UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | |

CANDIDATE NUMBER | | | |

3360305085

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/04**

Paper 4 (Extended) **October/November 2012**

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, 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 120.

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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. $\quad A = \pi rl$

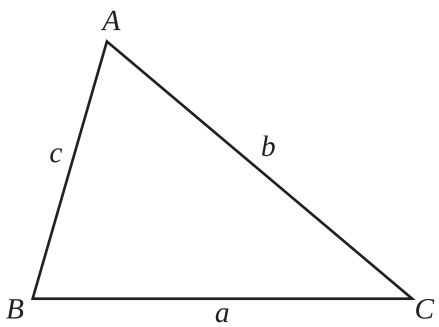
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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

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

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

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



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

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

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

Answer **all** the questions.

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1 A number of students were asked how many brothers or sisters they have.
The results are shown in the table.

Number of brothers or sisters	0	1	2	3	4	5	6
Frequency	9	15	13	6	2	3	2

Find

(a) the number of students,

Answer(a) .... [1]

(b) the median,

Answer(b) .... [1]

(c) the mean,

Answer(c) .... [1]

(d) the upper quartile,

Answer(d) .... [1]

(e) the range,

Answer(e) .... [1]

(f) the mode.

Answer(f) .... [1]

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2 **(a)** Mr Pereira shares $200 between his two sons in the ratio

Pedro : Jose = 3 : 2.

(i) Write this ratio in the form n : 1.

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

(ii) Show that Pedro receives $120.

[1]

(iii) Pedro invests his $120 at a rate of 4 % per year **simple** interest.

Calculate the **total amount** Pedro has after 2 years.

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

(iv) Jose invests his $80 at a rate of 3.95 % per year **compound** interest.

Calculate the **total amount** Jose has after 2 years.

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

(v) Show that, over 2 years, 3.95% per year compound interest is better than 4% per year simple interest.

[2]

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(b) The value of Mr Pereira's car is \$24 000.
The value of the car decreases by 10 % each year.

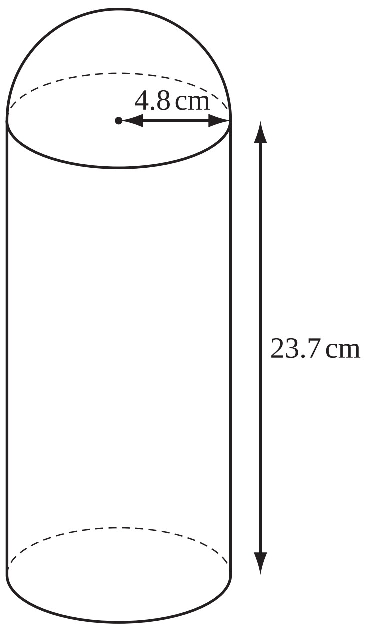
(i) Find the value of the car after 2 years.

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

(ii) Find the number of **complete** years it takes for the value of the car to reduce from \$24 000 to \$10 000.

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

3



The diagram shows a solid made using a hemisphere and a cylinder.
The radius of both the hemisphere and the cylinder is 4.8 cm.
The height of the cylinder is 23.7 cm.

(a) **(i)** Calculate the volume of the solid.
Give your answer correct to the nearest cubic centimetre.

Answer(a)(i) .... cm^3 [4]

(ii) Write your answer to **part(a)(i)** in cubic metres.

Answer(a)(ii) .... m^3 [1]

(iii) The solid is made of wood.
1 m^3 of wood has a mass of 820 kg.

Calculate the mass of the solid.

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

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(b) The surface of the solid, including the base, is painted at a cost of 0.15 cents per square centimetre.

Calculate the cost of painting the solid.
Give your answer in **dollars**, correct to the nearest cent.

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Answer(b) $ .... [5]

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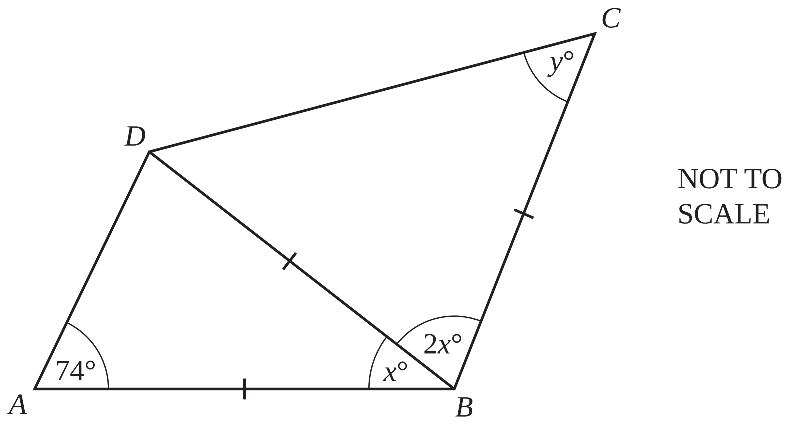
4 **(a)** Each interior angle of a regular polygon with n sides is 175°.

