Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

6395456361

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **May/June 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 **20** printed pages.

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. $\quad A = \pi rl$

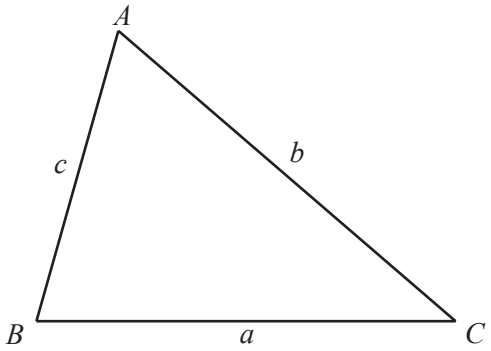
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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)** Work out.

$$\frac{\sqrt[3]{402}}{3.15^2}$$

..... [1]

(b) Write 130.47 correct to

(i) one decimal place,

..... [1]

(ii) one significant figure.

..... [1]

(c) Work out 23% of \$76.80 .

\$ ..... [2]

(d) \$4200 is shared in the ratio 3 : 4 : 6 : 8 .

Find the difference between the largest share and the smallest share.

\$ ..... [3]

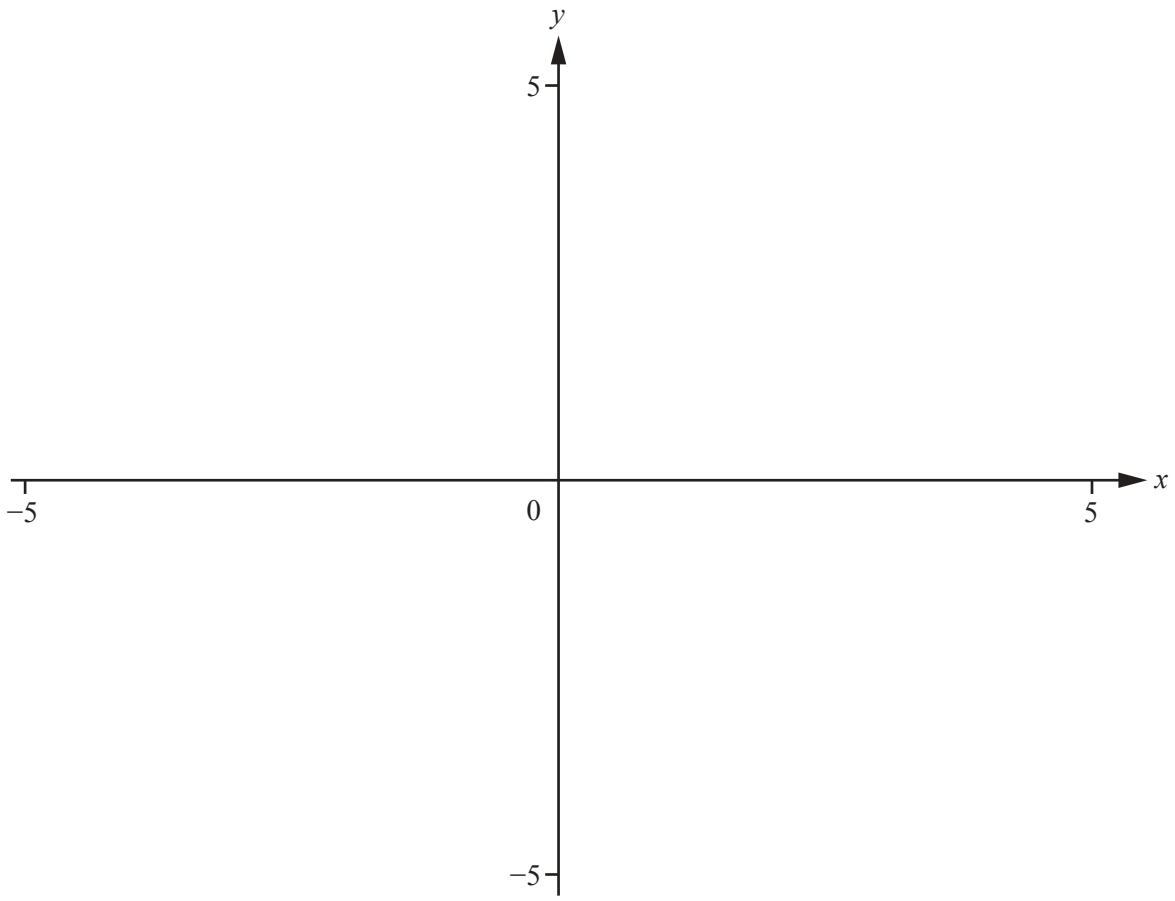
(e) Write down an irrational number less than 10.

