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2440459145

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/31**

Paper 3 (Core) **October/November 2021**

1 hour 45 minutes

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a graphic display calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π, use your calculator value.

INFORMATION

- The total mark for this paper is 96.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

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Formula List

Area, A, of triangle, base b, height h.	$A = \frac{1}{2}bh$
Area, A, of circle, radius r.	$A = \pi r^2$
Circumference, C, of circle, radius r.	$C = 2\pi r$
Curved surface area, A, of cylinder of radius r, height h.	$A = 2\pi rh$
Curved surface area, A, of cone of radius r, sloping edge l.	$A = \pi rl$
Curved surface area, A, of sphere of radius r.	$A = 4\pi r^2$
Volume, V, of prism, cross-sectional area A, length l.	$V = Al$
Volume, V, of pyramid, base area A, height h.	$V = \frac{1}{3}Ah$
Volume, V, of cylinder of radius r, height h.	$V = \pi r^2 h$
Volume, V, of cone of radius r, height h.	$V = \frac{1}{3}\pi r^2 h$
Volume, V, of sphere of radius r.	$V = \frac{4}{3}\pi r^3$

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Answer **all** the questions.

1 **(a)** Write sixty thousand and three in figures.

..... [1]

(b) Work out $\sqrt{729}$.

..... [1]

(c) Work out.

$$\frac{6.89}{3.21+4.73}$$

..... [1]

(d) Write down all the factors of 10.

..... [2]

(e) Write 965.384 correct to

(i) 1 decimal place,

..... [1]

(ii) 3 significant figures,

..... [1]

(iii) the nearest ten.

..... [1]

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[Turn over

2 **(a)** These are the first four terms of a sequence.

23 27 31 35

(i) Write down the next two terms of this sequence.

..... , ... [2]

(ii) Write down the rule for continuing this sequence.

..... [1]

(b) Here is a list of numbers.

-2 $\sqrt{3}$ 0.24 9 $-\frac{1}{3}$

Write down **one** of the numbers from the list to complete each statement.
You must use a different number in each statement.

..... is a natural number ($\mathbb{N}$).

..... is an integer ($\mathbb{Z}$).

..... is a rational number ($\mathbb{Q}$). [3]

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3 **(a)** Kate works part-time in a supermarket.
She is paid \$14 per hour.
One month, Kate works 64 hours.

Work out how much she is paid that month.

\$ ..... [1]

(b) Kate invests \$560 at a rate of 1.6% per year simple interest.

Calculate the total interest she receives at the end of 8 years.

\$ ..... [2]

(c) Ruth invests \$800 at a rate of 2.1% per year compound interest.

Work out the value of her investment at the end of 4 years.

\$ ..... [3]

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4 (a)

Decorations
$5 for a packet of 3 decorations
$9 for a packet of 6 decorations

(i) Paul buys 5 packets of 3 decorations and 2 packets of 6 decorations.

(a) Work out the total number of decorations he buys.

..... [1]

(b) Work out the total amount he pays for these decorations.

$ ..... [2]

(ii) Vasek buys 15 decorations.

Work out the **least** amount that he pays for 15 decorations.

$ ..... [2]

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(b) Vasek buys 12 praline balls.

(i) One praline ball costs \$0.83 .

Work out the cost of the 12 praline balls.

\$ ..... [1]

(ii) Vasek pays with \$10.

Work out how much change he receives.

\$ ..... [1]

(iii) Vasek shares the 12 praline balls with his friend, Paul, in the ratio Vasek : Paul = 2 : 1.

Work out how many praline balls they each receive.

Vasek .....

Paul ..... [2]

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5 **(a)** A taxi company charges a fixed amount of \$3 and then \$1.50 for each kilometre travelled.

(i) Write a formula for the cost, \$$C$, for travelling n kilometres.

..... [2]

(ii) Menno travels 15 kilometres in a taxi from this company.

Work out the cost of Menno's taxi journey.

\$ ..... [2]

(iii) Weston pays \$37.50 for a taxi journey with this company.

Work out how many kilometres the taxi travels.

