UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

6596303759

MATHEMATICS **0580/31**

Paper 3 (Core) **May/June 2010**

2 hours

Candidates answer on the Question Paper.

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

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 a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, 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 104.

This document consists of **12** printed pages.

1 The population of a village is 2250.

(a) 32% of the population are children.
Calculate the number of children in the village.

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

(b) 360 people in the village are over the age of 60.

(i) For these 360 people, the ratio of men to women is 2 : 7.
Calculate how many men are over the age of 60.

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

(ii) Write 360 as a fraction of 2250 in its lowest terms.

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

(c) The population of 2250 is expected to increase by 18% next year.
Calculate the expected population next year.

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

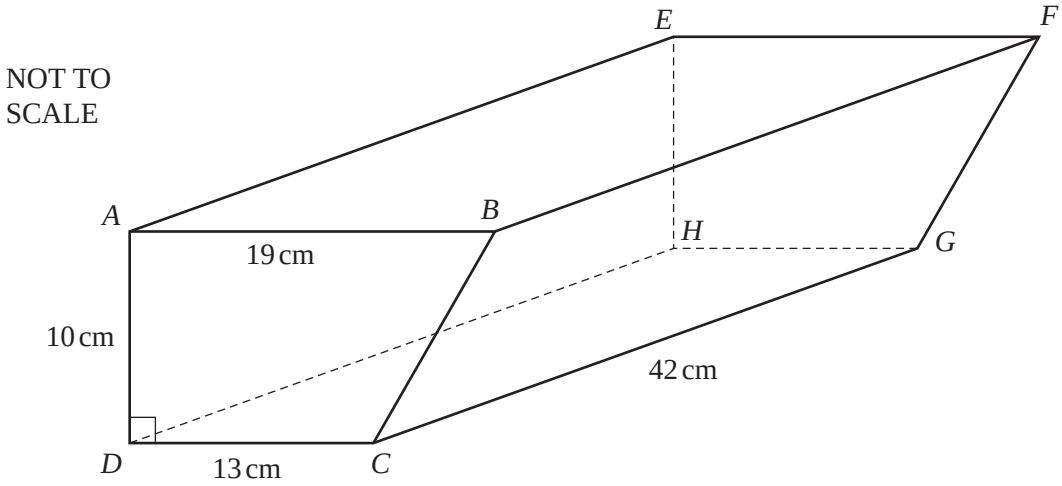
(d) Write the number 2250 in standard form.

Answer(d) ..... [1]

(e) Another village has a population of 1770, correct to the nearest ten.
Write down the lower bound for the population of this village.

Answer(e) ..... [1]

2



The diagram shows a block of stone in the shape of a prism of length 42 cm.
The cross-section is a trapezium $ABCD$.
$AB = 19$ cm, $AD = 10$ cm, $DC = 13$ cm and angle $ADC = 90°$.

(a) Calculate

(i) the perimeter of the rectangular face $ABFE$,

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

(ii) the area of the cross-section $ABCD$,

Answer(a)(ii) ..... cm^2 [3]

(iii) the volume of the block of stone.

Answer(a)(iii) ..... cm^3 [2]

(b) The mass of 1 cubic centimetre of the stone is 4 grams.
Calculate the mass of the block.
Give your answer in kilograms.

