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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **May/June 2012**

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 **20** printed pages.

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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. $\quad A = \pi rl$

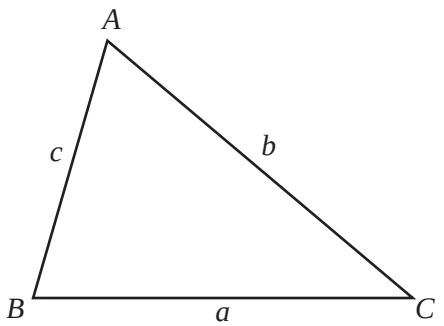
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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



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

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

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

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Answer **all** the questions.

1 **(a)** A farmer sows 600 tomato seeds.
85% of the seeds grow into plants.

Find the number of seeds that grow into plants.

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

(b) **(i)** The farmer sows 20 000 carrot seeds.
17 500 of these seeds grow into plants.

Calculate the percentage which did **not** grow into plants.

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

(ii) In one season the farmer sells 161.2 tonnes of carrots.
This is 4% more than he expected to sell.

Calculate the number of tonnes he expected to sell.

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

(c) The farmer sows broccoli seeds, cabbage seeds and pumpkin seeds in the ratio

broccoli seeds : cabbage seeds : pumpkin seeds = 2 : 5 : 7 .

The total number of seeds sown is 8 400.

Find the number of cabbage seeds sown.

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

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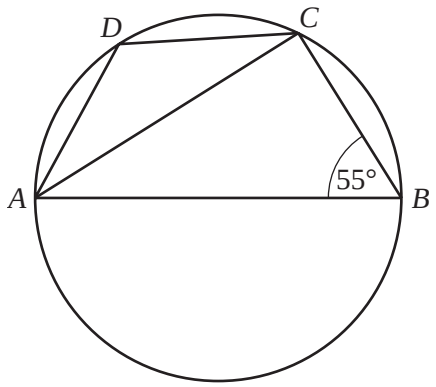
2 **(a)**



NOT TO SCALE

C and *D* are points on the circumference of a circle.
AB is a diameter of the circle and angle *ABC* = 55°.

Find

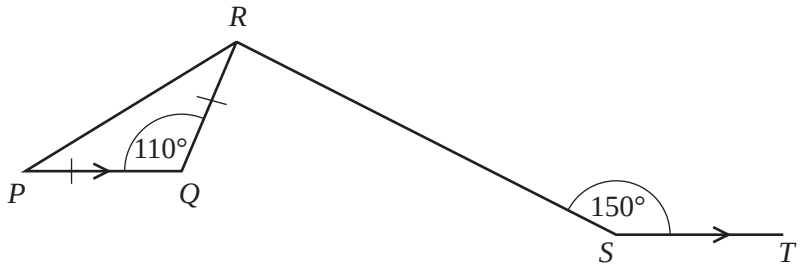
(i) angle *ADC*,

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

(ii) angle *CAB*.

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

(b)



NOT TO SCALE

In the diagram angle *PQR* = 110° and angle *RST* = 150°.
PQ = *QR* and *PQ* is parallel to *ST*.

Find

(i) angle *PRQ*,

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

(ii) angle *QRS*.

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

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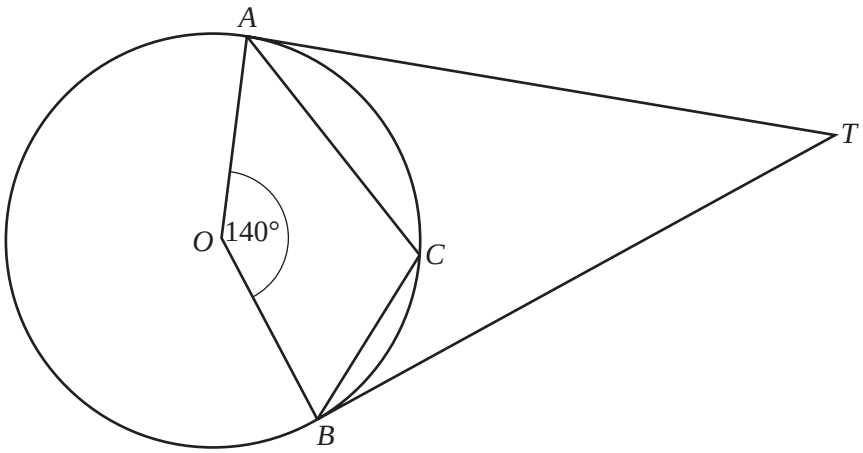
(c)



NOT TO SCALE

TA and *TB* are tangents to a circle centre *O*.
C is a point on the circumference and angle *AOB* = 140°.

