UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/04**

Paper 4 (Extended) **October/November 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 **18** printed pages and **2** blank pages.

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. $\quad A = \pi rl$

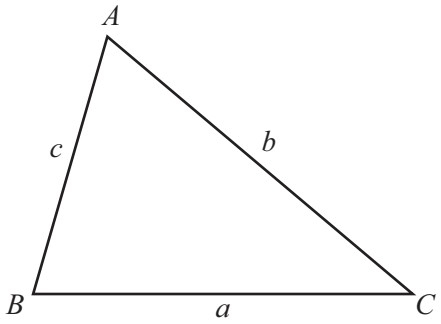
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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 Manuel buys a car for $8000.

(a) Each year the value of the car decreases by 8% of its value at the start of the year.

(i) Calculate the value of the car after 5 years.

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

(ii) Calculate how many **more** years it takes for the value of the car to be less than $4000.

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

(b) Manuel has a journey of 235 km.
The journey takes 3 h 15 min and the car uses 19.7 litres of fuel.

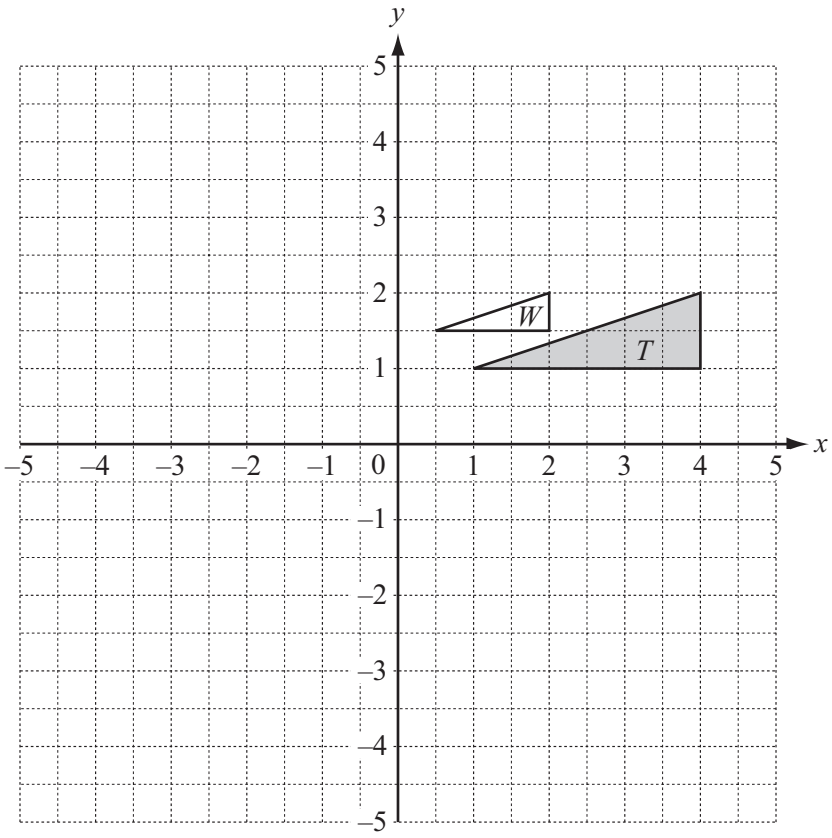
(i) Calculate the average speed of the journey in kilometres per hour.

Answer(b)(i) ..... km/h [2]

(ii) Find the rate at which the car uses fuel.
Give your answer in litres per 100 km.

Answer(b)(ii) ..... *l*/100 km [1]

2



(a) (i) Reflect triangle T in the x-axis. Label the image U. [2]

(ii) Rotate triangle U clockwise through 90° about (0, 0). Label the image V. [2]

(iii) Describe fully the **single** transformation that maps triangle T onto triangle V.

.....

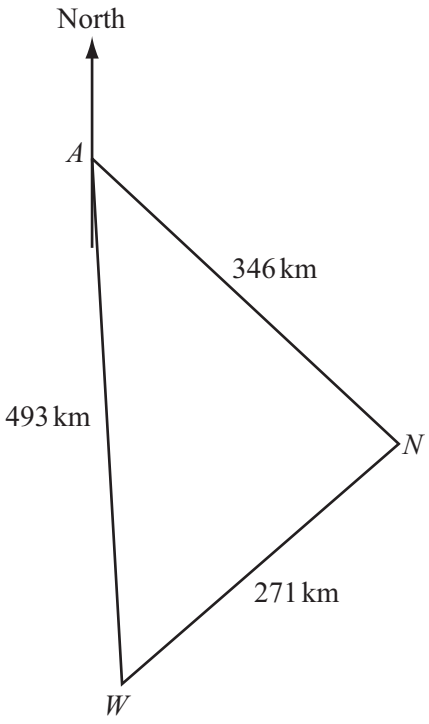
..... [2]

(b) Describe fully the **single** transformation that maps triangle T onto triangle W.