Find n.

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

(b)



In the diagram $BA = BD = BC$.
Angle $DAB = 74°$, angle $ABD = x°$, angle $DBC = 2x°$ and angle $BCD = y°$.

(i) Find the value of y.

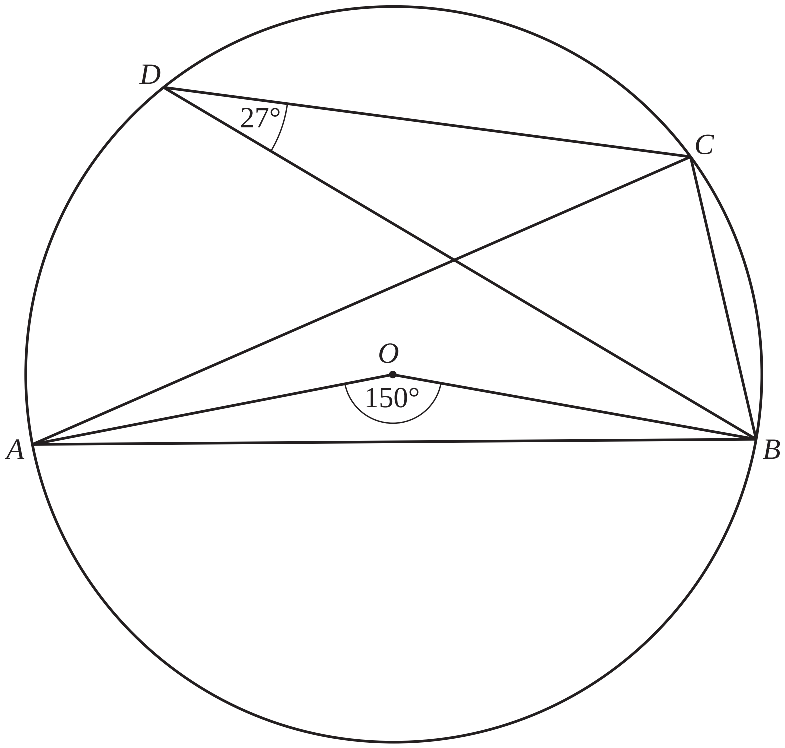
Answer(b)(i) y = ... [3]

(ii) Explain why AD is not parallel to BC.

....

.... [2]

(c)



In the diagram A, B, C and D lie on the circle, centre O.
Angle $AOB = 150°$ and angle $BDC = 27°$.

Calculate

(i) angle ACB,

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

(ii) angle OAC.

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

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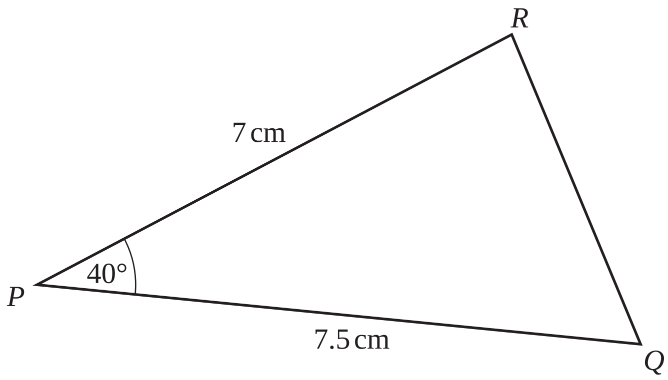
5



