Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

9778586246

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/41**

Paper 4 (Extended) **May/June 2017**

2 hours 15 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, glue or correction fluid.
You may use an HB 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 120.

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

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Formula List

For the equation $ax^2 + bx + c = 0$ $\quad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Curved surface area, A, of cylinder of radius r, height h. $\quad A = 2\pi rh$

Curved surface area, A, of cone of radius r, sloping edge l. $\quad A = \pi rl$

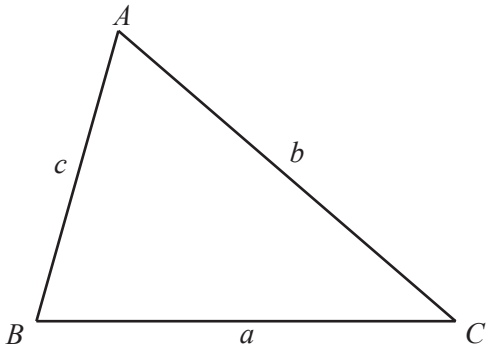
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

Volume, V, of pyramid, base area A, height h. $\quad V = \frac{1}{3}Ah$

Volume, V, of cylinder of radius r, height h. $\quad V = \pi r^2 h$

Volume, V, of cone of radius r, height h. $\quad V = \frac{1}{3}\pi r^2 h$

Volume, V, of sphere of radius r. $\quad V = \frac{4}{3}\pi r^3$



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

$$\text{Area} = \frac{1}{2}bc\sin A$$

Answer **all** the questions.

1 **(a)** Find the next term and the nth term in each of the following sequences.

(i) 4, 8, 12, 16, 20, …

next term = ...

nth term = ... [2]

(ii) −1, −3, −5, −7, −9, …

next term = ...

nth term = ... [3]

(iii) 3, 12, 27, 48, 75, …

next term = ...

nth term = ... [3]

(iv) 1, 8, 27, 64, 125, …

next term = ...

nth term = ... [2]

(b) Use your answers to **part (a)**, to find the next term and the nth term in the following sequence.

7, 25, 61, 121, 211, …

next term = ...

nth term = ... [3]

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2 **(a)** The heights, x cm, of some plants are shown in the table.

Height (x cm)	Frequency
$0 < x \leqslant 10$	7
$10 < x \leqslant 20$	13
$20 < x \leqslant 30$	20
$30 < x \leqslant 40$	32
$40 < x \leqslant 50$	28

Calculate an estimate of the mean height of the plants.

..... cm [2]

