UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MATHEMATICS

Paper 3 (Core)

0580/03 0581/03

Candidates answer on the Question Paper.
Additional Materials: Electronic calculator
Geometrical instruments
Mathematical tables (optional)
Tracing paper (optional)

May/June 2006

2 hours

Candidate Name

Centre Number

Candidate Number

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 THE BARCODE.
DO **NOT** WRITE IN THE GREY AREAS BETWEEN THE PAGES.

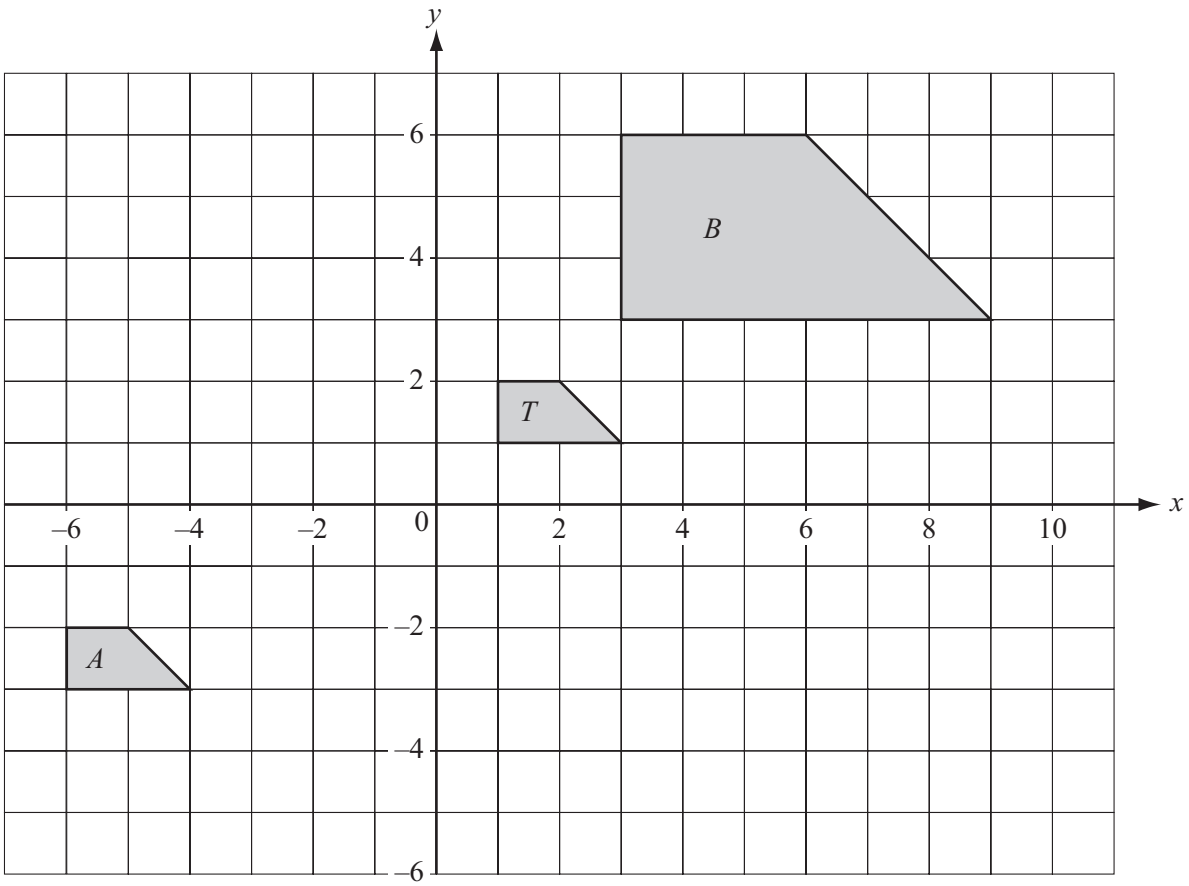
Answer **all** questions.
If working is needed for any question it must be shown below that question.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use

The total number of marks for this paper is 104.
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. Given answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

This document consists of **11** printed pages and **1** blank page.

