Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
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0709517296

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/43**

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 **19** printed pages and **1** blank page.

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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. $\quad A = \pi rl$

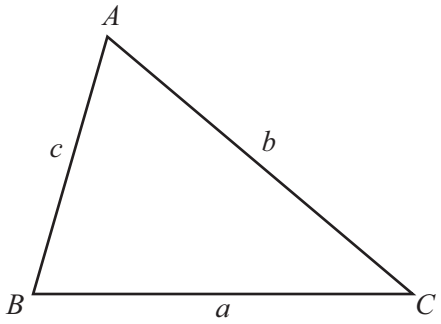
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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)** One year Sami paid 18% of his earnings in tax.
After paying tax he had \$65 600.

How much did Sami earn before paying tax?

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

(b) Sami and Jennie each have \$5000 to invest.
They both invest in accounts that give compound interest.

(i) Sami invests in an account that gives 4% interest in the first year, 3% interest in the second year and 2% in any year after that.

Calculate the value of Sami's investment after 3 years.

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

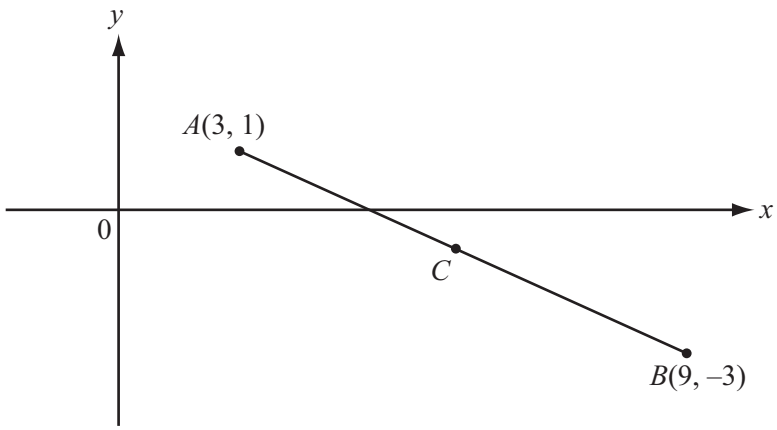
(ii) Jennie's investment gives 2.5% compound interest each year.

After 5 years, how much more is the value of Sami's investment than Jennie's?

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

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2



NOT TO SCALE

A is the point (3, 1) and B is the point (9, –3).

(a) C is the midpoint of AB.

Find the co-ordinates of C.

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

(b) Find the equation of the line, through C, perpendicular to AB.

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

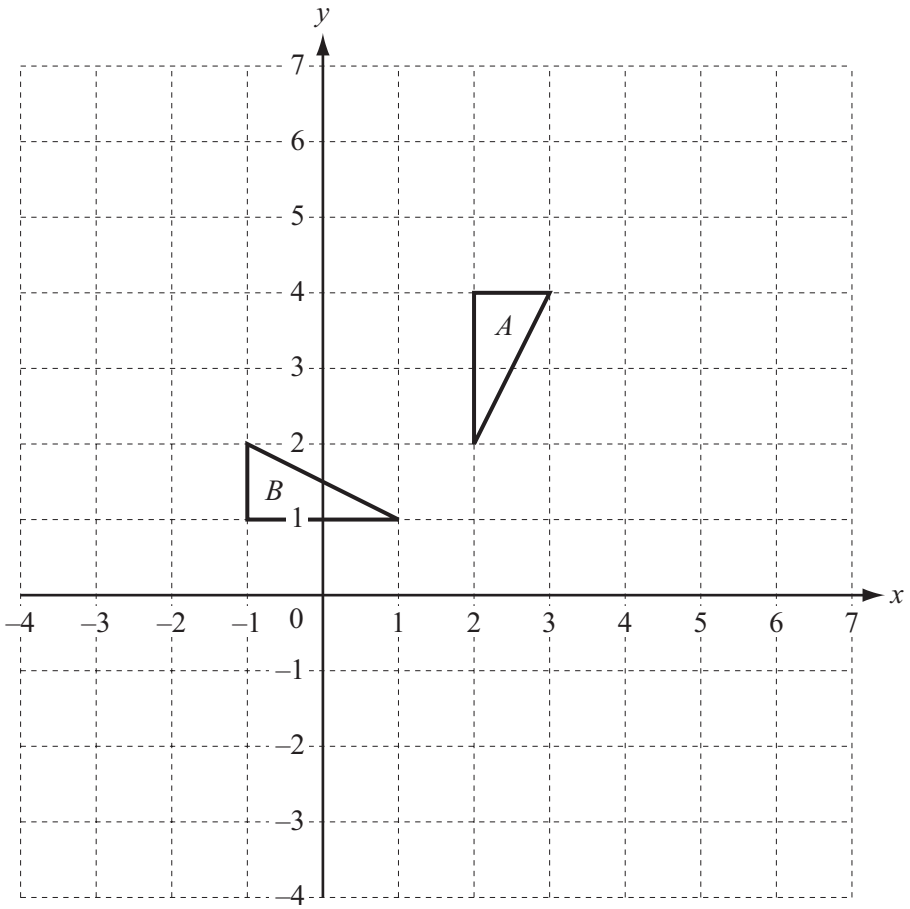
(c) The line AB meets the y-axis at P.
The line in **part (b)** meets the y-axis at Q.

