Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

4886478967

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/41**

Paper 4 (Extended) **May/June 2019**

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.

Cambridge Assessment International Education

[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. $\quad A = \pi rl$

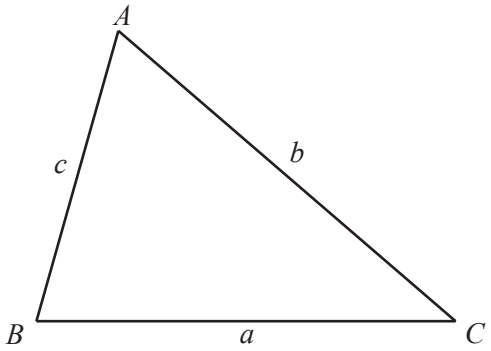
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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 In a sale, a shop reduces all its prices by 15%.

(a) Calculate the sale price of a television originally costing \$630.

\$ ..... [2]

(b) The price of a fridge in the sale is \$952.

Calculate the original price.

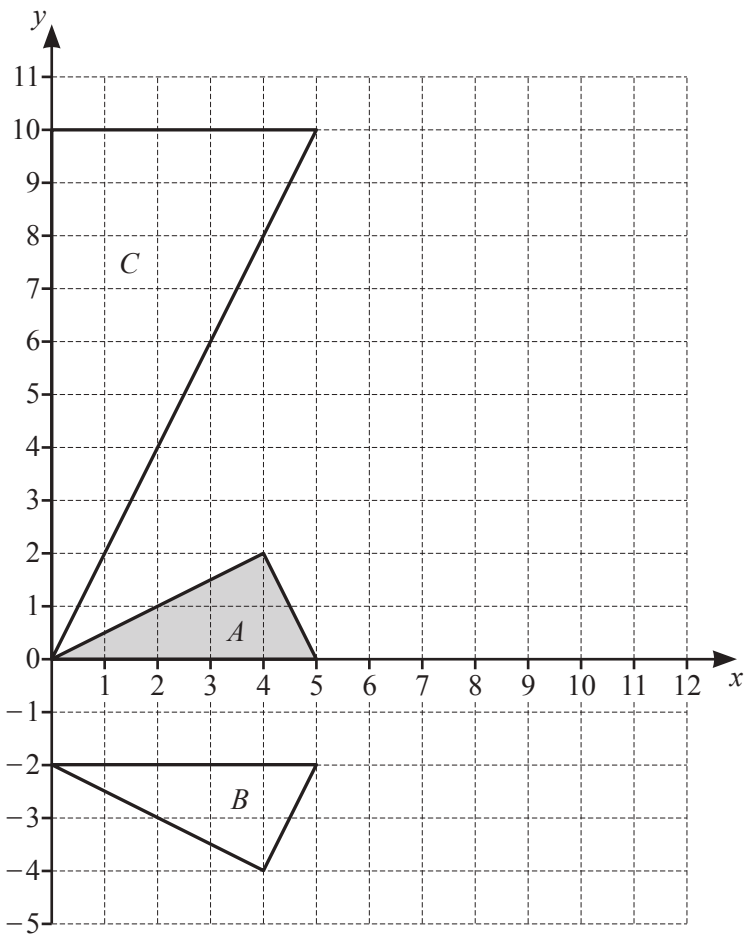
\$ ..... [3]

(c) After one week the shop reduces the price of the television in **part (a)** by a further 5% each week until it is sold.

Calculate the number of weeks from the start of the sale until the television reaches half the original price.

..... [4]

2



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

..... [2]

(b) Translate triangle A by the vector $\begin{pmatrix} 6 \\ -3 \end{pmatrix}$. [2]

(c) Triangle A can be mapped onto triangle C by a rotation followed by an enlargement.

(i) Use trigonometry to calculate the angle of rotation.

..... [3]

(ii) The scale factor of the enlargement is $\sqrt{a}$ where a is an integer.

