UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

CAMBRIDGE INTERNATIONAL MATHEMATICS 0607/43

Paper 4 (Extended) **May/June 2013**

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.

For Examiner's Use

This document consists of **20** printed pages.

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Formula List

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

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

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

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

Volume, V, of pyramid, base area A, height h. $\qquad V = \dfrac{1}{3}Ah$
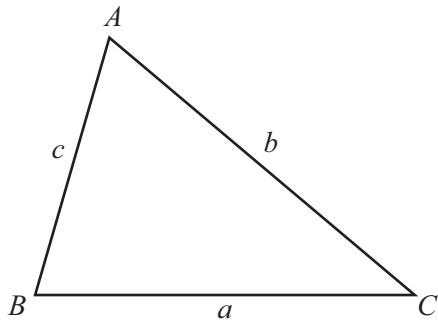
Volume, V, of cylinder of radius r, height h. $\qquad V = \pi r^2 h$

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

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

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

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

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

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Answer **all** the questions.

1 y varies inversely as the square root of x.
   $y = 16$ when $x = 4$.

(a) Find the value of y when $x = 16$.

Answer(a) y = ... [3]

(b) Find the value of x when $y = 64$.

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

(c) Find x in terms of y.

Answer(c) x = ... [3]

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2 **(a)** Solve the equation.

$$2\log 6 - \log 9 + \log x = 3$$

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

(b) Solve the simultaneous equations.

$$3x - 4y = 10$$
$$5x - 3y = 2$$

Answer(b) $x =$ ....

$y =$ .... [4]

3 For each Venn diagram, describe the shaded region using set notation.

*For
~~iner's~~*

(a)

U

Answer(a) .... [1]

(b)

U

Answer(b) .... [1]

(c)

U

Answer(c) .... [1]

(d)

U

Answer(d) .... [2]

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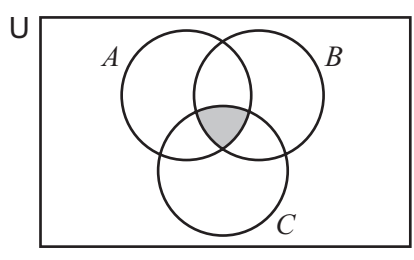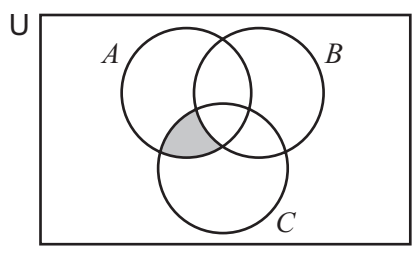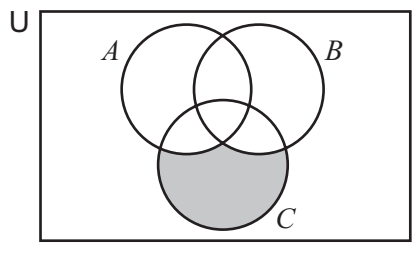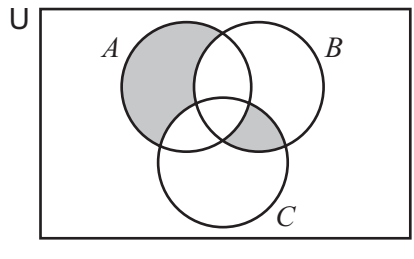
4 **(a)**
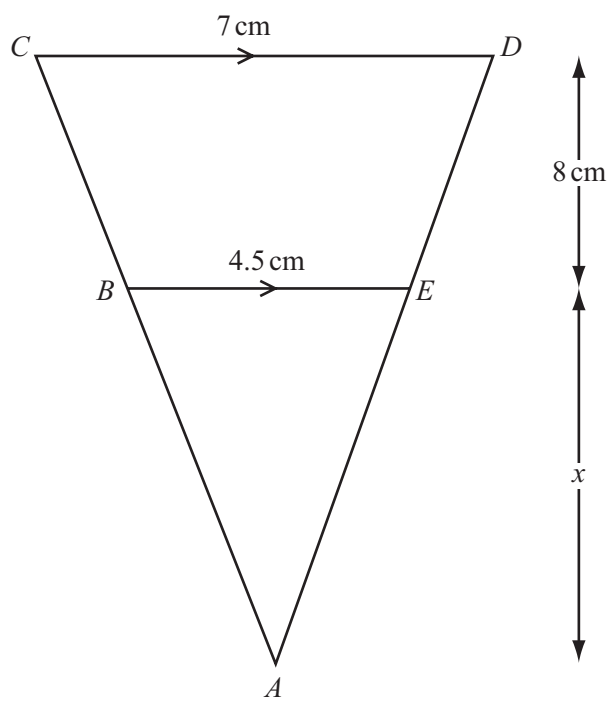
NOT TO
SCALE