(i) Find angle *ATB*.

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

(ii) Find angle *ACB*.

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

(iii) On the diagram, draw the chord *AB*.

The radius of the circle is 5 cm.
Calculate the length of the chord *AB*.

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

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3 In a scientific experiment the following six masses, in grams, were recorded.

9.6×10^{-5} 1.01×10^{-4} 9.3×10^{-5} 1.04×10^{-4} 1.03×10^{-4} 9.8×10^{-5}

(a) Find the median.

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

(b) Find the range.

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

(c) Calculate the mean.
Give your answer correct to 2 significant figures.

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

(d) Another mass, x grams, is recorded.
The mean of the seven masses is now 1.0×10^{-4} g.

Find the value of x.

Answer(d) $x =$ ..... g [3]

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4 $f(x) = x^2 - 5$ $g(x) = x - 2$

(a) Find the value of $f(-2)$.

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

(b) Solve $f(x) = 4$.

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

(c) Show that $f(g(x)) = x^2 - 4x - 1$.

[2]

(d) Solve $f(g(x)) = f(x)$.

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

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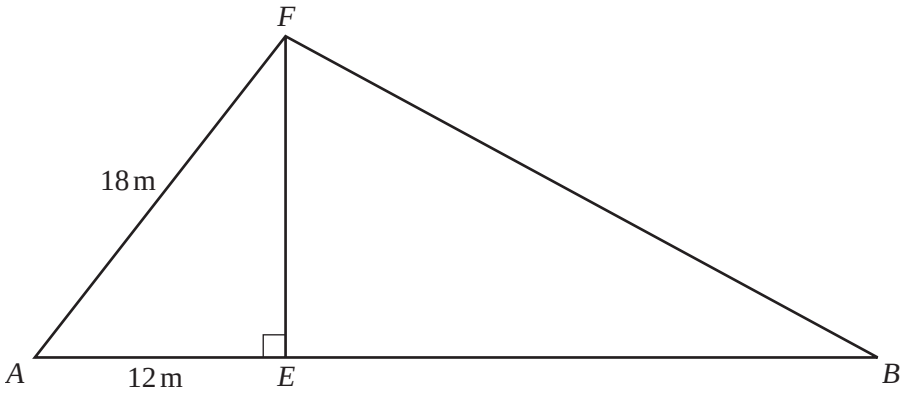
5



NOT TO SCALE

EF is a vertical flagpole.
Two ropes, *AF* and *BF*, keep the flagpole in position.
The points *A*, *E* and *B* all lie in a straight line on horizontal ground.
AF = 18 m and *AE* = 12 m.

(a) **(i)** Calculate the height of the flagpole, *EF*.

Answer(a)(i) ..... m [2]

(ii) Calculate the size of angle *FAE*.

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

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(b) Angle $FAE = 2 \times$ angle FBE.

Show that $BE = 30.0$ m, correct to 1 decimal place.

[3]

(c) Calculate the length of rope, BF.

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

(d) P is on BF so that $BP = 20$ m.
Another rope, EP, joins E to P.

Use the cosine rule to calculate the length of the rope, EP.

Answer(d) ..... m [3]

