Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

6674351105

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **October/November 2014**

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.

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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. $\quad A = \pi rl$

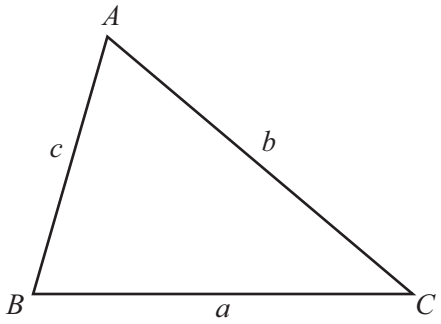
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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.

1 **(a)** Asha and Karim share a sum of money in the ratio Asha : Karim = 5 : 4 .
Asha receives \$600.

Show that Karim receives \$480.

[1]

(b) Asha spends 20% of her \$600 and invests the remaining money at a rate of 4% per year simple interest.

Calculate the amount Asha has at the end of 3 years.

Answer(b) \$ ..... [4]

(c) Karim invests all of his \$480 at a rate of 3.5% per year compound interest.

(i) Calculate the amount Karim has at the end of 3 years.

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

(ii) Calculate the minimum number of whole years it takes for Karim's \$480 to double in value.

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

2 A train leaves Beijing at 15 52 and takes 13 hours and 45 minutes to reach Xian.
The distance from Beijing to Xian is 1200 km.
The cost of a ticket is 441 Yuan (¥).

(a) Calculate the cost per kilometre to travel from Beijing to Xian.

Answer(a) ¥ ..... [1]

(b) Find the time that the train arrives in Xian.

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

(c) Calculate the average speed of the train.

Answer(c) ..... km/h [2]

(d) One day the train is delayed and arrives in Xian at 05 58.

For this train, calculate the percentage increase on the scheduled journey time of 13 h 45 min.

Answer(d) ..... % [4]

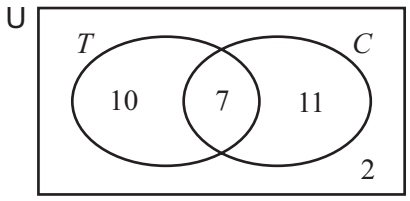
(e) The ticket price of ¥441 is a 5% increase on the previous price of a ticket.

Calculate the previous price of a ticket.

Answer(e) ¥ ..... [3]

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3



U = {30 students}
T = {students who go to the theatre}
C = {students who go to the cinema}

(a) **(i)** How many students go to the theatre but do not go to the cinema?

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

(ii) Find $n(T \cup C)$.

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

(iii) Find $n(T' \cup C)$.

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

(b) One of the 30 students is chosen at random.

Find the probability that this student

(i) goes to the cinema,

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

(ii) either goes to the theatre or does not go to the cinema.

