Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

MATHEMATICS **0580/41**

Paper 4 (Extended) **October/November 2015**

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 130.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **16** printed pages.

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CAMBRIDGE International Examinations

1 **(a)** Luc is painting the doors in his house.
He uses $\frac{3}{4}$ of a tin of paint for each door.

View solution

Work out the least number of tins of paint Luc needs to paint 7 doors.

Answer(a) ..... [3]

(b) Jan buys tins of paint for $17.16 each.
He sells the paint at a profit of 25%.

View solution

For how much does Jan sell each tin of paint?

Answer(b) $ ..... [2]

(c) The cost of $17.16 for each tin of paint is 4% more than the cost in the previous year.

View solution

Work out the cost of each tin of paint in the previous year.

Answer(c) $ ..... [3]

(d) In America a tin of paint costs $17.16 .
In Italy the same tin of paint costs €13.32 .
The exchange rate is $1 = €0.72 .

View solution

Calculate, in dollars, the difference in the cost of the tin of paint.

Answer(d) $ ..... [2]

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(e) Paint is sold in cylindrical tins of height 11 cm.
Each tin holds 750 ml of paint.

View solution

(i) Write 750 ml in cm^3.

Answer(e)(i) ..... cm^3 [1]

(ii) Calculate the radius of the tin.
Give your answer correct to 1 decimal place.

View solution

Answer(e)(ii) ..... cm [3]

(iii) A mathematically similar tin has a height of 22 cm.

How many **litres** of paint does this tin hold?

View solution

Answer(e)(iii) ..... litres [2]

(f) The mass of a tin of paint is 890 grams, correct to the nearest 10 grams.

Work out the upper bound of the total mass of 10 tins of paint.

View solution

Answer(f) ..... g [1]

(g) The probability that a tin of paint is dented is 0.07 .

Out of 3000 tins of paint, how many would you expect to be dented?

View solution

Answer(g) ..... [2]

(h) Tins of paint are filled at the rate of 2 m^3 per minute.

How many 750 ml tins of paint can be filled in 1 hour?

View solution

Answer(h) ..... [3]

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2 **(a)** Calculate $2^{0.7}$.

View solution

Answer(a) ..... [1]

(b) Find the value of x in each of the following.

View solution

(i) $2^x = 128$

Answer(b)(i) x = ... [1]

(ii) $2^x \times 2^9 = 2^{13}$

View solution

Answer(b)(ii) x = ... [1]

(iii) $2^9 \div 2^x = 4$

View solution

Answer(b)(iii) x = ... [1]

(iv) $2^x = \sqrt[3]{2}$

View solution

Answer(b)(iv) x = ... [1]

(c) **(i)** Complete this table of values for $y = 2^x$.

View solution

x	–3	–2	–1	0	1	2	3
y	0.125		0.5		2	4	8

[2]

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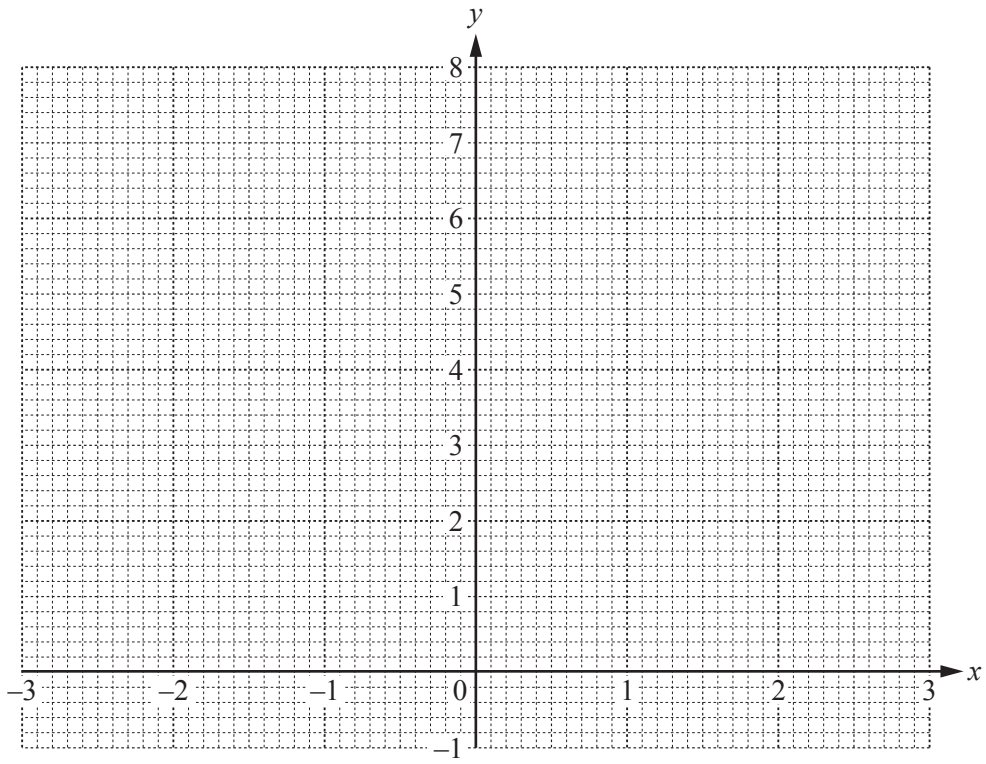
(ii) On the grid, draw the graph of $y = 2^x$ for $-3 \leqslant x \leqslant 3$.

