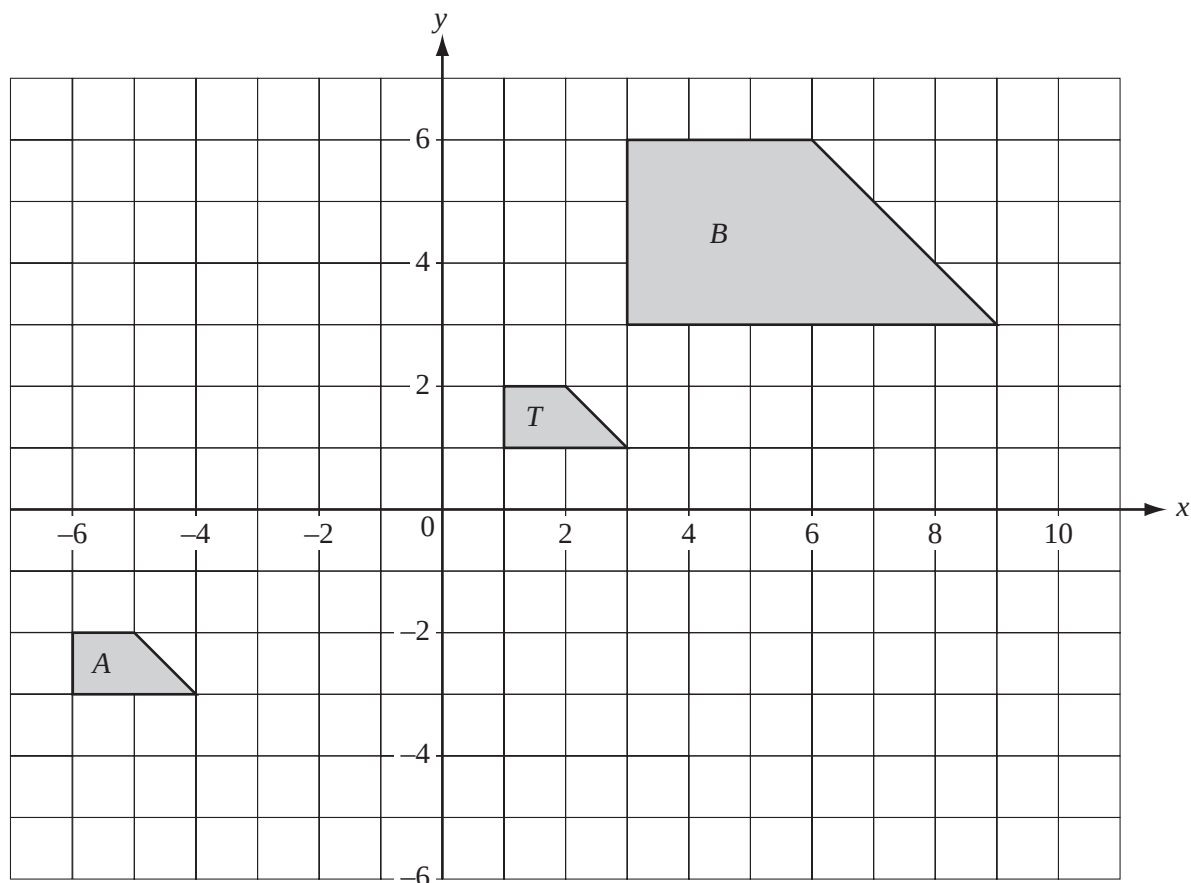




1

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The shapes  $T$ ,  $A$  and  $B$  are drawn on the grid above.

(a) In each case describe fully the **single** transformation which maps

(i)  $T$  onto  $A$ ,

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

(ii)  $T$  onto  $B$ .

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

(b) Draw on the grid the rotation of  $T$  by  $90^\circ$  anticlockwise about  $(0,0)$ .  
Label your answer  $R$ .

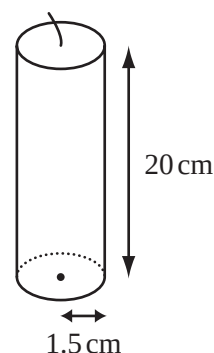
[2]

(c) Draw on the grid the reflection of  $T$  in the line  $y = -2$ .  
Label your answer  $M$ .

