Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

5650475962

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/43**

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.

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[Turn over

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. $\quad A = \pi rl$

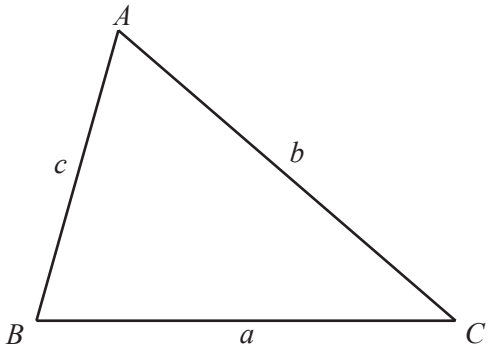
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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

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

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

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



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

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

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

Answer **all** the questions.

1 Sancha flew from Santiago to Paris, a distance of 11 585 km.
The average speed of the flight was 852.9 km/h.

(a) Find the length of time for the flight.
Give your answer in hours and minutes.

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

(b) The journey back from Paris to Santiago took 14 hours 30 minutes.
The plane left Paris at 23 20.
The local time in Santiago is 6 hours behind the local time in Paris.

Find the local time this plane arrived in Santiago.

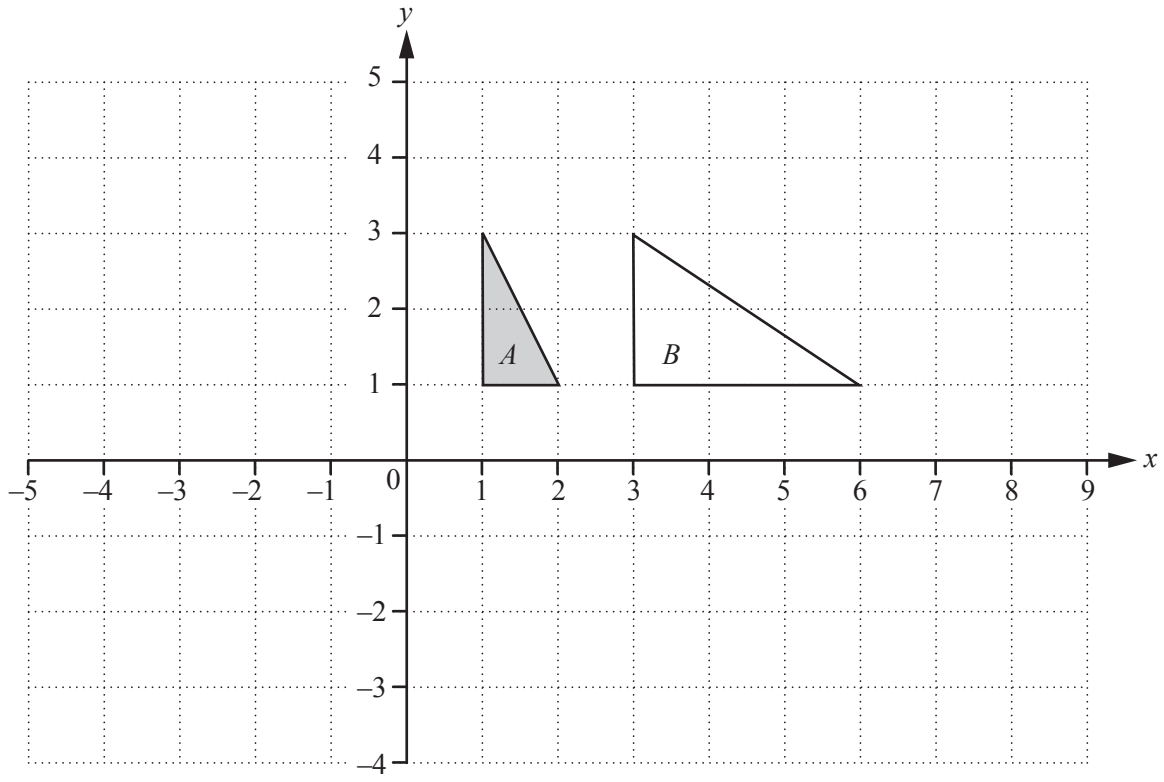
Answer(b) ..... [2]

(c) Find the overall average speed for the total journey from Santiago to Paris and back to Santiago.

