



CANDIDATE
NAME

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CENTRE
NUMBER

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CANDIDATE
NUMBER

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0607/41

May/June 2022

2 hours 15 minutes

You must answer on the question paper.

You will need: Geometrical instruments

- 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.

- 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. Any blank pages are indicated.

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 . $A = \pi rl$

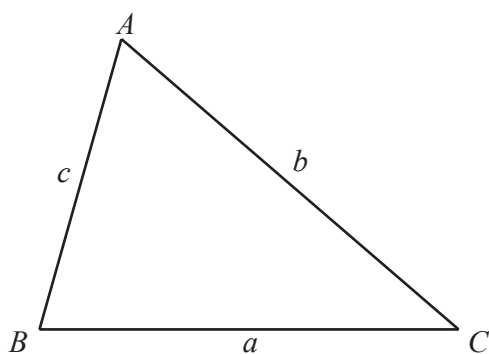
Curved surface area, A , of sphere of radius r . $A = 4\pi r^2$

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 . $V = \frac{4}{3}\pi r^3$



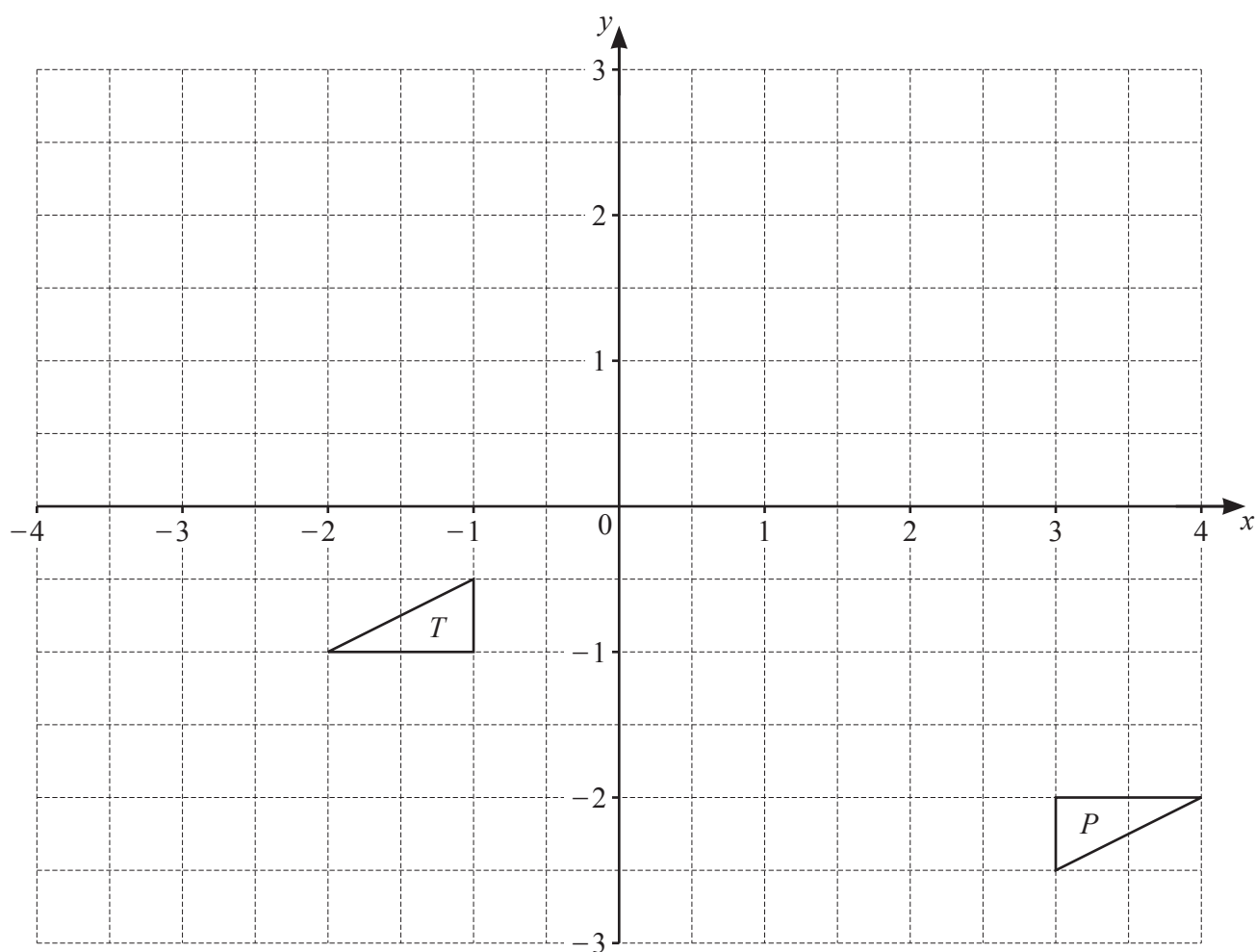
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

Answer **all** the questions.