Find the distance PQ.

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

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3



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

Answer(a) .....

..... [3]

(b) **(i)** Enlarge triangle *A* with scale factor –2 and centre (3, 2).
Label the image *C*. [2]

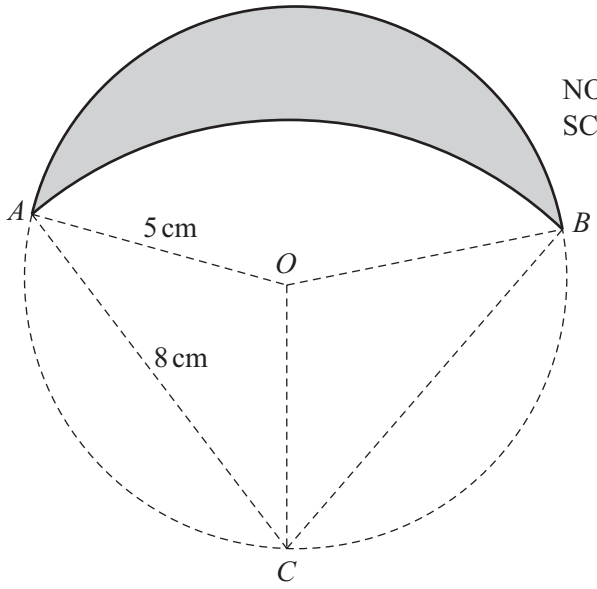
(ii) Describe fully the **single** transformation that maps triangle *C* onto triangle *A*.

Answer(b)(ii) .....

..... [2]

(c) Stretch triangle *B* with stretch factor 2 and *y*-axis invariant.
Label the image *D*. [2]

4



The shaded region is formed by the arcs of two circles.
One circle has centre O and radius 5 cm. The other has centre C and radius 8 cm.
The points A, B and C are on the circumference of the circle, centre O.

(a) Calculate angle ACO and show that it rounds to 36.87° correct to 2 decimal places.

[2]

(b) Calculate the area of the sector CAB.

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

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(c) Calculate the area of the sector OAC.