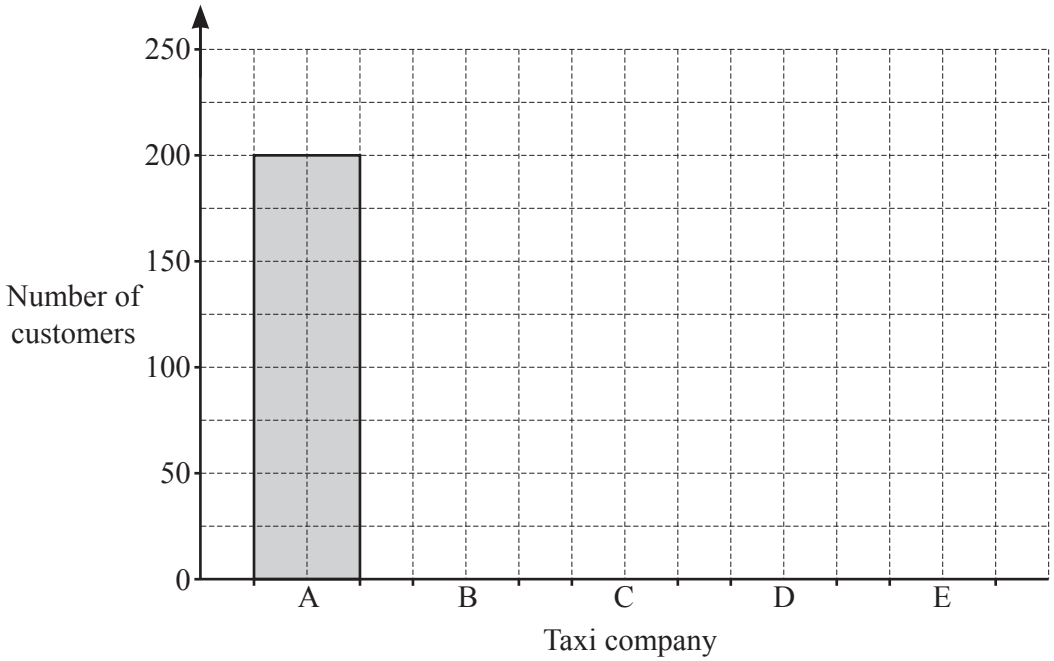
..... km [2]

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(b) The table shows the number of customers for some taxi companies on Monday.
There is a total of 875 customers on Monday.

Taxi company	A	B	C	D	E
Number of customers	200	150	225	125	175

(i) Complete the bar chart to show this information.



[2]

(ii) Write down the company that had the most customers.

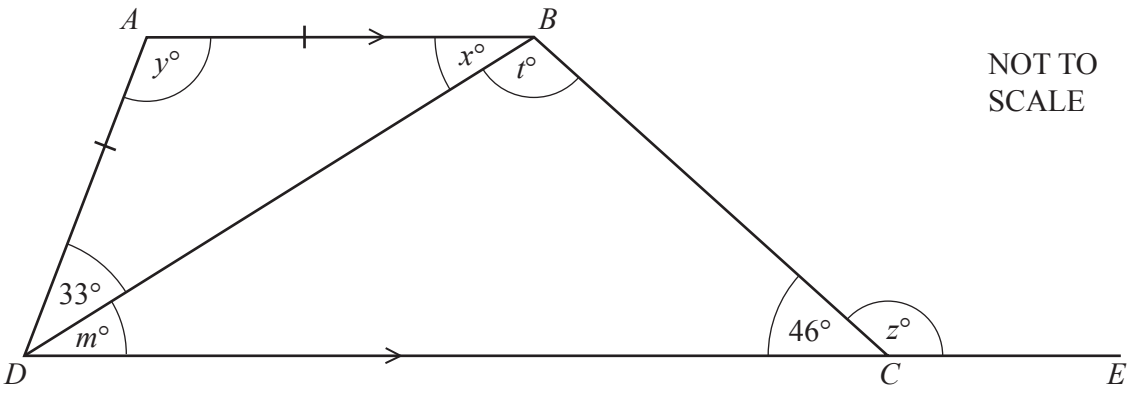
..... [1]

(iii) One of the 875 customers is chosen at random.

Find the probability that this customer used company E.

..... [1]

6



ABCD is a trapezium with angle *ADB* = 33° and angle *BCD* = 46°.
AB is parallel to *DC* and *AD* = *AB*.
DCE is a straight line.

(a) Write down the mathematical name for triangle *ABD*.

