Cambridge IGCSE

**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

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| CANDIDATE NAME | | | | | | | | | |
| CENTRE NUMBER | | | | | | CANDIDATE NUMBER | | | | |

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**CAMBRIDGE INTERNATIONAL MATHEMATICS** **0607/43**

Paper 4 (Extended) **October/November 2015**

**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, glue or correction fluid.
You may use an HB 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 $\pi$, 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.



DC (ST/SW) 103703/4
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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 $l$. $\quad A = \pi rl$

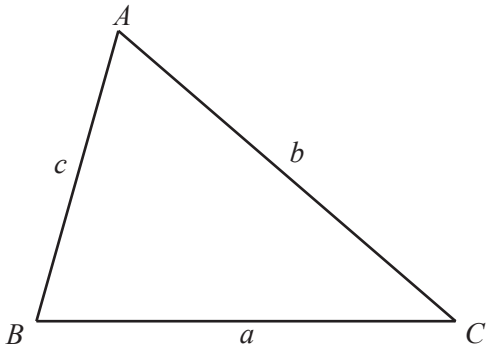
Curved surface area, $A$, of sphere of radius $r$. $\quad A = 4\pi r^2$

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

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



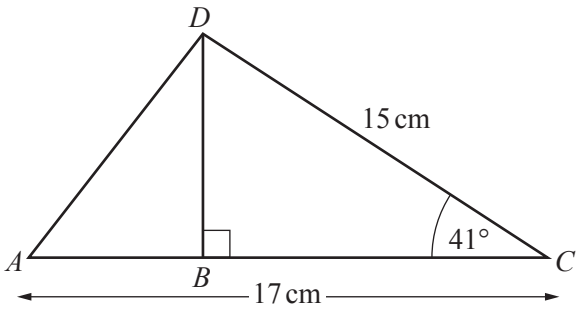

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

Answer **all** the questions.

**1**




NOT TO SCALE

**(a)** Calculate the length of *BD*.

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

**(b)** Calculate the area of triangle *ACD*.

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

**(c)** Use the cosine rule to find the length of *AD*.

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

**2** **(a)** Jay buys a bicycle for $220.
He later sells it for $160.

Calculate his percentage loss.

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

**(b)** A television has a sale price of $216 after a reduction of 10%.

Calculate the original price of the television.

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

**(c)** The population of a village is 2180.
The population decreases by 3% each year.

**(i)** Calculate the population in 20 years time.

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

**(ii)** Calculate the number of whole years it takes for the population to decrease from 2180 to less than 1000.

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

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**3** **(a)** The speeds, $v$ km/h, of 120 cars passing under a bridge are measured.
The table shows the results.

| Speed ($v$ km/h) | $30 < v \leqslant 50$ | $50 < v \leqslant 60$ | $60 < v \leqslant 70$ | $70 < v \leqslant 75$ | $75 < v \leqslant 90$ |
|---|---|---|---|---|---|
| Frequency | 2 | 25 | 46 | 41 | 6 |

**(i)** Write down the interval that contains the lower quartile.

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

**(ii)** Calculate an estimate of the mean.

*Answer(a)*(ii) ..... km/h [2]

**(iii)** Complete the table of frequency densities.

| Speed ($v$ km/h) | $30 < v \leqslant 50$ | $50 < v \leqslant 60$ | $60 < v \leqslant 70$ | $70 < v \leqslant 75$ | $75 < v \leqslant 90$ |
|---|---|---|---|---|---|
| Frequency density | | | | | |

[3]

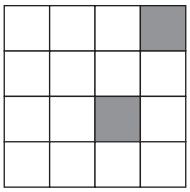
**(b)** The table below shows the monthly rainfall and the average midday temperatures of a city.

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rainfall ($r$ mm) | 15 | 20 | 20 | 35 | 70 | 90 | 75 | 70 | 50 | 30 | 12 | 8 |
| Temperature ($t$° C) | 35 | 25 | 22 | 15 | 10 | 10 | 15 | 20 | 27 | 30 | 38 | 36 |

Find the equation of the line of regression, giving $t$ in terms of $r$.

