Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

0217364842

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **May/June 2019**

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 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.

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. $\quad A = \pi rl$

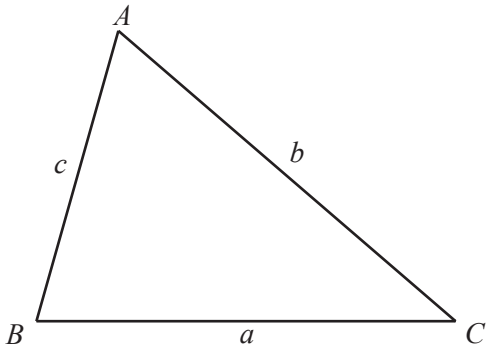
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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

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 Louis and Maria share \$50 in the ratio 11 : 14.

(a) Show that Louis receives \$22.

[1]

(b) Louis and Maria each spend \$6 from their share of the \$50.

Find the new ratio Louis' money : Maria's money.

..... : ..... [2]

(c) Louis spends $\frac{17}{32}$ of his **remaining** money to buy a bus ticket.

Calculate the cost of the bus ticket.

\$ ..... [1]

(d) In a sale, a bookshop reduces the price of each book by 10%.
Maria buys two of these books.

(i) The first book Maria buys has an original price of \$6.

Calculate how much Maria pays for this book.

\$ ..... [2]

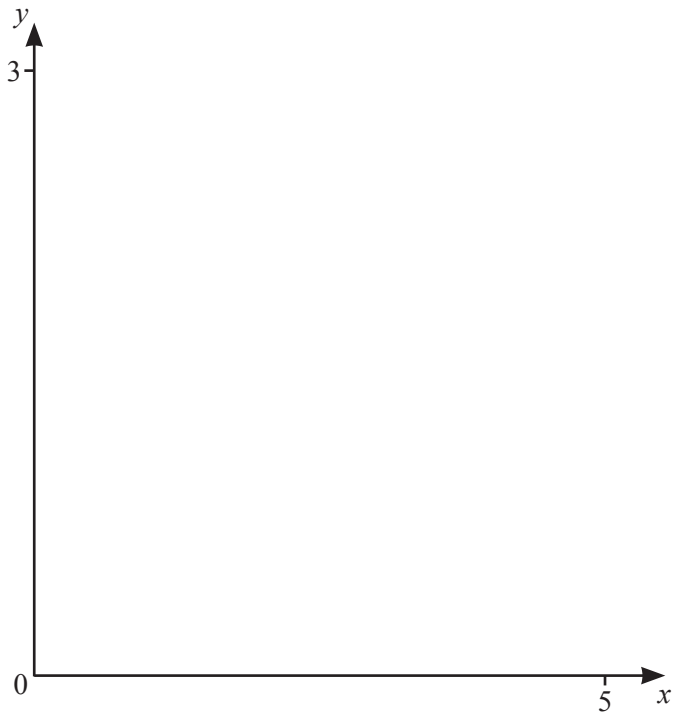
(ii) Maria pays \$3.69 for her second book.

Calculate the original price of this book.

\$ ..... [3]

[Turn over

2



(a) On the diagram, sketch the graph of $y = \log\left(\frac{x+1}{x}\right)$ for $0 < x \leqslant 5$. [2]

(b) Write down the equations of the asymptotes to the graph of $y = \log\left(\frac{x+1}{x}\right)$.

.....

..... [2]

(c) Solve the equation $\log\left(\frac{x+1}{x}\right) = 0.5$.

$x =$ ..... [1]

(d) On the same diagram, sketch the graph of $y = \frac{x}{2}$ for $0 < x \leqslant 5$. [1]

(e) Solve the equation $\log\left(\frac{x+1}{x}\right) = \frac{x}{2}$.

$x =$ ..... [1]