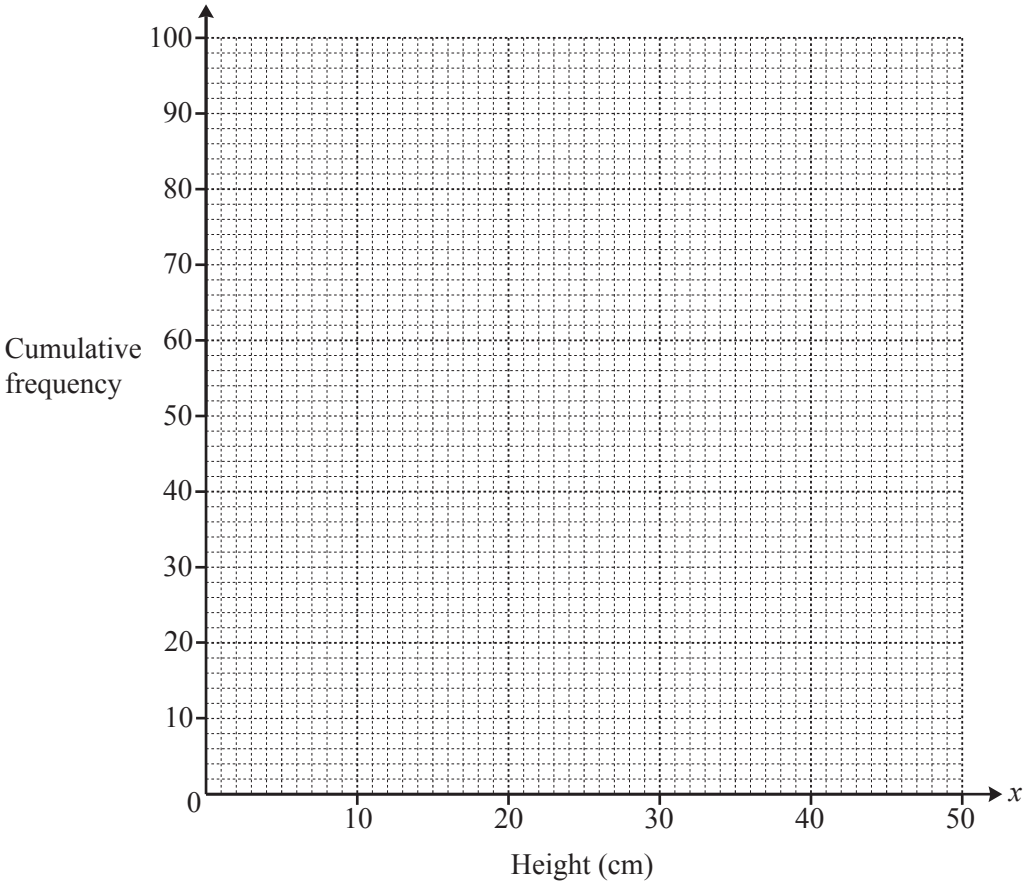
(b) **(i)** Complete the cumulative frequency table for the plants.

Height (x cm)	Cumulative Frequency
$0 < x \leqslant 10$	7
$0 < x \leqslant 20$	
$0 < x \leqslant 30$	
$0 < x \leqslant 40$	
$0 < x \leqslant 50$	

[1]

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(ii) On the grid below, draw the cumulative frequency curve.



[3]

(c) Use your graph in **part (b)(ii)** to find estimates for

(i) the median height,

..... cm [1]

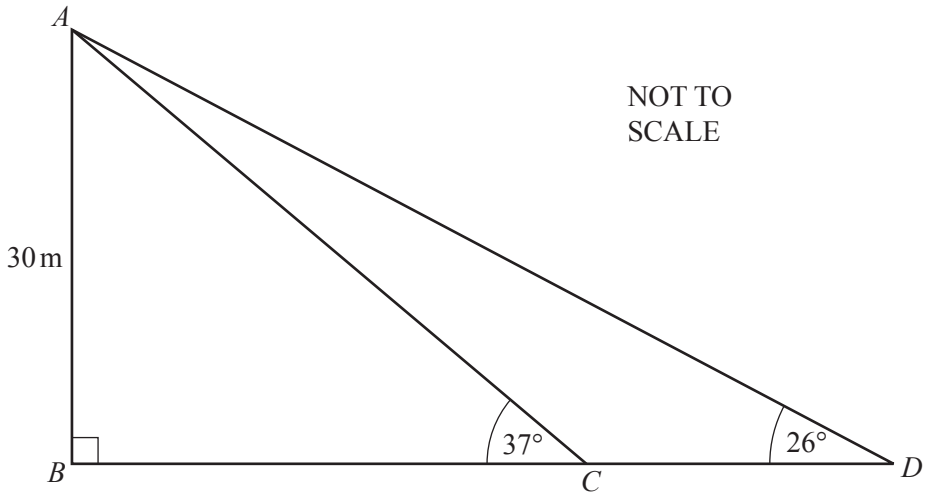
(ii) the interquartile range,

..... cm [2]

(iii) the range of heights of plants that are between the 45th and the 55th percentile.

..... cm [3]

3



In the diagram, *BCD* is a straight line.

(a) Find *AC*.

AC = ... m [3]

(b) Find *BC*.

