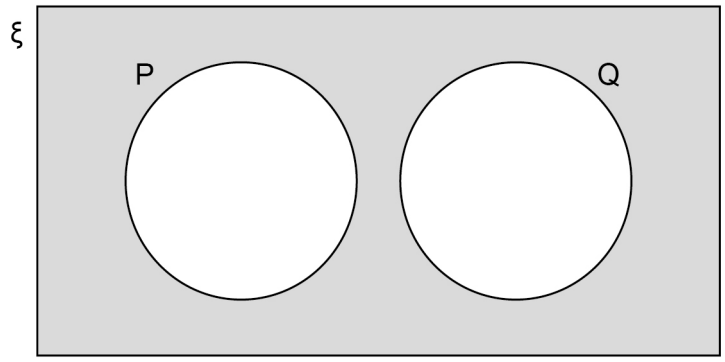
Give your answer as a decimal.

[4 marks]

Answer _____

Do not write outside the box

10 (b) Here is another Venn diagram.



Circle the set that is shaded.

[1 mark]

P′ Q′ P U Q (P U Q)′

11 Two numbers a and b are written as a product of their prime factors.

$a = 2^3 \times 3^2 \times 5 \times 7^3$ $b = 2^4 \times 3 \times 5^2$

11 (a) Write down the highest common factor of a and b.

[1 mark]

Answer _____

11 (b) Write down the lowest common multiple of a and b.

[1 mark]

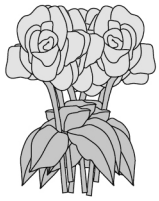
Answer _____

7

Turn over ►

Do not write outside the box

12 Three shops sell roses.

Shop A	**Shop B**	**Shop C**
		
6 for $25.50	Were $5.25 each Now 20% off	$5.70 each Buy one, get one half price

At which shop is it cheapest to buy 12 roses?

Show working to support your answer.

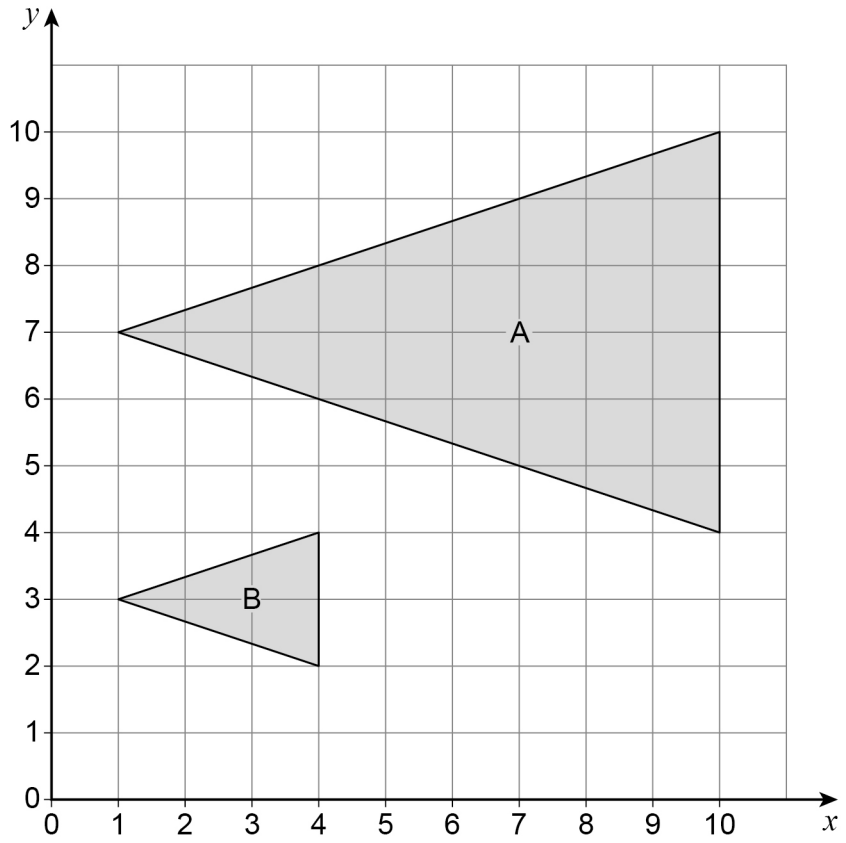
State the total cost at that shop.

