Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/43**

Paper 4 (Extended) **October/November 2018**

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 **16** printed pages.

DC (SC/CGW) 156335/2

CAMBRIDGE International Examinations

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. $\quad A = \pi rl$

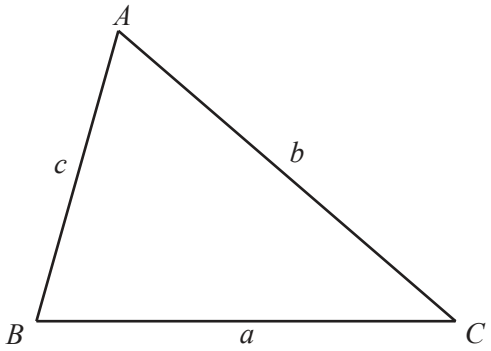
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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 **(a)** In a school there are 225 girls and 190 boys.

(i) Work out the number of boys as a fraction of the total number of students.
Give your answer in its lowest terms.

..... [2]

(ii) Write the ratio number of girls : number of boys in its simplest form.

..... [2]

(b) In a mathematics class there are 15 boys.
The ratio number of girls : number of boys = 6 : 5.

Find the number of girls in this class.

..... [2]

(c) In a science class of 33 students there are 15 boys.

(i) Find the number of boys as a percentage of the number of students in the class.

..... % [1]

(ii) 20% of these boys did not complete an experiment.

Work out the number of boys who did not complete the experiment.

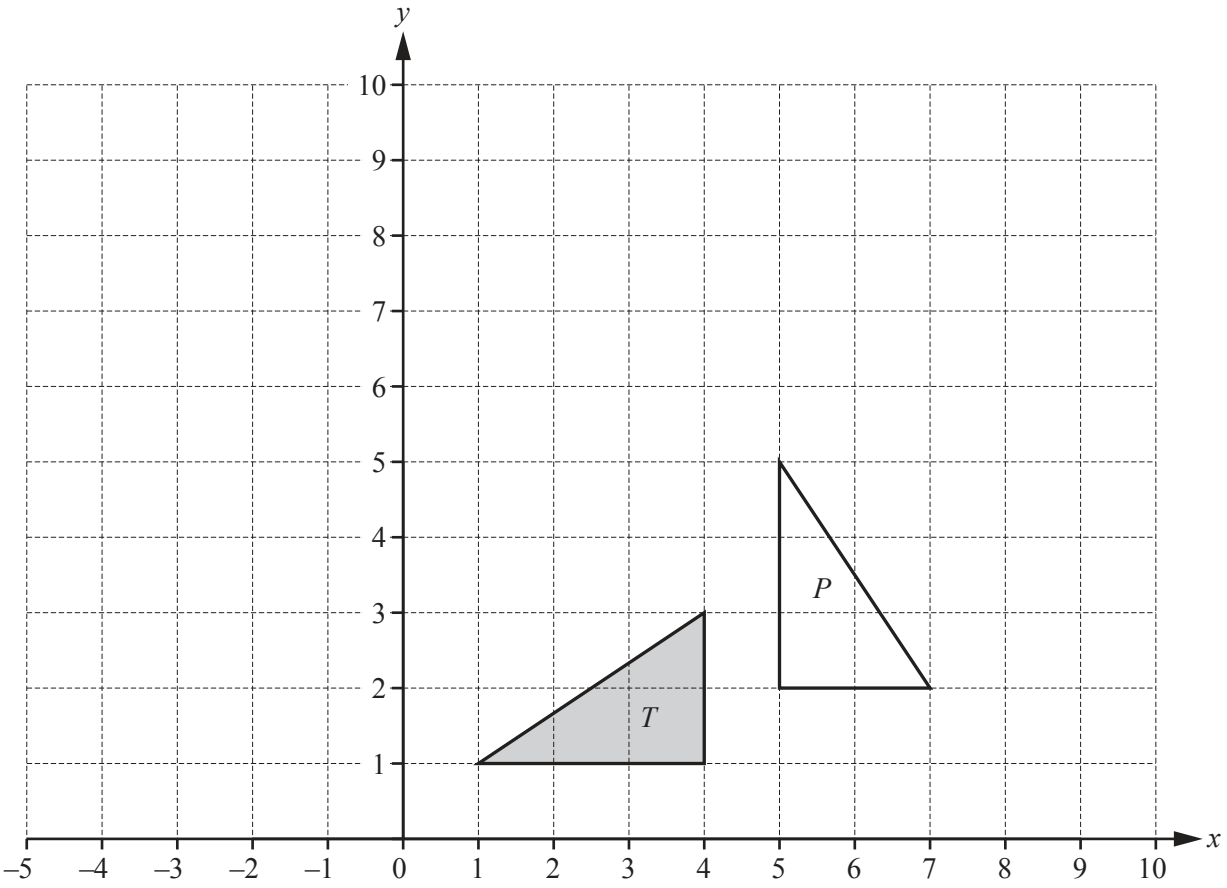
..... [2]

