Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME											
CENTRE NUMBER							CANDIDATE NUMBER				

9579248365

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **February/March 2023**

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 [ ].

DC (CE/FC) 317733/4

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. $\quad A = \pi rl$

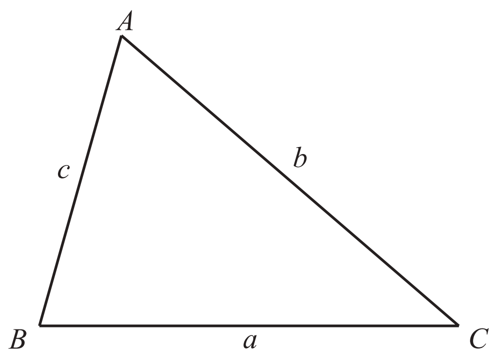
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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

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

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

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



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

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

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

Answer **all** the questions.

1 The table shows the marks scored by each of 75 students in a test.

Mark	0	1	2	3	4	5	6	7	8	9	10
Number of students	1	4	5	6	9	10	11	7	6	13	3

(a) Write down the mode.

.... [1]

(b) Write down the range.

.... [1]

(c) Find the median.

.... [1]

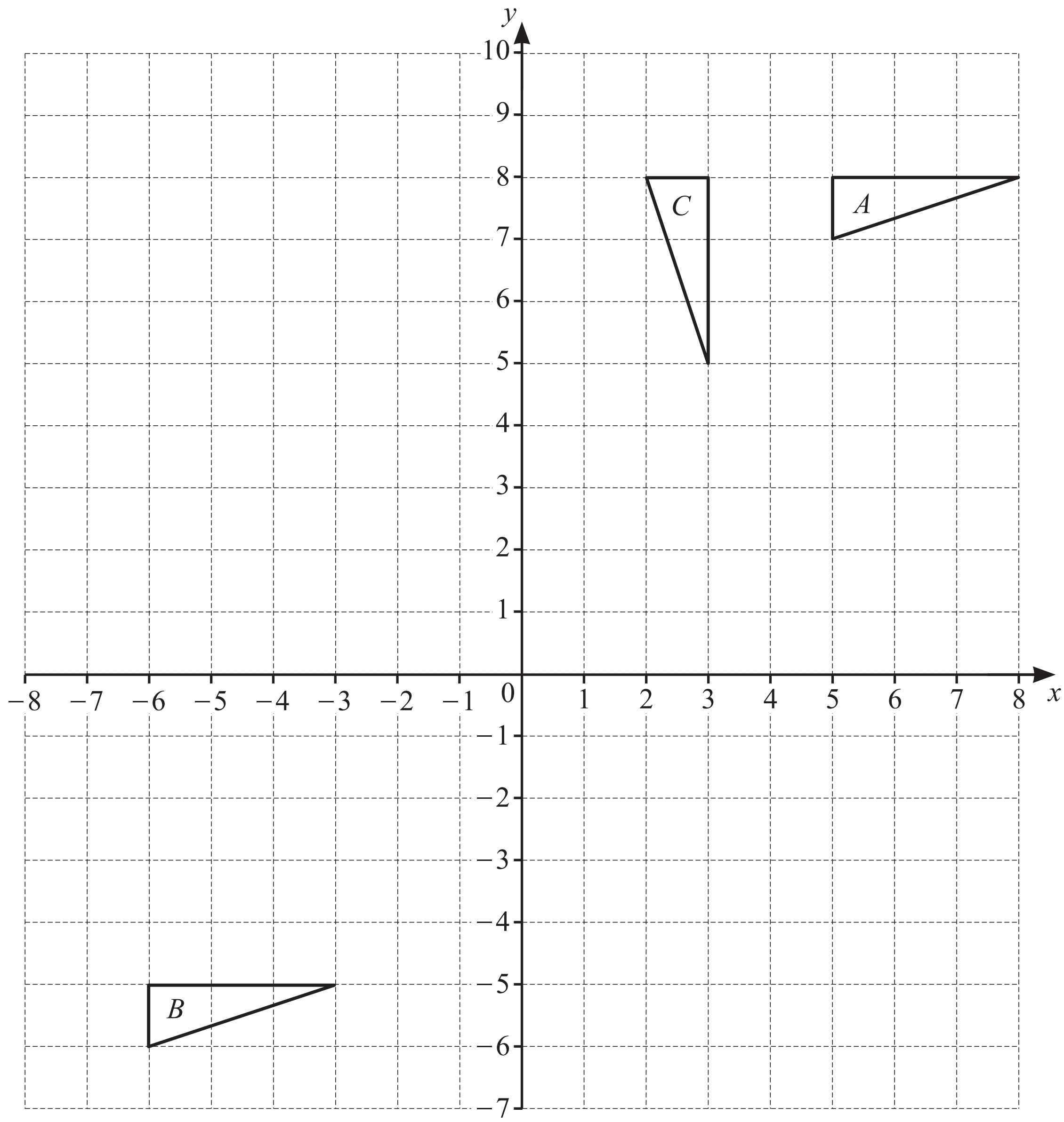
(d) Find the lower quartile.