[5 marks]

Shop _____ Total cost $ _____

Do not write outside the box

13 Describe fully the **single** transformation that maps triangle A to triangle B.



[3 marks]

Turn over for the next question

8

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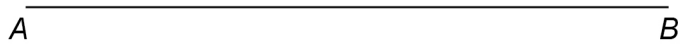
14 (a) Use a ruler and compasses for this question.

Construct the perpendicular bisector of line *AB*.

[2 marks]



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14 (b) A region is

less than 6 cm from point *C*

and

greater than 4 cm from point *C*.

Use compasses to draw an accurate diagram to show the region.

Label the region R.

[2 marks]

4

Do not write outside the box

15 A whole number is added to its reciprocal.

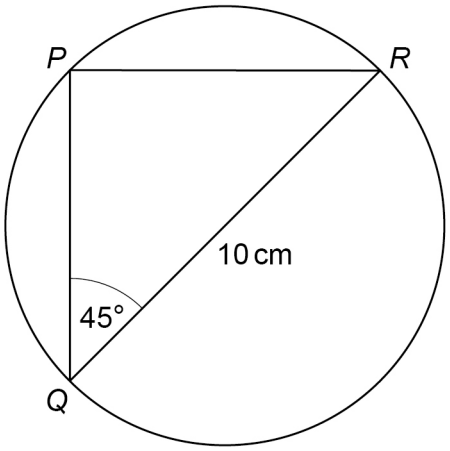
Circle the possible answer.

[1 mark]

1 2.2 2.5 0

16 *P*, *Q* and *R* are points on a circle.

QR is a diameter of length 10 cm



Not drawn accurately

Work out the perimeter of triangle *PQR*.

Give your answer as a decimal.

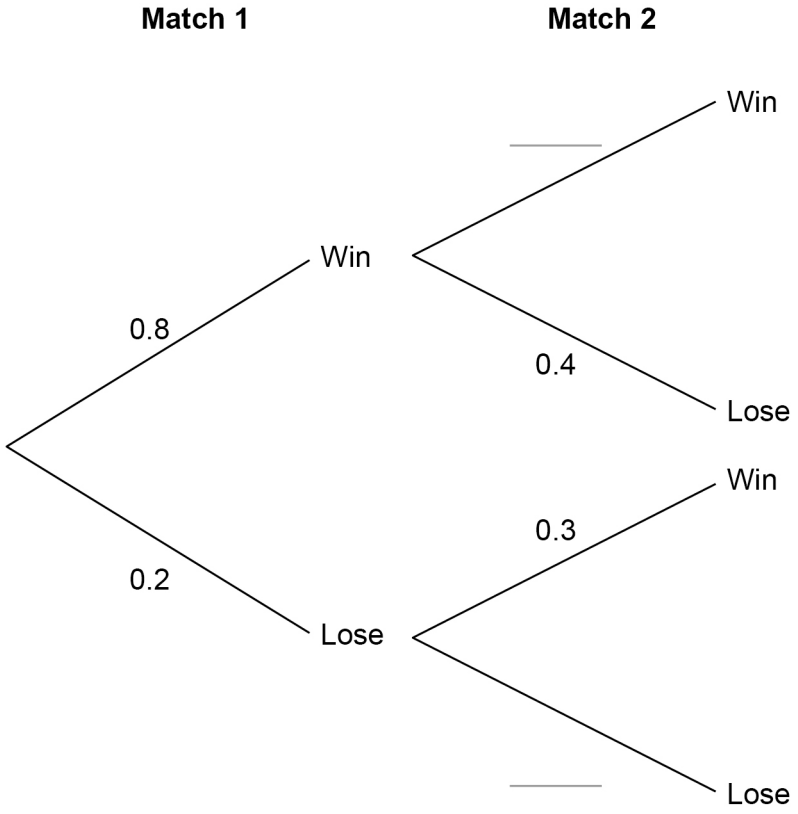
[3 marks]

Answer _____ cm

Do not write outside the box

17 Glynn plays two tennis matches.

The tree diagram shows some of the probabilities of Glynn winning or losing each match.



17 (a) Complete the tree diagram.

[2 marks]

17 (b) Work out the probability that Glynn wins **exactly** one of the matches.