BC = ... m [3]

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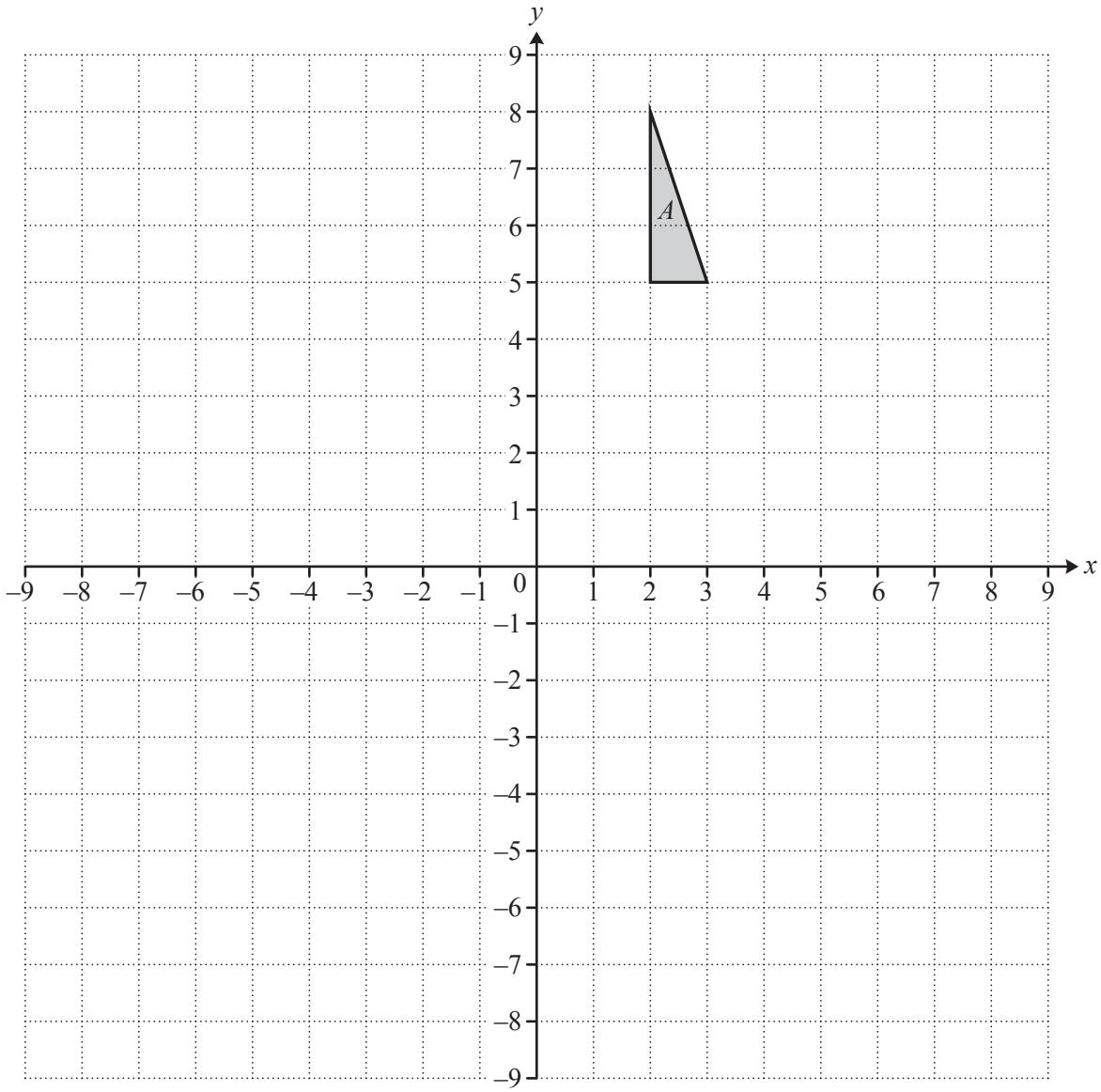
(c) Find CD.

$CD =$ ..... m [3]

(d) Find the area of triangle ACD.