View solution



[4]

(iii) Use your graph to solve $2^x = 5$.

View solution

Answer(c)(iii) $x =$ ..... [1]

(iv) Find the equation of the line joining the points (1, 2) and (3, 8).

View solution

Answer(c)(iv) ..... [3]

(v) By drawing a suitable line on your graph, solve $2^x - 2 - x = 0$.

View solution

Answer(c)(v) $x =$ ..... or $x =$ ..... [2]

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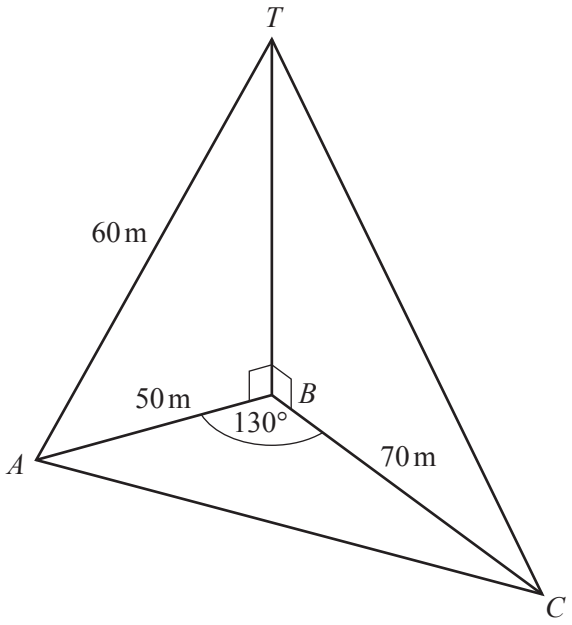
3 (a)



NOT TO SCALE

A, B and C are points on horizontal ground.
BT is a vertical pole.
$AT = 60$ m, $AB = 50$ m, $BC = 70$ m and angle $ABC = 130°$.

(i) Calculate the angle of elevation of T from C.

Answer(a)(i) ..... [5]

(ii) Calculate the length AC.

Answer(a)(ii) AC = ... m [4]

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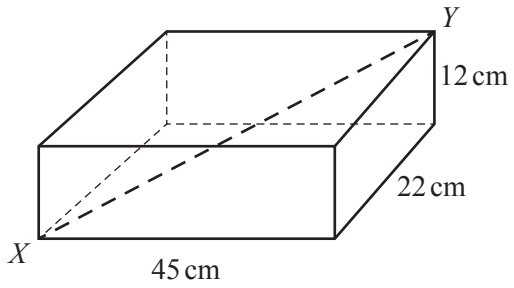
(iii) Calculate the area of triangle *ABC*.

View solution

Answer(a)(iii) ..... m^2 [2]

View solution

(b)



NOT TO SCALE

A cuboid has length 45 cm, width 22 cm and height 12 cm.

Calculate the length of the straight line *XY*.

Answer(b) XY = ... cm [4]

4 Ali buys x rose bushes and y lavender bushes.

He buys:
- at least 5 rose bushes
- at most 8 lavender bushes
- at most 15 bushes in total
- more lavender bushes than rose bushes.

(a) (i) Write down four inequalities, in terms of x and/or y, to show this information.

View solution

Answer(a)(i) .....

