Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	

5483705885

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **May/June 2015**

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 **20** printed pages.

DC (NH/SW) 99286/6

[Turn over

Formula List

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

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. $A = \pi rl$

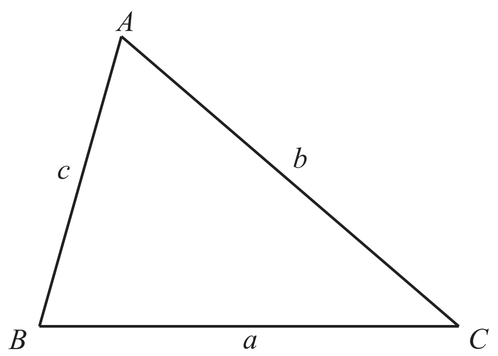
Curved surface area, A, of sphere of radius r. $A = 4\pi r^2$

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

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

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

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



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

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

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

Answer **all** the questions.

1 An art gallery values its paintings every five years.
The value of one painting increased by 90% every five years from 1990.
The value in 1995 was $76 000.

(a) Calculate the exact value of the painting in

(i) 1990,

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

(ii) 2010.

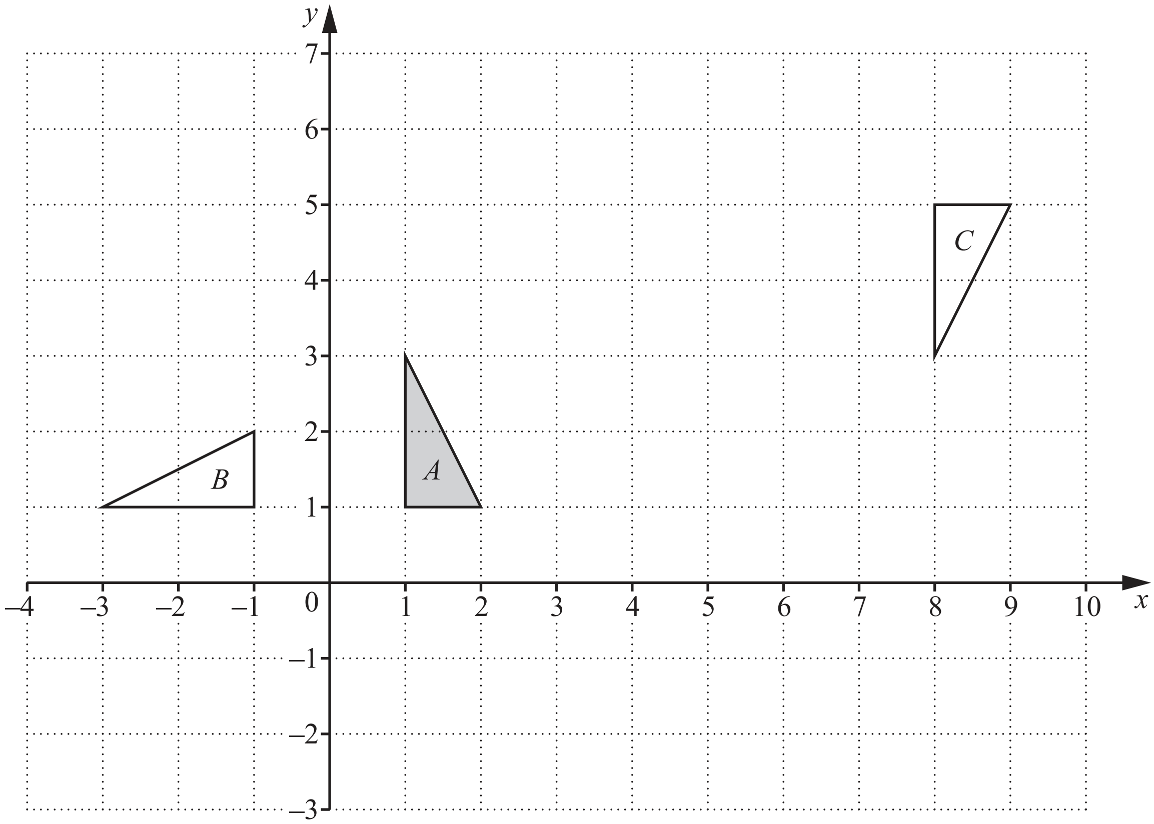
Answer(a)(ii) $ .... [3]

(b) The value of the painting continues to increase by 90% every five years.