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

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2



(a) (i) Rotate triangle *A* through 90° anticlockwise about the origin.
Label the image *C*. [2]

(ii) Reflect triangle *C* in the *x*-axis.
Label the image *D*. [2]

(iii) Describe fully the **single** transformation that is equivalent to a rotation through 90° anticlockwise about the origin followed by a reflection in the *x*-axis.

Answer(a)(iii) .....

..... [2]

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

Answer(b) .....

..... [3]

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3 Sinitta makes necklaces.
Each necklace costs Sinitta \$56 to make.
They are sold through an internet shop at a selling price of \$80.

(a) (i) The internet shop charges her 7% of the selling price.

Find the amount that Sinitta receives from the shop for a necklace.

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

(ii) The shop increases the charge to 12% of the selling price of \$80.

Calculate the percentage reduction in Sinitta's **profit**.

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

(b) Sinitta also makes silver rings.
Each ring contains 22 g of silver.
In the last year the cost of silver has increased by 8% to \$143.10 per 100 grams.

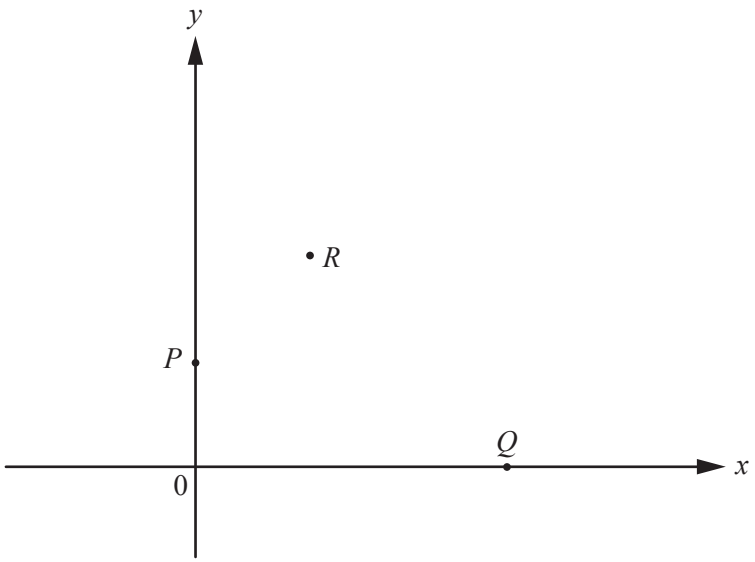
(i) Find the cost of each 100 g of silver before the increase.

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

(ii) Find the increase in the cost of the silver in a ring.

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

4 P is the point (0, 4), Q is the point (6, 0) and R is the point (2, 7).



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(a) S is the point such that $\overrightarrow{RS} = \overrightarrow{QP}$.

Find the co-ordinates of S.

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

(b) Calculate $|\overrightarrow{QP}|$.

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

(c) Find the equation of the line PQ.

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

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(d) Write down the co-ordinates of N, the midpoint of PQ.

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

(e) Find the equation of the perpendicular bisector of PQ.

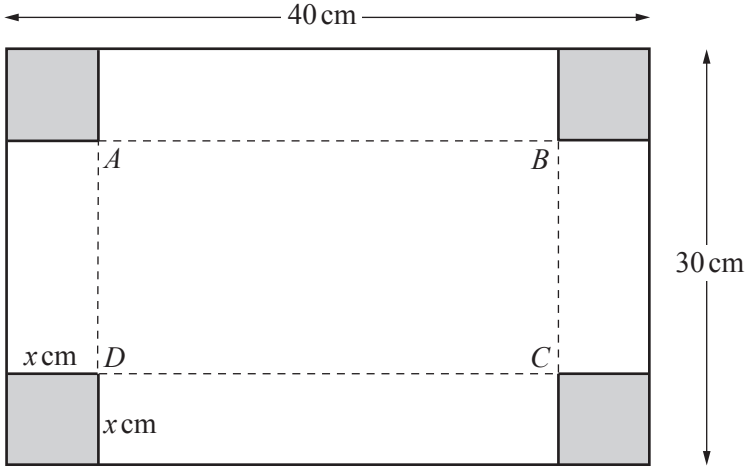
Answer(e) ..... [3]

(f) A and B are points on the perpendicular bisector of PQ such that $AN \neq BN$.