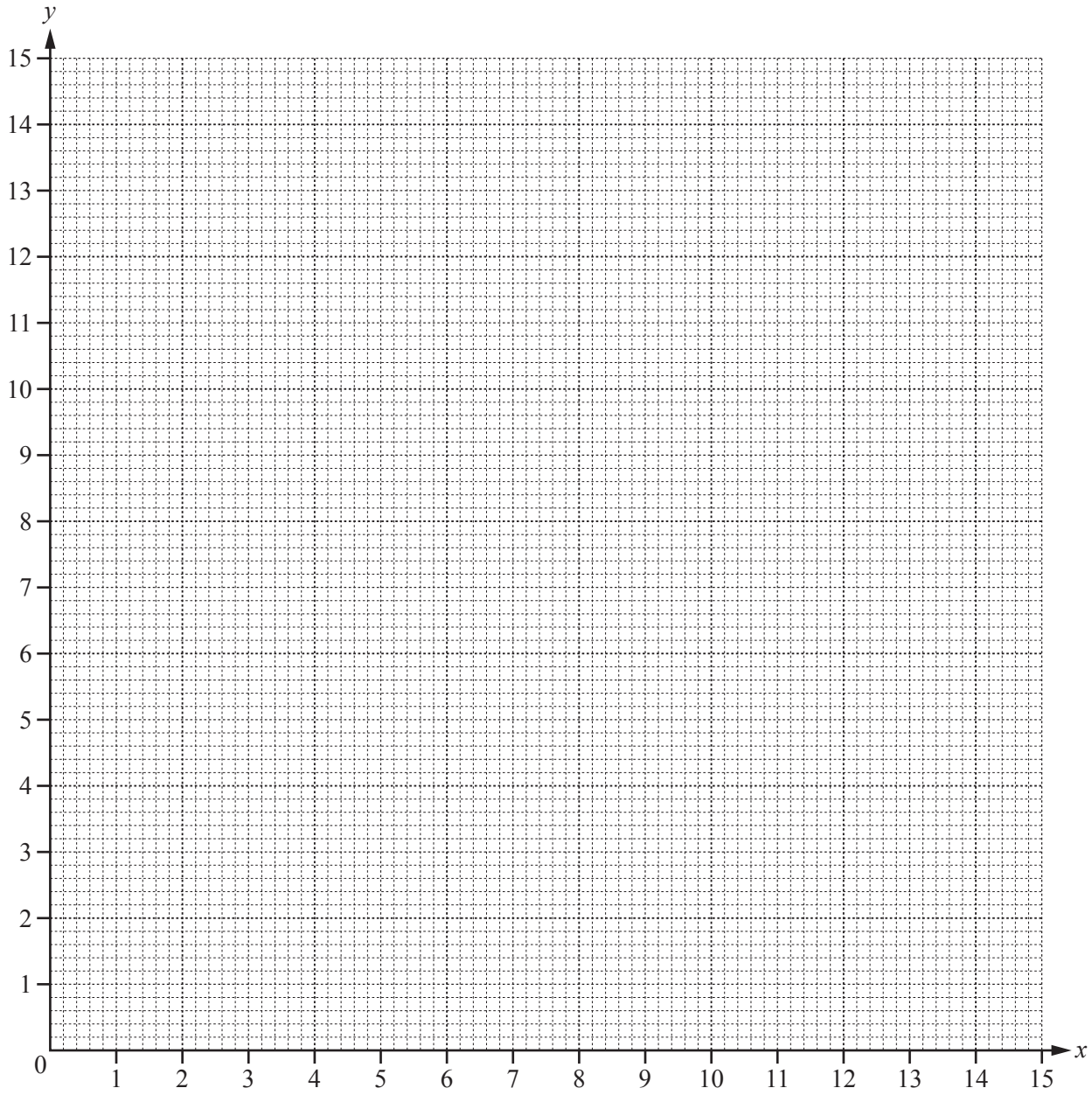
.....

.....

..... [4]

(ii) On the grid, show the information in **part (a)(i)** by drawing four straight lines. Label the region R where all four inequalities are true.

View solution



[5]

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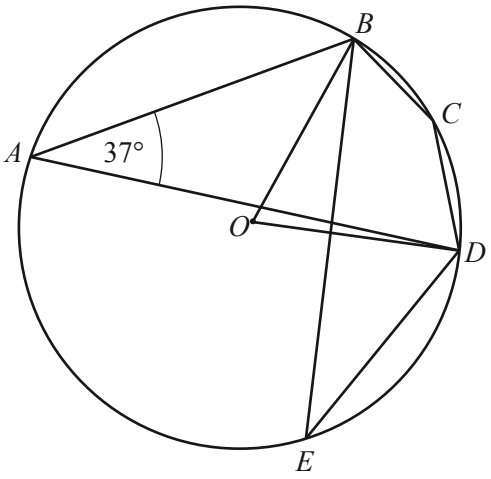
(b) Rose bushes cost \$6 each and lavender bushes cost \$4.50 each.