(d) This year the number of students studying mathematics is 390.
This is an increase of 4% on the number of students who studied mathematics last year.

Work out the number of students who studied mathematics last year.

..... [3]

2



(a) Describe fully the **single** transformation that maps triangle T onto triangle P.

.....

..... [3]

(b) Reflect triangle T in the y-axis. [1]

(c) Translate triangle T by the vector $\begin{pmatrix} 5 \\ 6 \end{pmatrix}$. [2]

(d) Stretch triangle T, stretch factor 3 and x-axis invariant. [2]

3 **(a)** $\mathbf{p} = \begin{pmatrix} 2 \\ -1 \end{pmatrix}$ $\mathbf{q} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$

Find

(i) $\mathbf{q} - \mathbf{p}$,

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(ii) $2\mathbf{p}$,

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(iii) $|2\mathbf{p}|$.

..... [2]

(b) A is the point (0, 2) and B is the point (2, 7).

(i) Write $\overrightarrow{AB}$ as a column vector.

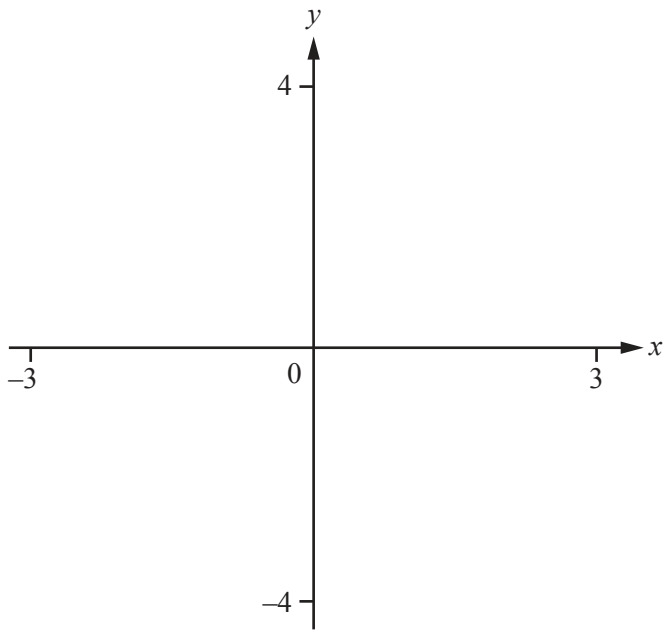
$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [2]

(ii) $\overrightarrow{BC} = 2\overrightarrow{AB}$

Find the co-ordinates of C.

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

4 (a)



$f(x) = x + \frac{1}{2x}$, $x \neq 0$

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

(ii) Find the co-ordinates of the local minimum point.

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

(iii) Find the range of $f(x)$ for $x > 0$.

