UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

9202671358

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/04**

Paper 4 (Extended) **October/November 2010**

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, highlighters, glue or correction fluid.
You may use a 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.

For Examiner's Use

This document consists of **18** printed pages and **2** blank 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. $\quad A = \pi rl$

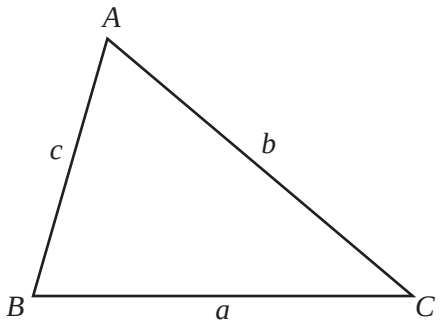
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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

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 A train from Picton to Christchurch leaves Picton at 13 00.
The length of the journey is 340 km.

(a) The train arrives at Christchurch at 18 21.
Show that the average speed is 63.55 km/h, correct to 2 decimal places.

[4]

(b) One day the weather is bad and the average speed of 63.55 km/h is reduced by 15 %.

(i) Calculate the new average speed.

Answer(b)(i) ..... km/h [2]

(ii) Calculate the new time of arrival at Christchurch.
Give your answer to the nearest minute.

Answer(b)(ii) ..... [3]

2 **(a)** **(i)** Find the value of $2^7 \times 3^6$.

Answer(a)(i) ..... [1]

(ii) Write your answer to **part (i)** in standard form.

Answer(a)(ii) ..... [1]

(b) Find the value of $\frac{1}{\sqrt{(22)^3}}$, giving your answer in standard form.

Answer(b) ..... [2]

(c) $m^5 = 2000$.
Find the value of m.

Answer(c) ..... [1]

(d) $5^n = 2000$.
Find the value of n.

Answer(d) ..... [2]

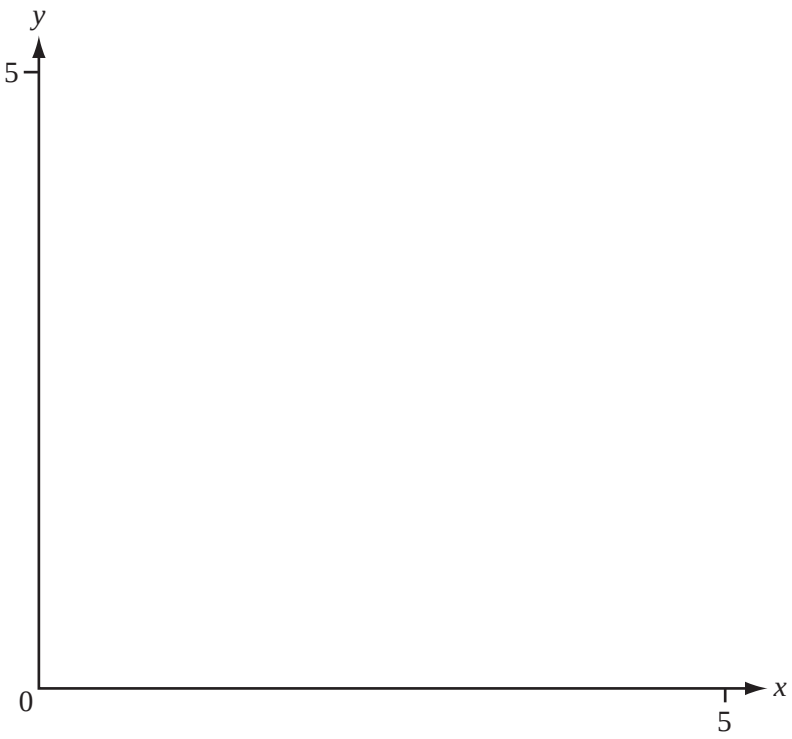
3 **(a)** Solve the equation $x^2 + 2x - 4 = 0$.
Give your answers correct to 2 decimal places.

Answer(a) $x =$ ..... or $x =$ ..... [3]

(b) Solve the inequality $x^2 + 2x - 4 \leqslant 0$.