In which year's valuation will the value of the painting first be over $10 million?

Answer(b) .... [2]

2



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

Answer(a) ....

.... [3]

(b) Complete the statement.

Triangle A can be mapped onto triangle C by a translation with vector $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ followed by

a reflection in the line .... [2]

(c) Stretch triangle A with the x-axis invariant and stretch factor 2. [2]

3 Jean-Paul goes on holiday and drives 780 km.
He leaves at 06 45 and arrives at 16 10.

(a) Find the average speed for the whole journey.

Answer(a) .... km/h [3]

(b) He travels partly on autoroutes and partly on other roads.
He travels for 520 km on autoroutes at an average speed of 105 km/h.

Find the average speed for the part of the journey on other roads.

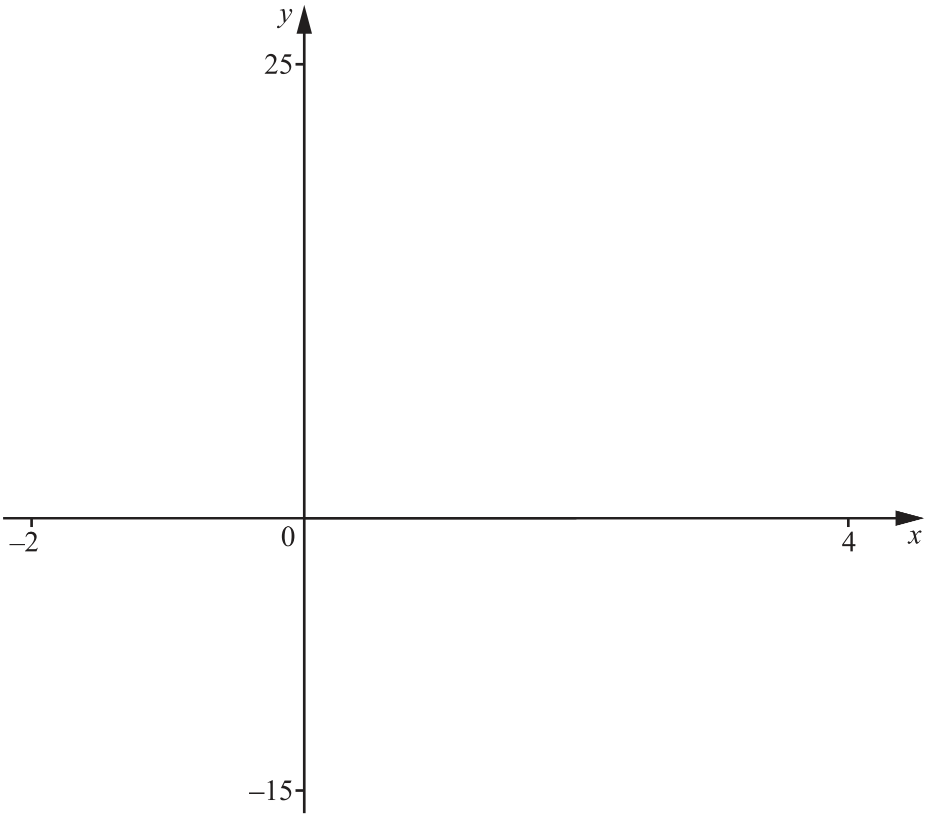
Answer(b) .... km/h [3]

(c) For every 100 km travelled on autoroutes, Jean-Paul's car uses 6 litres of fuel.
For every 100 km travelled on other roads, it uses 8 litres of fuel.
Fuel costs 1.63 euros per litre.
The total autoroute toll charges are 15.20 euros.

Find the total cost of the journey.

Answer(c) .... euros [4]

4



$\mathrm{f}(x) = x^3 - 3x^2 + 6$

(a) On the diagram, sketch the graph of $y = \mathrm{f}(x)$ for $-2 \leqslant x \leqslant 4$. [2]

(b) Find the co-ordinates of the local maximum point and the local minimum point.

Answer(b) Maximum (................. , ...)

Minimum (................. , ...) [2]

(c) Find the range of values of k for which the equation $\mathrm{f}(x) = k$ has 3 different solutions.