.....

..... [3]

3



NOT TO SCALE

The diagram shows the straight line distances between the cities Auckland (A), Napier (N) and Wellington (W) in New Zealand.

(a) The bearing of W from A is 179°.

Calculate the bearing of N from A.

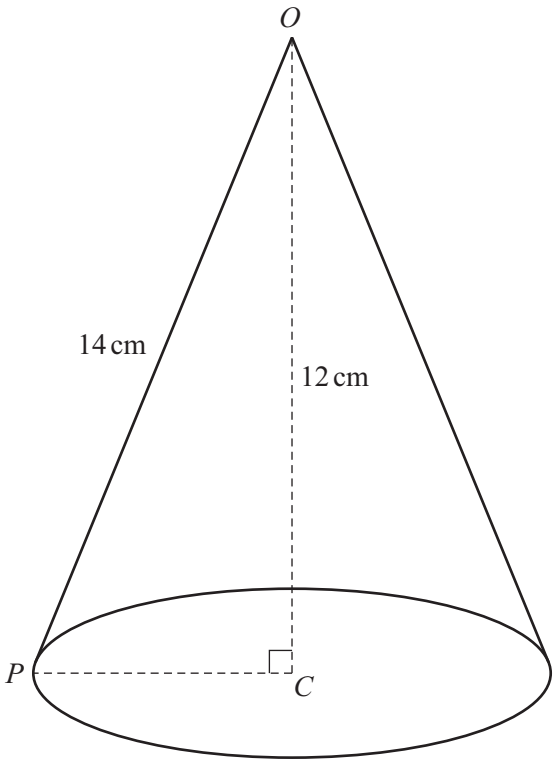
Answer(a) ..... [4]

(b) A map shows the three cities.
The scale of the map is 1 : 10 000 000.

Calculate the area of triangle ANW on the map.
Give your answer in square centimetres.

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

4



NOT TO SCALE

The diagram shows a hollow cone of height 12 cm and sloping edge, OP, 14 cm.
C is the centre of the base of the cone.

(a) Calculate

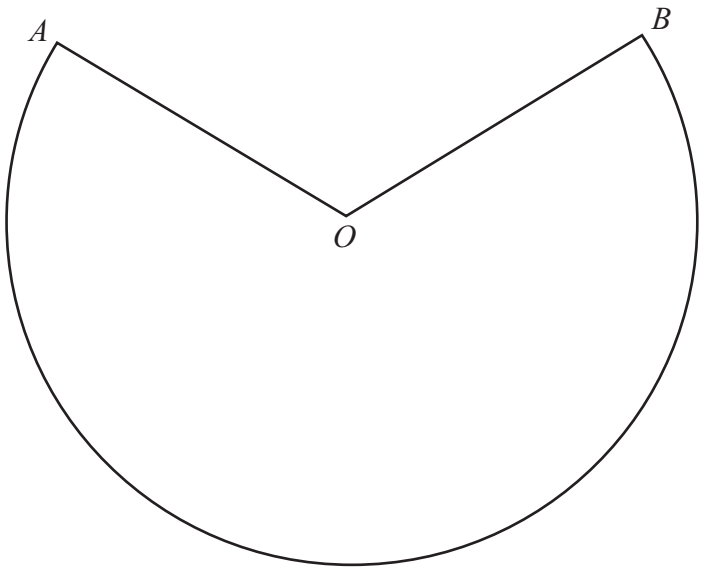
(i) the radius of the base of the cone,

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

(ii) the volume of the cone.

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

(b) The cone is cut along the sloping edge OP and opened out to make a sector of a circle.