..... [1]

(b) Find the value of each of *x*, *y*, *z*, *m* and *t*.

x = ...

y = ...

z = ...

m = ...

t = ... [5]

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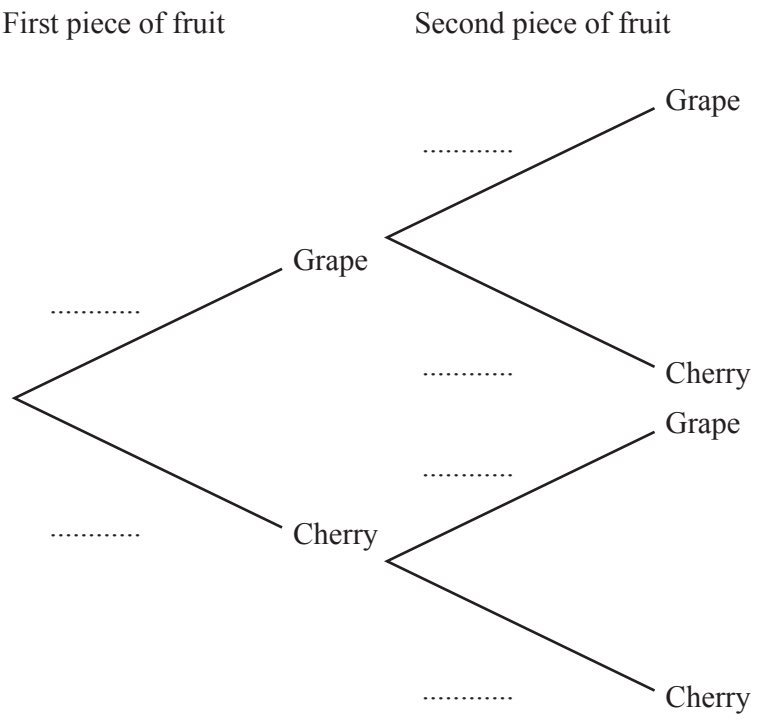
7 A bag contains 30 pieces of fruit.
There are 16 grapes and 14 cherries.
Fumi takes one piece of fruit at random from the bag and eats it.

(a) Find the probability that she takes a grape.

..... [1]

(b) Fumi takes a second piece of fruit at random from the bag.

(i) Complete the tree diagram.



[3]

(ii) Work out the probability that Fumi takes 2 cherries.

..... [2]

8 **(a)** Solve.

(i) $\frac{x}{7} = 3$

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

(ii) $3x + 7 = -8$

$x =$ ..... [2]

(b) $M = 2P + 3Q$

Find the value of M when $P = 2.13$ and $Q = 1.46$.

$M =$ ..... [2]

(c) Simplify.

$3a - 4b + a + 2b$

..... [2]

(d) Simplify fully.

$$\frac{a^3 b}{ab^2}$$

..... [2]

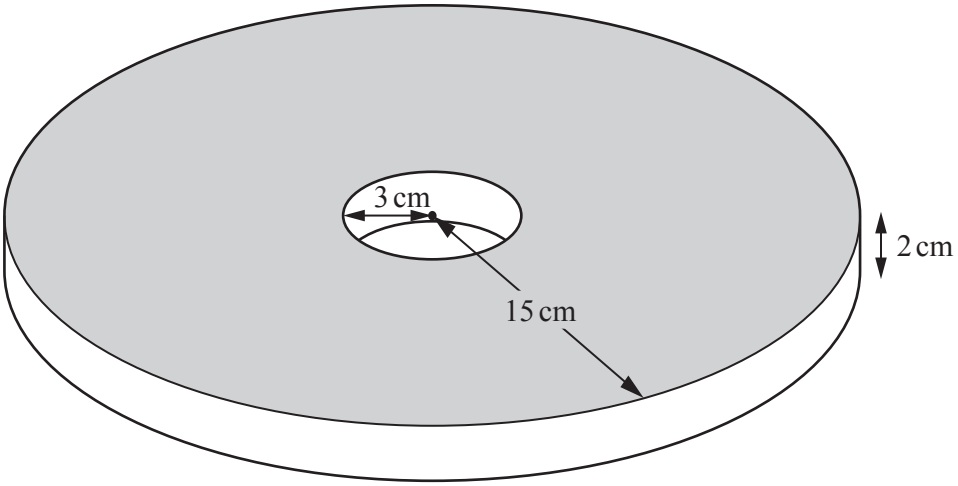
(e) Write as a single fraction in its simplest form.

$$\frac{4p}{5} \times \frac{3p}{8}$$

..... [2]

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9



NOT TO SCALE

A solid metal disc is in the shape of a cylinder with a smaller cylinder removed from the centre. The radius of the larger cylinder is 15 cm and the radius of the smaller cylinder is 3 cm. The height of the disc is 2 cm.