Answer(c) .... [2]

(d) Describe fully the symmetry of the graph of $y = f(x)$.

Answer(d) ....

.... [3]

(e) The graph of $y = g(x)$ is the translation of the graph of $y = f(x)$ with vector $\begin{pmatrix} 0 \\ -2 \end{pmatrix}$.

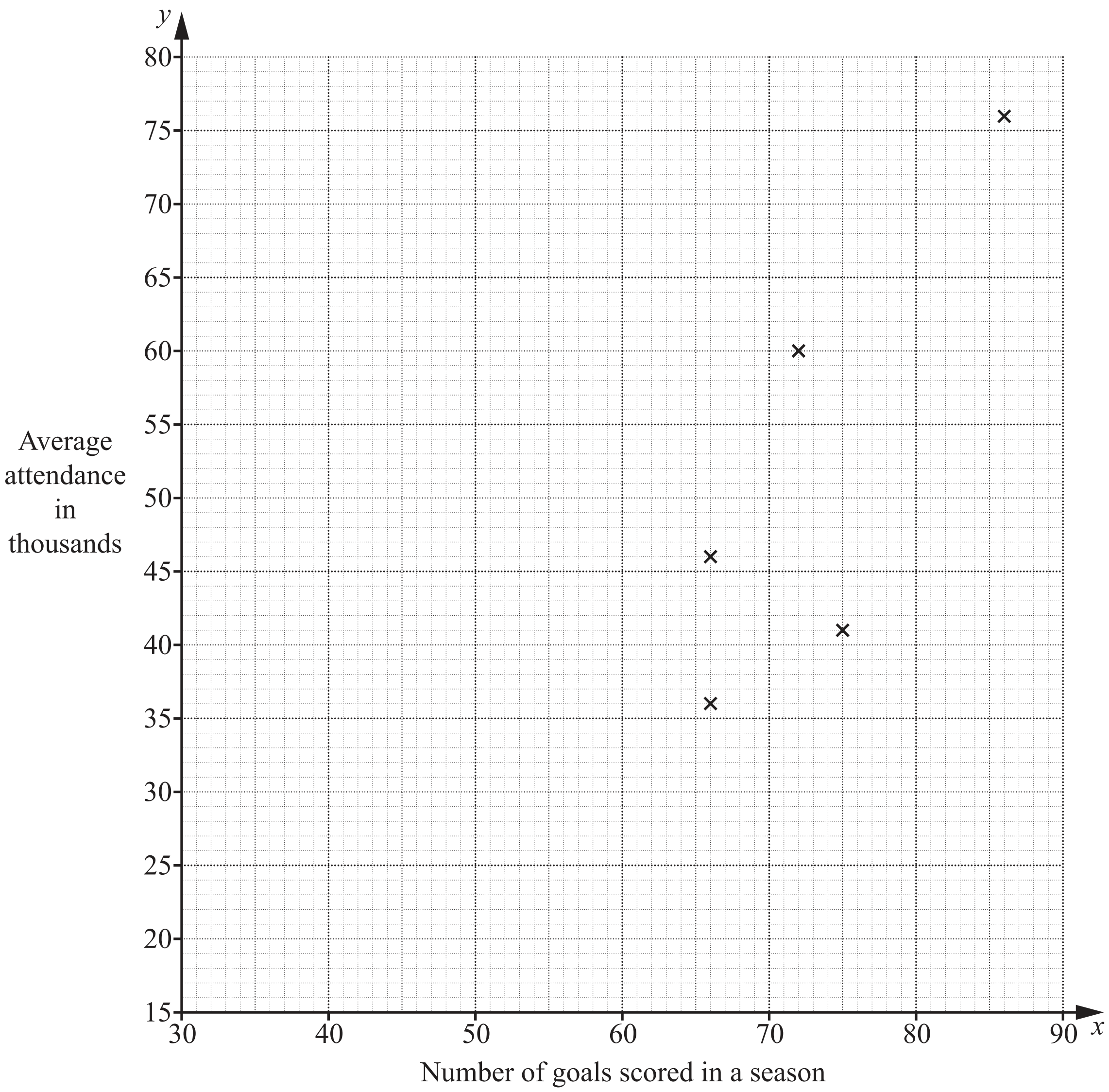
Write down and simplify $g(x)$.

