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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 [].

This document has **20** pages.

Formula List

For the equation $ax^2 + bx + c = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Curved surface area, A , of cylinder of radius r , height h . $A = 2\pi rh$

Curved surface area, A , of cone of radius r , sloping edge l . $A = \pi rl$

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

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

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

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

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



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

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

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

Answer **all** the questions.

- 1 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.

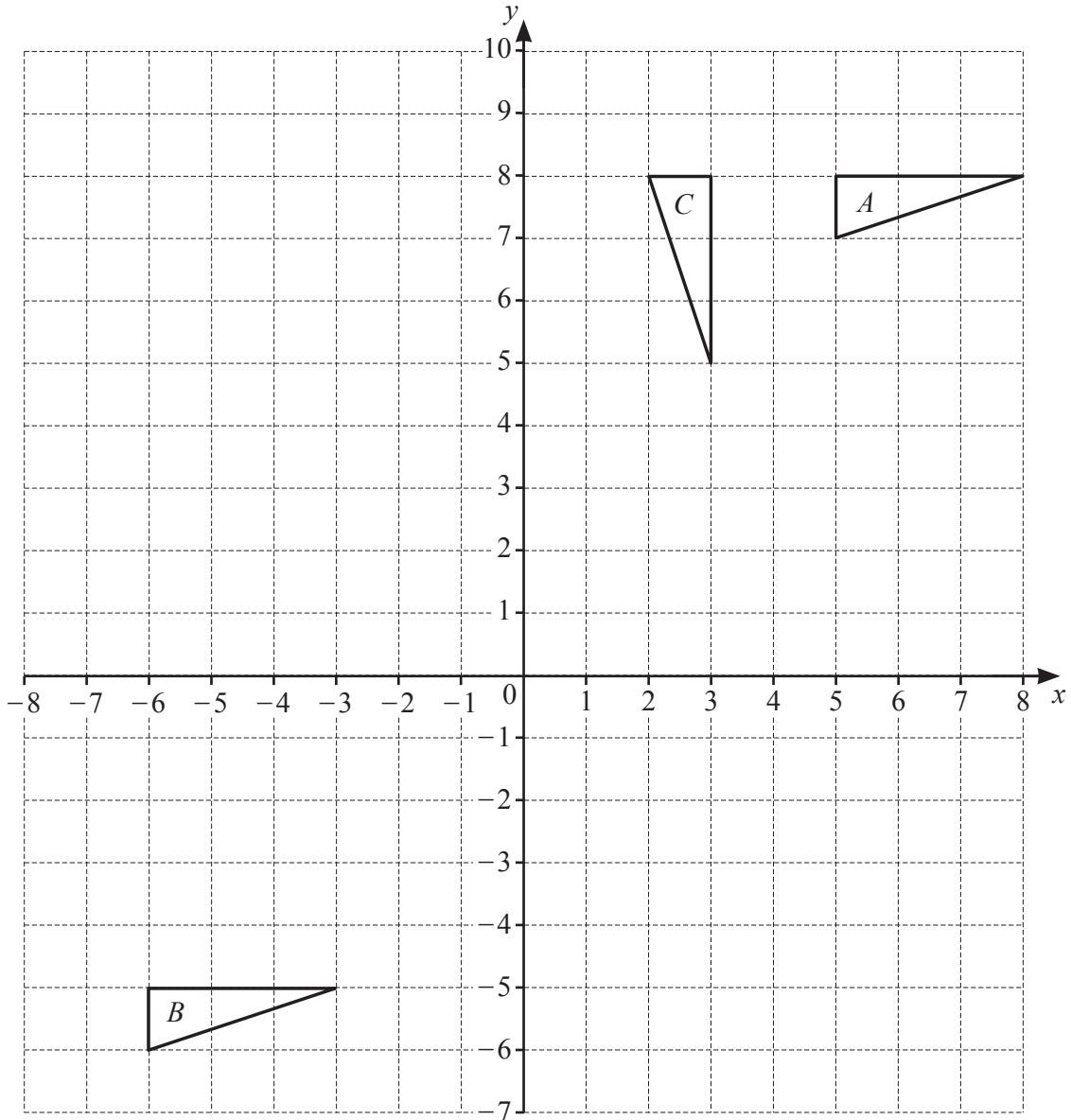
..... [1]

- (d) Find the lower quartile.