Find the value of a.

$a =$ ..... [3]

3 1 3 5 9 15 45

The list shows the six factors of 45.

This is a method for finding how many factors a number has.

- Write the number as the product of its prime factors in index form.
- Add one to each of the powers and multiply these numbers together.

For example,

$45 = 3^2 \times 5^1$

$(2+1) \times (1+1) = 3 \times 2 = 6$

So 45 has 6 factors.

(a) $24 = 2^3 \times 3^1$

By listing all the factors of 24, show that the method works for 24.

[3]

(b) Use the method to find how many factors 360 has.

..... [4]

4 Rani planted some seeds in her garden.
After two months she measured the heights, h cm, of each of 120 plants.

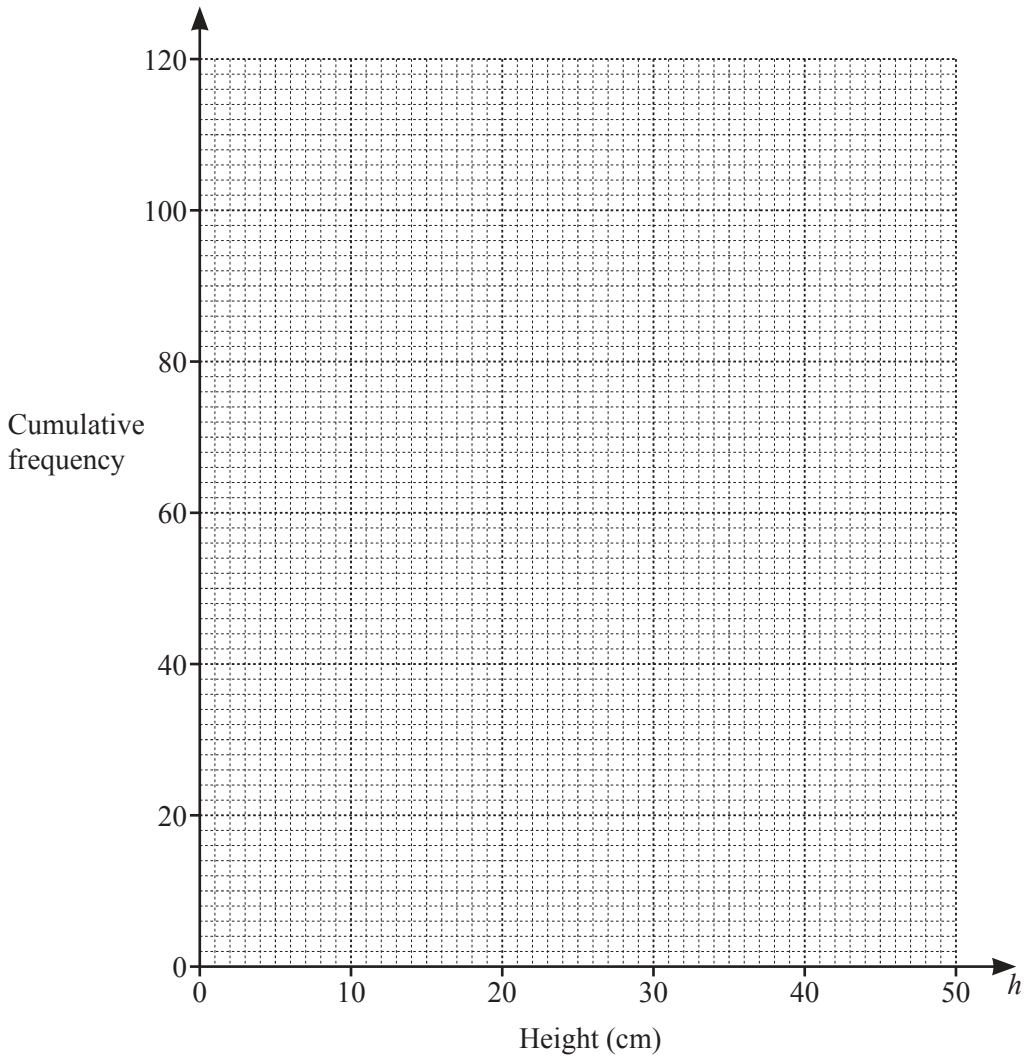
The results are shown in the table.