..... m^2 [2]

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(a) Translate triangle A with vector $\begin{pmatrix} 0 \\ -4 \end{pmatrix}$. Label the image B. [2]

(b) Rotate triangle A through 90° anticlockwise about (0, 0). Label the image C. [2]

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

.....

..... [2]

(d) Reflect triangle A in the line $y = -x$. Label the image D. [3]

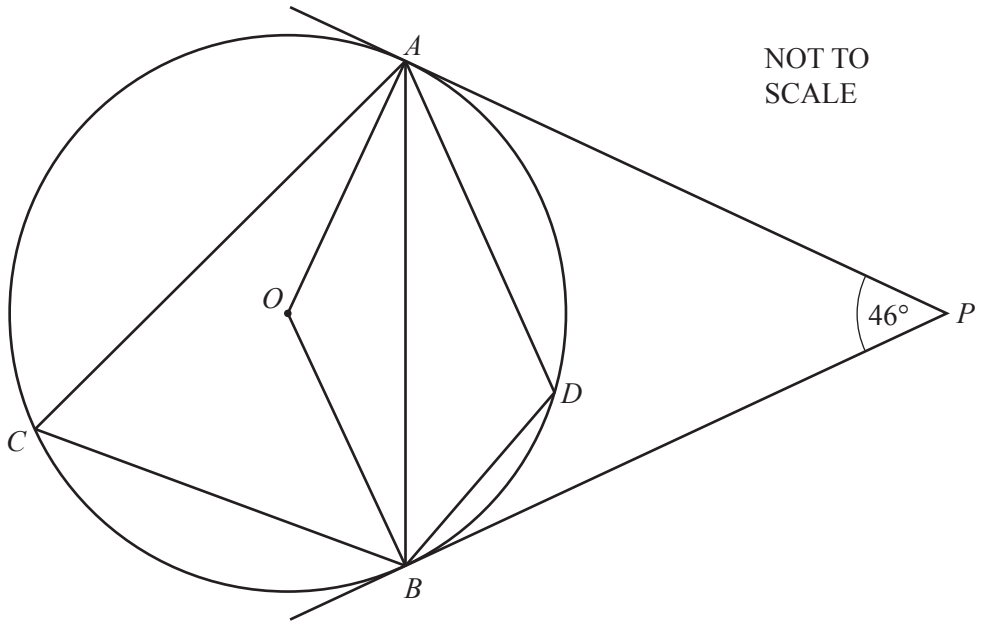
(e) Describe fully the **single** transformation that maps triangle C onto triangle D.

.....

..... [2]

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5



A, B, C and D lie on a circle, centre O.
AP and BP are tangents to the circle.
Angle $APB = 46°$.

(a) Complete the statement.

Angle $OAP = 90°$ because .....

..... [1]

(b) Find the value of

(i) angle AOB,

Angle $AOB =$ ..... [2]

(ii) angle OAB,

Angle $OAB =$ ..... [2]

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(iii) angle ACB,

Angle ACB = ... [2]

(iv) angle ADB.

Angle ADB = ... [2]

(c) OB bisects angle ABC.

Find angle OAC.

Angle OAC = ... [3]

6 y varies inversely as the square of x.
$y = 32$ when $x = 2$.

(a) Find the value of y when $x = 4$.

$y =$ ..... [3]

(b) Find the value of x when $y = 512$.

