UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MATHEMATICS

0580/03
0581/03

Paper 3 (Core)

May/June 2004

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

2 hours

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 in the spaces provided on the Question Paper.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

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.
The total of the 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. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

This document consists of **15** printed pages and **1** blank page.

UNIVERSITY *of* CAMBRIDGE
International Examinations

[Turn over

1 **(a)** The list shows marks in an examination taken by a class of 10 students.

65, 51, 35, 34, 12, 51, 50, 75, 48, 39

(i) Write down the mode.

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

(ii) Work out the median.

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

(iii) Calculate the mean.

Answer(a)(iii) .... [2]
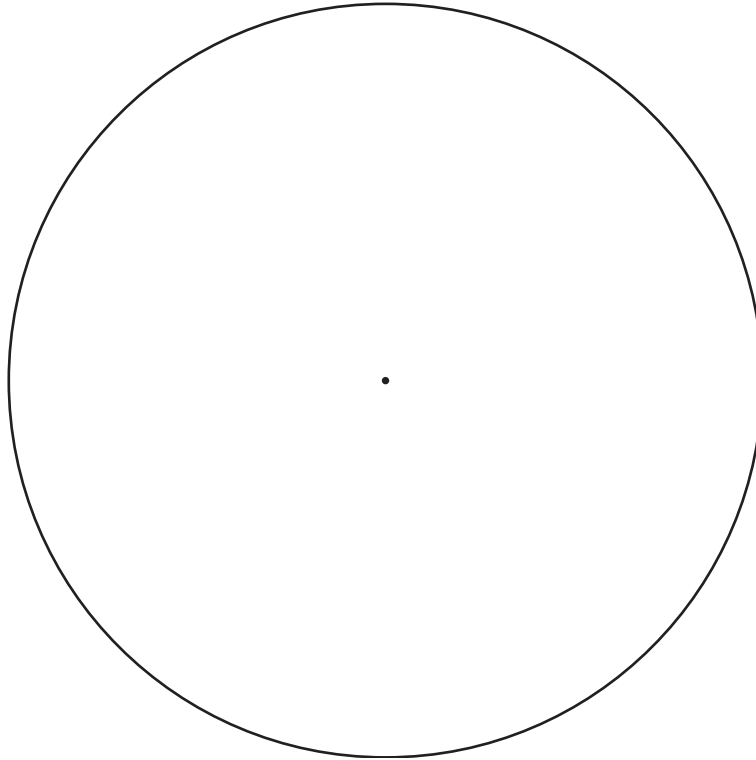
(b) Grades were awarded for the examination.
The table below shows the number of students in the whole school getting each grade.

Grade	Number of students	Angle on a pie chart
A	5	
B	15	
C	40	
D	20	
E	10	
Totals	90	

(i) Complete the table above by calculating the angles required to draw a pie chart. [2]

(ii) Using the circle at the top of the opposite page, draw an accurate pie chart to show the data in the table.
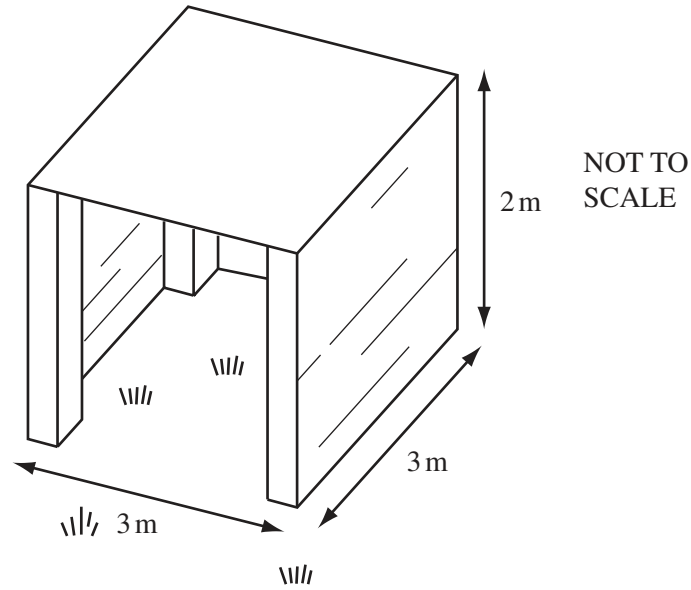Label the sectors A, B, C, D and E.

