UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

* 1 6 0 4 4 6 3 6 9 4 *

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **May/June 2013**

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.

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This document consists of **19** printed pages and **1** blank page.

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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. $\quad A = \pi rl$

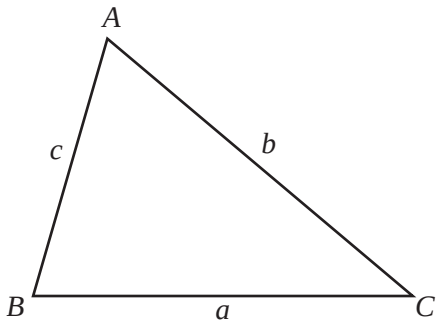
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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.

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1 **(a)** **(i)** Kim's wage is $720 each month.
She spends $196 each month on food.

Calculate $196 as a percentage of $720.

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

(ii) She pays 25% of the $720 in taxes.

Find the ratio money spent on food : money paid in taxes.
Give your answer in its simplest form.

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

(iii) The $720 is an increase of 44% on Kim's previous wage.
Calculate her previous wage.

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

(iv) Next year the $720 will increase by 4%.
Calculate next year's monthly wage.

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

(b) Jay's monthly wage is $650.
Each year Jay's monthly wage increases by 5%.

Calculate the number of years it will take for Jay's monthly wage to exceed $1000.

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

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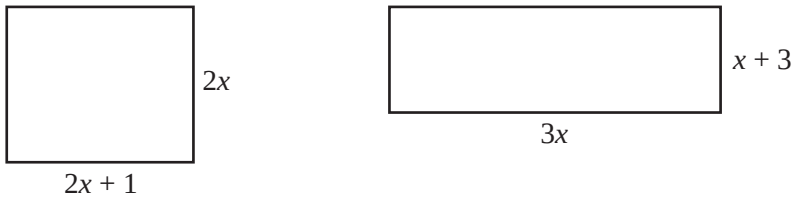
2 **(a)**



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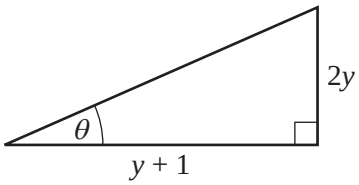
The areas of the rectangles are equal.

Find the value of x.
Show all your working.

Answer(a) $x =$ ..... [4]

(b)



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Find the value of y when $\tan\theta = \frac{1}{3}$.

Show all your working.

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

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(c) Jo walks 10 km at w kilometres per hour.
Sam cycles 10 km at $(w + 9)$ kilometres per hour.
The difference between the times taken by Jo and Sam is $2\frac{1}{2}$ hours.

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(i) Show that $w^2 + 9w - 36 = 0$.

[4]

(ii) Find the time, in hours and minutes, taken by Jo to walk the 10 km.

Answer(c)(ii) ..... h ..... min [4]

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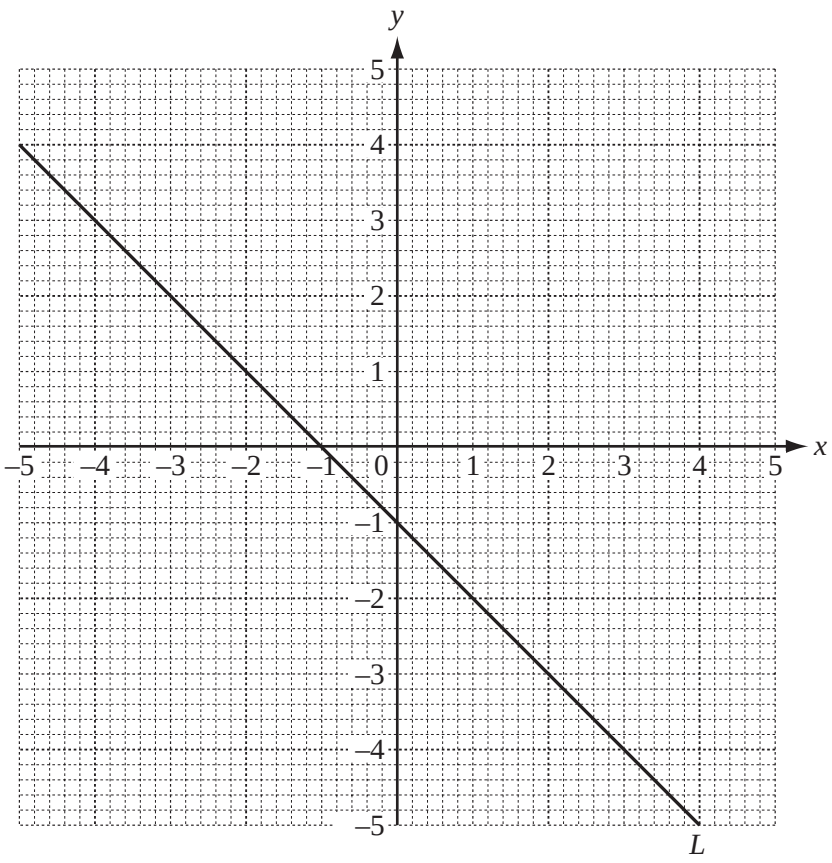

(a) Find the equation of the line L.