1



(a) Translate triangle T by the vector $\begin{pmatrix} -2 \\ 2 \end{pmatrix}$. [2]

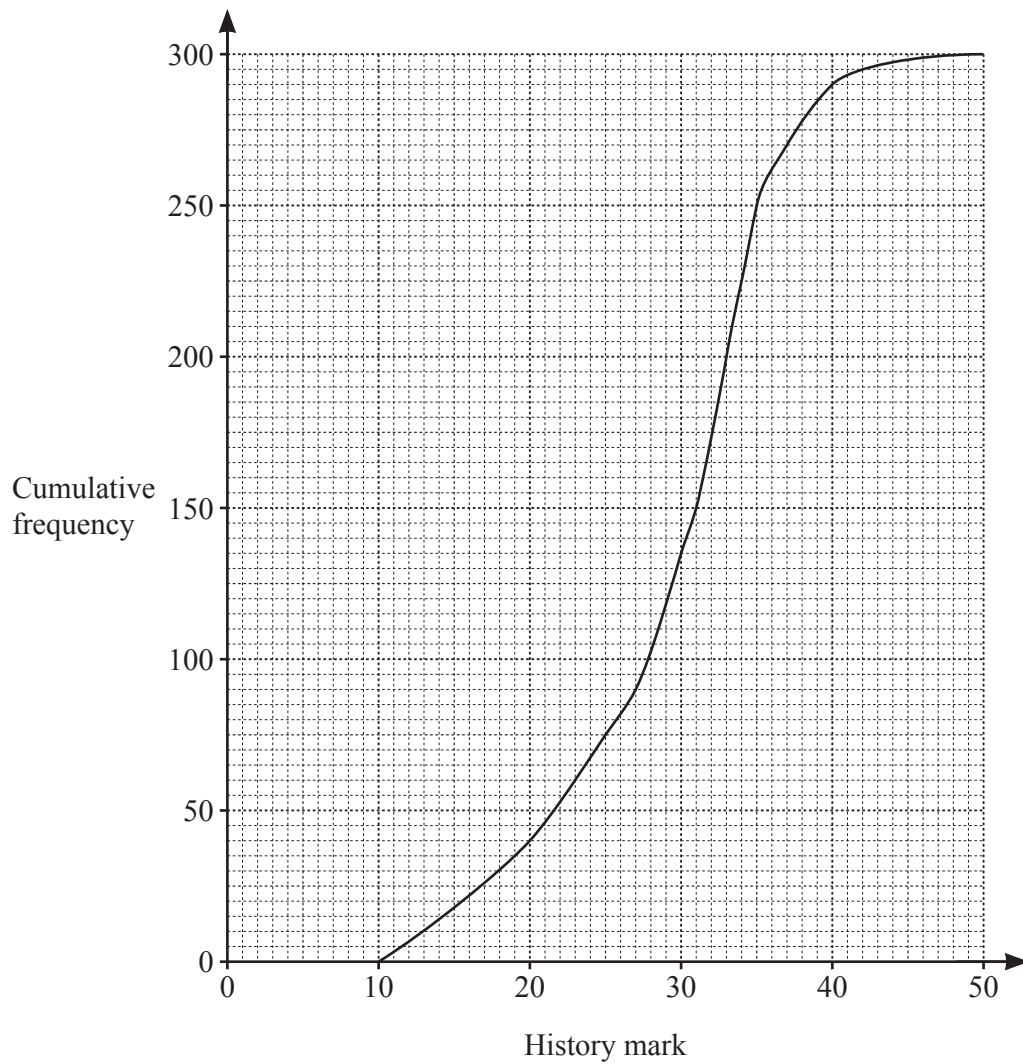
(b) Reflect triangle T in the line $y = 0.5$. [2]

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

..... [3]

(d) Enlarge triangle P with scale factor -2 , centre $(3, -1)$. [2]

- 2 (a) The cumulative frequency curve shows the marks for 300 students in a history test.



