UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

6816953946

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/04**

Paper 4 (Extended) **May/June 2009**

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 the marks for this paper is 120.

For Examiner's Use

This document consists of **23** printed pages and **1** blank page.

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. $\quad A = \pi rl$

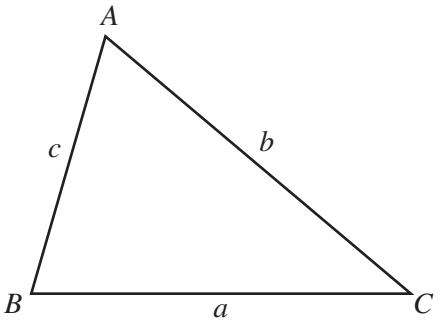
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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.

For Examiner's Use

1 Katharine and Lucas share a gift of \$200 in the ratio

Katharine : Lucas = 11 : 9

(a) Show that Katharine receives \$110.

[2]

(b) Katharine spends \$60.
She then invests the remaining \$50 for 3 years at 5% **simple** interest per year.
Find the amount Katharine has after 3 years.

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

(c) Lucas receives \$90 and spends \$30.
He invests the remaining \$60 for 3 years at 4% **compound** interest per year.
Find the amount Lucas has after 3 years.
Give your answer correct to 2 decimal places.

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

For Examiner's Use

2 Davinia records the shoe sizes of the girls in her class.

Shoe size	35	36	37	38	39	40
Frequency	2	7	6	4	3	2

Find

(a) the mean,

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

(b) the median,

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

(c) the mode,

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

(d) the lower quartile,

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

(e) the inter-quartile range.

Answer (e) ..... [1]

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3 **(a)** Factorise completely $2x + 4y + px + 2py$.

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

(b) Solve the equation $2x^2 + 2x - 5 = 0$.
Give your answers correct to 2 decimal places.

Answer (b) $x =$ ..... or ..... [4]

(c) y varies as the square root of w.
When $w = 9$, $y = 4$.
Find the value of y when $w = 36$.

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Answer (c) $y =$ ..... [3]

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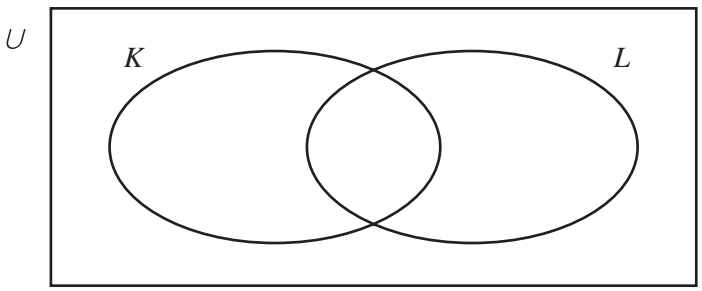
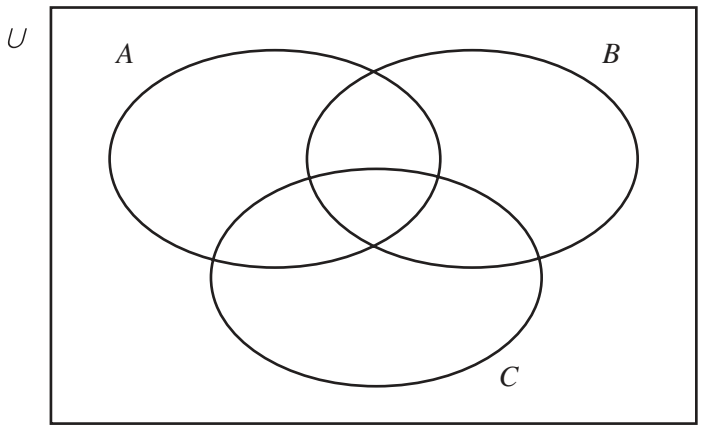
4 (a)



Shade $K \cap L'$ on the diagram. [1]

(b)