Answer(b) ..... [2]

4



(a) On the diagram above, **sketch** the lines

(i) $x + y = 5$, [1]

(ii) $y = 1$, [1]

(iii) $y = 2x$. [1]

(b) Write R in the region where $x \geqslant 0$, $y \geqslant 1$, $y \geqslant 2x$ and $x + y \leqslant 5$. [1]

5 The numbers of passengers in 72 taxis arriving at a city centre were recorded.

The table shows the results.

Number of passengers	1	2	3	4	5	6
Frequency	7	27	19	8	9	2

(a) Find

(i) the range,

Answer(a)(i) ..... [1]

(ii) the mode,

Answer(a)(ii) ..... [1]

(iii) the median,

Answer(a)(iii) ..... [1]

(iv) the mean,

Answer(a)(iv) ..... [1]

(v) the upper quartile.

Answer(a)(v) ..... [1]

(b) The probability that a taxi, chosen at random, had n passengers is $\frac{3}{8}$.

Find the value of n.

Answer(b) ..... [2]

(c) **(i)** A taxi was chosen at random.

Calculate the probability that it had 5 passengers.
Give your answer as a fraction, in its lowest terms.

Answer(c)(i) ..... [2]

(ii) Later, when 360 taxis have arrived at the city centre, how many would be expected to have 5 passengers?

Answer(c)(ii) ..... [1]

6 **(a)** Potatoes cost \$$t$ per kilogram and carrots cost \$$(3t - 1)$ per kilogram.
The **total cost** of 20 kg of potatoes and 8 kg of carrots is \$42.60.

Find the value t.

Answer(a) ..... [3]

(b) Peas cost \$$y$ per kilogram and beans cost \$$(y + 2)$ per kilogram.
Anna spends \$15 on peas and \$9 on beans.
The **total mass** of the peas and the beans is 8 kg.

(i) Write an equation in terms of y and show that it simplifies to $4y^2 - 4y - 15 = 0$.

[4]

(ii) Factorise the expression $4y^2 - 4y - 15$.

Answer(b)(ii) ..... [2]

(iii) Find the cost of 1 kg of peas.

Answer(b)(iii) \$ ..... [1]

7 $f(x) = \sin x°$ $g(x) = 2\sin x°$ $h(x) = 3\sin(4x)°$ $k(x) = \sin(x +$

(a) Write down the domain of $f(x)$.

Answer(a) ..... [1]

(b) Write down the amplitude and period of $h(x)$.

Answer(b) Amplitude = ...

Period = ... [2]

(c) Describe fully a **single** transformation that maps the graph of $y = f(x)$ onto the graph of

(i) $y = g(x)$,

.....