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

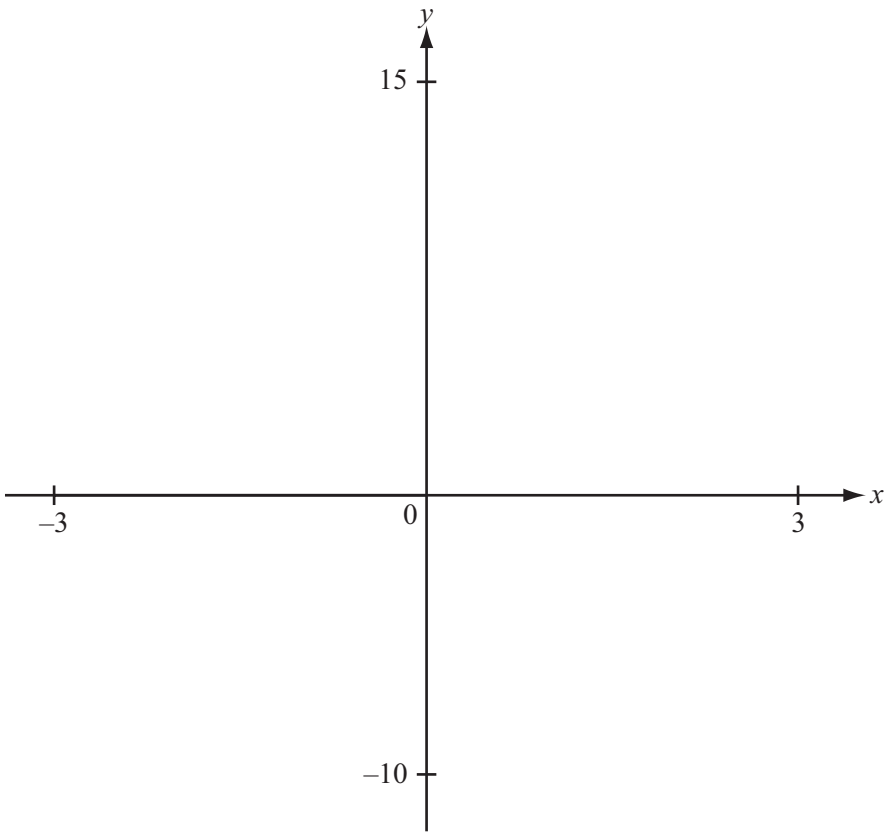
(d) Calculate the area of the triangle OAC.

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

(e) Using your answers to **parts (b)**, **(c)** and **(d)**, calculate the area of the shaded region.

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

5



(a) On the diagram, sketch the graph of $y = f(x)$ where $f(x) = 3 + 5x - x^3$ for $-3 \leqslant x \leqslant 3$. [2]

(b) Find the zeros of $f(x)$.

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

(c) Find the co-ordinates of the local minimum.

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

(d) $g(x) = 4 - 2x$

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

Answer(d)(i) $x =$ ..... or $x =$ ..... or $x =$ ..... [3]

(ii) Write down the range of values of x for which $f(x) > g(x)$.

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

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6 Here is some information about three dolls that are all mathematically similar.

NOT TO SCALE			
Height	8 cm	12 cm	
Surface Area		300 cm^2	800 cm^2
Volume		600 cm^3	

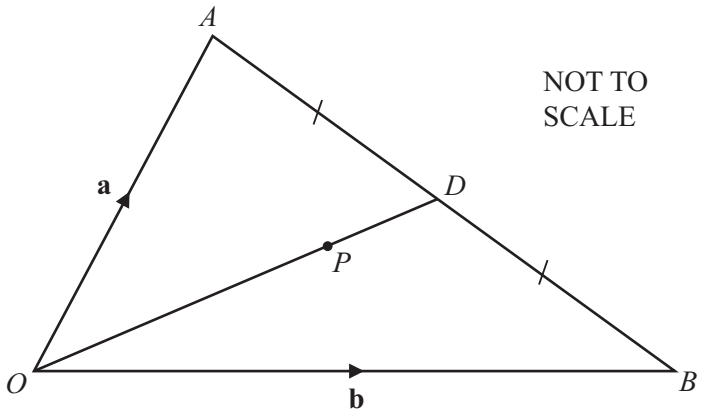
(a) Calculate the surface area of the smallest doll.

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

(b) Calculate the volume of the largest doll.