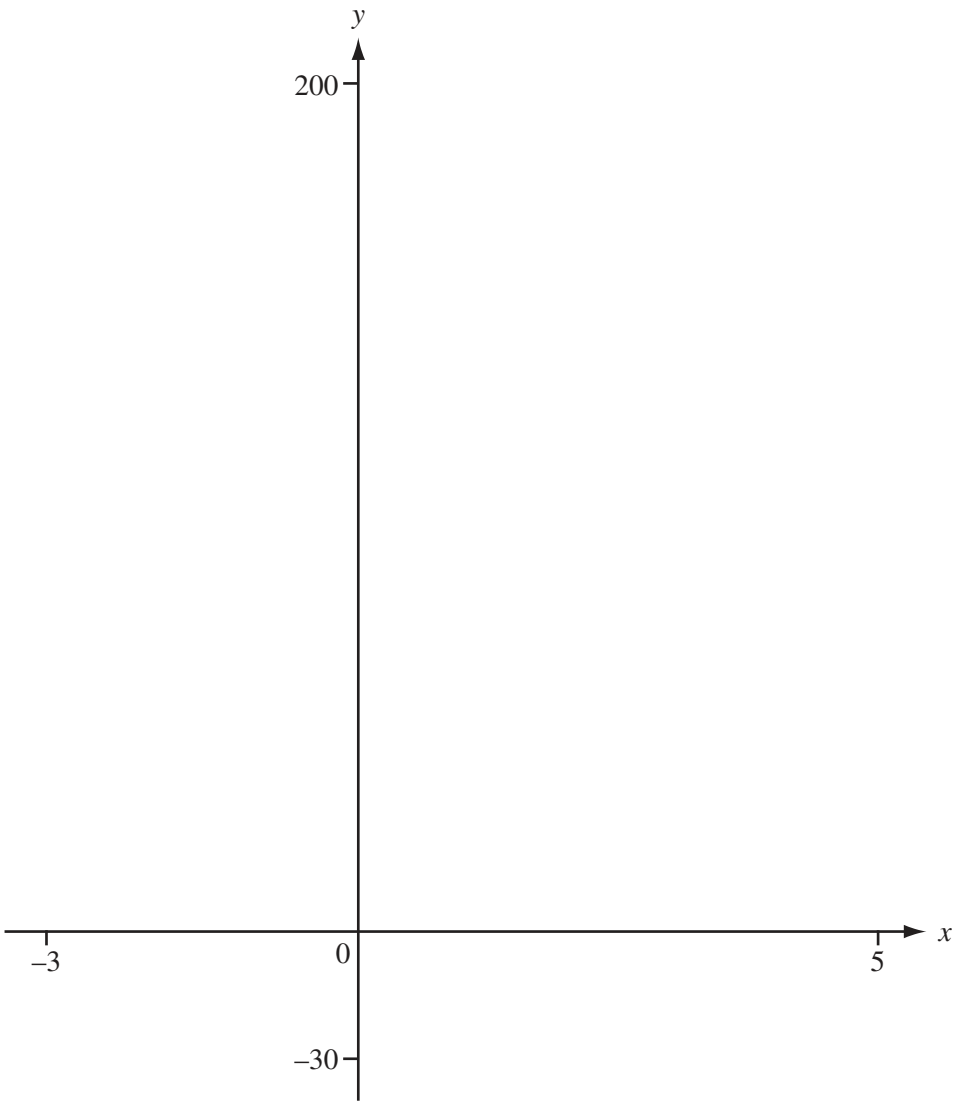
Shade $(A \cap B) \cup C$ on the diagram. [2]

(c) There are 20 students in Helena's class.
6 students have fair hair.
10 students have long hair.
8 students do not have fair hair **and** do not have long hair.
How many students have fair hair and long hair?

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

5

For Examiner's Use



(a) For $-3 \leqslant x \leqslant 5$, sketch the following graphs on the diagram above.

(i) $y = x^4 - 4x^3$ [2]

(ii) $y = |40 - 17x|$ [2]

(b) Solve the equation $x^4 - 4x^3 = 0$.

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

(c) Find the co-ordinates of the local minimum point on the graph of $y = x^4 - 4x^3$.

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

(d) Solve the equation $x^4 - 4x^3 = |40 - 17x|$.

