Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

0643142836

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **May/June 2022**

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 $ax^2 + bx + c = 0$ $\quad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

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. $\quad A = \pi rl$

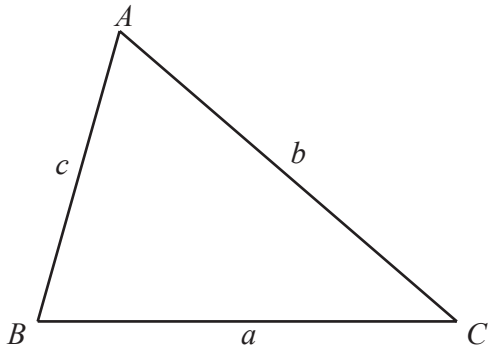
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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



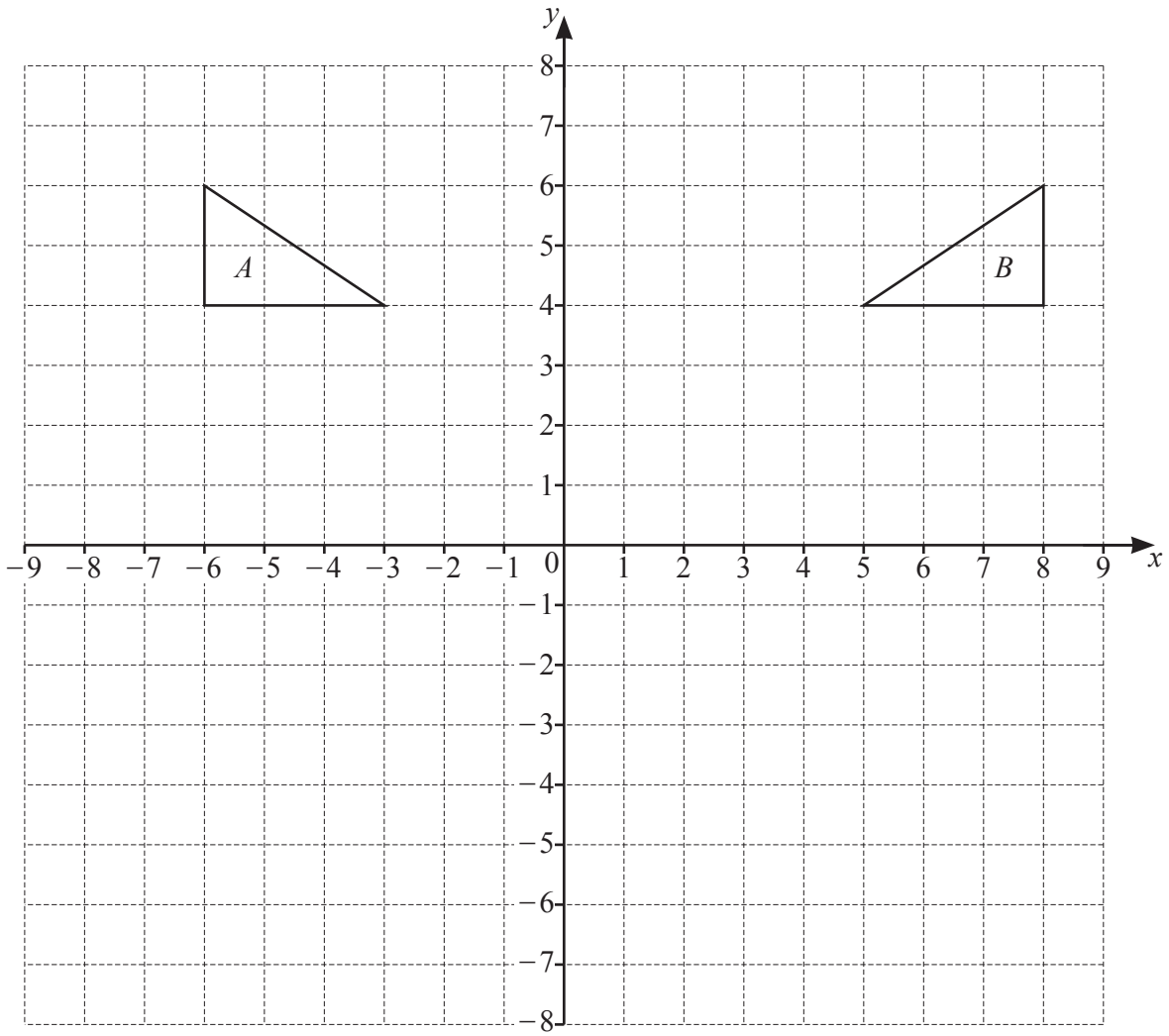
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

Answer **all** the questions.