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

7 (a)



$\overrightarrow{OA}$ = **a** and $\overrightarrow{OB}$ = **b**.
D is the midpoint of AB and $\overrightarrow{OP} = \frac{2}{3}\overrightarrow{OD}$.

(i) Find $\overrightarrow{AB}$ in terms of **a** and **b**.

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

(ii) Find $\overrightarrow{OD}$ in terms of **a** and **b**.

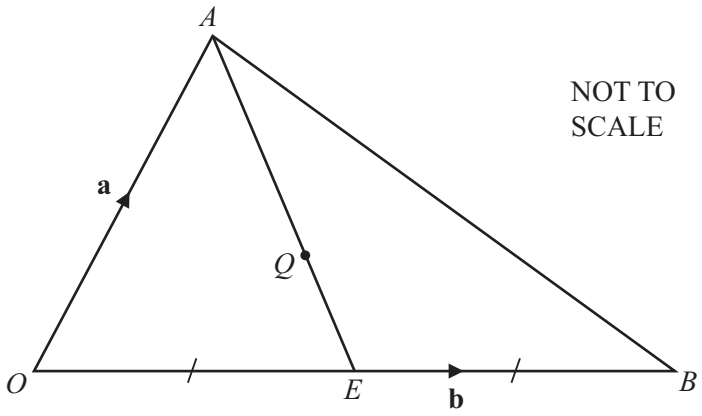
Answer(a)(ii) ..... [1]

(iii) Find $\overrightarrow{OP}$ in terms of **a** and **b**.
Write your answer as simply as possible.

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

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(b)



The triangle AOB is identical to the triangle in **part (a)**.

$\overrightarrow{OA}$ = **a** and $\overrightarrow{OB}$ = **b**.
E is the midpoint of $\overrightarrow{OB}$ and $\overrightarrow{AQ} = \frac{2}{3}AE$.

(i) Find $\overrightarrow{AE}$ in terms of **a** and **b**.

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

(ii) Find $\overrightarrow{OQ}$ in terms of **a** and **b**.
Write your answer as simply as possible.

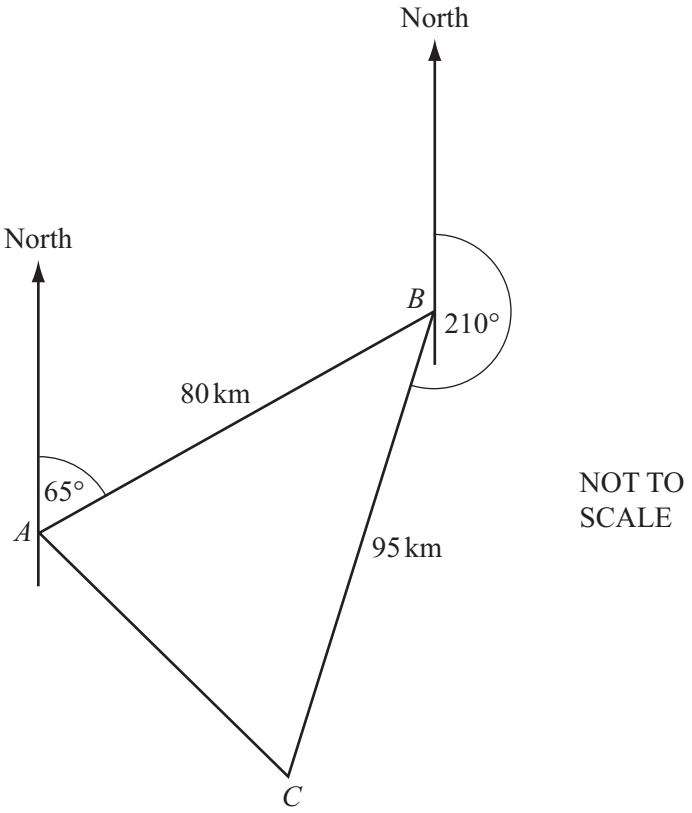
Answer(b)(ii) ..... [2]

(c) From your answers to **parts (a)(iii)** and **(b)(ii)**, what can you say about the points P and Q?