..... [1]

(f) Work out $7.31 \times 10^{-2} + 1.56 \times 10^{-1}$.
Give your answer in standard form.

..... [2]

2



$$f(x) = 1 - \frac{x}{(x^2 - 9)}$$

(a) On the diagram, sketch the graph of $y = f(x)$, for values of x between -5 and 5. [3]

(b) Write down the equations of the three asymptotes.

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

(c) The line $y = x$ intersects the curve $y = 1 - \frac{x}{(x^2 - 9)}$ three times.

Find the values of the x co-ordinates of the points of intersection.

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

3 **(a)** y varies directly as the square root of x.
$y = 32$ when $x = 16$.

(i) Find y in terms of x.

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

(ii) Find the value of y when $x = 4$.

$y =$ ..... [1]

(iii) Find x in terms of y.

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

(b) p varies inversely as $q + 2$.
$p = 3$ when $q = 2$.

Find the value of p when $q = 4$.

$p =$ ..... [3]

4 **(a)** The mass, x grams, of each of 100 oranges is found.
The results are shown in the table.

Mass (x grams)	Frequency
$0 < x \leqslant 100$	4
$100 < x \leqslant 140$	14
$140 < x \leqslant 180$	22
$180 < x \leqslant 250$	35
$250 < x \leqslant 300$	25

(i) Calculate an estimate of the mean mass of the oranges.

..... g [2]

(ii) Two of these oranges are chosen at random.

Calculate the probability that they both have a mass of 140 g or less.

..... [2]

(iii) The oranges with a mass of 140 g or less are removed.
From the remaining oranges, two are chosen at random.

Calculate the probability that one orange has a mass of 250 g or less and the other has a mass of more than 250 g.