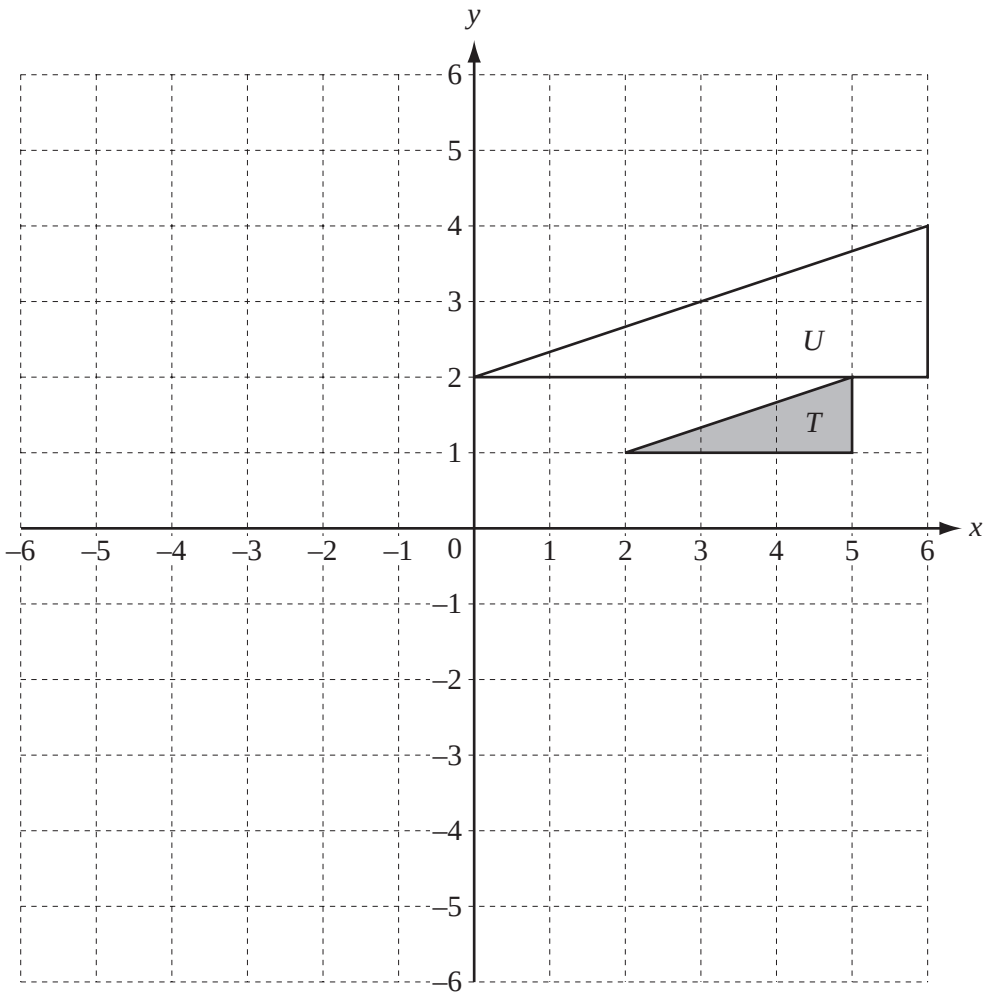
..... [3]

(ii) $y = k(x)$.

.....

..... [2]

8



(a) On the grid,

(i) draw the translation of triangle T by $\begin{pmatrix} -6 \\ 3 \end{pmatrix}$, [2]

(ii) draw the reflection of triangle T in the line $y = -x$. [2]

(b) Describe fully the **single** transformation that maps triangle T onto triangle U.

.....

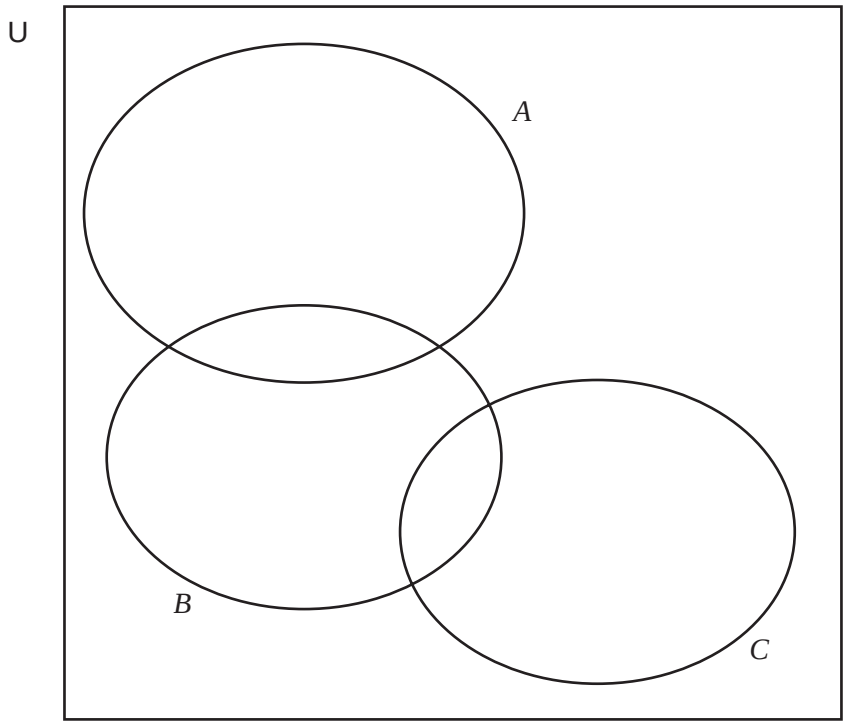
..... [3]

(c) Write down the inverse of the transformation in **part (a)(i)**.

