Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

5752784072

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **October/November 2017**

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.

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[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. $\quad A = \pi rl$

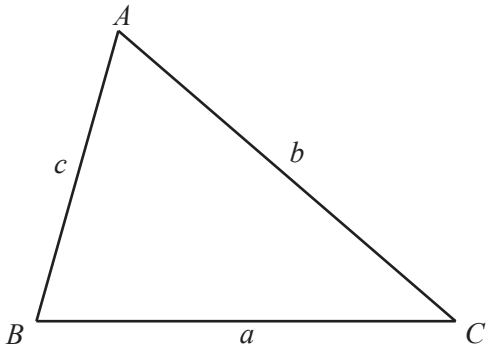
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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 **(a)** These are the first four terms of a sequence.

27 20 13 6

(i) Write down the next two terms.

..... , ... [2]

(ii) Find the *n*th term.

..... [2]

(b) These are the first four terms of another sequence.

8 16 32 64

(i) Write down the next two terms.

..... , ... [2]

(ii) Find the *n*th term.

..... [2]

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

(a) Jake buys a jacket which had an original price of \$65.

(i) Calculate how much Jake pays for the jacket.

\$ ..... [2]

(ii) After paying for the jacket, Jake has \$24.75 left.

Work out \$24.75 as a fraction of the total amount of money Jake had before he bought the jacket. Give your answer in its lowest terms.

..... [2]

(b) In the sale, Amy pays \$80.75 for a coat.

Calculate the original price of the coat.

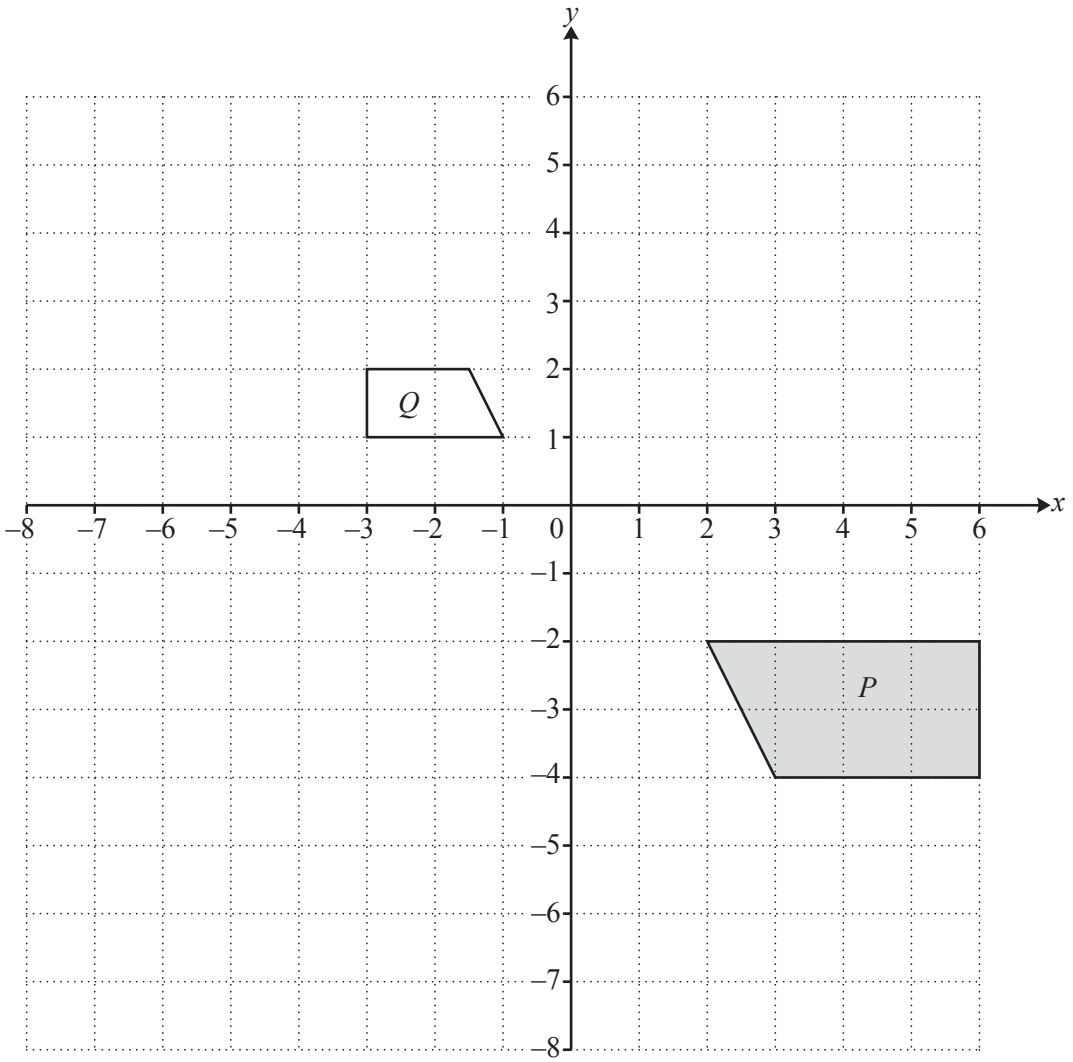
\$ ..... [3]