1



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

.....

..... [2]

(b) Rotate **triangle *B*** through 90° clockwise with centre of rotation (1, 0).
Draw this triangle and label it *C*. [2]

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

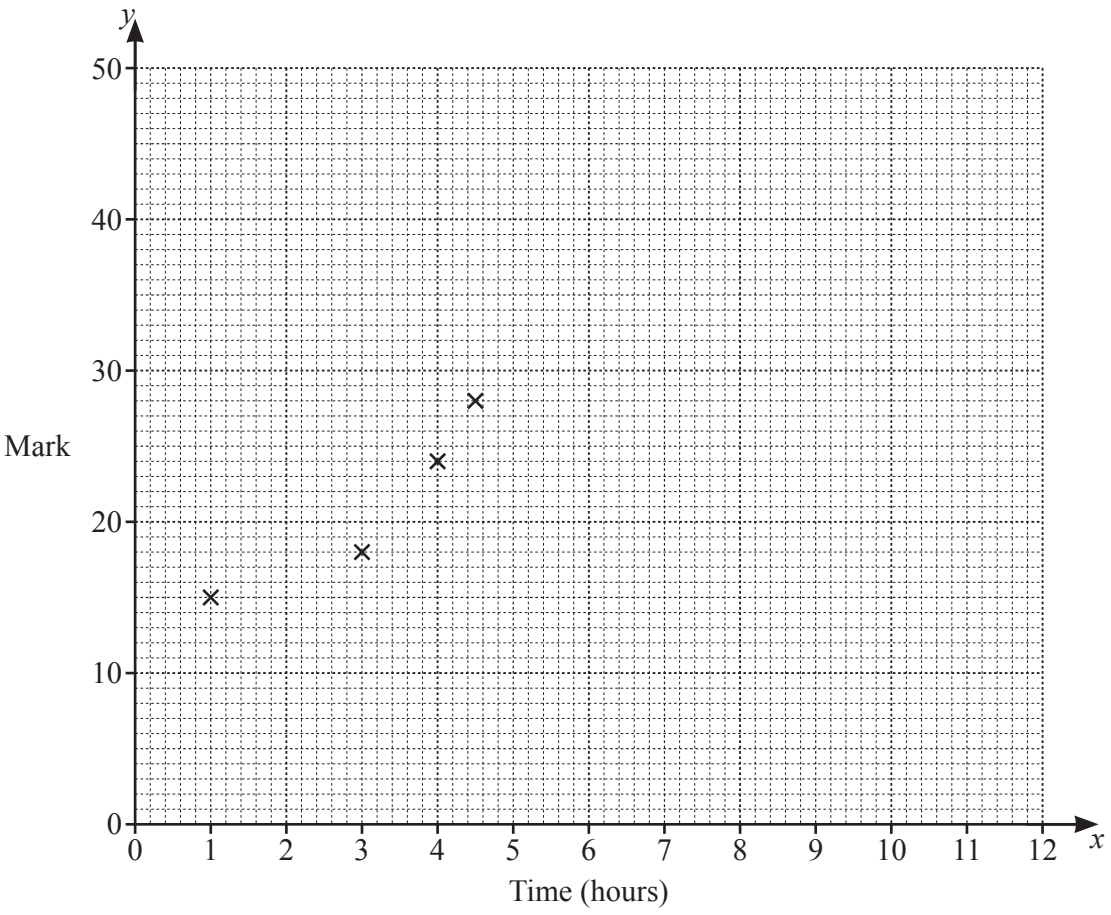
.....

..... [2]

2 The number of hours, x, spent revising and the mark scored, y, in an examination for each of 10 students are shown in the table.

Time, x hours	1	3	4.5	4	6	4	5.5	6	12	8
Mark, y	15	18	28	24	28	30	38	40	43	48

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



[2]

(ii) Write down the type of correlation shown by the scatter diagram.