[3 marks]

Answer _____

9

Turn over ►

Do not write outside the box

18 (a) Work out $\begin{pmatrix} 5 & -2 \\ -3 & 6 \end{pmatrix}\begin{pmatrix} 0 & 3 \\ -1 & 2 \end{pmatrix}$

[2 marks]

Answer $\begin{pmatrix} & \\ & \end{pmatrix}$

18 (b) $\begin{pmatrix} 4 & c \\ 8d & 9 \end{pmatrix}\begin{pmatrix} 1 \\ -2 \end{pmatrix} = \begin{pmatrix} 20 \\ 2d \end{pmatrix}$

Work out the values of c and d.

[3 marks]

$c =$ _____ $d =$ _____

Do not write outside the box

19 Simplify $\dfrac{3(a+4)^2}{6(a+4)}$

Circle your answer.

[1 mark]

$\dfrac{a+4}{2}$ $\quad$ $\dfrac{1}{2(a+4)}$ $\quad$ $2(a+4)$ $\quad$ $\dfrac{2}{a+4}$

20 A model car is made using a linear scale of 1 : 64

Circle the volume of the model car as a fraction of the volume of the actual car.

[1 mark]

$\dfrac{1}{4}$ $\quad$ $\dfrac{1}{64}$ $\quad$ $\dfrac{1}{4096}$ $\quad$ $\dfrac{1}{262\,144}$

Turn over for the next question

7

Do not write outside the box

21 A shopkeeper recorded the amount of money people spent in his shop.

The cumulative frequency table shows information about his results.

Amount spent, \$$d$	**Cumulative frequency**
$d \leqslant 5$	7
$d \leqslant 10$	19
$d \leqslant 15$	42
$d \leqslant 20$	56
$d \leqslant 25$	60

21 (a) Work out the number of people who spent more than \$10 but no more than \$20

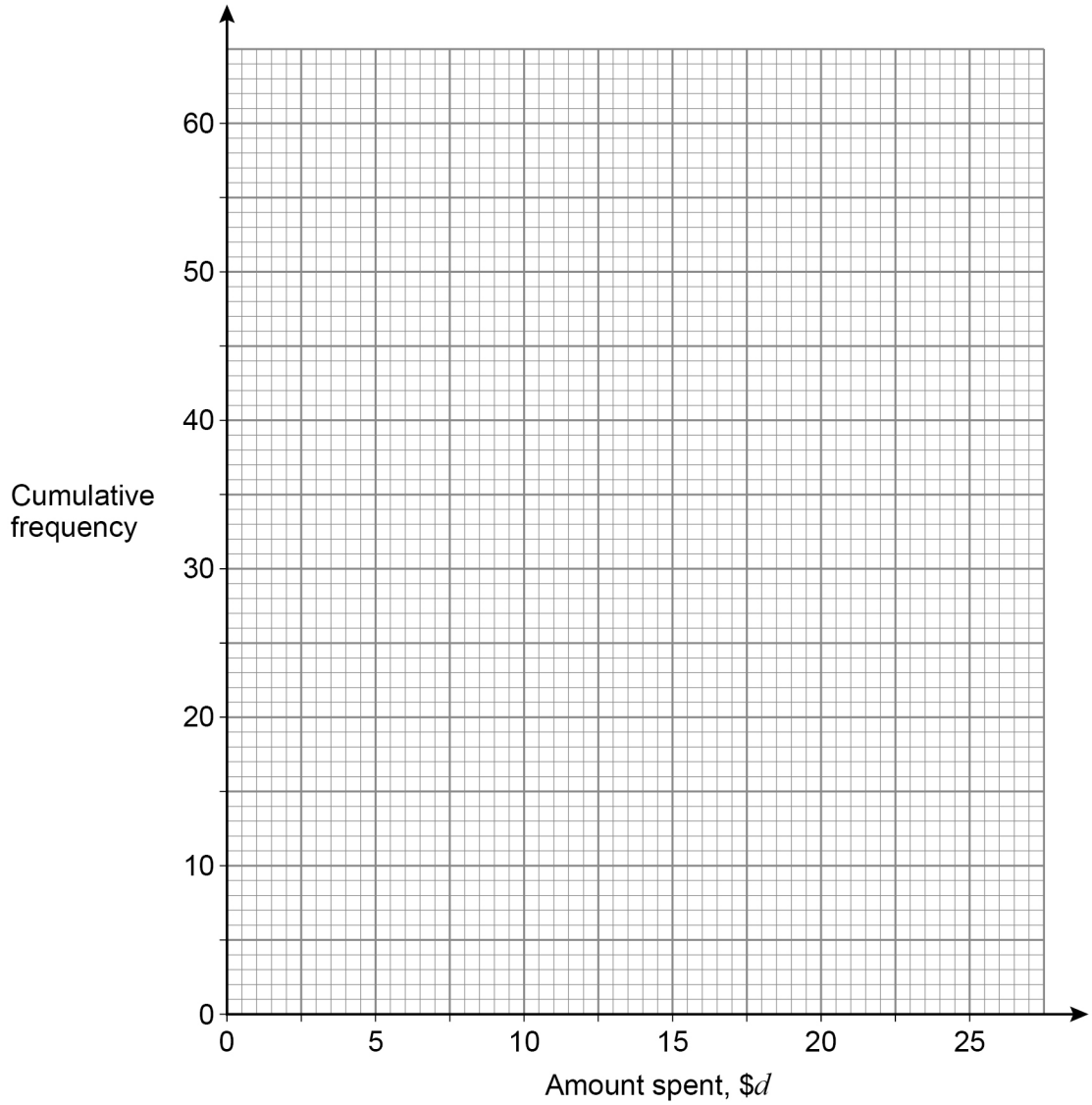
[1 mark]

