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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.



Formula List

For the equation $ax^2 + bx + c = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Curved surface area, A , of cylinder of radius r , height h . $A = 2\pi rh$

Curved surface area, A , of cone of radius r , sloping edge l . $A = \pi rl$

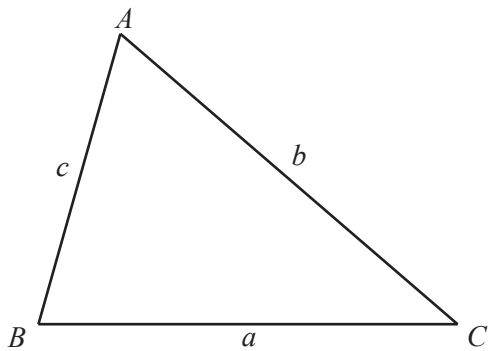
Curved surface area, A , of sphere of radius r . $A = 4\pi r^2$

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

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

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

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



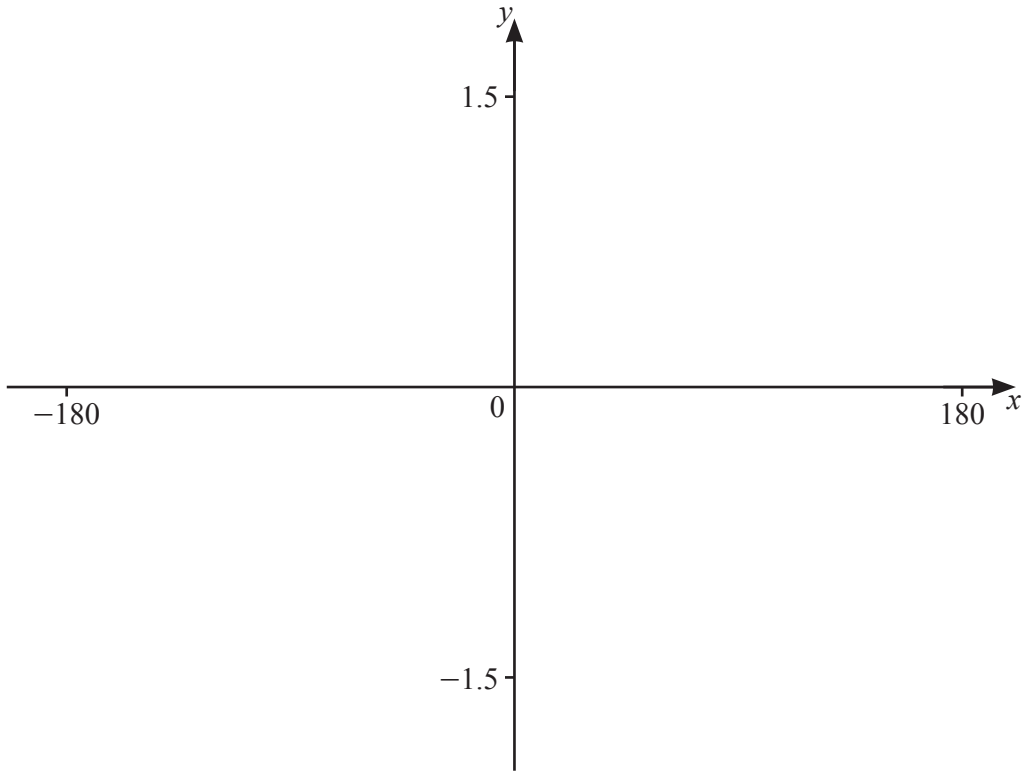
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

Answer **all** the questions.

1



$$f(x) = (\sin x^\circ)^2$$

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

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

..... [4]

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

..... [2]

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]