..... [1]

(b) Find the mean mark.

..... [1]

(c) **(i)** Find the equation of the regression line for y in terms of x.
Give your answer in the form $y = mx + c$.

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

(ii) The value for m represents a connection between time and mark.

Write down the units of m.

..... [1]

(d) Use your answer to **part (c)(i)** to estimate

(i) the mark scored for a student who revised for 10 hours,

..... [1]

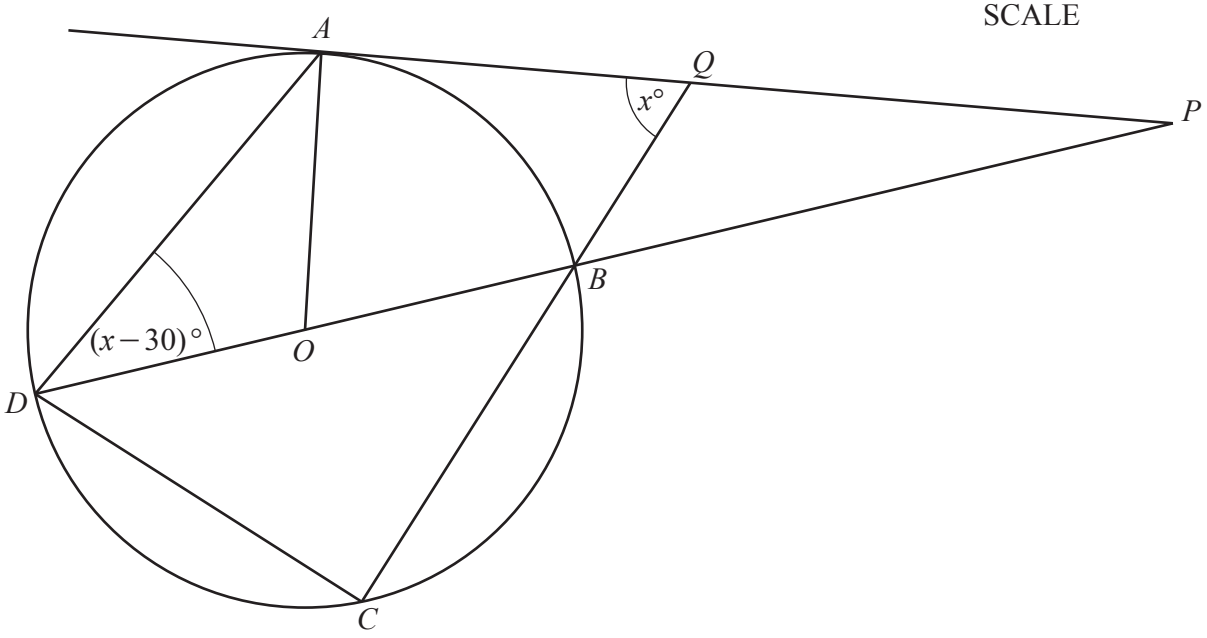
(ii) the number of hours spent revising for a student to score a mark of 36.

..... [1]

[Turn over

3

NOT TO SCALE



A, *B*, *C* and *D* lie on a circle centre *O*.
PQA is a tangent to the circle.
QBC and *PBOD* are straight lines.

Angle $BQA = x°$ and angle $ODA = (x - 30)°$.

Find, in terms of x, expressions for each of the following angles.
Give each answer in its simplest form.

(a) angle *BOA*

Angle *BOA* = ... [1]