Answer _____

Do not write outside the box

21 (b) Draw a cumulative frequency graph to represent this information.

[2 marks]



Turn over for the next question

3

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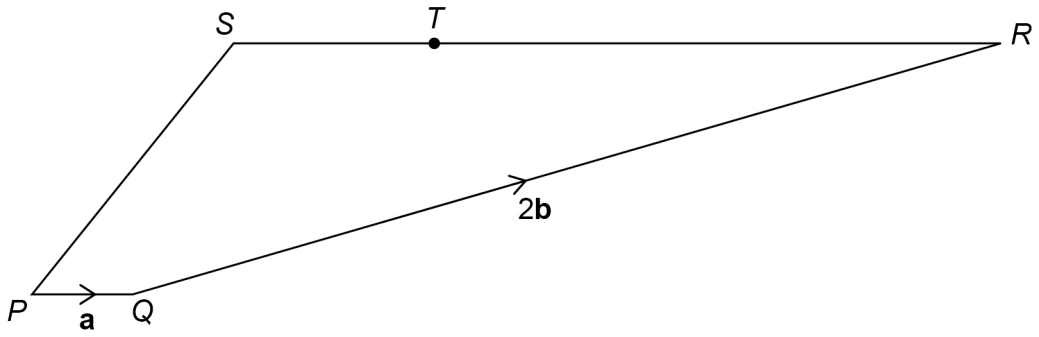
22 Here is quadrilateral *PQRS*.

$\overrightarrow{SR} = 8\overrightarrow{PQ}$

$ST : TR = 1 : 3$

Not drawn accurately



Work out $\overrightarrow{PT}$ in terms of **a** and **b**.

Give your answer in its simplest form.

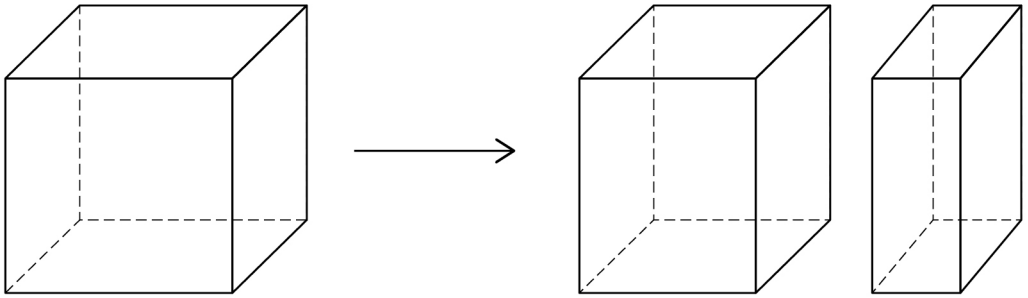
[4 marks]

Answer _____

Do not write outside the box

23 The total surface area of a cube is 150 cm^2

The cube is cut vertically to make two cuboids, X and Y.



X Y

The total surface area of X is 120 cm^2

Work out the total surface area of Y.

