CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/33

Paper 3 (Core)

May/June 2012

1 hour 45 minutes

Candidates answer on the Question Paper

Additional Materials: Geometrical Instruments
                         Graphics Calculator

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.
Do not use staples, paper clips, highlighters, glue or correction fluid.
You may use a pencil for any diagrams or graphs.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** the questions.
Unless instructed otherwise, give your answers exactly or correct to three significant figures as appropriate.
Answers in degrees should be given to one decimal place.
For π, use your calculator value.
You must show all the relevant working to gain full marks and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 96.

For Examiner's Use

This document consists of **19** printed pages and **1** blank page.

[Turn over

Formula List

Area, A, of triangle, base b, height h.	$A = \dfrac{1}{2}bh$
Area, A, of circle, radius r.	$A = \pi r^2$
Circumference, C, of circle, radius r.	$C = 2\pi r$
Curved surface area, A, of cylinder of radius r, height h.	$A = 2\pi rh$
Curved surface area, A, of cone of radius r, sloping edge l.	$A = \pi rl$
Curved surface area, A, of sphere of radius r.	$A = 4\pi r^2$
Volume, V, of prism, cross-sectional area A, length l.	$V = Al$
Volume, V, of pyramid, base area A, height h.	$V = \dfrac{1}{3}Ah$
Volume, V, of cylinder of radius r, height h.	$V = \pi r^2 h$
Volume, V, of cone of radius r, height h.	$V = \dfrac{1}{3}\pi r^2 h$
Volume, V, of sphere of radius r.	$V = \dfrac{4}{3}\pi r^3$

Answer **all** the questions.

1 Mr and Mrs Habib and their two children are going on holiday from Dubai to London.

(a) Their flight leaves at 14 20.

They need to be at the airport $2\frac{1}{2}$ hours before take-off.

The journey from home to the airport takes 35 minutes.

What is the latest time they can leave home?

Answer(a) .... [2]

(b) The flight leaves on time at 14 20 and takes 7 hours 30 minutes.
The time in London is 4 hours behind the time in Dubai.

What time is it in London when they arrive?

Answer(b) .... [2]

(c) The price of each ticket is 1600 Dirhams.
They must also pay 28% in taxes.

Calculate the **total** cost of all the tickets including taxes.

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

(d) In London Mrs Habib changes 3000 Dirhams to Pounds, £.
The exchange rate is £1 = 5.50 Dirhams.

Calculate the amount she receives.
Give your answer correct to 2 decimal places.

Answer(d) £ .... [2]

2   David has a farm on which he keeps chickens and goats.

   (a) The probability that a chicken will lay an egg on any day is 0.8 .

   (i) Find the probability that a chicken will not lay an egg on any day.

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

   (ii) Calculate the probability that a chicken will lay an egg on two consecutive days.

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

   (b) David records the number of eggs he collects each day for 90 days.
   The results are shown in this table.

Number of eggs collected in one day	55	56	57	58	59	60
Number of days	11	23	20	16	14	6

   Find

   (i) the mode,

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

   (ii) the median,

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

   (iii) the upper quartile,

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

   (iv) the total number of eggs collected in the 90 days.

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

(c) David records the amount of milk the goats produce over the same 90 days.
The results are shown in this table.

Amount of milk (*m*, litres)	$30 \leqslant m < 40$	$40 \leqslant m < 50$	$50 \leqslant m < 60$	$60 \leqslant m < 70$	$70 \leqslant m < 80$
Number of days	10	17	19	26	18

Calculate an estimate of the mean amount of milk produced per day.