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

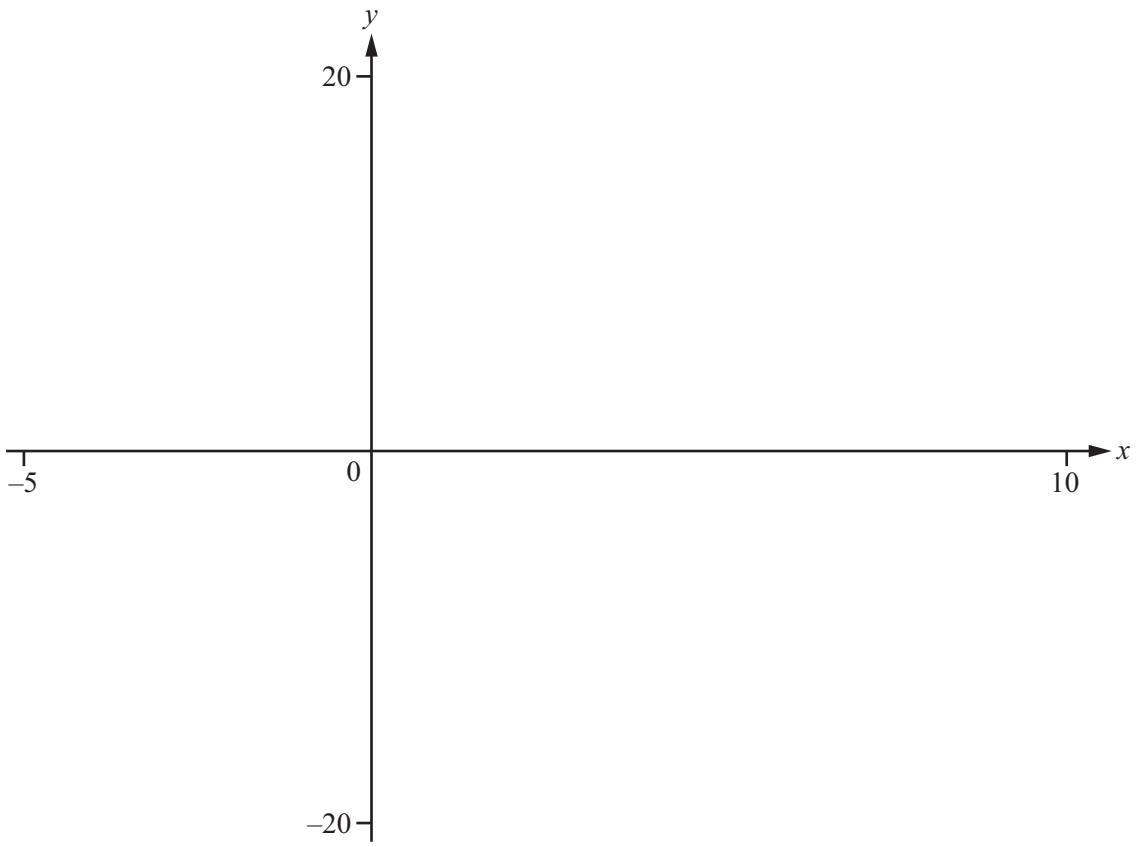
(c) Two of the students who go to the theatre are chosen at random.

Find the probability that they both also go to the cinema.

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

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4



$$f(x) = \frac{x^2}{(x-2)}, \quad x \neq 2$$

(a) On the diagram, sketch the graph of $y = f(x)$, for values of x between –5 and 10. [2]

(b) Find the co-ordinates of

(i) the local maximum point,

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

(ii) the local minimum point.

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

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(c) Write down the range of f(x) for $x \in \mathbb{R}$.

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

(d) Write down an integer value of k for which the equation $f(x) = k$ has no solutions.

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

(e) Write down the equation of the vertical asymptote of the graph of $y = f(x)$.

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

(f) **(i)** On the same diagram, sketch the graph of $y = x + 2$. [1]

(ii) Complete the following statement.

The graph of $y = x + 2$ is ..... of the graph of $y = f(x)$. [1]

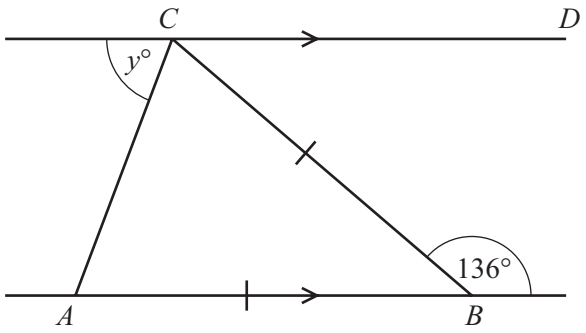
(g) $g(x) = 1.5^x + 10$

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

(ii) Solve the inequality $g(x) < f(x)$.