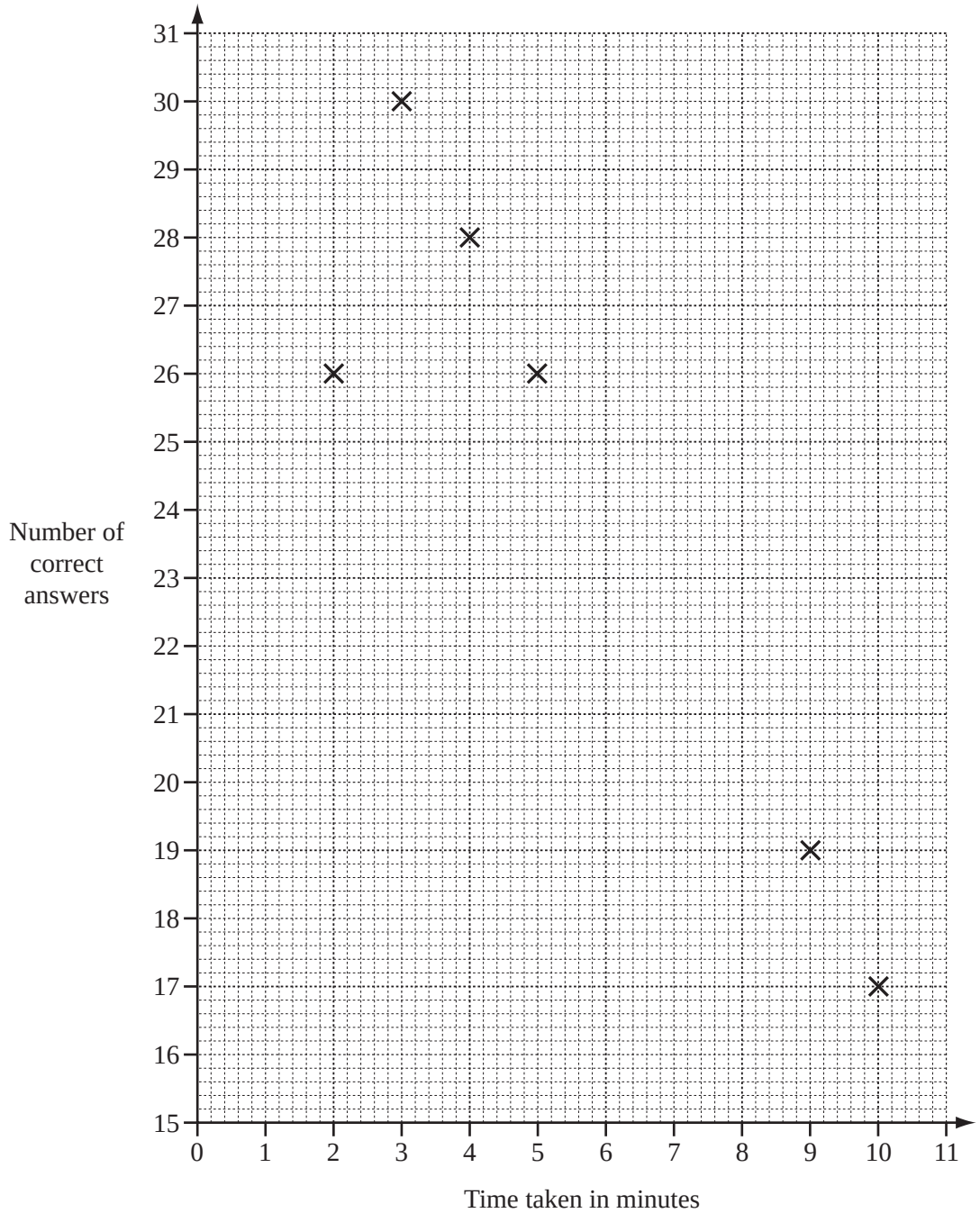
Answer(b) ..... kg [3]

3 Twelve students each answer 30 questions in a quiz.

The time taken and the number of correct answers for each student is given in the table.

Time taken in minutes	9	4	5	10	3	2	8	8	4	5	6	7
Number of correct answers	19	28	26	17	30	26	25	20	23	21	24	22

(a) Complete the scatter diagram below to show this information.
The first six points have been plotted for you.



[3]

(b) What type of correlation does the scatter diagram show?

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

(c) **(i)** Find the range of the **time taken**.

Answer(c)(i) ..... min [1]

(ii) Calculate the mean time taken.

Answer(c)(ii) ..... min [3]

(d) **(i)** Find the mode for the **number of correct answers**.