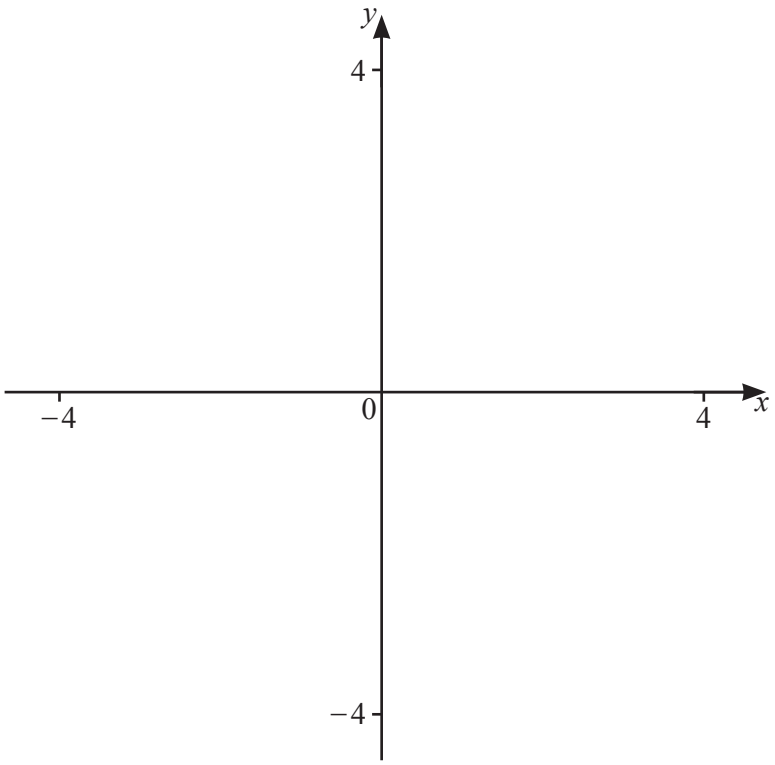
(b) angle *QBO*

Angle *QBO* = ... [3]

(c) angle *CDB*

Angle *CDB* = ... [3]

4



(a) On the diagram, sketch the graph of $y = \mathrm{f}(x)$, where

$\mathrm{f}(x) = 4 - |2x|$ for values of x between -4 and 4. [3]

(b) Write down the x-coordinates of the points where the graph meets the x-axis.

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

(c) On the diagram, sketch the graph of $y = \mathrm{g}(x)$, where

$\mathrm{g}(x) = 0.25x^2$ for values of x between -4 and 4. [2]

(d) Write down the equation of the line of symmetry of the graph of $y = \mathrm{g}(x)$.

..... [1]

(e) Find the value of the x-coordinate of each point of intersection of the two graphs.

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

(f) On your diagram shade the region defined by

$\mathrm{f}(x) \geqslant \mathrm{g}(x)$. [1]

5 **(a)** Alenia, Bob and Cara share some money in the ratio 5 : 3 : 4 .
Alenia's share is \$1240.

(i) Show that Bob's share is \$744.

[1]

(ii) Cara spends \$$x$ from her share.
The ratio of Bob's money : Cara's money is now 4 : 3 .

Find the value of x.

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

(b) A shop has a sale and all prices are reduced by 20%.

(i) Bob buys a coat.
The original price of the coat was \$92.

Work out the sale price of the coat.

\$ ..... [2]

(ii) Cara buys a jacket in the sale for \$132.

Work out the original price of the jacket.

\$ ..... [2]

(c) On 1 January 2022 Alenia buys a scooter for $1240.
On 1 January 2023 the value of the scooter is reduced by 18%.
On 1 January 2024 the value of the scooter is reduced by 12% of its 1 January 2023 value.

(i) Calculate the value of the scooter on 1 January 2024.

$ ..... [3]

(ii) After 1 January 2024, the value of the scooter is reduced by 12% each year.

Find the year in which the value of the scooter on 1 January will first be below $310.

..... [4]

6 The lifetimes, x hours, of 80 electric light bulbs are shown in the table.

Lifetime (x hours)	Frequency
$850 < x \leqslant 870$	4
$870 < x \leqslant 890$	6
$890 < x \leqslant 900$	12
$900 < x \leqslant 920$	18
$920 < x \leqslant 940$	16
$940 < x \leqslant 950$	20
$950 < x \leqslant 1000$	4

(a) Calculate an estimate of the mean lifetime.

