Cambridge Assessment International Education

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6994140095

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **February/March 2024**

2 hours 15 minutes

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a graphic display calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π, use your calculator value.

INFORMATION

- The total mark for this paper is 120.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **24** pages. Any blank pages are indicated.

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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. $\quad A = \pi rl$

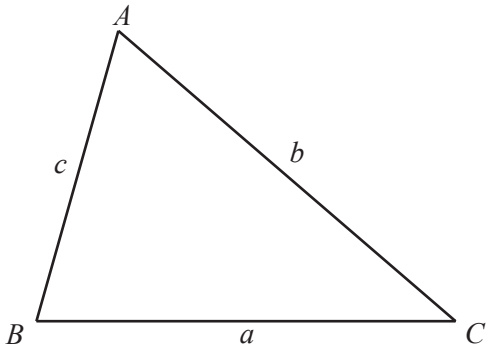
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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

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. $\quad V = \frac{4}{3}\pi r^3$



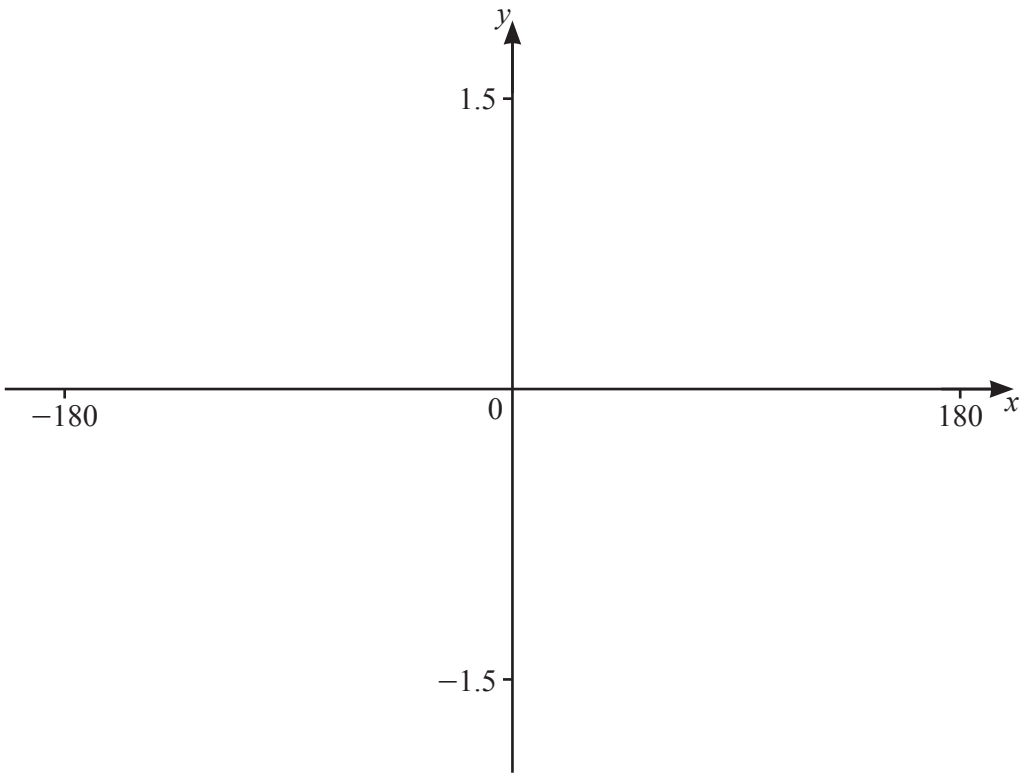
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

Answer **all** the questions.

1



$f(x) = (\sin x°)^2$

(a) On the diagram, sketch the graph of $y = f(x)$ for $-180 \leqslant x \leqslant 180$. [2]

(b) Write down the amplitude and period of $f(x)$.

Amplitude .....