- (i) Find an estimate for the median.

..... [1]

- (ii) Estimate the number of students with a mark of more than 20.

..... [2]

- (iii) 70% of the students pass the test.

Find the pass mark.

..... [2]

- (b) The table shows the marks for 100 students in a geography test.

Mark m	$10 < m \leq 20$	$20 < m \leq 30$	$30 < m \leq 40$	$40 < m \leq 50$
Frequency	2	28	57	13

Calculate an estimate of the mean.

..... [2]

- (c) The table shows the marks for 9 students in chemistry and in physics.

Chemistry mark (x)	33	28	39	40	22	25	38	43	36
Physics mark (y)	45	32	26	49	18	36	29	40	35

- (i) Find the equation of the regression line for y in terms of x .

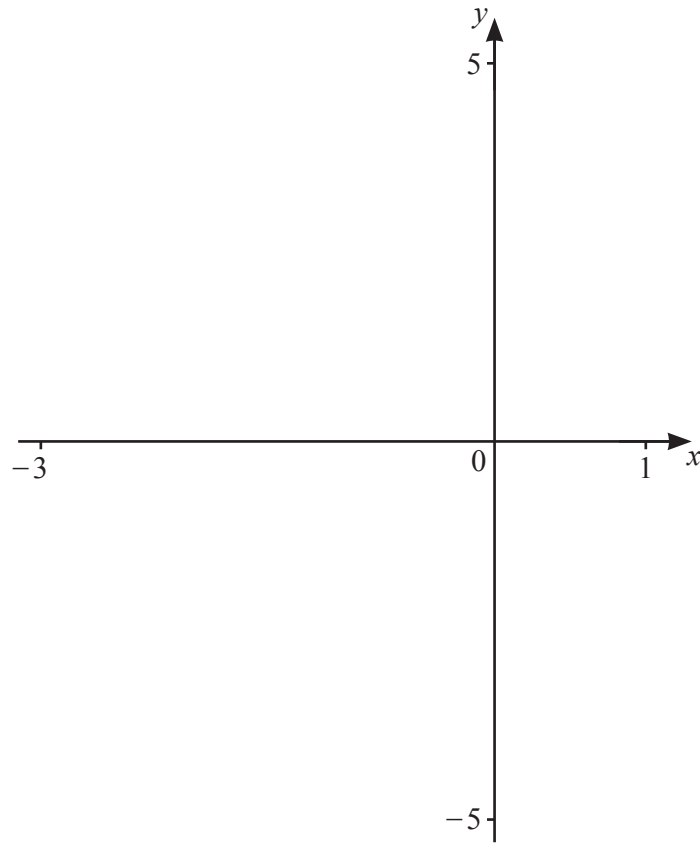
$y =$ [2]

- (ii) What type of correlation is seen in this data?

..... [1]

- (iii) Use your answer to **part (c)(i)** to estimate the physics mark for a student with a mark of 30 in chemistry.

..... [1]



$$f(x) = 2x + 4 - \frac{1}{x^2}$$

(a) On the diagram, sketch the graph of $y = f(x)$ for values of x between -3 and 1 . [3]

(b) Write down the equation of the asymptote of the graph.

..... [1]

(c) Find the coordinates of the local maximum.

(.....,) [1]

(d) $g(x) = x^3 - 5x$ for $-3 \leq x \leq 1$.

Solve $f(x) \leq g(x)$.

..... [4]

- 4 (a) \$216 is shared in the ratio 5 : 1.

Work out the larger share.

\$ [2]

- (b) Luis shares some money between Ali, Betty and Clare in the ratio 3 : 4 : 6.
Ali receives \$171.

Find the total amount of money Luis shared.

\$ [2]

- (c) Farima invests \$1400 in a savings account paying simple interest at a rate of 2.5% per year.

Calculate the total amount in the account at the end of 3 years.

\$ [3]

- (d) Emir invests \$3000 at a rate of 2% per year compound interest.

- (i) Calculate the value of Emir's investment at the end of 4 years.

\$ [2]

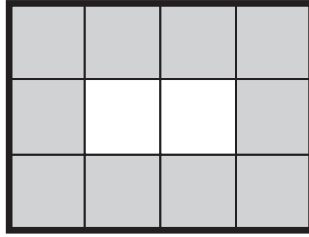
- (ii) Find the number of complete years until Emir's investment is first worth more than \$4000.