[3]

(iii) What is the probability that a student chosen at random from the group taking the examination was awarded

(a) grade C,

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

(b) grade D or grade E?

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

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2

NOT TO
SCALE

2 m

3 m

3 m

The diagram shows a shelter that Vudnella will build for her goats.
The shelter will stand on level ground with four identical vertical posts at the corners. Three walls will be made by attaching thin rectangular pieces of wood to the posts. The front will be left open. The shelter will have a thin square roof, 3 metres by 3 metres. The shelter will be 2 metres high.

(a) Calculate the area of the roof.

Answer(a) .... m^2 [1]

(b) (i) Calculate the area of one wall.

Answer(b)(i) .... m^2 [1]

(ii) Write down the total area of the three walls.

Answer(b)(ii) .... m^2 [1]

(c) The three walls will be made up from thin rectangular pieces of wood.
Each piece of wood is 3 metres long and 20 **centimetres** wide.
You may ignore the thickness of the wood.

(i) Calculate the area, in square metres, of one of the pieces of wood.

Answer(c)(i) .... m^2 [2]

(ii) Calculate the total number of pieces of wood she will need to build the three walls of the shelter.

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

(d) The four corner posts are each 2 metres high and 10 **centimetres** by 10 **centimetres** in cross-section.
Calculate the volume, in cubic metres, of one post.

Answer(d) ....m^3 [2]

(e) To build the shelter, she will also need 1.5 kilograms of nails.
Complete the table below.

Item		Total cost of item
Posts	at $1.20 each	$..........................
Rectangular pieces of wood	at $0.30 each	$..........................
Roof material	at $1.60 per m^2	$..........................
Nails	at $1.40 per kg	$..........................
Total cost of shelter		$..........................

[5]

3 **(a)** Complete the table below for $y = 8 - x^2$.

x	-3.5	-3	-2.5	-2	-1.5	-1	0	1	1.5	2	2.5	3	3.5
y	-4.25	-1	1.75	4	5.75			7	5.75		1.75		-4.25

[3]

(b) On the grid below, draw the graph of $y = 8 - x^2$ for $-3.5 \leqslant x \leqslant 3.5$.

[4]
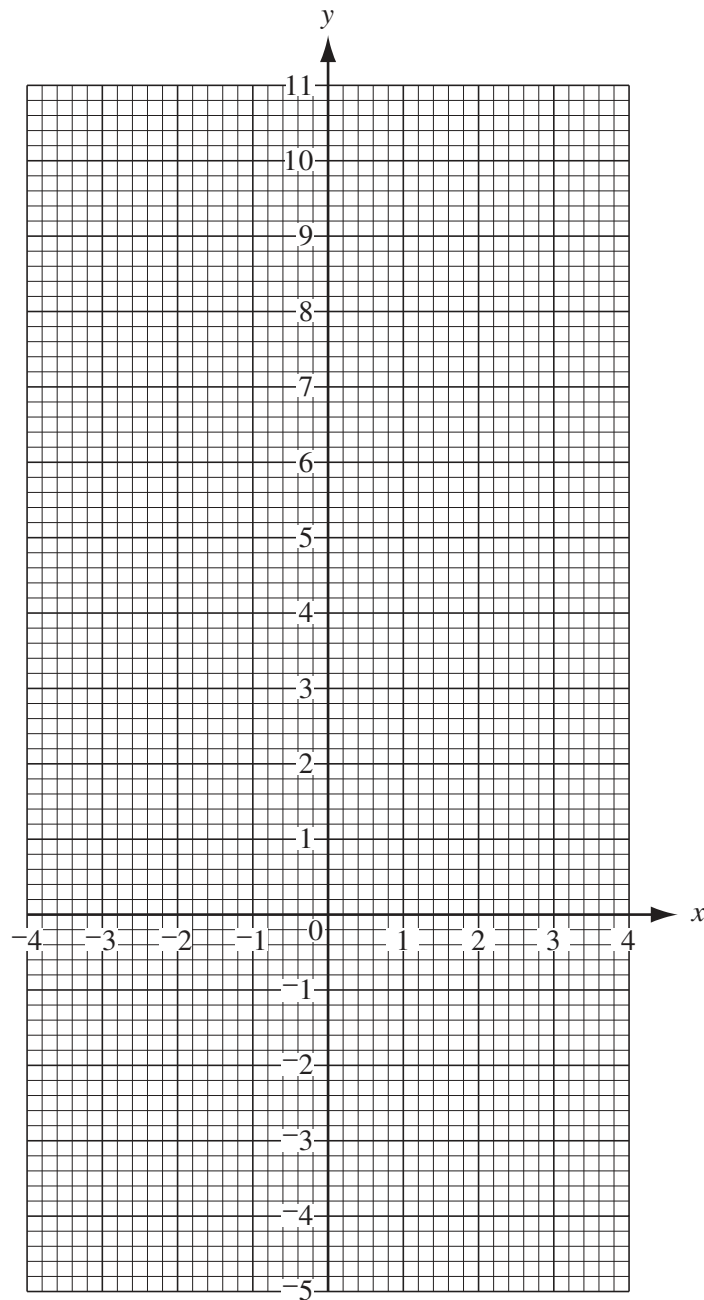
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(c) Using the graph, write down the values of *x* for which $8 - x^2 = 0$.