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

5 (a)



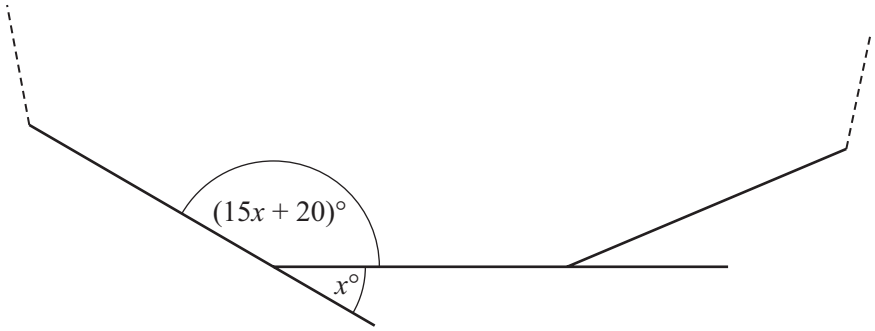
NOT TO SCALE

In the diagram, CD and AB are parallel and $AB = BC$.

Find the value of y.

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

(b)



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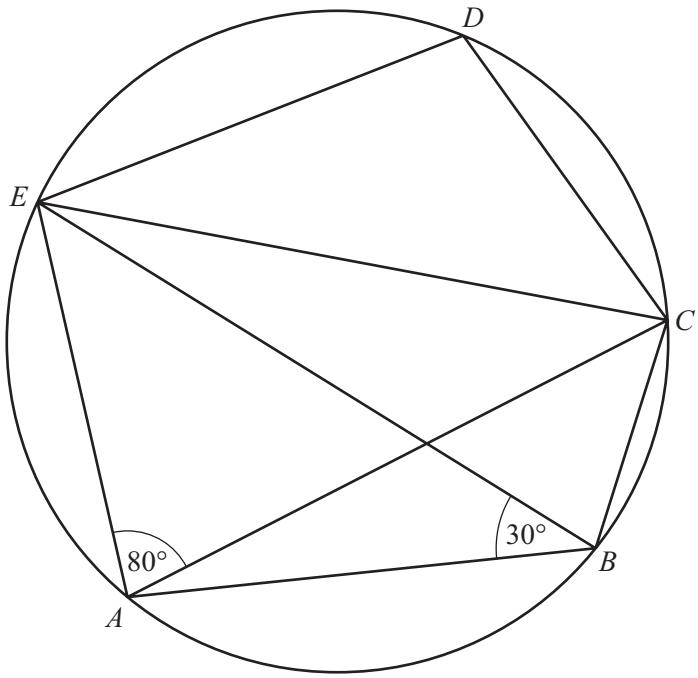
The diagram shows part of a regular polygon.
The interior angle is $(15x + 20)°$ and the exterior angle is $x°$.

Find the number of sides of this polygon.

Answer(b) ..... [4]

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(c)



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The points A, B, C, D and E lie on the circumference of a circle.

Find

(i) angle ACE,

Answer(c)(i) Angle ACE = ... [1]

(ii) angle AEC,

Answer(c)(ii) Angle AEC = ... [1]

(iii) angle EDC.

Answer(c)(iii) Angle EDC = ... [1]

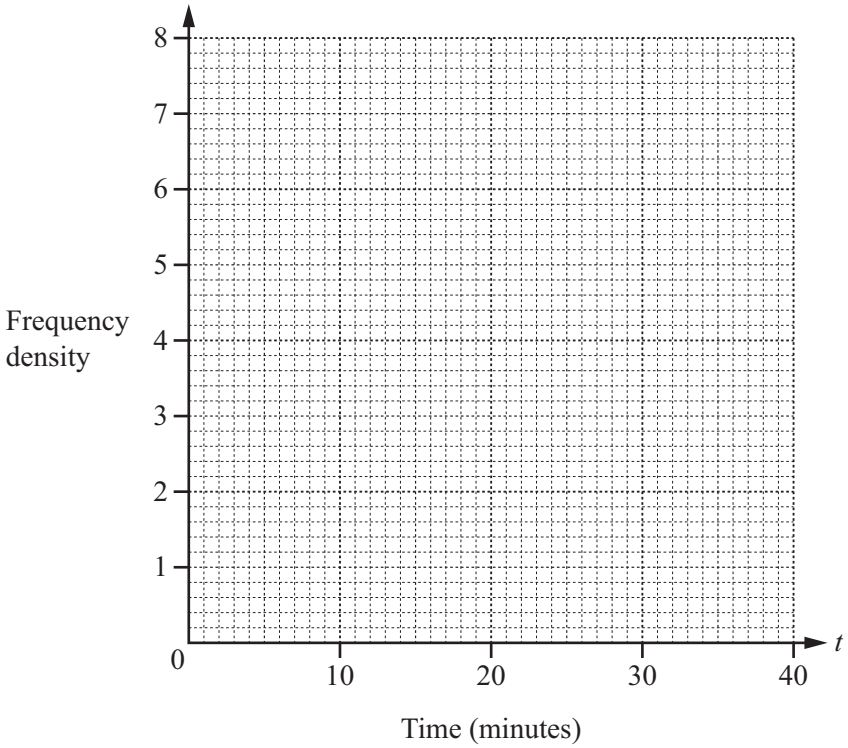
6 **(a)** The time taken, t minutes, for each of 100 cars to complete the same journey is recorded.