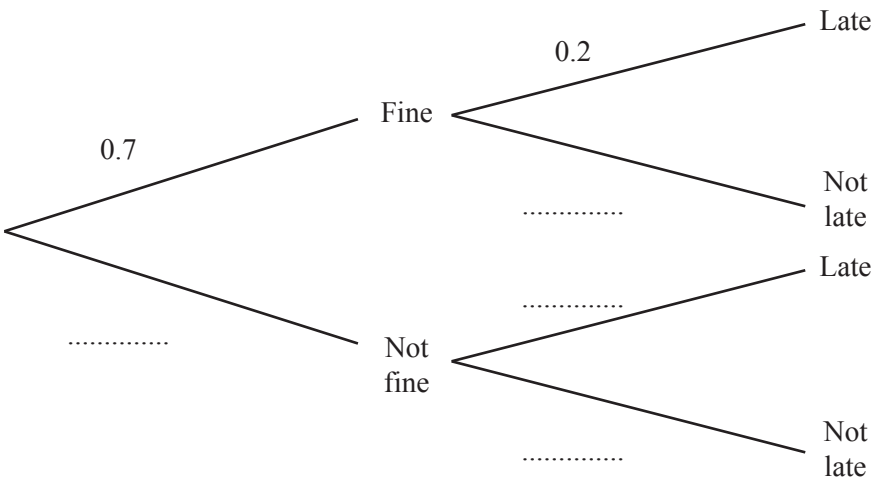
(f) On your diagram, shade the region where $y \leqslant 0.5$, $y \geqslant \frac{x}{2}$ and $y \geqslant \log\left(\frac{x+1}{x}\right)$. [1]

3 Jono walks to school when the weather is fine.
When the weather is not fine, Jono takes the bus.

If Jono walks to school, the probability that he is late is 0.2 .
If Jono takes the bus, the probability that he is late is 0.05 .

On any day, the probability that the weather is fine is 0.7 .

(a) Complete the tree diagram.



[3]

(b) **(i)** Find the probability that, on any day, Jono is late.

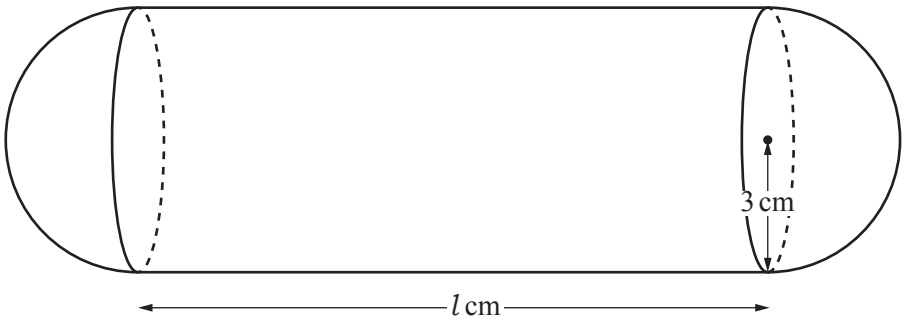
..... [3]

(ii) Jono attends school on 200 days.

Find the expected number of days that Jono is late.

..... [1]

4



NOT TO SCALE

The diagram shows a solid made from a cylinder and two hemispheres.
The radius of the cylinder and each hemisphere is 3 cm.
The total volume of the solid is $144\pi\,\text{cm}^3$.

(a) The length of the cylinder is l cm.

Find the value of l.

$l =$ ..... [3]

(b) The solid is made of steel.
1 cm^3 of steel has a mass of 7.8 g.

Calculate the mass of the solid.
Give your answer in kilograms.

..... kg [2]

(c) The solid is melted down and made into 20 cubes each of side length 2.8 cm.

Calculate the volume of steel **not** used for the cubes as a percentage of the $144\pi\,\text{cm}^3$.

.....% [3]

(d) A solid that is mathematically similar to the original solid has a volume of $18\pi\,\text{cm}^3$.

Find the radius of the new cylinder.

..... cm [3]

5 **(a)** Karl invests $200 at a rate of 1.5% per year simple interest.

Calculate the value of Karl's investment at the end of 8 years.

$ ..... [3]

(b) Lena invests $200 at a rate of 1.4% per year compound interest.

Calculate the value of Lena's investment at the end of 8 years.