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

(d) Complete the table below for $y = 2x + 5$.

x	-3	0	3
y			11

[2]

(e) On the grid on the opposite page, draw the line $y = 2x + 5$ for $-3 \leqslant x \leqslant 3$. [2]

(f) Find the gradient of the line $y = 2x + 5$.

Answer(f) .... [2]
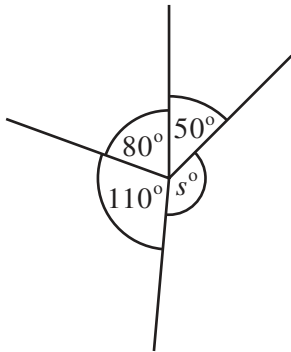
(g) Using your graphs, write down the *x* coordinates of the intersections of the graphs of $y = 8 - x^2$ and $y = 2x + 5$.

Answer(g) x = ... and .... [2]
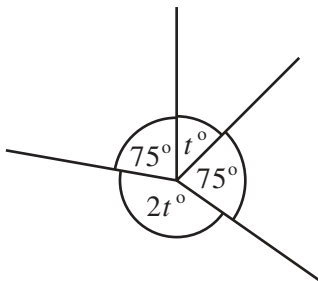
4 **In this question the diagrams are not to scale.**

(a) Calculate the value of *s*.

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

(b) Calculate the value of *t*.

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

(c) **(i)**
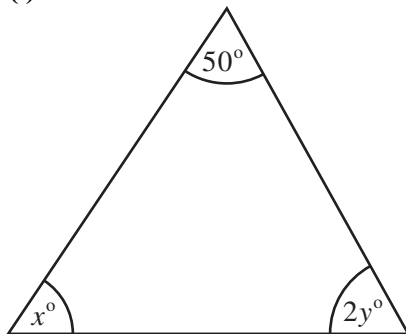
Complete the equation $x + 2y =$ .... [2]

(ii)
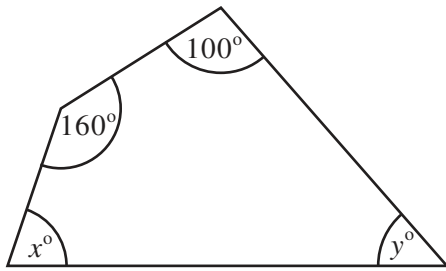
Complete the equation $x + y =$ .... [2]

(iii) Solve the simultaneous equations given by your answers to **parts (c)(i)** and **(c)(ii)** to find the values of x and y.

Answer(c)(iii) $x =$ .... , $y =$ .... [3]

5 **(a)** Change 200 metres to kilometres.