1



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.

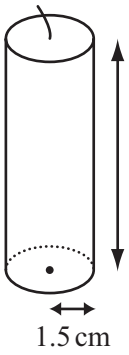
Answer(a)(ii) ..... [3]

(b) Draw on the grid the rotation of T by 90° 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]

For Examiner's Use

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.



NOT TO SCALE

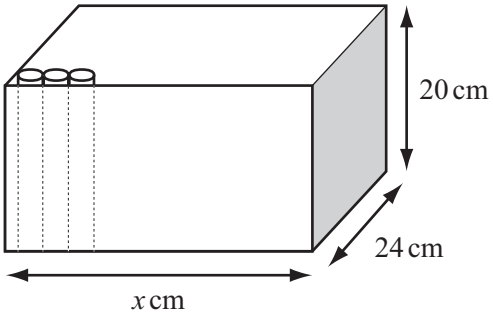
(a) Calculate, correct to the nearest cubic centimetre, the volume of wax in the candle.
[The volume of a cylinder, radius r, height h, is $\pi r^2 h$.]

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

(b) The candle burns 0.8 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 cm by 24 cm by 20 cm.
Each box contains 96 candles.
Calculate the minimum value of x.



NOT TO SCALE

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]

For Examiner's Use

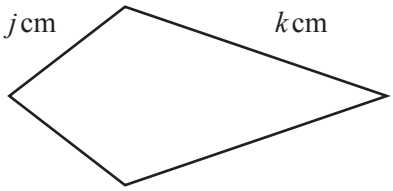
3 **(a)** Simplify the expression $5p - 2q - (p + q)$.

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.



NOT TO SCALE

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

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]

4

For Examiner's Use

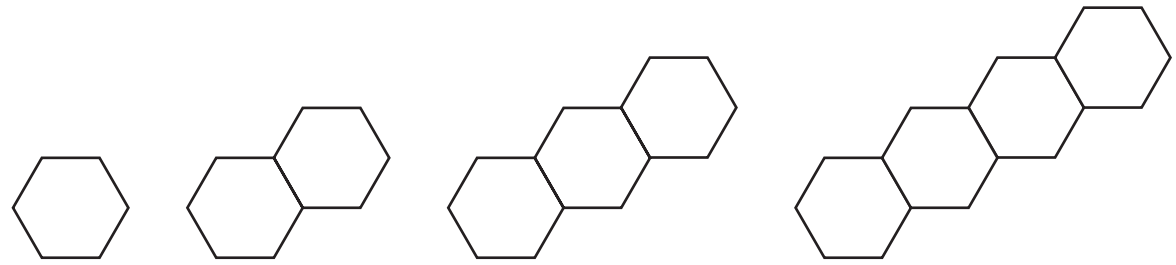


Diagram 1 Diagram 2 Diagram 3 Diagram 4

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?