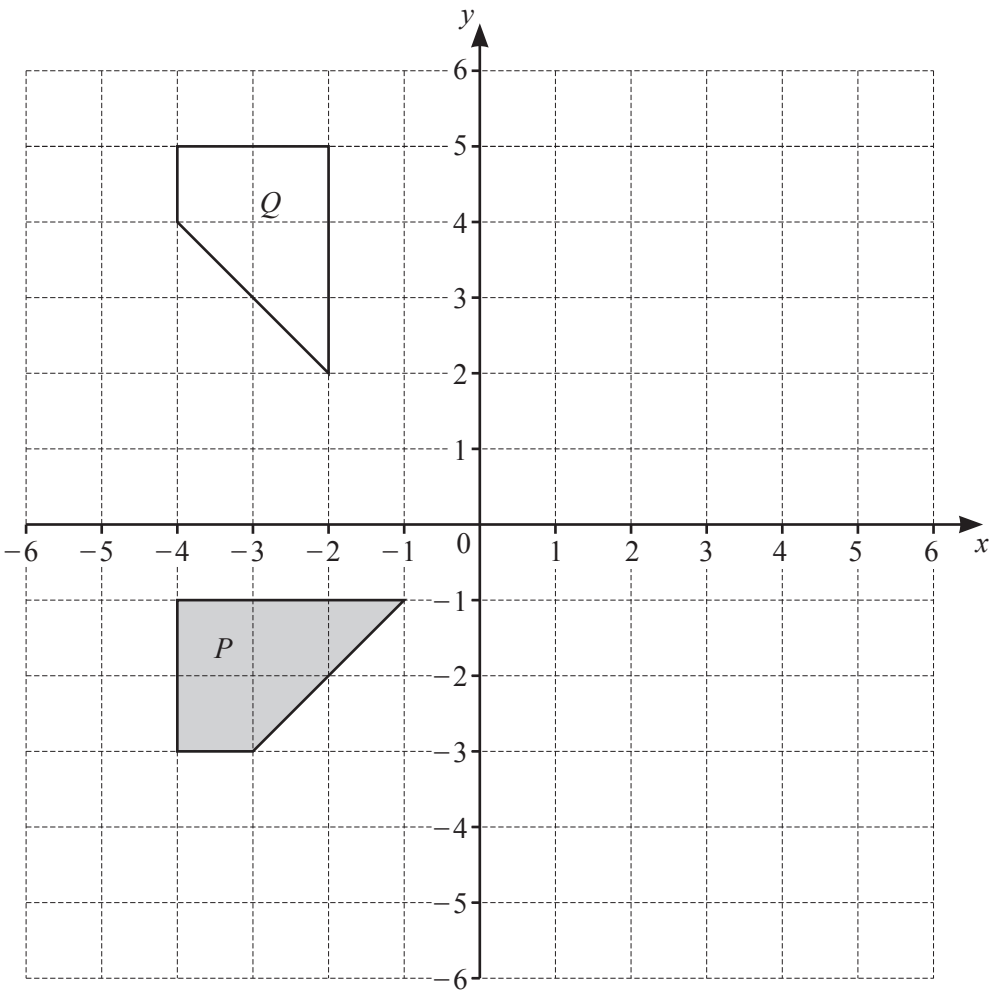
$ ..... [3]

(c) The rates of interest remain the same as in **part (a)** and **part (b)**.

Find how many **more** complete years it will take for the value of Lena's investment to be greater than the value of Karl's investment.

..... [2]

6



(a) Reflect shape P in the y-axis. [1]

(b) Translate shape P by the vector $\begin{pmatrix} 6 \\ -3 \end{pmatrix}$. [2]

(c) Describe fully the **single** transformation that maps shape P onto shape Q.

.....

..... [3]

(d) Stretch shape P with stretch factor 2 and the x-axis invariant. [2]

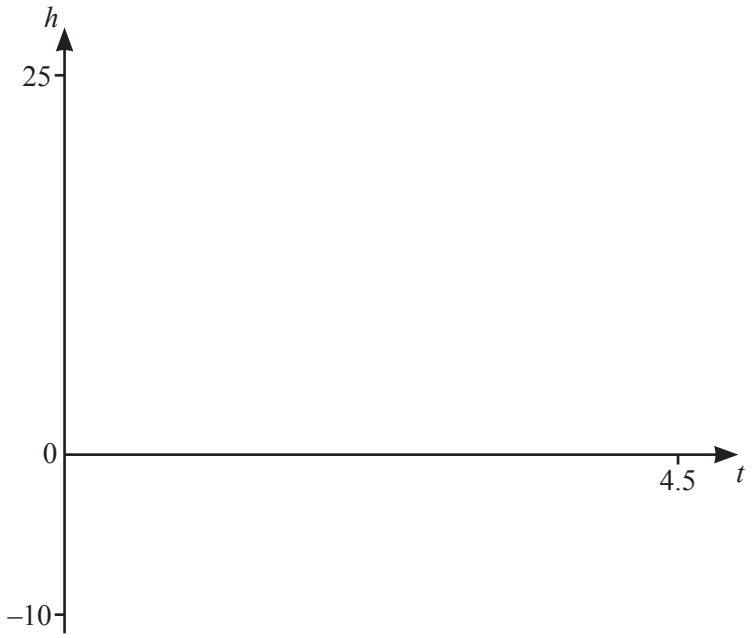
[Turn over

7 A stone is thrown vertically upwards from ground level.
Its height, h metres above ground level, after t seconds, is given by $h = 20t - 4.9t^2$.