(a) Find the shaded area.

..... cm^2 [3]

(b) Find the volume of the disc.

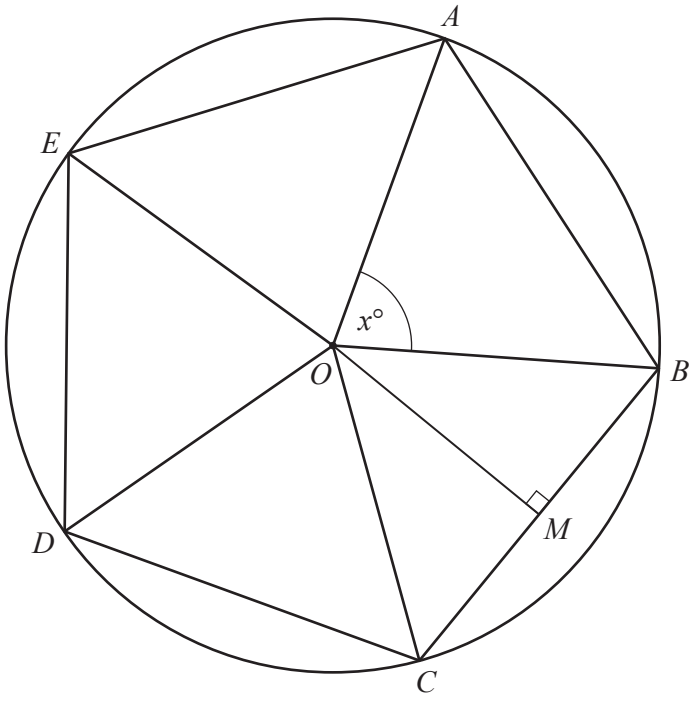
..... cm^3 [1]

(c) A solid cube has the same volume as the disc.

Find the length of one side of this cube.

..... cm [2]

10



NOT TO SCALE

The diagram shows a regular pentagon, $ABCDE$, inscribed in a circle, centre O.

(a) Show that $x = 72°$.

[1]

(b) Show that angle $OAB = 54°$.

[1]

(c) The circle has radius 6 cm.
M is the mid-point of BC.

(i) Use trigonometry to calculate OM.

..... cm [2]

(ii) Calculate BC.

..... cm [3]

(iii) Calculate the area of the pentagon.

..... cm^2 [2]

11 A farmer finds the mass, in kilograms, of each of 100 chickens.
The results are shown in the table.

Mass (w kg)	Frequency
$1 < w \leqslant 1.5$	8
$1.5 < w \leqslant 2$	15
$2 < w \leqslant 2.5$	32
$2.5 < w \leqslant 3$	23
$3 < w \leqslant 3.5$	16
$3.5 < w \leqslant 4$	6

(a) Write down the modal class.