Period ..... [2]

(c) $g(x) = 0.002x + 0.5$

(i) On the diagram, sketch the graph of $y = g(x)$ for $-180 \leqslant x \leqslant 180$. [2]

(ii) Solve $g(x) = f(x)$ for $-180 \leqslant x \leqslant 180$.

..... [4]

(iii) Solve $g(x) < f(x)$ for $-180 \leqslant x \leqslant 180$.

..... [2]

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2 Asif, Basheera and Chelsea make baskets.

(a) The selling price of a basket increases by 8%.
The new selling price is \$4.86 .

Find the original selling price of a basket.

\$ ..... [2]

(b) Asif earns \$4.70 per hour plus \$1.21 for each basket he makes.
Each week he works 8 hours a day for 5 days.
Each day Asif makes 18 baskets.

Calculate the total amount Asif earns in one week.

\$ ..... [3]

(c) One day Basheera and Chelsea make a total of 36 baskets.
They each work for 8 hours.
Basheera takes x minutes to make a basket.
Basheera takes 6 minutes longer than Chelsea to make a basket.

(i) Write down an expression in terms of x for the number of baskets Chelsea makes.

..... [1]

(ii) Write down an equation in terms of x and show that it simplifies to

$$3x^2 - 98x + 240 = 0.$$

[3]

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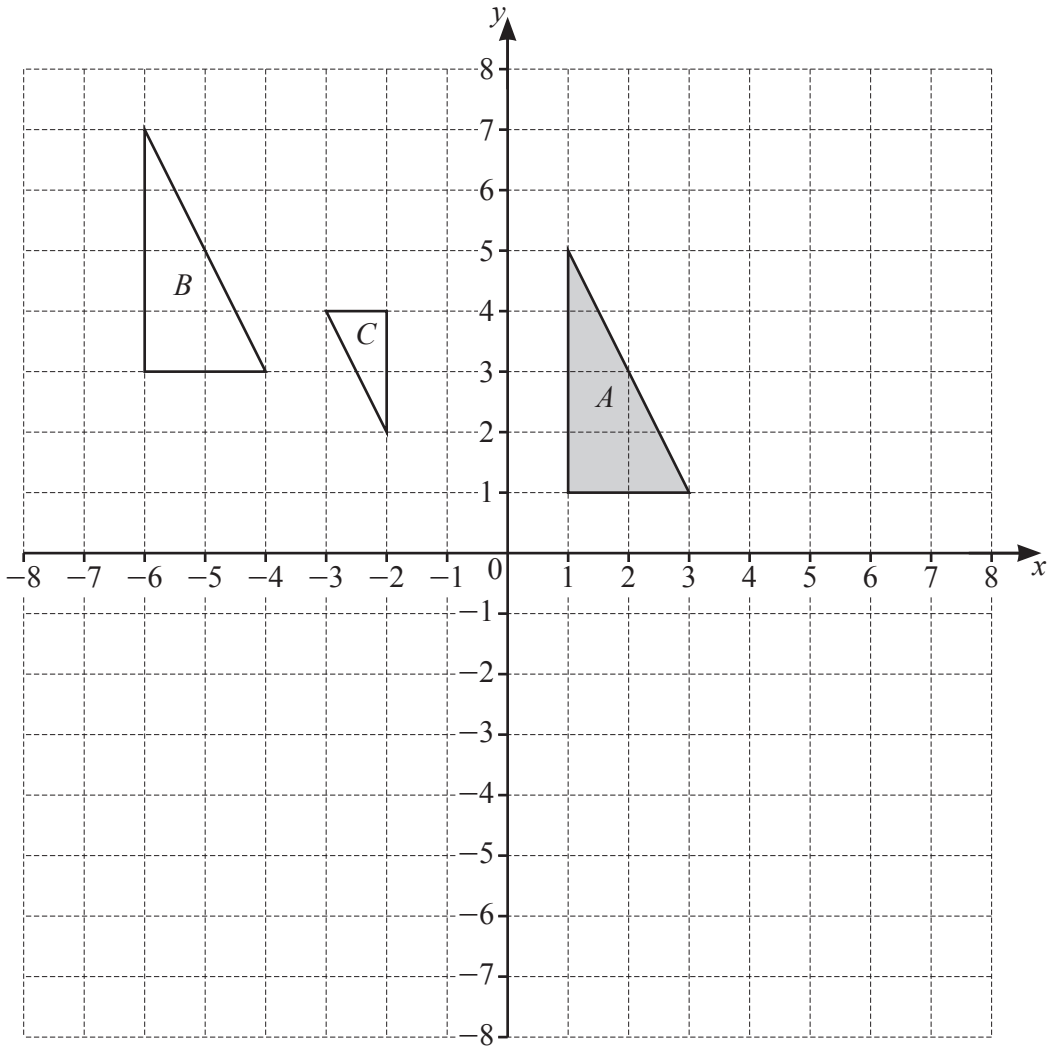
(iii) Solve the equation $3x^2 - 98x + 240 = 0$.