(a) Find the height of the stone after 1 second.

..... m [1]

(b) **(i)** On the diagram, sketch the graph of $h = 20t - 4.9t^2$ for $0 \leqslant t \leqslant 4.5$.



[2]

(ii) Complete the statement.

The maximum height reached by the stone is ..... m when t = ... s.
[2]

(iii) Find the length of time the stone is in the air before it hits the ground.

..... s [1]

(iv) Find the length of time the stone is more than 18 m above ground level.

..... s [3]

8 Find the nth term of each sequence.

(a) 7, 14, 21, 28, ...

..... [1]

(b) 10, 7, 4, 1, ...

..... [2]

(c) 8, 16, 32, 64, ...

..... [2]

(d) 2, 6, 12, 20, ...

..... [2]

9 240 students take part in a charity run.
The table shows information about the times, t minutes, taken to complete the run.

Time (t minutes)	$20 < t \leqslant 40$	$40 < t \leqslant 50$	$50 < t \leqslant 55$	$55 < t \leqslant 75$
Number of students	20	70	120	30

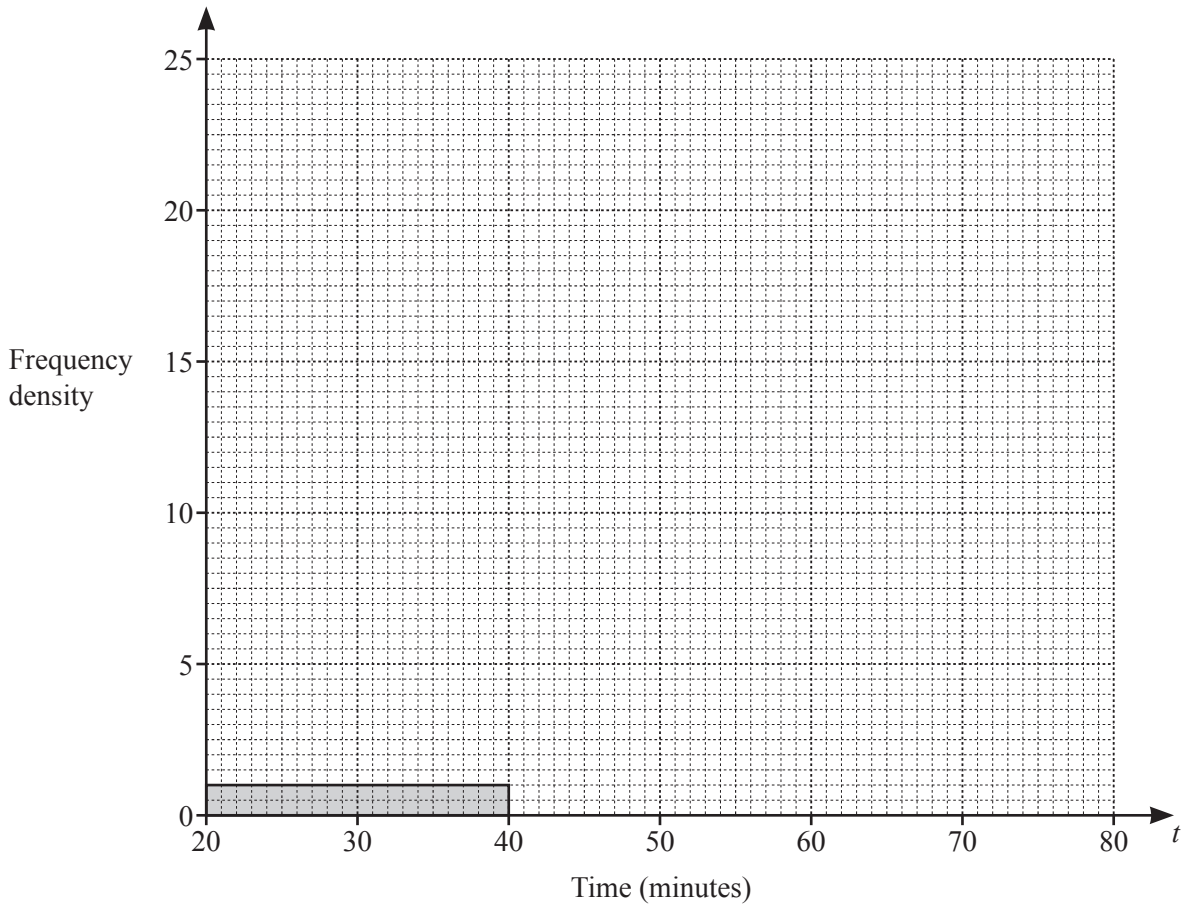
(a) Write down the time interval that contains the median.