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

For Examiner's Use

6 **(a)** Farooz cycles 35 kilometres in $2\frac{1}{2}$ hours.

She then walks for $1\frac{3}{4}$ hours at 4 km/h.

Calculate Farooz's average speed for the whole journey.

Answer (a) ..... km/h [3]

(b) Basil runs 10 kilometres at an average speed of 12.6 km/h.

(i) Find the time, in minutes, Basil takes.

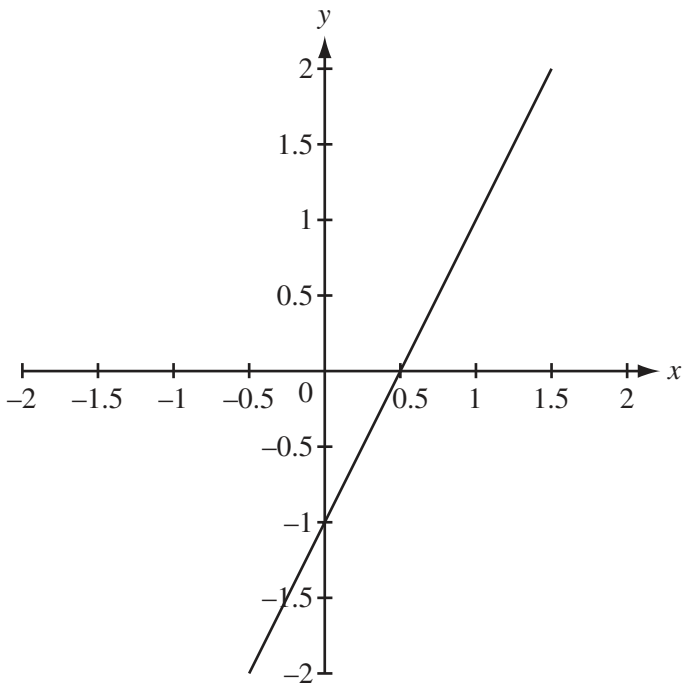
Answer (b)(i) ..... minutes [2]

(ii) Basil's speed of 12.6 km/h is 5% faster than his speed in a previous run.
Find Basil's speed in his previous run.

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

[Turn over

7 (a)



The graph shows $y = f(x)$, where $f(x) = 2x - 1$.

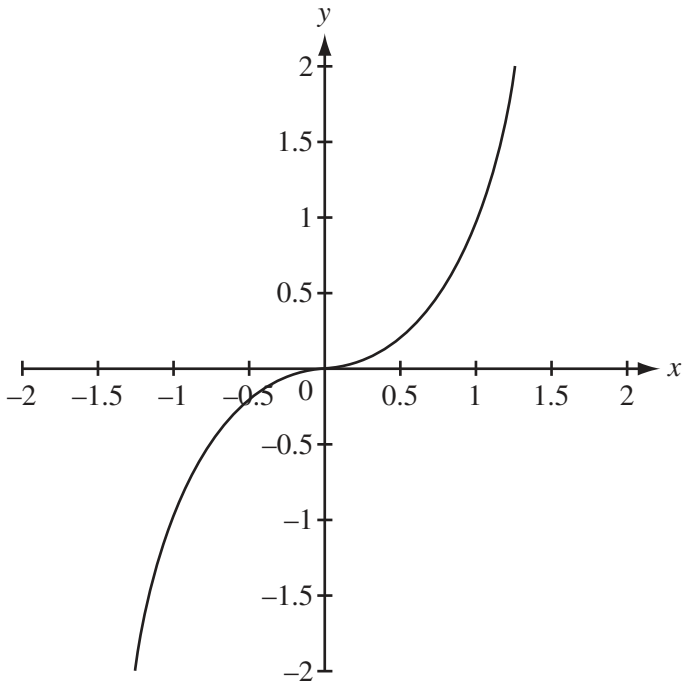
(i) Find the inverse function, $f^{-1}(x)$.

Answer (a)(i) $f^{-1}(x) =$ ..... [2]

(ii) Sketch the graph of $y = f^{-1}(x)$ on the diagram above. [1]

(b)

For Examiner's Use



The graph shows $y = g(x)$, where $g(x) = x^3$.

