Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

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2803584907

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/41**

Paper 4 (Extended) **October/November 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 **18** printed pages and **2** blank 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. $\quad A = \pi rl$

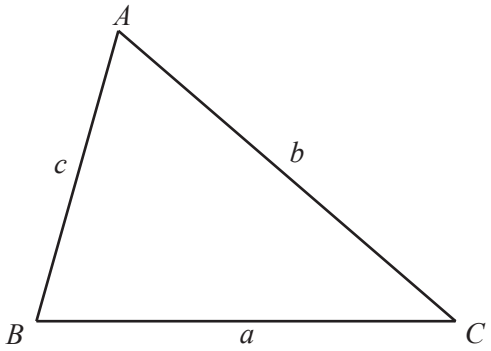
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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

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 12 students are each given a spelling test.
Here is a list of the scores.

9 5 10 9 11 7 7 6 6 7 8 11

Find

(a) the range,

..... [1]

(b) the mode,

..... [1]

(c) the median,

..... [1]

(d) the upper quartile,

..... [1]

(e) the inter-quartile range,

..... [1]

(f) the mean.

..... [1]

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2 **(a)** Increase 4.5 kg by 16%.

..... kg [2]

(b) Find the percentage profit when the cost price of a book is \$8.50 and the selling price is \$11.05 .

.....% [3]

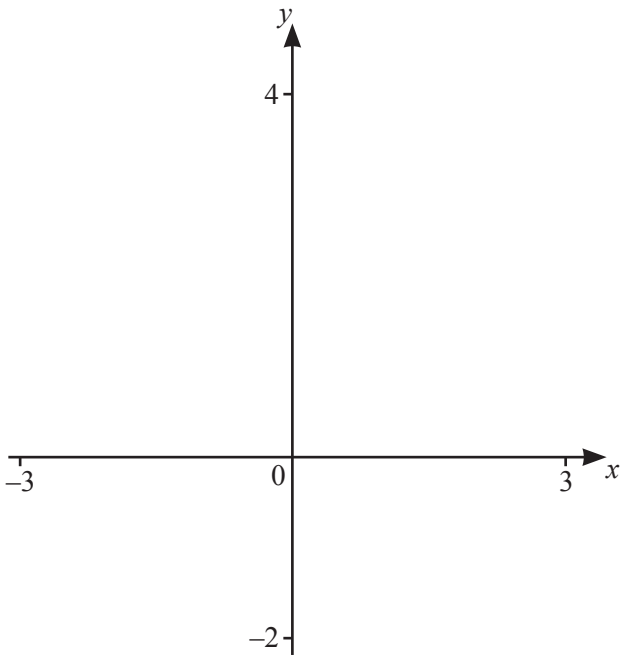
(c) The price of a loaf of bread increases by \$0.06 .
This is a 5% increase.

Find the original price of this loaf of bread.

\$..... [2]

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3



$$f(x) = \frac{1}{(1-x^3)}, \quad x \neq 1$$

(a) On the diagram, sketch the graph of $y = f(x)$ for values of x between -3 and 3. [3]

(b) Write down the range of $f(x)$ for $-3 \leqslant x \leqslant 0$.

..... [2]

(c) On the same diagram, sketch the graph of $y = x^2$ for $-2 \leqslant x \leqslant 2$. [1]

(d) **(i)** Solve the equation $\frac{1}{1-x^3} = x^2$.