.....

..... [2]

9



U = {prime numbers less than 20}
A = {factors of 12}
B = {factors of 70}
C = {factors of 91}

(a) List the 8 elements of set U.
(1 is **not** a prime number.)

Answer(a) {.....} [1]

(b) Write all the elements of U in the correct parts of the Venn diagram above. [3]

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

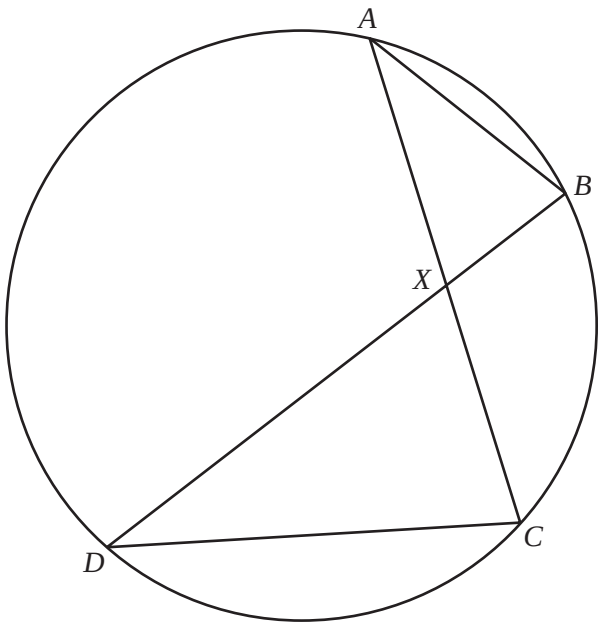
Answer(c) {.....} [1]

(d) Write down the value of $n((B \cup C) \cap A')$.

Answer(d)..... [1]

(e) On the Venn diagram, shade the region $B \cap A' \cap C'$. [1]

10 (a)



NOT TO SCALE

A, B, C and D lie on a circle.
AC and BD intersect at X.

(i) Explain why triangles ABX and DCX are similar.

.....

.....

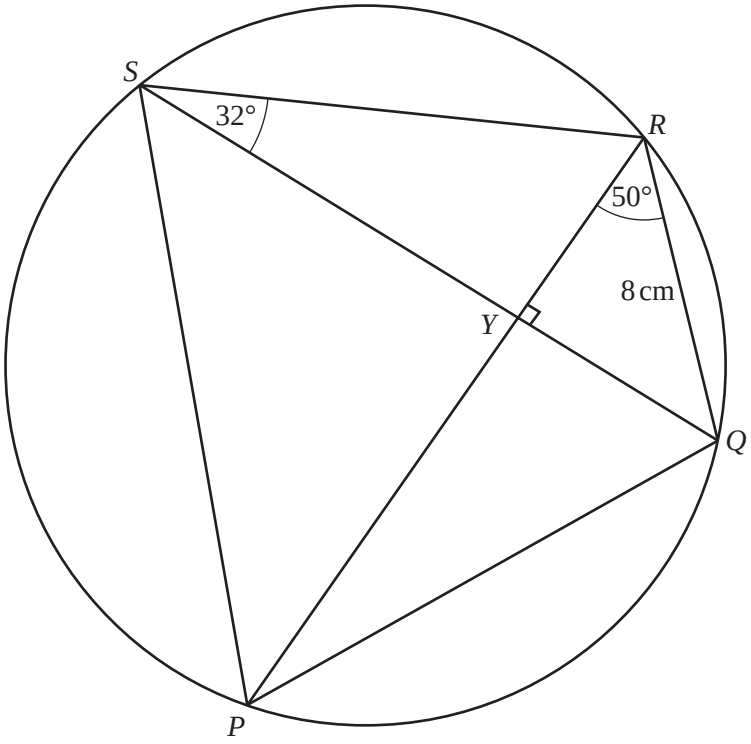
..... [3]

(ii) $BX = 2$ cm, $CX = 4$ cm and the area of triangle ABX is 4.5 cm^2.

Calculate the area of triangle DCX.

Answer(a)(ii) ..... cm^2 [2]

(b)



NOT TO SCALE

PQRS is a cyclic quadrilateral.
Angle *RSQ* = 32° and angle *PRQ* = 50°.