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

3 **All the measurements on the diagram are in centimetres.**

A

17

8

NOT TO
SCALE

5   C   10

N

B

9

E   P   10   D
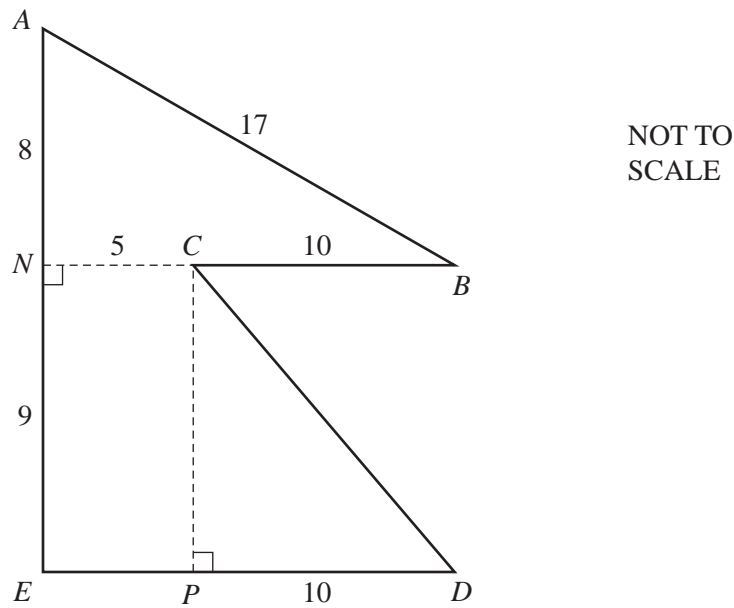
The diagram shows a flag *ABCDE*.
AN = 8 cm, *NC* = 5 cm, *CB* = 10 cm, *AB* = 17 cm, *EN* = 9 cm and *PD* = 10 cm.

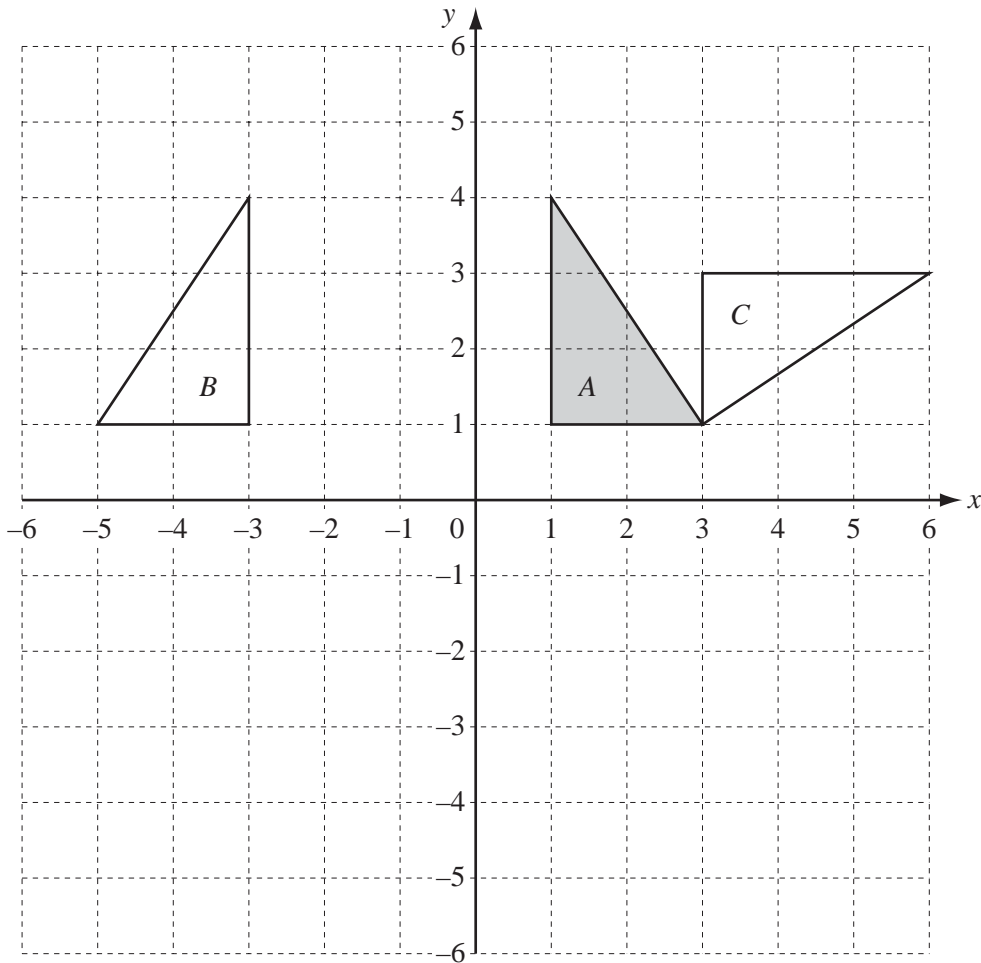**(a)** Calculate the total area of the flag.