What is the greatest amount of money Ali could spend?

View solution

Answer(b) \$ ..... [2]

5



NOT TO SCALE

A, *B*, *C*, *D* and *E* are points on the circle, centre *O*.
Angle *BAD* = 37°.

Complete the following statements.

(a) Angle *BED* = ... because .....

View solution

..... [2]

(b) Angle *BOD* = ... because .....

View solution

..... [2]

(c) Angle *BCD* = ... because .....

View solution

..... [2]

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6 120 students take a mathematics examination.

(a) The time taken, m minutes, for each student to answer question 1 is shown in this table.

Time (m minutes)	$0 < m \leqslant 1$	$1 < m \leqslant 2$	$2 < m \leqslant 3$	$3 < m \leqslant 4$	$4 < m \leqslant 5$	$5 < m \leqslant 6$
Frequency	72	21	9	11	5	2

Calculate an estimate of the mean time taken.

View solution

Answer(a) ..... min [4]

(b) **(i)** Using the table in **part (a)**, complete this cumulative frequency table.

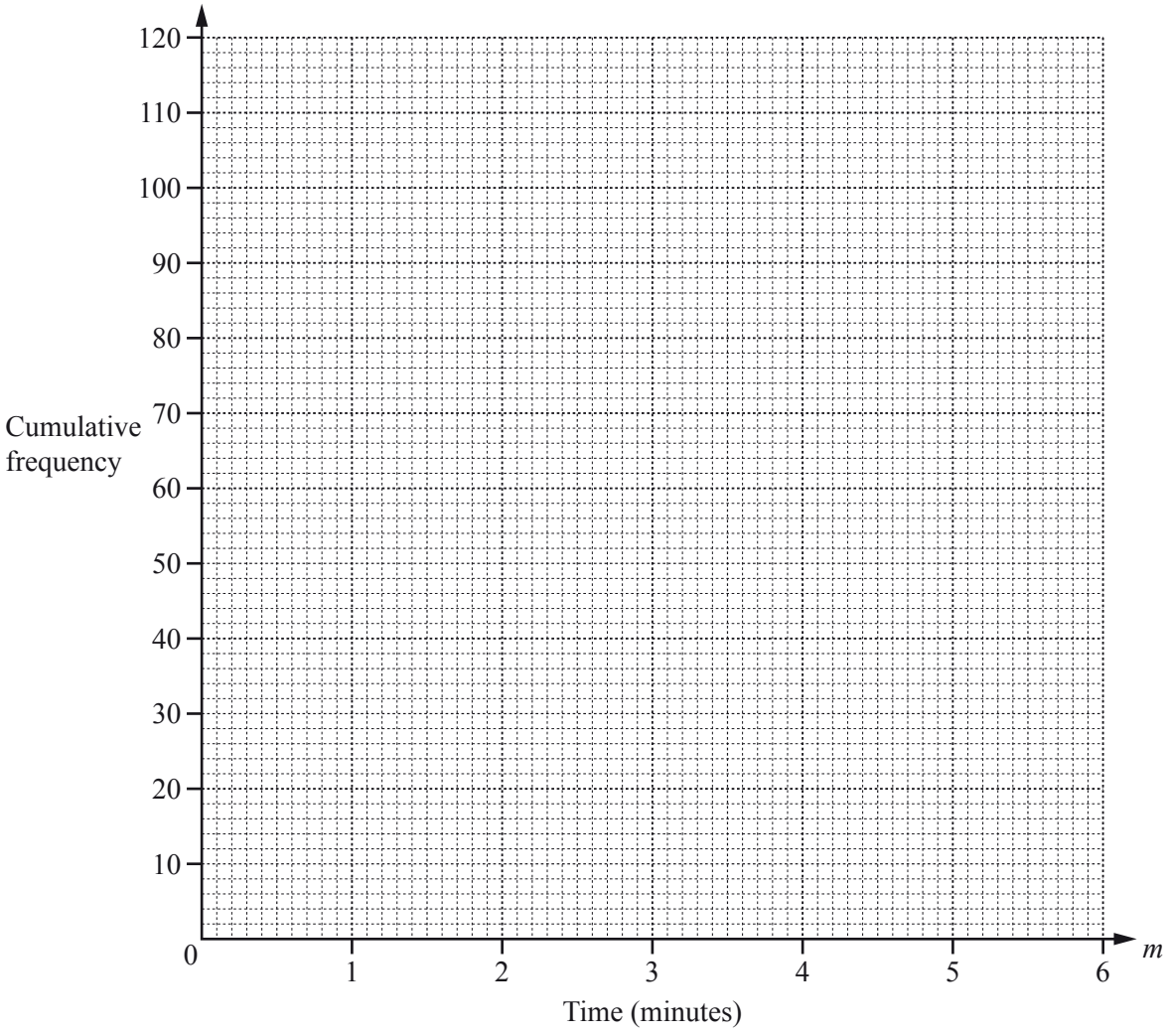
View solution

Time (m minutes)	$m \leqslant 1$	$m \leqslant 2$	$m \leqslant 3$	$m \leqslant 4$	$m \leqslant 5$	$m \leqslant 6$
Cumulative frequency	72					120

[2]

(ii) Draw a cumulative frequency diagram to show the time taken.

View solution



[3]