NOT TO SCALE

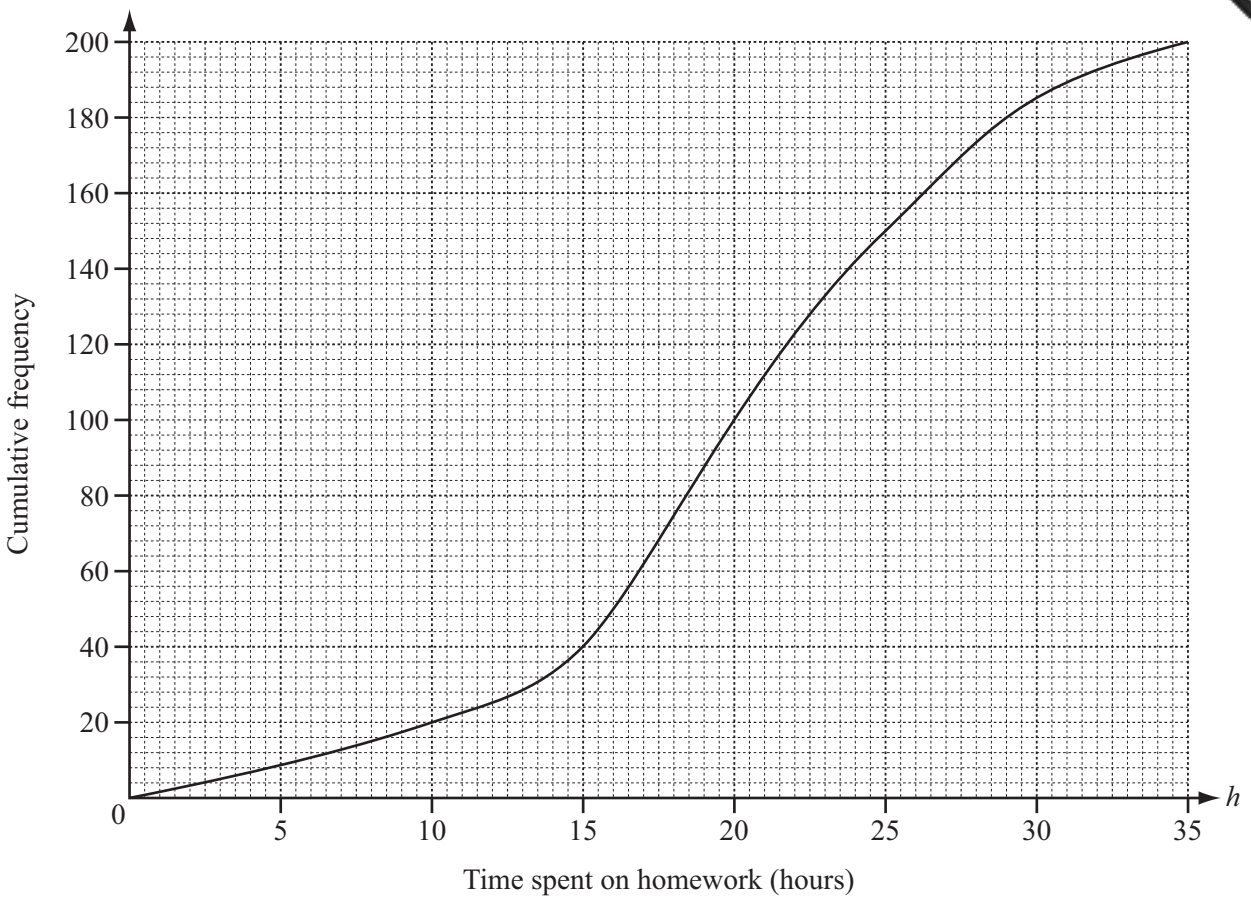
(i) Calculate the area of the sector and show that it rounds to 317 cm^2, correct to 3 significant figures.

[2]

(ii) Calculate the reflex angle AOB.

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

5 200 students each record the number of hours, h, they spend on homework in one week. The cumulative frequency curve shows the results.



(a) Find

(i) the median,

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

(ii) the lower quartile,

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

(iii) the inter-quartile range,

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

(iv) the 90th percentile,

Answer(a)(iv) ..... h [1]

(v) the number of students who spend more than 10 hours on homework.

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

(b) (i) Use the cumulative frequency curve to complete the frequency table.

Time spent on homework h hours	$0 < h \leqslant 10$	$10 < h \leqslant 15$	$15 < h \leqslant 20$	$20 < h \leqslant 25$	$25 < h \leqslant 35$
Frequency	20	20		50	

[2]

(ii) Calculate an estimate of the mean number of hours spent on homework.