What is the mathematical name given to the quadrilateral $PAQB$?

Answer(f) ..... [1]

5



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The diagram shows a rectangle, with sides 40 cm and 30 cm, made from a metal sheet.

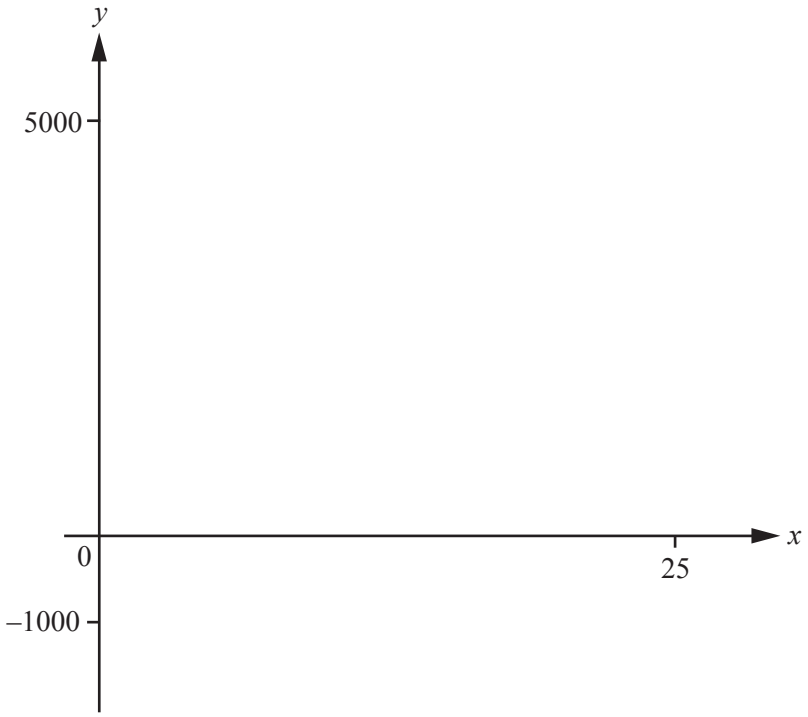
A square of side x cm is cut from each of the four corners of the rectangle.
The remaining shape is folded up to make a rectangular open box with $ABCD$ as the base.
The height of the box is x cm.

(a) Show that the volume of the box is $1200x - 140x^2 + 4x^3$.

[3]

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(b) On the diagram, sketch the graph of $y = 1200x - 140x^2 + 4x^3$ for $0 \leqslant x \leqslant 25$.



[2]

(c) Solve the equation $1200x - 140x^2 + 4x^3 = 2000$.

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

(d) Which solution to **part (c)** is not a possible value of x when the volume of the box is 2000 cm^3? Give a reason for your answer.

Answer(d) .....

..... [1]

(e) What is the maximum volume of the box?
For this volume what is the length of the box?

Answer(e) Maximum volume = ... cm^3

Length = ... cm [2]

6 **(a)** **(i)** Find an expression for the nth term of this sequence.

$$2, \quad 6, \quad 10, \quad 14, \quad ...$$

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

(ii) Use your answer to **part (a)(i)** to find an expression for u, the nth term of this sequence.

$$2 \times 10^2, \quad 6 \times 10^3, \quad 10 \times 10^4, \quad 14 \times 10^5, \quad ...$$

Answer(a)(ii) $u =$ ..... [1]

(b) The nth term, t, of another sequence, is given by $t = 2 \times 10^{(3-2n)}$.