.... [1]

(e) Calculate the mean.

.... [2]

2



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

....

.... [2]

(b) Describe the **single** transformation that maps triangle A onto triangle C.

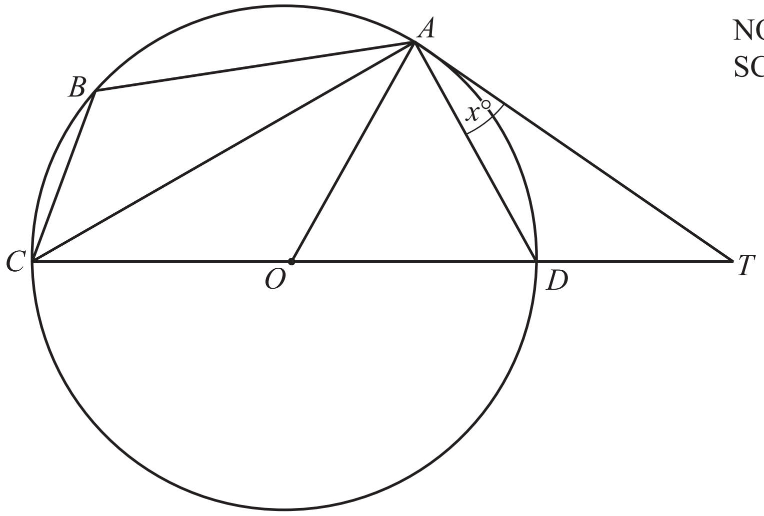
....

.... [3]

(c) Reflect **triangle *B*** in the line $y = 1$. Label the image D. [2]

(d) Enlarge **triangle *B*** scale factor 2, centre $(-6, -6)$. Label the image E. [2]

3



A, B, C and D lie on a circle, centre O.
$CODT$ is a straight line.
AT is a tangent to the circle at A.
Angle $DAT = x°$.

(a) Complete the statement.

Angle $CAD = 90°$ because

.... [1]

(b) Find, in terms of x,

(i) angle ACD

Angle ACD = ... [1]

(ii) angle AOD

Angle AOD = ... [1]

(iii) angle AOC

Angle AOC = ... [1]

(iv) angle ADO

Angle ADO = ... [1]

(v) angle ABC.

Angle ABC = ... [1]

(c) Given that angle $DTA = y°$, find y in terms of x.

y = ... [1]

4 The heights, x cm, of 500 students in a school are shown in the table.

Height (x)	Frequency
$150 < x \leqslant 155$	24
$155 < x \leqslant 160$	42
$160 < x \leqslant 165$	84
$165 < x \leqslant 170$	106
$170 < x \leqslant 175$	112
$175 < x \leqslant 180$	87
$180 < x \leqslant 185$	45

(a) Calculate an estimate of the mean height.