Answer(a) .... cm^2 [4]

(b) The outside edge of the flag is shown by the solid lines.

   (i) Calculate the length of *CD*.

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

   (ii) Calculate the total length of the outside edge of the flag.

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

4

(a) Describe fully the **single** transformation that maps **triangle** *A* onto triangle *B*.

Answer(a) ....

.... [2]

(b) Describe fully the **single** transformation that maps **triangle** *A* onto triangle *C*.

Answer(b) ....

.... [3]

(c) Draw the image of **triangle** *A* after an enlargement, centre (3, 6) with scale factor 2. [2]

5 **(a)** In 2010 the men's world record for running 400 metres was 43.18 seconds.

Calculate the average speed of this runner.

Answer(a) .... m/s   [2]

(b)
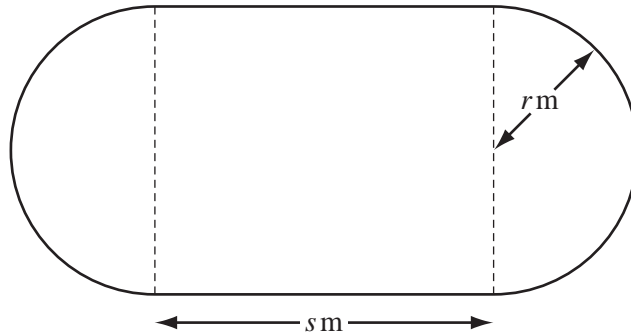
The diagram shows the edge of a running track.
There are two straight sections each *s* metres long and two semicircular ends of radius *r* metres.
The formula for the distance around the track, *D* metres, is

$$D = 2s + 2\pi r .$$

(i) Calculate the distance around the track when $s = 75$ and $r = 30$.

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

(ii) Rearrange $D = 2s + 2\pi r$ to make *r* the subject.

Answer(b)(ii) *r* = ...   [2]

(iii) When $D = 400$ and $s = 85$, show that $r = 36.6$ correct to 3 significant figures.

[1]

6
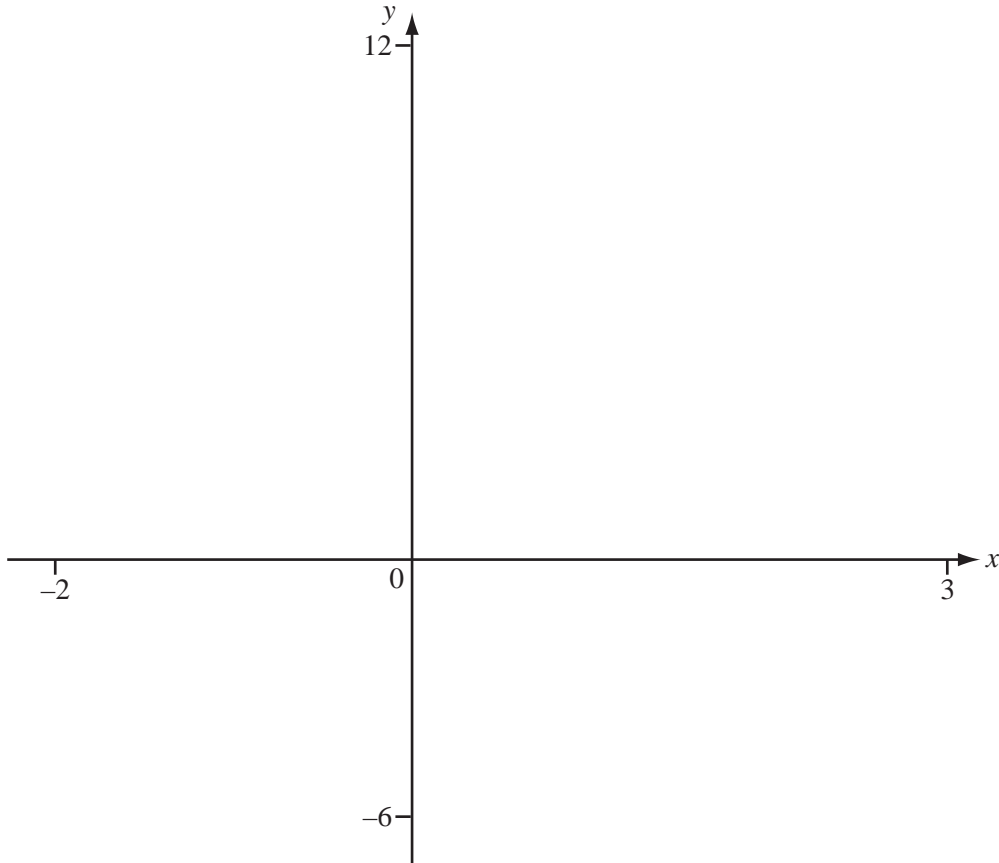
(a) Sketch the graph of $y = 3^x - 5x$ for $-2 \leqslant x \leqslant 3$. [2]