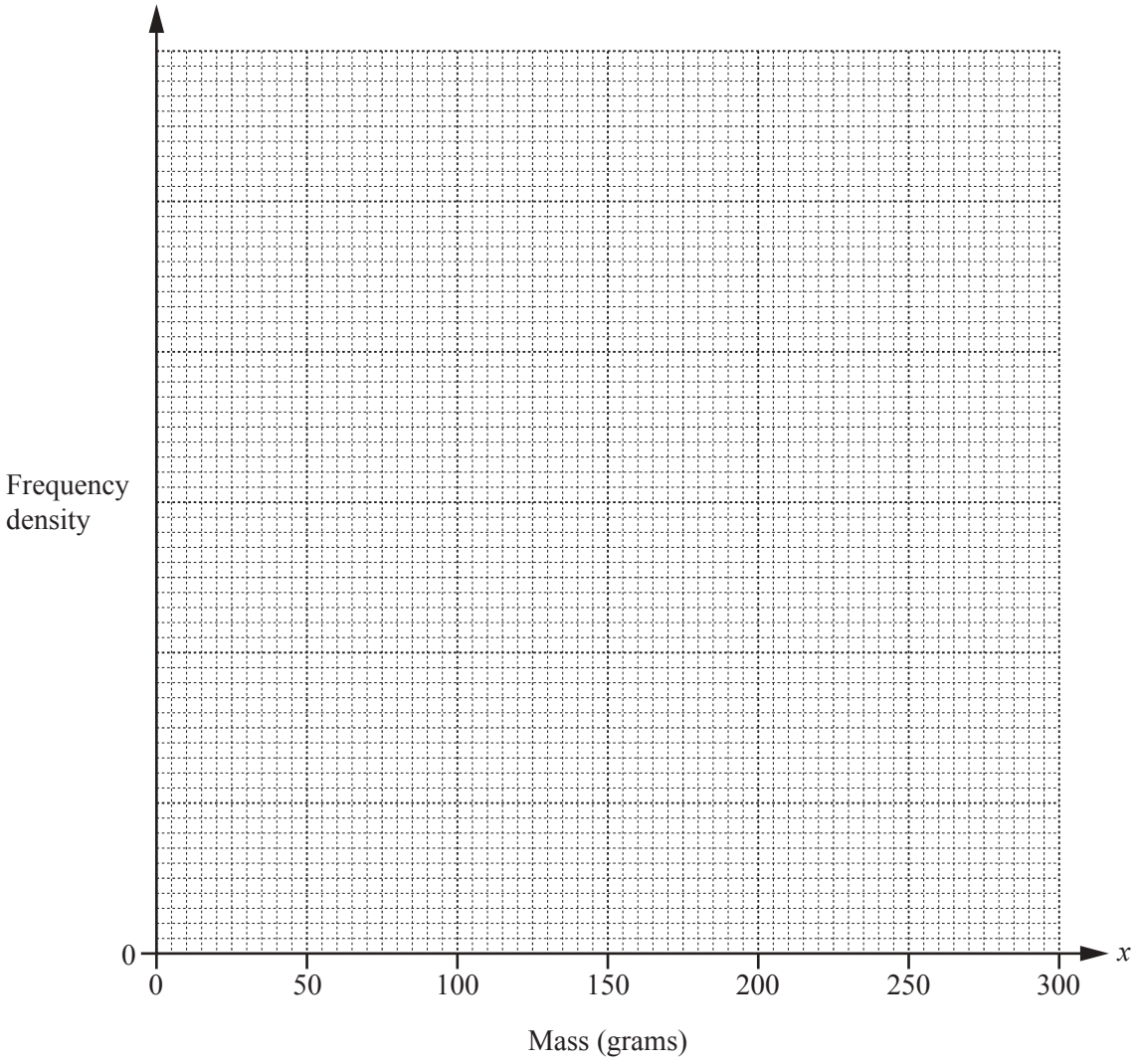
..... [3]

(b) (i) Complete the frequency density column in this table.

Mass (x grams)	Frequency	Frequency density
$0 < x \leqslant 100$	4	
$100 < x \leqslant 140$	14	
$140 < x \leqslant 180$	22	
$180 < x \leqslant 250$	35	
$250 < x \leqslant 300$	25	

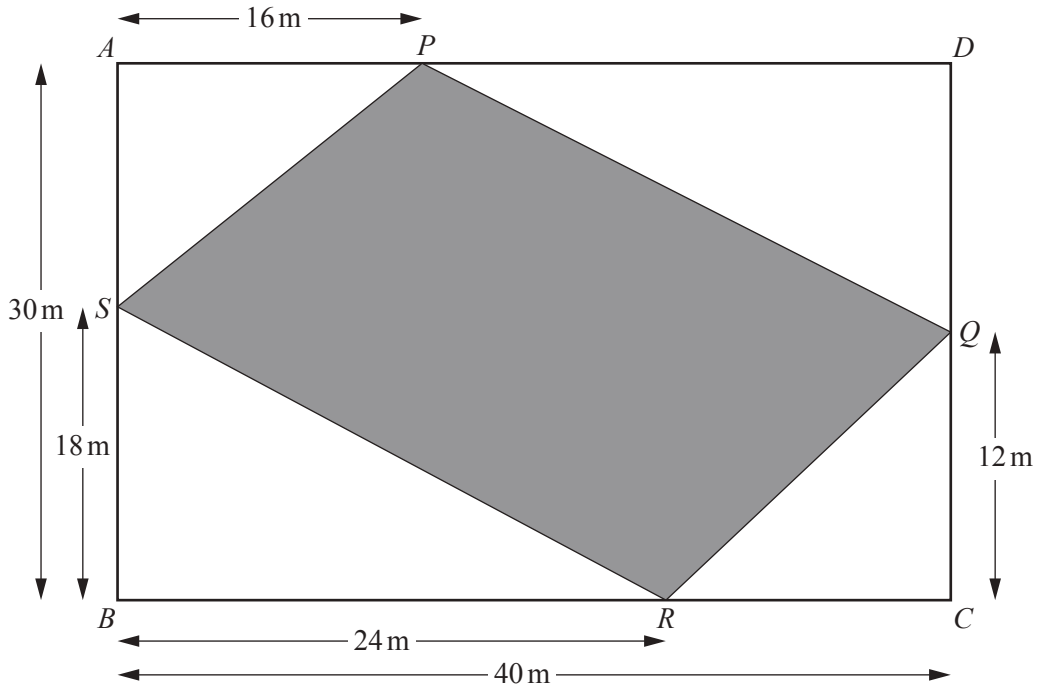
[2]