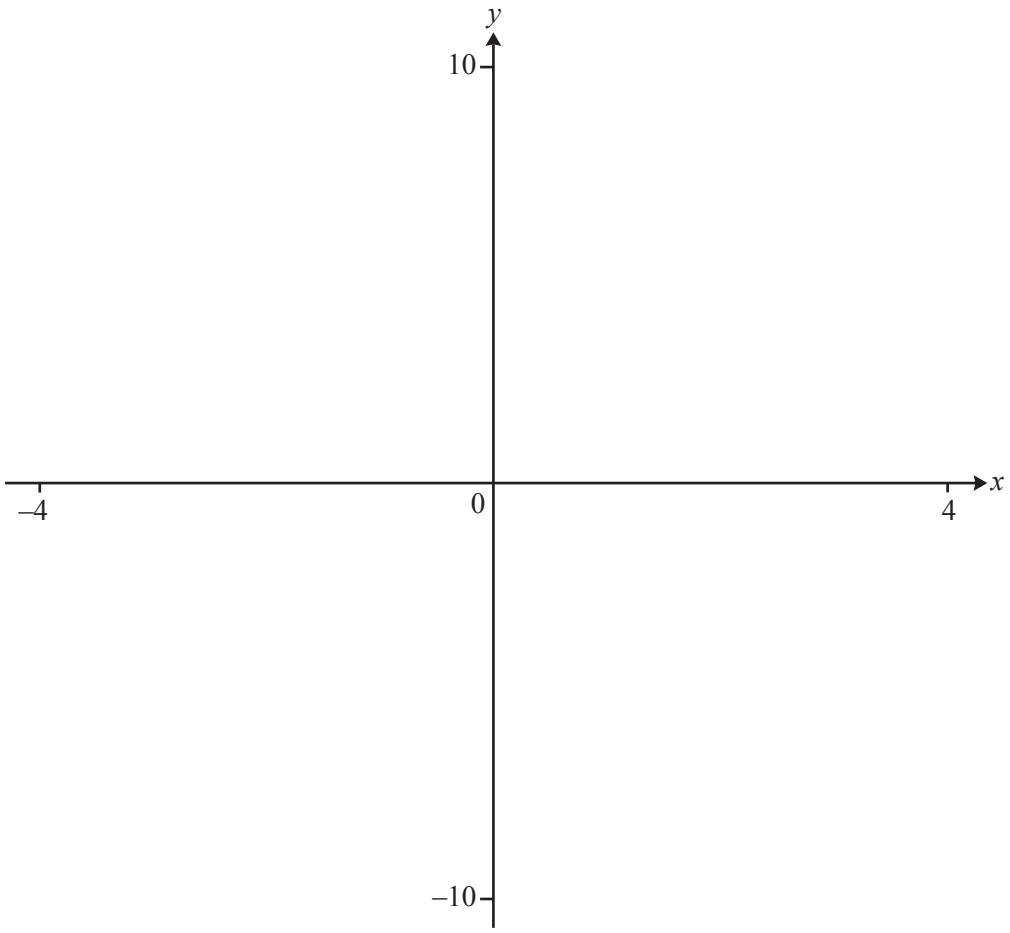
$x =$ ..... [2]

(c) Find x in terms of y.

$x =$ ..... [3]

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$\mathrm{f}(x) = |9 - x^2|$

(a) On the diagram, sketch the graph of $y = \mathrm{f}(x)$, for values of x between -4 and 4. [4]

(b) Solve $\mathrm{f}(x) = 7$.

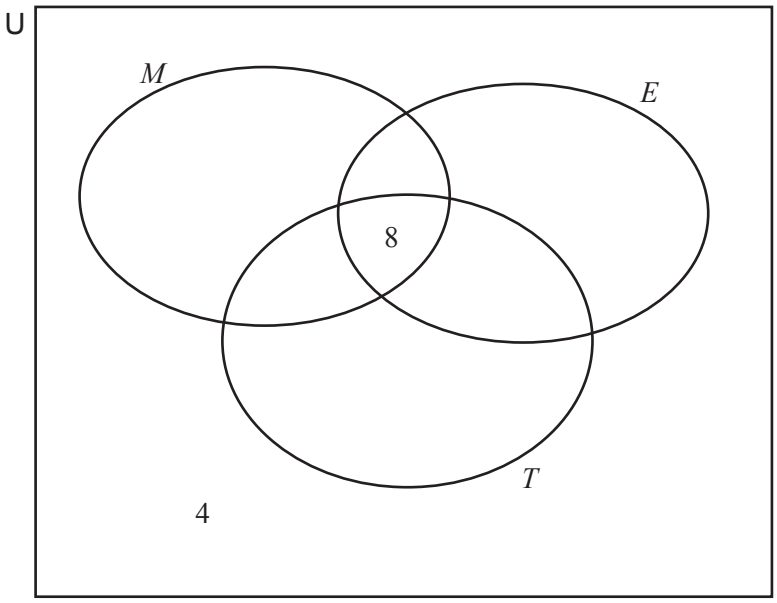
..... [2]