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

8 A ship sails 80 km on a bearing of 065° from A to B.
It then sails 95 km on a bearing of 210° from B to C.
It then sails back to A.

The diagram below shows this journey.



(a) Show that angle $ABC = 35°$.

[1]

(b) (i) Calculate the distance the ship sails from C to A.

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

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(ii) Calculate the bearing on which the ship sails from *C* to *A*.

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

(c) The ship sails at 18 km/h from *A* to *B*.
It then sails at 22 km/h from *B* to *C* and then at 15 km/h from *C* to *A*.

(i) Calculate the total time for the journey.
Give your answer in hours and minutes.

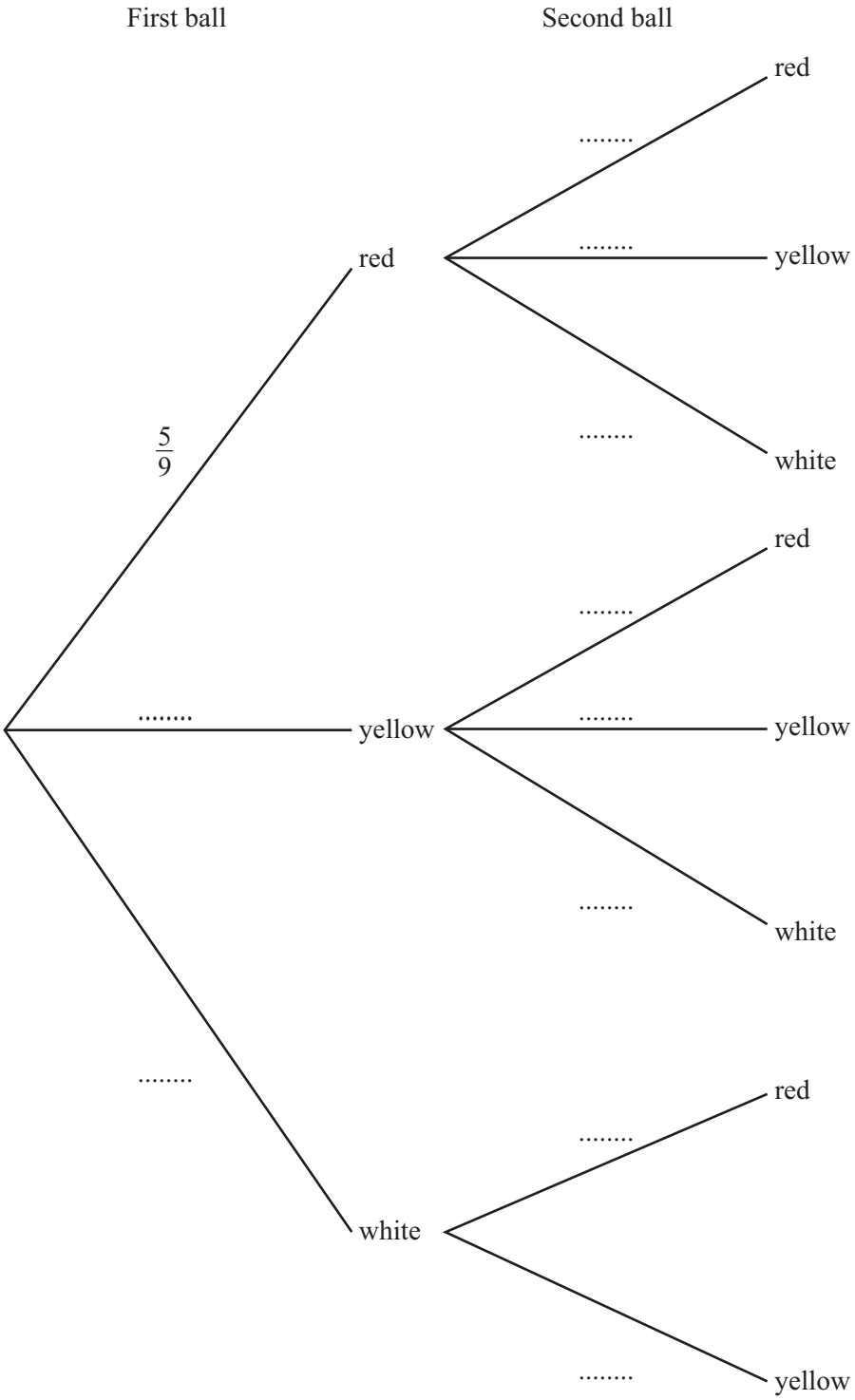
Answer(c)(i) ..... hours ..... minutes [3]