Answer(e) g(*x*) = ... [1]

5 The table shows the number of goals scored in a season, x, and the average attendance at matches in thousands, y, for ten teams in a league.

Team	A	B	C	D	E	F	G	H	I	J
Number of goals scored in a season (x)	86	66	75	72	66	55	71	53	47	45
Average attendance in thousands (y)	76	46	41	60	36	36	45	25	20	35

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



[2]

(b) What type of correlation is shown by the scatter diagram?

Answer(b) .... [1]

(c) Find the mean

(i) number of goals scored,

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

(ii) average attendance.

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

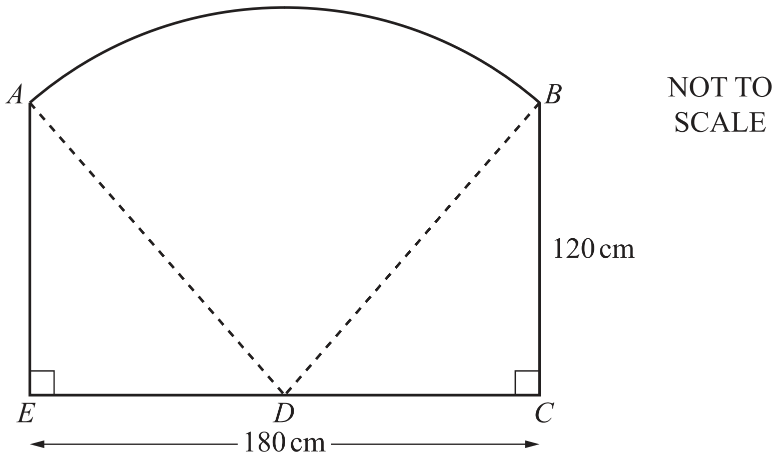
(d) Find the equation of the line of regression in the form $y = mx + c$.

Answer(d) $y =$ .... [2]

(e) Use your answer to **part (d)** to estimate the average attendance for a team that scored 80 goals in a season.

Answer(e) .... [1]

6



The diagram shows a fence panel *ABCDE*.
The vertical edges *AE* and *BC* are of length 120 cm and the horizontal base *EC* is of length 180 cm.
D is the midpoint of *EC*.

(a) Calculate *AD*.

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

(b) Show that angle *ADB* = 73.74° correct to 2 decimal places.

[3]

(c) *AB* is an arc of a circle centre *D*.
Find the area of the fence panel.