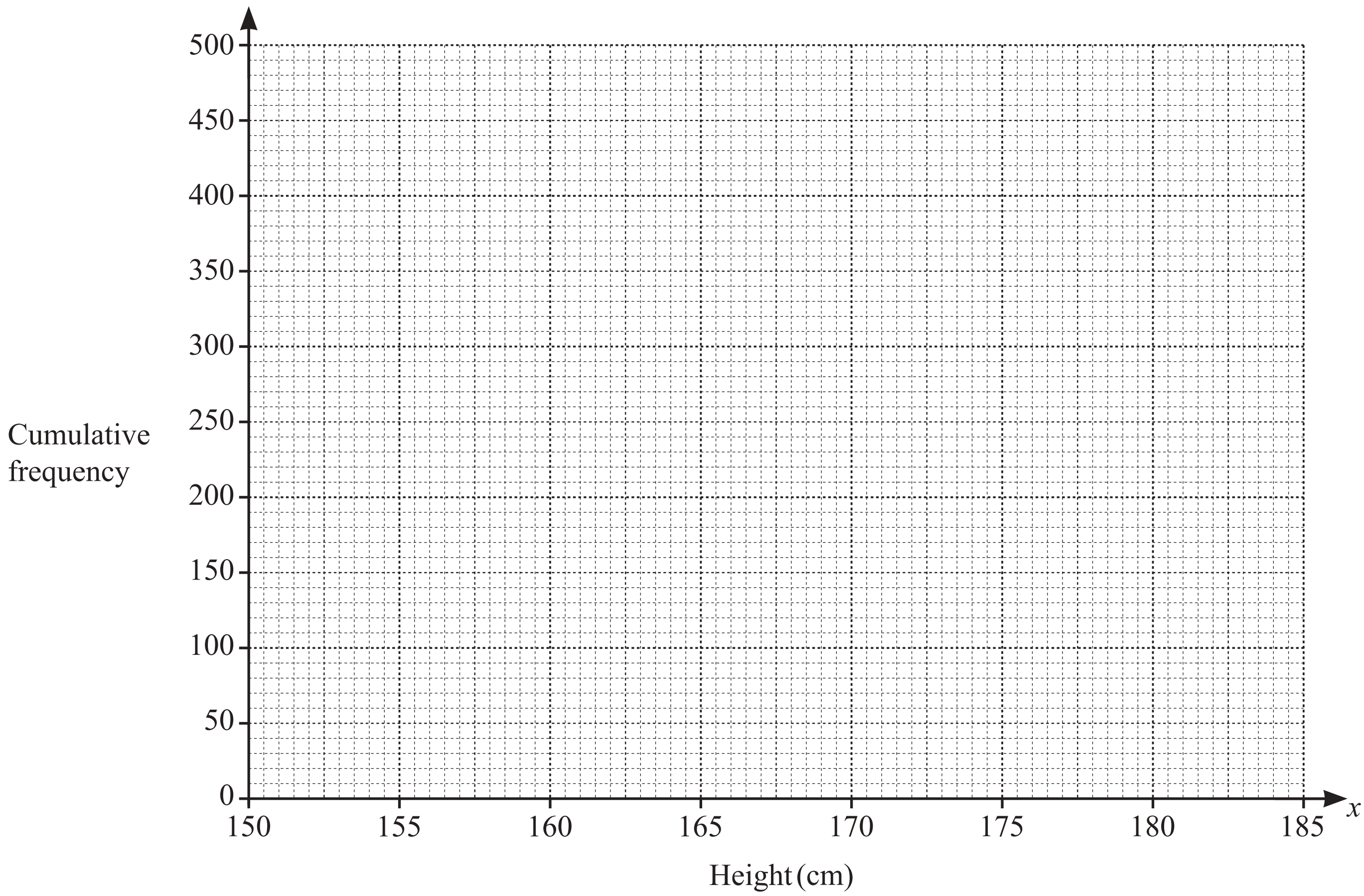
.... cm [2]

(b) Complete the cumulative frequency table.

Height (x)	Cumulative frequency
$x \leqslant 155$	24
$x \leqslant 160$	
$x \leqslant 165$	
$x \leqslant 170$	
$x \leqslant 175$	
$x \leqslant 180$	
$x \leqslant 185$	500

[1]

(c) On the grid below, draw a cumulative frequency curve.



[3]

(d) Use your graph in **part (c)** to find an estimate for

(i) the upper quartile

.... cm [1]

(ii) the percentage of students who are less than 162 cm in height.

.... % [2]

5 **(a)** $X = 3A + 5B$

Work out the value of B when $X = 48$ and $A = 4$.

$B =$ .... [2]

(b) Solve $6(1-2x) = 2+4(x-1)$.

$x =$ .... [3]

(c) Solve $\dfrac{3x-2}{5} = \dfrac{3+2x}{4} - 2$.

$x =$ .... [3]

(d) Solve $4\log 2 - 2\log x + \log 4 = 2$.

You must show your working.