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

(b) **(i)** On the grid, draw the line $y = 2x + 4$. [2]

(ii) On the grid, shade the region where $y \geqslant 0$ and $y \geqslant 2x + 4$. [2]

(c) P is the point $(1, -4)$ and Q is the point $(3, 2)$.

Find the equation of the line passing through P and Q.

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

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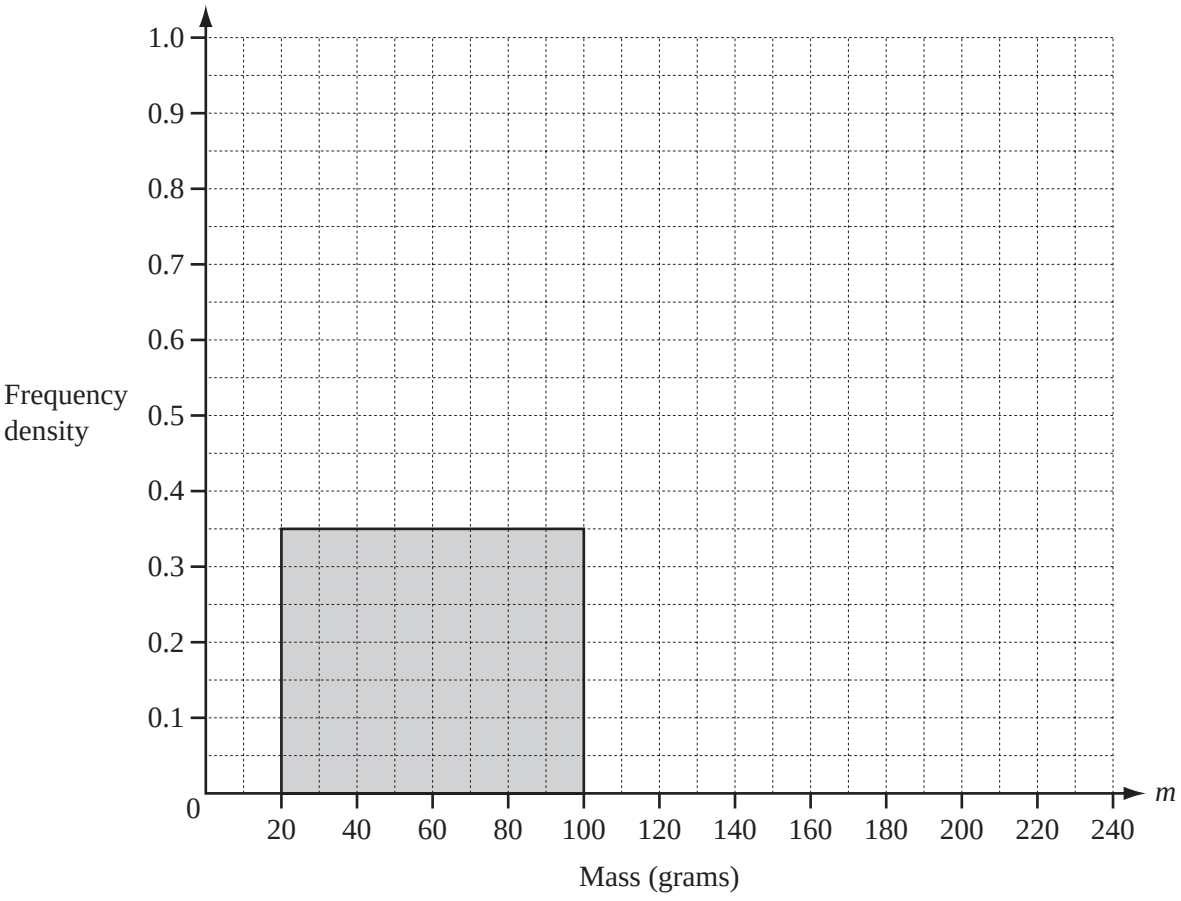
4 The masses of 100 apples are measured.
The results are shown in the table.