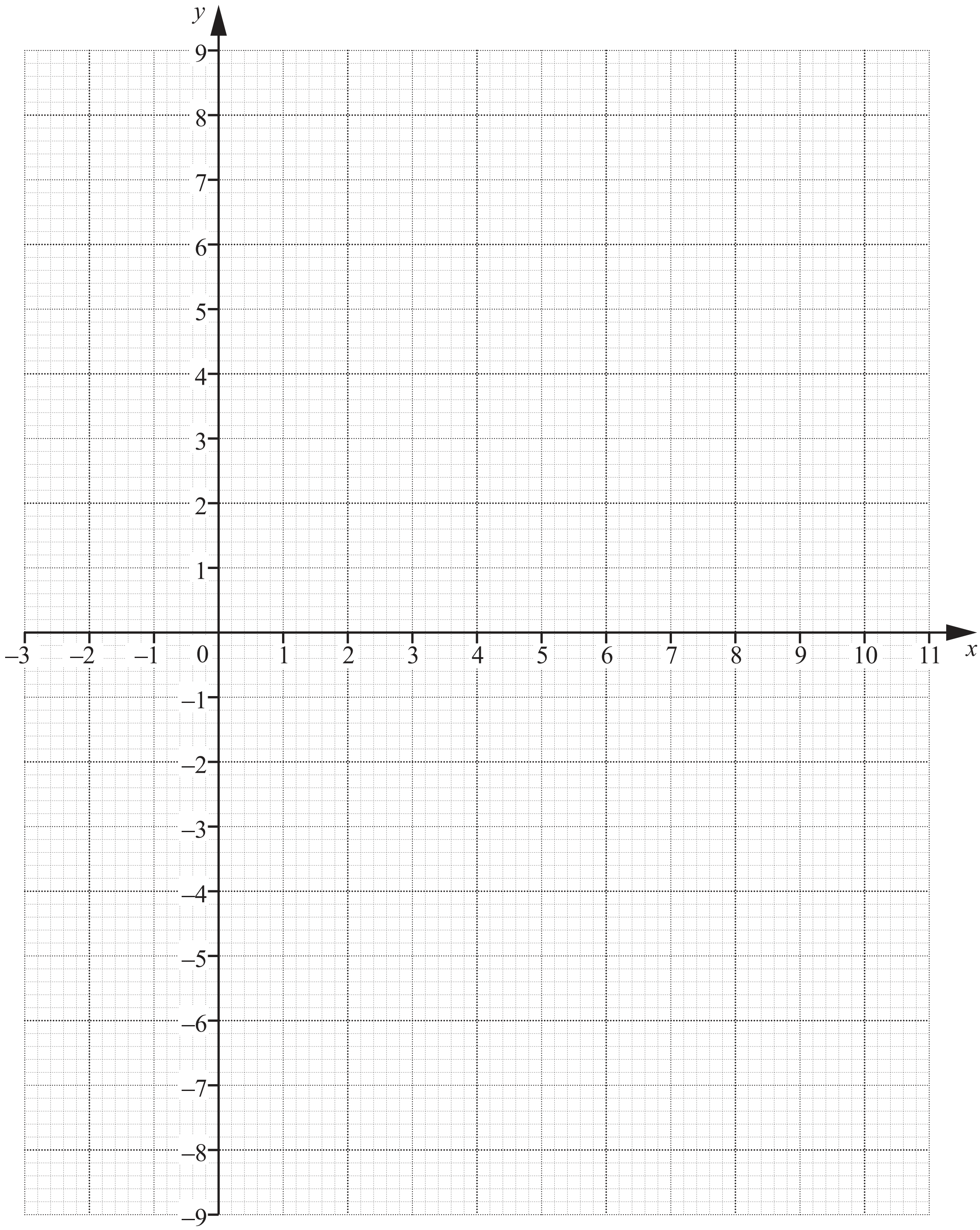
Answer(c) ....cm^2 [3]

(d) Stefan's fence has 8 panels, each identical to *ABCDE*.
He wishes to paint both sides of all the panels.
Each litre of paint covers an area of 6 **square metres**.

Calculate the number of litres Stefan needs to paint **both** sides of the whole fence.

Answer(d) .... litres [3]

7



(a) On the grid, show clearly the region defined by these inequalities.

$x \geqslant -1 \qquad y \geqslant 2 \qquad y \geqslant 2x - 3 \qquad 3x + 5y \leqslant 30$ [7]

(b) Use your diagram to estimate

(i) the greatest value of y in the region,

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

(ii) the greatest value of $x + y$ in the region.

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

8 **(a)** Give an example of

(i) discrete data,

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

(ii) continuous data.

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

(b) The table shows the heights, h cm, of 30 students in a class.

Height (h cm)	$150 < h \leqslant 155$	$155 < h \leqslant 160$	$160 < h \leqslant 165$	$165 < h \leqslant 170$	$170 < h \leqslant 175$	$175 < h \leqslant 180$
Frequency	2	4	8	7	5	4

(i) Write down the modal interval.

Answer(b)(i) .... $< h \leqslant$ .... [1]

(ii) Write down the interval that contains the median.

Answer(b)(ii) .... $< h \leqslant$ .... [1]

(iii) Calculate an estimate of the mean.

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

(iv) Explain why the answer to **part (b)(iii)** is an estimate and not an exact answer.