(b) Find the co-ordinates of the local minimum point.
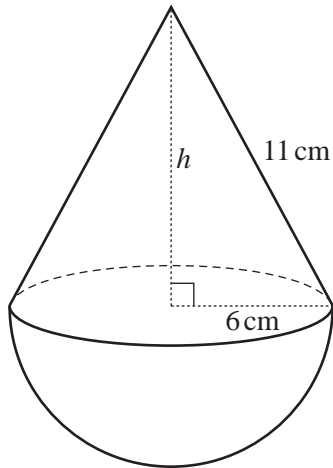
Answer(b) (............ , ...) [2]

(c) On the same diagram sketch the graph of $y = 4x - 5$. [2]

(d) Write down the solutions to the equation $3^x - 5x = 4x - 5$.

Answer(d) x = ... or *x =* .... [2]

7 A child's toy is made using a cone and a hemisphere.

NOT TO SCALE

The hemisphere and the base of the cone each have a radius of 6 cm.
The sloping edge of the cone is 11 cm.

(a) (i) Calculate the height of the cone, h.

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

(ii) Calculate the volume of the cone.

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

(b) (i) Calculate the curved surface area of the **cone**.

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

(ii) Calculate the total surface area of the **toy**.

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

8
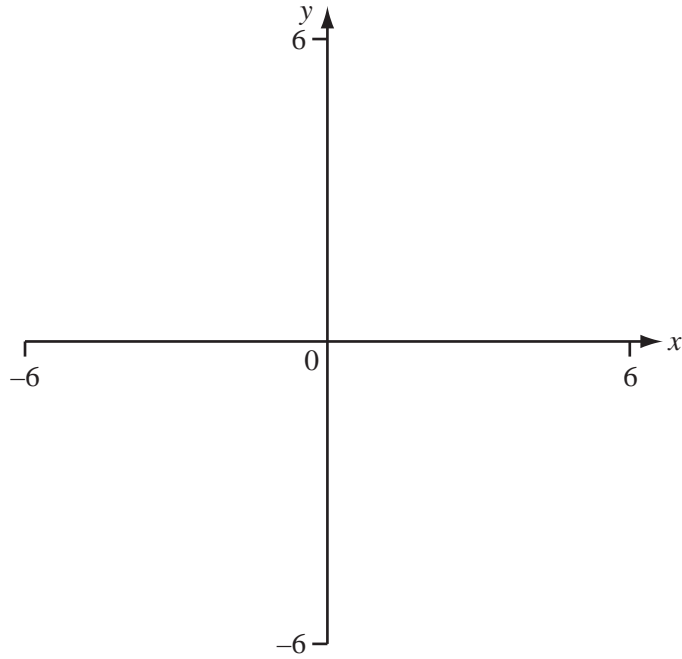
(a) (i) Sketch the graph of $y = \dfrac{(x+3)}{(x-2)}$ for $-6 \leqslant x \leqslant 6$. [2]

(ii) Write down the co-ordinates of the point where the curve crosses the x-axis.