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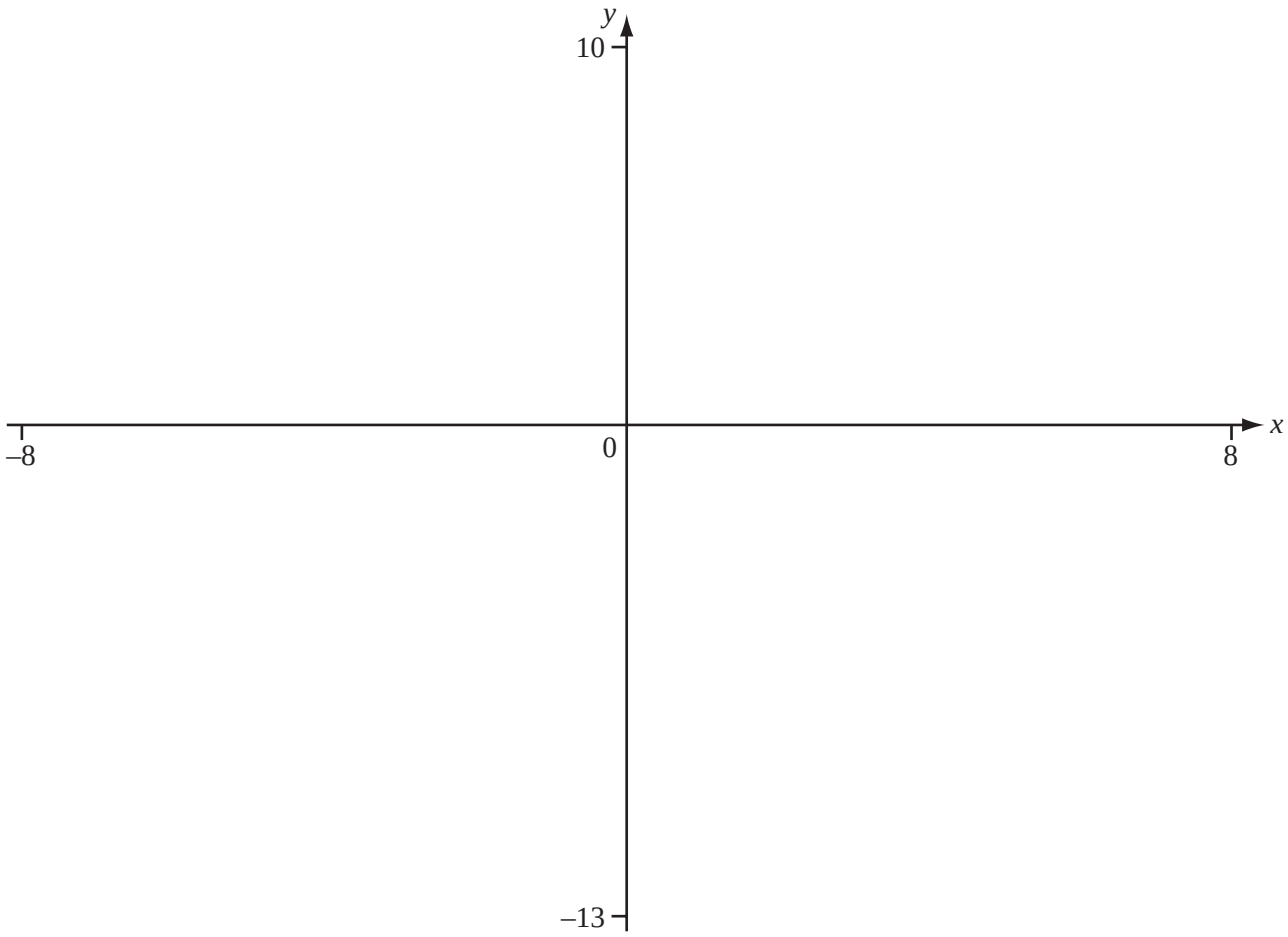
6 $\quad f(x) = \dfrac{x^2 - 5x + 6}{x - 1}$, for $-8 \leqslant x \leqslant 8$.

(a) On the diagram, sketch the graph of $y = f(x)$.



[3]

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

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

(c) Find the range of $f(x)$ for the domain $-8 \leqslant x \leqslant 8$.

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

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(d) Solve $f(x) = 0$.

Answer(d) $x =$ ..... or $x =$ ..... [1]

(e) On the diagram, sketch the graph of $y = 3x - 2$. [2]

(f) Write down the co-ordinates of the points where $\dfrac{x^2 - 5x + 6}{x - 1} = 3x - 2$.

Give each answer correct to 3 decimal places.

Answer(f) (..... , ...)

(..... , ...) [2]

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7 **(a)** Rajiv invests \$525 at x% per year **simple** interest.
After 3 years he has \$588.

Find the value of x.

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

(b) A company's profits increase by 5% each year.
In 2002 the profit was \$10 000.

Find the profit in 2010.
Give your answer correct to the nearest \$100.