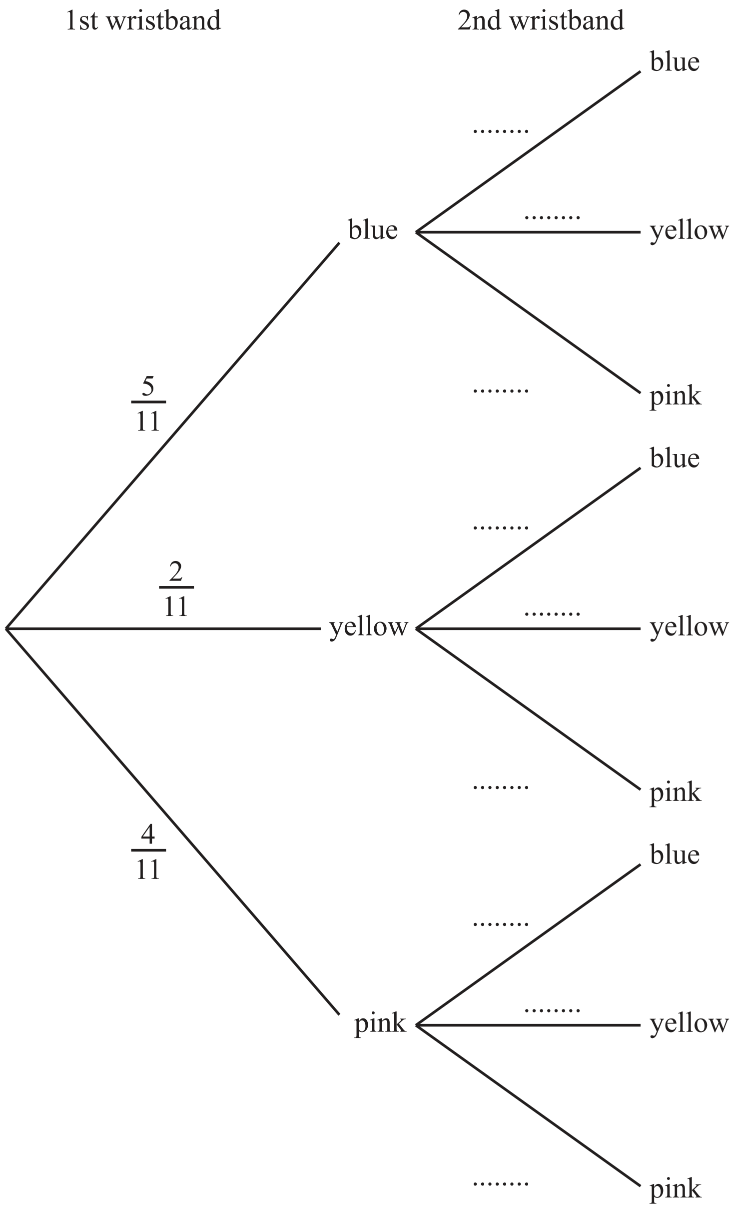
Answer(b)(iv) ....

.... [1]

9 Gitte has a bag containing coloured wristbands.
There are 5 blue wristbands, 2 yellow wristbands and 4 pink wristbands.

Gitte takes a wristband at random from the bag.
If it is yellow, she puts it back in the bag.
If it is blue or pink she puts it on her wrist.
She then takes another wristband at random from the bag.

(a) Complete the tree diagram.



[3]

(b) If the second wristband is yellow, Gitte puts it back in the bag.
If it is blue or pink she puts it on her other wrist.