Mass (m grams)	$20 < m \leqslant 100$	$100 < m \leqslant 150$	$150 < m \leqslant 240$
Frequency	28	45	27

(a) Calculate an estimate of the mean mass.

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

(b) Use the information in the table to complete the histogram.



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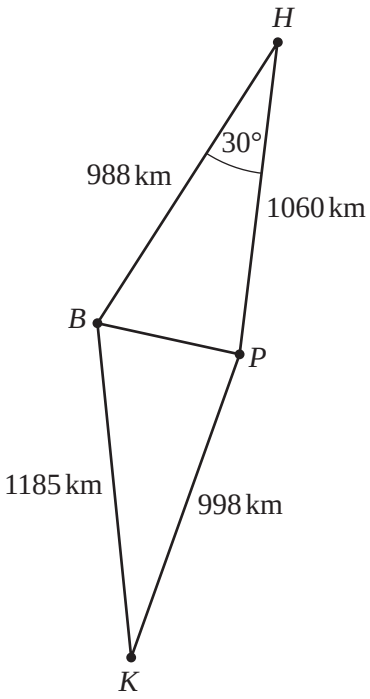

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The diagram shows some straight line distances between Bangkok (*B*), Hanoi (*H)*, Phnom Penh (*P)* and Kuala Lumpur (*K*). Angle *BHP* = 30°.

(a) Calculate *BP* and show that it rounds to 535 km, correct to the nearest kilometre.

[3]

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(b) Calculate angle *BKP*.

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

(c) The bearing of *P* from *K* is 020°.

Find the bearing of *B* from *K*.

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

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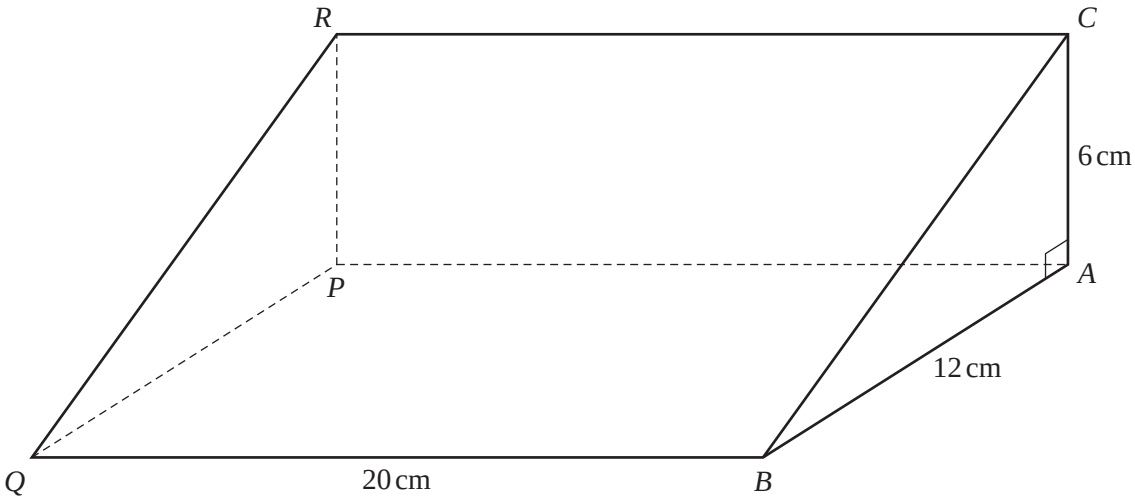

The diagram shows a triangular prism of length 20 cm.
The cross-section of the prism is triangle ABC with angle $BAC = 90°$, $AC = 6$ cm and $AB = 12$ cm.

(a) Calculate the volume of the prism.

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

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(b) (i) Calculate the **total** surface area of the prism.

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Answer(b)(i) ..... cm^2 [4]

(ii) The surface of the prism is painted at a cost of \$0.005 per square centimetre.

Calculate the cost of painting the surface of the prism.

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

(c) Calculate the angle between the diagonal line CQ and the base $ABQP$.

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

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7 A flight from London, England to Auckland, New Zealand departs at 14 00 on February 7th.
The journey takes $27\frac{1}{2}$ hours and the distance is 18 400 km.
The time in New Zealand is 13 hours ahead of the time in England.

(a) Find the time and the date that the flight arrives in Auckland.

Answer(a) Time .....

Date ..... [3]

(b) Calculate the average speed of the journey.

Answer(b) ..... km/h [1]

(c) The cost of a ticket for the flight is 3600 pounds (£).
£1 = 2.09 New Zealand dollars (NZD).

(i) Calculate the cost of the ticket in NZD.