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

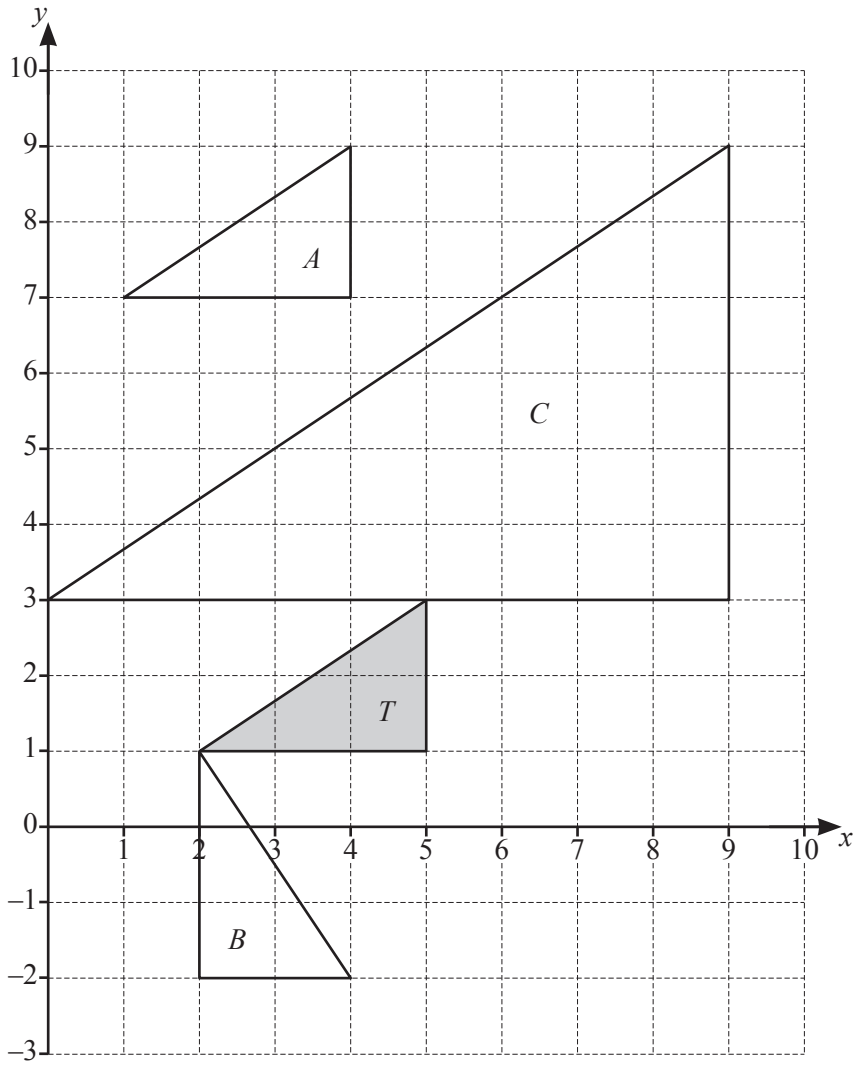
(ii) The equation $\frac{1}{1-x^3} = x^2$ can be written in the form $x^u - x^w + 1 = 0$.

Find the value of u and the value of w.

$u =$ .....

$w =$ ..... [2]

4



(a) Describe fully the **single** transformation that maps triangle *T* onto

(i) triangle *A*,

.....

..... [2]

(ii) triangle *B*,

.....

..... [3]

(iii) triangle *C*.

.....

..... [3]

(b) Stretch triangle *T* by a factor of 2 with the *y*–axis invariant. [2]

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5 Each year the value of a motor bike **decreases** by 10% of its value at the start of the year.
At the start of 2019, the value of the motor bike was \$2025.

(a) Find the value at the end of 4 years.
Give your answer correct to the nearest dollar.

\$ ..... [4]

(b) Find the value at the start of 2017.

\$ ..... [2]

(c) Find the number of complete years it takes for the value of \$2025 to decrease to a value less than \$500.

..... [4]

6



The diagram shows a six-sided die and a coin.

The numbers on the faces of the die are 1, 1, 1, 2, 2, 3.

When the die is rolled it is equally likely for any of the six faces to be on the top.
When the coin is spun it is equally likely to land showing heads or tails.

(a) Abi rolls the die.

Write down the probability that it shows the number 3 on the top.

..... [1]

(b) Beatrice rolls the die and spins the coin.

(i) Find the probability that the die shows the number 2 on the top and the coin shows heads.

..... [2]

(ii) Find the probability that the die shows the number 2 on the top or the coin shows heads or both.

..... [2]

(c) Carl spins the coin 3 times.

Find the probability that the coin shows heads at least once.

..... [2]

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(d) Drew rolls the die 3 times and records the numbers on the top.

Find the probability that the die shows each of the numbers, 1, 2 and 3, once.

..... [3]

(e) Eva spins the coin n times.
The probability that the coin shows tails each time is $\frac{1}{64}$.

Find the value of n.