(i) Find angle *PSQ*.

Answer(b)(i) ..... [1]

(ii) Calculate angle *PQR*.

Answer(b)(ii) ..... [2]

(iii) *PR* and *QS* intersect at right angles at *Y* and *QR* = 8 cm.

Calculate the length of *RY*.

Answer(b)(iii) ..... cm [2]

(iv) Write down the size of the radius of the circle that can be drawn through *Q*, *R* and *Y*.

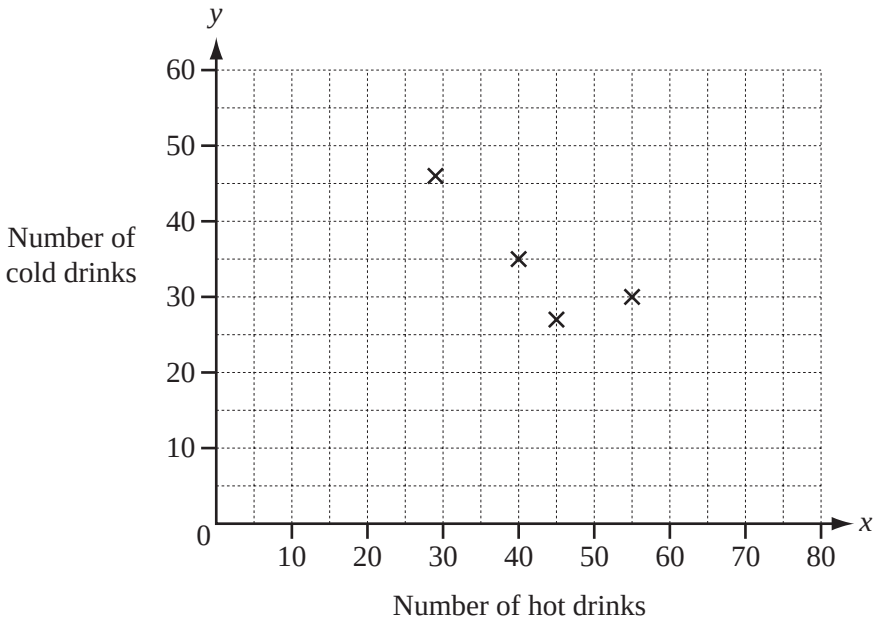
Answer(b)(iv) ..... cm [1]

11 During one week a café records the number of hot drinks (x) and cold drinks (y) it sells each d

The table shows the results.

Day	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Number of hot drinks (x)	55	29	40	45	65	80	60
Number of cold drinks (y)	30	46	35	27	20	15	25

(a) Complete the scatter diagram by plotting the points for Friday, Saturday and Sunday.
The first four points have been plotted for you.



[2]

(b) Describe any correlation between x and y.

.....

[1]

(c) **(i)** Find the equation of the line of regression, giving y in terms of x.

Answer(c)(i) $y =$ .....

[2]

(ii) 50 hot drinks are sold on one day in the following week.
How many cold drinks would you expect to be sold on this day?

Answer(c)(ii) .....

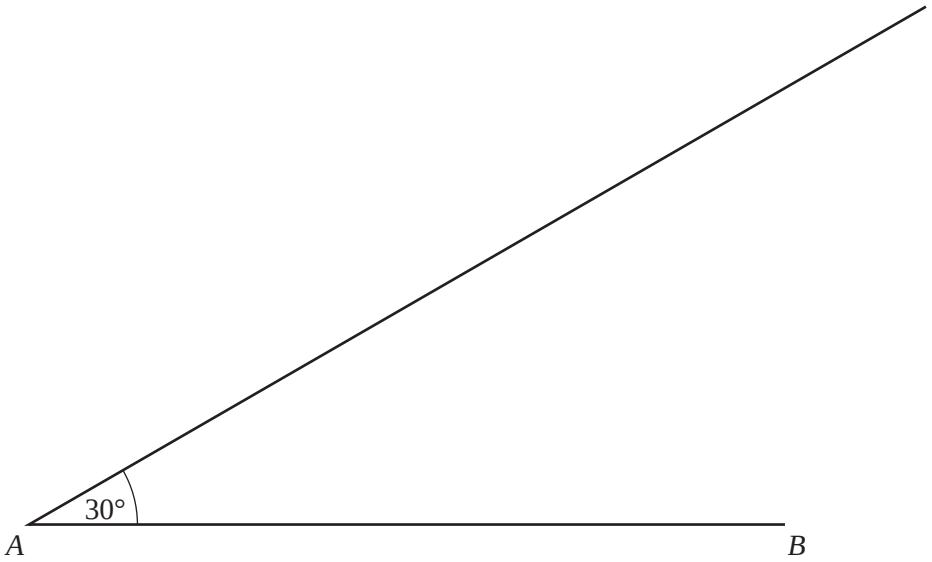
[2]