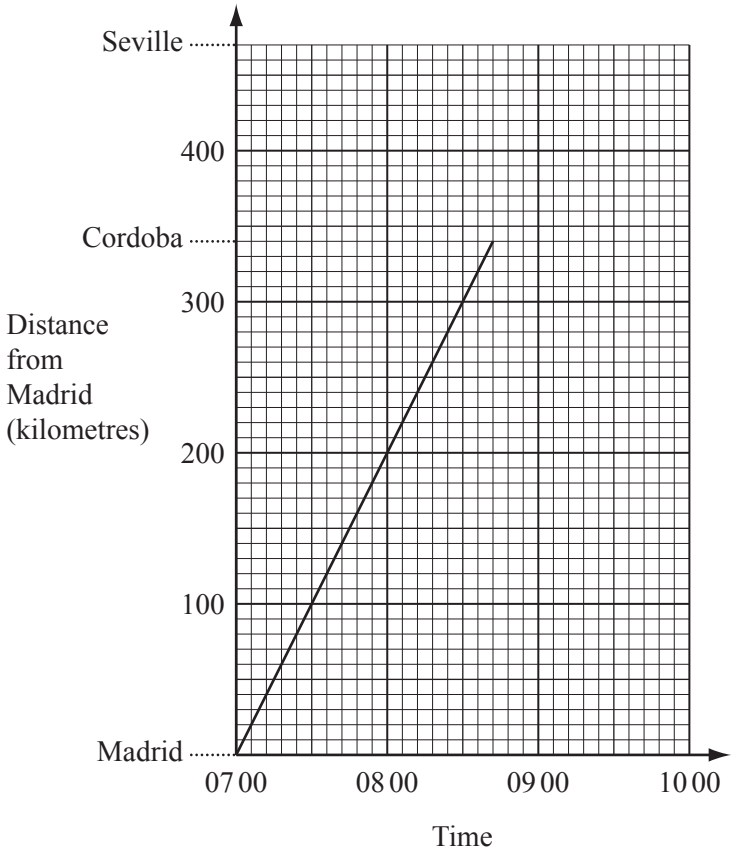
Answer(c) ..... [2]

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

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

For Examiner's Use

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]

For Examiner's Use

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

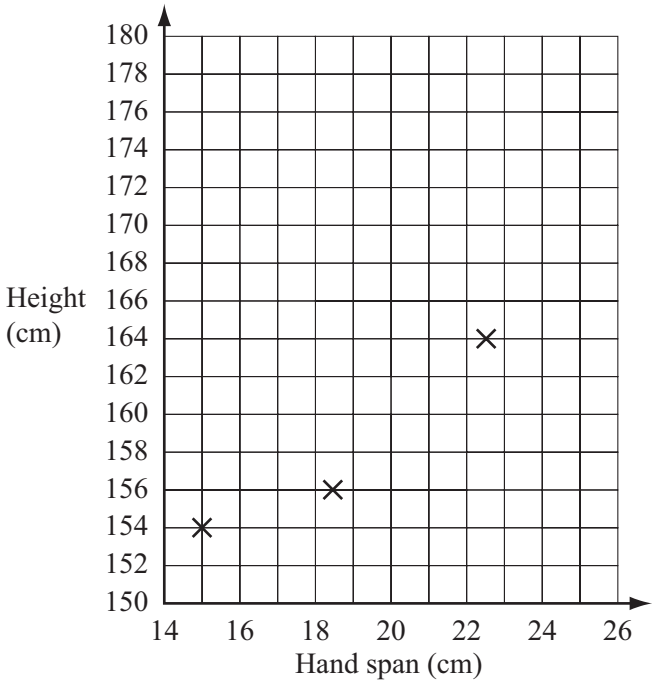
(i) the mean **height**,

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?

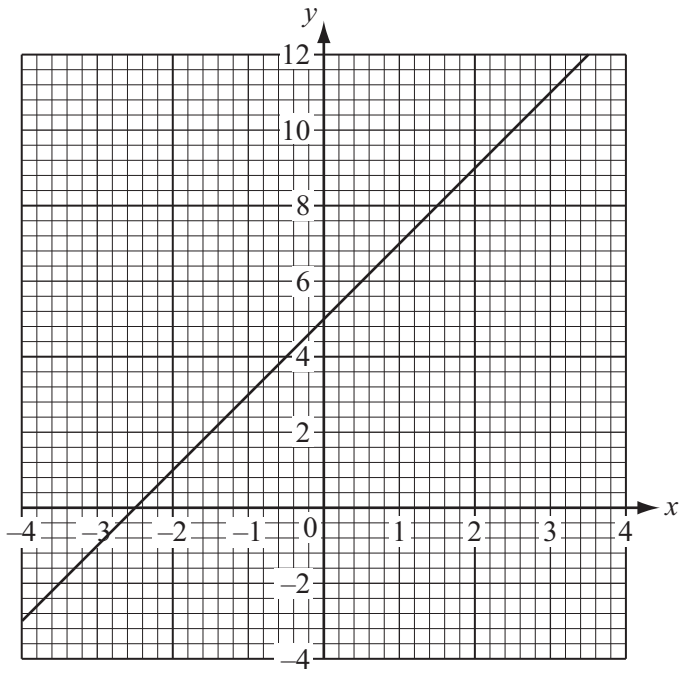
Answer(b)(v) ..... [1]