(i) Write down the first 4 terms in this sequence, giving your answers in standard form.

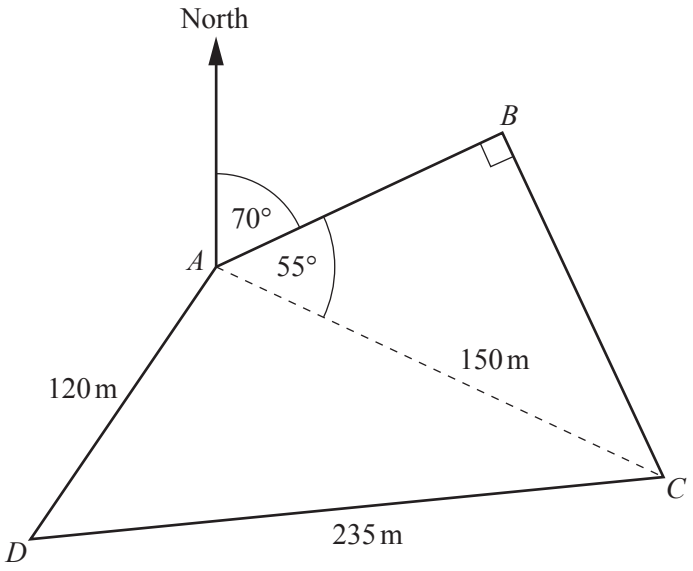
Answer(b)(i) ..... , ... , ... , ... [2]

(ii) Using your answer to **part (a)(ii)**, find and simplify an expression for $\frac{u}{t}$.

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

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7



The diagram shows a field *ABCD* with a path from *A* to *C*.
AC = 150 m, *AD* = 120 m and *CD* = 235 m.
Angle *ABC* = 90°, angle *BAC* = 55° and the bearing of *B* from *A* is 070°.

(a) Calculate the length of *AB*.

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

(b) Calculate the bearing of *D* from *A*.

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

(c) Calculate the area of the field *ABCD*.

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

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8 100 light bulbs were tested.
The length of life, t, in thousands of hours was recorded.
The results are shown in this table.