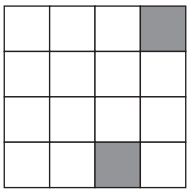
*Answer(b)* $t =$ ..... [2]

**4** **(a)** **(i)** Shade in one more square so that the diagram has one line of symmetry.



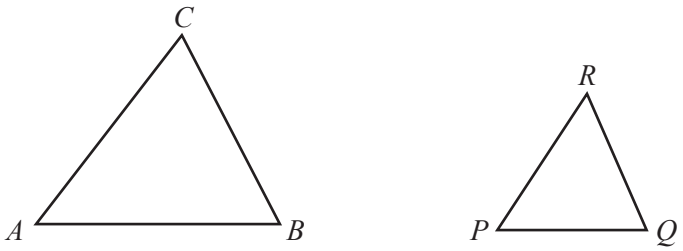
[1]

**(ii)** Shade in two more squares so that the diagram has rotational symmetry of order 2 and no lines of symmetry.



[1]

**(b)**




NOT TO SCALE

Triangle $ABC$ and triangle $PQR$ are mathematically similar.
$AB : PQ = 3 : 2$.

**(i)** $CB = 10.5$ cm.
Calculate the length of $RQ$.

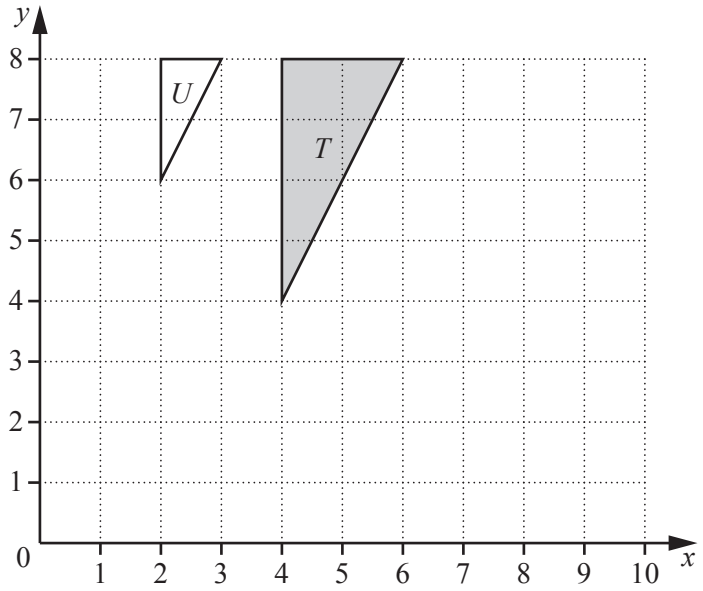
*Answer(b)*(i) ..... cm [2]

**(ii)** The area of triangle $ABC$ is 45 cm$^2$.
Calculate the area of triangle $PQR$.

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

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**5**




**(a) (i)** Describe fully the **single** transformation that maps triangle $T$ onto triangle $U$.

*Answer(a)*(i) .....

..... [3]

**(ii)** Describe fully the inverse of the transformation in **part(a)(i)**.

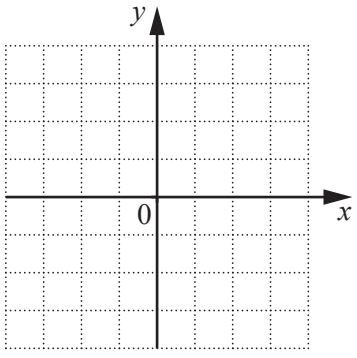
*Answer(a)*(ii) .....

..... [2]

**(b) (i)** Draw the image of triangle $T$ under a reflection in the line $y = x$. [2]

**(ii)** Draw the image of triangle $T$ under a rotation of 90° anti-clockwise about the point (6, 8). [2]

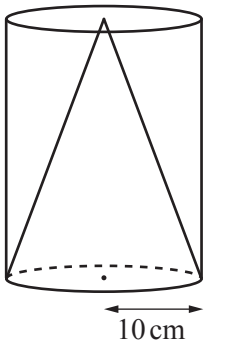
**(c)** Describe fully the **single** transformation equivalent to a rotation 90° clockwise about (0, 0) followed by a reflection in the line $y = -x$.
You may use the grid to help you.