In the diagram, *BE* is parallel to *CD*.
The perpendicular height between the lines *BE* and *CD* is 8 cm.
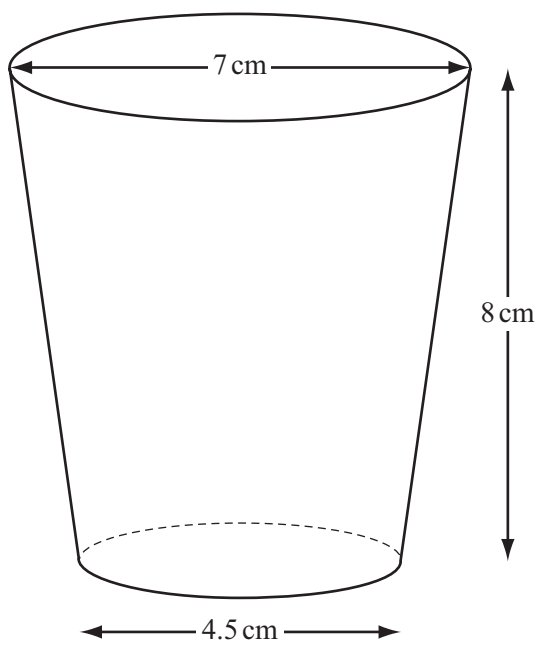The perpendicular height from the point *A* to the line *BE* is *x*.

Show that $x = 14.4$ cm.

[2]

(b)

7 cm

8 cm

NOT TO
SCALE

4.5 cm

The diagram shows a plastic cup.
The diameter of the circular base is 4.5 cm and the diameter of the circular top is 7 cm.
The height of the cup is 8 cm.

Using **part (a)**, calculate the volume of the cup.
Give your answer correct to the nearest cubic centimetre.

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

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5 **(a)** Solve the equation $10x^2 = 5 - x$.
Give your answers correct to 2 decimal places.

Answer(a) x = ... *or x =* .... [4]

(b) Solve the inequality $10x^2 > 5 - x$.

Answer(b) .... [2]

6 The transformation P is a rotation of 180° about the origin.
The transformation Q is a reflection in the line $y = x$.

(a) Find the image of the point (6, 2) under the transformation P.

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

(b) Find the image of the point (6, 2) under the transformation Q.

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

(c) Describe fully the **single** transformation equivalent to P followed by Q.

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

7

*For
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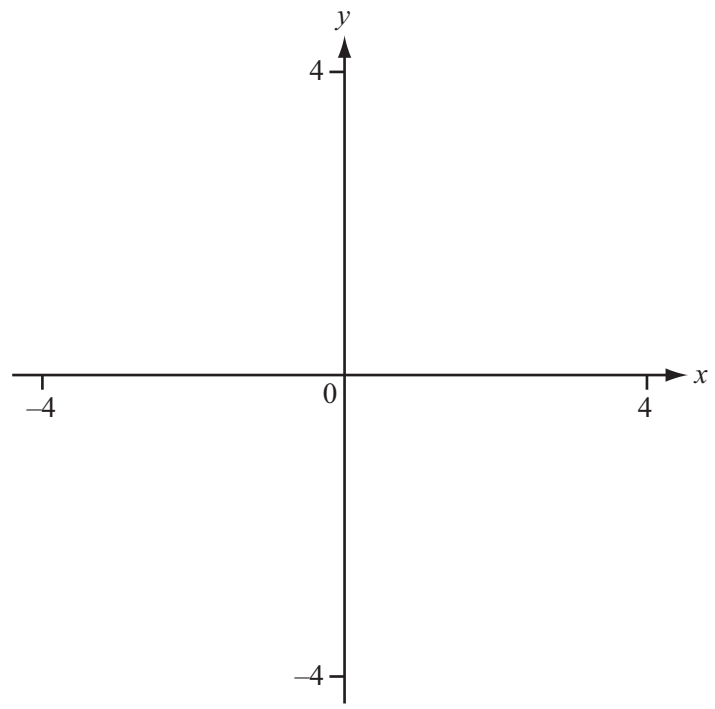
(a) On the diagram, sketch the graph of $y = $ f(x), where