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

(b)

P

200 m

Q

S

7.8 km

C
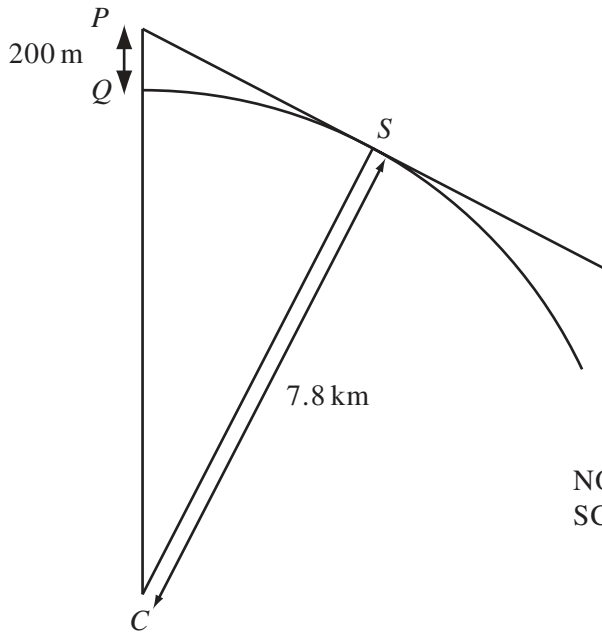
In the diagram, *Q* and *S* lie on a circle,
radius 7.8 **kilometres**, centre *C*.
CQ is extended by 200 **metres** to *P*.
PS is a tangent to the circle at *S*.

NOT TO
SCALE

(i) Why is angle *PSC* a right angle?

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

(ii) Write down the length of *PC* in kilometres.

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

(iii) Calculate the length of *PS* in kilometres.

Answer(b)(iii) .... km [3]

(iv) Calculate the area of triangle *PSC*.
Give your answer correct to 2 significant figures.

Answer(b)(iv) ....km^2 [3]

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6
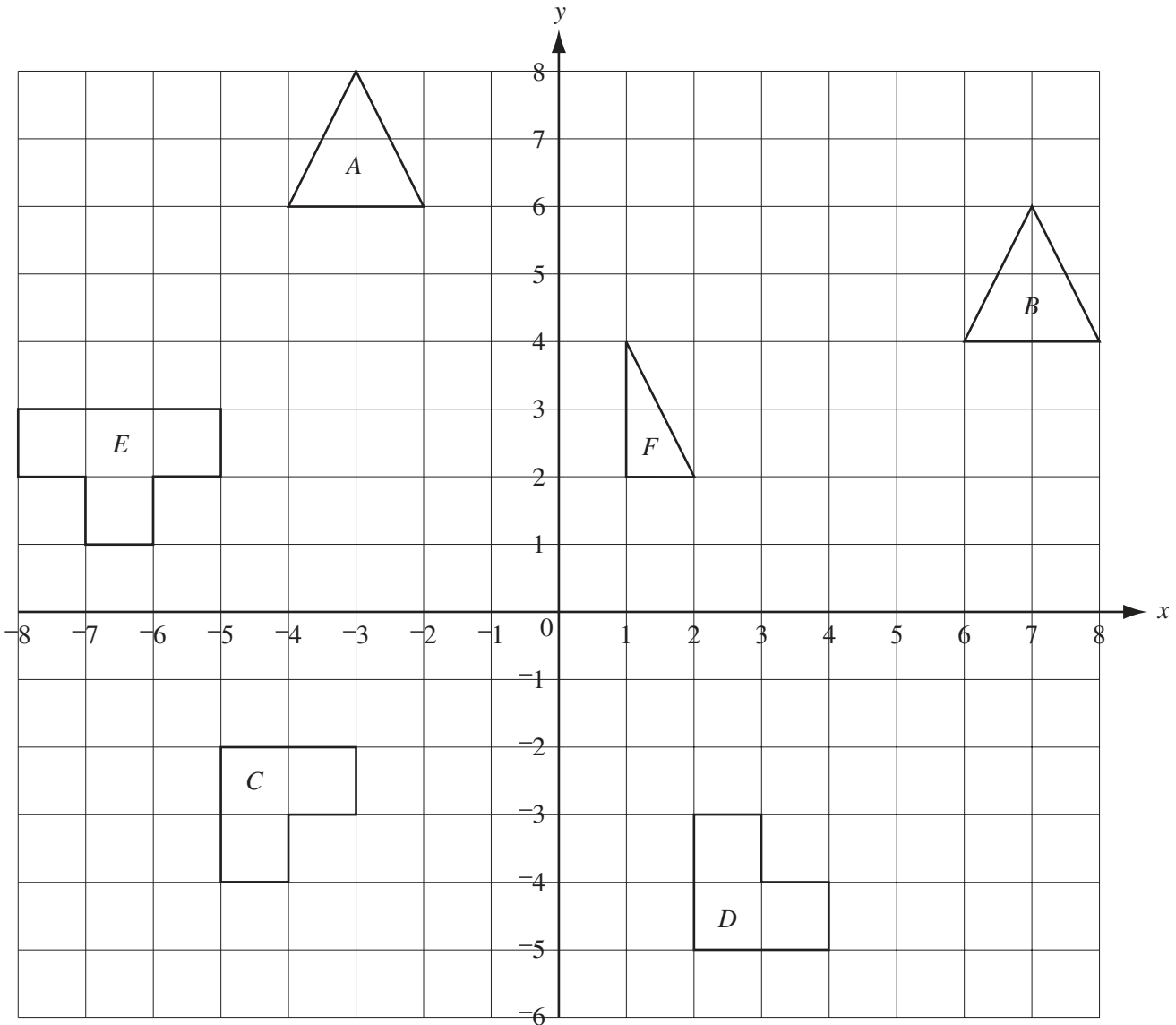
(a) Describe fully the single transformation that maps