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

(ii) Find the median for the number of correct answers.

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

(e) One of the 12 students is selected at random.

Write down the probability that the student

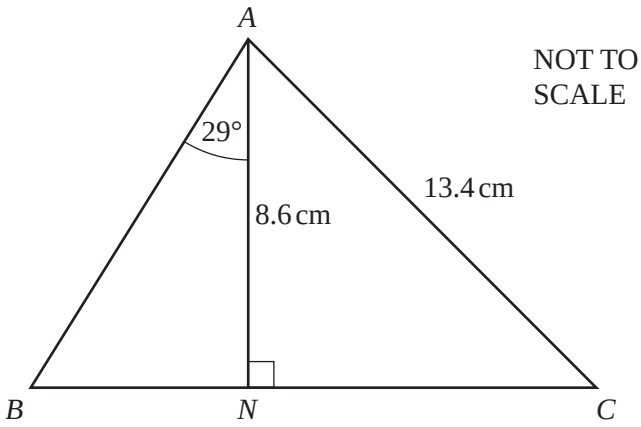
(i) took more than 8 minutes to answer the quiz,

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

(ii) took less than 5 minutes **and** had more than 24 correct answers.

Answer(e)(ii) ..... [2]

4



In triangle ABC, $AN = 8.6$ cm and is perpendicular to BC.

Angle $BAN = 29°$ and $AC = 13.4$ cm.

(a) Use trigonometry to calculate

(i) the length of BN,

Answer(a)(i) $BN =$ ..... cm [3]

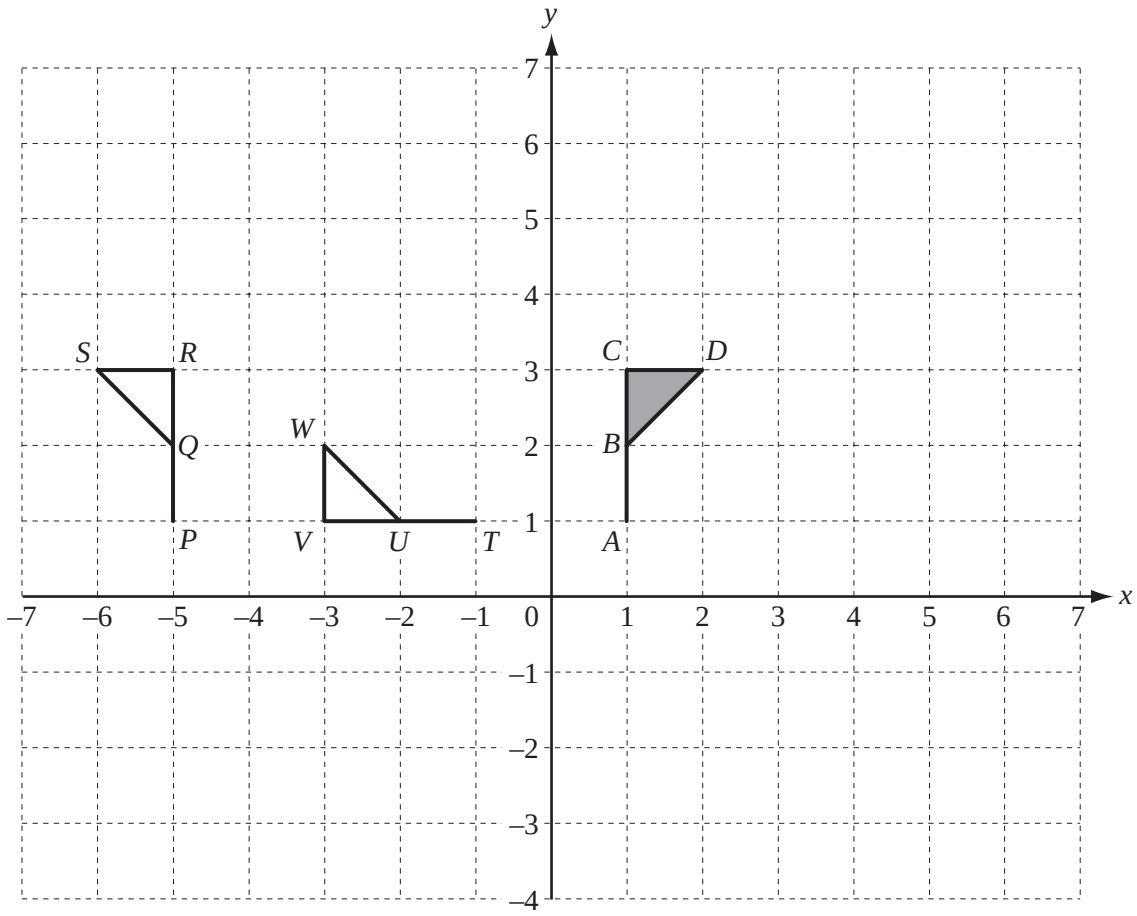
(ii) angle CAN.