..... [4]

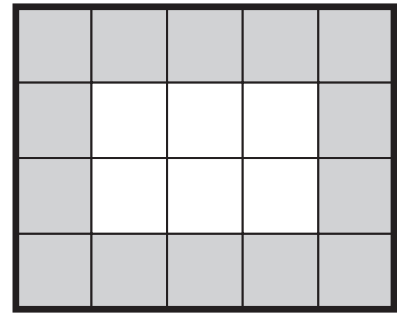
- 5 A sequence of patterns is made using grey tiles and white tiles.



Pattern 1



Pattern 2



Pattern 3

- (a) Complete the table.

Pattern number	1	2	3	4		n
Number of grey tiles	6	10				
Number of white tiles	0	2				

[6]

- (b) Find and simplify an expression for the total number of tiles in Pattern n .

..... [1]

- (c) Pattern k has a total of 600 tiles.

Find the number of grey tiles in Pattern k .

..... [4]

- (d) The tiles in a pattern are put in a bag.

The probability of taking a grey tile from the bag at random is $\frac{5}{12}$.

A tile is taken from the bag at random and replaced.

This is repeated 3 times.

Find the probability that all 3 tiles are white.

..... [2]

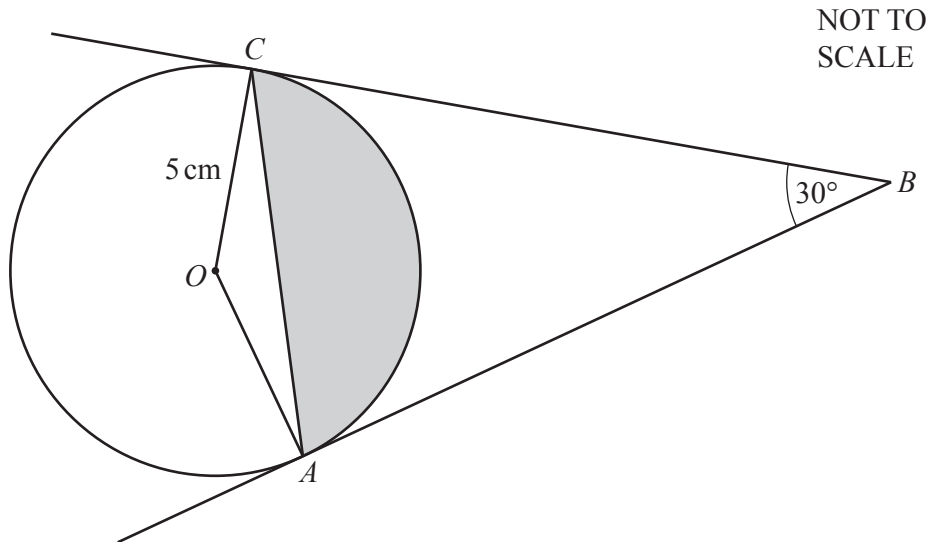
- (e) All the grey tiles from Pattern 4 are put in a bag.

Two tiles are taken from the bag at random without replacement.

Find the probability that one tile came from a corner of the pattern and the other did not.

..... [3]

6 (a)

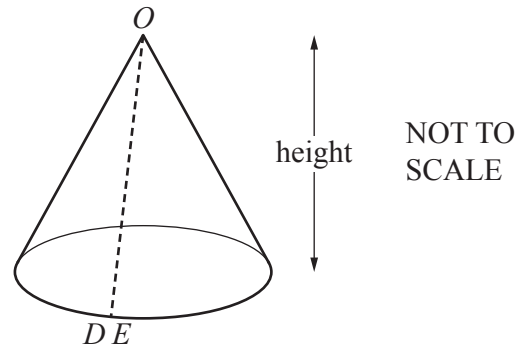
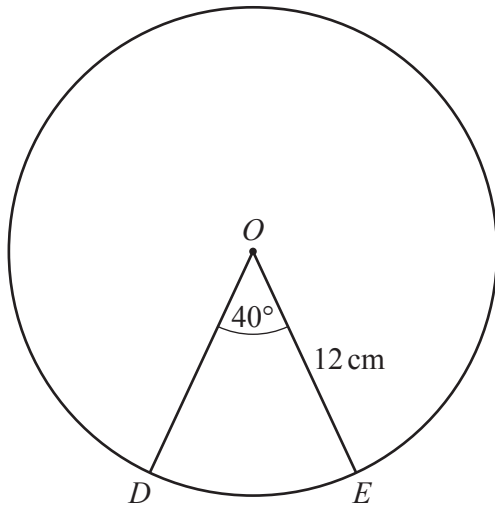


The diagram shows a circle, centre O , with radius 5 cm.
 BA and BC are tangents to the circle at A and C .
 Angle $ABC = 30^\circ$.