$x =$ ..... or ..... [2]

(iv) Find the number of baskets Chelsea makes.

..... [2]

3



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

.....

..... [2]

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

.....

..... [3]

(c) (i) Rotate triangle A through 90° clockwise about $(-1, -1)$. Label the image D. [2]

(ii) Reflect triangle D in the line $x = -1$. Label the image E. [2]

(iii) Describe fully the **single** transformation that maps triangle A onto triangle E.

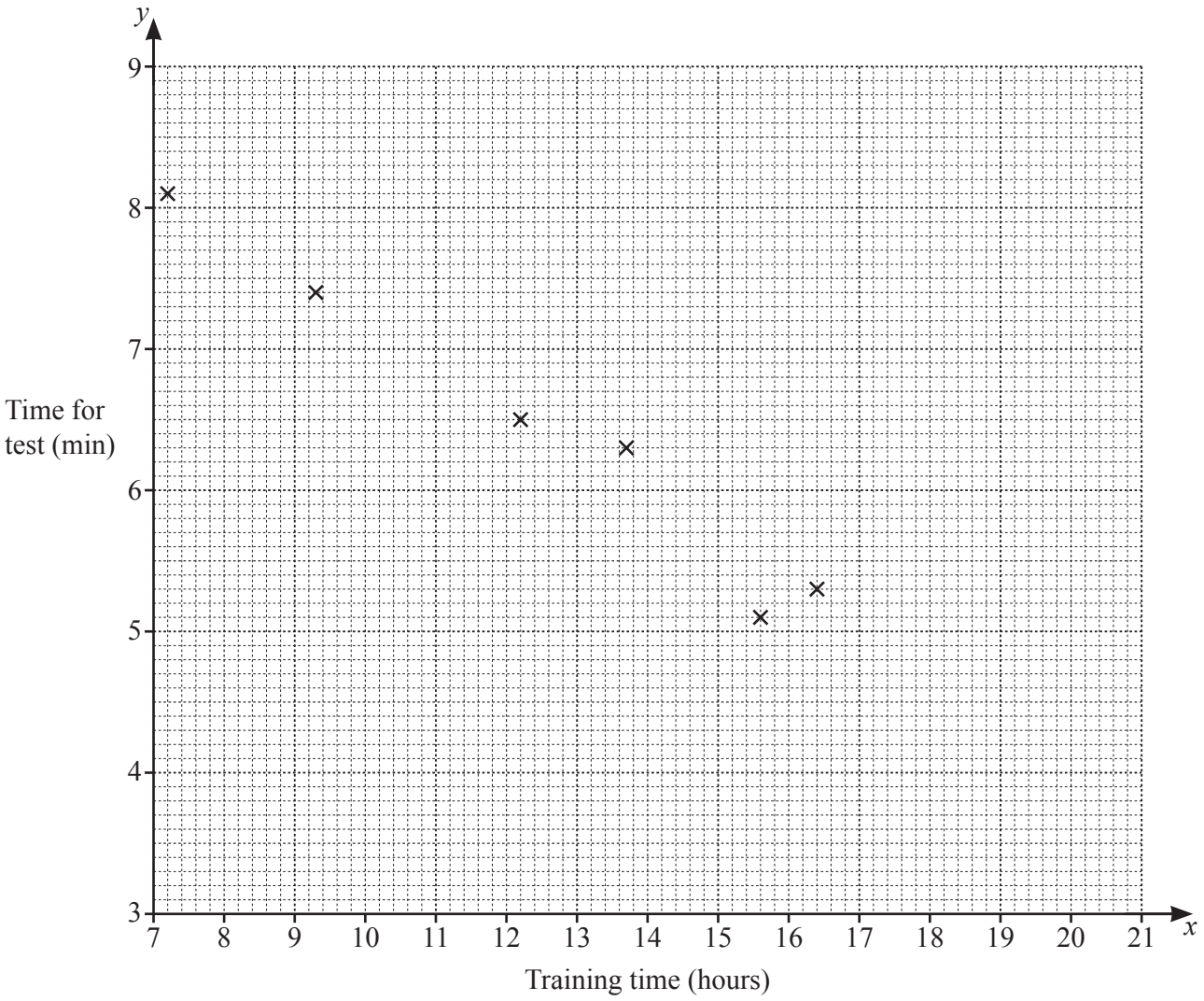
.....