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

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

9 There are 9 balls in a bag.
5 of these are red, 3 are yellow and 1 is white.
Two balls are selected at random without replacement.

(a) Complete the probability tree diagram.



[3]

(b) Find the probability that

(i) both balls are yellow,

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

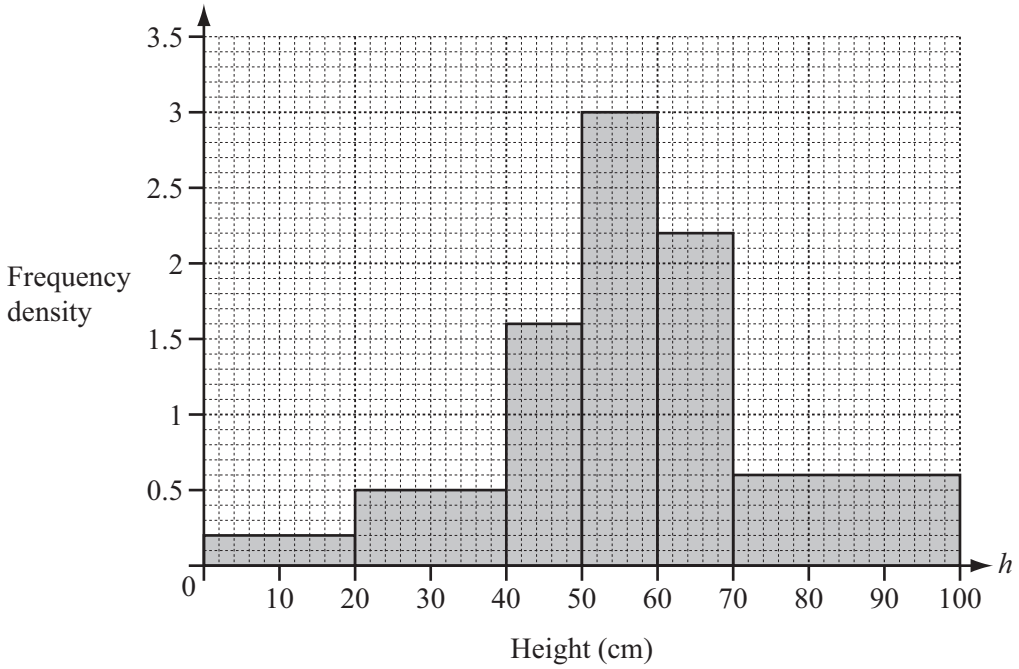
(ii) the two balls are different colours.

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

(c) Write down the probability that the second ball is red.

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

10 The heights, h cm, of 100 plants in each of two different soils, A and B, were recorded.
The histogram shows the heights of the plants in soil A.



(a) Complete the frequency table using the information in the histogram.

Height (h cm)	$0 < h \leqslant 20$	$20 < h \leqslant 40$	$40 < h \leqslant 50$	$50 < h \leqslant 60$	$60 < h \leqslant 70$	$70 < h \leqslant 100$
Frequency	4		16			18

[2]

(b) Calculate an estimate of the mean height of the plants in soil A.

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

(c) Complete the cumulative frequency table for the heights of the plants in soil A.