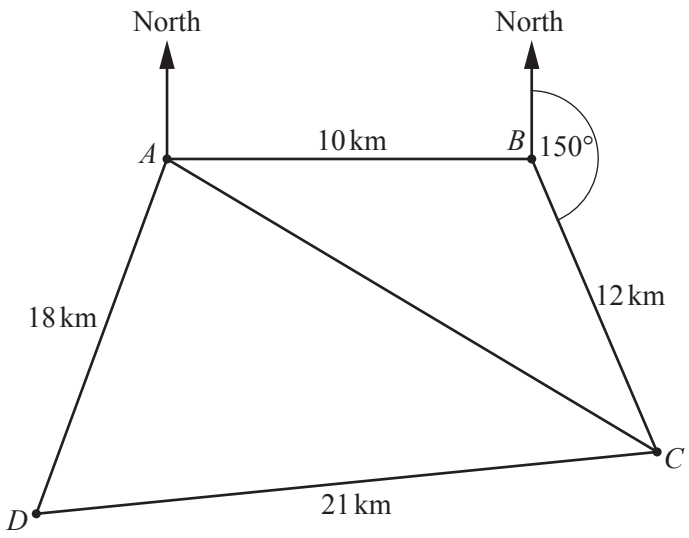
$n =$ ..... [1]

(f) Frank rolls the die twice and records the two numbers.
The probability of these two numbers occurring is $\frac{1}{3}$.

Find these two numbers.

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

7



NOT TO SCALE

The diagram shows four villages A, B, C and D and five straight roads connecting them.
B is 10 km due east of A.
C is 12 km from B on a bearing of 150°.
D is 21 km from C and 18 km from A.

(a) Calculate the distance AC and show that your answer rounds to 19.08 km, correct to 2 decimal places.

[4]

(b) Using the sine rule, calculate angle ACB and show that your answer rounds to 27.0°, correct to 1 decimal place.

[3]

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(c) Calculate the bearing of D from C.

..... [4]

(d) A straight path, BP, connects B to the closest point, P, on AC.

Calculate the length of this path.

..... km [2]

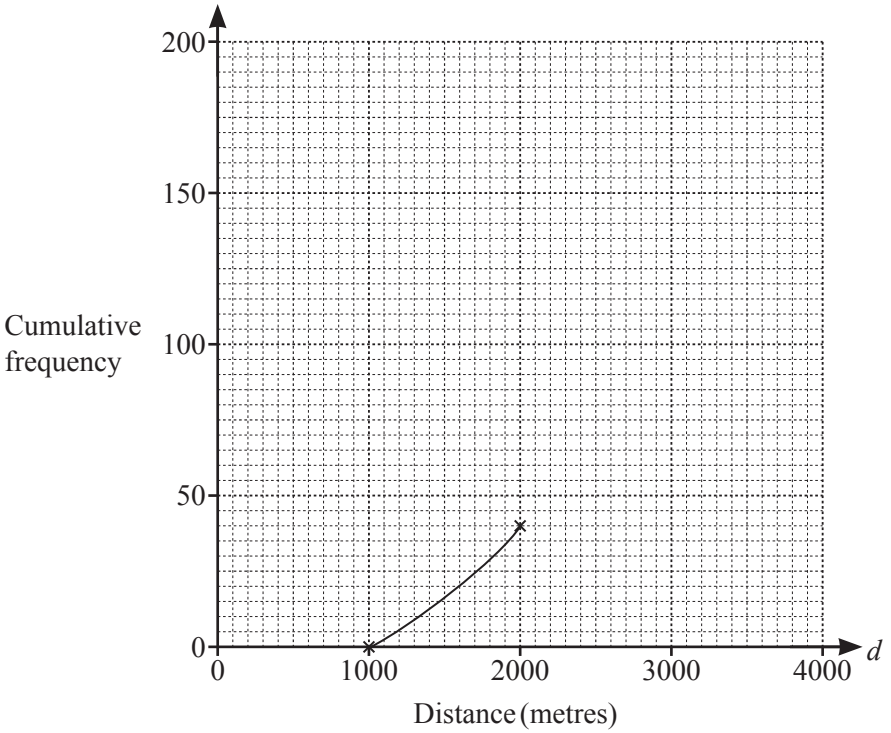
(e) The area within triangle ABC is grassland.

Calculate the area of this grassland.

.....km^2 [2]

8 **(a)** 200 people took part in a charity walk.
They each recorded how far, d metres, they walked in one hour.
The table shows the results.

Distance (d metres)	$1000 < d \leqslant 2000$	$2000 < d \leqslant 2500$	$2500 < d \leqslant 3000$	$3000 < d \leqslant 4000$
Number of people	40	60	80	20



(i) Complete the cumulative frequency curve. [3]

(ii) Use your curve to find the inter-quartile range.