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

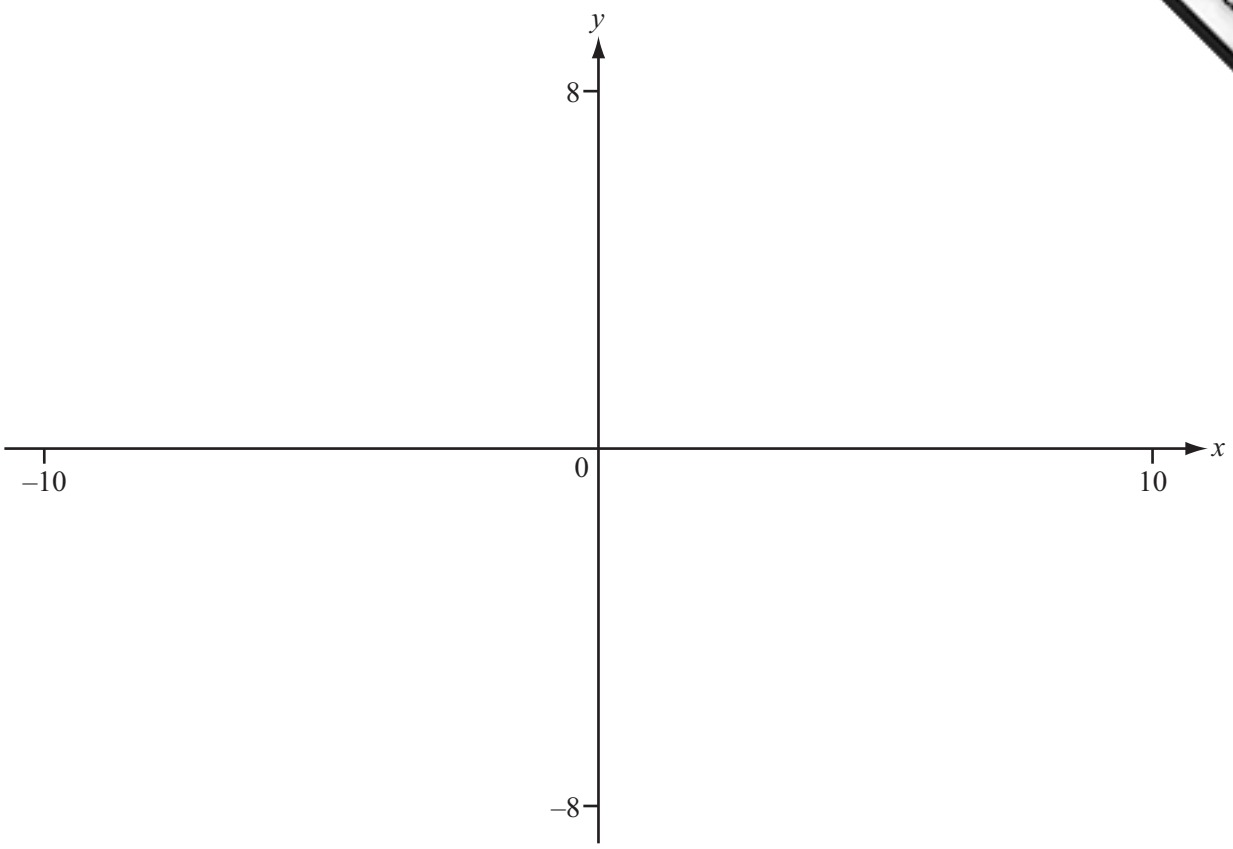
(iii) The data is used to draw a histogram.

Complete the frequency density table.
(Do not draw the histogram.)

Time spent on homework h hours	$0 < h \leqslant 15$	$15 < h \leqslant 20$	$20 < h \leqslant 25$	$25 < h \leqslant 35$
Frequency density			10	

[3]

6



$$f(x) = \frac{(2x-3)}{(x+2)}$$

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

(b) Write down the value of f(0).

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

(c) Solve the equation $f(x) = 0$.

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

(d) Write down the equations of the asymptotes.

Answer(d) .....

..... [2]

(e) Find the range of $f(x)$ for the domain $0 \leqslant x \leqslant 8$.

Answer(e) ..... [2]

(f) $g(x) = 3 - x$

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

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

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

(iii) Show that the equation $f(x) = g(x)$ can be re-arranged into $x^2 + x - 9 = 0$.