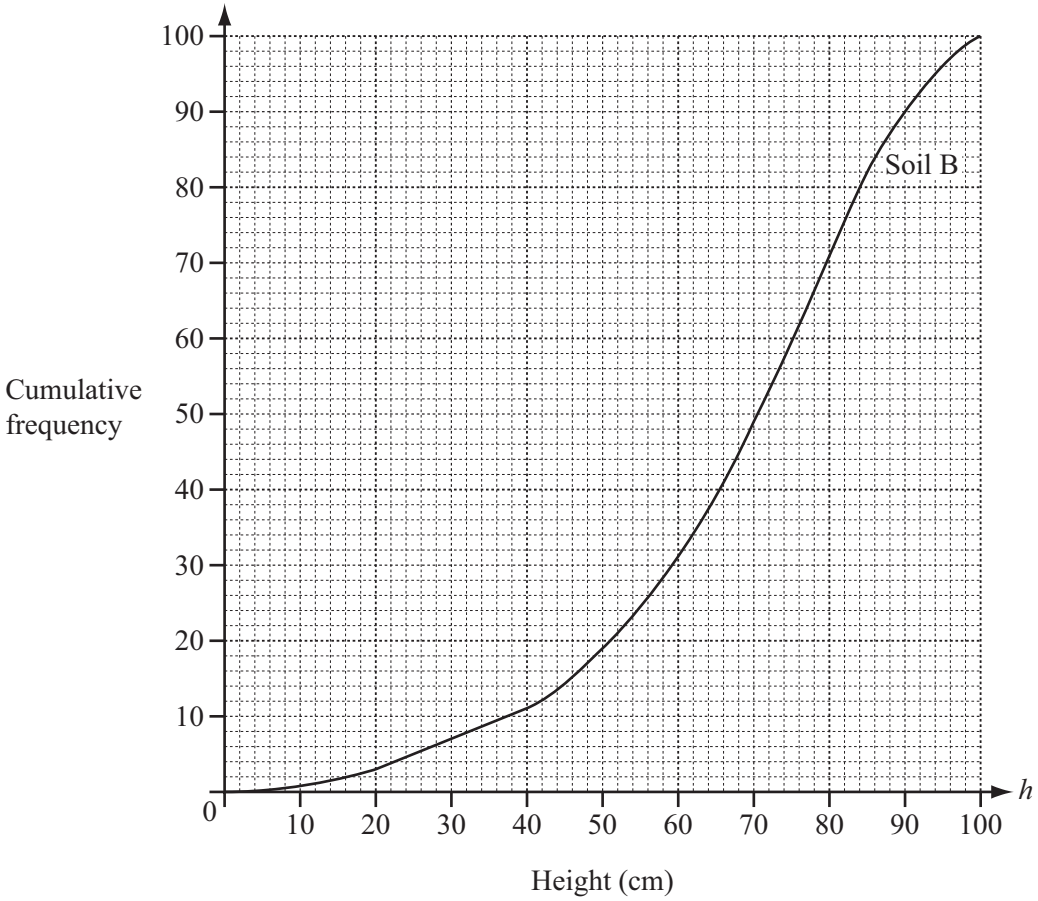
Height (h cm)	$h \leqslant 20$	$h \leqslant 40$	$h \leqslant 50$	$h \leqslant 60$	$h \leqslant 70$	$h \leqslant 100$
Cumulative frequency	4					100

[2]

(d) The graph opposite shows the cumulative frequency curve for the heights of the plants in soil B.

Using the same grid, draw the cumulative frequency curve for the heights of the plants in soil A.

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[3]

(e) **(i)** In which soil is the median height greater?
Show how you decide.