..... [1]

- (e) Calculate the mean.

..... [2]



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

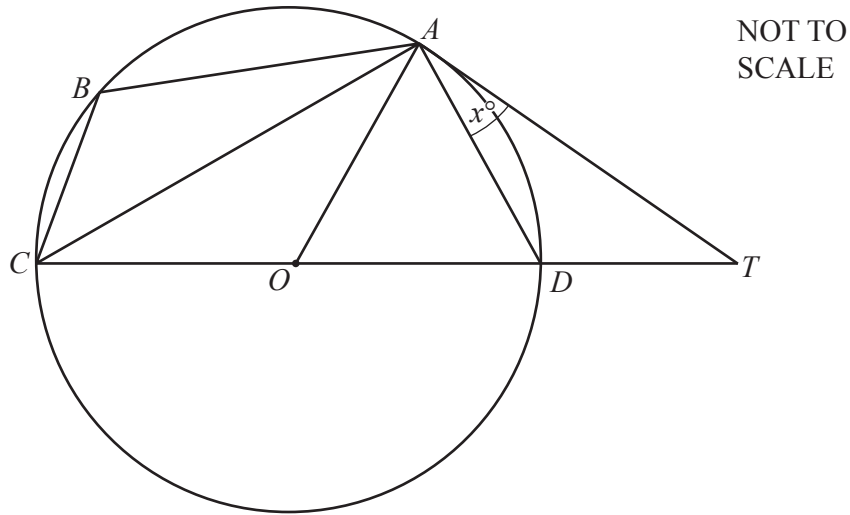
.....
 [2]

- (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]



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 $DAT = x^\circ$.

(a) Complete the statement.

Angle $CAD = 90^\circ$ 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 $DTA = y^\circ$, 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
$150 < x \leq 155$	24
$155 < x \leq 160$	42
$160 < x \leq 165$	84
$165 < x \leq 170$	106
$170 < x \leq 175$	112
$175 < x \leq 180$	87
$180 < x \leq 185$	45

(a) Calculate an estimate of the mean height.

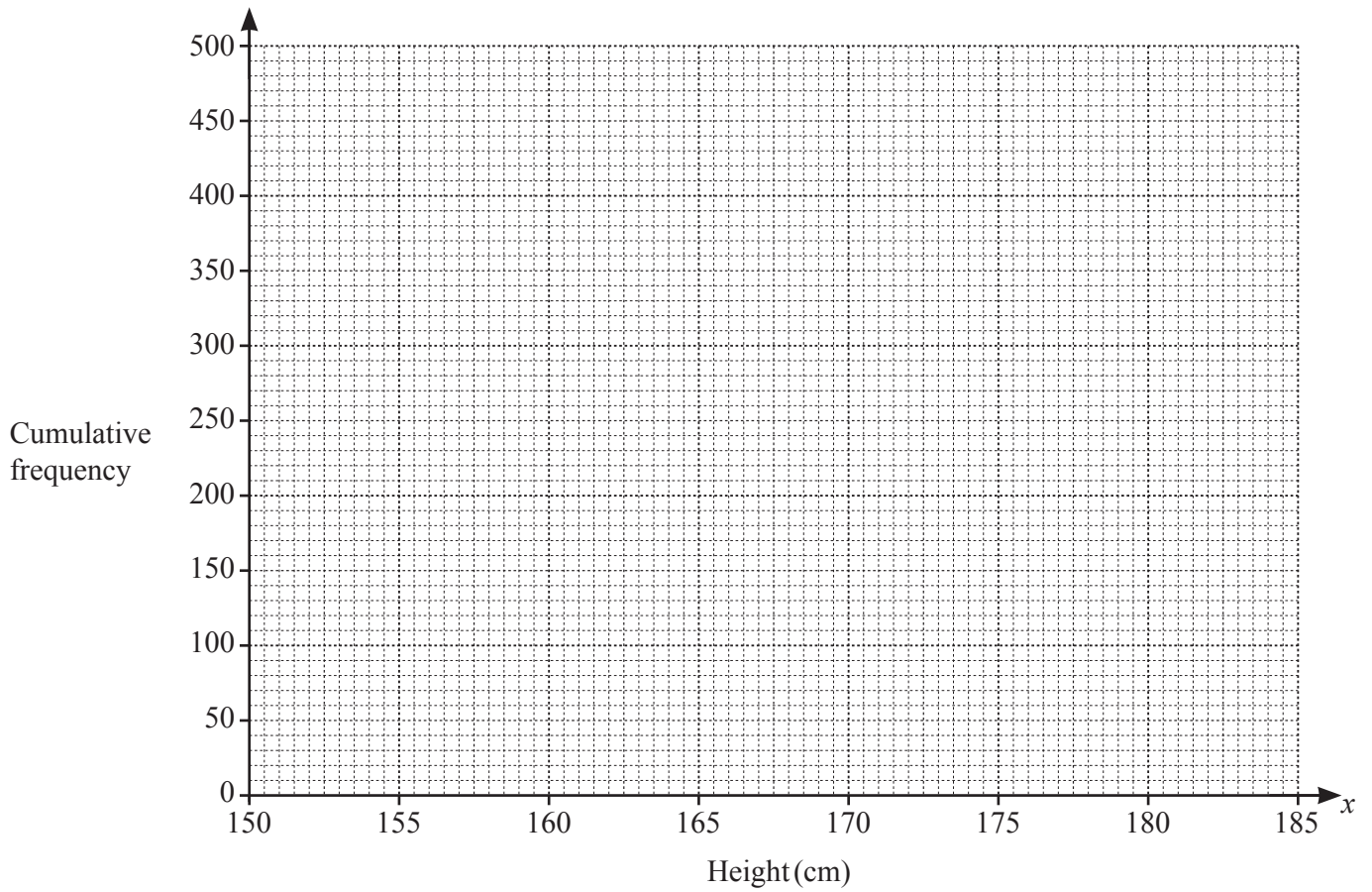
..... cm [2]