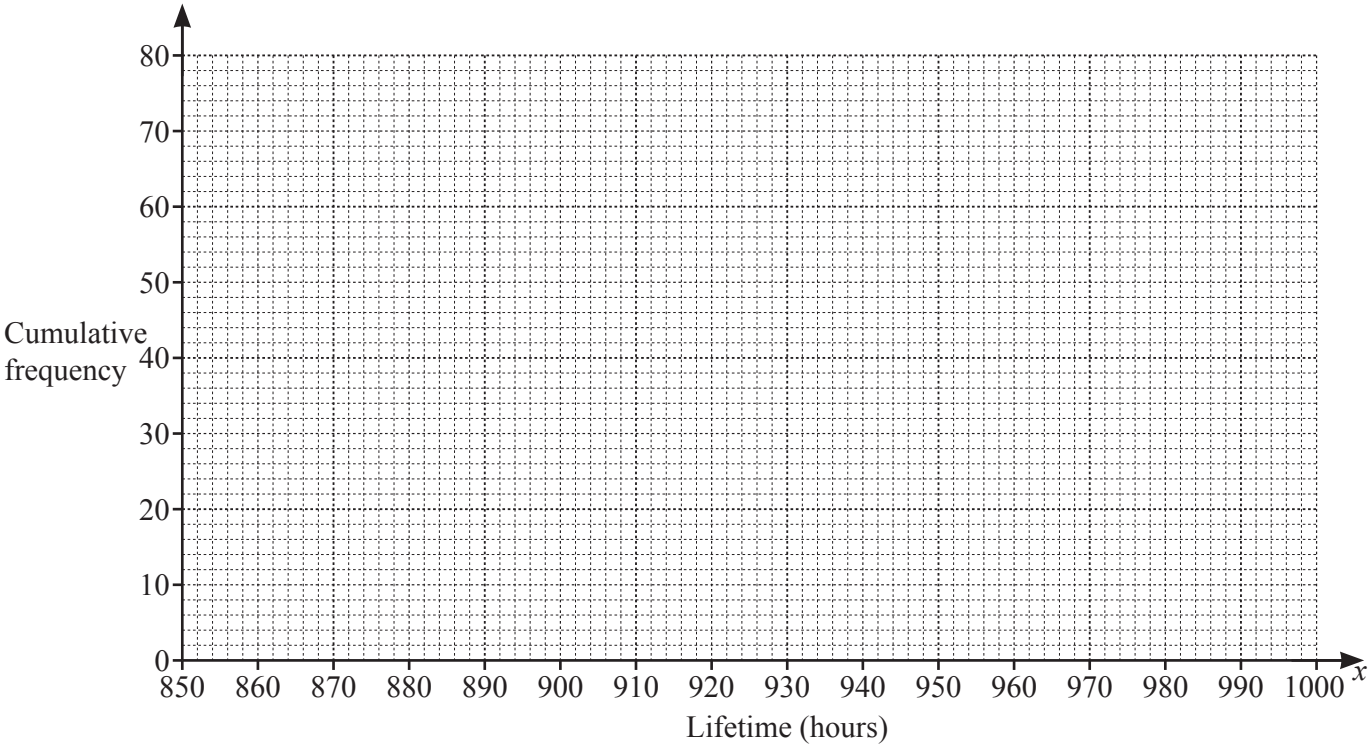
..... h [2]

(b) Complete the cumulative frequency table.

Lifetime (x hours)	Cumulative frequency
$x \leqslant 870$	4
$x \leqslant 890$	
$x \leqslant 900$	
$x \leqslant 920$	
$x \leqslant 940$	
$x \leqslant 950$	
$x \leqslant 1000$	80

[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 median lifetime,

..... h [1]

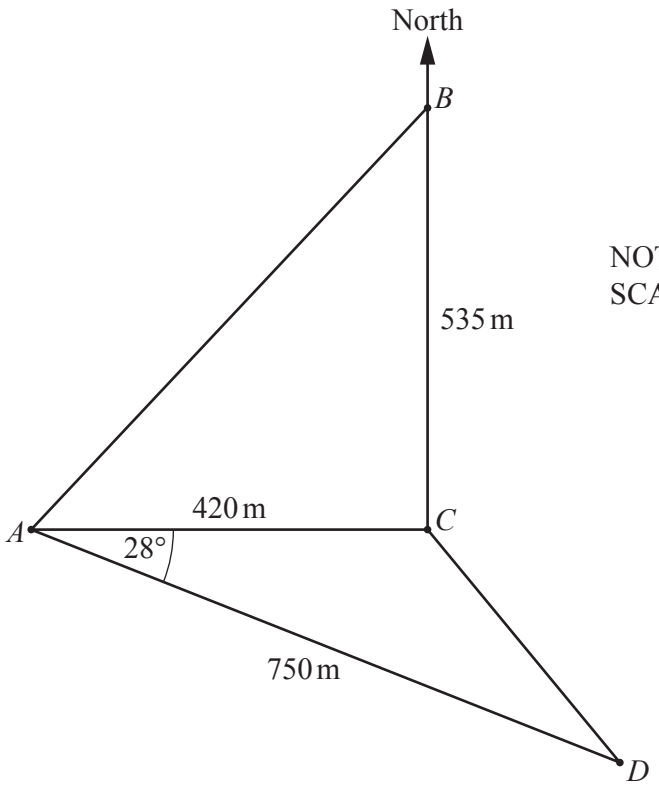
(ii) the interquartile range.