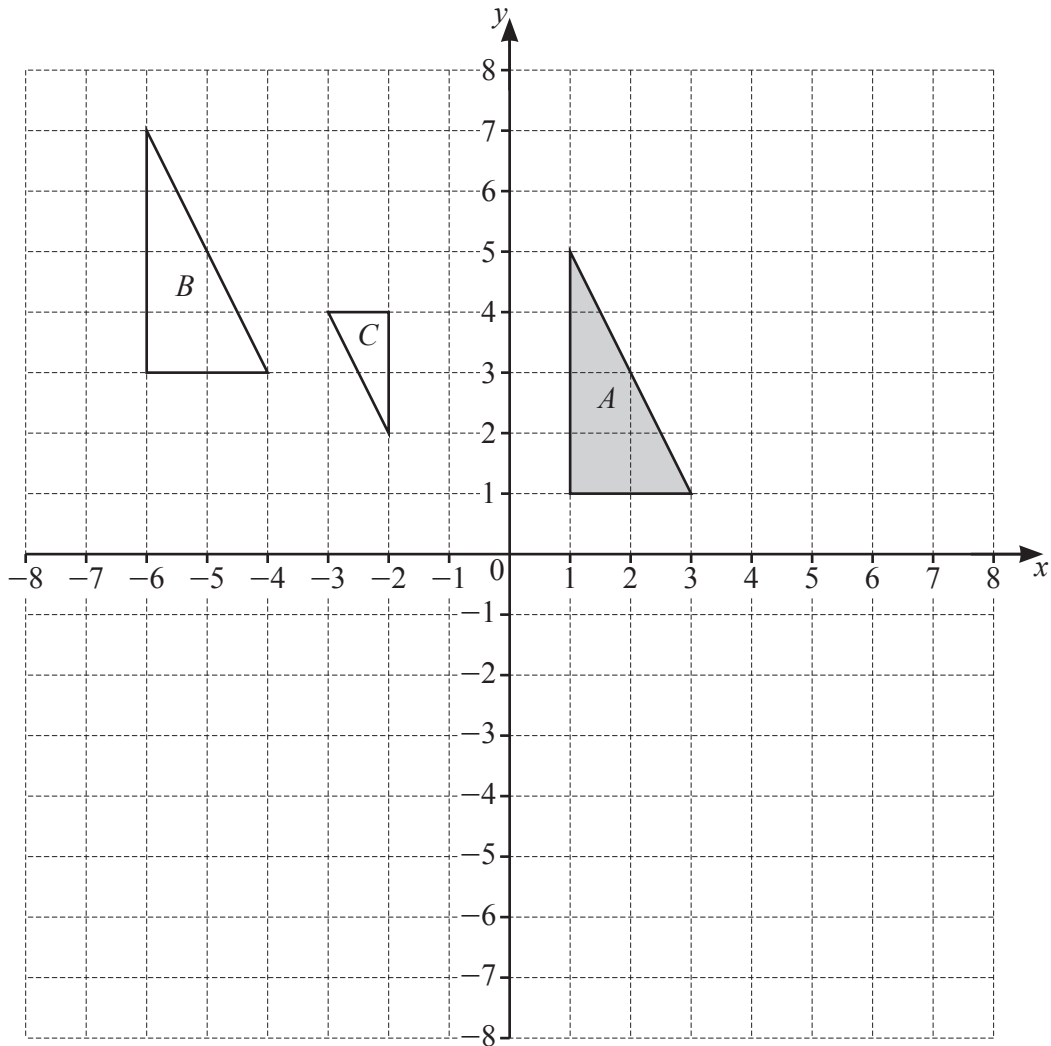
(iii) Solve the equation $3x^2 - 98x + 240 = 0$.

$x = \dots\dots\dots$ or $\dots\dots\dots$ [2]

(iv) Find the number of baskets Chelsea makes.

$\dots\dots\dots$ [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 .