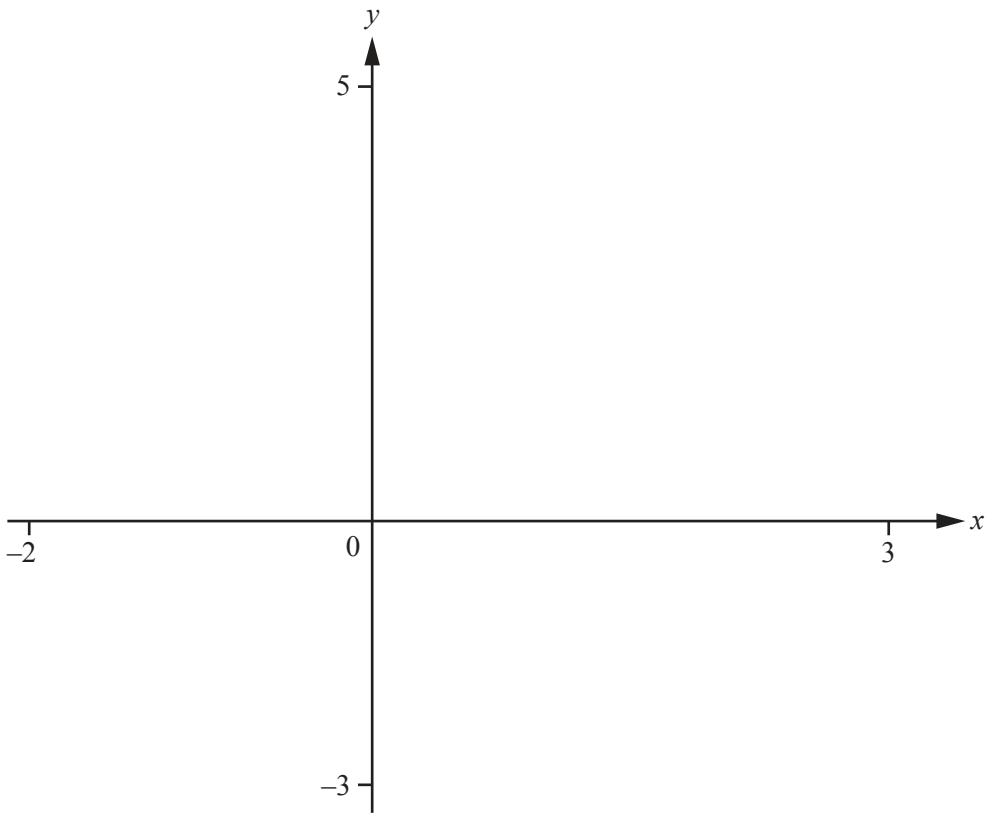
..... [1]

(iv) Write down the equations of the two asymptotes to the graph of $y = f(x)$.

.....

..... [2]

(b)



(i) On the diagram, sketch the graph of

(a) $y = 2^x - 3$ for $-2 \leqslant x \leqslant 3$, [2]

(b) $y = 6\log x$ for $x > 0$. [2]

(ii) Solve the inequality $6\log x > 2^x - 3$.

..... [2]

5 The table shows the scores of 10 students in a mathematics test and in a physics test.

Student	A	B	C	D	E	F	G	H	I	J
Mathematics (x)	4	6	6	8	9	9	9	10	10	10
Physics (y)	5	5	6	9	9	8	7	9	10	7

(a) Find the median and the upper quartile of the physics scores.

median = ...

upper quartile = ... [2]

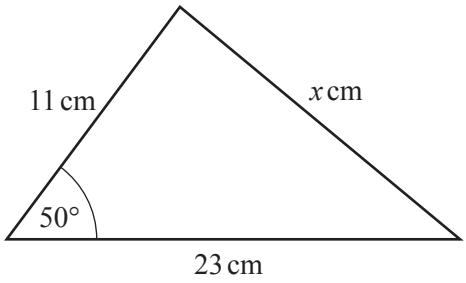
(b) Write down the type of correlation between the mathematics scores and the physics scores.

..... [1]

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

y = ... [2]

6



NOT TO SCALE

Calculate

(a) the area of the triangle,

..... cm^2 [2]

(b) the value of x.

x = ... [3]

7 **(a)** The population of a small town is decreasing at a rate of 5% every 10 years.
The population is now 26 010.

Calculate the population in 20 years time.
Give your answer correct to the nearest 100.

..... [3]

(b) The population was previously **increasing** at a rate of 2% each year.
The population is now 26 010.

(i) Calculate the population 2 years ago.