..... h [2]

(e) Find the percentage of bulbs that have a lifetime of more than 900 hours.

..... % [2]

7



The diagram shows four points A, B, C and D.
B is due north of C and C is due east of A.
$AC = 420$ m, $AD = 750$ m, $BC = 535$ m and angle $CAD = 28°$.

(a) Find the bearing of

(i) D from A,

..... [1]

(ii) A from D.

..... [1]

(b) Calculate AB.

$AB =$ ..... m [2]

(c) Calculate CD.

$CD =$ ..... m [3]

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

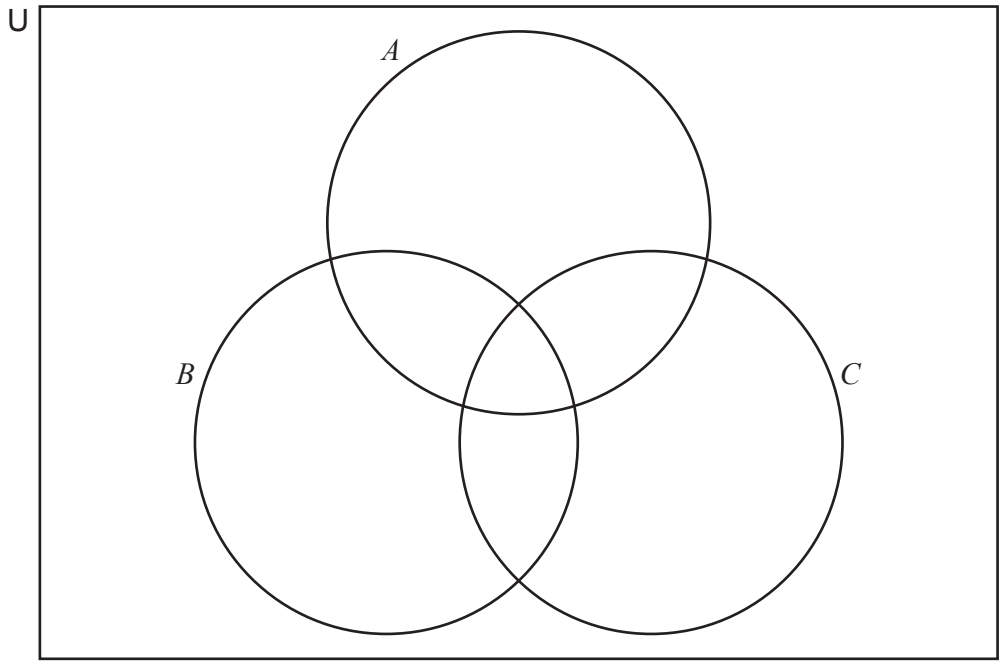
..... m^2 [3]

(e) Angle ACD is obtuse.

Find the bearing of D from C.

..... [4]

8 The Venn diagram shows the sets A, B and C.



U = {integers from 10 to 20, including 10 and 20}

A = {prime numbers}

B = {multiples of 3}

C = {multiples of 4}

(a) List the elements of set A.

..... [1]

(b) Write all the elements of U in the correct parts of the Venn diagram. [2]

(c) List the elements of $(A \cup B)'$.

..... [1]

(d) Find $\mathrm{n}((A \cup B) \cap C')$.

..... [1]

9 Find the next term and the nth term in each of the following sequences.

(a) 100, 91, 82, 73, 64, ...

Next term = ...

nth term = ... [3]

(b) 64, −32, 16, −8, 4, ...

Next term = ...

nth term = ... [3]

(c) −1, 8, 21, 38, 59, ...