Answer(b) \$ ..... [3]

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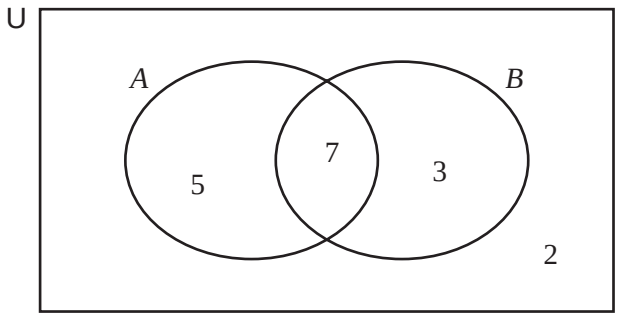
8 **(a)** The Venn diagram shows the number of athletes (A) and the number of basketball players (B) in a class.



Use the Venn diagram to complete the following.

(i) $n(A)$ = ... [1]

(ii) $n(A \cap B')$ = ... [1]

(iii) $n(A \cap B)'$ = ... [1]

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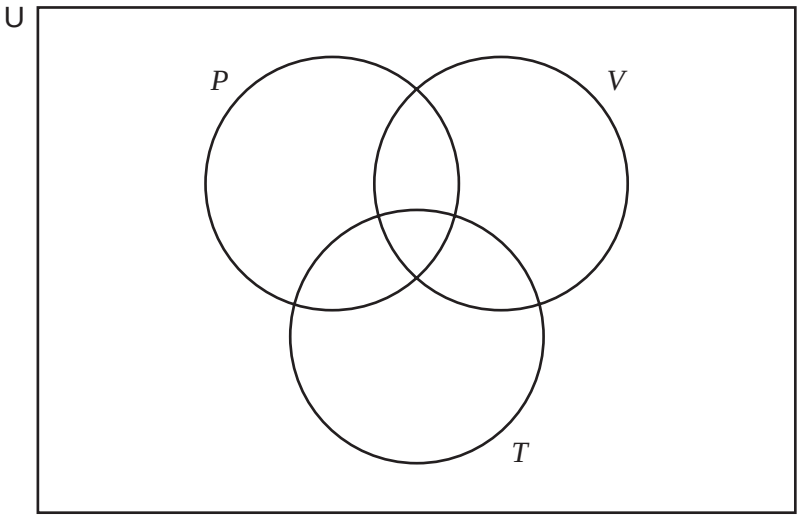
(b) Each student in a school orchestra can play at least one of the piano, the violin and the tru

24 students play the piano
24 students play the violin
13 students play the trumpet
12 students play both the piano and the violin
7 students play both the piano and the trumpet
2 students play both the violin and the trumpet
No student plays all three instruments

(i) Use this information to complete the Venn diagram below where

$P =$ {students who play the piano},
$V =$ {students who play the violin},
$T =$ {students who play the trumpet}.



[3]

(ii) How many students are there in this orchestra?

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

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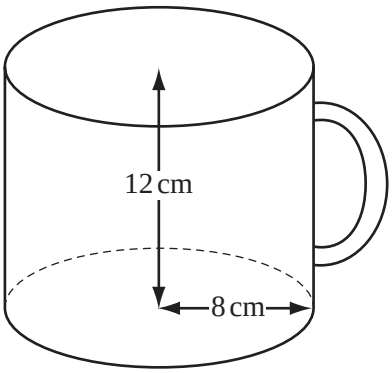

NOT TO SCALE

The diagram shows a large mug in the shape of a cylinder, open at the top.
The internal radius of the mug is 8 cm and the internal height is 12 cm.

(a) Calculate the volume of water the mug holds when filled to the top.

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

(b) Calculate the **total** surface area of the inside of the mug.

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

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(c) 500 cm^3 of water is poured into the mug.

Calculate the depth of water in the mug.
Give your answer in centimetres correct to the nearest millimetre.

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

(d) The mug shown in the diagram is mathematically similar to a smaller mug.
The volume of the smaller mug is $\frac{1}{8}$ of the volume of the larger one.

Find the radius of the smaller mug.

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

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10 The lengths of 30 fish caught in a competition are recorded.
The length of each fish is measured correct to the nearest centimetre.
The results are shown in the ordered stem and leaf diagram.