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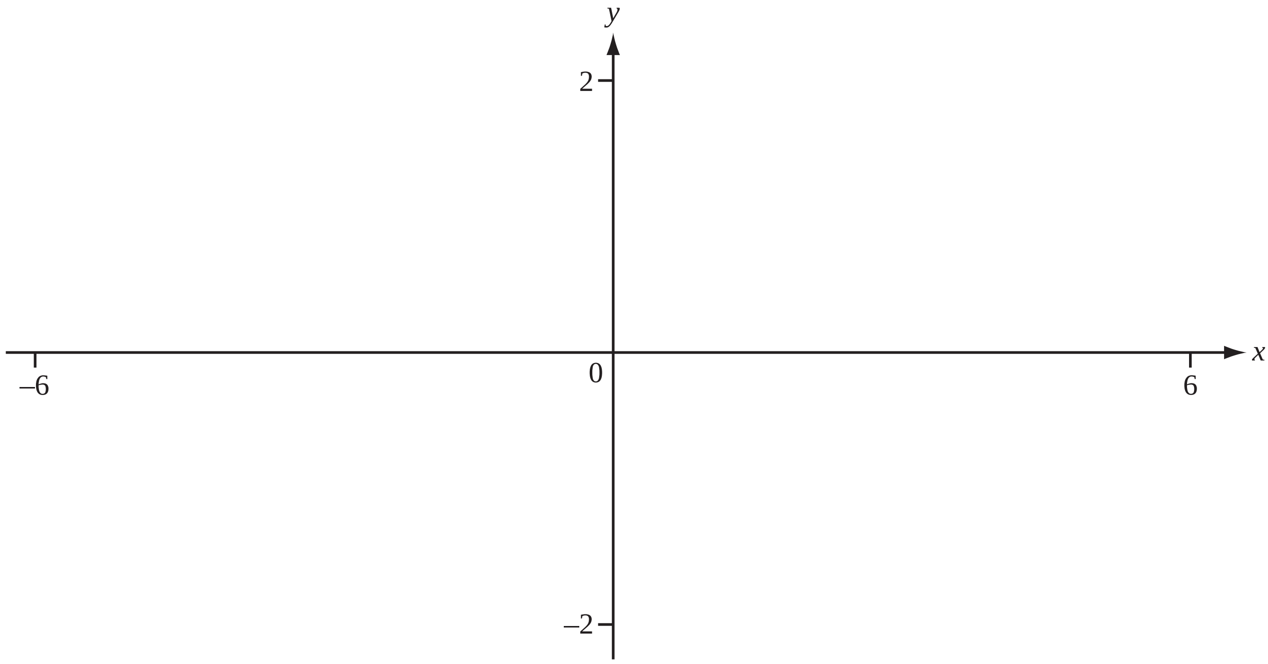
(a) Calculate the area of triangle *PQR*.

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

(b) Calculate *QR*.

Answer(b) .... cm [3]

6



$$f(x) = \frac{4}{x^2 - x - 6}$$

(a) On the diagram sketch the graph of $y = f(x)$ for $-6 \leqslant x \leqslant 6$. [5]

(b) Write down the equations of the three asymptotes.

Answer(b) .... , ... , ... [3]

(c) Find the range of f(x).

Answer(c) .... [3]

(d) Write down the range of $|f(x)|$.

Answer(d) .... [1]

(e) $g(x) = \log x$

(i) On the same diagram sketch the graph of $y = g(x)$. [2]

(ii) Solve the equation $\dfrac{4}{x^2 - x - 6} = \log x$.

Answer(e)(ii) $x =$ .... or $x =$ .... [2]

(iii) Solve the equation $\left|\dfrac{4}{x^2 - x - 6}\right| = \log x$.

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

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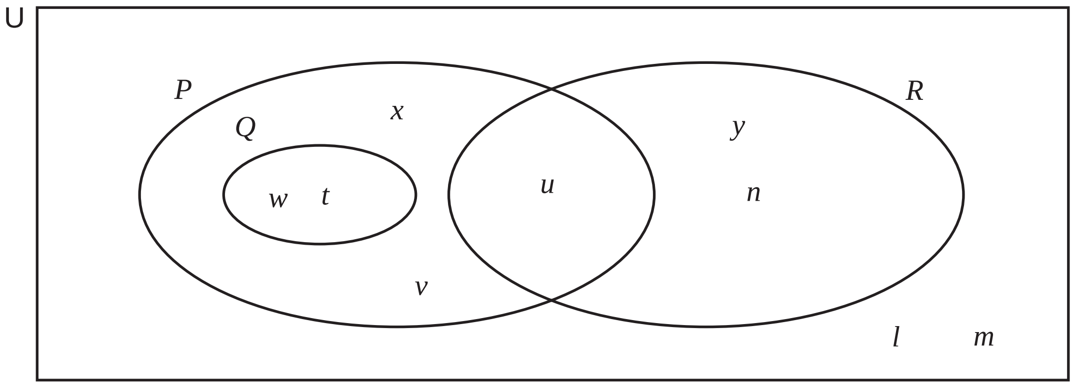
7



The Venn diagram shows three sets P, Q and R.
$\mathsf{U} = \{l, m, n, t, u, v, w, x, y\}$

(a) Use set notation to complete each statement.