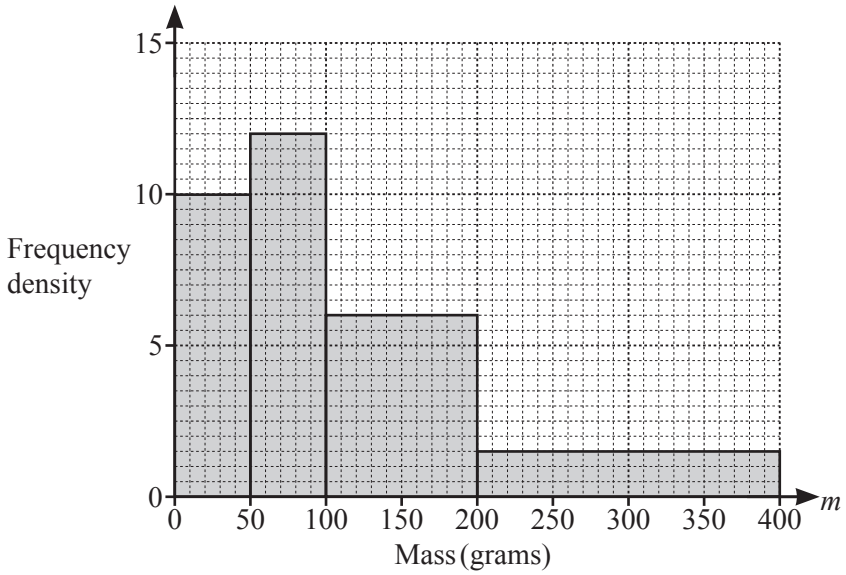
..... m [2]

(iii) Use your curve to estimate the number of people who walked further than 3500 m.

..... [2]

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(b) 2000 people took part in a "NO FOOD FOR 6 HOURS" day.
They each recorded the reduction in their mass, m grams, at the end of the day.
The histogram shows their results.



(i) Complete the frequency table.

Reduction in mass (m grams)	$0 < m \leqslant 50$	$50 < m \leqslant 100$	$100 < m \leqslant 200$	$200 < m \leqslant 400$
Number of people	500			

[2]

(ii) Calculate an estimate of the mean.

..... g [2]

9 **(a)** Lionel runs 10.6 km in 94 minutes.

Calculate his average speed in km/h.

..... km/h [2]

(b) Monika walks 2 km at a speed of 4 km/h and then 3 km at a speed of 3 km/h.

Calculate Monika's overall average speed.

..... km/h [3]

(c) A train is travelling at v metres per second.

Find an expression, in terms of v, for the speed of the train in kilometres per hour.
Give your answer in its simplest form.

..... km/h [2]

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(d) (i) A car travels 50 km at x km/h and then 80 km at $(x + 10)$ km/h.

Find an expression, in terms of x, for the total time taken, T hours.
Give your answer as a single fraction, in its simplest form.

$T =$ ..... h [3]

(ii) When $T = 2$, show that $x^2 - 55x - 250 = 0$.

[2]

(iii) When $T = 2$, find the value of x.

$x =$ ..... [3]

10 $f(x) = 2x + 3$ $g(x) = \frac{1}{x}$, $x \neq 0$ $h(x) = 2^x$ $j(x) = \log_3 x$

(a) Find

(i) $f(-2)$,

..... [1]

(ii) $g\left(\frac{1}{2}\right)$.

..... [1]

(b) Find $g(f(1))$.

..... [2]

(c) Find x when $h(x) = \frac{1}{8}$.

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

(d) Find $j(81)$.

..... [1]

(e) Find $f(f(x))$ in its simplest form.

..... [2]

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(f) Find $f(x) \times f(x) + f(x) + 1$ in its simplest form.

..... [3]

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

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

11



$f(x) = 3\sin(3x°)$

(a) On the diagram, sketch the graph of $y = f(x)$ for $0 \leqslant x \leqslant 180$. [2]

(b) Write down the amplitude and the period of $f(x)$.

Amplitude = ...

Period = ... [2]

(c) Solve the inequality $f(x) < -1.5$ for $0 \leqslant x \leqslant 180$.

..... [2]

(d) $g(x) = 3\sin(x°)$

(i) On the same diagram, sketch the graph of $y = g(x)$ for $0 \leqslant x \leqslant 180$. [1]

(ii) On the diagram, shade the regions where $f(x) \geqslant g(x)$. [1]

(iii) Describe fully the **single** transformation that maps the graph of $y = g(x)$ onto the graph of $y = f(x)$.

.....

..... [3]

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