$$\text{f}(x) = \frac{(x-1)}{(x^2-4)} \quad \text{between } x = -4 \text{ and } x = 4 \,.$$

[4]

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

Answer(b) ....

....

.... [3]

(c) The line $y = x$ intersects the curve $y = \dfrac{(x-1)}{(x^2-4)}$ three times.

Find the values of the x co-ordinates of the points of intersection.
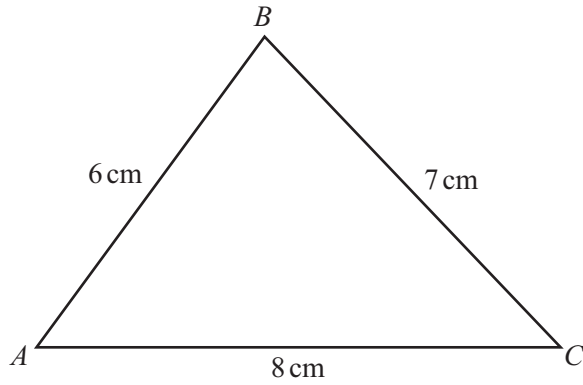
Answer(c) $x = $ ....

$x = $ ....

$x = $ .... [3]

8

B

6 cm   7 cm

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A   8 cm   C

The diagram shows a triangle *ABC*.

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

Answer(a) .... [3]

(b) Find the area of triangle *ABC*, giving your answer correct to 2 decimal places.

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

(c) Find the length of the perpendicular line from *C* to the line *AB*.

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

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9 The British Lions squad for the 2009 tour of South Africa originally contained 40 play
   England, Ireland, Scotland and Wales.
   The playing positions, either Forward or Back, of these players is shown in the table.

	England	Ireland	Scotland	Wales
Forward	6	5	2	6
Back	3	9	2	7

(a) A player is selected at random from the squad to visit a local hospital.

Calculate the probability that the player chosen is

(i) a Forward from Ireland,

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

(ii) **not** from Wales.

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

(b) A player is chosen at random from the Backs to give a TV interview.

Calculate the probability that he is from England.
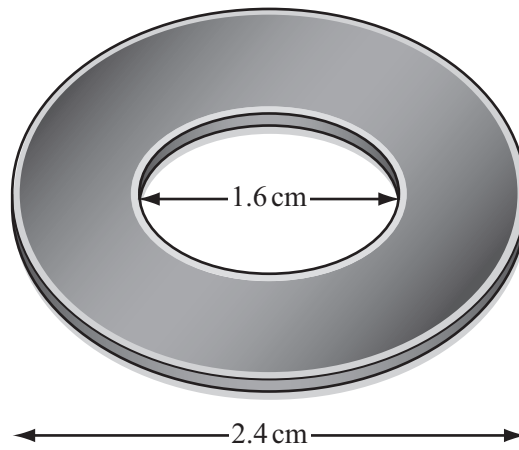
Answer(b) .... [2]

(c) Three Forwards are chosen at random to take part in a 'tug-o-war' competition.

Calculate the probability they are all from Wales.

Answer(c) .... [3]

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10 (a)

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1.6 cm

2.4 cm

The diagram shows a brass washer.
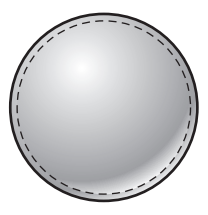The washer is made by removing a circular disc of **diameter** 1.6 cm from a circular disc of **diameter** 2.4 cm.

(i) Find the area of the top surface of the washer in square centimetres.

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

(ii) The washer is 2 mm thick.
Calculate the volume of the washer in **cubic centimetres**.

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

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(b)

NOT TO
SCALE

The diagram shows a globe made from brass.
Globes are hollow spheres.
The outside diameter of this globe is 32 cm and the inside diameter is 30 cm.