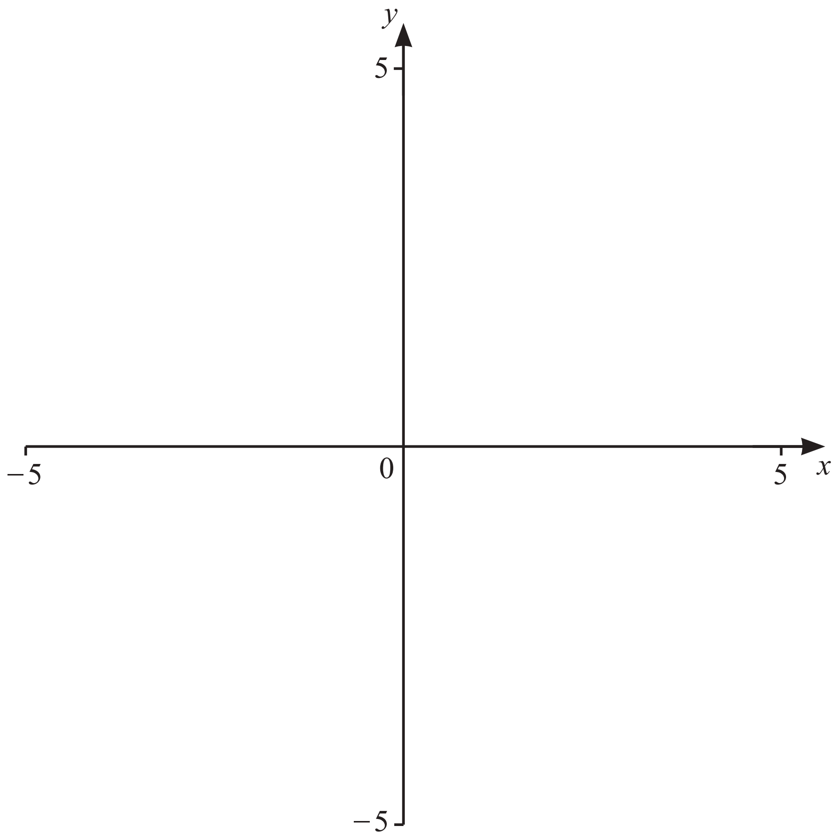
$x =$ .... [4]

(e) Solve $x = 16 - 6x^2$.

Give your answers correct to 2 decimal places.

.... [3]

6



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

(a) On the diagram, sketch the graph of $y = f(x)$ for values of x between -5 and 5. [4]

(b) Write down the equations of the two vertical asymptotes.

.... , ... [2]

(c) Write down the coordinates of the local minimum point.

(...................... , ...) [1]

(d) On the diagram, sketch the graph of $y = g(x)$, where

$$g(x) = 3 - x \quad \text{for } -2 \leqslant x \leqslant 5\ .$$ [1]

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

.... [2]

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

.... [3]

7 y varies inversely as the cube root of x.
$y = 10$ when $x = 8$.

(a) Find y in terms of x.

$y =$ .... [3]

(b) Find the value of x when $y = 8$.

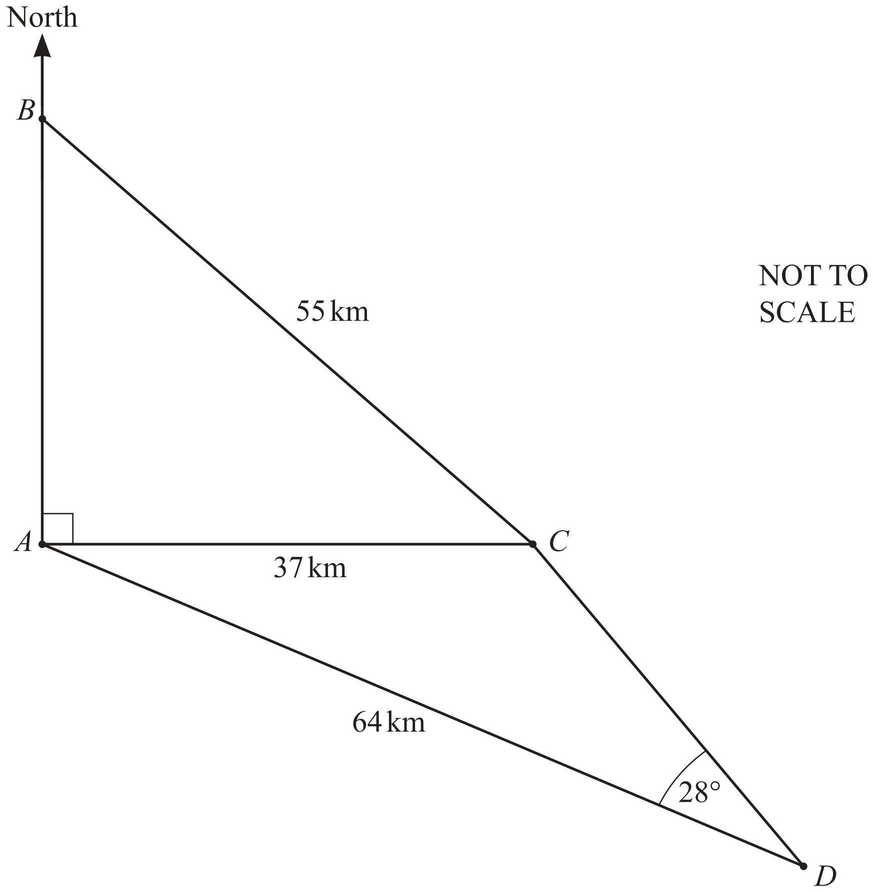
$x =$ .... [2]