1	1	1	2	4	5	6	7	8	9
2	0	4	5	7	9				
3	2	6	7	8	9				
4	3	4	6	7	8				
5	2	4	5						
6	3	4	9						

Key 3 | 2 means 32 cm

(a) Find the inter-quartile range.

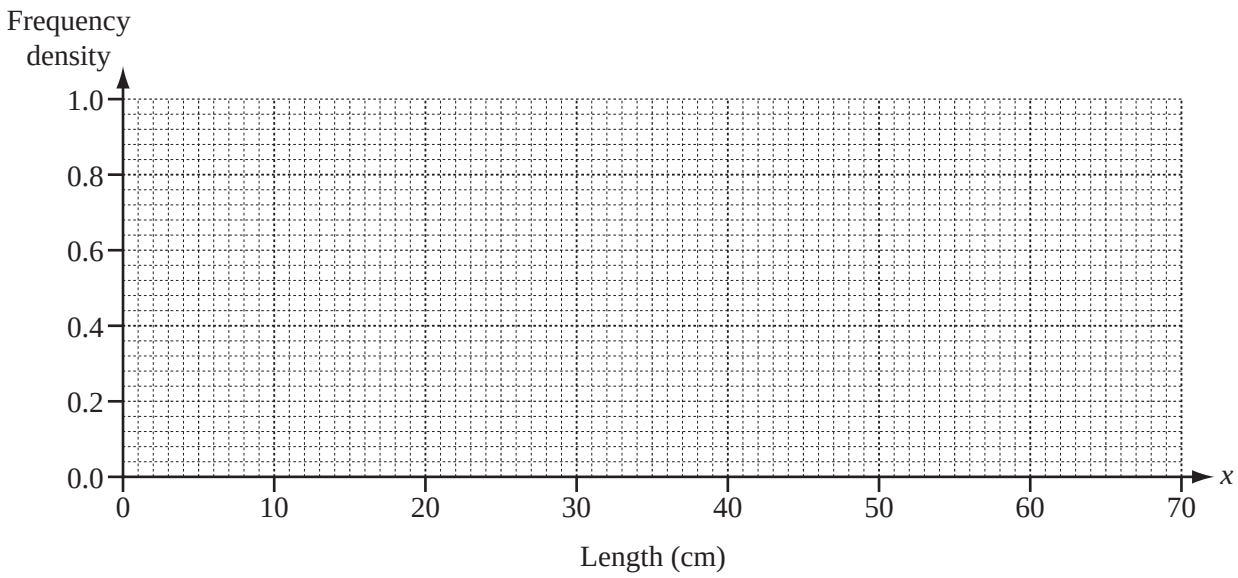
Answer(a) ..... cm [2]

(b) Complete the table for the lengths of the 30 fish.

Class Interval	Frequency	Frequency density
$9.5 \leqslant x < 14.5$		0.8
$14.5 \leqslant x < 19.5$		
$19.5 \leqslant x < 39.5$		
$39.5 \leqslant x < 49.5$		
$49.5 \leqslant x < 69.5$		

[4]

(c) On the grid, draw a histogram to show this information.



[3]

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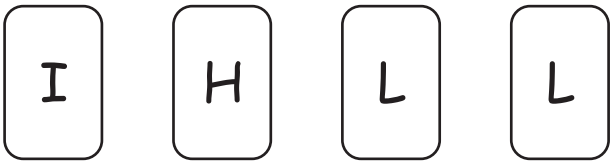
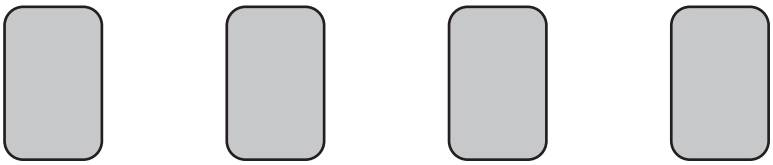
11 Gemma has these four cards.



They are shuffled and placed face down on a table.



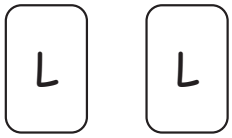
The cards are turned over, one at a time.