..... [2]

4 Ten people trained for a fitness test.
The table shows the amount of time they each trained and the time they each took to do the test.

Training time (x hours)	12.2	9.3	16.4	7.2	15.6	13.7	9.4	13.1	12.8	14.2
Time for test (y minutes)	6.5	7.4	5.3	8.1	5.1	6.3	7.6	6.6	6.9	5.7

(a) Complete the scatter diagram.
The first 6 points have been plotted for you.



[2]

(b) What type of correlation is shown on the scatter diagram?

..... [1]

(c) Find the equation of the regression line.
Give your answer in the form $y = mx + c$.

$y =$ ..... [2]

(d) Anna trained for 10.8 hours.

Use your equation to estimate the time Anna took for the test.

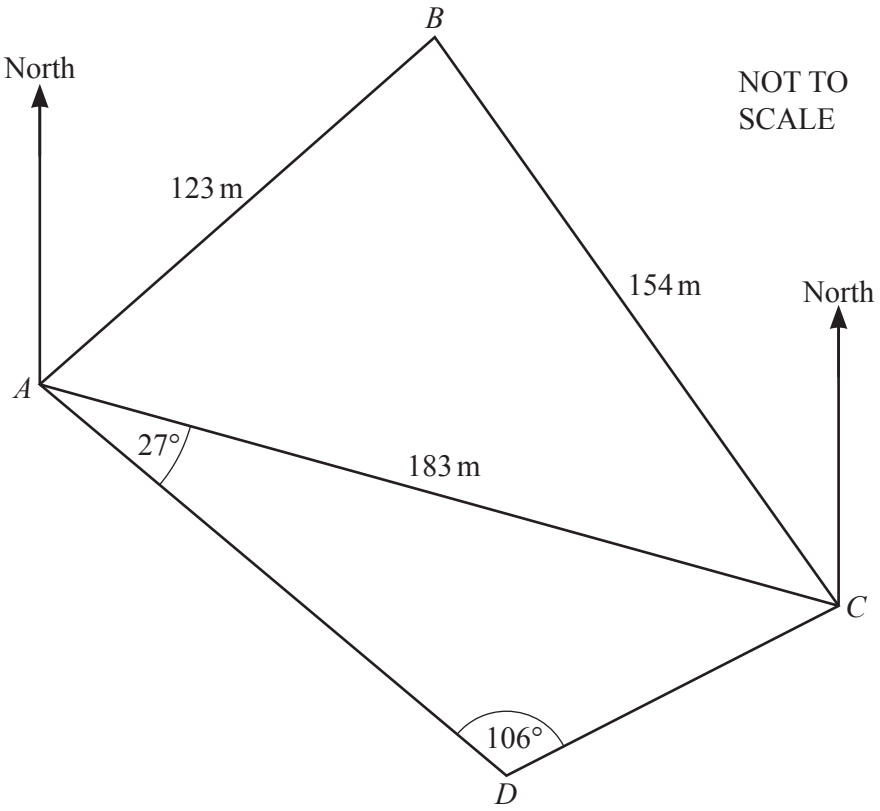
..... min [1]

(e) Ben trained for 20.5 hours.