Answer(a)(ii) Angle $CAN =$ ..... [2]

(b) Calculate the length of NC.

Answer(b) $NC =$ ..... cm [3]

5



(a) On the grid, draw the image of

(i) the flag *ABCD* after translation by $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$, [2]

(ii) the flag *ABCD* after enlargement, scale factor 2, centre the origin, [2]

(iii) the flag *ABCD* after reflection in the *x*-axis. [2]

(b) Describe fully the **single** transformation which maps *ABCD* onto *PQRS*.

..... [2]

(c) Describe fully the **single** transformation which maps *ABCD* onto *TUVW*.

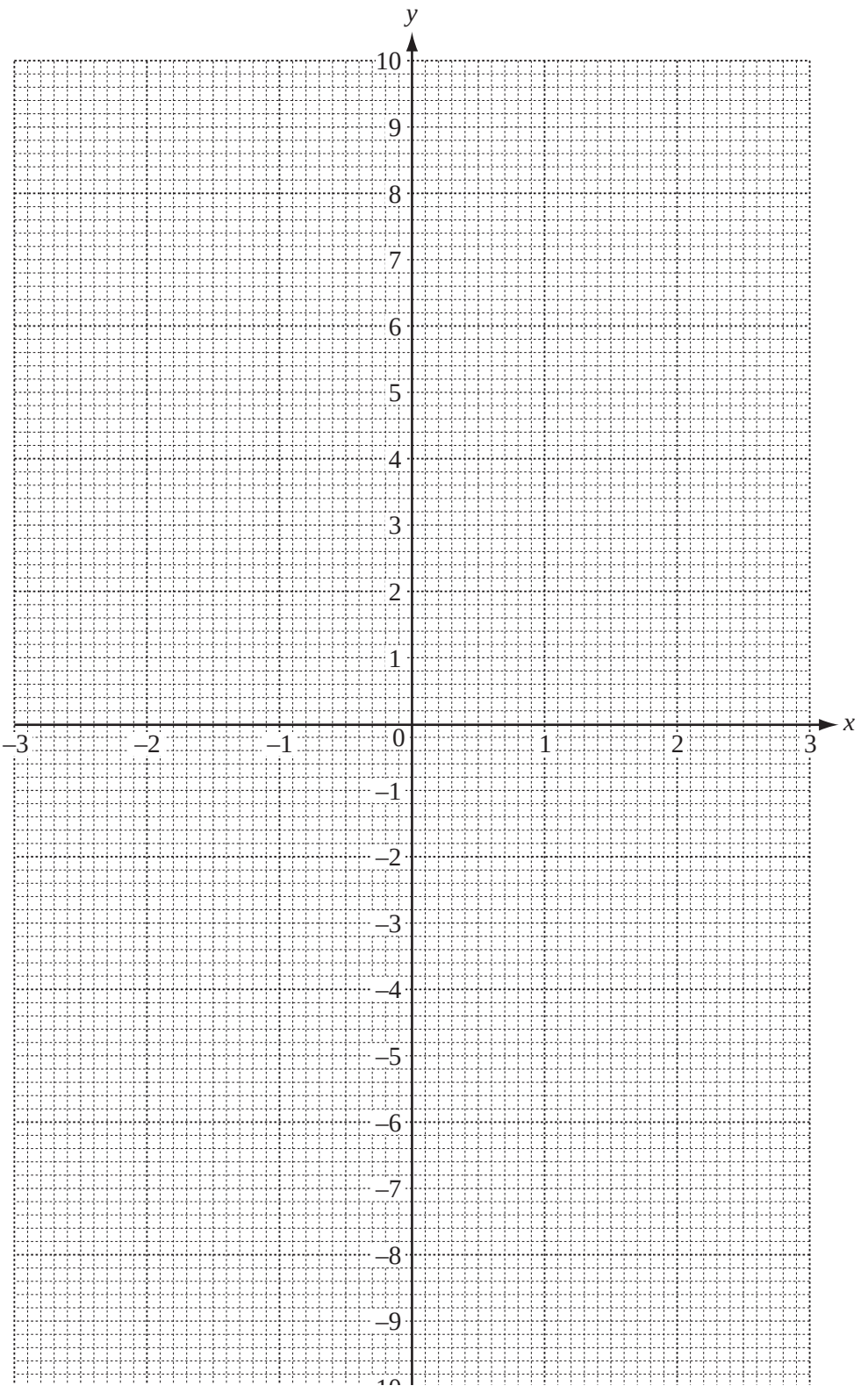
..... [3]