(i) Find the inverse function, $g^{-1}(x)$.

Answer (b)(i) $g^{-1}(x) =$ ..... [1]

(ii) Sketch the graph of $y = g^{-1}(x)$ on the diagram above. [2]

(iii) Describe fully the **single** transformation which maps the graph of $y = g(x)$ onto the graph of $y = g^{-1}(x)$.

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

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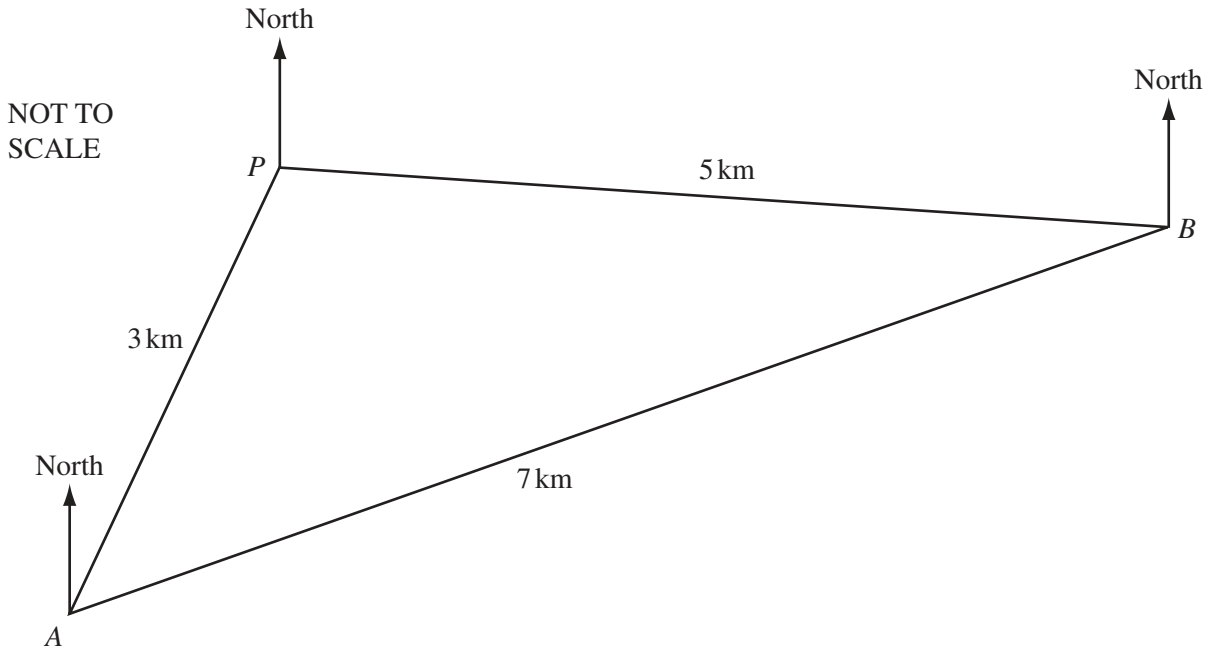

Sunil walks 15 kilometres along three straight paths PA, AB and BP.

$PA = 3$ km, $AB = 7$ km and $BP = 5$ km.

(a) Calculate

(i) angle APB,

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

(ii) the area of triangle APB.

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

(b) The bearing of A from P is 220°.

Find

(i) the bearing of P from A,

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

(ii) the bearing Sunil uses when walking from B to P.