For Examiner's Use

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]

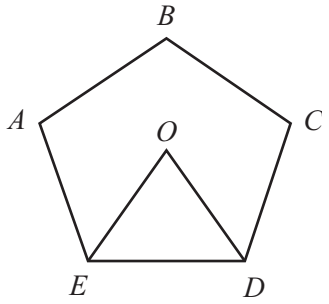
(e) Write down the coordinates of the points of intersection of the straight line with your curve.

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

For Examiner's Use

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

NOT TO SCALE



(i) What is the special name for the polygon?

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

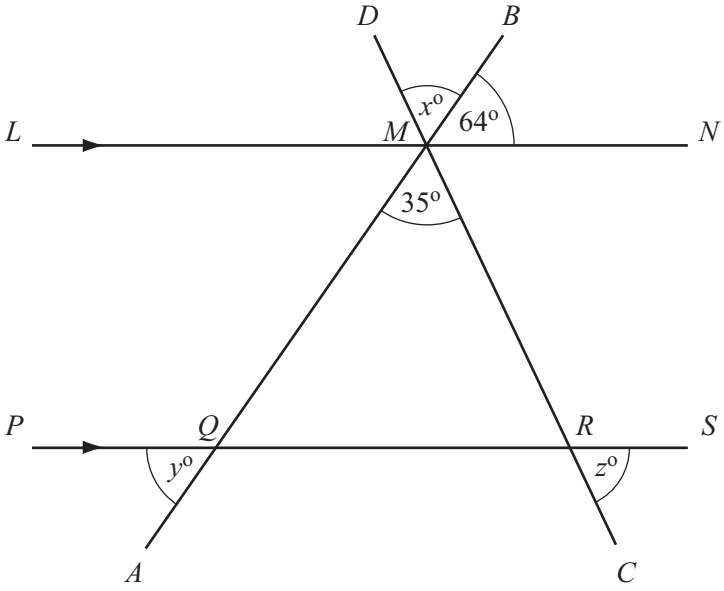
(ii) Calculate angle *EOD*.

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° and angle *BMN* = 64°.



NOT TO SCALE

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

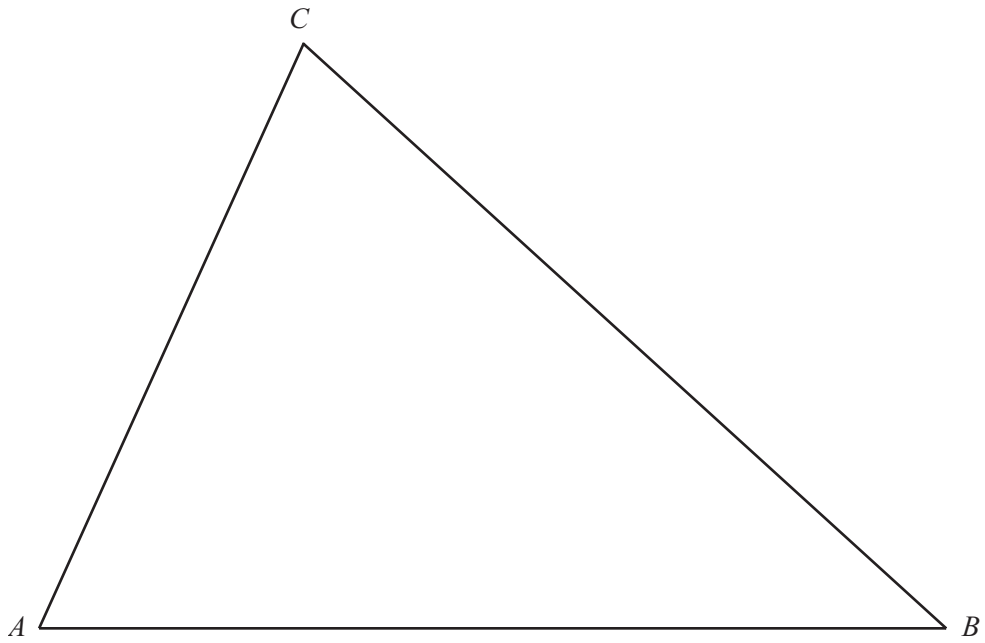
Answer(b) *x* = ... [1]