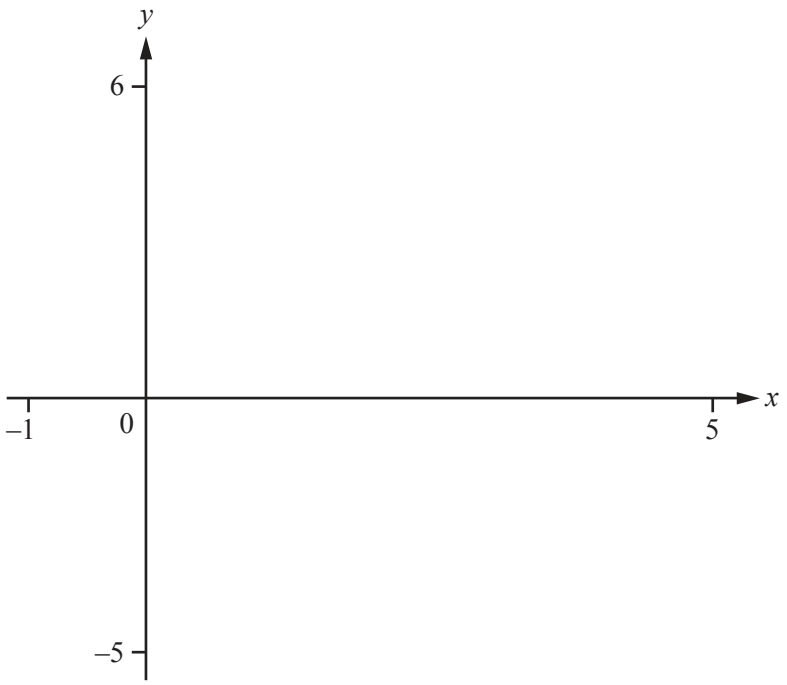
..... [2]

(ii) Find the number of complete years since the population was last less than 20 000.

..... [4]

[Turn over

8



$f(x) = 1 + 4x - x^2$

(a) On the diagram, sketch the graph of $y = f(x)$ for $-1 \leqslant x \leqslant 5$. [2]

(b) Write down the equation of the line of symmetry of the graph of $y = f(x)$.

..... [1]

(c) **(i)** Find the zeros of $f(x)$.

..... [2]

(ii) Solve the inequality $f(x) > 0$.

..... [1]

(d) Solve the equation $f(x) + 1 = 0$.

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

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

On the diagram, sketch the graph of $y = g(x)$ for $-1 \leqslant x \leqslant 5$. [2]

(f) On the diagram, shade the region where $y \leqslant f(x)$ and $y \leqslant g(x)$. [1]

9 When Helena goes for a walk, she walks d kilometres.

The probability that $0 < d \leqslant 2$ is $\frac{1}{5}$ and the probability that $2 < d \leqslant 4$ is $\frac{1}{4}$.

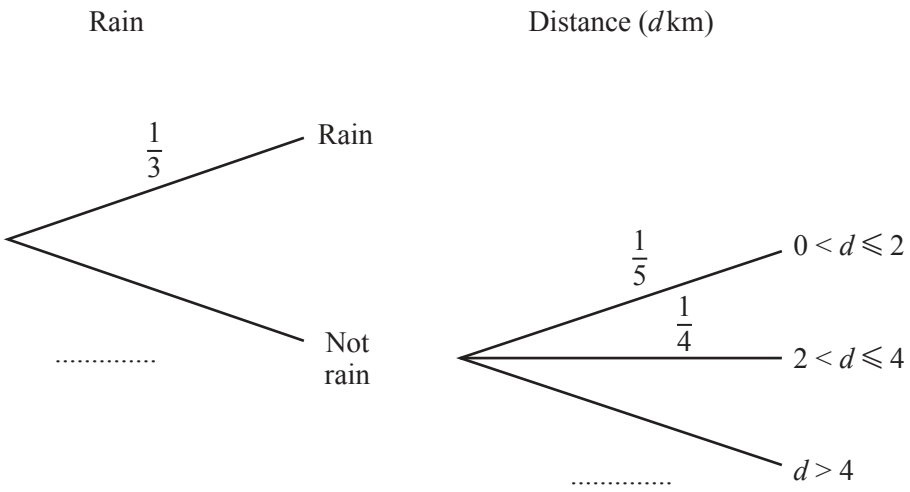
(a) Find the probability that $d > 4$.