Time (t minutes)	$0 < t \leqslant 10$	$10 < t \leqslant 15$	$15 < t \leqslant 20$	$20 < t \leqslant 40$
Frequency	4	38	34	24

(i) Calculate an estimate of the mean.

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

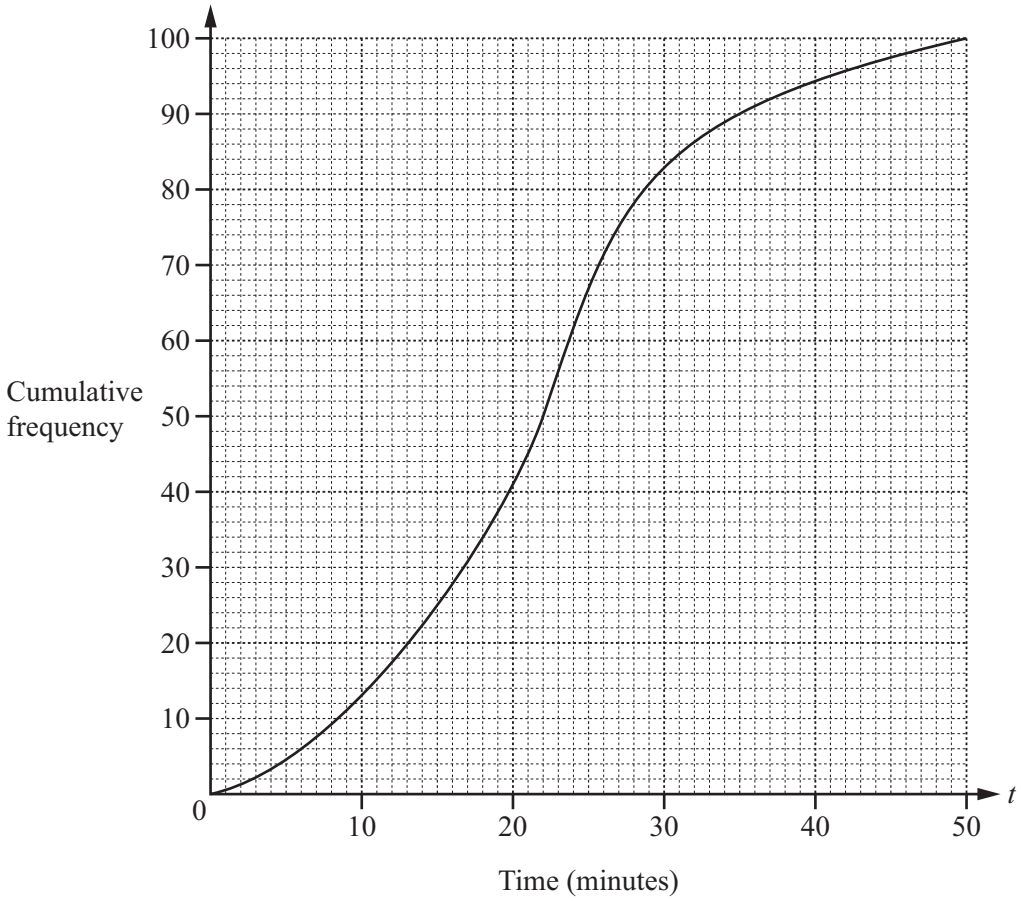
(ii) On the grid, draw a histogram to show the information given in the table.