..... $< t \leqslant$ ..... [1]

(b) Calculate an estimate of the mean.

.....min [2]

(c) Complete the histogram to show the information in the table.



[4]

(d) (i) One of the 240 students is chosen at random.

Find the probability that this student took more than 55 minutes to complete the run.

..... [1]

(ii) Two students are chosen at random from the 240 students.

Calculate the probability that they both took more than 50 minutes.

..... [2]

(iii) Two students are chosen at random from the 240 students.

Complete the statement.

The probability that they both had times in the interval ..... $< t \leqslant$ ..... is $\frac{161}{1912}$.

[2]

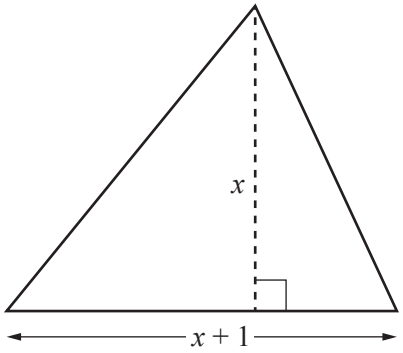
10 **(a)** Amy buys 3 pencils and 1 ruler and pays 67 cents.
Ben buys 2 pencils and 3 rulers and pays 96 cents.

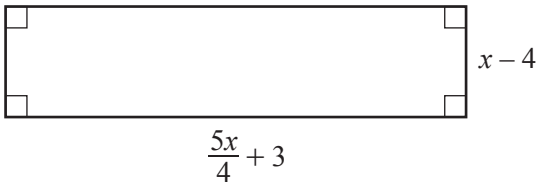
Find the cost of 1 pencil and the cost of 1 ruler.
You must show all your working.

Pencil ..... cents

Ruler ..... cents [5]

(b) In this part, all measurements are in centimetres.





NOT TO SCALE

The area of the triangle is the same as the area of the rectangle.

(i) Show that $3x^2 - 10x - 48 = 0$.

[4]

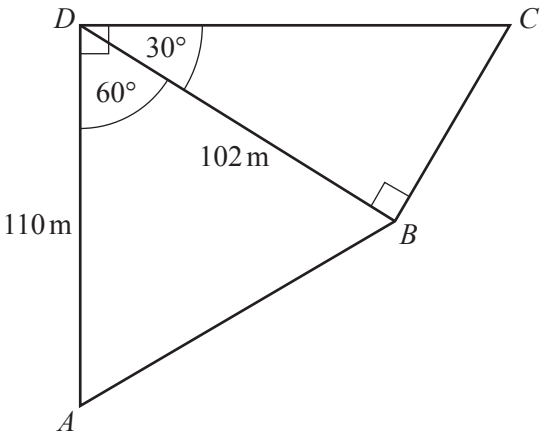
(ii) Factorise $3x^2 - 10x - 48$.

..... [2]

(iii) Find the area of the triangle.

..... cm^2 [2]

11



NOT TO SCALE

The diagram shows two fields on horizontal ground.
A is due south of D and C is due east of D.

(a) Calculate DC.

$DC =$ ..... m [3]

(b) Calculate AB.

$AB =$ ..... m [3]

(c) Calculate the **total** area of the fields.

..... m^2 [3]

(d) Calculate the bearing of *A* from *B*.

..... [4]

12 $\mathrm{f}(x) = 10 - x$ $\mathrm{g}(x) = x^2 + 1$ $\mathrm{h}(x) = \frac{1}{x}$ $\mathrm{j}(x) = \log_3 x$

(a) Find g(3).

..... [1]

(b) Find f(h(2)).

..... [2]

(c) Find g(f(x)) in the form $ax^2 + bx + c$.

..... [3]

(d) For some functions, $\mathrm{p}^{-1}(x) = \mathrm{p}(x)$.

Write down which two functions, f(x), g(x), h(x) or j(x), have this property.

..... and ..... [2]

(e) Write $\mathrm{h}(x) - \frac{1}{\mathrm{f}(x)}$ as a single fraction in its simplest form.

..... [3]

(f) **(i)** Find $j(243)$.

..... [1]

(ii) Find x when $j(x) = 1.5$.

$x =$ ..... [1]

(iii) Find $j^{-1}(x)$.

$j^{-1}(x) =$ ..... [2]

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