Explain why you should not use your equation to estimate the time Ben took for the test.

..... [1]

5



The diagram shows a field $ABCD$, with a straight path AC.
The bearing of C from A is 122°.

(a) Calculate the bearing of D from C.

..... [3]

(b) Show that angle $ABC = 81.9°$ correct to one decimal place.

[3]

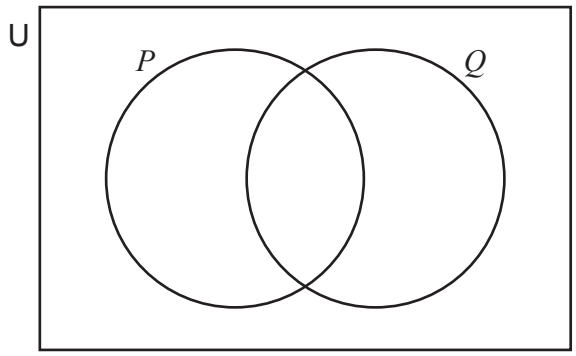
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(c) Find the total area of the field *ABCD*.

..... m^2 [5]

6 **(a)** U = {integers from 1 to 15}
P = {factors of 12}
Q = {multiples of 3}

(i) Complete the Venn diagram.



[2]

(ii) Write down the elements of $P \cap Q$.

..... [1]

(iii) Find $\mathrm{n}\big((P' \cap Q) \cup (P \cap Q')\big)$.

..... [1]

(b)



Bag *A* Bag *B*

Bag *A* contains 4 black balls and 3 white balls.
Bag *B* contains 2 black balls and 4 white balls.

(i) Amy picks a ball at random from bag *A*.
She notes the colour of the ball and replaces it in bag *A*.

Find the probability that Amy's ball is black.

..... [1]

(ii) Basma picks two balls at random from bag *B*.
She notes the colour of each ball and replaces them in bag *B*.

Find the probability that both balls are white.

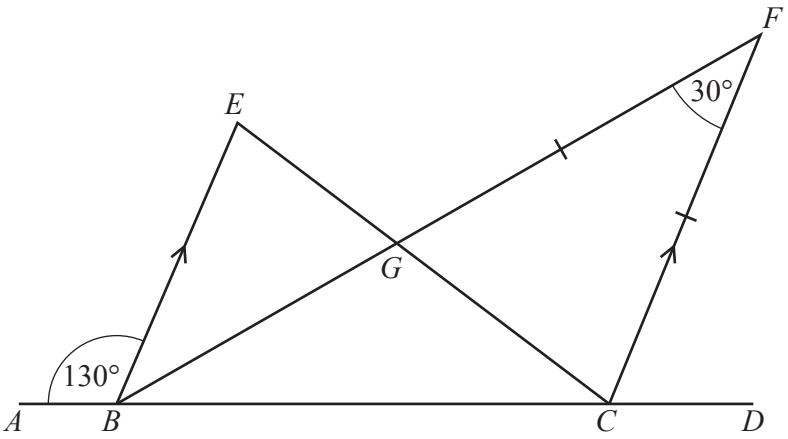
..... [2]

(iii) Basma chooses one bag at random.
She picks one ball at random from this bag.

Find the probability that the ball is white.

..... [3]

7 (a)



NOT TO SCALE

ABCD is a straight line and *EC* and *BF* meet at *G*.
BE is parallel to *CF* and $GF = CF$.
Angle $ABE = 130°$ and angle $BFC = 30°$.