Height (h cm)	$0 < h \leqslant 10$	$10 < h \leqslant 20$	$20 < h \leqslant 25$	$25 < h \leqslant 30$	$30 < h \leqslant 35$	$35 < h \leqslant 40$	$40 < h \leqslant 50$
Frequency	0	16	28	32	24	14	6

(a) Calculate an estimate of the mean height.

..... cm [2]

(b) Draw a cumulative frequency curve for this information.



[5]

(c) Use your cumulative frequency curve to estimate

(i) the median height,

..... cm [1]

(ii) the interquartile range,

..... cm [2]

(iii) the number of plants with a height of more than 37 cm.

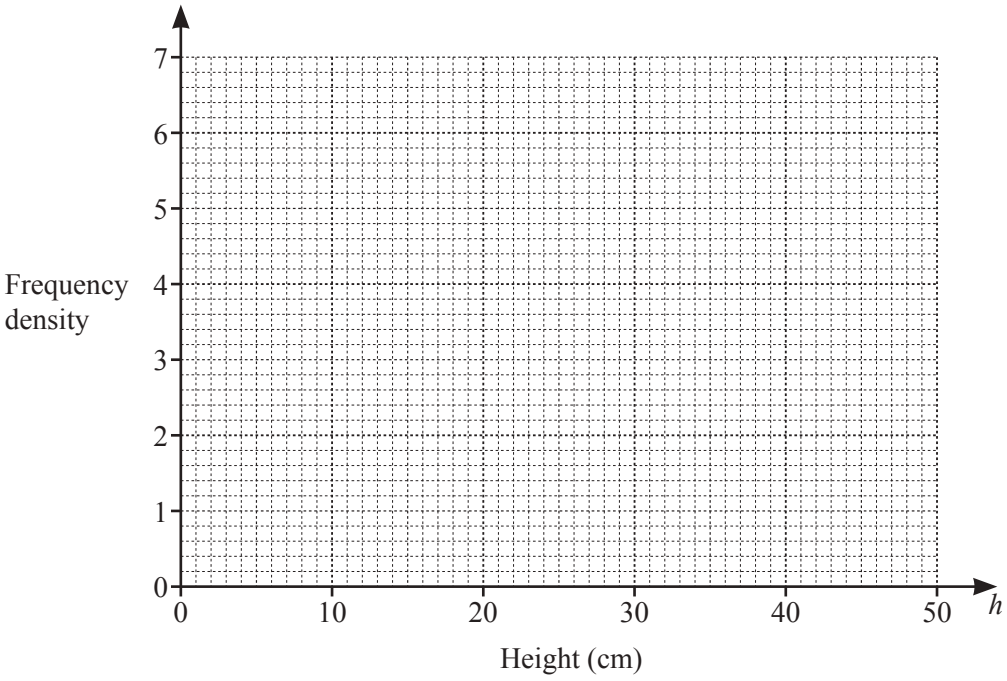
..... [2]

(d) (i) Complete this table of frequency densities for the 120 plants.

Height (h cm)	$0 < h \leqslant 10$	$10 < h \leqslant 20$	$20 < h \leqslant 25$	$25 < h \leqslant 30$	$30 < h \leqslant 35$	$35 < h \leqslant 40$	$40 < h \leqslant 50$
Frequency density	0	1.6					

[2]

(ii) Draw a histogram to show this information.



[3]

5 Jian asks 60 people what their favourite type of television programme is.

These are the results.

Type of programme	Number of people
Factual	15
Sport	18
Drama	12
Game Show	10
Other	5

(a) Jian draws a pie chart to show these results.