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

(iii) Write down the co-ordinates of the point where the curve crosses the y-axis.

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

(iv) Write down the equations of the two asymptotes.

Answer(a)(iv) ....

and .... [2]

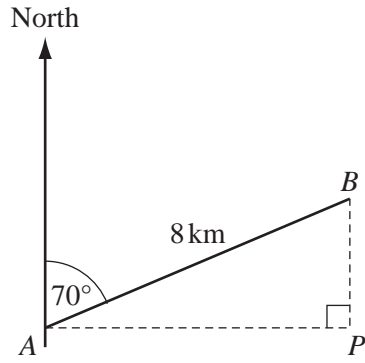**(b)** The graph of $y = x^2$ is shown on the axes below.
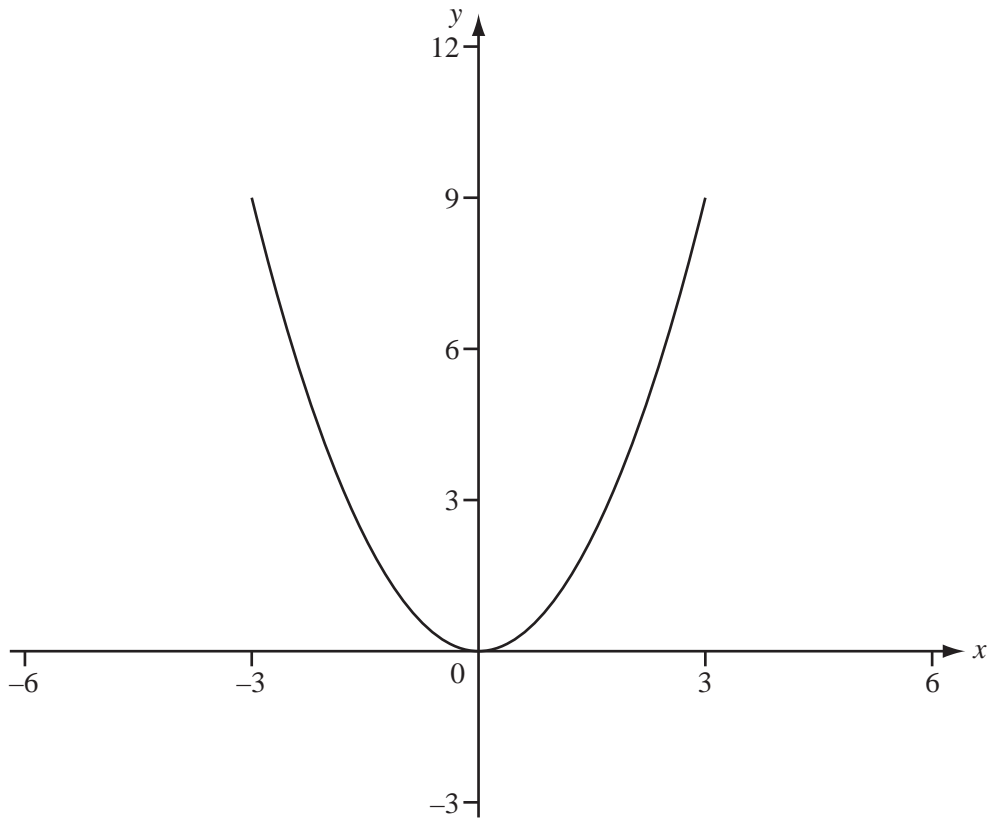
(i) Using the same axes, sketch the graph of $y = (x+3)^2$. [1]

(ii) Describe fully the **single** transformation that maps the graph of $y = x^2$ onto the graph of $y = (x+3)^2$.

Answer(b)(ii) ....

.... [2]

9

North

NOT TO
SCALE

A ship sails on a bearing of 070° from A to B.
$AB = 8$ km.