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

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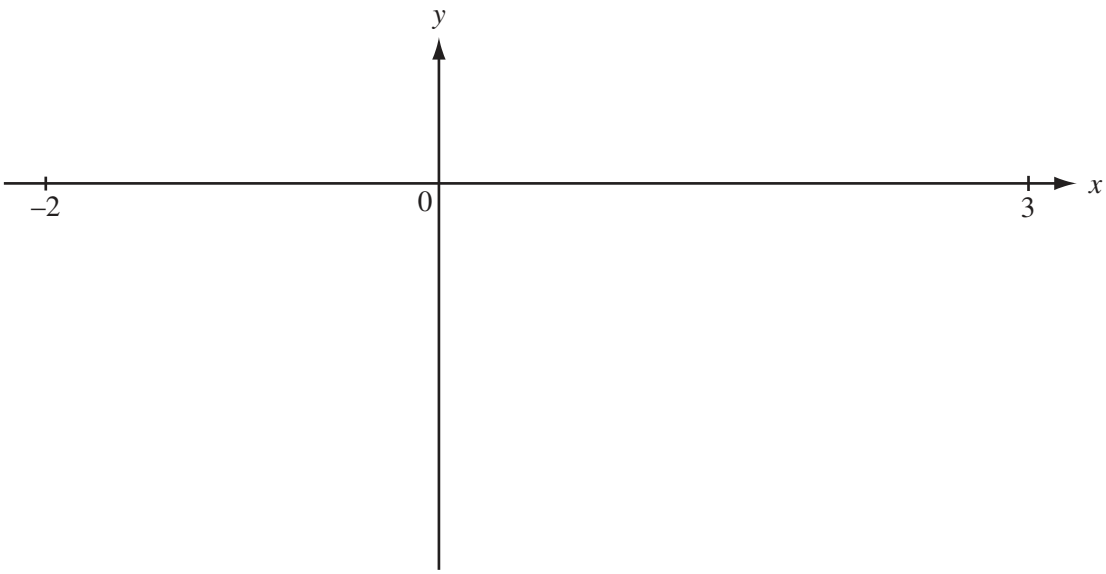


$$f(x) = x^3 - x^2 - 7x - 1$$

For the domain $-2 \leqslant x \leqslant 3$

(a) sketch the graph of $y = f(x)$, [2]

(b) find the range of the function $f(x)$.

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

For Examiner's Use

10 A football team plays 28 games.
The table shows the results.

Result	Win (W)	Draw (D)	Lose (L)
Frequency	14	5	9

(a) One of the games is chosen at random.

What is the probability that the team

(i) wins,

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

(ii) draws,

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

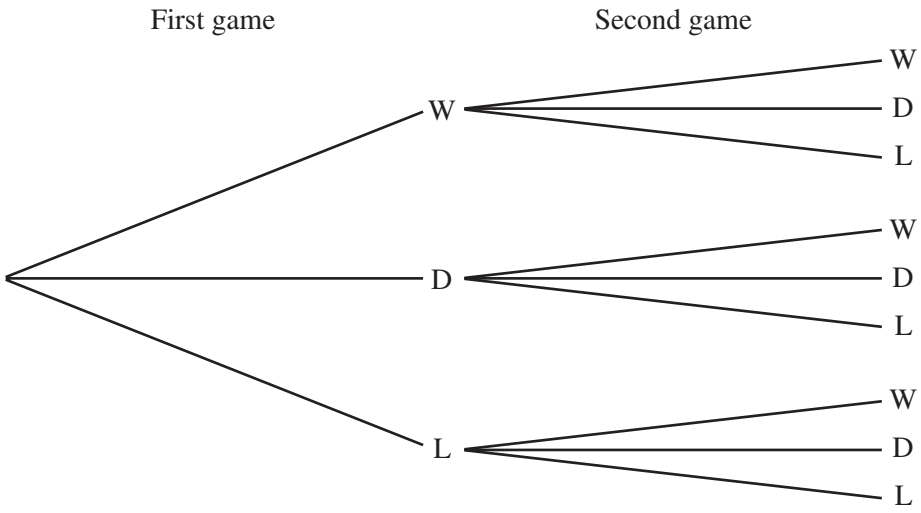
(iii) loses?

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

For Examiner's Use

(b) The football team plays two more games.

The tree diagram shows the possible outcomes.



Using the probabilities you have worked out in part (a) for both of these games, find the probability that the team

(i) wins both games,

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

(ii) wins one game and draws the other,

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

(iii) does not lose both games.