*Answer(c)* .....

..... [3]

**6** The diagram shows a solid cone inside a cylinder.
The base radius of the cone and the radius of the cylinder are both 10 cm.
The height of both the cone and the cylinder is 30 cm.

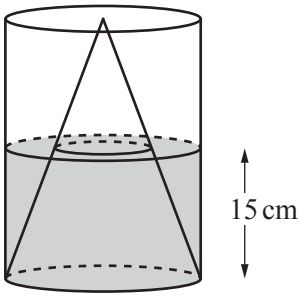



NOT TO SCALE

**(a)** Find the volume of the cylinder **not** occupied by the cone.

*Answer(a)* ..... $cm^3$ [3]

**(b)** Water is poured into the cylinder until it reaches a depth of 15 cm.




NOT TO SCALE

**(i)** Calculate the volume of the part of the cone that is below the water level and show that it rounds to 2749 $cm^3$, correct to the nearest cubic centimetre.

[4]

**(ii)** Calculate the amount of water that has been poured into the cylinder.
Give your answer in litres.

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

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**7** **(a)** Kim walks 10 km at 4 km/h and then a further 6 km at 3 km/h.

Calculate Kim's average speed.

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

**(b)** Chung runs at $x$ km/h for 45 minutes and then at $(x - 2)$ km/h for 30 minutes.

Find an expression, in terms of $x$, for Chung's average speed in km/h.
Give your answer in its simplest form.

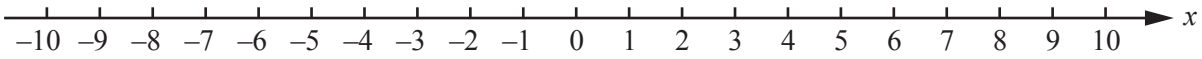
*Answer(b)* ..... km/h [4]

**8** **(a)** **(i)** Solve the inequality.

$$2(x-3) < 5(x+3)$$

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

**(ii)** Show your answer to **part(a)(i)** on the number line.




[1]

**(b)** Solve the equation.

$$(x+3)^2 + (x+1)^2 = 25$$

Give your answers correct to 2 decimal places.

*Answer(b)* $x =$ ..... or $x =$ ..... [6]

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**(c)** Solve the equations.

**(i)** $\log x = 5 - x$

*Answer(c)*(i) $x =$ ..... [3]

**(ii)** $\log x = |5 - x|$

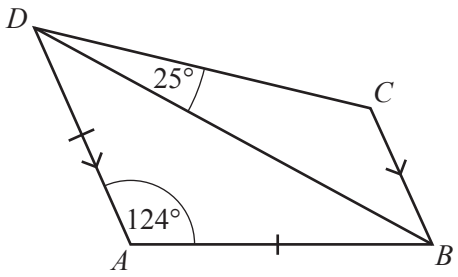
*Answer(c)*(ii) $x =$ ..... or $x =$ ..... [2]

**(d)** Simplify, giving your answer as a single fraction.

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

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

**9 (a)**




NOT TO SCALE

In the quadrilateral $ABCD$, $DA = AB$ and $DA$ is parallel to $CB$.
Angle $DAB = 124°$ and angle $BDC = 25°$.

Calculate angle $BCD$.

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

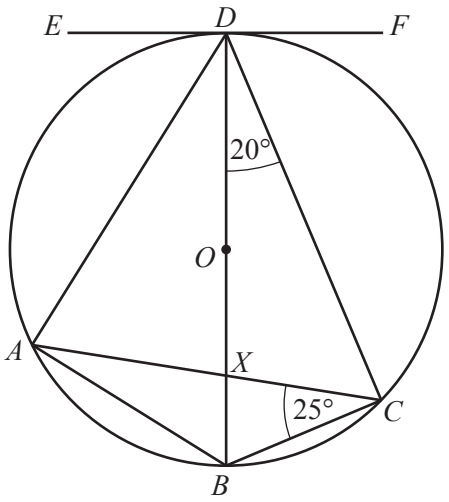
**(b)** Nine of the angles of a 10-sided polygon are each 142°.