(ii) On the grid, draw a histogram to show this information.



[4]

5



NOT TO SCALE

In the diagram, *ABCD* is a rectangle.

(a) Find *PS*.

PS = ... m [2]

(b) Find angle *BRS*.

Angle *BRS* = ... [2]

(c) Find the perimeter of *PQRS*.

..... m [3]

(d) Find the shaded area.

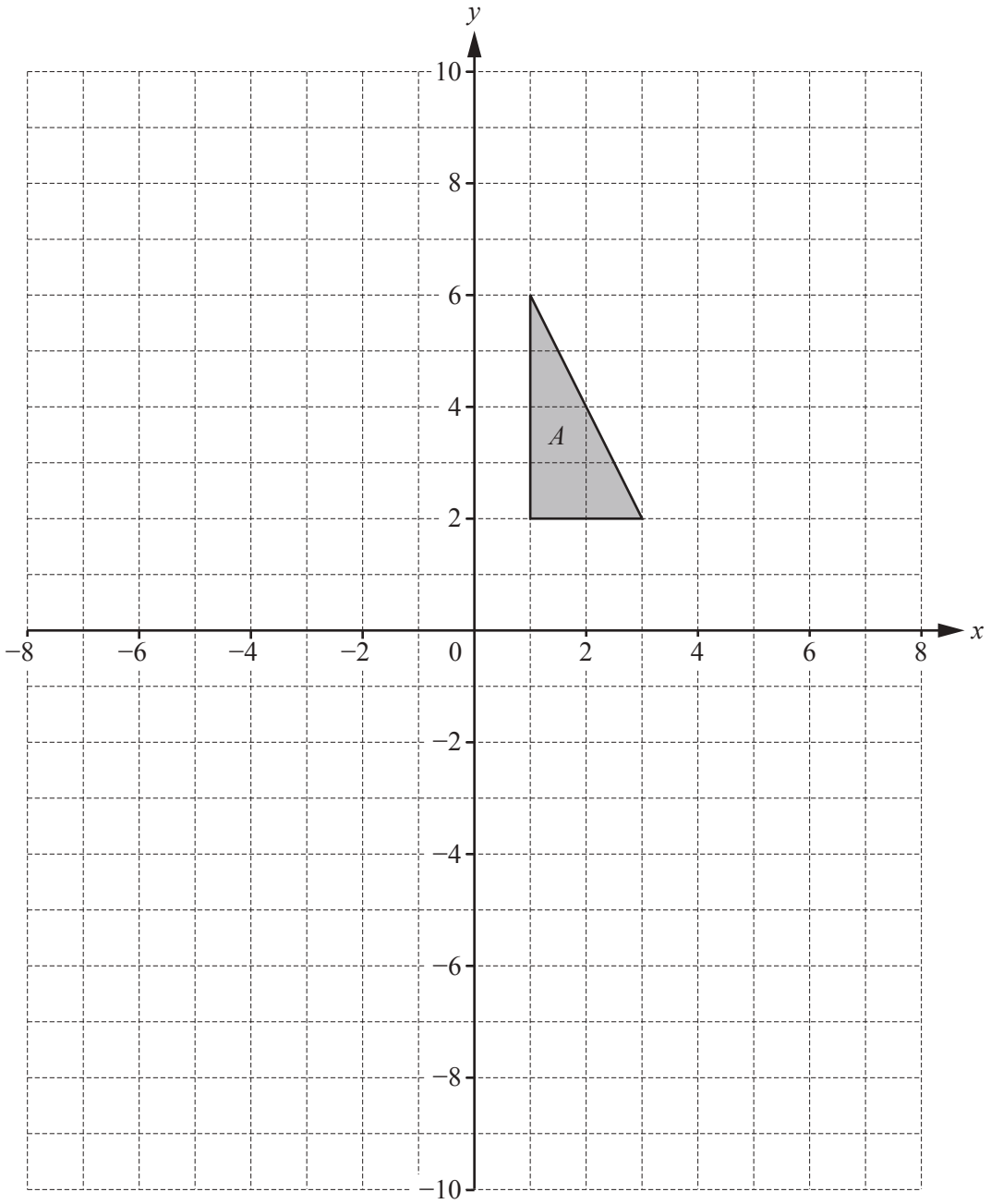
..... m^2 [3]