(c) w varies as the square of y.
$w = 18$ when $y = 3$.

Find w in terms of x.
Give your answer in the form $w = px^q$, where p and q are constants.

$w =$ .... [4]

8



The diagram shows four points A, B, C and D on level ground.
B is due north of A and C is due east of A.

(a) Calculate AB.

$AB =$ .... km [3]

(b) Calculate the obtuse angle ACD.

Angle ACD = ... [3]

(c) Find the bearing of

(i) D from A

.... [2]

(ii) A from D.

.... [1]

(d) Calculate the area of the quadrilateral $ABCD$.

.... km^2 [3]

9 Henryk invests \$5000 in Bank *A* and \$5000 in Bank *B*.

(a) Bank *A* pays compound interest at a rate of 3.5% each year.

(i) Find the total amount Henryk has in Bank *A* at the end of 4 years.

\$ .... [2]

(ii) Calculate the number of complete years it takes for the value of Henryk's investment of \$5000 in Bank *A* to be first greater than \$8000.

.... [4]

(b) Bank *B* pays simple interest at a rate of 4% each year.

(i) Find the total amount Henryk has in Bank *B* at the end of 4 years.

\$ .... [3]

(ii) Calculate the number of complete years it takes for the value of Henryk's investment of \$5000 in Bank *B* to be \$8000.

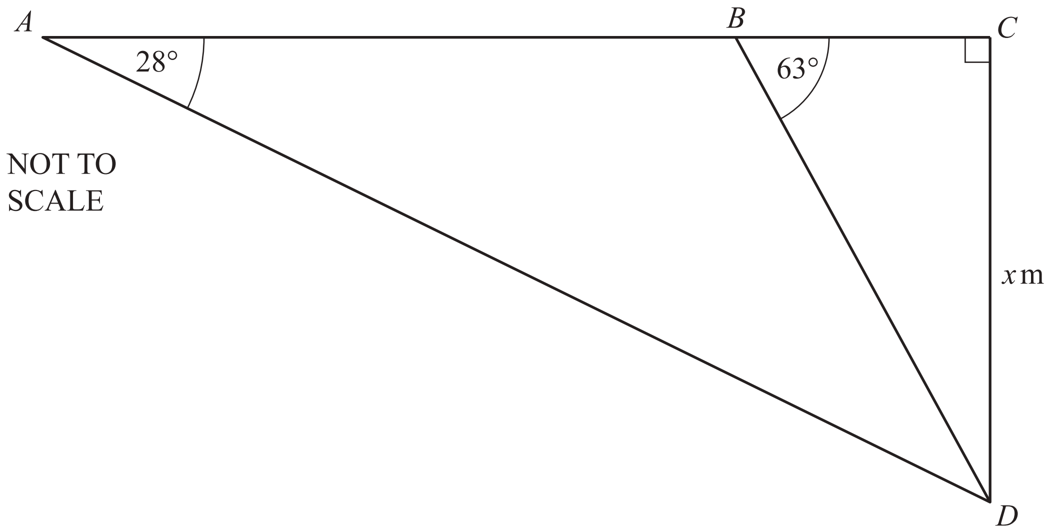
.... [2]

(c) At the end of x complete years, the total amount that Henryk has in Bank A is greater than the total amount he has in Bank B.