Find the probability that,

(a) the first card turned over is

,

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

(b) the first two cards turned over are 

,

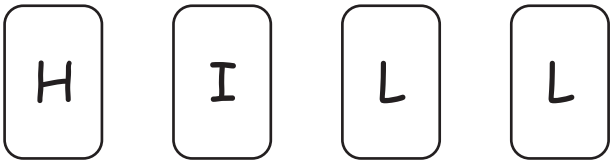
Answer(b) ..... [2]

(c) the **second** card turned over is

,

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

(d) the cards are turned over in this order.



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

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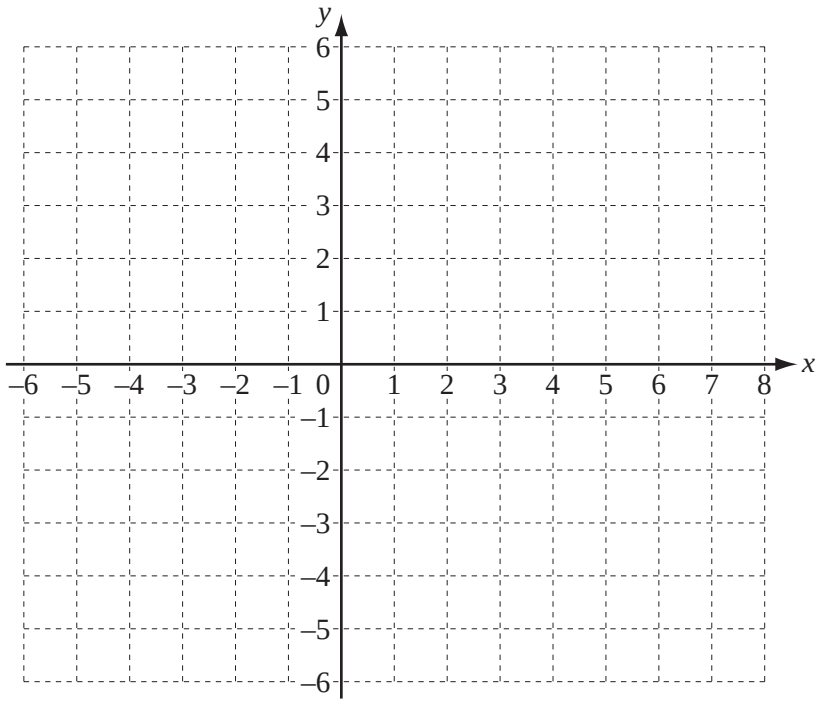
12 A quadrilateral has vertices $P(0, 0)$, $Q(4, 0)$, $R(6, 4)$ and $S(0, 2)$.

(a) On the grid, draw the quadrilateral $PQRS$.



[1]

(b) On the same diagram,

(i) reflect $PQRS$ in $x = 0$, [1]

(ii) translate $PQRS$ using the vector $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$, [2]

(iii) enlarge $PQRS$, centre $(0, 0)$, scale factor $\frac{1}{2}$. [3]

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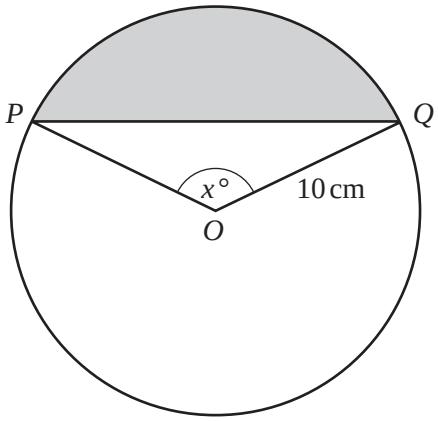

NOT TO SCALE

The diagram shows a circle, centre O, radius 10 cm.
PQ is a chord and angle $POQ = x°$.

(a) Write down, in terms of x and π, an expression for the area of the sector POQ.

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

(b) Write down, in terms of x, an expression for the area of the triangle POQ.

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

(c) Write down, in terms of x and π, an expression for the area of the shaded segment.

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

(d) The area of the **triangle** POQ is 25 cm^2.
Angle POQ is obtuse.

Show that $x = 150$.

[3]

(e) Find the area of the shaded segment.

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

Question 14 is on the next page.

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14 A regular pentagon is drawn inside a circle so that its vertices lie on the circumference of the c
The length of each side of the pentagon is 4 cm.

(a) Sketch a diagram to show this information.

[1]

(b) Calculate the radius of the circle.

Answer(b) ..... cm [4]

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