Calculate the area of the shaded minor segment.

..... cm^2 [4]

(b)



The circle, centre O , has radius 12 cm.

Angle $DOE = 40^\circ$.

The minor sector DOE is removed.

The major sector is formed into a cone by joining OD to OE .

Calculate the height of the cone.

..... cm [5]

- 7 Abbi makes wooden boards in three sizes, small, medium and large. They are all cuboids.
The medium board has height 2 cm, width 23 cm and length 50 cm.

(a) Calculate the volume of the medium board.

..... cm^3 [2]

- (b) The small board is mathematically similar to the large board.
The small board has a volume of 287.5 cm^3 and a height of 1.15 cm.
The large board has a volume of 18400 cm^3 .

(i) Find the height of the large board.

..... cm [3]

- (ii) Is the medium board mathematically similar to the large board?
Explain how you decide.

..... because

..... [3]

- 8 (a) A is the point $(-11, 7)$ and B is the point $(8, -13)$.

Find the length of AB .

..... [3]

- (b) P is the point $(2, -5)$ and Q is the point $(6, 11)$.

Line L is perpendicular to PQ and crosses PQ at point R .

The ratio $PR : RQ = 3 : 1$.

Find the equation of line L .

..... [6]

9 (a) $f(x) = 2x + 3$ $g(x) = 2 - 4x$ $h(x) = 3^x$

(i) Find $f(5)$.

..... [1]

(ii) Find and simplify $g(f(x))$.

..... [2]

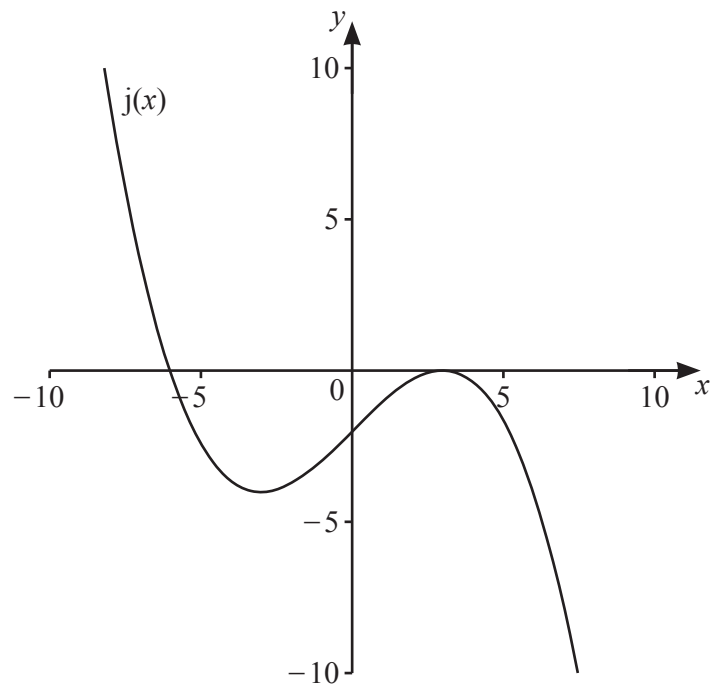
(iii) Find $g^{-1}(x)$.

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

(iv) Solve $h(x) = 48$.

..... [2]

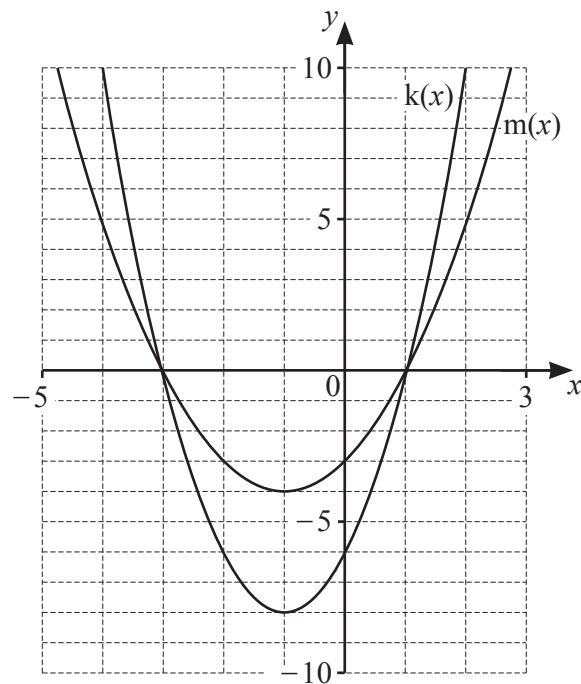
- (b) (i) The diagram shows a sketch of the graph of $y = j(x)$.