..... [2]

(b) If it rains, Helena never goes for a walk.
If it does not rain, Helena always goes for a walk.

On any day, the probability that it rains is $\frac{1}{3}$.

(i) Complete the tree diagram showing the probabilities of the two events.



[1]

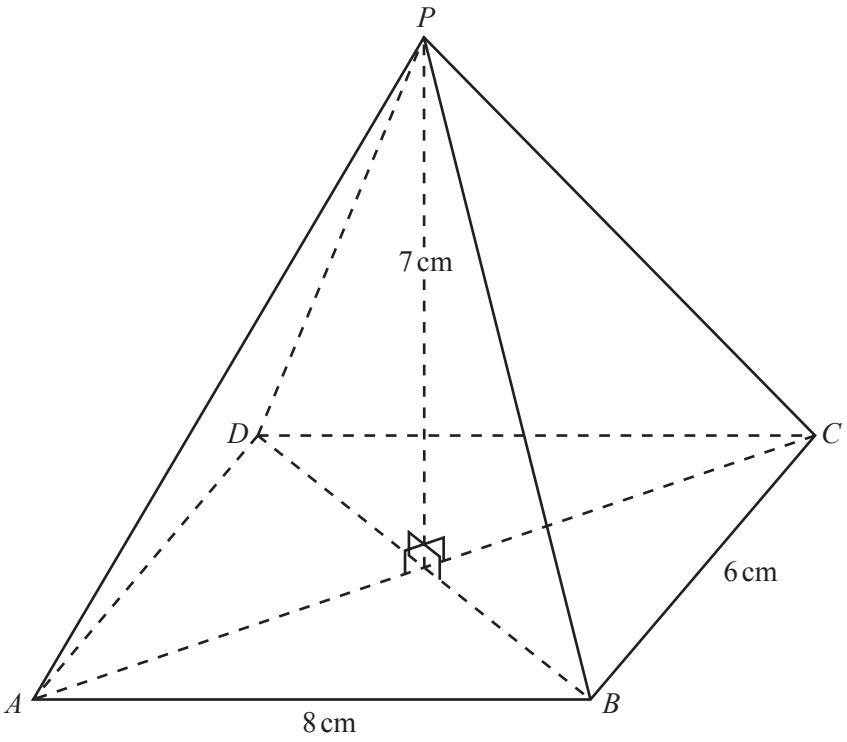
(ii) Find the probability that, on any day, Helena walks more than 2 km.

..... [3]

(iii) Find the expected number of days that Helena walks more than 2 km, during a period of 90 days.

..... [1]

10



NOT TO SCALE

The diagram shows a pyramid of height 7 cm on a rectangular base 8 cm by 6 cm. The point P is directly above the centre of the base.

(a) Calculate the angle between the triangle PBC and the base $ABCD$.

..... [2]

(b) Calculate the angle between PB and the base $ABCD$.

..... [3]

(c) Calculate PC.

$PC =$ ..... cm [2]

(d) Calculate angle PCB.

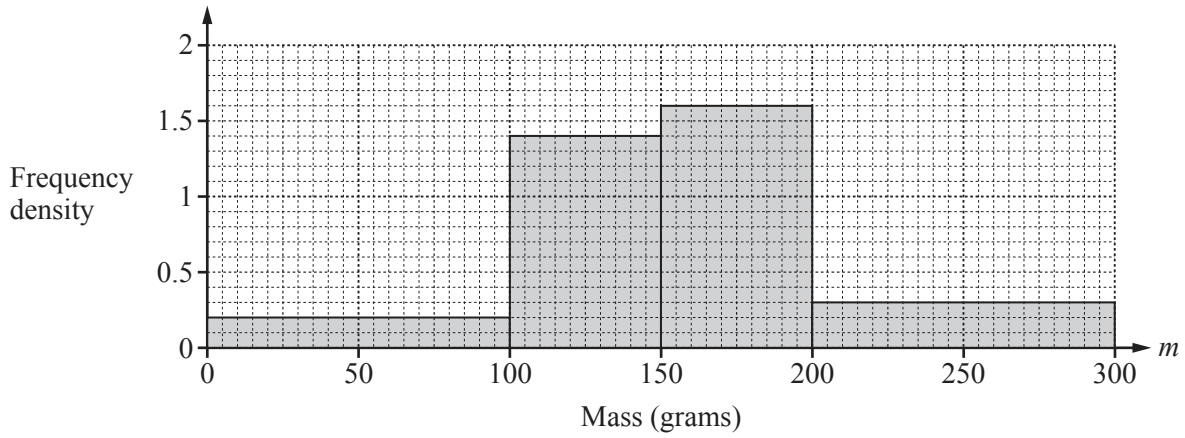
Angle PCB = ... [2]