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

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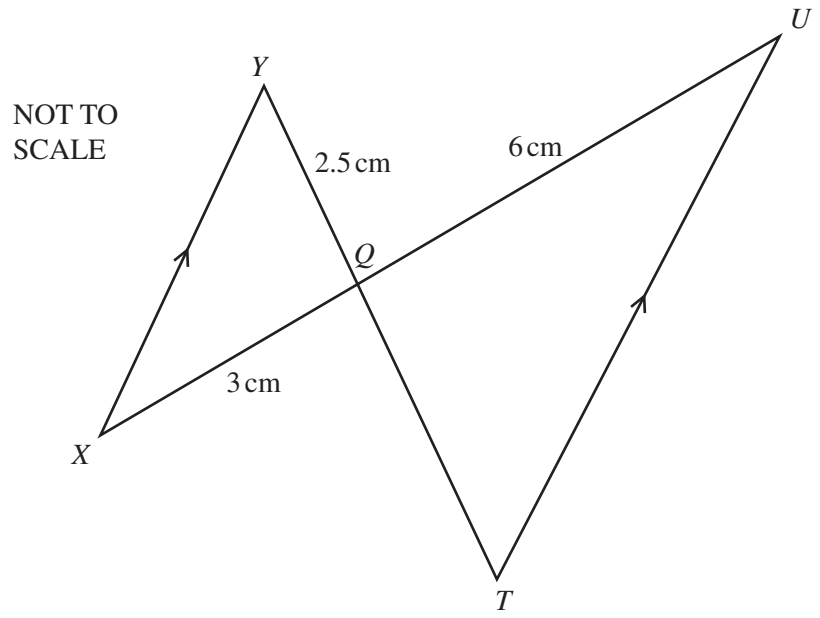

In the diagram, XY and TU are parallel. YT and XU intersect at Q.

(a) Complete the statement.

"Triangle XQY is ..... to triangle UQT." [1]

(b) $YQ = 2.5$ cm, $XQ = 3$ cm and $QU = 6$ cm.

(i) Calculate the length of QT.

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

(ii) The area of triangle XQY is $2.8\,cm^2$.

Calculate the area of triangle UQT.

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

(iii) Angle $XYQ = 26.5°$.

Use the sine rule to calculate angle QXY.

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

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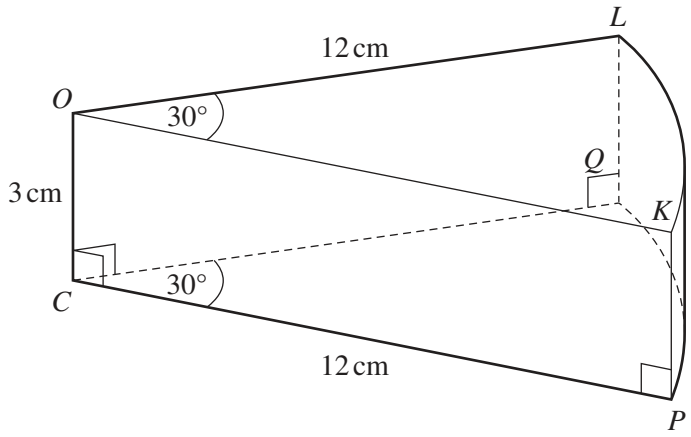
NOT TO SCALE



The diagram shows a slice of cake.

OKL and *CPQ* are identical sectors of radius 12 cm and angle 30°.

OKL is vertically above *CPQ* and $CO = QL = PK = 3$ cm.