(a) Use trigonometry to calculate
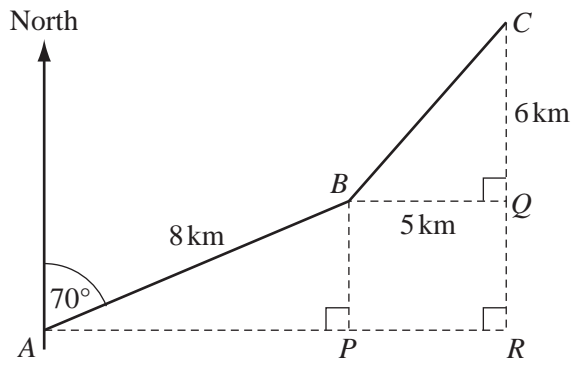
    (i) AP, the distance B is east of A,

Answer(a)(i) _____ km   [2]

    (ii) BP, the distance B is north of A.

Answer(a)(ii) _____ km   [2]

(b) The ship then sails from *B* to *C*.

NOT TO SCALE

BQ = 5 km and *CQ* = 6 km.

(i) Find the distances *AR* and *CR*.

Answer(b)(i) *AR =* .... km

CR = ... km [1]

(ii)
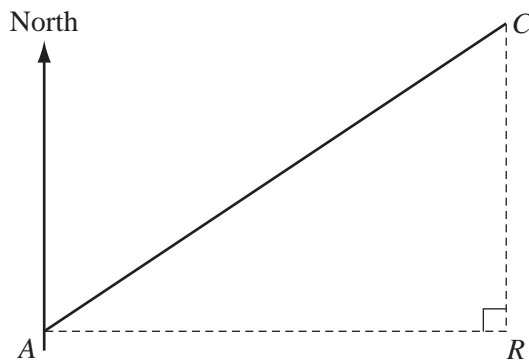
NOT TO SCALE

Another ship sails directly from *A* to *C*.

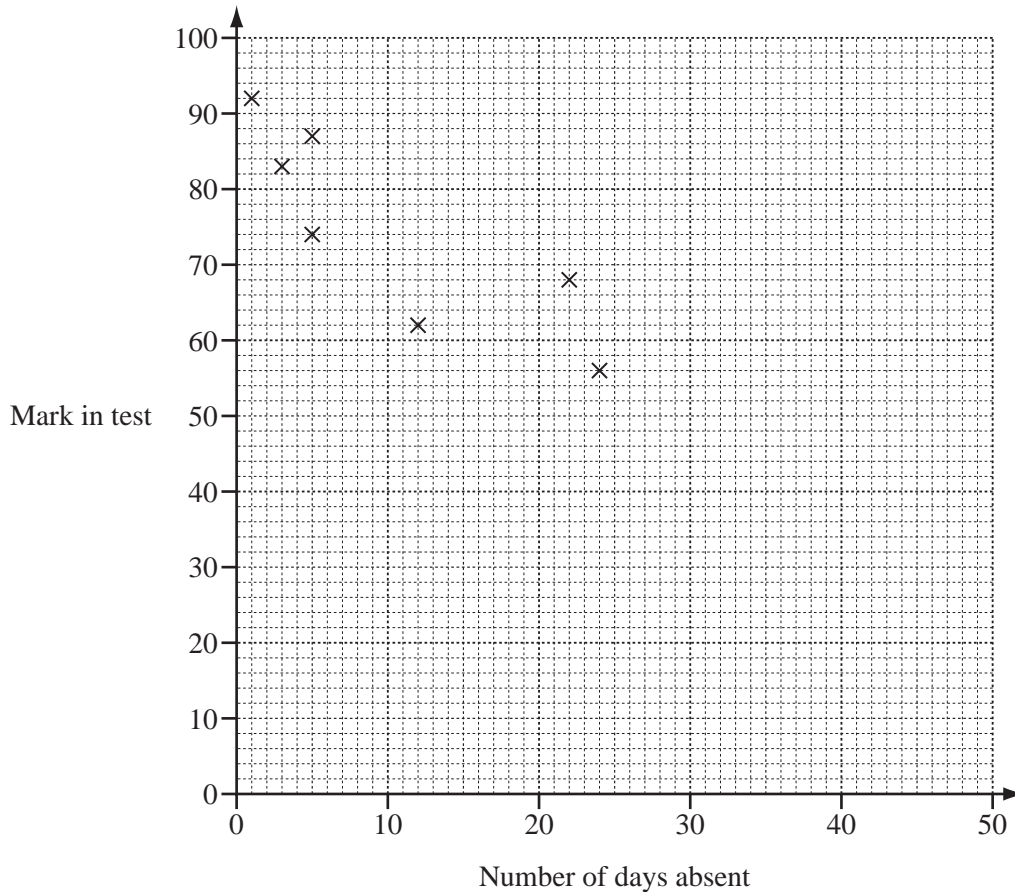Using your answers to **part (b)(i)**, calculate the bearing of *C* from *A*.