(b) Complete the cumulative frequency table.

Height (x)	Cumulative frequency
$x \leq 155$	24
$x \leq 160$	
$x \leq 165$	
$x \leq 170$	
$x \leq 175$	
$x \leq 180$	
$x \leq 185$	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 $A = 4$.

$B = \dots\dots\dots$ [2]

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

$x = \dots\dots\dots$ [3]

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

$x = \dots\dots\dots$ [3]

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

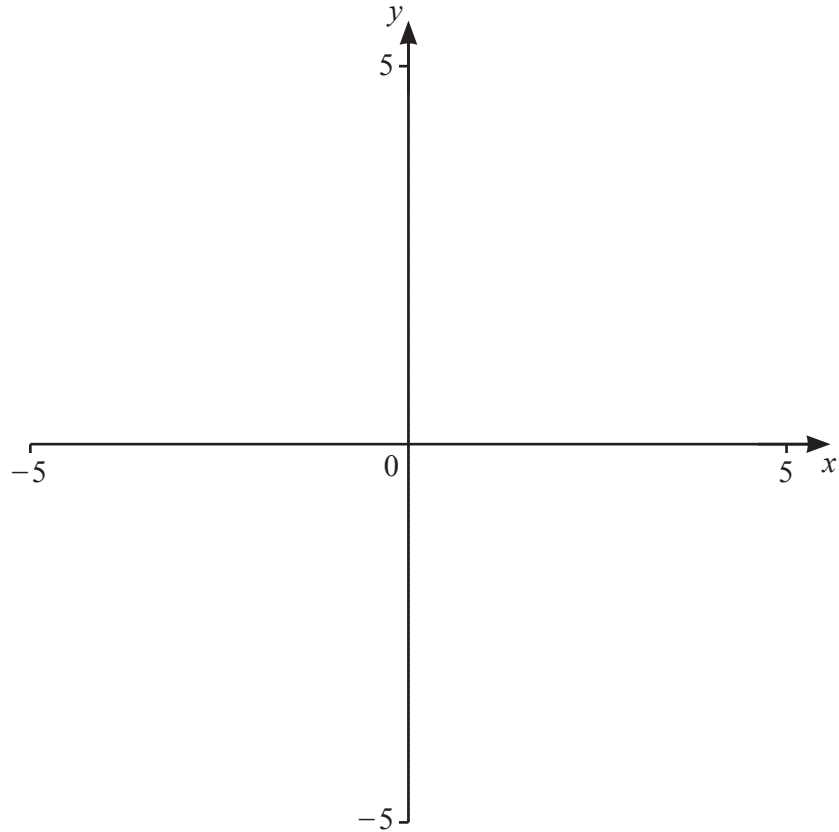
You must show your working.