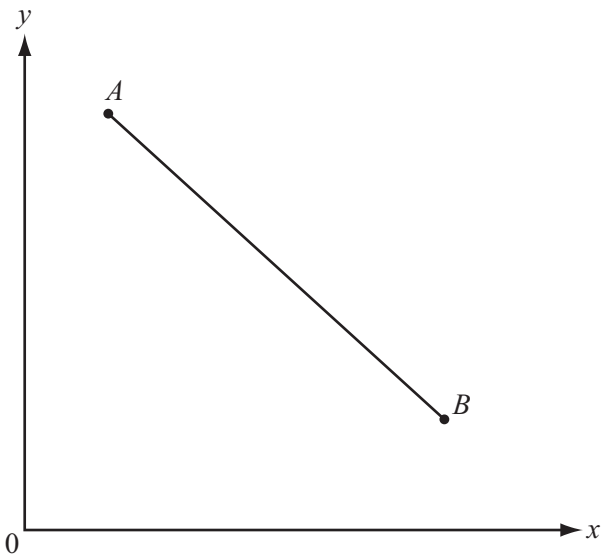
[3]

(iv) The exact solutions of the equation $x^2 + x - 9 = 0$ are $\frac{-1 \pm \sqrt{k}}{2}$.

Find the value of k.

Answer(f)(iv) $k =$ ..... [2]

7



NOT TO SCALE

A (1, 6) is joined to B (5, 2) by the line AB.

(a) Calculate the length of the line AB.

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

(b) Find the equation of the straight line that passes through A and B.

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

(c) **(i)** Find the equation of the line which is perpendicular to AB and passes through the origin.

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

(ii) Find the co-ordinates of the point of intersection of the line in **part (c)(i)** and the line AB.

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

8 Find the *n*th term of each of the following sequences.

(a) 21, 17, 13, 9, 5, ...

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

(b) 3, 6, 12, 24, 48, ...

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

(c) $\frac{1}{4}$, $\frac{4}{5}$, $\frac{9}{6}$, $\frac{16}{7}$, $\frac{25}{8}$, ...

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

(d) 0, 6, 24, 60, 120, ...

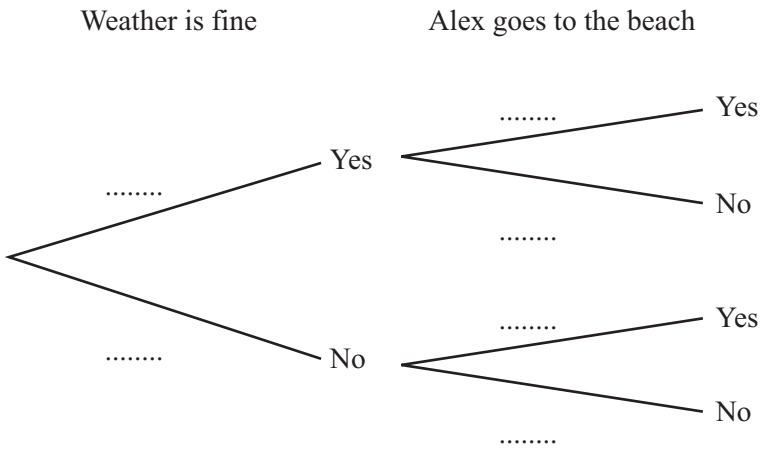
Answer(d) ..... [4]

9 If the weather is fine, the probability that Alex goes to the beach is $\frac{9}{10}$.

If the weather is not fine, the probability that Alex goes to the beach is $\frac{3}{10}$.

The probability that the weather will be fine is $\frac{5}{6}$.

(a) Complete the tree diagram.



[3]

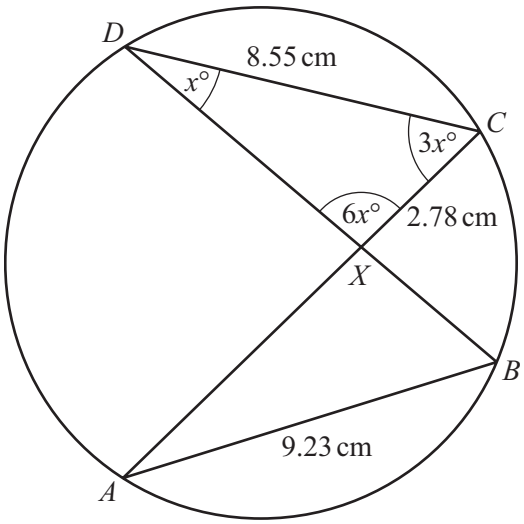
(b) Find the probability that Alex goes to the beach.