(e) Explain why triangle *ASP* is similar to triangle *BSR*.

.....

..... [2]

6



(a) Translate triangle A with vector $\begin{pmatrix} -7 \\ -3 \end{pmatrix}$. Label the image B. [2]

(b) Rotate triangle A through 90° anti-clockwise about $(-1, 2)$. Label the image C. [2]

(c) Describe fully the **single** transformation that maps triangle C onto triangle B.

.....

..... [3]

(d) Enlarge triangle A scale factor -2 with centre $(3, 1)$. Label the image D. [2]

(e) Describe fully the **single** transformation that maps triangle D onto triangle A.

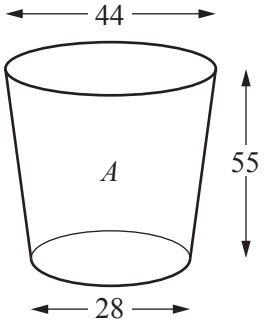
.....

..... [2]

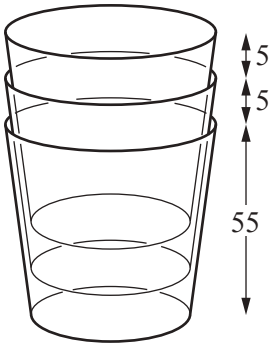
[Turn over

7 In this question, all lengths are measured in millimetres.

A small plastic cup, A, is shown in this diagram.



These plastic cups are stacked as shown in the diagram.



(a) Find the height of a stack of 8 of these cups.

..... mm [2]

(b) Find the number of these cups in a stack that has a total height of 105 mm.

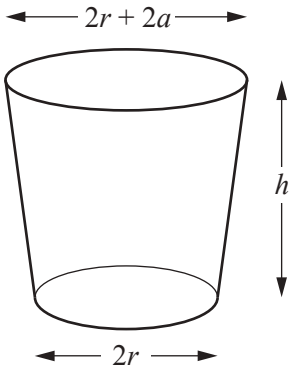
..... [2]

(c) A similar cup, B, has base diameter 42 mm.

Find the height of this cup.

..... mm [2]

(d)



The formula for the volume of a similar cup is $V = \frac{\pi h(3r^2 + 3ar + a^2)}{3}$.

(i) For cup A, show that $a = 8$ mm.

[2]

(ii) Find the volume of cup A.

..... mm^3 [2]