(c) One day the shop reduces its **sale** prices by 10%.

Calculate the overall percentage reduction of the original prices.

..... % [2]

3



(a) **(i)** Reflect shape P in the line $y = 1$.
Label the image A. [2]

(ii) Rotate shape P through 90° clockwise about $(-1, 1)$.
Label the image B. [2]

(iii) Describe fully the **single** transformation that maps shape A onto shape B.

.....

..... [2]

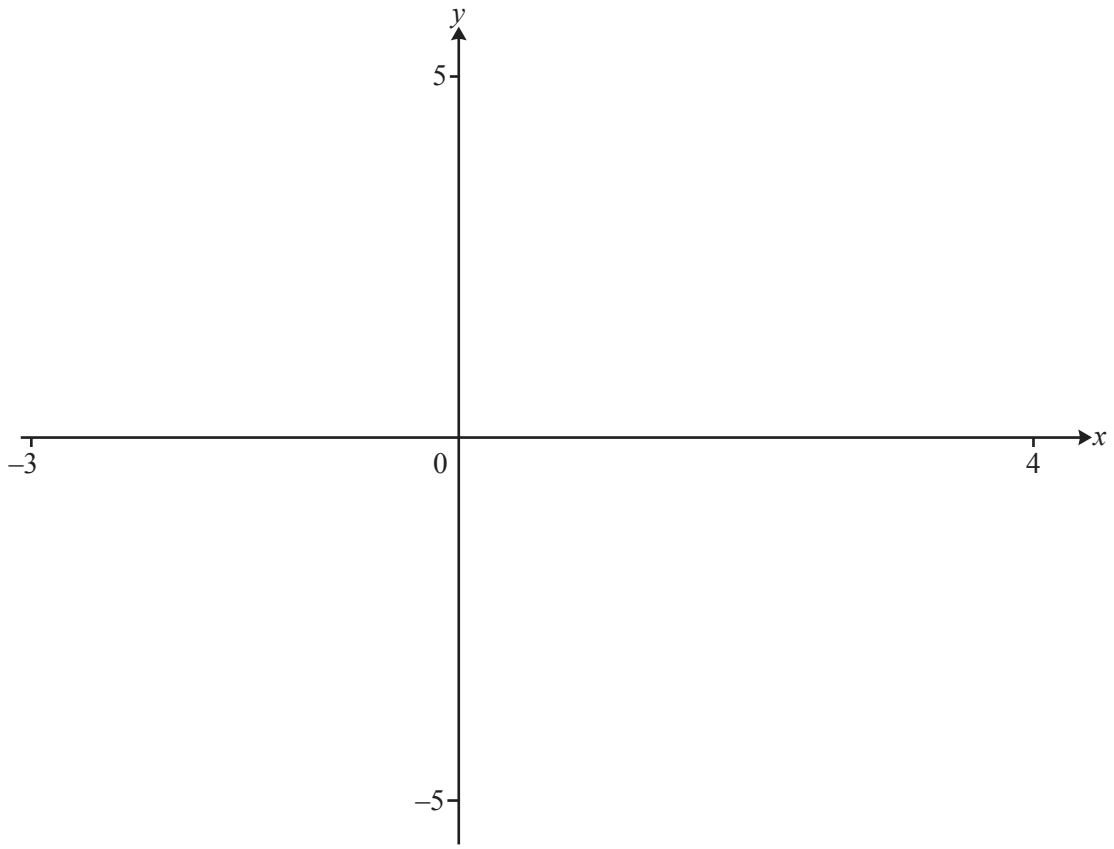
(b) Describe fully the **single** transformation that maps shape P onto shape Q.