$x = \dots\dots\dots$ [4]

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

Give your answers correct to 2 decimal places.

$\dots\dots\dots$ [3]



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

(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
 $g(x) = 3 - x$ for $-2 \leq x \leq 5$. [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 .

$$y = \dots\dots\dots [3]$$

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

$$x = \dots\dots\dots [2]$$

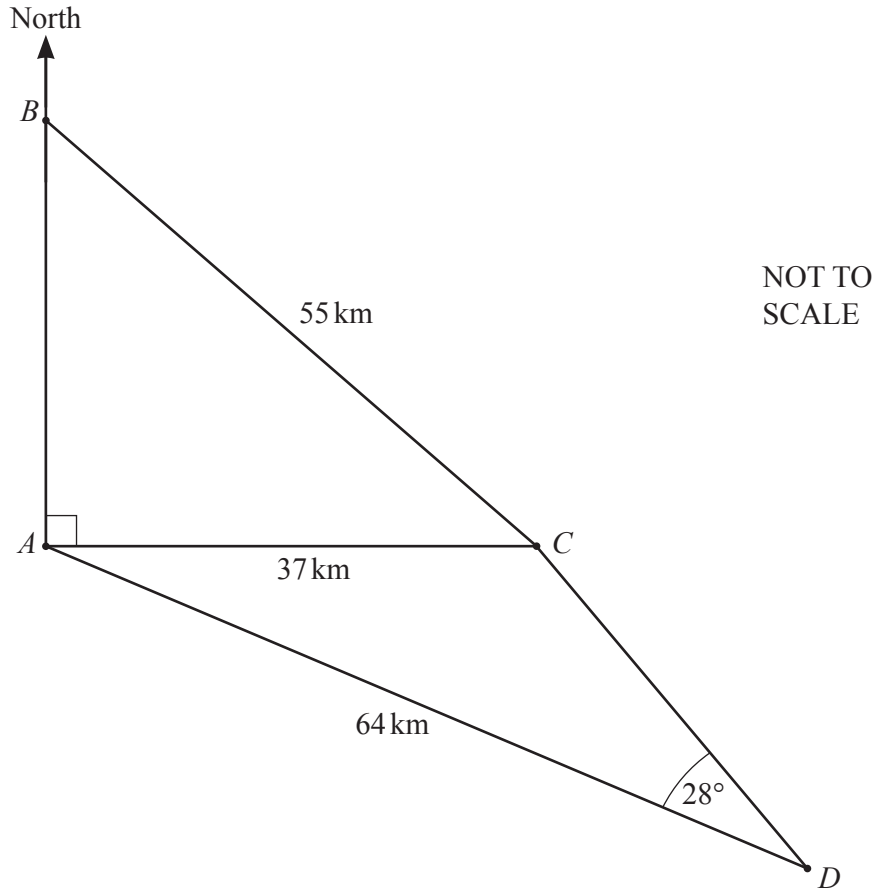
- (c) w varies as the square of y .
 $w = 18$ when $y = 3$.

Find w in terms of x .

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

$$w = \dots\dots\dots [4]$$

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 .

$AB = \dots\dots\dots$ km [3]

(b) Calculate the obtuse angle ACD .

Angle $ACD = \dots\dots\dots$ [3]

(c) Find the bearing of

(i) D from A

$\dots\dots\dots$ [2]

(ii) A from D .

$\dots\dots\dots$ [1]

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

$\dots\dots\dots \text{ km}^2$ [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.