Calculate the other angle.

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

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**(c)**




NOT TO SCALE

*A*, *B*, *C* and *D* lie on the circle, centre *O*.
*BD* is a diameter and *EDF* is a tangent at *D*.
*AC* and *BD* intersect at *X*.

Angle *BCA* = 25° and angle *BDC* = 20°.

Calculate

**(i)** angle *ADE*,

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

**(ii)** angle *DAC*,

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

**(iii)** angle *AXD*.

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

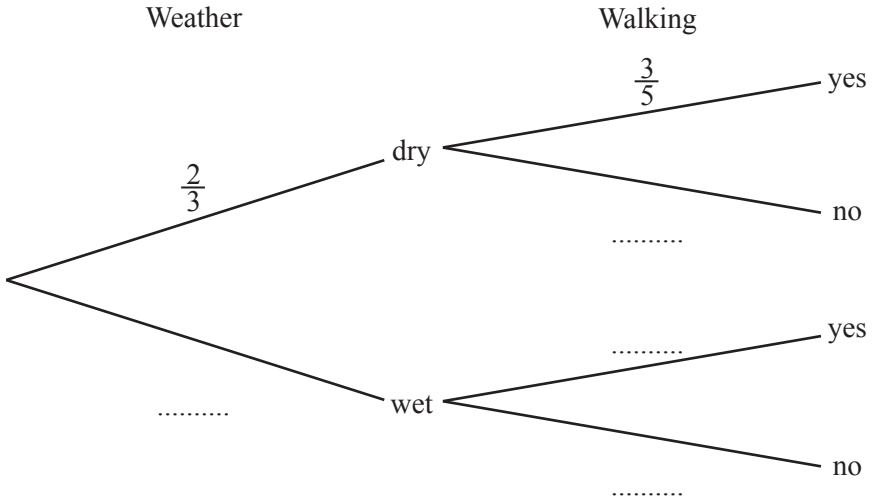
**10** In this question, the weather is only considered to be either wet or dry.

When the weather is dry the probability that Sara will go walking is $\frac{3}{5}$.

When the weather is wet the probability that Sara will go walking is $\frac{1}{10}$.

The probability of a dry day is $\frac{2}{3}$.

**(a)** Complete the tree diagram.



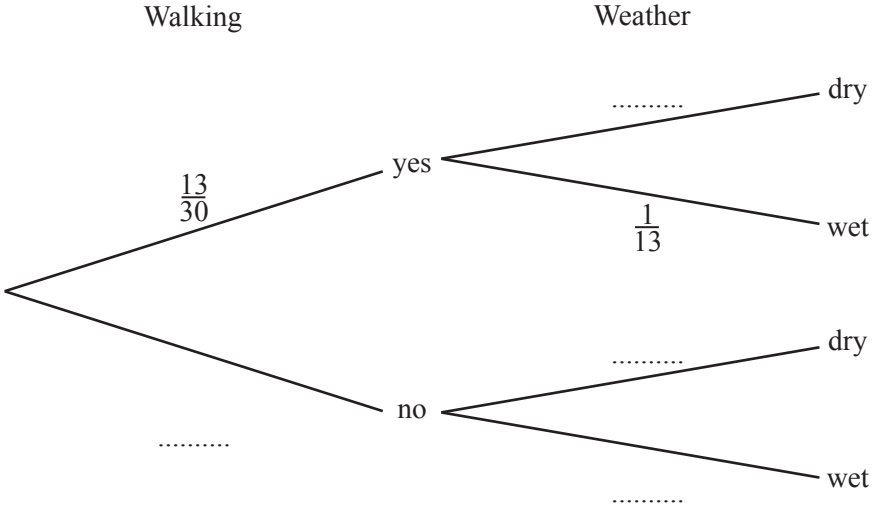

[3]

**(b)** Show that the probability that Sara goes walking is $\frac{13}{30}$.

[2]

**(c)** The probability that Sara does not go walking when the weather is wet is $\frac{9}{30}$.

Complete this tree diagram.