.....

..... [3]

(c) Stretch shape P with the x-axis invariant and factor 2. [2]

4



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

(a) On the diagram, sketch the graph of $y = f(x)$ for values of x from –3 to 4. [3]

(b) Find the two values of x for which $f(x)$ does not exist.

..... , ... [2]

(c) When $k \neq 0$, write down the number of solutions to the equation $f(x) = k$.

..... [1]

(d) $g(x) = 2^{-x} + 1$

(i) On the diagram, sketch the graph of $y = g(x)$ for $-2 \leqslant x \leqslant 4$. [2]

(ii) Write down the equation of the asymptote to the graph of $y = g(x)$.

..... [1]

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

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

5 **(a)** Carlos owns a vintage car.
Each year the value of the car increases by 4% of its value at the start of the year.
At the start of 2012 the value of the car was \$17 500.

Calculate the value of the car at the start of 2018.
Give your answer correct to the nearest \$100.

\$ ..... [4]

(b) Alex invests \$200 at a rate of r % per year compound interest.
After 12 years, Alex has a total amount of \$239.12 .

Find the value of r.

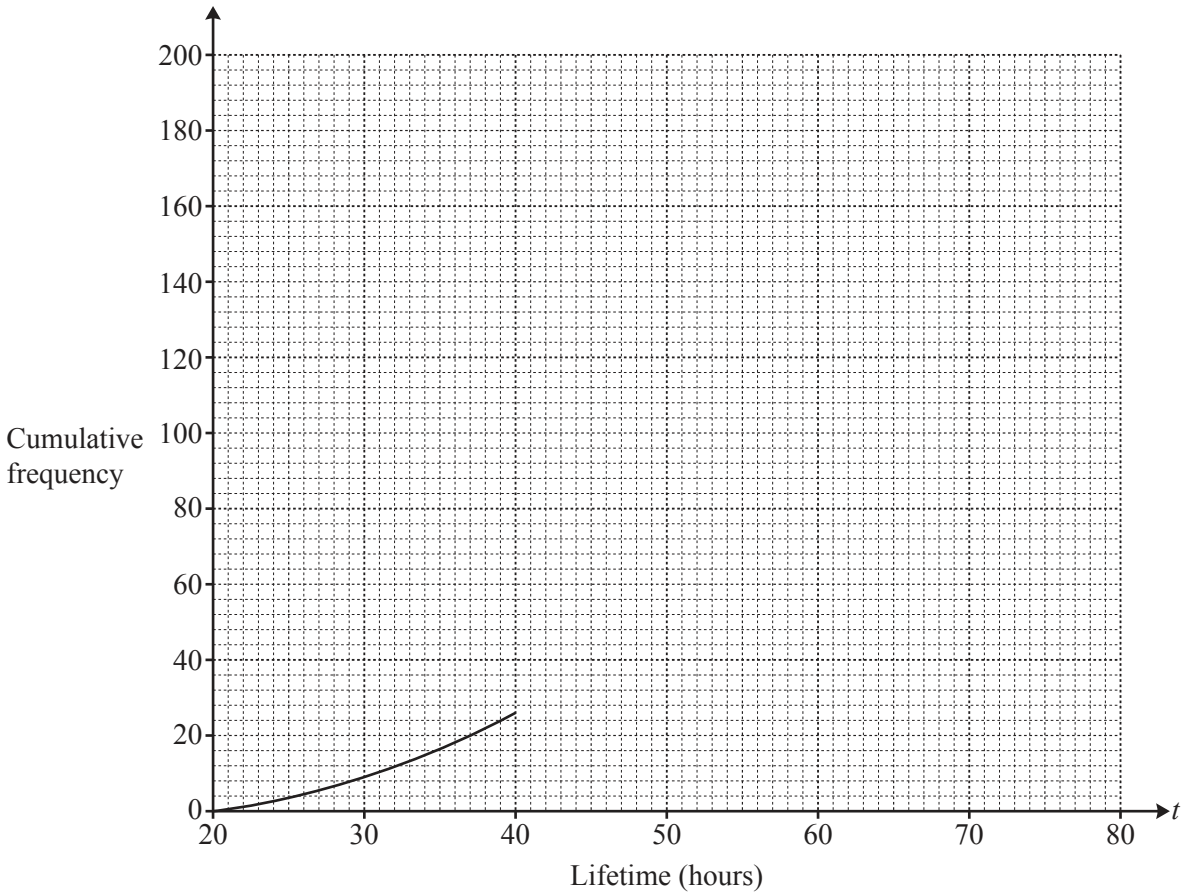
r = ... [3]