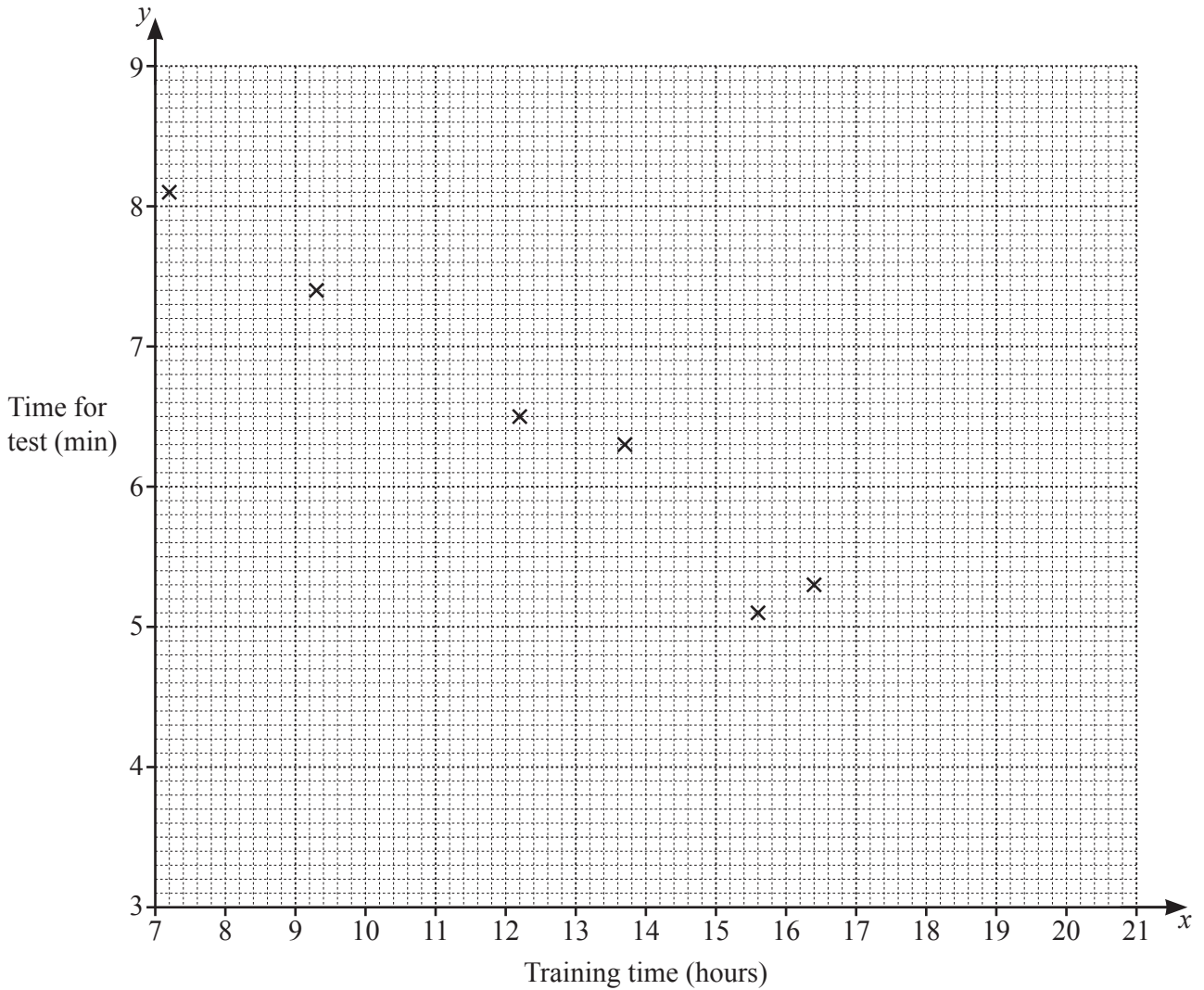
.....

..... [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 $y = mx + c$.

$$y = \dots\dots\dots [2]$$

- (d) Anna trained for 10.8 hours.

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

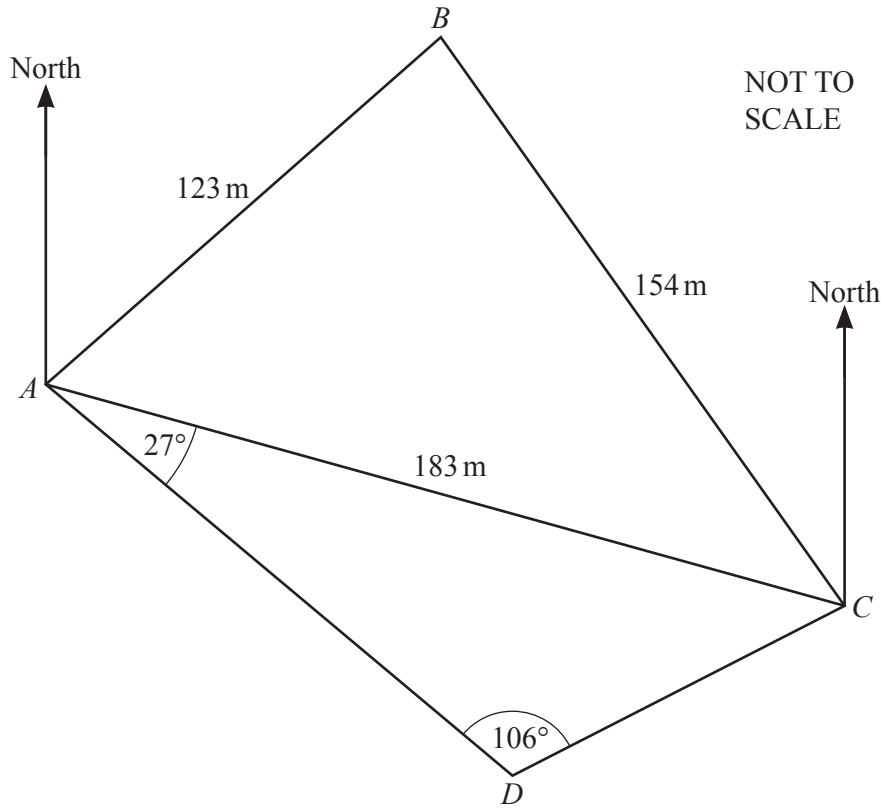
$$\dots\dots\dots \text{ min } [1]$$

- (e) Ben trained for 20.5 hours.