[3]

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(b) The time taken, t minutes, for each of another 100 cars to complete the same journey is recorded. The information is shown in the diagram below.



Find

(i) the median,

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

(ii) the inter-quartile range,

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

(iii) the number of cars taking more than 35 minutes.

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

7 **(a)** Solve the simultaneous equations.
Show your working.

$$x + 2y = 4$$
$$2x + 5y = 11$$

Answer(a) $x =$ .....

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

(b) Solve the equation to find x in terms of k.

$$\frac{x+2}{7} - \frac{2x-1}{3} = k$$

Answer(b) $x =$ ..... [4]

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(c) A library spends \$120 on newspapers and \$90 on magazines.
Newspapers cost \$$x$ each.
Magazines cost \$(x + 0.4) each.

(i) Write down, in terms of x, the number of newspapers that can be bought for \$120.

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

(ii) Write down, in terms of x, the number of magazines that can be bought for \$90.

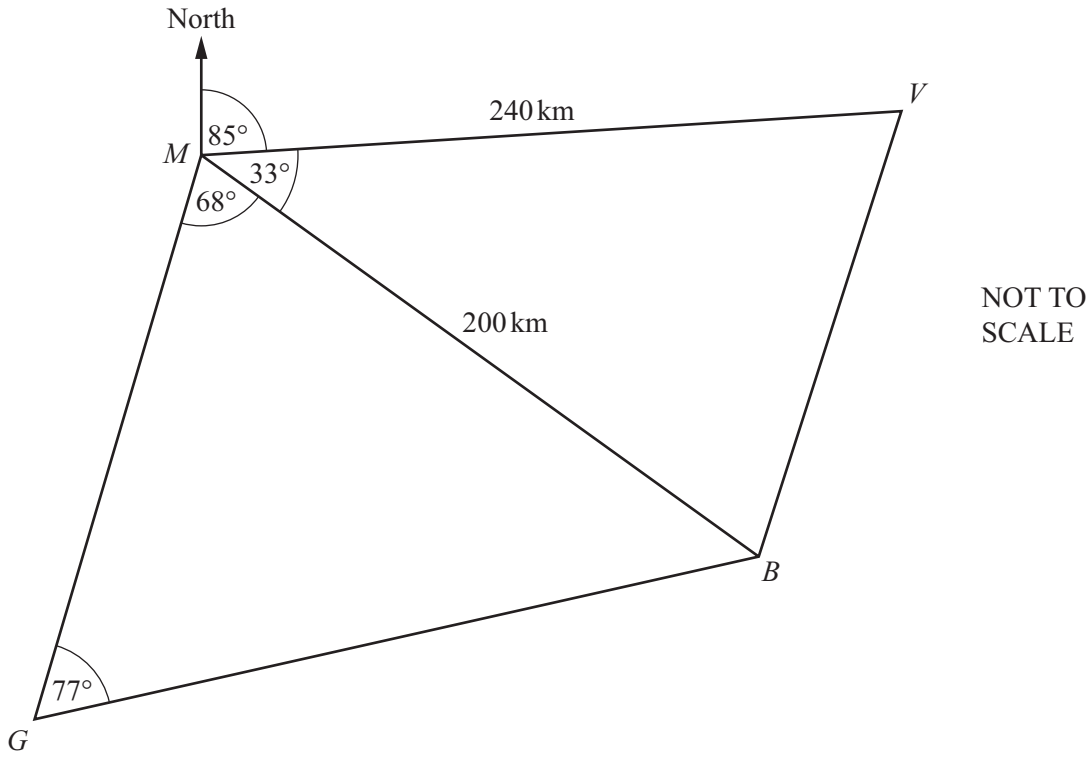
Answer(c)(ii) ..... [1]

(iii) The **total** number of newspapers and magazines that the library buys is 225.