y = ... [2]

z = ... [2]

For Examiner's Use

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



(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.

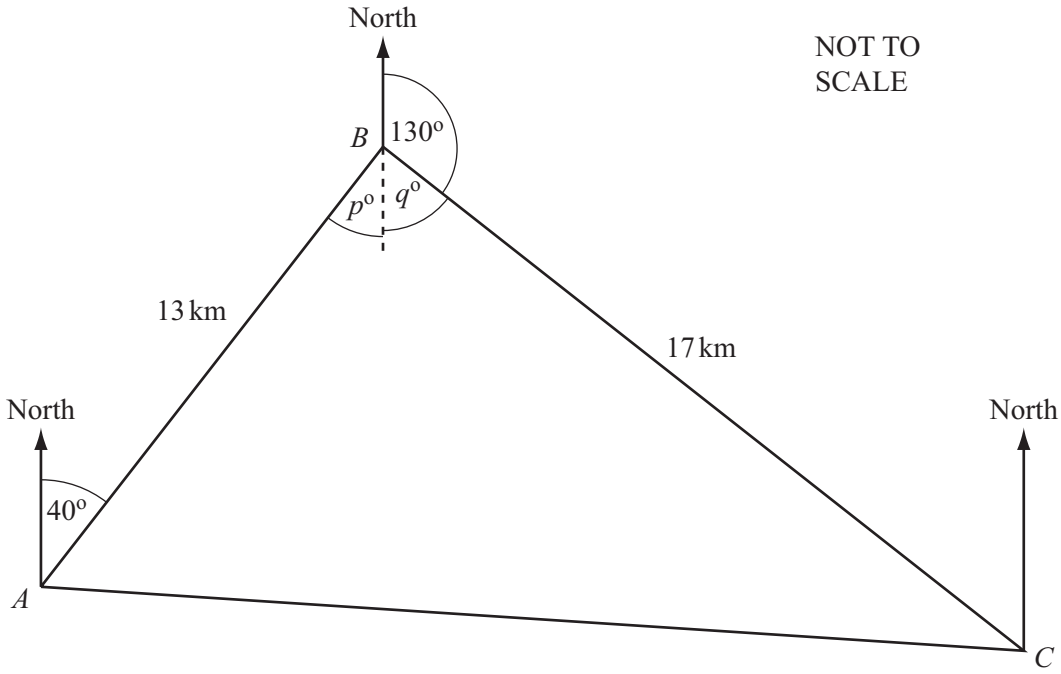
Answer(b)(ii) ..... m [1]

(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]

For Examiner's Use

10 Bashira lives in town *A* and works in town *B*, which is 13 kilometres from *A* on a bearing of 040°. 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° from *B*.



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

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

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

Answer(b) Angle $ACB =$ ..... [2]

(c) Calculate the distance CA.

Answer(c) $CA =$ ..... km [2]

(d) Calculate the area of the triangle ABC.

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

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

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

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