After choosing the second wristband, find the probability that she is wearing

(i) no wristbands,

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

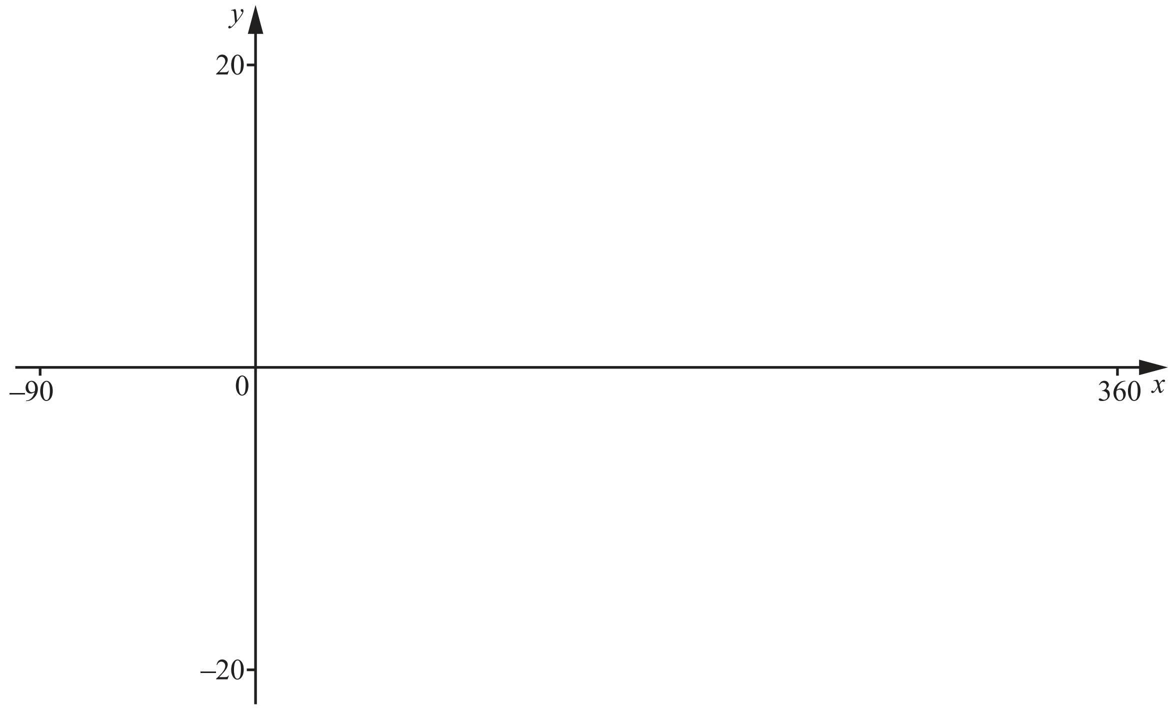
(ii) a matching pair of wristbands,

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

(iii) only one wristband.

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

10



$f(x) = 2\tan(x + 30)°$

(a) On the diagram, sketch the graph of $y = f(x)$ for values of x between –90 and 360. [3]

(b) Solve the equation $f(x) = 5$ for values of x between –90 and 360.

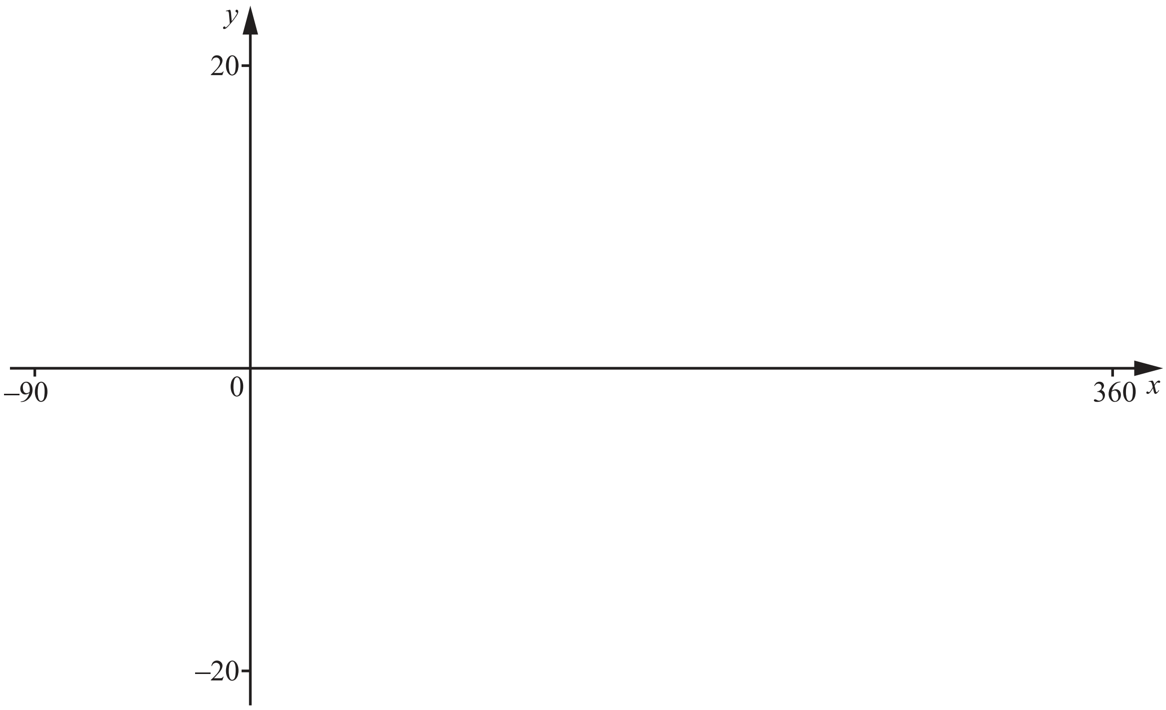
Answer(b) x = ... or x = ... [2]

(c) Write down the equations of the two asymptotes to this graph for values of x between –90 and 360.