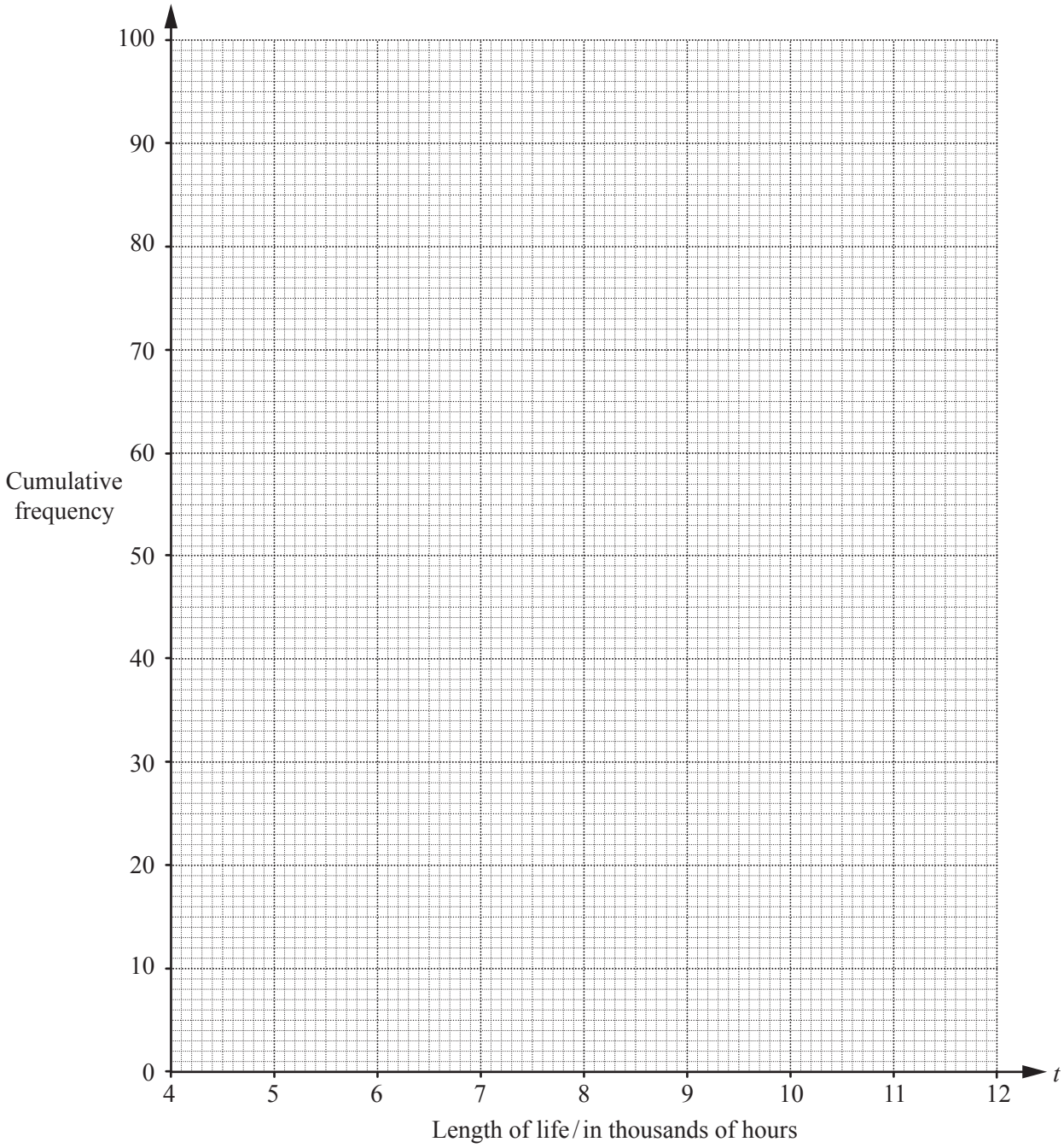
Length of life (t) in thousands of hours	$4 < t \leqslant 5$	$5 < t \leqslant 6$	$6 < t \leqslant 7$	$7 < t \leqslant 8$	$8 < t \leqslant 9$	$9 < t \leqslant 10$	$10 < t \leqslant 12$
Frequency	8	21	31	23	10	5	2

(a) Calculate an estimate of the mean value of t.

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

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(b) Draw a cumulative frequency curve for the length of life of the light bulbs.



[5]

(c) Use your graph to estimate

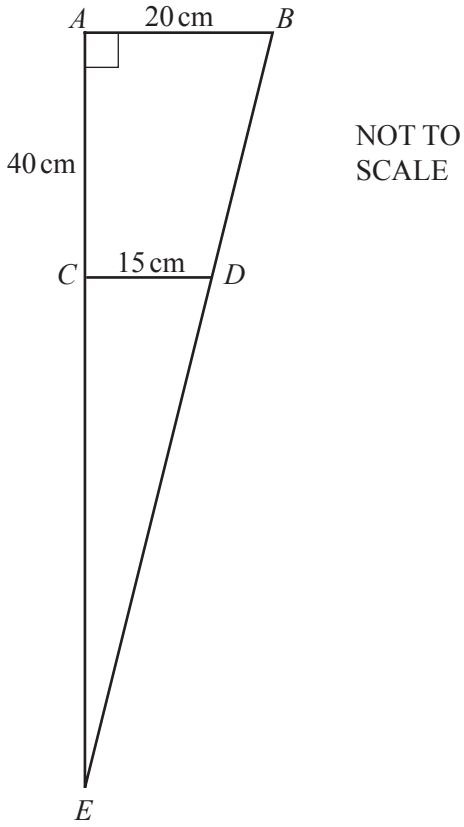
(i) the number of light bulbs that lasted longer than 8500 hours,

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

(ii) the interquartile range.