(i) y .... R [1]

(ii) Q .... P [1]

(iii) $Q \cap R =$ .... [1]

(iv) P .... $Q = P$ [1]

(b) List the elements of the following sets.

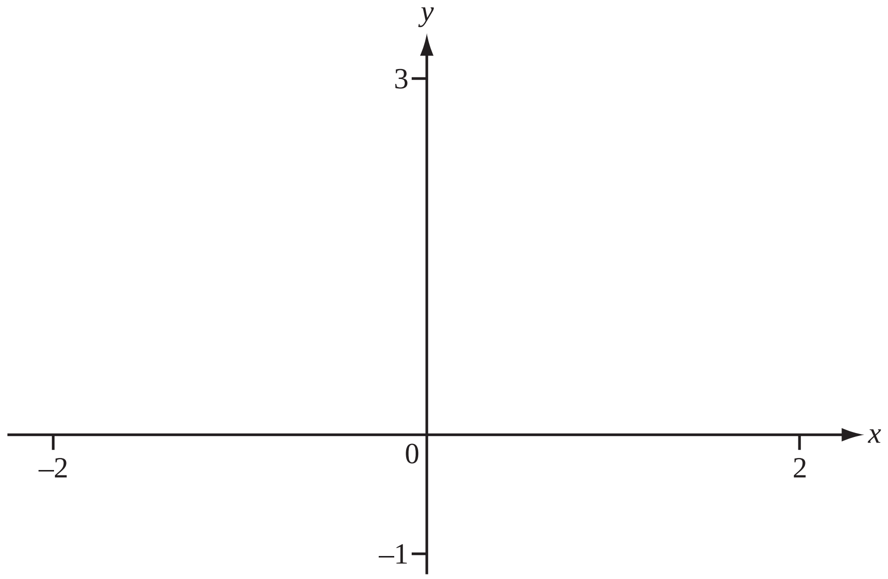
(i) $P = \{$ .... $\}$ [1]

(ii) $P \cap Q = \{$ .... $\}$ [1]

(iii) $(P \cup R)' = \{$ .... $\}$ [1]

(iv) $Q \cup R$ $\{$ .... $\}$ [1]

8



(a) Sketch the following lines.

(i) $y = x + 1$ [1]

(ii) $y = 2 - \dfrac{x}{3}$ [1]

(b) Find the co-ordinates of the point of intersection, I, of the two lines in **part (a)**.

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

(c) Find the area of the triangle enclosed by the lines $y = x + 1$, $y = 2 - \dfrac{x}{3}$ and $x = 0$.

Answer(c) .... [2]

(d) Find the equation of the line which passes through I and is perpendicular to the line $y = x + 1$.

Answer(d) .... [3]

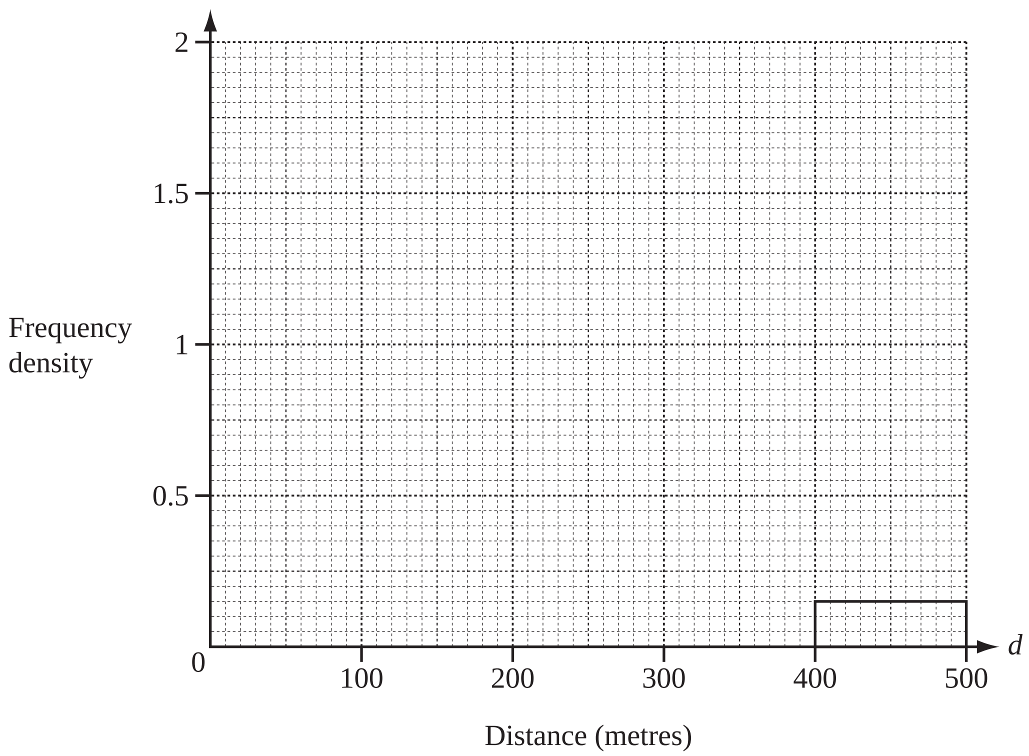
9 200 students measured the distance, d metres, they walked in 5 minutes.
The table shows the results.