Find the cost of a newspaper.

Answer(c)(iii) \$ ..... [4]

8



The diagram shows the straight line distances between Milan (*M*), Venice (*V*), Bologna (*B*) and Genoa (*G*).

(a) Calculate the distance *BV*.

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

(b) Calculate the distance *GB*.

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

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(c) A map of the region is drawn to a scale of $1 : 1\,000\,000$.

Calculate the area, on the map, of the quadrilateral *MVBG*.
Give your answer in square centimetres.

Answer(c) ..... cm^2 [5]

(d) The bearing of *V* from *M* is 085°.

Calculate the bearing of

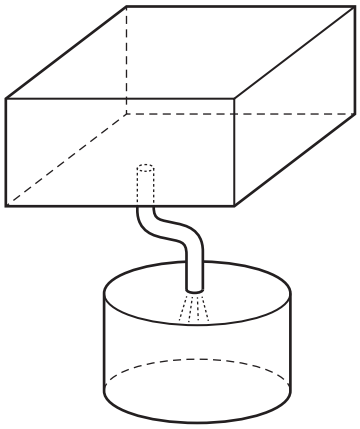
(i) *G* from *M*,

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

(ii) *M* from *V*.

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

9 The diagram shows two containers, a cuboid and a cylinder, connected by a pipe.



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The cuboid measures 1.5 m by 1.5 m by 1 m. It is filled with water.
The cylinder is empty. It has radius 80 cm and height 90 cm.

Water flows from the cuboid to the cylinder until the cylinder is full.
The water flows through the pipe at a rate of 35 cm^3 per second.

(a) Calculate the time taken to fill the cylinder.
Give your answer in hours and minutes, correct to the nearest minute.

Answer(a) ..... h ..... min [5]

(b) Calculate the amount of water remaining in the cuboid.
Give your answer in cm^3, correct to 2 significant figures.

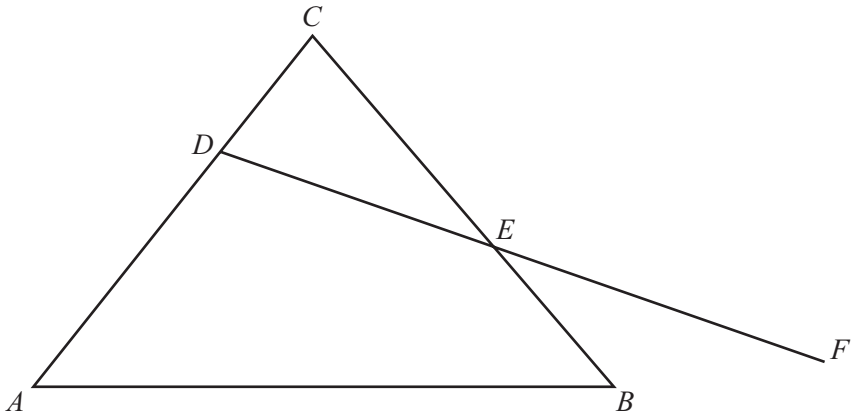
Answer(b) ..... cm^3 [4]

(c) Write your answer to **part (b)** in standard form.

Answer(c) ..... cm^3 [1]

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10



NOT TO SCALE

In the diagram $AD = 2DC$, $BE = \frac{1}{2}EC$ and DEF is a straight line.

$\overrightarrow{AB} = \mathbf{r}$ and $\overrightarrow{BC} = \mathbf{t}$.

(a) Find, in terms of **r** and **t**, in their simplest forms,

(i) $\overrightarrow{AC}$,

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

(ii) $\overrightarrow{DE}$.

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

(b) $\overrightarrow{EF} = \frac{1}{3}\mathbf{r} - \frac{1}{3}\mathbf{t}$.

(i) Find $\overrightarrow{BF}$ in terms of **r** and/or **t**.

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

(ii) What does your answer show about the point F?