Find

(i) angle *FCD*

Angle *FCD* = ... [2]

(ii) angle *FBC*

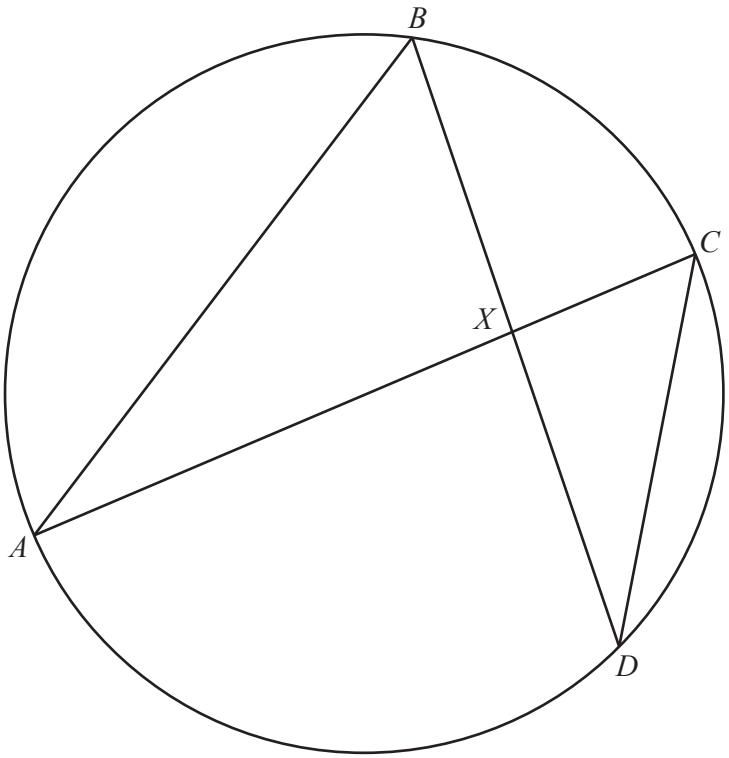
Angle *FBC* = ... [1]

(iii) angle *BGE*.

Angle *BGE* = ... [2]

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(b)



NOT TO SCALE

A, B, C and D are points on the circle.
AC and BD meet at X.

(i) Show that triangles AXB and DXC are similar.
Give a reason for each statement you make.

.....

.....

.....

.....

..... [2]

(ii) $AX = 5\,\text{cm}$, $XC = 2\,\text{cm}$ and $XD = 4\,\text{cm}$.