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

9 (a)



The diagram shows two similar triangles EAB and ECD.
$AB = 20$ cm, $CD = 15$ cm, $AC = 40$ cm and angle $CAB = 90°$.

(i) Show that $EC = 120$ cm.

[2]

(ii) Find ED.

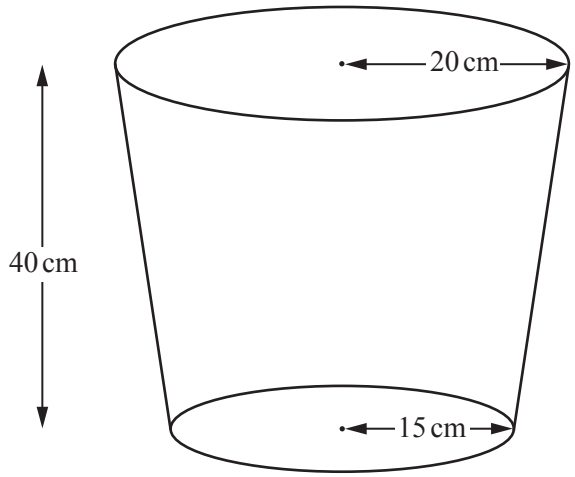
Answer(a)(ii) ..... cm [2]

(iii) Find DB.

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

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(b)



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The diagram shows an open waste paper bin made from metal.

The radius of the circular top is 20 cm.
The radius of the circular base is 15 cm.
The perpendicular height of the bin is 40 cm.

Using answers from **part (a)**, calculate

(i) the volume of the waste paper bin,

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

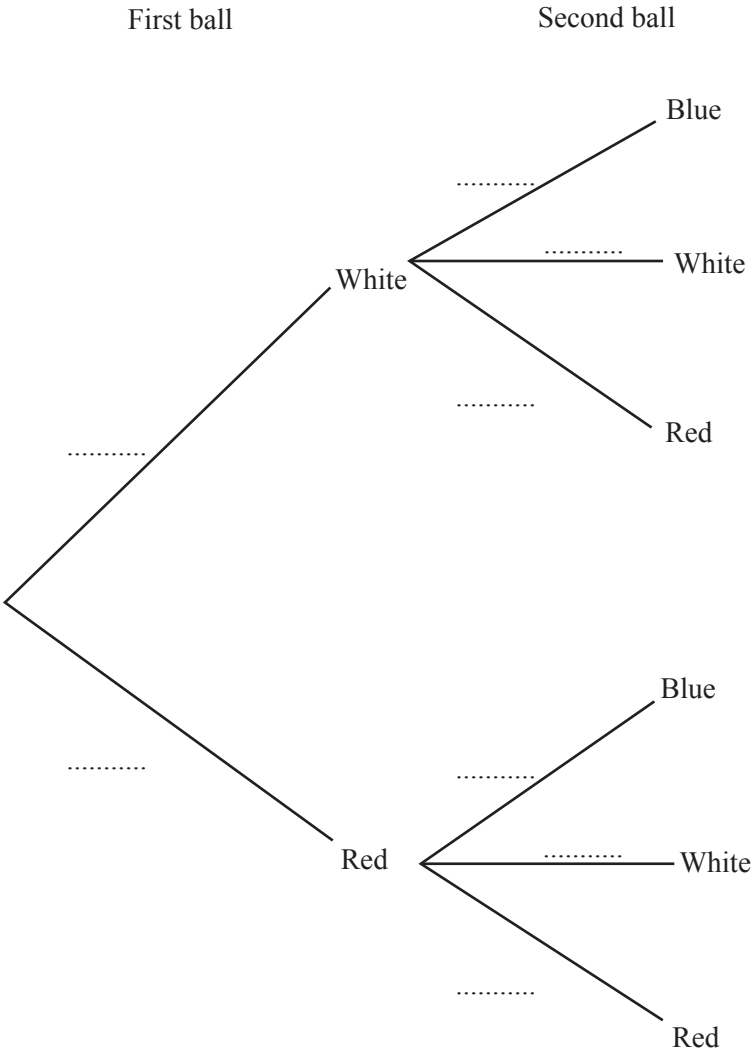
(ii) the area of metal needed to make the bin.