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(iii) Use your cumulative frequency diagram to find

(a) the median,

Answer(b)(iii)(a) ..... min [1]

(b) the inter-quartile range,

View solution

Answer(b)(iii)(b) ..... min [2]

(c) the 35th percentile.

Answer(b)(iii)(c) ..... min [2]

View solution

(c) A new frequency table is made from the table shown in **part (a)**.

Time (m minutes)	$0 < m \leqslant 1$	$1 < m \leqslant 3$	$3 < m \leqslant 6$
Frequency	72		

(i) Complete the table above. [2]

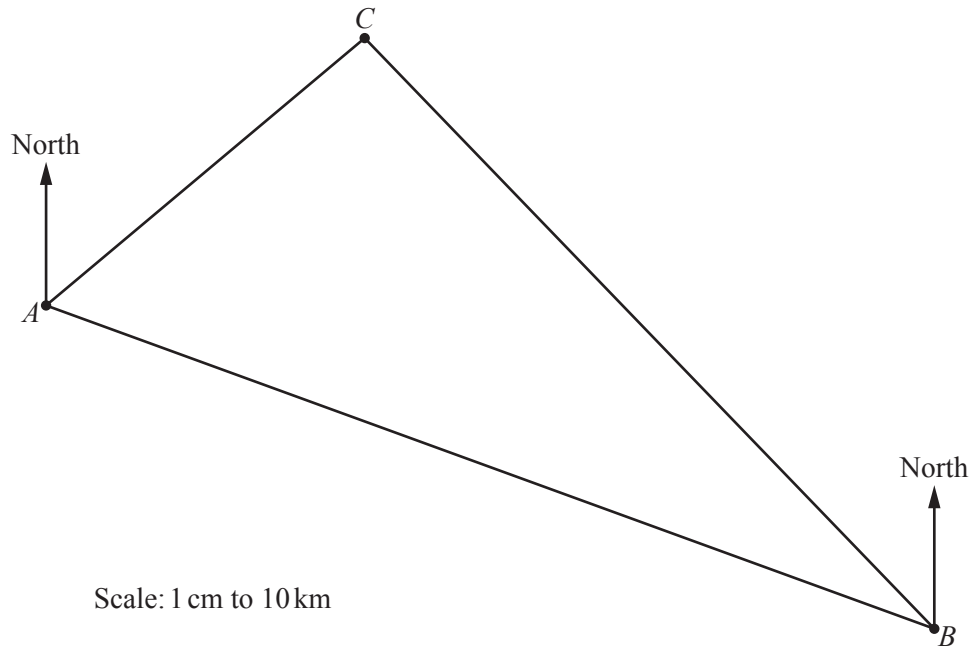
(ii) A histogram was drawn and the height of the first block representing the time $0 < m \leqslant 1$ was 3.6 cm.

Calculate the heights of the other two blocks.

View solution

Answer(c)(ii) ..... cm and ..... cm [3]

7 The scale drawing shows the positions of three towns A, B and C on a map.
The scale of the map is 1 centimetre represents 10 kilometres.



(a) Find the actual distance AB.

View solution

Answer(a) ..... km [1]

(b) Measure the bearing of A from B.

View solution

Answer(b) ..... [1]

(c) Write the scale 1 cm to 10 km in the form 1 : n.

View solution

Answer(c) 1 : ..... [1]

(d) A national park lies **inside** the triangle ABC.
The four boundaries of the national park are

- equidistant from C and B
- equidistant from AC and CB
- 15 km from CB
- along AB.