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

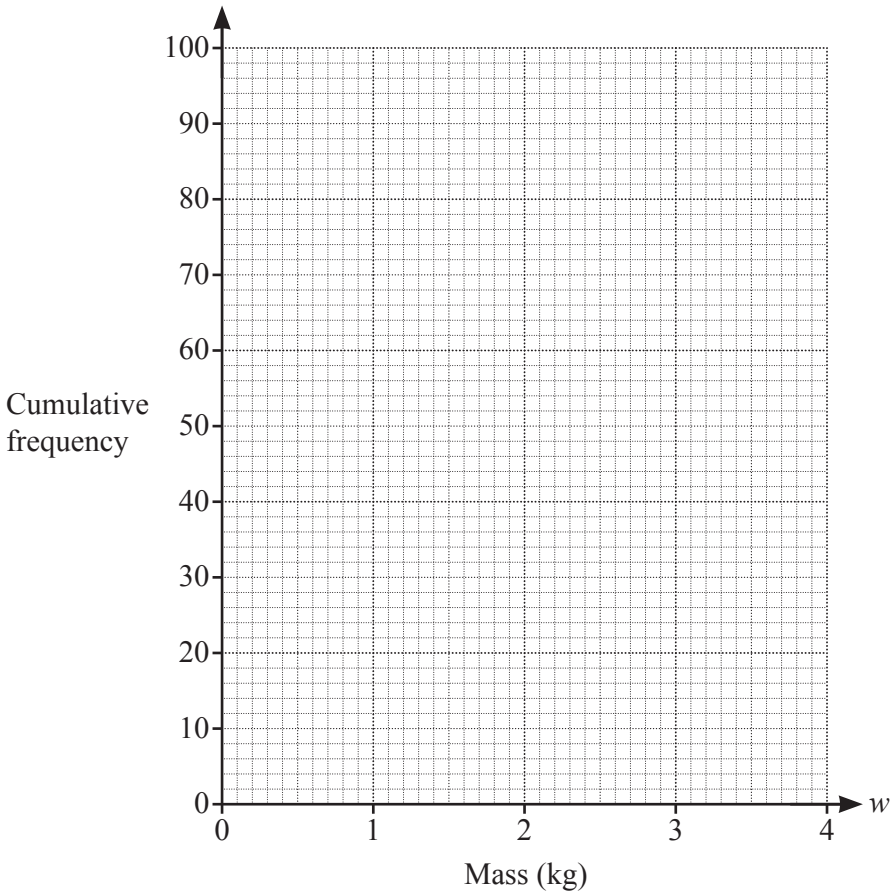
(b) Complete the cumulative frequency table for this data.

Mass (w kg)	Cumulative frequency
$w \leqslant 1.5$	
$w \leqslant 2$	
$w \leqslant 2.5$	
$w \leqslant 3$	
$w \leqslant 3.5$	
$w \leqslant 4$	100

[2]

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(c) On the grid, draw a cumulative frequency curve.



[3]

(d) Use your curve to find an estimate for

(i) the median,

..... kg [1]

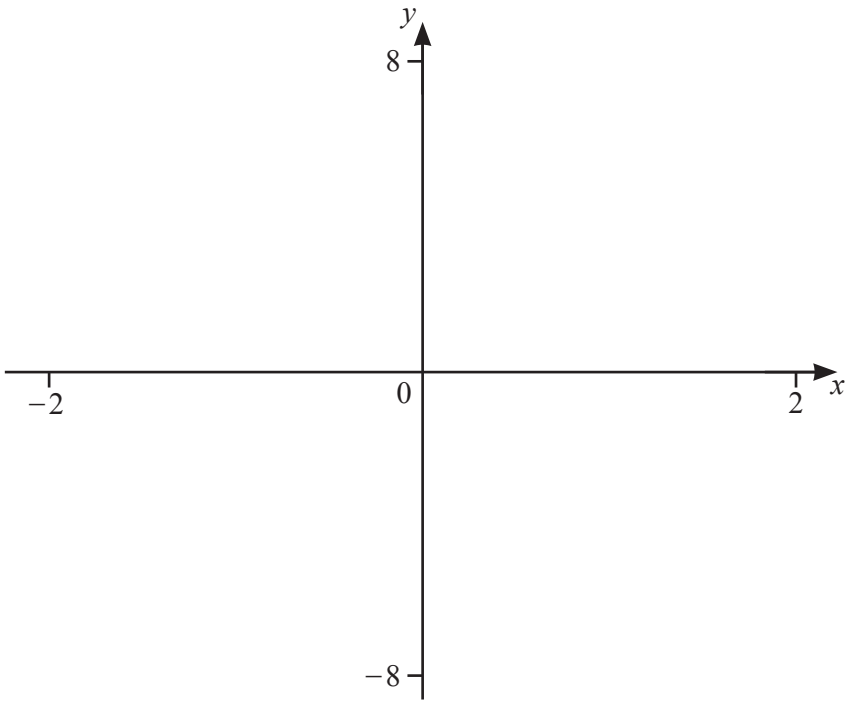
(ii) the interquartile range,

..... kg [2]

(iii) the number of chickens with a mass greater than 3.25 kg.

..... [2]

12



(a) On the diagram, sketch the graph of $y = x^3$ for $-2 \leqslant x \leqslant 2$. [2]

(b) Write down the coordinates of the point where the graph crosses the y-axis.

(..... , ...) [1]

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

(d) Find the x-coordinate of the points of intersection of $y = x^3$ and $y = 2x$.

..... , ... , ... [3]

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