Calculate the sector angle for Drama.

..... [2]

(b) Jian chooses one of the 60 people at random.

Write down the probability that the person says Factual.

..... [1]

(c) Jian chooses two of the 60 people at random.

(i) Find the probability that one of them says Drama and the other says Game Show.

..... [3]

(ii) Find the probability that at least one person says Sport.

..... [3]

6 y is inversely proportional to $\sqrt{x}$.
When $x = 9$, $y = 6$.

(a) **(i)** Find an equation connecting x and y.

..... [2]

(ii) Calculate y when $x = 30$.

..... [1]

(iii) Calculate x when $y = 15$.

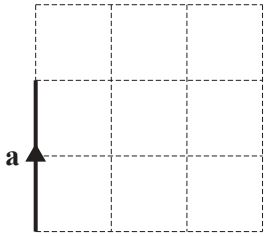
..... [2]

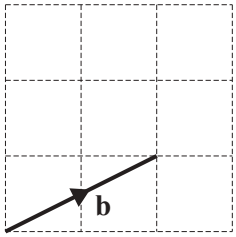
(b) For the three variables x, y and z, z is also proportional to $(y + 5)$.
When $x = 9$, $z = 33$.

Find an equation connecting x and z.

..... [2]

7 The vectors **a** and **b** are shown on the grids.



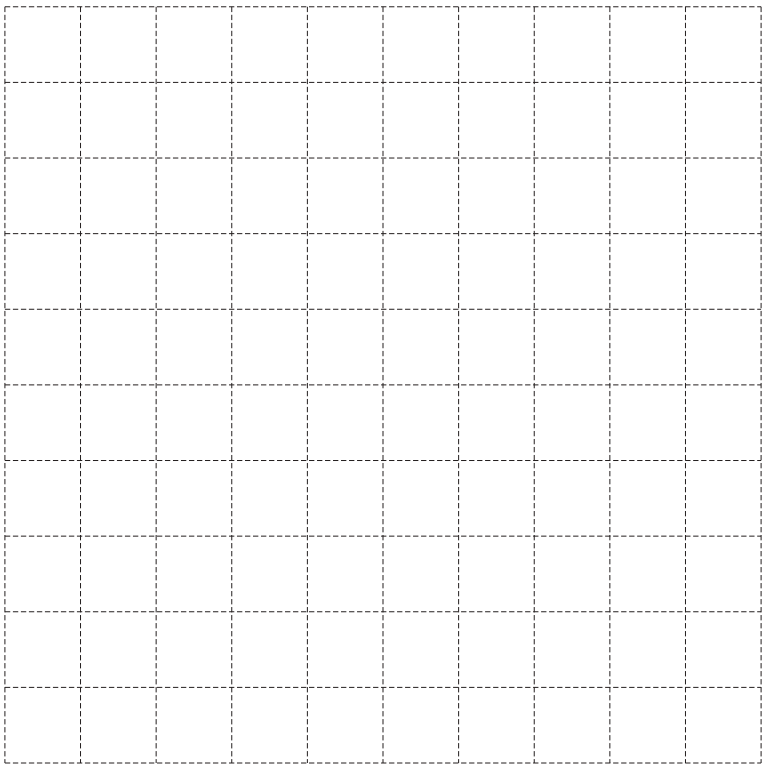


(a) On the grid below, draw and label the following three vectors.