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

(ii) Calculate the cost of the journey, in NZD per kilometre.
Give your answer correct to 2 decimal places.

Answer(c)(ii) ..... NZD/km [2]

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8 **(a)** Solve the equation $\frac{2}{x} = x^3 + 2$.

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Answer(a) $x =$ .....

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

(b) Solve the inequality $\frac{2}{x} \geqslant x^3 + 2$.

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

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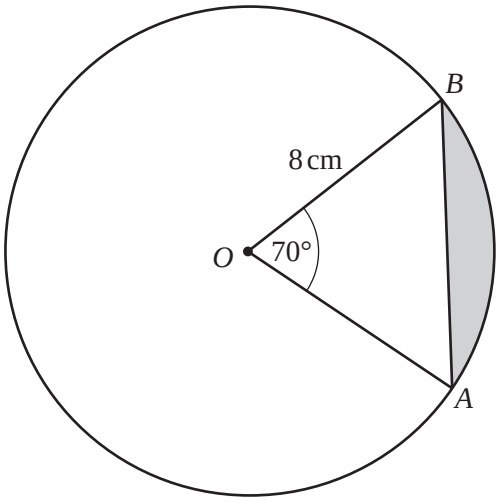

NOT TO SCALE

AB is a chord of the circle centre *O*.

Calculate

(a) the length of the chord *AB*,

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

(b) the length of the arc *AB*,

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

(c) the area of the shaded region.

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

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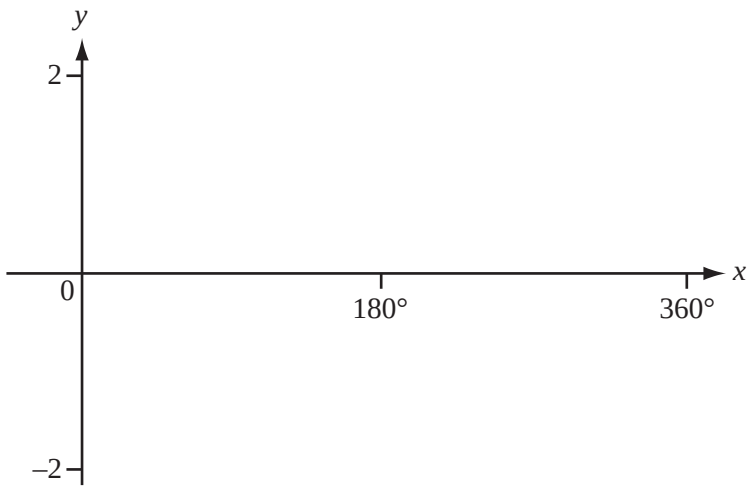

$f(x) = \cos x$ $\quad$ $g(x) = 2\sin\left(\frac{x}{2}\right)$

(a) On the diagram, sketch the following graphs.

(i) $y = f(x)$ [2]

(ii) $y = g(x)$ [2]

(b) Write down the equation of the line of symmetry of the graphs.

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

(c) Write down the co-ordinates of the local minimum point on the graph of $y = f(x)$ for $0° \leqslant x \leqslant 360°$.

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

(d) Write down the period and amplitude of $g(x)$.

Answer(d) period = ...

amplitude = ... [2]

(e) Write down the range of $g(x)$ for the following domains.

(i) $0° \leqslant x \leqslant 360°$

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

(ii) $\mathbb{R}$

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

(f) Solve the equation $f(x) = g(x)$ for $0° \leqslant x \leqslant 360°$.

Answer(f) x = ... or x = ... [2]

(g) Shade the regions on the diagram where $y \leqslant f(x)$ **and** $y \geqslant g(x)$. [1]

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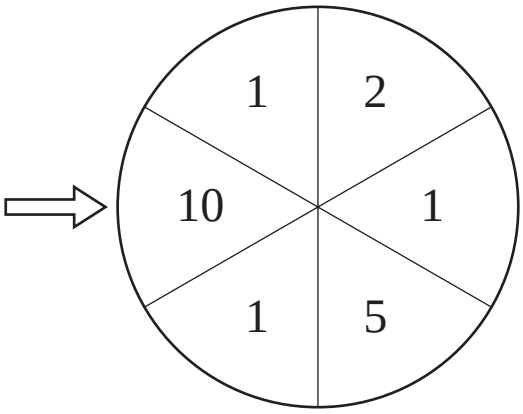


The diagram shows a disc, with six equal sectors, and an arrow.
When the disc is spun, each sector is equally likely to stop next to the arrow.