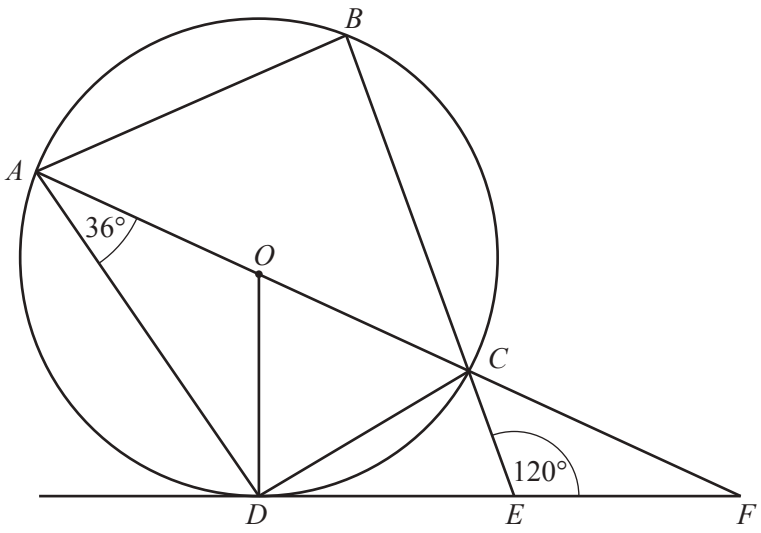
(iii) Find the volume of cup B.

..... mm^3 [3]

(iv) Rearrange $V = \frac{\pi h(3r^2 + 3ar + a^2)}{3}$ to make h the subject.

$h =$ ..... [2]

8



NOT TO SCALE

A, B, C and D lie on a circle, centre O.
DEF is a tangent to the circle at D.
$AOCF$ and BCE are straight lines.

(a) Complete the statement.

Angle $ODE = 90°$ because .....

..... [1]

(b) Find the value of

(i) angle AOD,

Angle AOD = ... [2]

(ii) angle ODC,

Angle ODC = ... [2]

(iii) angle ABC,

Angle ABC = ... [1]

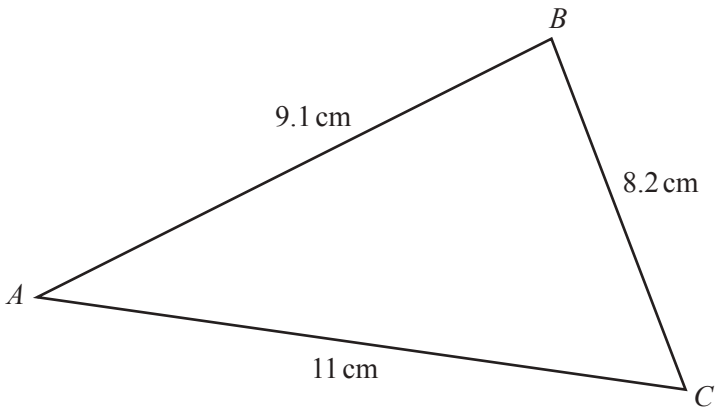
(iv) angle CFD,

Angle CFD = ... [1]

(v) angle CAB.

Angle CAB = ... [1]

9



NOT TO SCALE

(a) Show that angle $BAC = 47.0°$, correct to 1 decimal place.

[3]

(b) Use the sine rule to find angle ABC.

Angle ABC = ... [3]

(c) Find the area of triangle ABC.

..... cm^2 [2]