$2\mathbf{b}$

$2\mathbf{a} + \mathbf{b}$

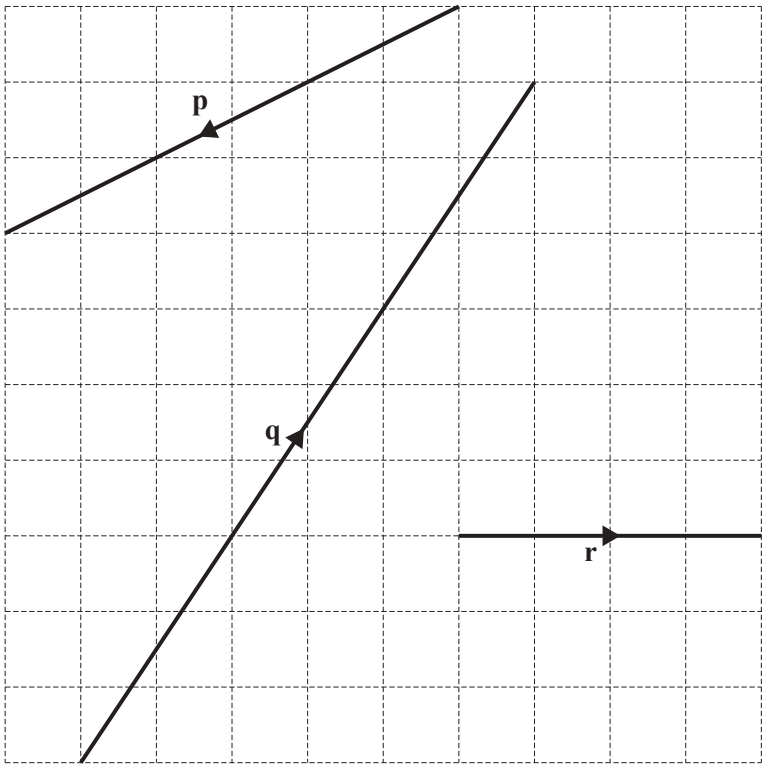
$\mathbf{a} - 2\mathbf{b}$



[3]

(b) Vectors **p**, **q**, and **r** are drawn on this grid.

Write each of the vectors in terms of **a** and/or **b**.

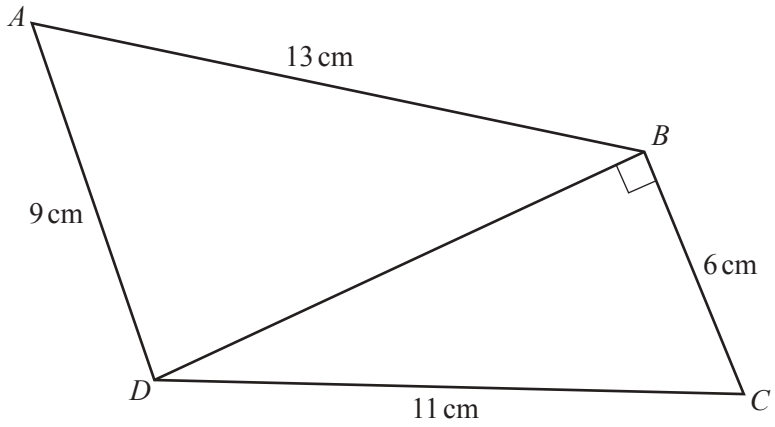


p = ...

q = ...

r = ... [3]

8



NOT TO SCALE

ABCD is a quadrilateral.

(a) Show that $BD = 9.22$ cm, correct to 3 significant figures.

[3]

(b) Calculate angle *ABD*.

Angle *ABD* = ... [3]

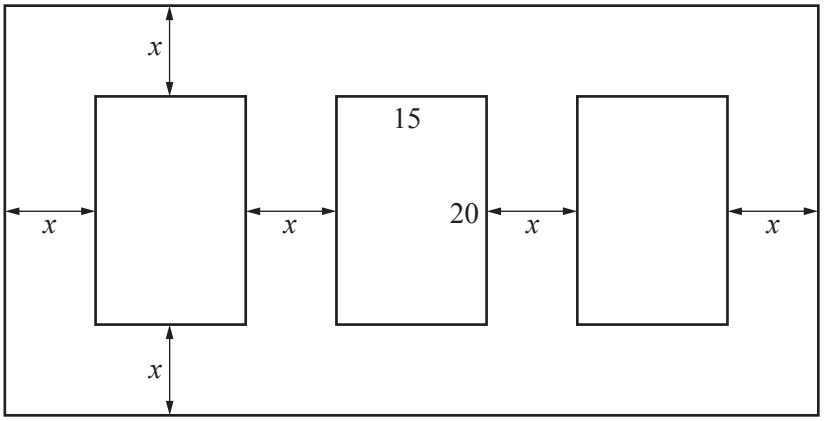
(c) Calculate the total area of the quadrilateral *ABCD*.