(a) The disc is spun.
Write down the probability that the sector next to the arrow is labelled with

(i) 1 or 2,

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

(ii) an even number,

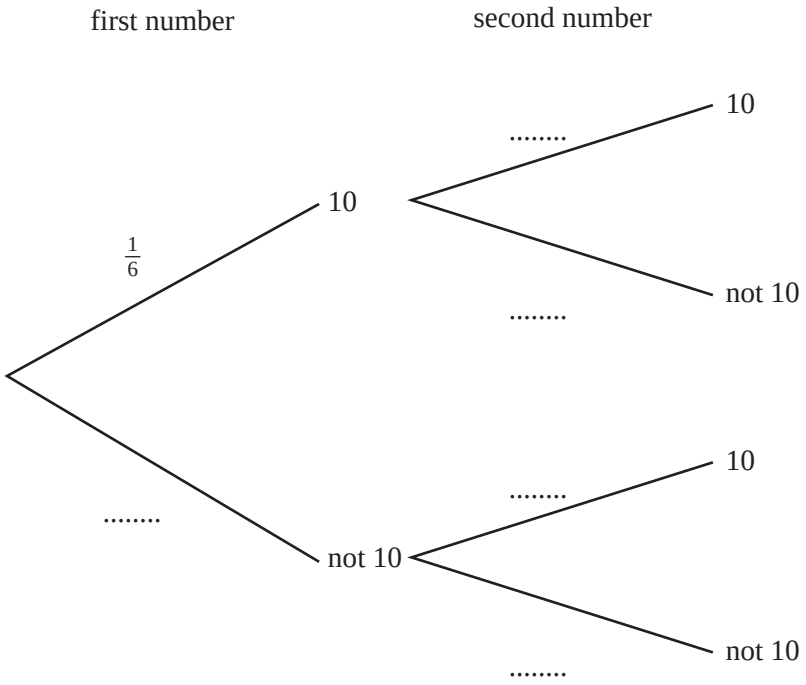
Answer(a)(ii) ..... [1]

(iii) a number which is a factor of 10.

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

(b) The disc is spun twice.

(i) Complete the tree diagram by writing the missing probabilities on each branch.



[2]

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(ii) Find the probability that the arrow is next to the number 10 twice.

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

(iii) Find the probability that the arrow is next to the number 10 at least once.

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

(c) The disc is spun n times until it stops with the number 10 next to the arrow.
Find n when the probability that this happens is $\frac{625}{7776}$.

Answer(c) $n =$ ..... [2]

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Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature (t °C)	13	13	15	16	19	23	25	26	24	20	18	13
Rainfall (r mm)	59	49	62	46	25	6	1	3	28	62	63	66

The table shows the average monthly temperature, t, and rainfall, r, in Malaga, Spain.

(a) Find the mean, median, upper quartile and range of the average monthly **temperatures**.

Answer(a) mean = ... °C

median = ... °C

upper quartile = ... °C

range = ... °C [4]

(b) (i) Find the equation of the line of regression for this data, giving r in terms of t.

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

(ii) Describe the type of correlation between r and t.

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

(iii) Calculate an estimate of the rainfall when the temperature is 22°C.

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

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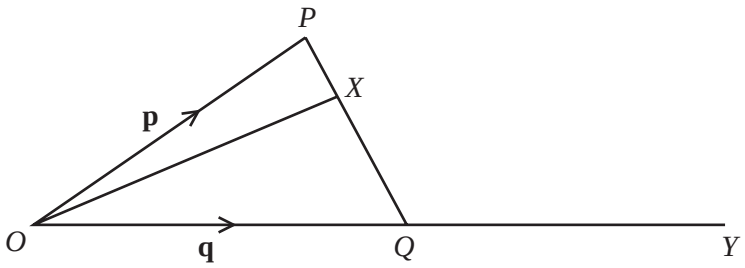

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The diagram shows a triangle OPQ.
The point X is on PQ so that $PX : XQ = 1 : 2$.
$\overrightarrow{OP} = \mathbf{p}$ and $\overrightarrow{OQ} = \mathbf{q}$.

(a) Find $\overrightarrow{OX}$ in terms of **p** and **q**.
Give your answer in its simplest form.

Answer(a) $\overrightarrow{OX}$ ..... [2]

(b) OQY is a straight line and $OY = 2OQ$.

Find $\overrightarrow{XY}$ in terms of **p** and **q**.
Give your answer in its simplest form.

Answer(b) $\overrightarrow{XY}$ ..... [3]

(c) $\mathbf{p} = \begin{pmatrix} 3 \\ k \end{pmatrix}$ and $|\mathbf{p}| = 5$.

Find the two possible values of k.

Answer(c) $k =$ ..... or $k =$ ..... [2]

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