Calculate

(a) the length of the arc *KL*,

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

(b) the area of the sector *OKL*,

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

(c) the volume of the slice of cake,

For Examiner's Use

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

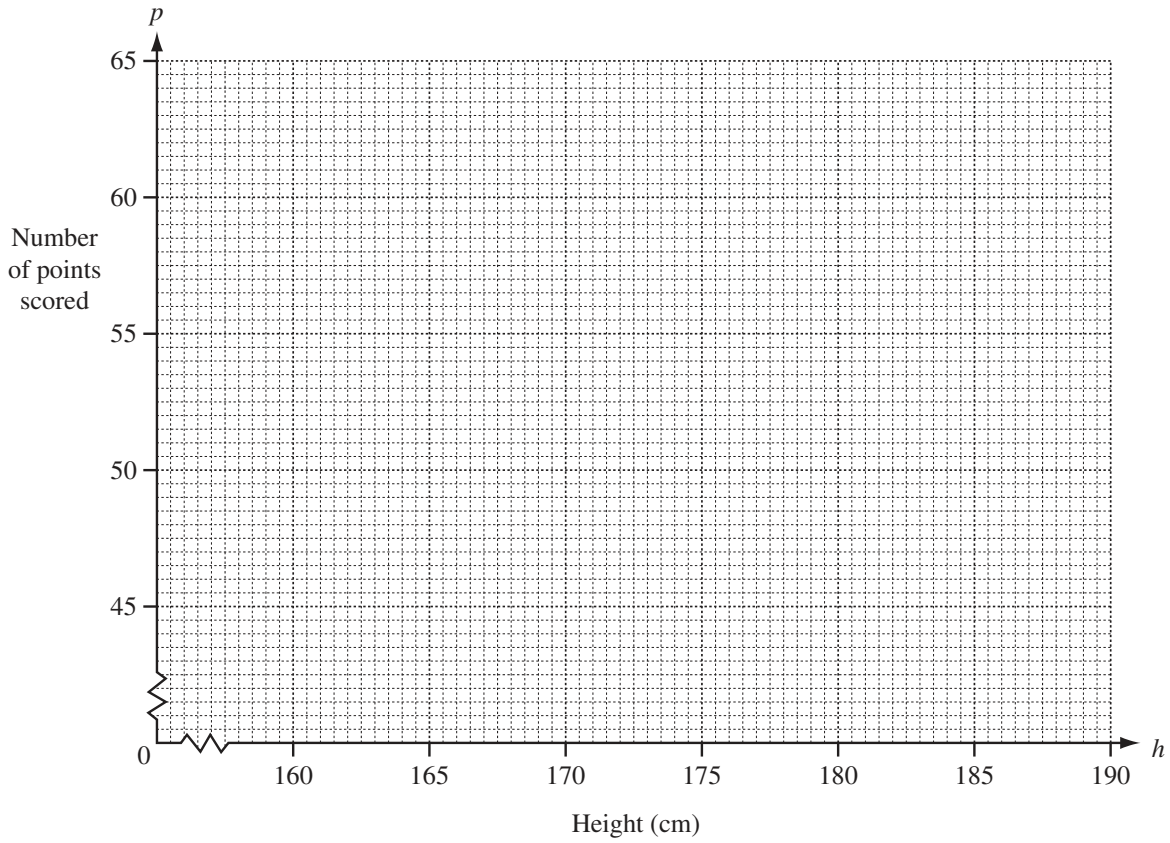
(d) the **total** surface area of the slice of cake.

Answer (d) ..... cm^2 [4]

13 Ten players in a basketball club want to find out if there is any correlation between a person's height (h centimetres) and the number of points (p) scored in a month.

Player	Fred	Greg	Andy	Bill	Chris	Dave	Ed	Hans	Ian	Jim
Height (h)	185	190	183	186	165	185	175	170	190	170
Points (p)	50	59	52	53	47	55	50	51	63	52

(a) On the grid below, draw a scatter diagram to show the information in the table.



[3]

(b) Describe any correlation between the height and the number of points scored.

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

(c) Find

(i) the mean height,

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

(ii) the mean number of points scored.

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

(d) **(i)** Find the equation of the line of regression, which gives p in terms of h.

Answer (d)(i) $p =$ ..... [2]

(ii) Draw the line of regression accurately on the grid. [2]

(iii) Predict the number of points a player of height 178 cm would score.