12 In triangle ABC, $AB = 10$ cm, $BC = 6$ cm and angle $BAC = 30°$.

(a) Calculate the **sine** of angle ACB.
Give your answer correct to 4 decimal places.

Answer(a) ..... [3]

(b) To draw triangle ABC accurately, the line AB and an angle 30° have been drawn.



(i) On the diagram, mark the two possible positions of C, so that $BC = 6$ cm.
Label them C_1 and C_2. [2]

(ii) **Use your answer to part (a)** to calculate the sizes of angle AC_1B and angle AC_2B.
Give your answers correct to 1 decimal place.

Answer(b)(ii) angle AC_1B = ...

angle AC_2B = ... [2]

(iii) Calculate the size of angle C_1BC_2.

Answer(b)(iii) angle C_1BC_2= ..... [1]

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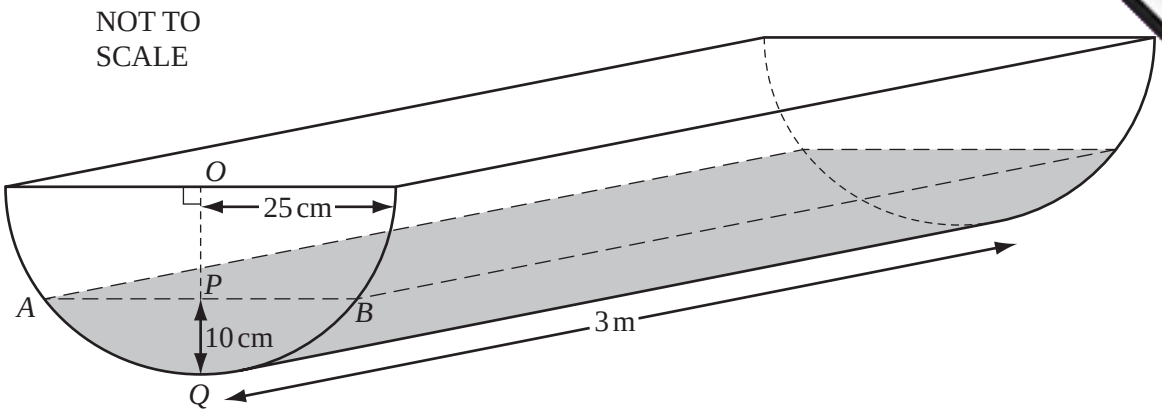

The diagram shows a water trough in the shape of a prism.

The cross-section is a semicircle, centre O, radius 25 cm.

The length of the trough is 3 **metres**.

(a) Calculate the area of the semicircle.

Answer(a) ..... cm^2 [2]

(b) Calculate the volume of the trough, giving your answer in cm^3.

Answer(b) ..... cm^3 [2]

(c) The diagram also shows water in the trough.
The depth PQ is 10 cm.
AB is horizontal and OPQ is vertical.

(i) Calculate angle AOB.

Answer(c)(i) ..... [3]

(ii) Calculate the area of triangle AOB.

Answer(c)(ii) ..... cm^2 [2]

(iii) Calculate the area of the sector AOB.

Answer(c)(iii) ..... cm^2 [2]

(iv) Calculate the shaded area $APBQ$.

Answer(c)(iv) ..... cm^2 [1]

(v) Calculate the volume of water in the trough.
Give your answer in litres.