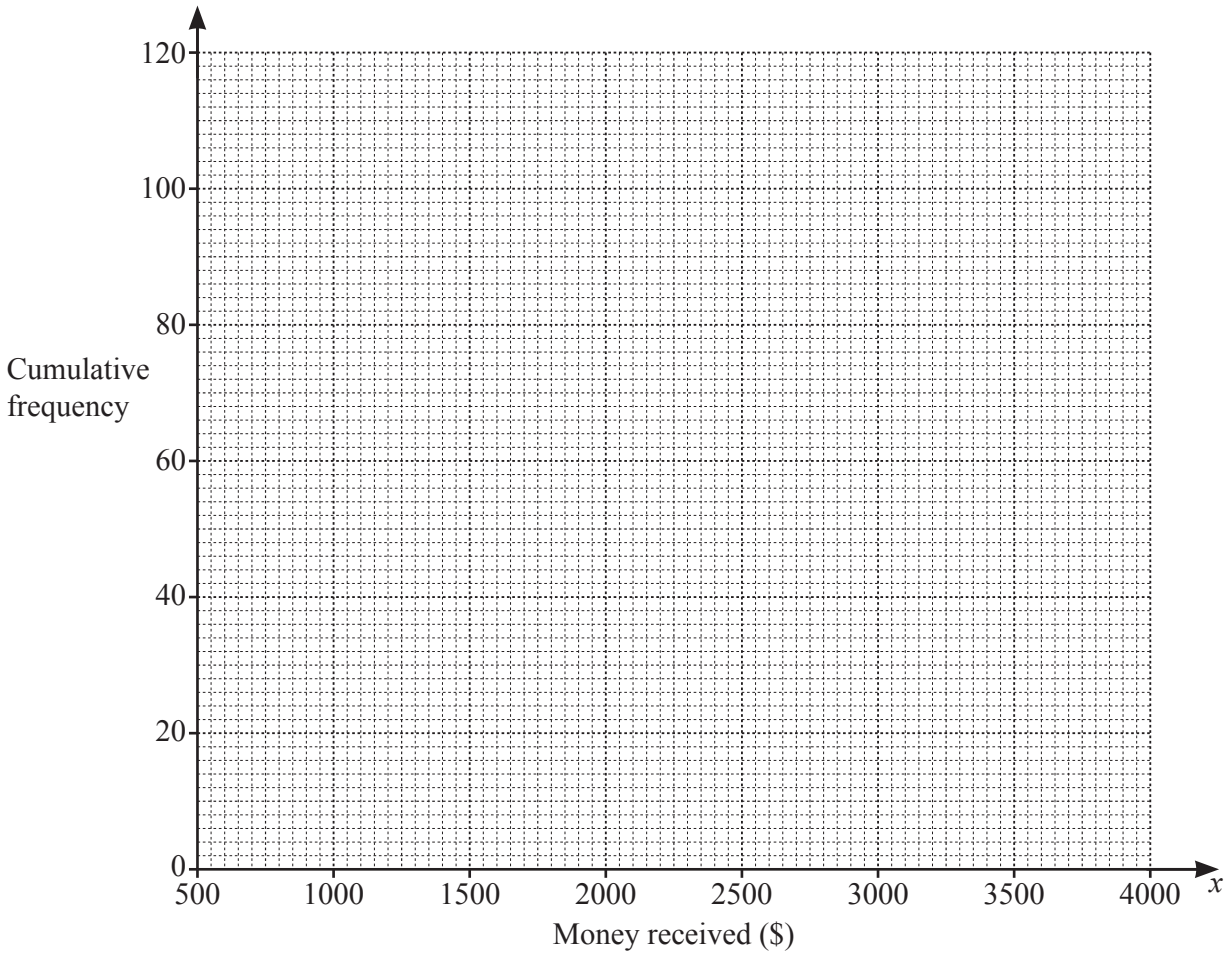
Find the length of BD.

$BD =$ ..... cm [3]

8 The table shows the money received in a shop for 120 days.

Money received ($\$x$)	Frequency
$500 < x \leqslant 1000$	6
$1000 < x \leqslant 1500$	16
$1500 < x \leqslant 2000$	24
$2000 < x \leqslant 2500$	36
$2500 < x \leqslant 3000$	20
$3000 < x \leqslant 3500$	14
$3500 < x \leqslant 4000$	4

(a) On the grid, draw a cumulative frequency curve to show this information.



[4]

(b) Use your curve to estimate

(i) the median

$ ..... [1]

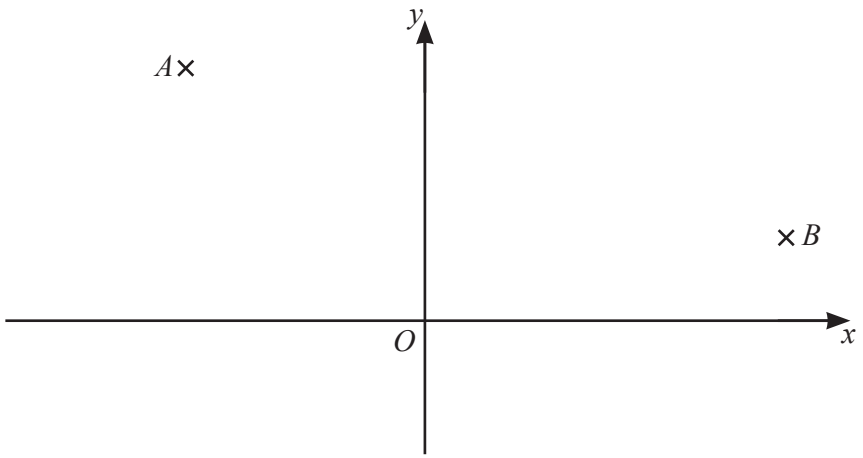
(ii) the interquartile range.