[4 marks]

Answer _____ cm^2

Turn over for the next question

8

Do not write outside the box

24 (a) $f(x) = \frac{2}{x}$ where $x \neq 0$

Write down an expression for $f(5x)$

[1 mark]

Answer _____

24 (b) $g(x) = x^2 - 4x + 7$

Work out an expression for $g(x + 5)$

Give your answer in the form $x^2 + bx + c$ where b and c are integers.

[3 marks]

_____

_____

_____

_____

_____

_____

Answer _____

Do not write outside the box

25 Rationalise the denominator of $\dfrac{10}{4-\sqrt{11}}$

Give your answer in the form $p+q\sqrt{11}$ where p and q are integers.

You **must** show your working.

[3 marks]

Answer _____

26 Prove that $\dfrac{5n^4+10n^2}{n^2+2}-n^2$ is a square number when n is a positive integer.

[3 marks]

10

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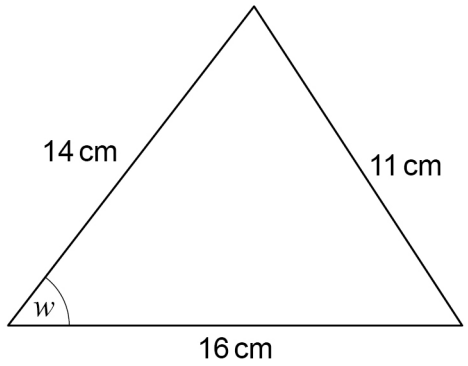


Work out the size of angle w.

[3 marks]

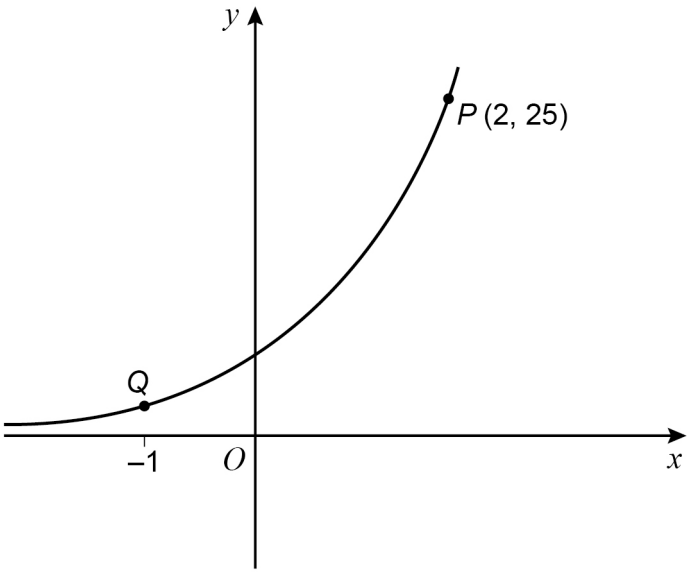
$w =$ _____ °

Do not write outside the box

28 The equation of a curve is $y = a^x$ where a is a positive constant.

P (2, 25) is a point on the curve.

Q is a point on the curve with x-coordinate -1



Work out the y-coordinate of Q.

Give your answer as a decimal.

[3 marks]

Answer _____

6

Turn over ►

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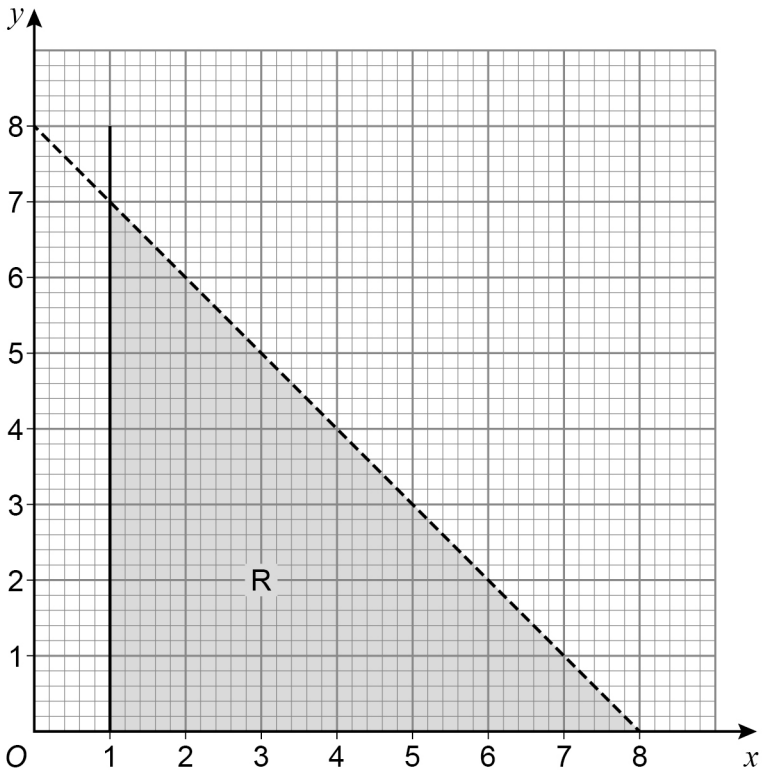
29 The diagram shows a shaded region, R, that satisfies three inequalities.