[2]

- 2 A candle, made from wax, is in the shape of a cylinder.  
The radius is 1.5 centimetres and the height is 20 centimetres.

- (a) Calculate, correct to the nearest cubic centimetre,  
the volume of wax in the candle.  
[The volume of a cylinder, radius  $r$ , height  $h$ , is  $\pi r^2 h$ .]



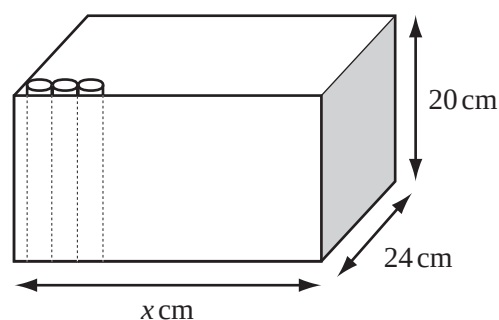
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Answer(a) .....  $\text{cm}^3$  [2]

- (b) The candle burns  $0.8 \text{ cm}^3$  of wax every minute.  
How long, in hours and minutes, will it last?  
Write your answer correct to the nearest minute.

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

- (c) The candles are stored in boxes which  
measure  $x \text{ cm}$  by  $24 \text{ cm}$  by  $20 \text{ cm}$ .  
Each box contains 96 candles.  
Calculate the minimum value of  $x$ .



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

- (d) A shopkeeper pays \$25 for one box of 96 candles. He sells all the candles for 35 cents each.  
(i) How much profit does he make?

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

- (ii) Calculate his profit as a percentage of the cost price.

Answer(d)(ii) ..... % [3]

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- 3 (a) Simplify the expression  $5p - 2q - (p + q)$ .

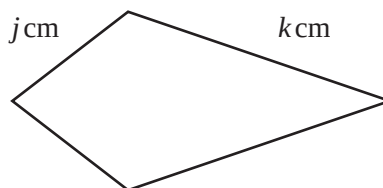
Answer(a) ..... [2]

- (b) Solve the equation  $3(2x - 5) = 27$ .

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

- (c) A kite has sides of length  $j$  cm and  $k$  cm.

- (i) Write down an expression in terms of  $j$  and  $k$  for the perimeter of the kite.



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

- (ii) The perimeter of the kite is 72 centimetres.  
Write down an equation in  $j$  and  $k$ .

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

- (iii) If  $k = 2j$ , find the value of  $k$ .

Answer(c)(iii)  $k =$  ..... [2]

- (d) (i) Use the formula  $w = \frac{s-t}{r}$  to find the value of  $w$  when  $s = \frac{5}{6}$ ,  $t = \frac{2}{3}$  and  $r = \frac{1}{2}$ .

Show all your working clearly.

Answer(d)(i) ..... [3]

- (ii) Rearrange the formula in **part (d)(i)** to find  $s$  in terms of  $w$ ,  $r$  and  $t$ .

Answer(d)(ii)  $s =$  ..... [2]



Diagram 1



Diagram 2

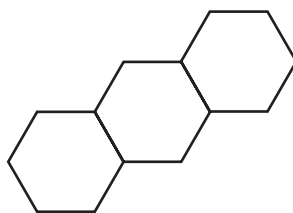


Diagram 3

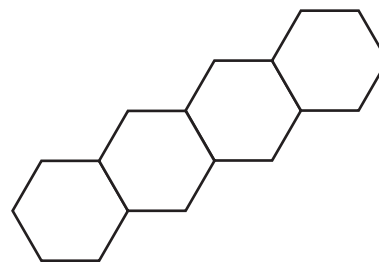


Diagram 4

The diagrams show a sequence of regular hexagons.  
Sticks of equal length are used to make the hexagons.

- (a) Complete the table for the number of sticks in each diagram.

| Diagram | 1 | 2  | 3 | 4 | 5 |
|---------|---|----|---|---|---|
| Sticks  | 6 | 11 |   |   |   |

[3]

- (b) How many sticks are there in the 20th diagram?