6 **(a)** A factory tests the lifetime, t hours, of each of 200 batteries.
The table shows the results.

Lifetime (t hours)	$20 < t \leqslant 30$	$30 < t \leqslant 40$	$40 < t \leqslant 50$	$50 < t \leqslant 60$	$60 < t \leqslant 70$	$70 < t \leqslant 80$
Frequency	9	17	39	97	29	9

(i) Write down the modal interval. ..... [1]

(ii) Complete the **cumulative** frequency curve.



[4]

(iii) Use your curve to find

(a) the median,

..... hours [1]

(b) the number of batteries with a lifetime greater than 65 hours.

..... [2]

(b) This table shows the lifetimes of **the same** batteries but the time intervals are different.

Lifetime (t hours)	$20 < t \leqslant 40$	$40 < t \leqslant 50$	$50 < t \leqslant 55$	$55 < t \leqslant 60$	$60 < t \leqslant 80$
Frequency	26	39	55	42	38

(i) Calculate an estimate of the mean.

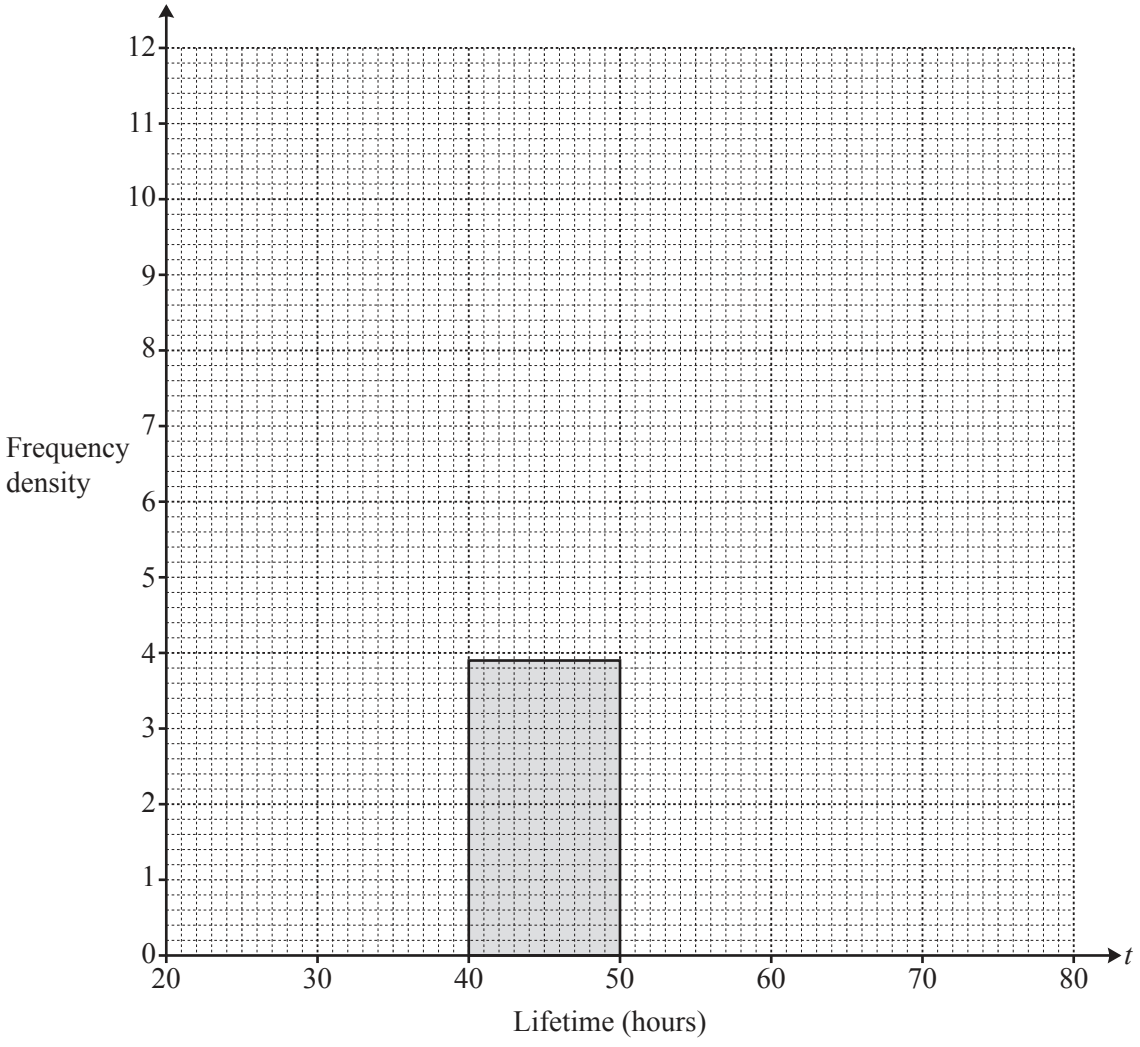
..... hours [2]