    (i) shape *A* onto shape *B*,

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

    (ii) shape *C* onto shape *D*.

    Answer(a)(ii) ....

    .... [3]

(b) On the grid above, draw

    (i) the reflection of shape *E* in the *y*-axis, [2]

    (ii) the enlargement of shape *F*, with scale factor 2 and centre (0, 0). [2]

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7 **(a)** **(i)** What is the special name given to a five-sided polygon?

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

(ii) Calculate the total sum of the interior angles of a regular five-sided polygon.

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

(iii) Calculate the size of one interior angle of a regular five-sided polygon.

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

(b)

North

NOT TO
SCALE

B 160°

North

x^o

y^o

North

100 km

120 km

70°

A

C
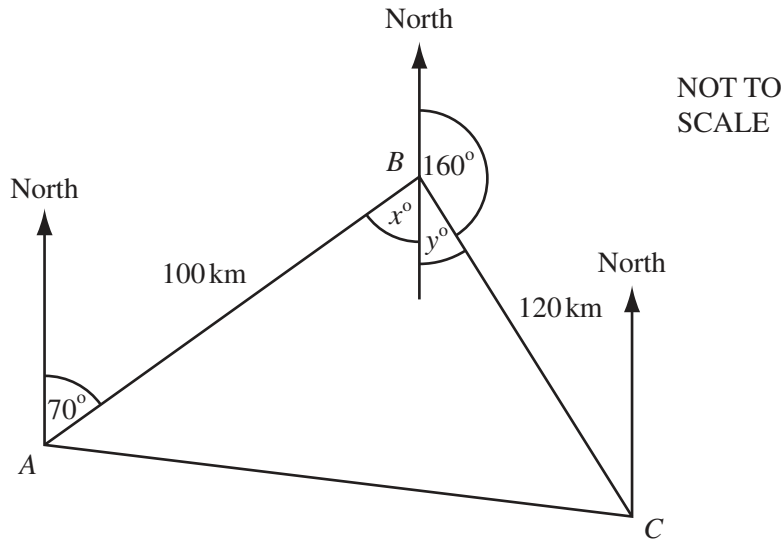
A ship sails 100 kilometres from *A* on a bearing of 070° to *B*.
It then sails 120 kilometres on a bearing of 160° to *C*.

(i) Show that $x + y = 90^o$.

Answer(b)(i)

[2]

(ii) Use trigonometry to calculate the size of angle *BAC*.

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

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(iii) Find the three-figure bearing of *C* from *A*.

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

(iv) Find the three-figure bearing of *A* from *C*.