On the same diagram, sketch the graph of $y = j(x+2)$.

[1]

- (ii) The diagram shows the graphs of $y = k(x)$ and $y = m(x)$.



Write $k(x)$ in terms of $m(x)$.

$k(x) = \dots\dots\dots$ [1]

- 10 (a) Simplify fully.

$$\frac{4x^2y}{3} \div \frac{x}{12y}$$

..... [2]

- (b) Write as a single fraction in its simplest form.

$$\frac{1}{x-3} - \frac{x-3}{2}$$

..... [3]

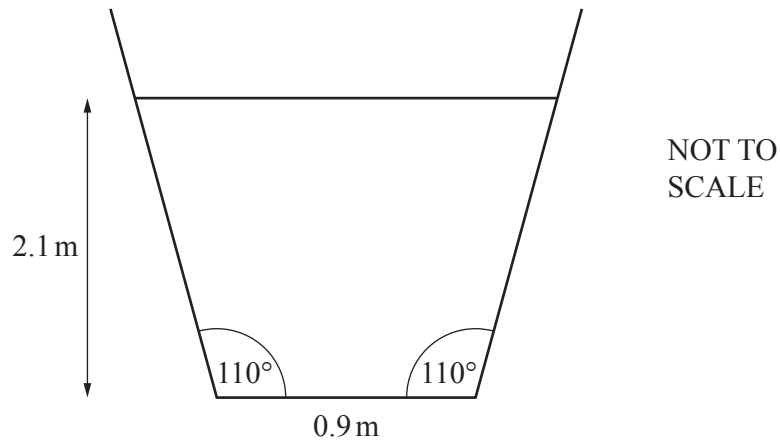
- (c) The n th term of a sequence is $an^2 + bn - 5$.
The second term of this sequence is -3 and the third term is 4 .

Find the value of a and the value of b .
You must show all your working.

$a =$

$b =$ [6]

11



The diagram shows the symmetrical cross-section of a ditch containing water.
 The angle between the base and each side of the ditch is 110° .
 The width of the base is 0.9 m and the depth of the water is 2.1 m.
 The ditch is 100 m long.

- (a) Calculate the volume of water in the ditch.

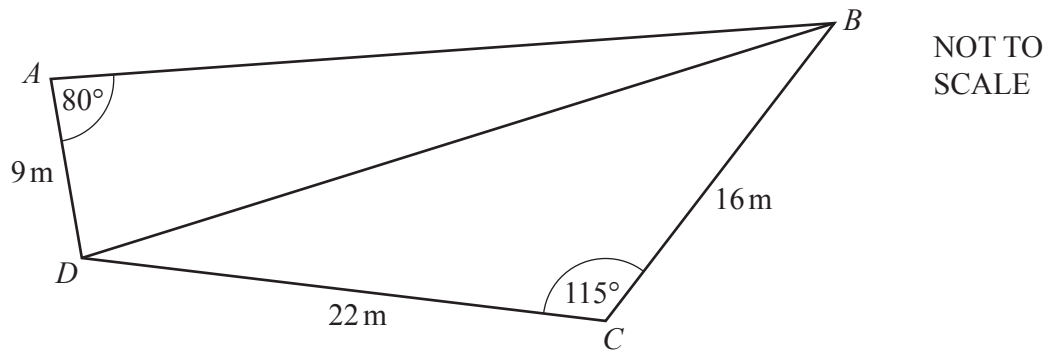
..... m^3 [4]

- (b) On a different day, the ditch contains 300 m^3 of water.
 Water is pumped out of the ditch at a rate of 4.2 litres per second.

Calculate the time taken to empty the ditch completely.
 Give your answer in hours and minutes, correct to the nearest minute.

..... h min [4]

12



- (a) Calculate the area of triangle BCD .

..... m^2 [2]

- (b) Calculate angle ADB .

Angle $ADB =$ [6]

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