..... cm^2 [3]

(d) Calculate the length of the diagonal AC.

$AC =$ ..... cm [3]

9 In this question all lengths are in centimetres.



NOT TO SCALE

The diagram shows a picture frame with three pictures.
The frame and the pictures are rectangles.

Each picture measures 20 cm by 15 cm.
The width of the borders between each picture and between each picture and the frame are all x cm.
The total area of the frame is 2208 cm^2.

(a) Show that $4x^2 + 85x - 654 = 0$.

[3]

(b) Solve the equation $4x^2 + 85x - 654 = 0$.
You must show all your working.

$x =$ ..... or $x =$ ..... [3]

(c) Find the dimensions of the picture frame.

Length ..... cm

Height ..... cm [2]

10 **(a)** $f(x) = 5 - 2x$ $\quad\quad$ $g(x) = 3x + 2$

(i) Find $f(-3)$.

..... [1]

(ii) Find $f(g(4))$.

..... [2]

(iii) Solve $\dfrac{f(x)}{g(x)} = 2$.

$x =$ ..... [3]

(iv) Find $f^{-1}(x)$.

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

(v) Find and simplify $g(f(x))$.

..... [2]

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

$$\frac{3}{\mathrm{f}(x)} + \frac{2}{\mathrm{g}(x)}$$

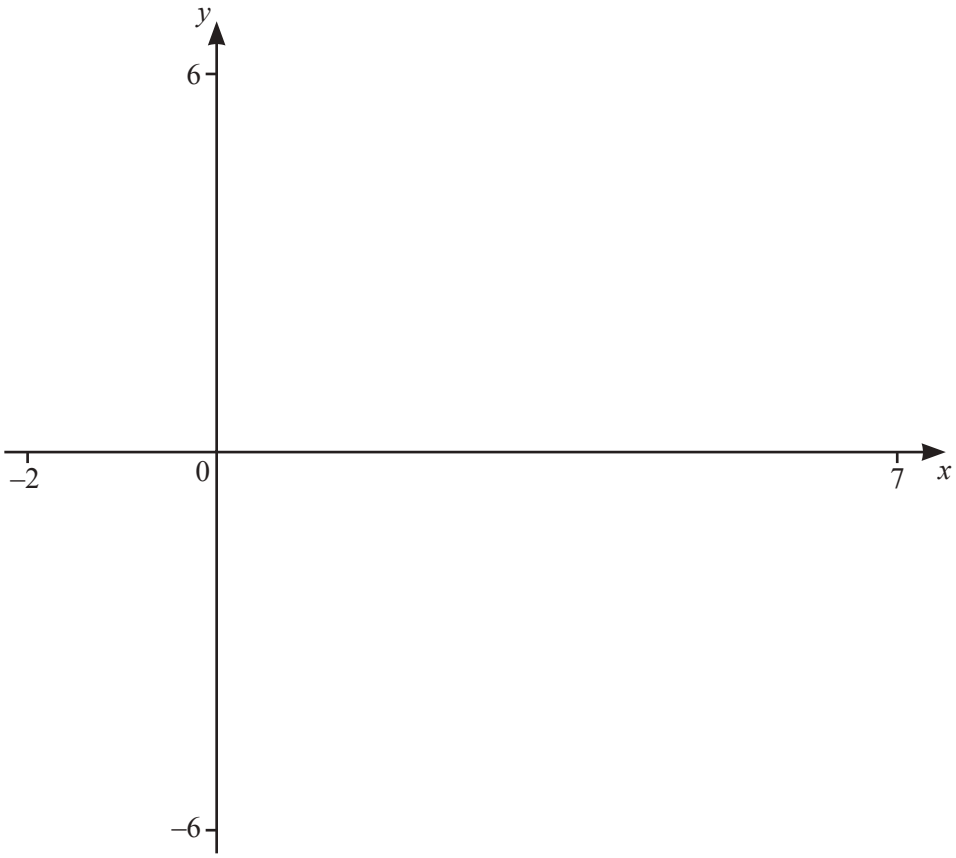
..... [3]