(e) X is a point on the line PC so that angle $BXC = 60°$.

Calculate BX.

BX = ... cm [3]

11 The mass, m grams, of each of 200 potatoes is measured.
The histogram shows the results.



(a) Complete the frequency table.

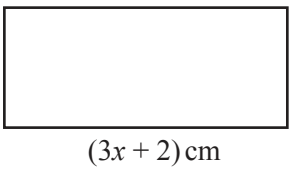
Mass (m grams)	$0 < m \leqslant 100$	$100 < m \leqslant 150$	$150 < m \leqslant 200$	$200 < m \leqslant 300$
Frequency	20			

[2]

(b) Calculate an estimate of the mean.

..... g [2]

12 (a)



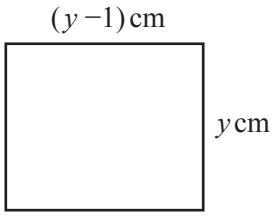
NOT TO SCALE

The perimeter of the rectangle is 44 cm.

Find the value of x.

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

(b)



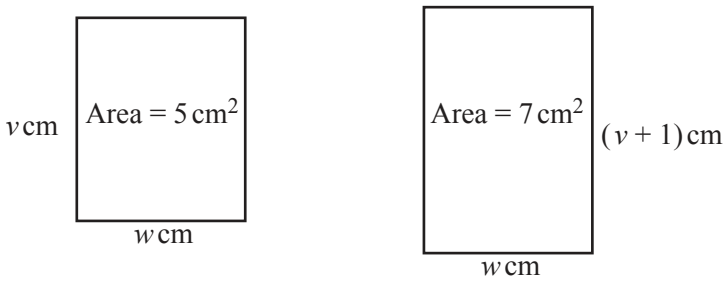
NOT TO SCALE

The area of the rectangle is 272 cm^2.

Find the value of y.

$y =$ ..... [3]

(c)



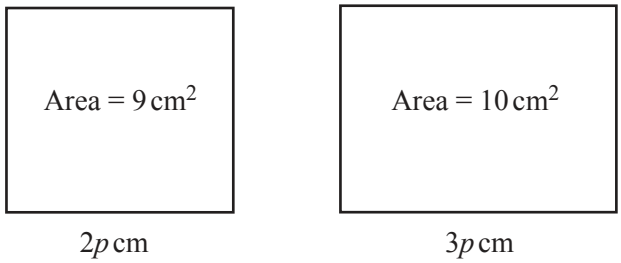
NOT TO SCALE

The two rectangles have the same length, w cm.

Find the value of v.

$v =$ ..... [3]

(d)



NOT TO SCALE

The perimeter of the larger rectangle is 2 cm **more** than the perimeter of the smaller rectangle.

Find the value of p.

$p =$ ..... [4]

Question 13 is printed on the next page.

13 $f(x) = 1 - x$ $g(x) = 3x - 2$ $h(x) = |x^2 - 4|$ $k(x) = 3x^2 + 2$

(a) Find $h(0)$.

..... [1]

(b) Find, giving your answer in its simplest form.

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

..... [2]

(ii) $g(x) \times f(x) + k(x)$

..... [3]

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

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

(d) Find x when

(i) $g(x) = 2$,

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

(ii) $h(x) = 3$.

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