$ ..... [2]

(c) Use your curve to estimate the percentage of these 120 days where the shop received more than $1800.

..... % [3]

9



A is the point $(-4, 6)$ and B is the point $(8, 2)$.

(a) Find the coordinates of the mid-point of AB.

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

(b) Find the equation of AB.

..... [3]

(c) Show that the equation of the perpendicular bisector of AB is $y = 3x - 2$.

[3]

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(d) The point C has coordinates (3, 7).

Show that C lies on the perpendicular bisector of AB.

[1]

(e) Find the area of triangle ABC.

..... [4]

10 $f(x) = 3x - 2$ $g(x) = 5 - 2x$ $h(x) = x^2$

(a) (i) Find $g(-2)$.

..... [1]

(ii) Find $h(g(x))$.
Write your answer in the form $ax^2 + bx + c$.

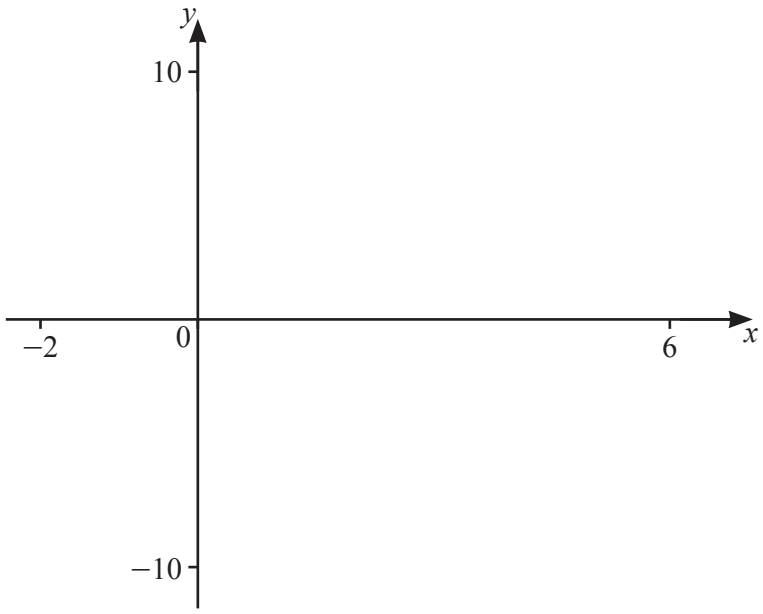
..... [3]

(iii) Find $g^{-1}(x)$.

$g^{-1}(x) =$ ..... [2]

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(b) (i) On the diagram, sketch the graph of $y = \dfrac{\mathrm{f}(x)}{\mathrm{g}(x)}$ for values of x between -2 and 6.



[3]

(ii) An asymptote to the graph of $y = \dfrac{\mathrm{f}(x)}{\mathrm{g}(x)}$ is parallel to the y-axis.

Find the equation of this asymptote.

..... [1]

(iii) Solve $\dfrac{\mathrm{f}(x)}{\mathrm{g}(x)} = 5 - 2^x$.

..... [3]

11 **(a)** Solve.

$$3x+2 > 7x-8$$

..... [2]

(b) Factorise fully.

$$75x^2-3$$

..... [2]

(c) Simplify.

(i) $\frac{2}{3x}+\frac{1}{6x}-\frac{1}{5x}$

..... [2]

(ii) $\frac{2x^2+3x-2bx-3b}{2x^2-7x-15}$

..... [4]

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