(i) Find the volume of brass used to make this globe in cubic centimetres.

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

(ii) A number of globes are to be made by melting 1 000 000 of the brass washers in **part (a)**.

Find the maximum number of globes that can be made.

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

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11 Carlos delivers computers from a factory to a town that is 720 km away.

When he drives at an average speed of x km/h the journey takes one hour longer than if he drives
$(x + 10)$ km/h.

(a) Write down an equation in x and show that it simplifies to $x^2 + 10x - 7200 = 0$.

[4]

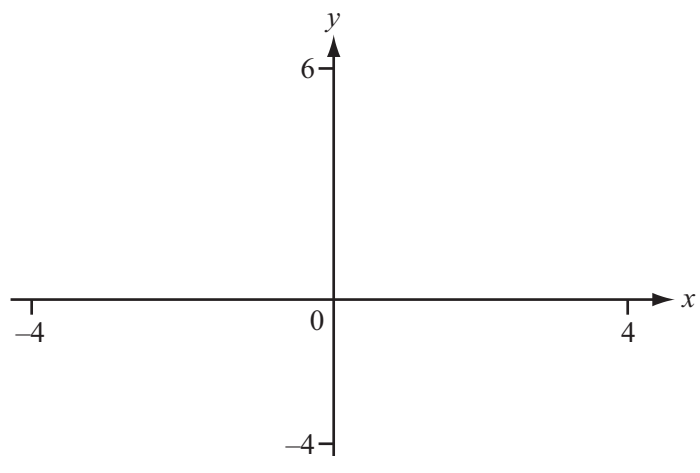**(b) (i)** Factorise $x^2 + 10x - 7200$.

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

(ii) Solve the equation $x^2 + 10x - 7200 = 0$.

Answer(b)(ii) $x =$ .... or $x =$ .... [1]

(iii) Carlos drives the 720 km at x km/h.
Work out the time of his journey.

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

12

(a) (i) On the diagram, sketch the graph of $y = f(x)$, where

$$f(x) = 2 - \frac{1}{(2x+3)} \quad \text{between } x = -4 \text{ and } x = 4 . \qquad [2]$$

(ii) Write down the co-ordinates of the points where the graph crosses the axes.

Answer(a)(ii)   (............... , ...)

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

(iii) Find f(0.25).

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

(b) Solve the inequality $2 - \dfrac{1}{(2x+3)} < 4$.

Answer(b)   ....   [4]

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

Answer(c)   ....   [4]

(d) Solve $f^{-1}(x) = 1$.

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

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For
miner's

13 The masses of 200 tomatoes are given in the table.

Mass (*m* grams)	Frequency
$0 < m \leqslant 20$	12
$20 < m \leqslant 30$	34
$30 < m \leqslant 40$	40
$40 < m \leqslant 45$	60
$45 < m \leqslant 50$	42
$50 < m \leqslant 80$	12