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

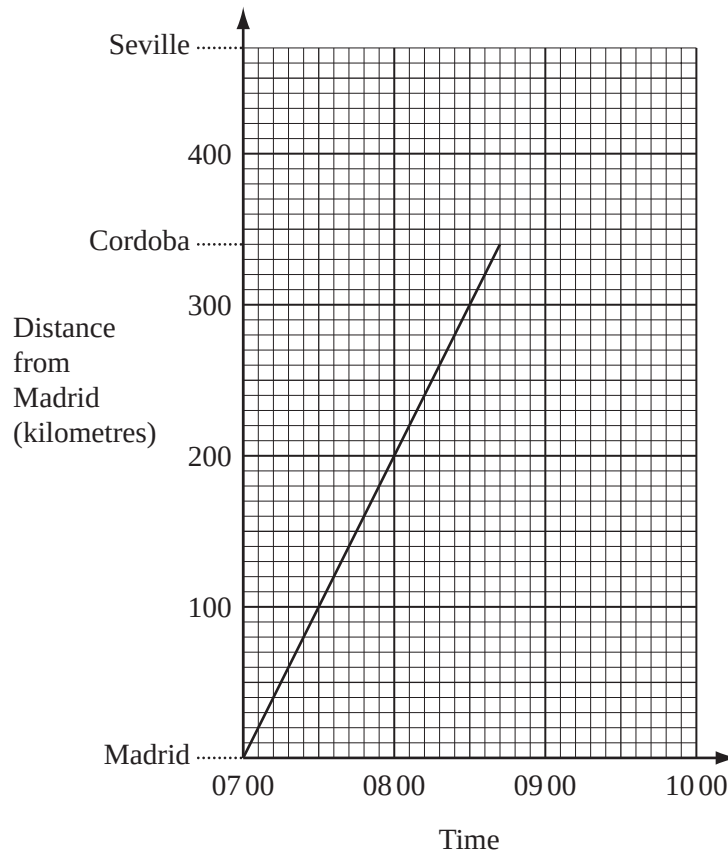
- (c) How many sticks are there in the  $n$ th diagram?

Answer(c) ..... [2]

- (d) How many hexagons are there in a diagram which has 186 sticks?

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

- 5 A train leaves Madrid at 07 00 and travels to Cordoba, a distance of 340 kilometres. The distance-time graph shows the journey.



- (a) Find the average speed of the train from Madrid to Cordoba, in kilometres per hour.

Answer(a) ..... km/h [2]

- (b) The train stops for 12 minutes at Cordoba. It then continues its journey at the same average speed to Seville.

(i) Complete the graph to show its journey. [2]

- (ii) At what time does it arrive in Seville?

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

- (c) Another train leaves Seville at 07 30 and travels, without stopping, to Madrid. This train arrives in Madrid at 09 45.

(i) Draw a line on the grid to show this journey. [2]

- (ii) How far from Madrid are the two trains when they pass each other?

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

- (iii) Calculate the average speed of the train from Seville to Madrid, in kilometres per hour.

Answer(c)(iii) ..... km/h [2]

- 6 Ahmed selected a sample of 10 students from his school and measured their hand spans and heights. The results are shown in the table below.

|                |     |      |      |     |     |     |      |     |      |     |
|----------------|-----|------|------|-----|-----|-----|------|-----|------|-----|
| Hand span (cm) | 15  | 18.5 | 22.5 | 26  | 19  | 23  | 17.5 | 25  | 20.5 | 22  |
| Height (cm)    | 154 | 156  | 164  | 178 | 162 | 170 | 154  | 168 | 168  | 160 |

He calculated the mean hand span to be 20.9 cm and the range of the hand spans to be 11 cm.

(a) Calculate

(i) the mean **height**,

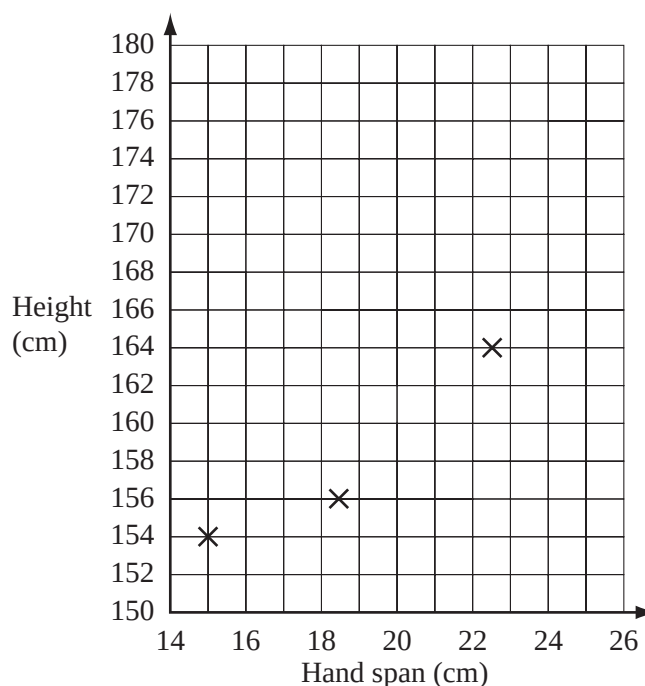
Answer(a)(i) Mean = ..... cm [2]