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

$$\dots\dots\dots [1]$$

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 $ABC = 81.9^\circ$ correct to one decimal place.

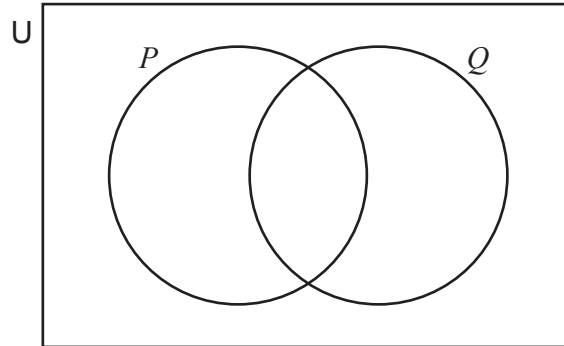
[3]

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

..... m^2 [5]

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

(i) Complete the Venn diagram.



[2]

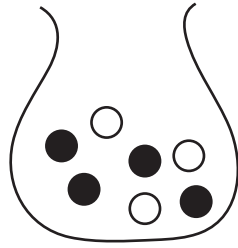
(ii) Write down the elements of $P \cap Q$.

..... [1]

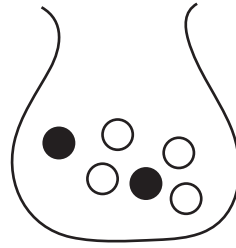
(iii) Find $n((P' \cap Q) \cup (P \cap Q'))$.

..... [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.

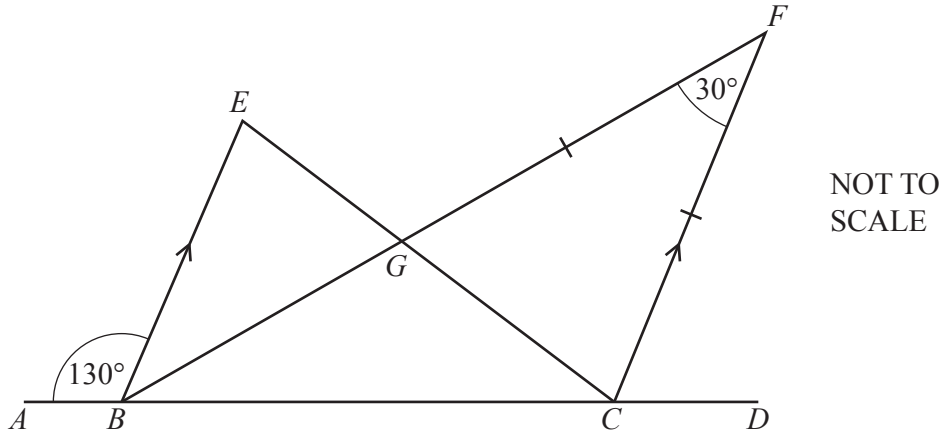
..... [2]

- (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)



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

Find

(i) angle FCD

Angle $FCD = \dots\dots\dots$ [2]