Answer(c)(v) ..... litres [2]

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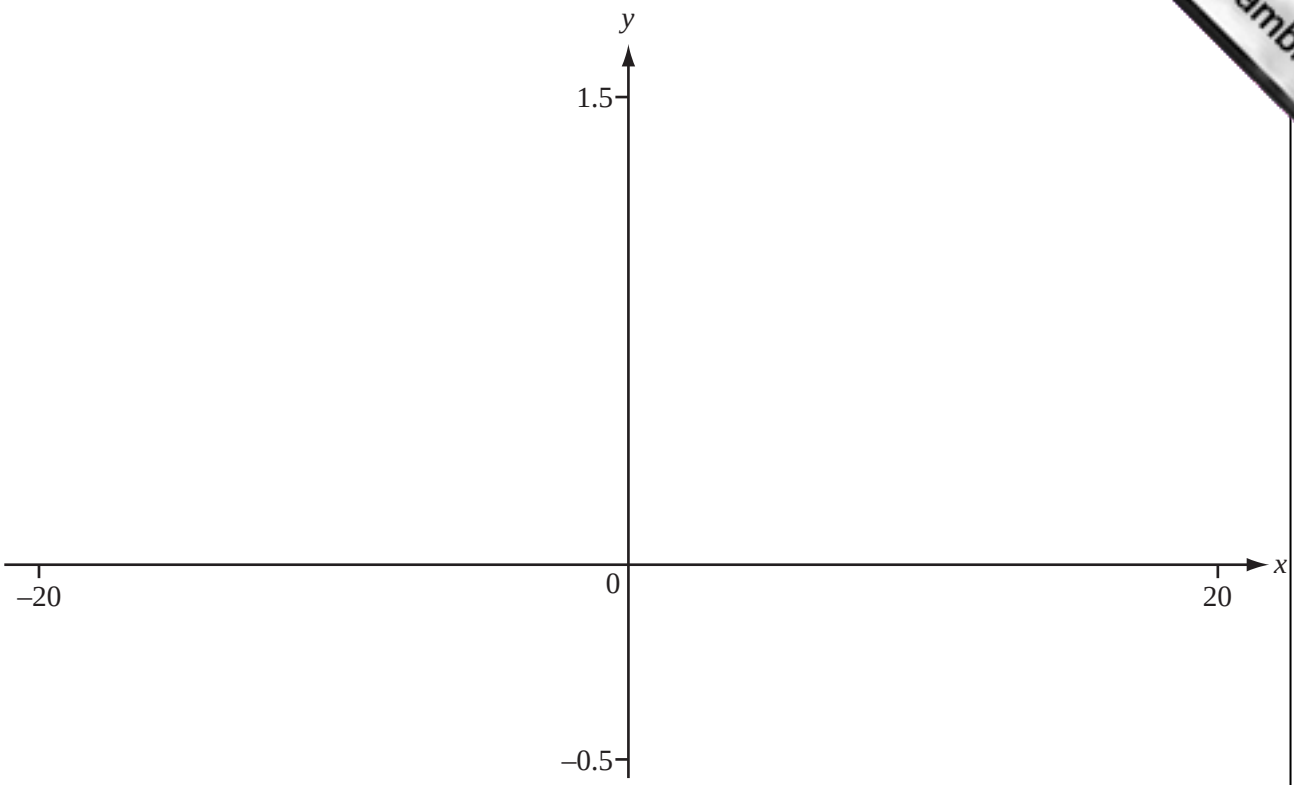

$$f(x) = \frac{x^2 + 1}{x^2 + 2x + 6}$$

(a) On the axes above, sketch the graph of $y = f(x)$ for $-20 \leqslant x \leqslant 20$.
(Note that $-0.5 \leqslant y \leqslant 1.5$) [3]

(b) Find the co-ordinates of the local maximum point.

Answer(b) (..... , ...) [2]

(c) Find the range of $f(x)$.

Answer(c) ..... [3]

(d) The graph has one asymptote.

Write down the equation of this asymptote.

Answer(d) ..... [1]

(e) Solve the equation $\frac{x^2 + 1}{x^2 + 2x + 6} = \frac{x + 5}{5}$.

Answer(e) $x =$ ..... [2]

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