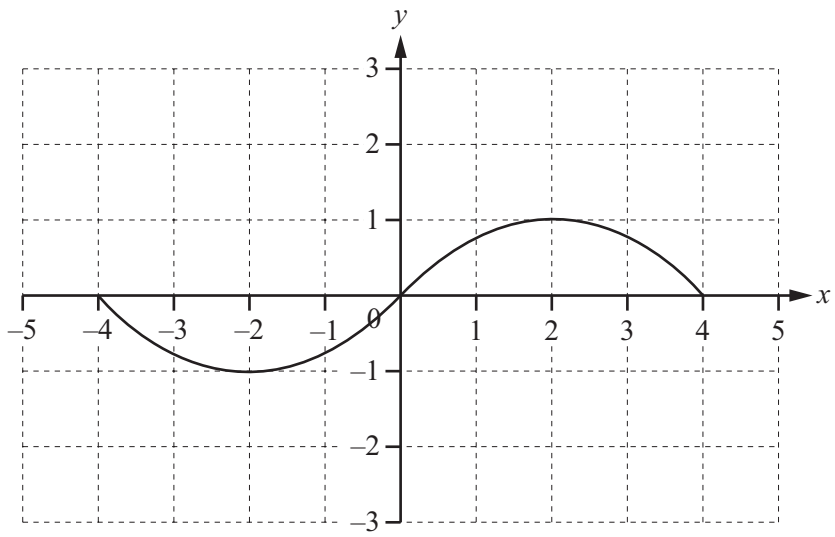
..... [1]

11 **(a)** $f(x) = 2x + 1$

Find $f(f(2))$.

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

(b)



The diagram shows the graph of $y = g(x)$.

(i) On the same diagram, sketch the graph of $y = g(x + 1)$. [2]

(ii) Describe fully the **single** transformation that maps the graph of $y = g(x)$ onto the graph of $y = g(x + 1)$.

.....

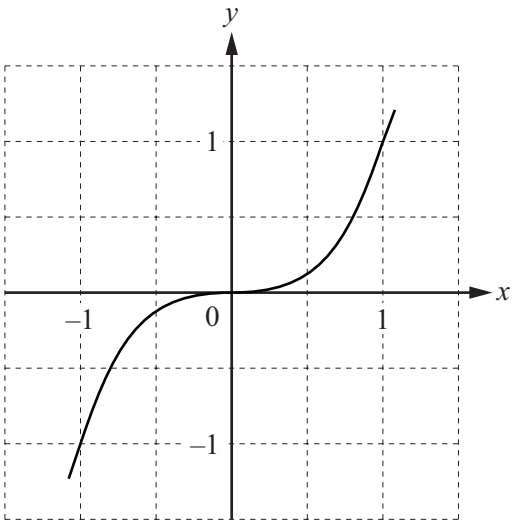
..... [2]

(c) $h(x) = x^3$

(i) Find $h^{-1}(x)$.

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

(ii)



The diagram shows the graph of $y = h(x)$.

(a) On the same diagram, sketch the graph of $y = h^{-1}(x)$. [1]

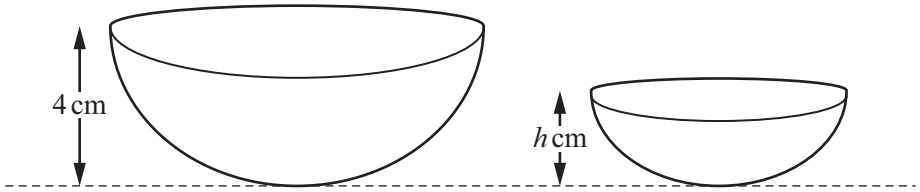
(b) Describe fully the **single** transformation that maps the graph of $y = h(x)$ onto the graph of $y = h^{-1}(x)$.

.....

..... [2]

Question 12 is printed on the next page.

12



NOT TO SCALE

The two bowls are mathematically similar.
The table shows some information about these bowls.

Bowl	Height (cm)	Surface area (cm^2)	Volume (cm^3)
Large bowl	4	A	500
Small bowl	h	90	108

Calculate

(a) the height of the small bowl, h cm,

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

(b) the surface area of the large bowl, A cm^2.

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

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