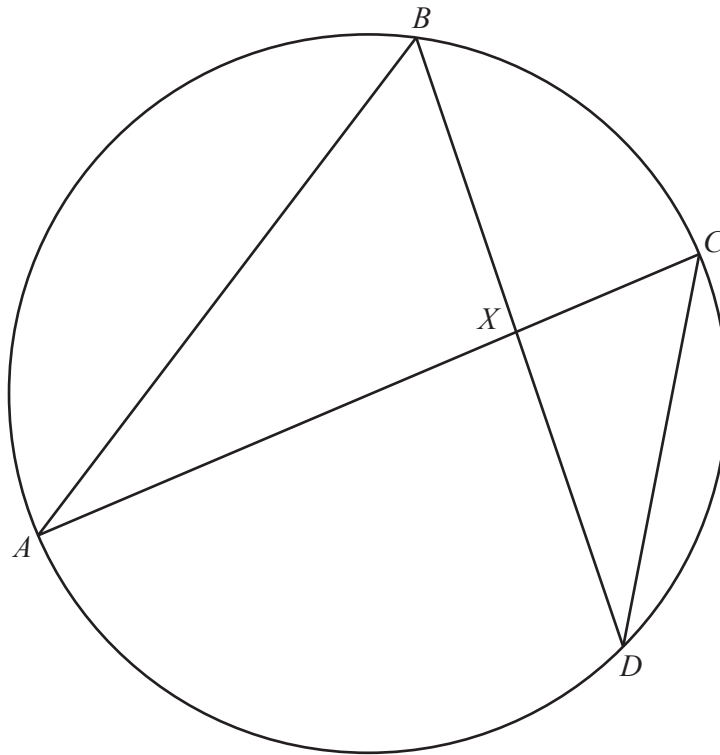
(ii) angle FBC

Angle $FBC = \dots\dots\dots$ [1]

(iii) angle BGE .

Angle $BGE = \dots\dots\dots$ [2]

(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) $AX = 5$ cm, $XC = 2$ cm and $XD = 4$ cm.

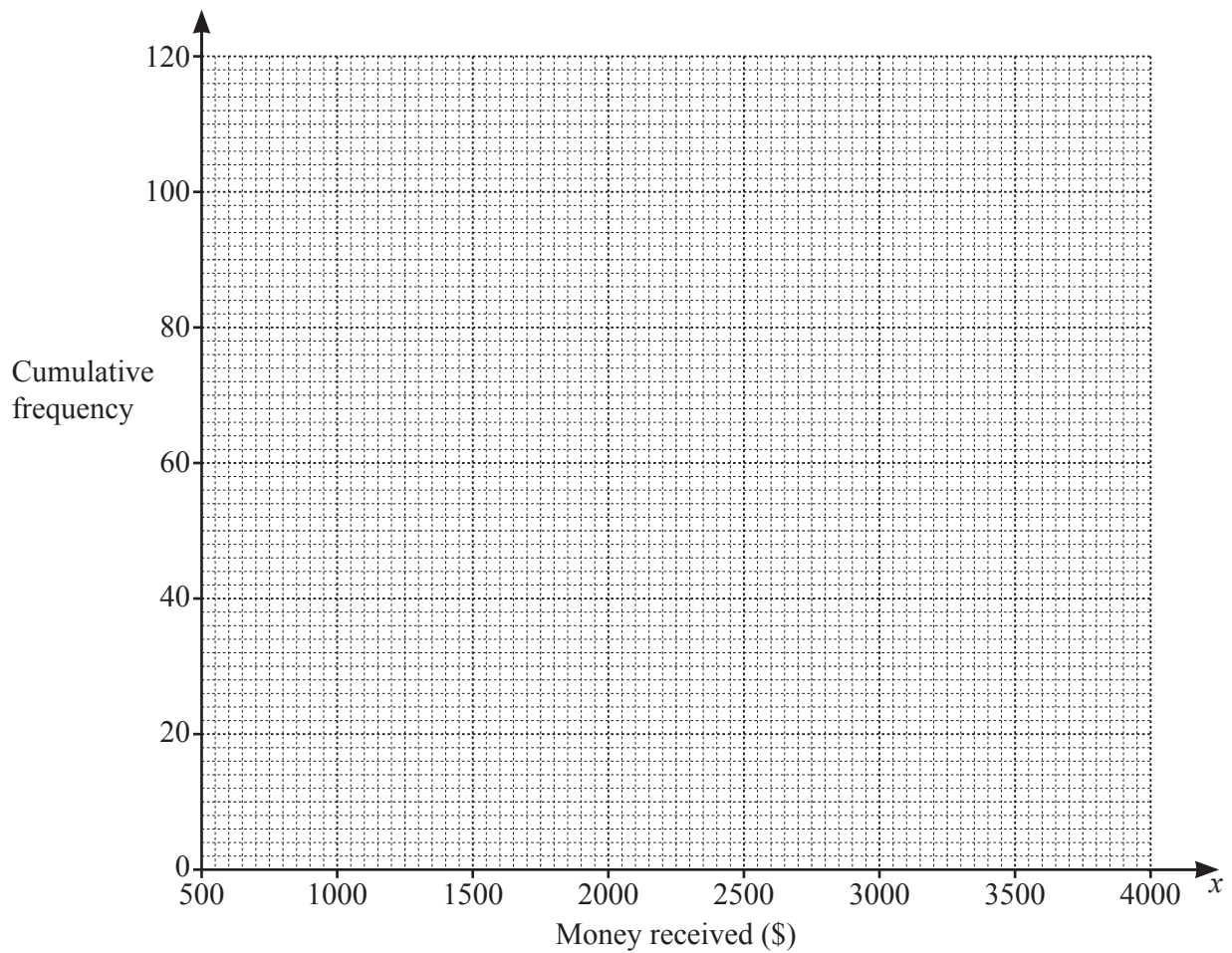
Find the length of BD .