(c) The equation $|9 - x^2| = k$ has two solutions.

Find the range of values of k.

..... [2]

8 The Venn diagram shows the sets M, E and T.



U = {students at a school}
M = {students who study mathematics}
E = {students who study English}
T = {students who study technology}

$\mathrm{n}(M \cap E \cap T) = 8$

$\mathrm{n}(M \cup E \cup T)' = 4$

$\mathrm{n}(M \cap E) = 12$, $\mathrm{n}(M \cap T) = 14$ and $\mathrm{n}(E \cap T) = 20$

$\mathrm{n}(M) = 25$, $\mathrm{n}(E) = 30$, $\mathrm{n}(T) = 35$ and $\mathrm{n}(\mathrm{U}) = 56$

(a) Complete the Venn diagram. [3]

(b) Find

(i) $\mathrm{n}(M \cap (E' \cup T'))$,

..... [1]

(ii) $\mathrm{n}(M \cap T')$.

..... [1]

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(c) One of these students is chosen at random.

Find the probability that this student studies English and mathematics but not technology.

..... [2]

(d) Two of the 56 students are chosen at random.

Find the probability that they both study technology.

..... [2]

(e) A student who studies mathematics is chosen at random.

Find the probability that this student also studies technology but not English.

..... [2]

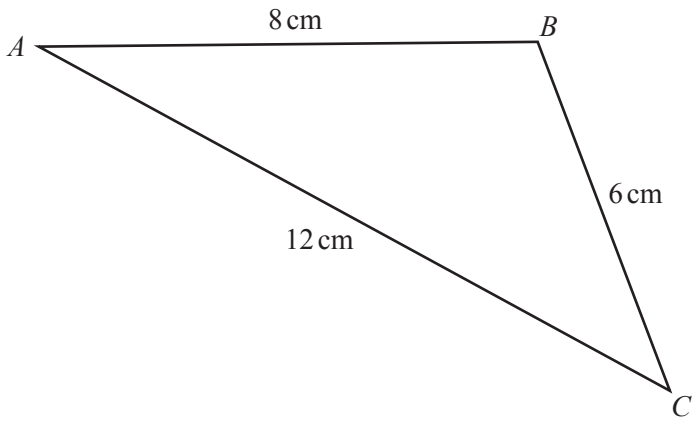
(f) Two students who study English are chosen at random.

Find the probability that they both study mathematics but not technology.

..... [3]

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The diagram shows triangle ABC.

(a) Use the cosine rule to find angle ABC.