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

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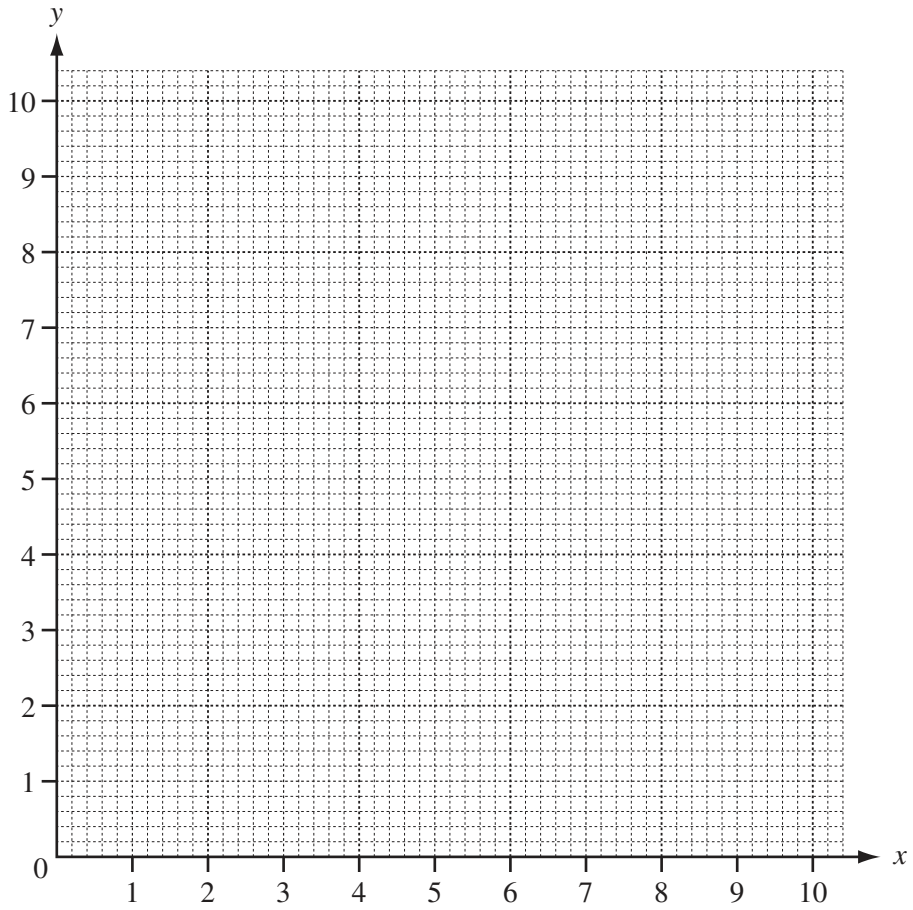
For Examiner's Use



(a) On the grid above draw the following lines.

$y = 2x$, for $0 \leqslant x \leqslant 5$

$x + y = 10$, for $0 \leqslant x \leqslant 10$

$2x + y = 10$, for $0 \leqslant x \leqslant 5$

[3]

(b) Show, by shading the **unwanted** regions, the region, T, containing the points which satisfy the three inequalities

$y \geqslant 2x$, $x + y \leqslant 10$ and $2x + y \geqslant 10$ [1]

(c) Find the greatest value of x in the region, T, when

(i) $x \in \mathbb{R}$,

Answer (c)(i) $x =$ ..... [1]

(ii) $x \in \mathbb{N}$.

Answer (c)(ii) $x =$ ..... [1]

(d) (x, y) lies in the region T.
Find all pairs of integer values of x and y when $2x + y = 11$

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

15 (a) (i) Red pencils cost 12 cents each.
What is the greatest number of red pencils you can buy for 360 cents?

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

(ii) Blue pencils cost x cents each.
Write down, in terms of x, the greatest number of blue pencils you can buy for 360 cents.

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

(iii) Yellow pencils cost $(x + 8)$ cents each.
Write down, in terms of x, the greatest number of yellow pencils you can buy for 360 cents.

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

(b) The number of blue pencils in **part (a)(ii)** is 16 more than the number of yellow pencils in **part (a)(iii)**.

(i) Write down an equation in x and show that it simplifies to $x^2 + 8x - 180 = 0$.

[4]

(ii) Factorise.

$$x^2 + 8x - 180$$

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

(iii) Solve the equation.

$$x^2 + 8x - 180 = 0$$

Answer (b)(iii) $x =$ ..... or ..... [1]

(iv) Write down the cost of a blue pencil.

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

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