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

(c) Which combination of these events has a probability of $\frac{1}{12}$?

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

10



NOT TO SCALE

A, B, C and D lie on the circumference of a circle.
AC and BD intersect at X.

(a) Angle $CDX = x°$, angle $DCX = 3x°$ and angle $CXD = 6x°$.

Show that angle $ABX = 54°$.

[3]

(b) (i) Complete the statement

Triangles CDX and BAX are ..... [1]

(ii) $AB = 9.23$ cm, $DC = 8.55$ cm and $XC = 2.78$ cm.

Calculate the length of BX.

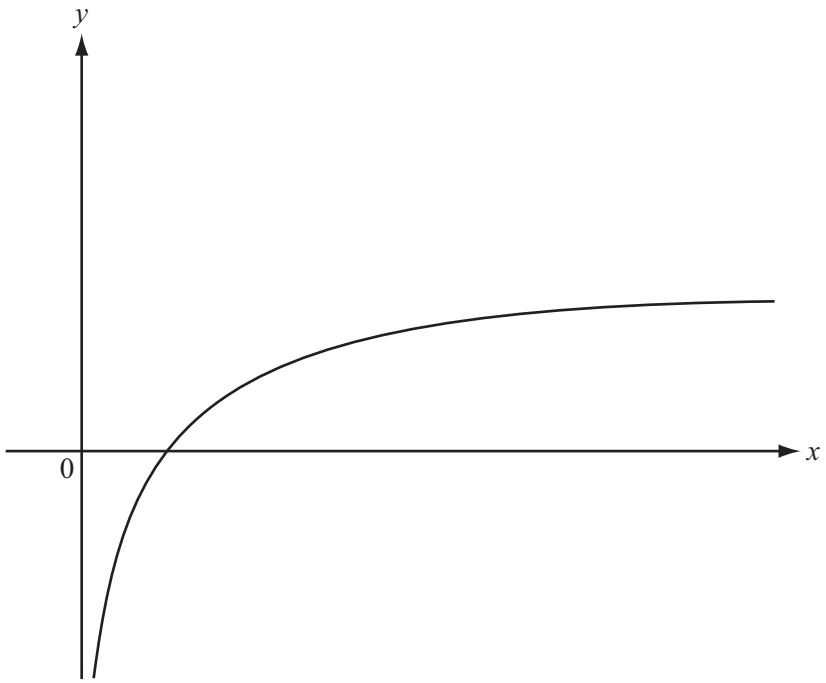
Answer(b)(ii) ..... cm [2]

(iii) Find the value of $\frac{\text{Area of triangle } CDX}{\text{Area of triangle } BAX}$.

Give your answer correct to 2 decimal places.

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

11 (a)



NOT TO SCALE

The sketch shows the graph of $y = \log_a x$.

On the same diagram, sketch the graph of $y = 2\log_a x$. [2]

(b) $3\log x = \log 16 - 2\log x$

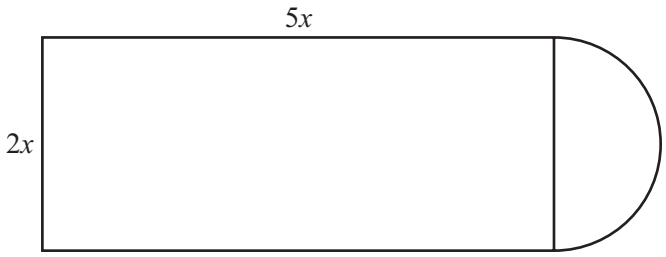
Find the value of x.

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

(c) Solve the equation $5^y = 100$.
Give your answer correct to 4 significant figures.

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

12



NOT TO SCALE

The diagram shows a rectangle with length $5x$ and width $2x$.
One of the shorter sides is joined to a semicircle with radius x.

(a) Find a formula, in terms of x and π, for the total area, A, of the shape.

Answer(a) $A =$ ..... [2]

(b) Make x the subject of your formula in **part (a)**.

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

(c) Find the value of x when $A = 200$.

Answer(c) $x =$ ..... [1]

13 **(a)** **(i)** Factorise.

$$2x^2 - x - 1$$

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

(ii) Write as a single fraction in its simplest form.

$$\frac{1}{2x^2 - x - 1} + \frac{4}{x - 1}$$

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

(b) Simplify.

$$\frac{p^2 - 25q^2}{p + 5q - pt - 5qt}$$

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

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