Distance (d metres)	$0 \leqslant d < 200$	$200 \leqslant d < 300$	$300 \leqslant d < 350$	$350 \leqslant d < 400$	$400 \leqslant d < 500$
Frequency	13	19	83	70	15

(a) Calculate an estimate of the mean distance walked.

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

(b) Complete the histogram below.
The bar for $400 \leqslant d < 500$ has already been drawn for you.



[4]

10 **(a)** Solve the equation $6 - 3x - x^2 = 0$.

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Answer(a) $x =$ .... or $x =$ .... [3]

(b) Solve the inequality $6 - 3x - x^2 \leqslant 0$.

Answer(b) .... [2]

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11 $f(x) = 2x + 3$ $g(x) = x^2 + x + 2$

(a) Find f(g(2)).

Answer(a) .... [2]

(b) Find g(f(x)) in its simplest form.

Answer(b) .... [3]

(c) Find $f^{-1}(x)$.

Answer(c) .... [2]

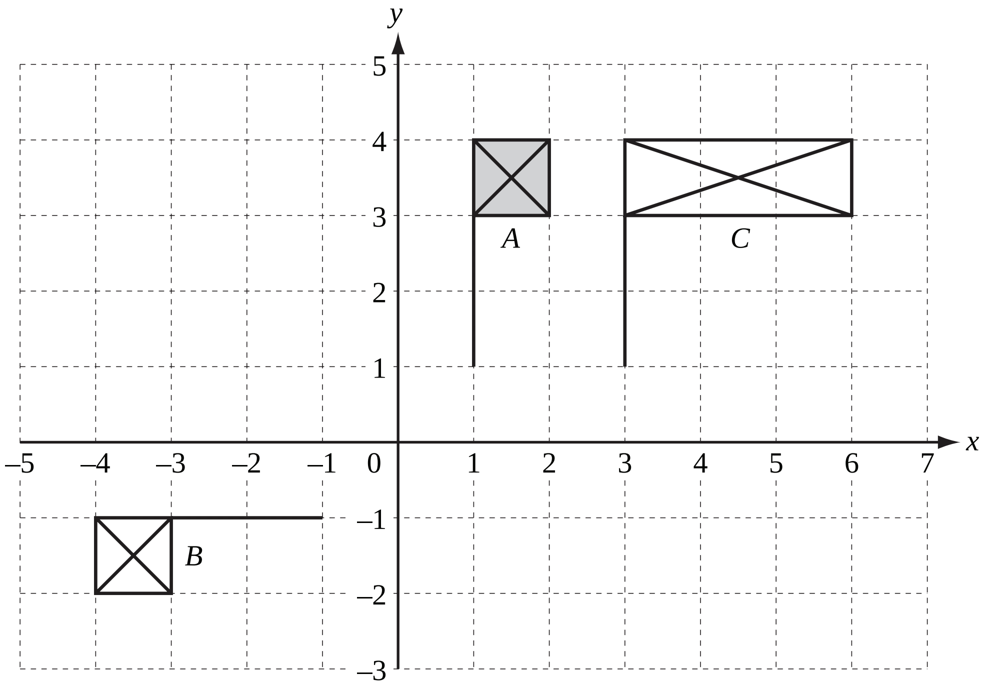
(d) **(i)** Find the value of f(f(1)).

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

(ii) Solve the equation f(f(x)) = f(x).

Answer(d)(ii) x = ... [2]

12



(a) Describe fully the **single** transformation that maps flag *A* onto

(i) flag *B*,

....