Answer(c) ....

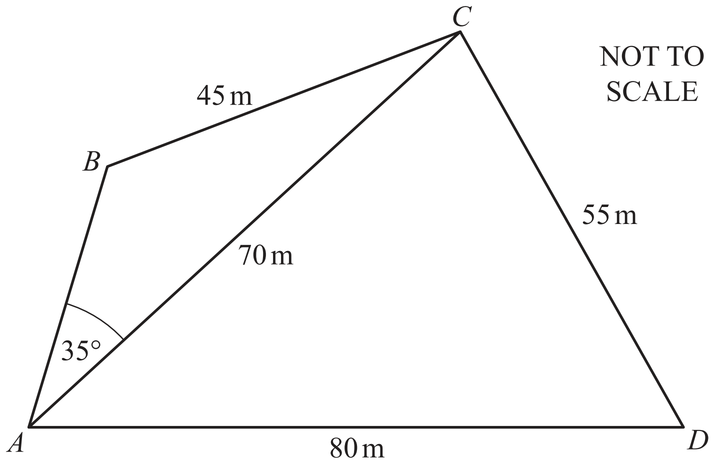
.... [2]

(d) On the diagram below, sketch the graph of $y = |2\tan(x+30)°|$ for values of x between –90 and 360.



[2]

11



The diagram shows the plan of a field *ABCD* with a path from *A* to *C*.

(a) Calculate

(i) the obtuse angle *ABC*,

Answer(a)(i) .... [4]

(ii) angle *CAD*.

Answer(a)(ii) .... [4]

(b) Waqar walks along the path *AC*.
Calculate his shortest distance from *B*.

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

12 $\mathrm{f}(x) = 5x - 2$ $\quad\quad$ $\mathrm{g}(x) = \dfrac{6}{4x+1},\ x \neq -\dfrac{1}{4}$ $\quad\quad$ $\mathrm{h}(x) = 5x^2 + 3x - 2$

(a) Find $\mathrm{f}(\mathrm{g}(1))$.

Answer(a) .... [2]

(b) Find and simplify these expressions.

(i) $\mathrm{g}(\mathrm{f}(x))$

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

(ii) $\mathrm{f}^{-1}(x)$

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

(c) Simplify.

(i) $\dfrac{\mathrm{f}(x)}{\mathrm{h}(x)}$

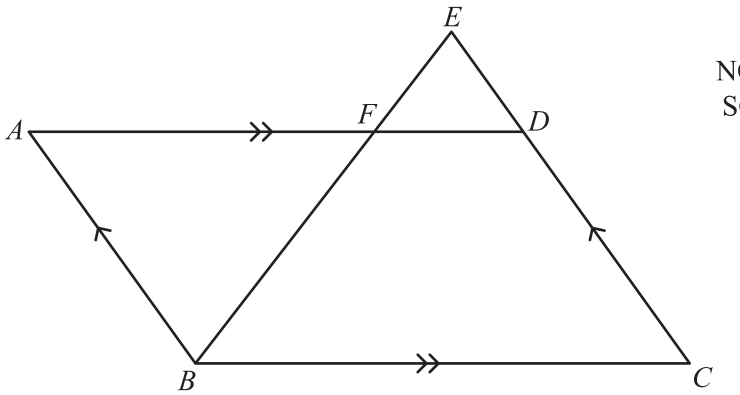
Answer(c)(i) .... [3]

(ii) $\mathrm{g}(x) - \dfrac{1}{\mathrm{f}(x)}$

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

Question 13 is printed on the next page.

13



ABCD is a parallelogram.
BFE and *CDE* are straight lines.

(a) Explain why triangles *AFB* and *DFE* are similar.

Answer(a) ....

....

.... [2]

(b) $BC = 10$ cm, $FD = 4$ cm and $EC = 8$ cm.

(i) Calculate the length of *AB*.

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

(ii) Find the value of $\dfrac{\text{Area of } DFE}{\text{Area of } AFB}$.

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

(iii) Find the value of $\dfrac{\text{Area of } DFE}{\text{Area of } ABCD}$.

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