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

8

                 A   *B*

ROAD

C
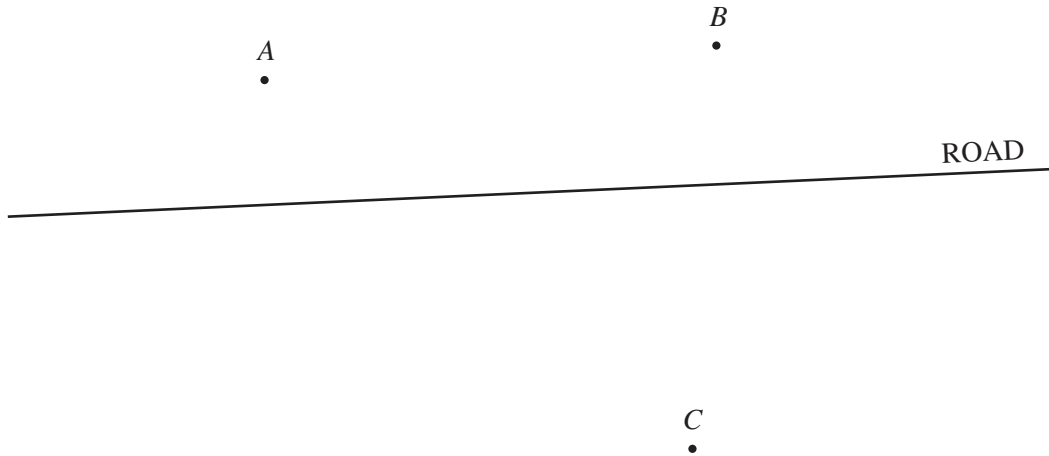
The map shows three towns, *A*, *B* and *C* and a road.

(a)   **(i)**   Measure and write down the distance, in centimetres, from *A* to *B*.

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

    (ii)   The towns *A* and *B* are 60 kilometres apart.
          The map is drawn to scale.
   Complete the statement in the answer space.

Answer(a)(ii) 1 cm represents .... km [2]

    (iii)   Find the actual distance, in kilometres, from town *A* to town *C*.

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

(b)   An airport is to be built 10 kilometres from the road.
      On the map, draw accurately the locus of the points that are 10 kilometres from the road.   [2]

(c)   The airport must be the same distance from *A* as it is from *B*.
      Using compasses and a straight edge only, draw the locus of the points that are equidistant from
      A and *B*.   [2]

(d)   The airport must be not more than 40 kilometres from *C*.
      Draw the locus of points that are 40 kilometres from *C*.   [2]

(e)   Mark and label *L*, the position for the airport.   [1]

9 **(a)** Look at the sequence of dots and squares below.
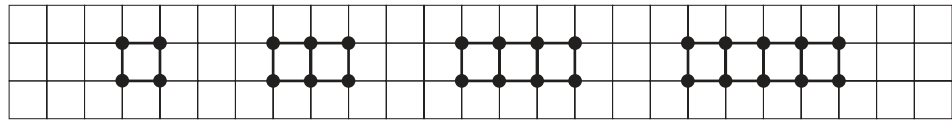
Number of dots	4	6	8	10
Number of squares	1	2	3	4

Find the number of dots when there are

(i) 5 squares,

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

(ii) 9 squares,

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

(iii) *n* squares.

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

(b) Another sequence of dots and squares is shown below.
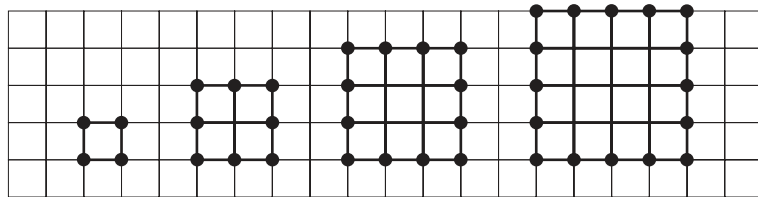
Diagram	1	2	3	4
Number of dots	4	8	12	16
Number of squares	1	4	9	16

(i) For diagram 5, find

(a) the number of dots,

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

(b) the number of squares.

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

(ii) Find the number of dots in the diagram that has 144 squares.

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

(iii) Find the number of squares in the diagram that has 40 dots.

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

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