(a) Calculate an estimate of the mean mass of a tomato.
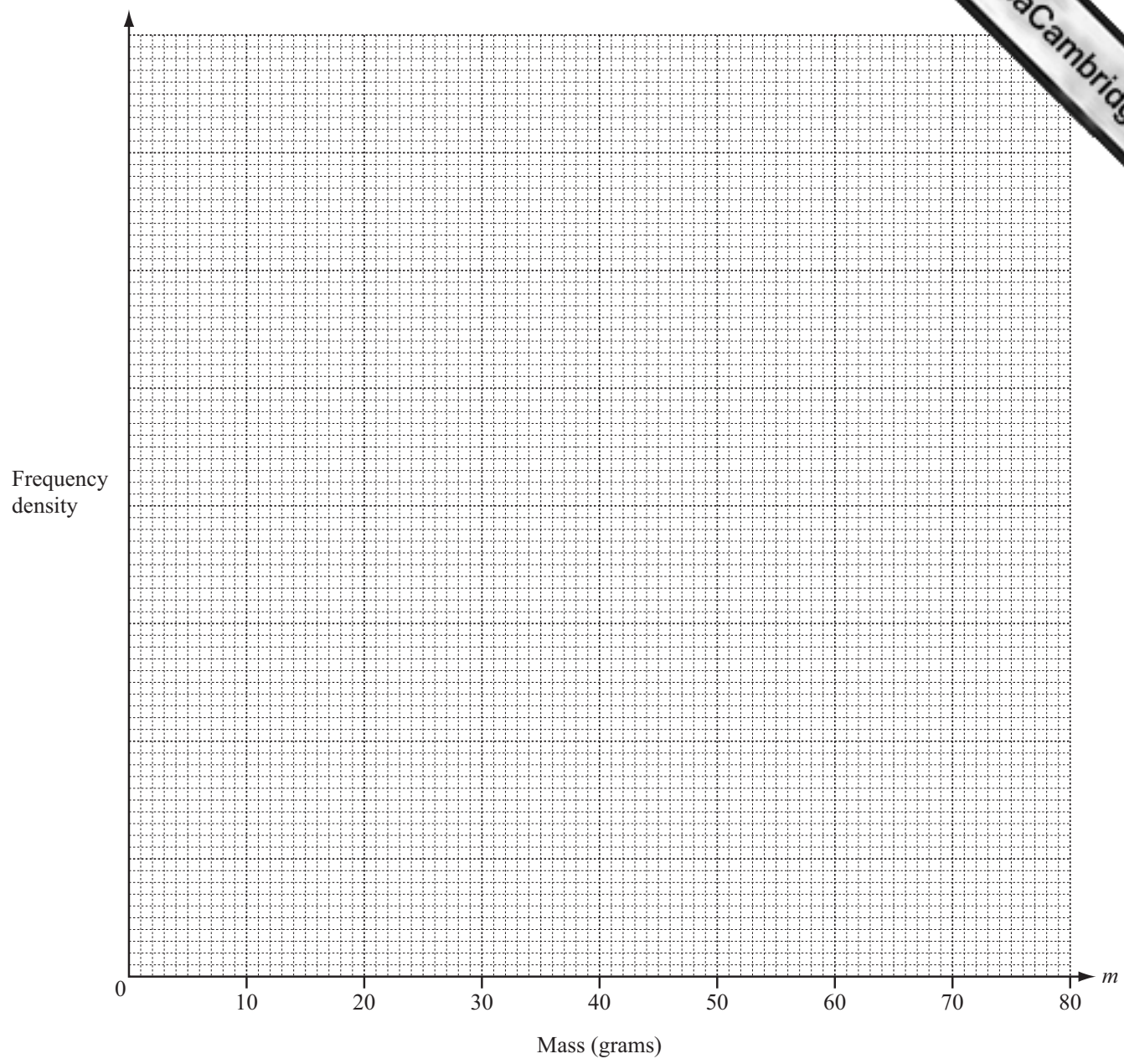Give your answer correct to the nearest gram.

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

(b) (i) Complete the frequency density column in this table.

Mass (*m* grams)	Frequency	Frequency density
$0 < m \leqslant 20$	12	
$20 < m \leqslant 30$	34	
$30 < m \leqslant 40$	40	
$40 < m \leqslant 45$	60	
$45 < m \leqslant 50$	42	
$50 < m \leqslant 80$	12	

[2]

(ii) On the grid opposite, draw an accurate histogram to show this information.
Mark a suitable scale on the frequency density axis.

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Frequency
density

0   10   20   30   40   50   60   70   80 m

Mass (grams)

[4]