(ii) Complete the table to show the frequency densities.

Lifetime (t hours)	$20 < t \leqslant 40$	$40 < t \leqslant 50$	$50 < t \leqslant 55$	$55 < t \leqslant 60$	$60 < t \leqslant 80$
Frequency	26	39	55	42	38
Frequency density		3.9			

[2]

(iii) Complete the histogram.



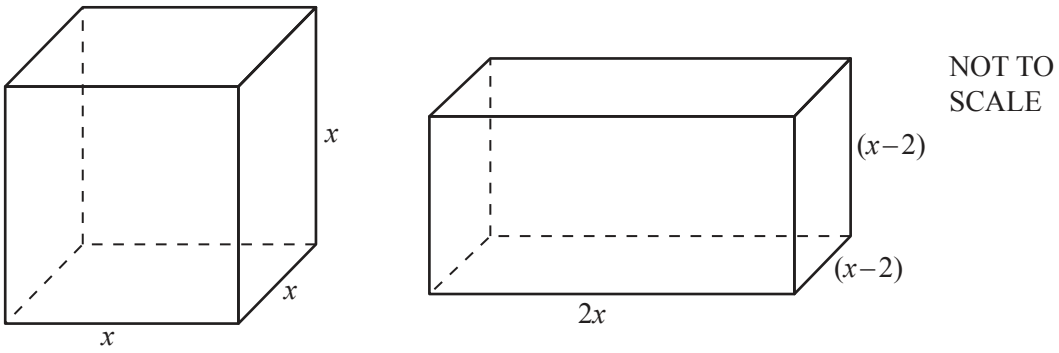
[3]

7 **(a)** Ali walks for 1 hour at x km/h and then for 2 hours at $\left(x+\frac{1}{4}\right)$ km/h.
He walks a total distance of 8 km.

Write an equation and solve it to find the value of x.

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

(b)



NOT TO SCALE

The volume of the cube is equal to the volume of the cuboid.

(i) Show that $x^3 - 8x^2 + 8x = 0$.

[3]

(ii)

On the diagram, sketch the graph of $y = x^3 - 8x^2 + 8x$ for $0 \leqslant x \leqslant 7.5$. [2]

(iii) Find the volume of the cuboid.

..... [2]

8 A fair 6-sided die is numbered 0, 1, 1, 2, 3, 3.

(a) The die is rolled and the number it shows is recorded.

Find the probability that the number is

(i) 3,

..... [1]

(ii) not 3,

..... [1]

(iii) an odd number.

..... [1]

(b) The die is rolled twice.

Find the probability that

(i) both numbers are 0,

..... [2]

(ii) one number is 2 and the other is 3.

..... [3]

(c) The die is rolled three times and the three numbers shown are added.

Find the probability that the total is **not** 0.

..... [2]

9 **(a)** **(i)** Find the equation of the line that passes through the points (1, 2) and (3, 12).
Give your answer in the form $y = mx + c$.