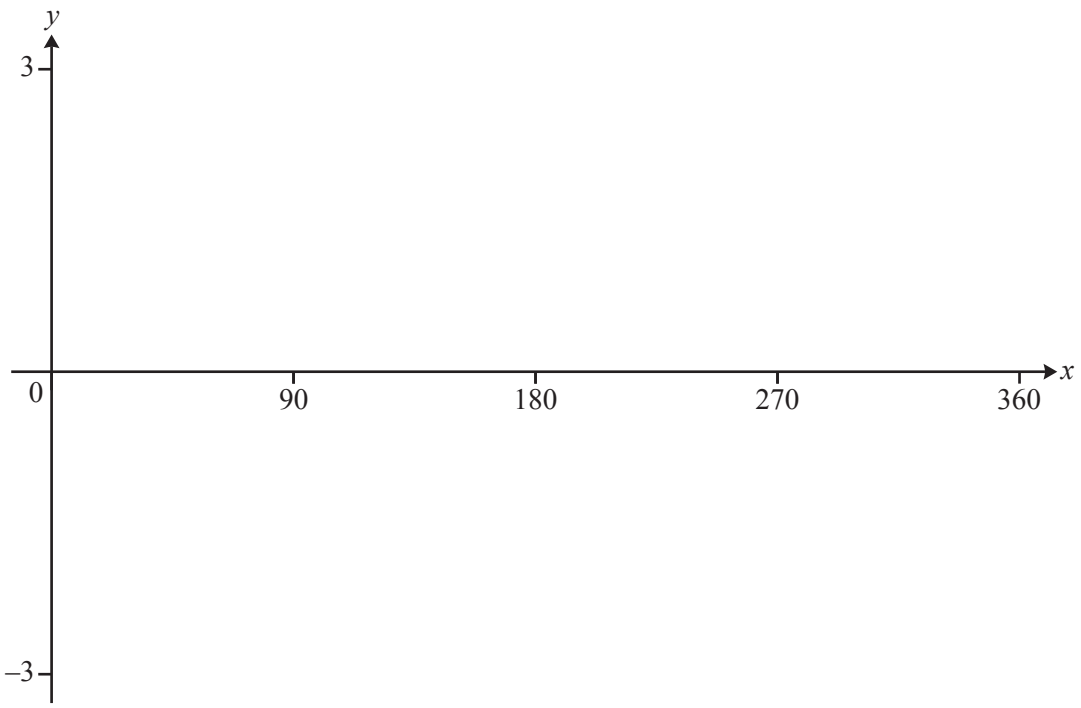
Angle ABC = ... [3]

(b) Use the sine rule to find angle BAC.

Angle BAC = ... [3]

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$\mathrm{f}(x) = 2\sin x + \cos x \qquad \text{for } 0° \leqslant x \leqslant 360°$

$\mathrm{g}(x) = 2 - \log x \qquad \text{for } 0° \leqslant x \leqslant 360°$

(a) On the diagram, sketch the graph of $y = \mathrm{f}(x)$. [3]

(b) On the same diagram, sketch the graph of $y = \mathrm{g}(x)$. [2]

(c) Solve the equation.

$$2\sin x + \cos x = 2 - \log x$$

..... [3]

11 Vito lives in Sicily.
Table A shows the distances, in km, between different towns.
Table B shows the average speed, in km/h, that Vito drives his car between towns.

Table A (distances, in km)

	Agrigento	Catania	Messina	Palermo	Trapani
Agrigento		175	275	155	170
Catania	175		100	215	325
Messina	275	100		225	330
Palermo	155	215	225		110
Trapani	170	325	330	110	

Table B (average speeds, in km/h)

	Agrigento	Catania	Messina	Palermo	Trapani
Agrigento		90	110	75	100
Catania	90		120	95	$90+x$
Messina	110	120		105	80
Palermo	75	95	105		$30+2x$
Trapani	100	$90+x$	80	$30+2x$	

(a) (i) Write down the distance from Agrigento to Messina.

..... km [1]

(ii) Find the time taken for Vito to drive from Agrigento to Messina.

..... hours [2]

(b) On another day, Vito drives from Agrigento to Trapani.
He arrives at Trapani at 10 42.

At what time did he leave Agrigento?

..... [3]

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(c) One day Vito drives from Catania to Palermo.
Vito's car uses fuel at the rate of 12.5 km/litre.
The cost of fuel is 1.432 euros per litre.

Find the cost of this journey.

.....euros [3]

(d) The time for Vito to drive from Catania to Trapani is $1\frac{1}{2}$ hours longer than the time for Vito to drive from Palermo to Trapani.

(i) Show that $x^2 - 75x + 1400 = 0$.

[5]

(ii) Find the two possible average speeds that Vito drives from Catania to Trapani.

.....km/h, ...km/h [3]

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