$BD =$ cm [3]

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

| Money received (\$ x) | Frequency |
|--------------------------|-----------|
| $500 < x \leq 1000$ | 6 |
| $1000 < x \leq 1500$ | 16 |
| $1500 < x \leq 2000$ | 24 |
| $2000 < x \leq 2500$ | 36 |
| $2500 < x \leq 3000$ | 20 |
| $3000 < x \leq 3500$ | 14 |
| $3500 < x \leq 4000$ | 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]

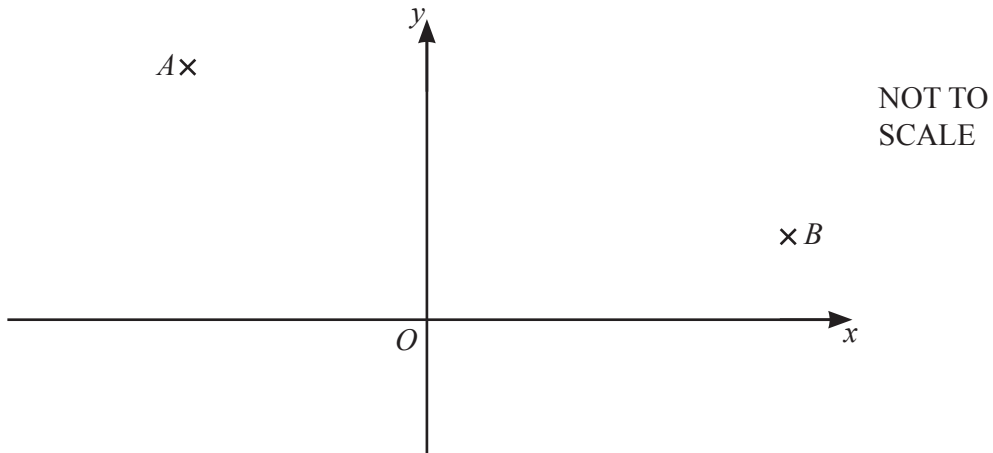
(ii) the interquartile range.

\$ [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]

(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]

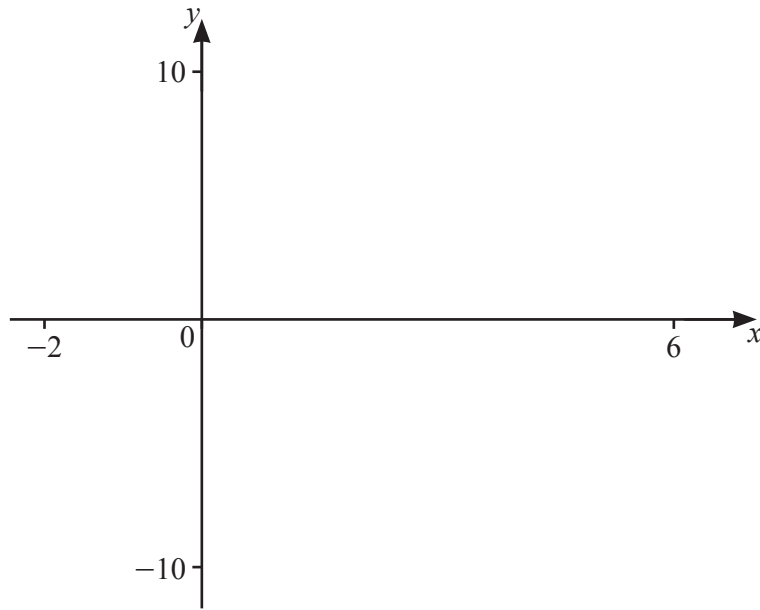
(ii) Find $h(g(x))$.
Write your answer in the form $ax^2 + bx + c$.

..... [3]

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

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

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



[3]

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

Find the equation of this asymptote.

..... [1]

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

..... [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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