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

(ii) Find the equation of the line that passes through the point (0, 2) and is perpendicular to the line in **part (a)(i)**.

..... [2]

.

(b) **(i)** Solve the equation $3x^2 + 4x - 4 = 0$.
You must show all your working.

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

(ii) Solve the inequality $3x^2 + 4x - 4 < 0$.

..... [2]

(c) The graph of $y = ax^2 + bx + c$ has its vertex at the point (1, 5) and intersects the y-axis at (0, 1).

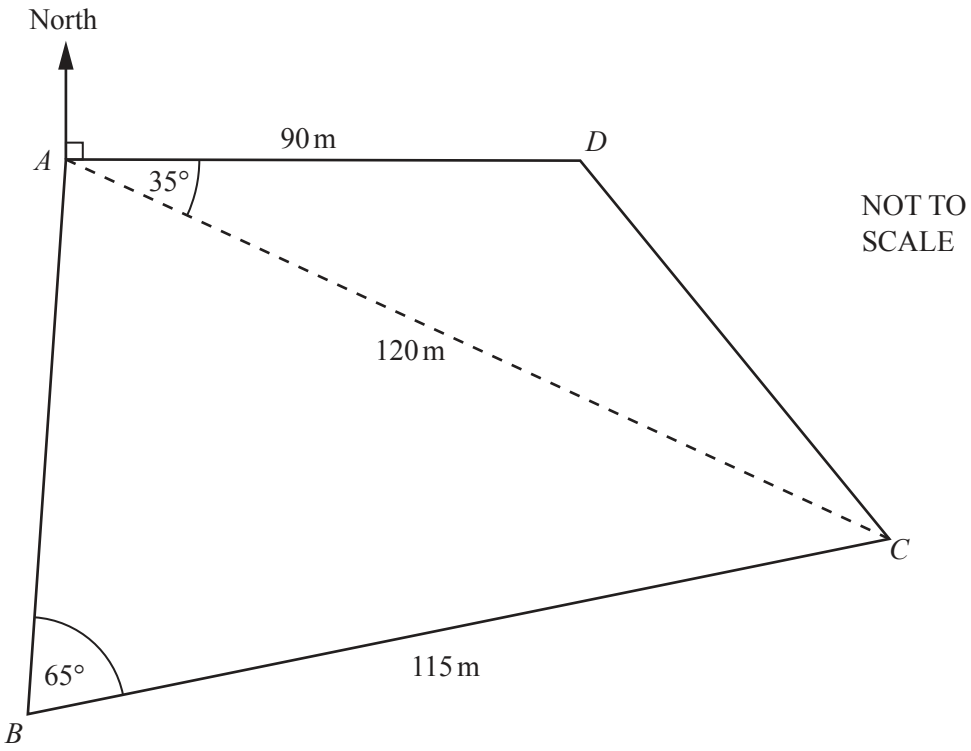
Find the values of a, b and c.

$a =$ .....

$b =$ .....

$c =$ ..... [3]

10



The diagram shows a school playing field, *ABCD*, which is on horizontal ground, with *D* due East of *A*.

(a) Find the bearing of

(i) *C* from *A*,

..... [1]

(ii) *A* from *C*.

..... [2]

(b) Calculate the length of *CD*.

CD = ... m [3]

(c) Calculate angle BAC.

Angle BAC = ... [3]

(d) **(i)** Calculate the area of the school playing field.

..... m^2 [4]

(ii) In the school office there is a plan of the school playing field.
It is drawn to a scale of 1 : 500.

Calculate the area of the school playing field on the plan.
Give your answer in cm^2.

..... cm^2 [3]

Question 11 is printed on the next page.

11 $f(x) = 2x + 1$ $g(x) = x^2 + 1$ $h(x) = \log x$

(a) **(i)** Find the value of f(4.5).

..... [1]

(ii) Find the value of h(f(4.5)).

..... [1]

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

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

(c) Find g(f(x)) in the form $ax^2 + bx + c$.

..... [3]

(d) $p(x) = x^2 - 1$

Find the **single** transformation that maps the graph of $y = g(x)$ onto the graph of $y = p(x)$.

..... [2]

(e) Solve the equation $h^{-1}(x) = 1000$.

$x =$ ..... [1]