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

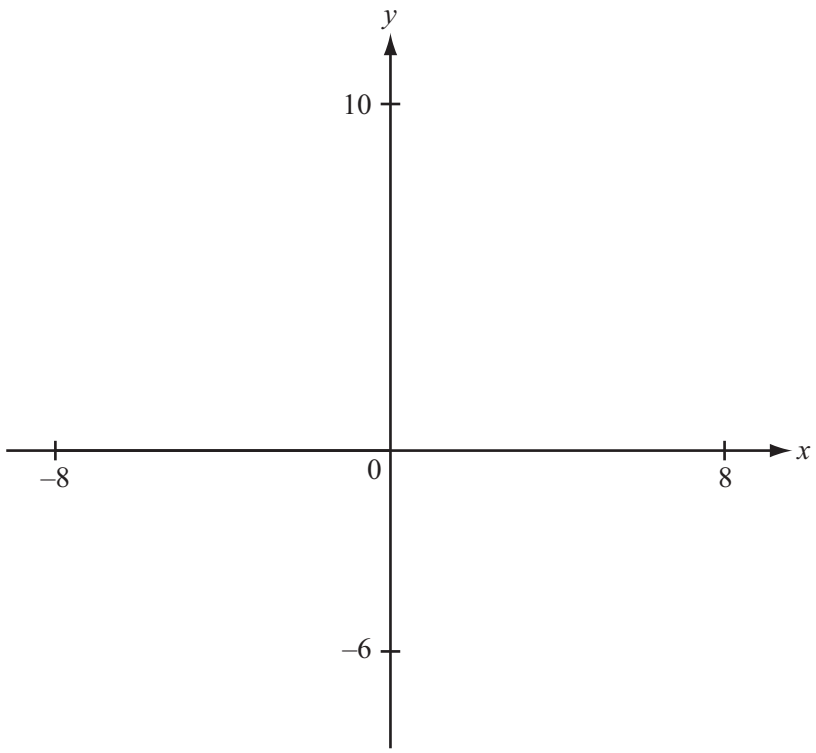
(ii) In which soil do the heights of the plants have a greater inter-quartile range and by how much?

Answer(e)(ii) soil ..... by ..... cm [4]

(f) Estimate the number of plants in soil B with a height greater than 85 cm.

Answer(f) ..... [2]

11



$$f(x) = \frac{2x^2}{x^2 - 4}$$

(a) On the diagram, sketch the graph of $y = f(x)$ between $x = -8$ and $x = 8$. [3]

(b) Find the range of $f(x)$ when $x \geqslant 1$.

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

(c) **(i)** Write down the equations of the three asymptotes of the graph of $y = f(x)$.

Answer(c)(i) .....

.....

..... [3]

(ii) Write down the equations of the asymptotes of the graph of $y = f(x + 3)$.

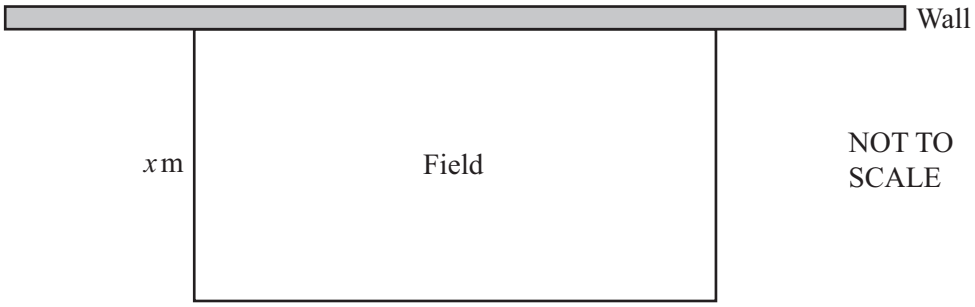
Answer(c)(ii) .....

.....

..... [2]

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12



A farmer makes a rectangular field.
For one side of the field he uses a wall.
He uses 100 m of fencing to make the other three sides.
The width of the field is x metres.

(a) Show that the area of the field, A m^2, is given by $A = 100x - 2x^2$.

[2]

(b) Find the width of the field when the area is 900 m^2.

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

(c) Find the maximum area of the field.

Answer(c) ..... m^2 [1]

(d) Another farmer uses 100 m of fencing to make a circular field.
Find the area of this field.

Answer(d) ..... m^2 [4]

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