Answer(b)(ii) ..... cm^2 [4]

10 Tricia has 2 bags.
In the first bag there are 6 white balls and 4 red balls.
In the second bag there are 4 blue balls, 3 white balls and 2 red balls.

She takes a ball at random out of the first bag.
She then takes a ball at random out of the second bag.

(a) Complete the tree diagram to show the probability of all the possible outcomes for the two balls.



[2]

(b) Calculate the probability that Tricia's two balls are

(i) both white,

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

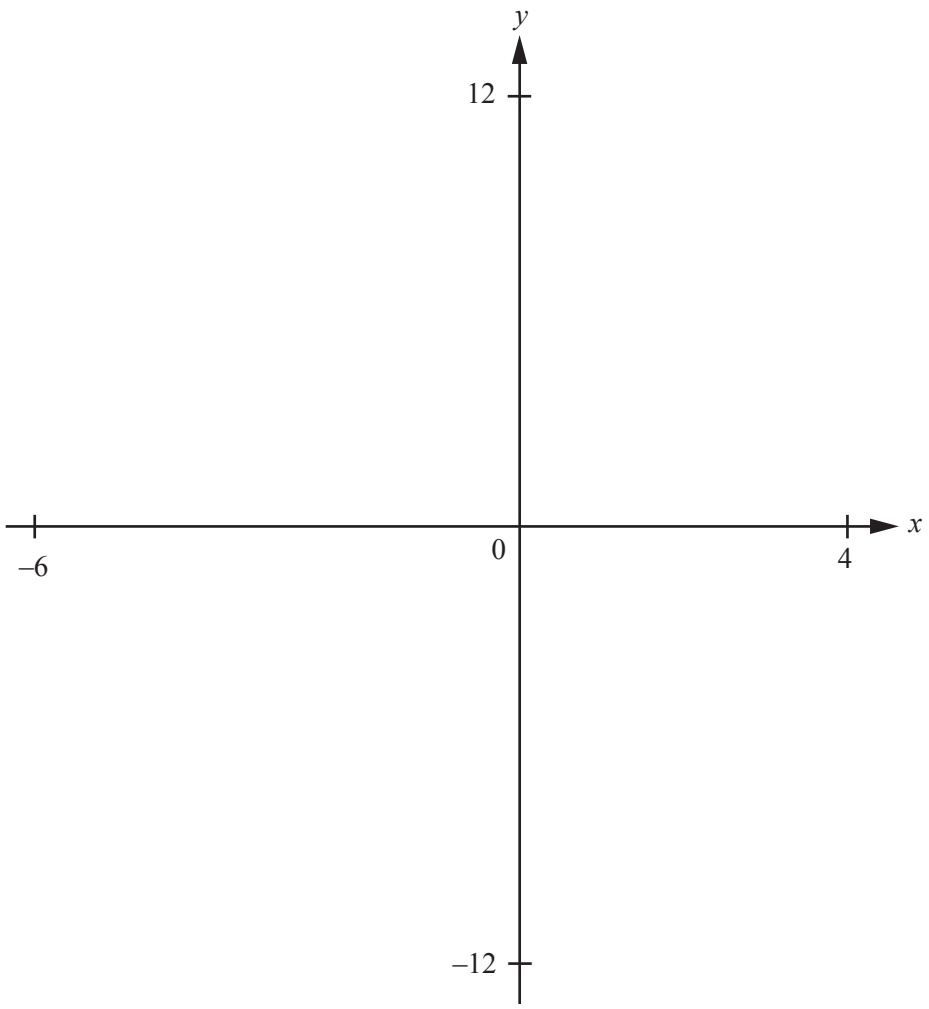
(ii) one white and one red,

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

(iii) of different colours.

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

11



$$f(x) = \frac{(1-2x)}{(x+3)}$$

(a) On the diagram, sketch the graph of $y = f(x)$ for values of x between $x = -6$ and $x = 4$. [3]

(b) Write down the equations of the asymptotes of the graph of $y = f(x)$.