[3]

**11** $f(x) = x^2 - 16$ $\quad g(x) = \dfrac{2}{x+1}, x \neq -1$ $\quad h(x) = 2^x$

**(a)** Find h(3).

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

**(b)** Find the range of g($x$) for the domain {0, 1}.

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

**(c)** f($x - 2$) can be written as $(x + a)(x + b)$.
Find the value of $a$ and the value of $b$.

*Answer(c)* $a =$ .....

$b =$ ..... [4]

**(d)** Find the inverse of

**(i)** g($x$),

*Answer(d)*(i) ..... [3]

**(ii)** h($x$).

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

**(e)** Describe fully the **single** transformation that maps the graph of $y = f(x)$ onto the graph of $y = 2x^2 - 32$.

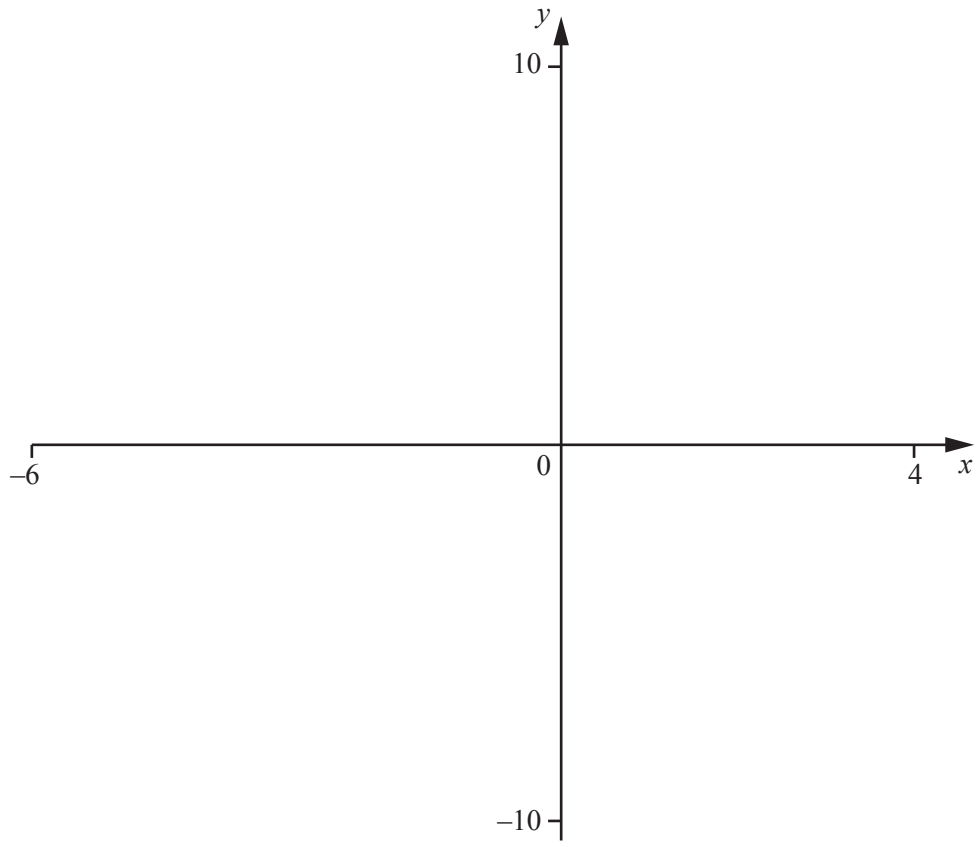
.....

..... [2]

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**Question 12 is printed on the next page**

**12**




**(a)** On the diagram, sketch the graphs of $y = \frac{12}{(x+2)}$ and $y = 2^x - 5$

for values of $x$ between $x = -6$ and $x = 4$. [4]

**(b)** Write down the equation of each asymptote of the graph of

**(i)** $y = \frac{12}{x+2}$,

*Answer(b)*(i) .....

..... [2]

**(ii)** $y = 2^x - 5$.

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

**(c)** Solve the inequality.

$2^x - 5 > \frac{12}{x+2}$ for $x > 0$.

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

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