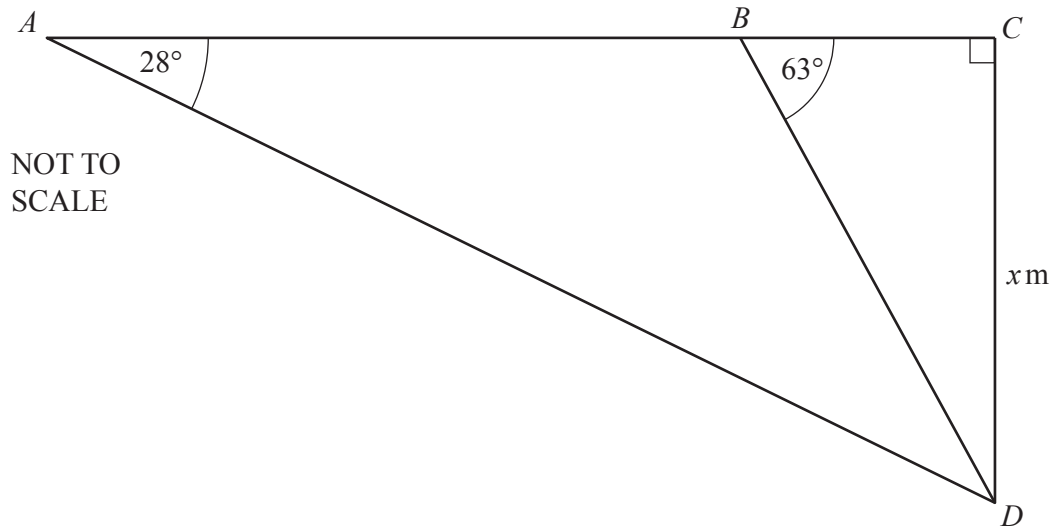
..... [2]

- (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 .

$x = \dots\dots\dots$ [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.

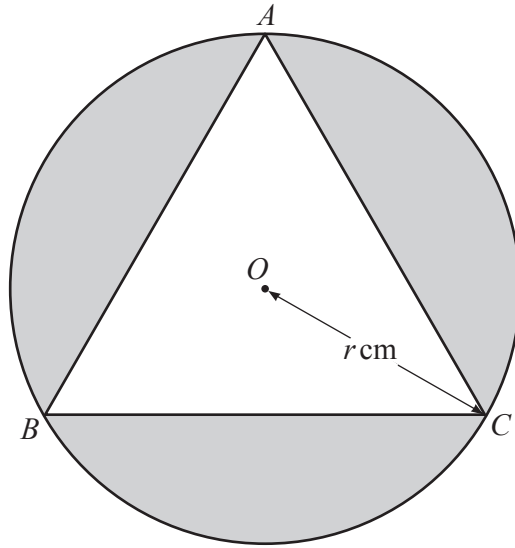
(a) Show that, in metres, $AC = \frac{x}{\tan 63} + 2400$.

[3]

(b) Find the value of x .

$x = \dots\dots\dots$ [5]

11



NOT TO SCALE

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

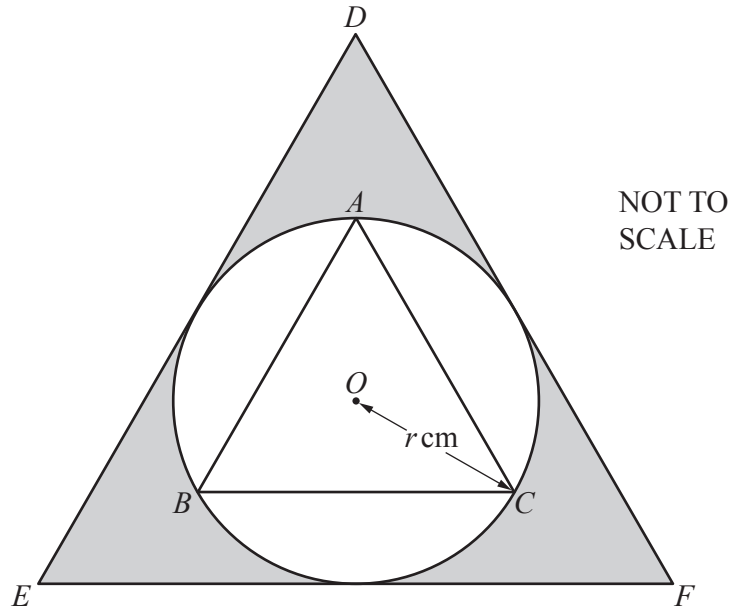
(a) (i) Show that the area of triangle ABC is $\frac{3\sqrt{3}}{4}r^2$ cm².

[4]

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

..... cm² [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]

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