Answer(b) .....

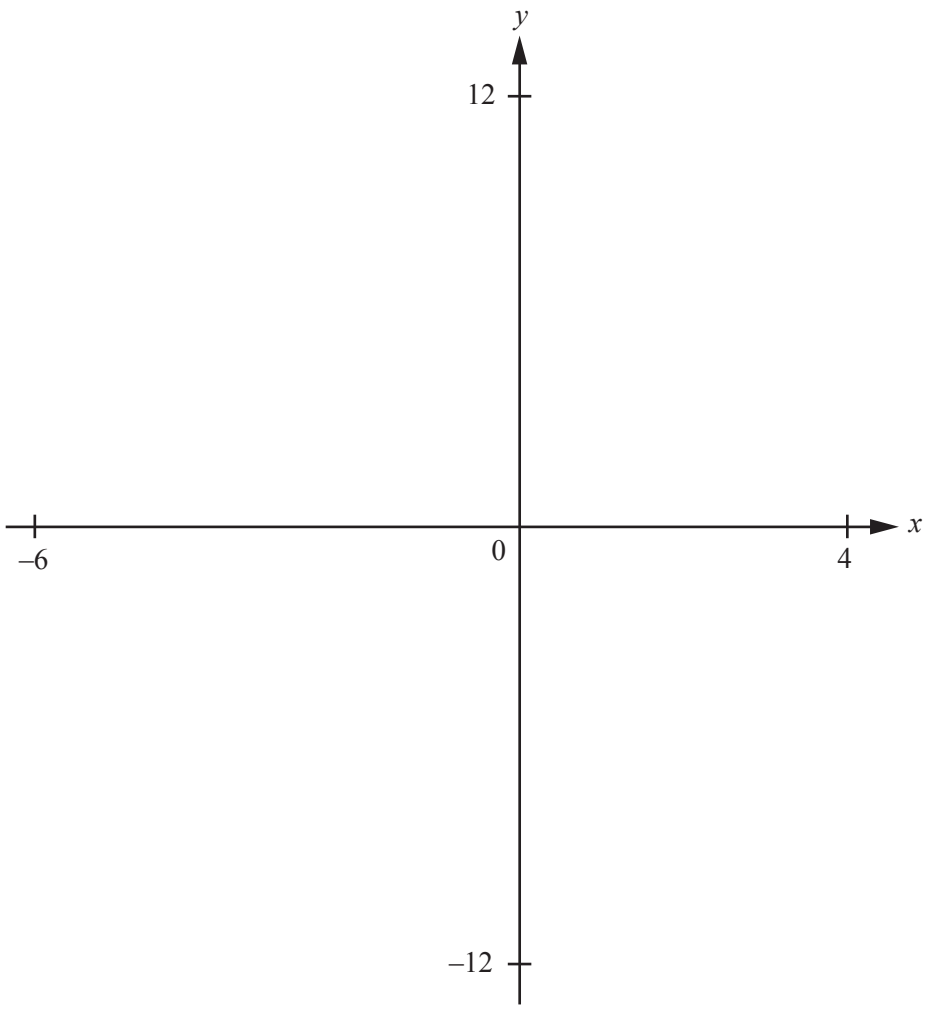
..... [2]

(c) Find the range of values for y when $x \geqslant 0$.

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

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(d)



On this diagram, sketch the graph of $y = \left|\frac{(1-2x)}{(x+3)}\right|$. [2]

(e) Solve $\left|\frac{(1-2x)}{(x+3)}\right| = 6$.

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

Question 12 is printed on the next page.

12 $f(x) = 3x - 1 \quad g(x) = 4 - 2x$

(a) Find

(i) $g(3)$,

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

(ii) $f(g(3))$.

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

(b) Find and simplify expressions for

(i) $g(f(x))$,

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

(ii) $g^{-1}(x)$,

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

(iii) $\frac{2}{f(x)} - \frac{3}{g(x)}$.

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

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