6 **(a)** Complete the table of values for the function $y = \frac{3}{x}$, $x \neq 0$.

x	–3	–2.5	–2	–1.5	–1	–0.5	–0.3		0.3	0.5	1	1.5	2	2.5	3
y	–1	–1.2		–2	–3	–6					3	2	1.5		1

[3]

(**b**) On the grid below, draw the graph of $y = \frac{3}{x}$ for $-3 \leqslant x \leqslant -0.3$ and $0.3 \leqslant x \leqslant 3$.



[5]

(c) Use your graph to solve the equation $\frac{3}{x} = 7$.

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

(d) Complete the table of values for $y = \frac{2x}{3} - 1$.

x	–3	0	3
y			

[2]

(e) On the grid, draw the straight line $y = \frac{2x}{3} - 1$ for $-3 \leqslant x \leqslant 3$. [2]

(f) Write down the co-ordinates of the points where the line $y = \frac{2x}{3} - 1$ intersects the graph of $y = \frac{3}{x}$.

Answer(f) (..... , ...) and (..... , ...) [2]

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7 $S = a + 4d$

(a) Find S when $a = 17$ and $d = -5$.

Answer(a) $S =$ ..... [2]

(b) Find d when $S = 37$ and $a = 5$.

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

(c) Make d the subject of the formula $S = a + 4d$.

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

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8 In this question give all your answers to 2 decimal places.

(a) Ankuri lends her brother $275 for 4 years at a rate of 3.6% per year **simple** interest. Calculate the total amount her brother owes after 4 years.

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

(b) Monesh invests $650 in a bank which pays 4% per year **compound** interest. Calculate the amount Monesh will have after 2 years.

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

(c) Theresa and Ian have 400 euros (€) each.