(ii) the range of the **heights**.

Answer(a)(ii) Range = ..... cm [2]

(b) In order to compare the two measures, he used a scatter diagram.

The first three points are plotted on the grid.



- (i) Complete the scatter diagram by plotting the remaining 7 points. [2]  
 (ii) Draw the line of best fit on the grid. [1]  
 (iii) Use the line of best fit to estimate the height of a student with hand span 21 cm.

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

(iv) Which one of the following words describes the correlation?

Positive      Negative      Zero

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

(v) What does this indicate about the relationship between hand span and height?

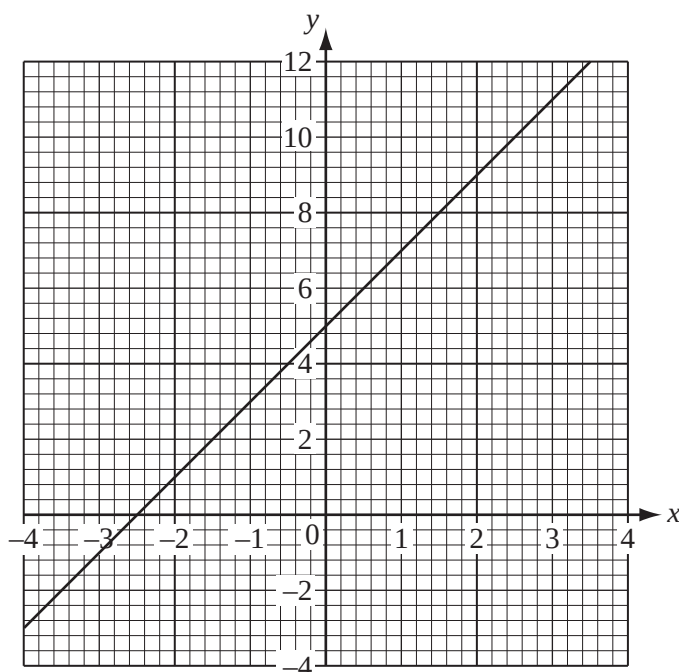
Answer(b)(v) ..... [1]

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- 7 (a) The equation of a straight line is  $y = mx + c$ .  
Which letter in this equation represents the gradient?

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

(b)



Write down the equation of the line shown on the grid above.

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

- (c) Complete the table of values for  $y = 12 - x^2$ .

|     |    |    |    |    |   |    |   |   |    |
|-----|----|----|----|----|---|----|---|---|----|
| $x$ | -4 | -3 | -2 | -1 | 0 | 1  | 2 | 3 | 4  |
| $y$ | -4 | 3  |    | 11 |   | 11 | 8 |   | -4 |

[3]

- (d) On the grid above, draw the graph of  $y = 12 - x^2$ .

[3]

- (e) Write down the coordinates of the points of intersection of the straight line with your curve.

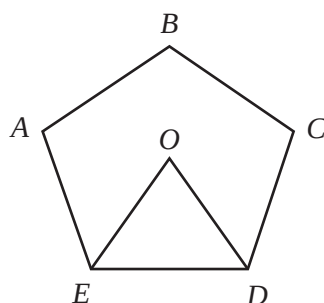
Answer(e) (....., ..... ) and (....., ..... ) [2]

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Use



- 8 (a)  $ABCDE$  is a regular polygon with centre  $O$ .