.... [2]

(ii) flag *C*.

....

.... [3]

(b) Draw the rotation of flag *A* through 90° clockwise about the point (1, – 1). [2]

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13 Sara cycles 10 km at a speed of $(x + 3)$ km/h.
She then cycles a further 4 km at a speed of x km/h.
The total time taken is 1 hour.

(a) **(i)** Write down an expression in x for the time Sara takes to cycle the first 10 km.

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

(ii) Show that $x^2 - 11x - 12 = 0$.

[3]

(b) Factorise $x^2 - 11x - 12$.

Answer(b) .... [2]

(c) Find the number of minutes Sara takes to cycle the first 10 km.

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

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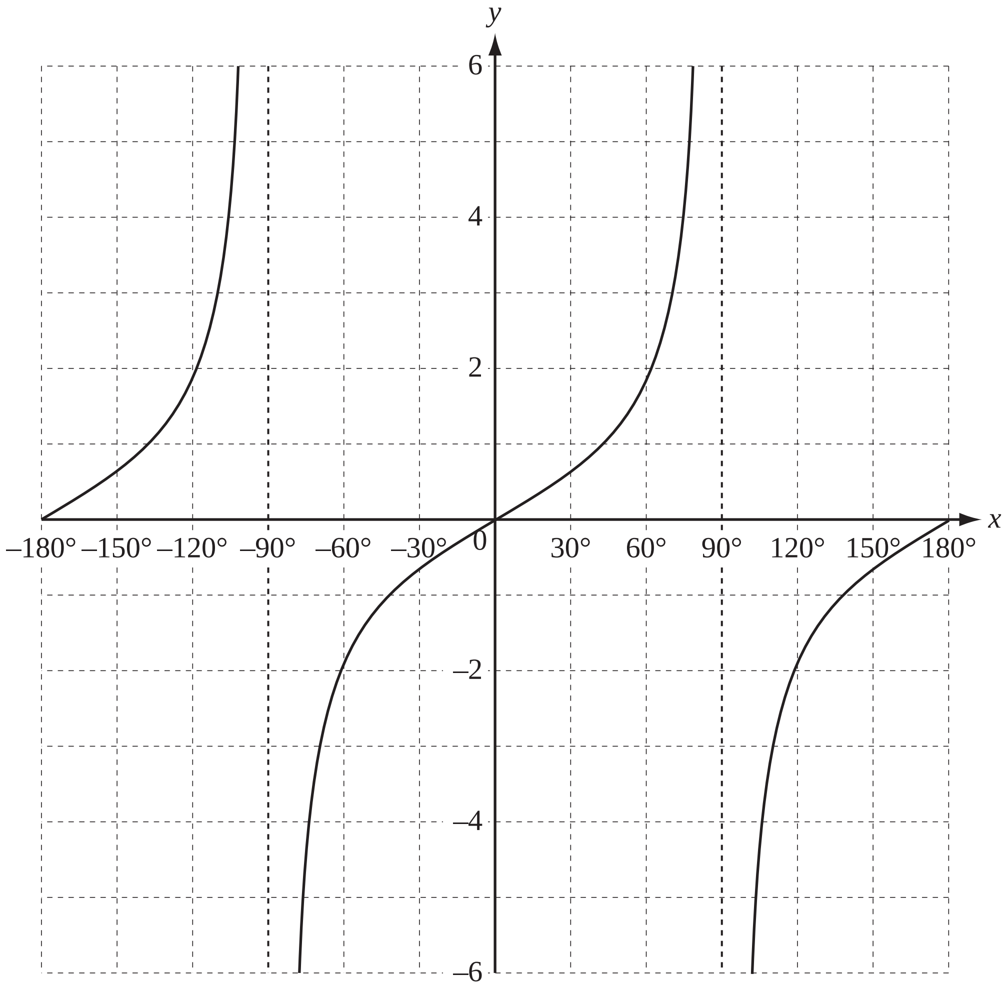
14



The diagram shows the graph of $y = \tan x$ for $-180° \leqslant x \leqslant 180°$.

(a) **(i)** On the diagram sketch the graph of $y = \tan(x - 60°)$ for $-180° \leqslant x \leqslant 180°$. [2]

(ii) Describe fully the **single** transformation that maps the graph of $y = \tan x$ onto the graph of $y = \tan(x - 60°)$.

....

.... [2]

(b) Solve the equation $\tan x = \sqrt{3}$ for $-180° \leqslant x \leqslant 180°$.

Answer(b) .... [2]

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