(b) The function $\mathrm{h}(x)$ has an inverse function $\mathrm{j}(x)$.

Write down, in its simplest form, $\mathrm{j}(\mathrm{h}(x))$.

..... [1]

11



$$f(x) = \frac{(x+2)}{(x-1)(x-4)}$$

(a) On the diagram, sketch the graph of $y = f(x)$ for values of x between -2 and 7. [3]

(b) Write down the co-ordinates of the local maximum.

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

(c) Write down the equation of each of the three asymptotes.

..... , ... , ... [3]

(d) $g(x) = x - 5$

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

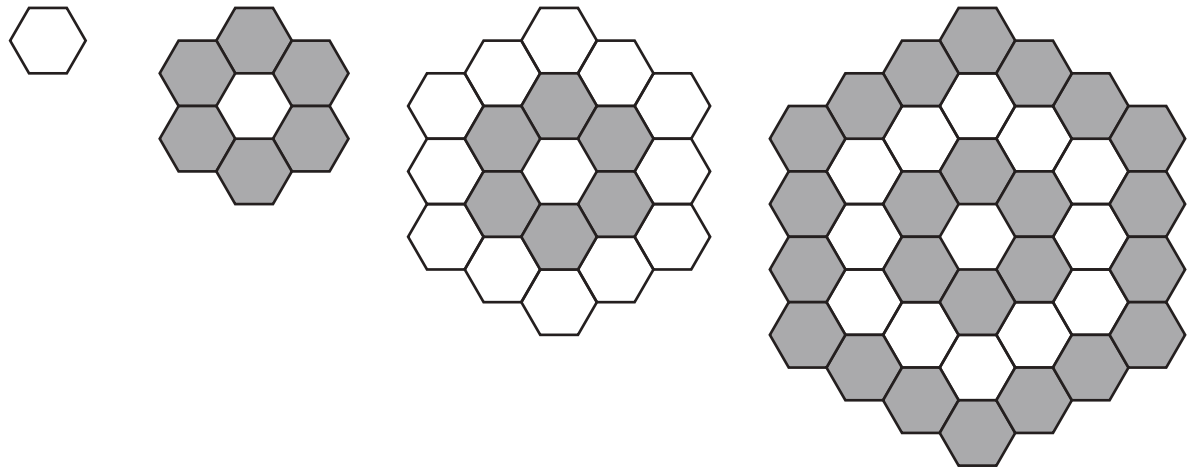
$x =$ ..... or $x =$ ..... or $x =$ ..... [3]

(ii) Solve the inequality $f(x) > g(x)$.

..... [3]

12 Here is a sequence of patterns made using identical regular hexagons.

Pattern 1 Pattern 2 Pattern 3 Pattern 4



Pattern number	1	2	3	4	5	6
Number of white hexagons	1	1	13	13		
Number of grey hexagons	0	6	6	24		
Total number of hexagons	1	7	19	37	61	

(a) Complete the table for Pattern 5 and Pattern 6. [5]

(b) The nth term of the sequence for the total number of hexagons is $3n^2 + pn + q$.

Find the value of p and the value of q.

$p =$ .....

$q =$ ..... [2]