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- (i) What is the special name for the polygon?  
*Answer(a)(i)* ..... [1]

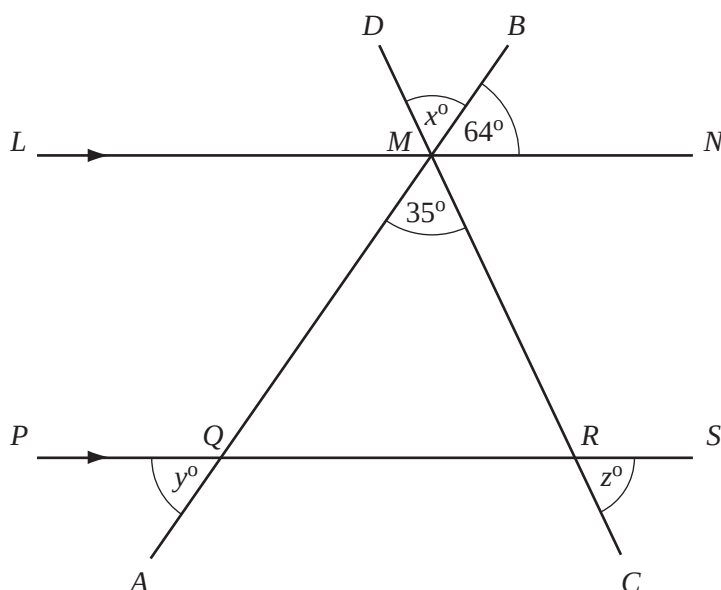
- (ii) Calculate angle  $EOD$ .

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

- (iii) Calculate angle  $AED$ .

*Answer(a)(iii)* Angle  $AED$  = ..... [2]

- (b) In the diagram below,  $AB$  and  $CD$  are straight lines which intersect at  $M$ .  
 $LMN$  and  $PQRS$  are parallel straight lines.  
 Angle  $QMR = 35^\circ$  and angle  $BMN = 64^\circ$ .



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Find the values of  $x$ ,  $y$  and  $z$ .

*Answer(b)*  $x$  = ..... [1]

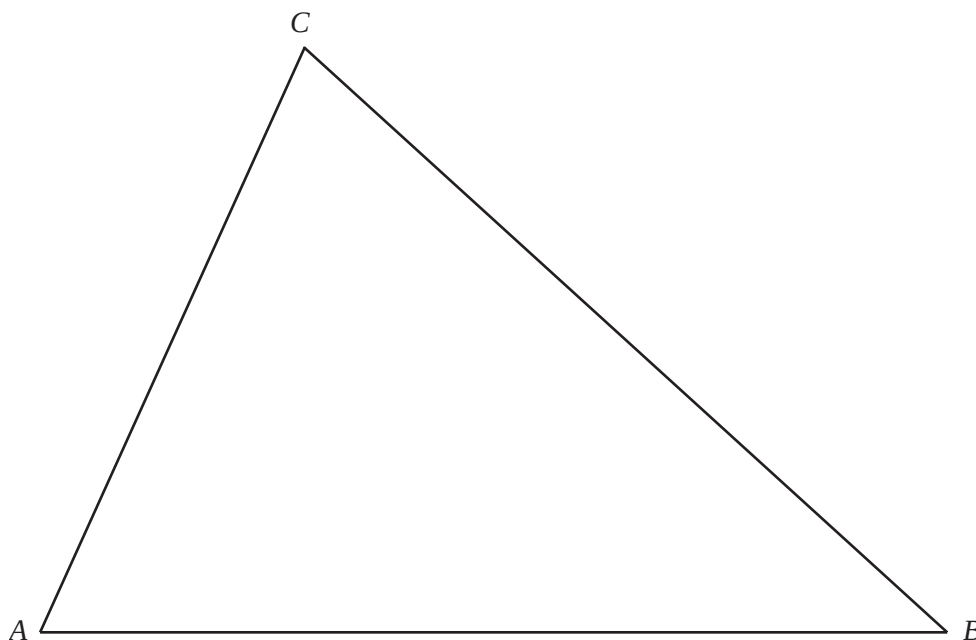
$y$  = ..... [2]

$z$  = ..... [2]

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- 9 A farmer owns a triangular field  $ABC$ .  
A scale diagram of this field is drawn below.  
1 centimetre represents 10 metres.