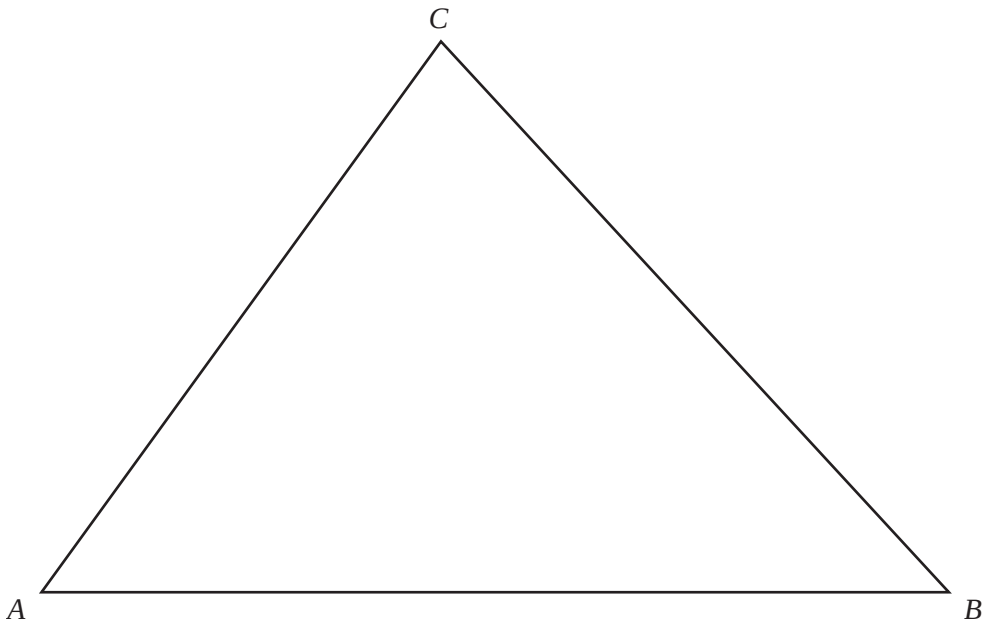
(i) Theresa changes her €400 for pounds (£) when the exchange rate is €1= £ 0.7857. Calculate the amount she receives.

Answer(c)(i) £ ..... [2]

(ii) Ian changes his €400 for dollars ($) when the exchange rate is $1= € 0.6374. Calculate the amount he receives.

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

9



Triangle *ABC* is drawn accurately.

(a) Measure and write down

(i) the length of *AC*,

Answer(a)(i) *AC* = ... cm [1]

(ii) the size of angle *CAB*.

Answer(a)(ii) Angle *CAB* = ... [1]

(b) Construct accurately the locus of all the points 7 cm from *C*. [2]

(c) The point *X* lies **outside** the triangle *ABC*, with *CX* = 7 cm and angle *BCX*= 67°.
Draw accurately the line *CX*. [2]

(d) Draw the line *BX*. Measure and write down the length of this line.

Answer(d) BX = ... cm [1]

(e) **Using a straight edge and compasses only**, construct the locus of points equidistant from *BC* and from *BX*. [2]

Question 10 is printed on the next page.

10

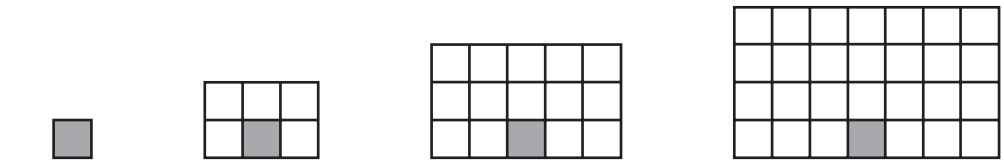


Diagram 1 Diagram 2 Diagram 3 Diagram 4

Look at the sequence of diagrams.

(a) Diagram 2 has a height of 2.

Write down the height of

(i) Diagram 5,

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

(ii) Diagram 10,

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

(iii) Diagram *n*.

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

(b) Diagram 2 has a width of 3.

Find the width of

(i) Diagram 5,

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

(ii) Diagram 10,

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

(iii) Diagram *n*.

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

(c) There are 6 squares in Diagram 2 and 15 squares in Diagram 3.

(i) Write down how many squares there are in Diagram 5.

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

(ii) Explain how this is found from the height and width of the diagram.

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

(iii) Write down, in terms of *n*, how many squares there are in Diagram *n*.

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