View solution

On the scale drawing, shade the region which represents the national park.
Leave in your construction arcs. [7]

(e) On the scale drawing, a lake inside the national park has area 0.4 cm^2.

View solution

Calculate the actual area of the lake.

Answer(e) ..... km^2 [2]

8 **(a)** Factorise $x^2 - 3x - 10$.

View solution

Answer(a) ..... [2]

(b) **(i)** Show that $\frac{x+2}{x+1} + \frac{3}{x} = 3$ simplifies to $2x^2 - 2x - 3 = 0$.

View solution

Answer(b)(i)

[3]

(ii) Solve $2x^2 - 2x - 3 = 0$.
Give your answers correct to 3 decimal places.
Show all your working.

View solution

Answer(b)(ii) x = ... or x = ... [4]

(c) Simplify $\frac{2x+3}{x+2} - \frac{x}{x+1}$.

View solution

Answer(c) ..... [4]

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9 The first three diagrams in a sequence are shown below.
The diagrams are made by drawing lines of length 1 cm.

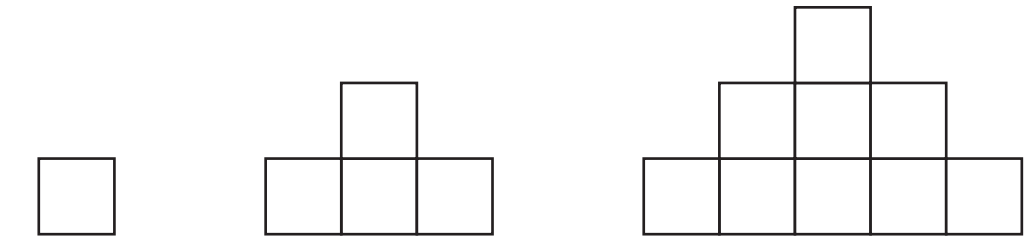

Diagram 1 Diagram 2 Diagram 3

(a) The areas of each of the first three diagrams are shown in this table.

View solution

Diagram	1	2	3
Area (cm^2)	1	4	9

(i) Find the area of Diagram 4.

Answer(a)(i) ..... cm^2 [1]

(ii) Find, in terms of n, the area of Diagram n.

View solution

Answer(a)(ii) ..... cm^2 [1]

(b) The numbers of 1 cm lines needed to draw each of the first three diagrams are shown in this table.

View solution

Diagram	1	2	3
Number of 1 cm lines	4	13	26

(i) Find the number of 1 cm lines needed to draw Diagram 4.

Answer(b)(i) ..... [1]

(ii) In which diagram are 118 lines of length 1 cm needed?

View solution

Answer(b)(ii) ..... [1]

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(c) The **total** number of 1 cm lines needed to draw both Diagram 1 and Diagram 2 is 17.
The **total** number of 1 cm lines needed to draw all of the first n diagrams is

View solution

$$\frac{2}{3}n^3 + an^2 + bn.$$

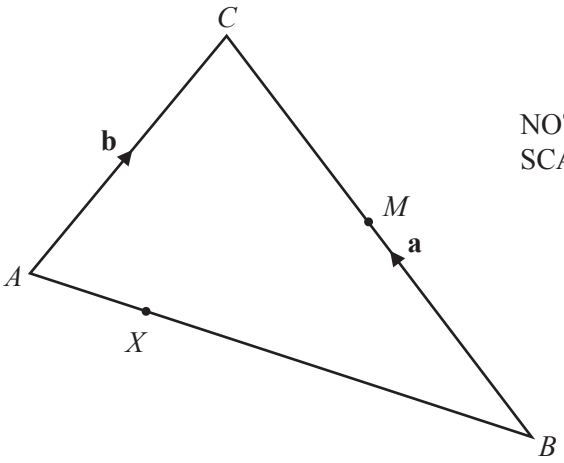
Find the value of a and the value of b.
Show all your working.

Answer(c) a = ...

b = ... [6]

Question 10 is printed on the next page.

10



NOT TO SCALE

$\overrightarrow{BC} = \mathbf{a}$ and $\overrightarrow{AC} = \mathbf{b}$.

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

View solution

Answer(a) $\overrightarrow{AB}$ = ... [1]

(b) M is the midpoint of BC.
X divides AB in the ratio 1 : 4.

View solution

Find $\overrightarrow{XM}$ in terms of **a** and **b**.
Show all your working and write your answer in its simplest form.

Answer(b) $\overrightarrow{XM}$ = ... [4]

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