29 (a) Write down the three inequalities.

[3 marks]

Answer _____

_____

_____

29 (b) x and y are **integers** such that $y > x$

Work out the coordinates of the point in R where $x + y$ has its smallest value.

[2 marks]

Answer(_____ , _____)

Do not write outside the box

30 One lap of a track has length 6.2 kilometres to the nearest 100 metres.
A car completes the lap in 118 seconds to the nearest second.

Is the upper bound of the average speed **less** than 54 metres per second?
You **must** show your working.

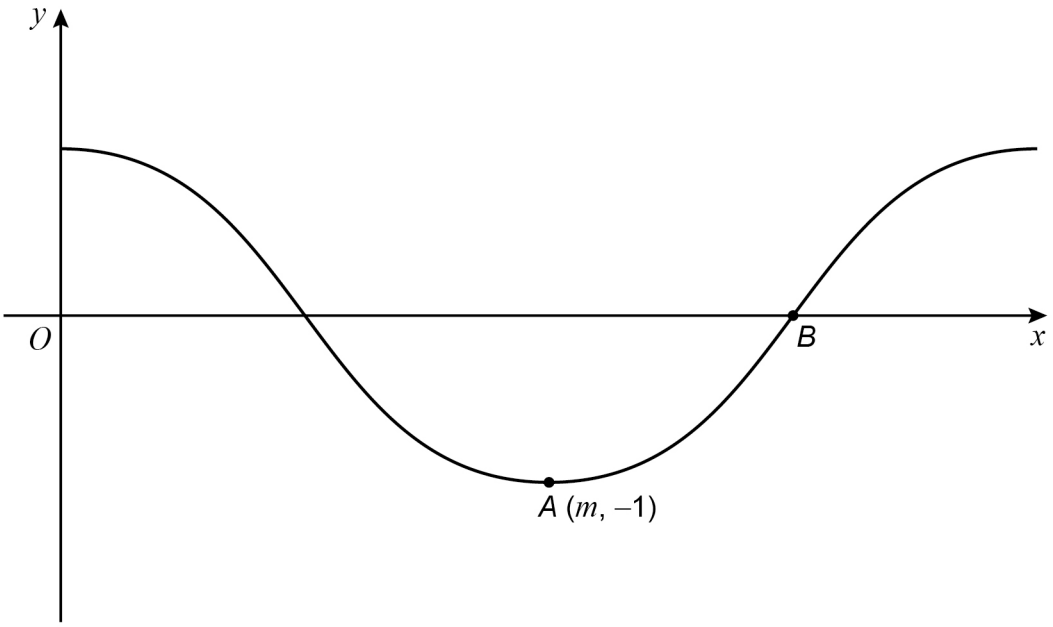
[3 marks]

Turn over for the next question

8

Do not write outside the box

31 Here is a sketch of part of the curve $y = \cos x$



31 (a) Write down the value of m.

[1 mark]

$m =$ _____ °

31 (b) Write down the coordinates of point *B*.

[1 mark]

Answer(_____ , _____)

31 (c) Work out the value of x between 360° and 540° for which $\cos x = -0.5$

[2 marks]

_____

_____

$x =$ _____ °

Do not write outside the box

32 A quadratic curve has

minimum point (2, −1)

y-intercept (0, 11)

The equation of the curve can be written in the form $y = d(x - e)^2 + f$

Work out the values of d, e and f.

[4 marks]

$d =$ _____ $e =$ _____ $f =$ _____

8

Do not write outside the box

33 $8^{\frac{2}{3}} \times 2^{-a} = 4^x$

Work out an expression for x in terms of a.

[4 marks]

Answer _____

END OF QUESTIONS

4

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