Given that $5 < x < 10$, use a graphical method to find the value of x.

$x =$ .... [4]

10



A plane is flying in a straight line ABC at a constant height, x metres, above ground level.
The point D is on the ground directly below C.

The plane is travelling at a constant speed of 480 km/h.
The time taken for the plane to travel from A to B is 18 seconds.

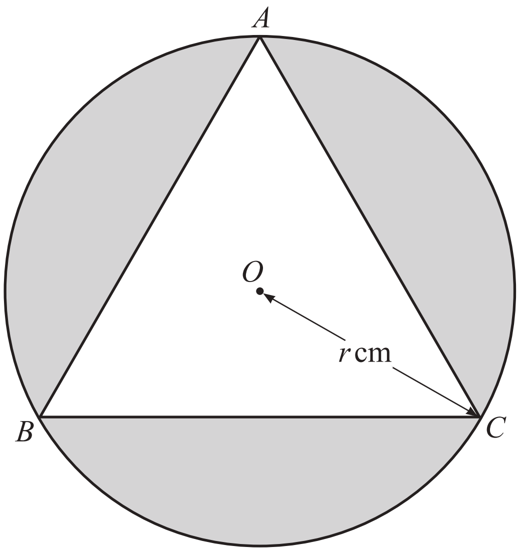
(a) Show that, in metres, $AC = \dfrac{x}{\tan 63} + 2400$.

[3]

(b) Find the value of x.

$x =$ .... [5]

11



NOT TO SCALE

The diagram shows an equilateral triangle *ABC* touching a circle, centre *O* and radius *r* cm.

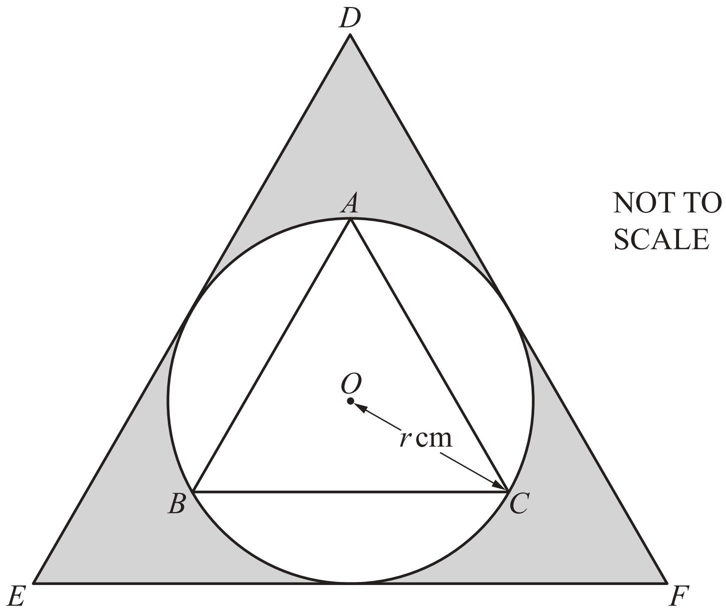
(a) **(i)** Show that the area of triangle *ABC* is $\frac{3\sqrt{3}}{4}r^2$ cm^2.

[4]

(ii) Find an expression, in terms of π and *r*, for the exact value of the shaded area.

.... cm^2 [1]

(b)



Another equilateral triangle DEF is touching the same circle.

Find an expression, in terms of π and r, for the exact value of this shaded area.

.... cm^2 [3]

(c) Find in its simplest form the ratio

perimeter of triangle ABC : perimeter of triangle DEF .

.... : .... [2]

Question 12 is printed on the next page.

12 A bag contains x red balls, y blue balls and z green balls.

(a) Paula chooses a ball at random from the bag, notes its colour and replaces it in the bag.
She then chooses a ball from the bag a second time and notes its colour.

Giving your answers as unsimplified algebraic fractions, find the probability, in terms of x, y, and z, that the two balls chosen are

(i) both red

.... [2]

(ii) one blue and one green.

.... [2]

(b) All of the green balls are removed from the bag.
Novak now chooses a ball at random from the bag, notes its colour and replaces it in the bag.
He then chooses a ball from the bag a second time and notes its colour.

The probability that the two balls chosen are both red is $\frac{49}{400}$.

Find, as a fraction, the value of $\frac{x}{y}$.

$\frac{x}{y}$ = ... [3]