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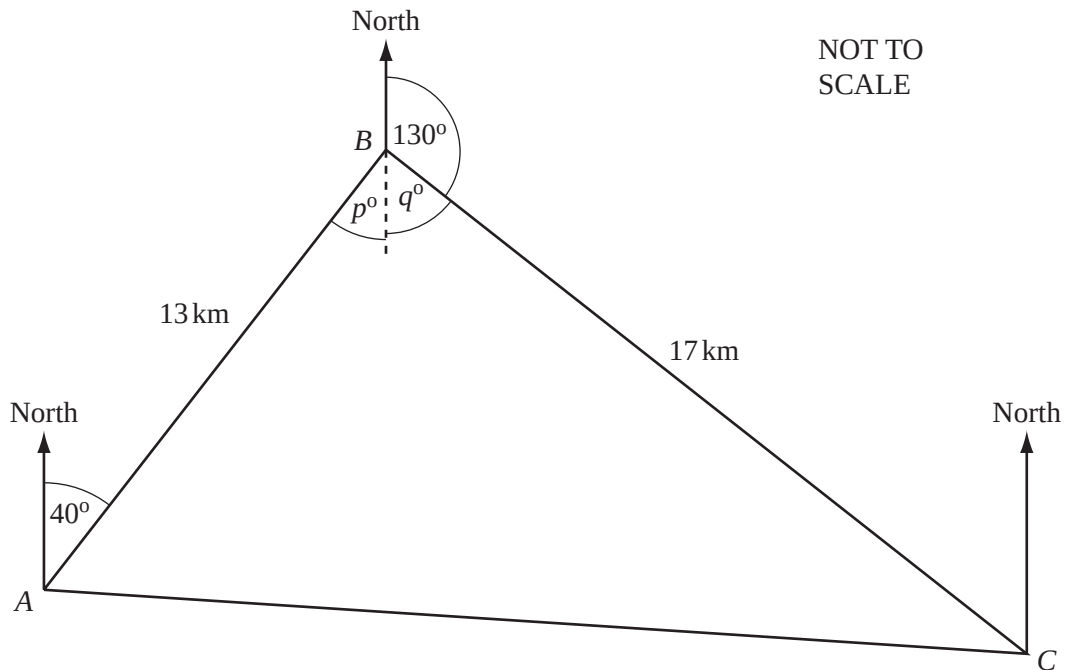
- (a) (i) Complete the following statement.  
The side of the field,  $AC$ , is ..... metres long. [1]
- (ii) Measure, in degrees, the angle  $ACB$ .  
*Answer(a)(ii)* Angle  $ACB$  = ..... [1]

**In the following parts, leave in all your construction lines.**

- (b) The farmer divides the field with a fence from  $A$  to the side  $BC$ .  
Each point on the fence is the same distance from  $AB$  as from  $AC$ .
- (i) Using a straight edge and compasses only, construct the line representing the fence. [2]
- (ii) Write down the length of this fence, in metres.  
*Answer(b)(ii)* ..... m [1]
- (c) He puts another fence along the perpendicular bisector of the side  $AC$ .  
Using a straight edge and compasses only, construct the line representing this fence. [2]
- (d) He decides to keep goats in the region of the field which is closer to  $AC$  than to  $AB$  and closer to  $A$  than to  $C$ .  
Label the region  $G$  in the field where he can keep goats. [2]

- 10 Bashira lives in town  $A$  and works in town  $B$ , which is 13 kilometres from  $A$  on a bearing of  $040^\circ$ . She drives from home to work and then drives to visit her mother who lives in town  $C$ . Town  $C$  is 17 kilometres from  $B$  on a bearing of  $130^\circ$  from  $B$ .

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- (a) By writing down the values of  $p$  and  $q$ , show that angle  $ABC = 90^\circ$ .

Answer(a)  $p = \dots\dots\dots$  and  $q = \dots\dots\dots$  [1]

- (b) Use trigonometry to calculate the size of angle  $ACB$ .

Answer(b) Angle  $ACB = \dots\dots\dots$  [2]

- (c) Calculate the distance  $CA$ .

Answer(c)  $CA = \dots\dots\dots$  km [2]

- (d) Calculate the area of the triangle  $ABC$ .

Answer(d)  $\dots\dots\dots$   $\text{km}^2$  [2]

- (e) Work out the bearing of  $A$  from  $C$ .

Answer(e)  $\dots\dots\dots$  [2]

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