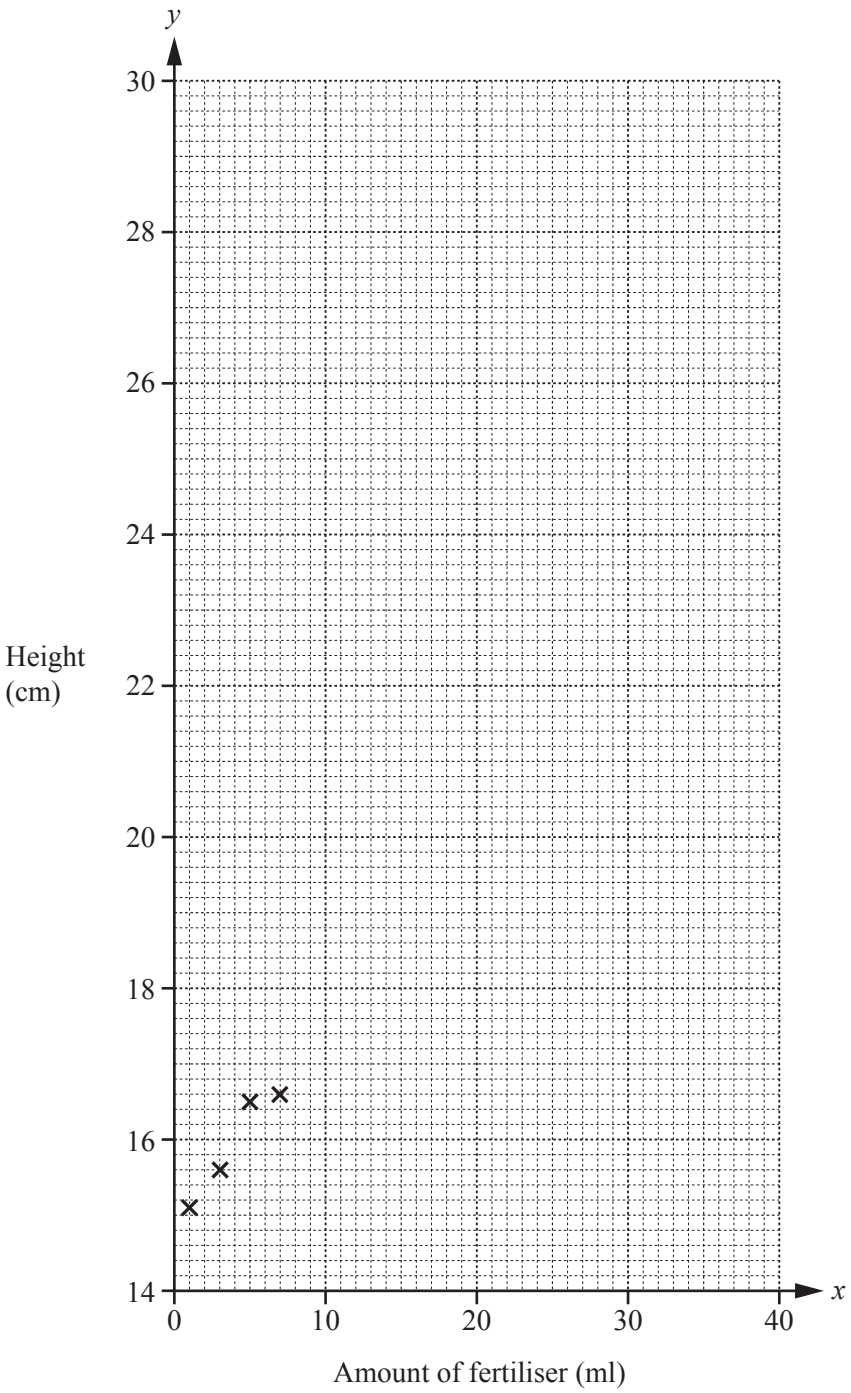
(d) Find the length of the perpendicular from B to AC.

..... cm [2]

10 Wasim sprays different amounts of fertiliser on some seedlings.
He measures the amount, x millilitres, sprayed on each seedling.
A week later he measures the height, y centimetres, of each seedling.
His results are shown in the table.

Amount of fertiliser (x ml)	1	3	5	7	10	14	18	25	30	35	40
Height (y cm)	15.1	15.6	16.5	16.6	17	19.8	21	25.1	28.8	28.6	29.1

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



[3]

(ii) What type of correlation is shown by the scatter diagram?

..... [1]

(b) Find

(i) the mean amount of fertiliser,

..... ml [1]

(ii) the mean height.

..... cm [1]

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

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

(ii) Use your answer to **part (c)(i)** to estimate the height of a seedling when the amount of fertiliser is 20 ml.

..... cm [1]

(iii) Write down the units of m in the equation of the regression line, $y = mx + c$.

..... [1]

Question 11 is printed on the next page.

11 $f(x) = 2x - 7$ $g(x) = \sqrt{x}$ $h(x) = \frac{1}{x}$, $x \neq 0$

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

..... [1]

(ii) Solve $f(x) = 1$.

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

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

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

(c) (i) Find $f(g(x))$ in terms of x.

..... [1]

(ii) Solve $f(g(x)) = 5$.

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

(d) (i) Find $h(g(f(x)))$ in terms of x.

..... [2]

(ii) Find an inequality in terms of x for which $h(g(f(x)))$ exists.

..... [2]