Next term = ...

nth term = ... [3]

10 (a) $P = \dfrac{(x+3)y}{5}$

Work out the value of P when $x = -18$ and $y = 28$.

$P =$ ..... [3]

(b) Simplify fully.

$$\frac{5y}{2x} \times \frac{4x}{3}$$

..... [2]

(c) Factorise fully.

(i) $15ab - 25bc$

..... [2]

(ii) $6x^2y^5 - 16x^3y^3$

..... [2]

(iii) $6cd - 3 - 9d + 2c$

..... [2]

(d) Make x the subject of the formula.

$$3ax = 1 - \frac{2x}{a+2}$$

$x =$ ..... [4]

(e) Solve the inequality.

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

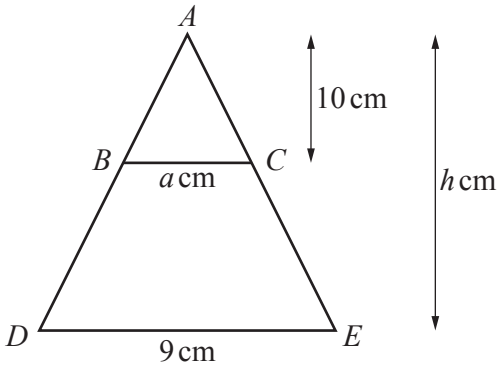
..... [3]

11 **(a)** A pyramid has a square base with sides of length 9 cm and vertical height h cm.

Find an expression, in terms of h, for the volume of the pyramid.

..... cm^3 [1]

(b)



NOT TO SCALE

ADE is an isosceles triangle.
BC is parallel to DE, $BC = a$ cm and $DE = 9$ cm.
The vertical height of triangle ADE is h cm and the vertical height of triangle ABC is 10 cm.

Show that $a = \frac{90}{h}$

[1]

(c) A square-based pyramid with base of side 9 cm and vertical height h cm contains some water.

When the pyramid is placed on level ground the surface of the water is 10 cm below the vertex of the pyramid (see Diagram 1).

When the pyramid stands vertically on its vertex, the surface of the water is 1 cm below the base of the pyramid (see Diagram 2).

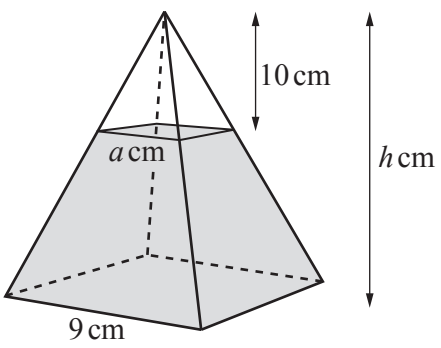


Diagram 1

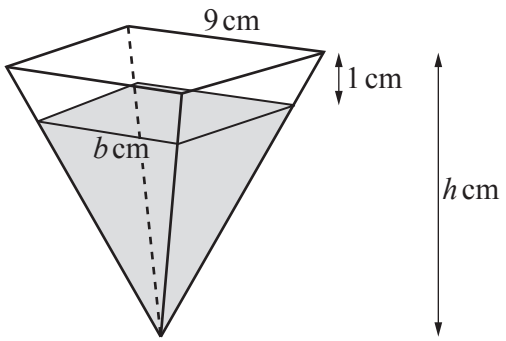


Diagram 2

(i) Use Diagram 1 to find an expression, in terms of a and h, for the volume of the water.

..... cm^3 [1]

(ii) Use Diagram 2 to find an expression, in terms of b and h, for the volume of the water.

..... cm^3 [1]

(iii) Show that $h^3 - 1000 = (h-1)^3$.

[3]

(iv) The equation $h^3 - 1000 = (h-1)^3$ simplifies to $h^2 - h - 333 = 0$.

Use a graphical method to find the value of h.

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

Question 12 is printed on the next page.

12 A bag contains 7 red balls, 4 blue balls and 1 green ball.
In an experiment, three balls are chosen at random without replacement.

(a) Find the probability that the three balls chosen are

(i) all green,

..... [1]

(ii) all red,

..... [2]

(iii) two red and one blue.

..... [3]

(b) This experiment is to be carried out 2640 times.

Use your answer from **part (a)(ii)** to find the expected frequency of 3 red balls being chosen.

..... [1]