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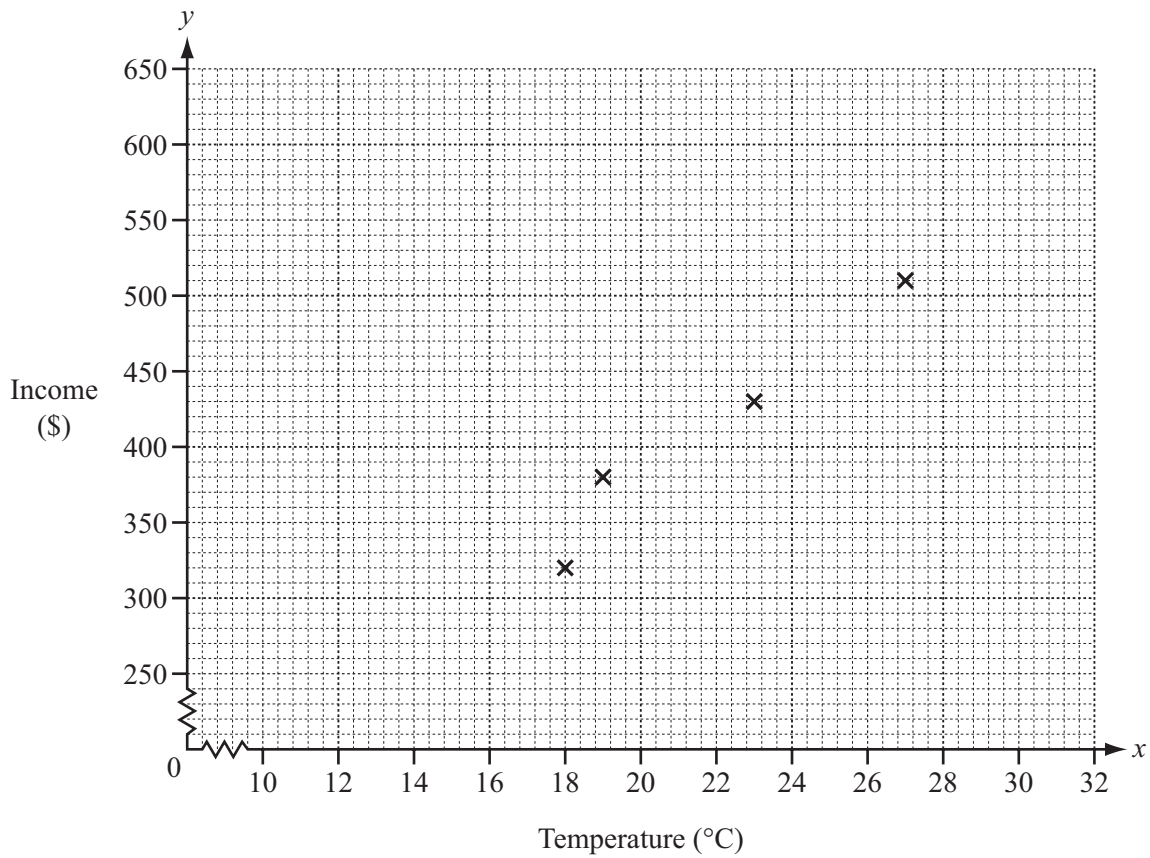**14** Zaira works at an ice-cream shop.
She wants to find out if there is a correlation between the maximum daily temperature, x °C, and the shop's daily income, y.

Zaira recorded the following results.

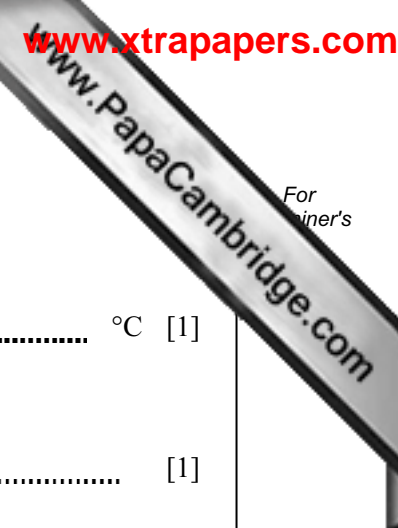| Temperature (x °C)	23	18	27	19	25	20	22	28	17	24
Income (y)	430	320	510	380	510	430	450	530	310	490

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

[3]

(ii) Describe the type of correlation between the temperature and the income.

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

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(b) Find

(i) the mean temperature,

Answer(b)(i) .... °C [1]

(ii) the mean income.

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

(c) **(i)** Find the equation of the regression line for *y* in terms of *x*.

Answer(c)(i) *y* = ... [2]

(ii) Estimate the income when the temperature is 21°C.

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

(iii) Estimate the income when the temperature is 32°C.

Answer(c)(iii) $ .... [1]

(iv) Explain which of your answers to **parts (c)(ii)** and **(c)(iii)** is likely to be the most reliable.

....

.... [2]

Question 15 is printed on the next page.

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15 Find the next term and the nth term in each of the following sequences.

(a) 6, 18, 54, 162, 486, ...

Answer(a) next term = ...

nth term = ... [3]

(b) –1, 1, 5, 11, 19, ...

Answer(b) next term = ...

nth term = ... [4]