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

10 A teacher recorded some information about 10 of his students.
The results are shown in the table.

Number days absent	5	1	12	22	3	24	5	46	44	30
Mark in a test	74	92	62	68	83	56	87	50	38	62

(a) Complete the scatter diagram.
The first 7 points in the table have been plotted for you.

Number of days absent

[2]

(b) Describe the type of correlation.

Answer(b) .... [1]

(c) Calculate the mean number of days absent, *d*.

Answer(c) *d* = ... [1]

(d) The mean mark in the test, *t*, is 67.2 .

On the scatter diagram plot the point (*d*, *t*). [1]

(e) Draw a line of best fit on your scatter diagram. [1]

(f) A student who had 36 days absent missed the test.

Use your line of best fit to estimate a test mark for that student.

Answer(f) .... [1]

11 (a) These are the first 5 terms of a sequence.

$$7 \qquad 11 \qquad 15 \qquad 19 \qquad 23$$

(i) Write down the next two terms in the sequence.

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

(ii) Find an expression for the *n*th term of the sequence.

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

(b) Write down the *n*th term of this sequence.

$$1, \qquad 4, \qquad 9, \qquad 16, \qquad 25, \qquad .....$$

Answer(b) .... [1]

(c) Here is another sequence.

$$8, \qquad 15, \qquad 24, \qquad 35, \qquad 48, \qquad .....$$

(i) Write down the next term of this sequence.

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

(ii) Use your answers to **part (a)(ii)** and **part (b)** to find the *n*th term of this sequence.

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

12
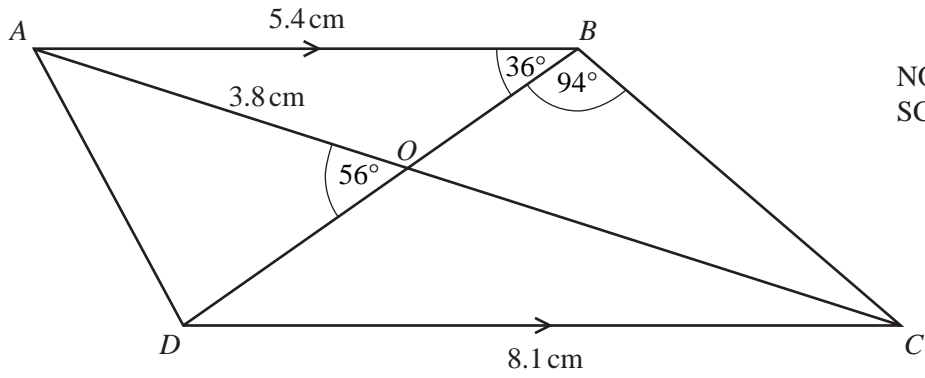
NOT TO
SCALE

The diagonals of the trapezium *ABCD* intersect at *O*.
AB is parallel to *DC*.
Angle *ABD* = 36°, angle *DBC* = 94° and angle *AOD* = 56°.

(a) Find

(i) angle *BAC*,

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

(ii) angle *BDC*,

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

(iii) angle *BCD*,

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

(iv) angle *BCA*.

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

(b) *AB* = 5.4 cm, *CD* = 8.1 cm and *AO* = 3.8 cm.
Triangles *AOB* and *COD* are similar.

Calculate the length of *CO*.

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

BLANK PAGE