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Cambridge Assessment International Education

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CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

4052619198

MATHEMATICS **0580/22**

Paper 2 (Extended) **October/November 2024**

1 hour 30 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 calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- 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 either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 70.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **16** pages.

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[Turn over

1 These are the first eight terms of a sequence.

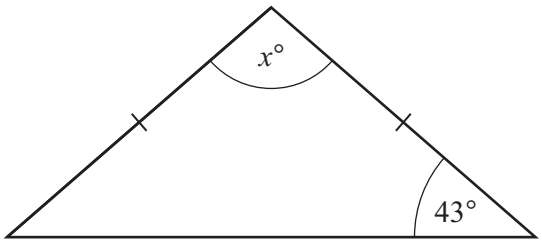
$c \quad -3 \quad -9 \quad -15 \quad -21 \quad -27 \quad -33 \quad k$

Find the value of c and the value of k.

$c =$ .....

$k =$ ..... [2]

2 The diagram shows an isosceles triangle.



NOT TO SCALE

Find the value of x.

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

3

0.25	3.142	$\sqrt{3}$	-3	24	-0.4	1.2	$-\frac{1}{4}$

Complete each statement with a number from the list.

..... is a natural number.

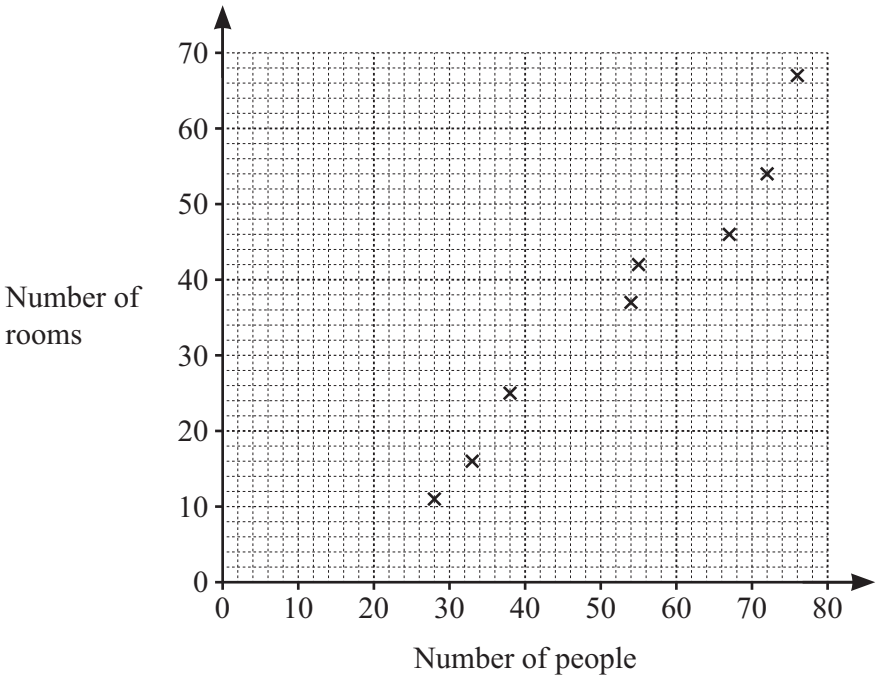
..... is an irrational number.

..... is the reciprocal of 4.

[3]

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4 The scatter diagram shows the number of rooms and the number of people in each of eight buildings.



(a) One of the buildings has 67 rooms.

Write down the number of people in this building.

..... [1]

(b) In another building there are 42 people and 33 rooms.

On the scatter diagram, plot this point. [1]

(c) **(i)** On the scatter diagram, draw a line of best fit. [1]

(ii) There are 45 people in a different building.

Find an estimate for the number of rooms in this building.

..... [1]

(d) What type of correlation is shown in the scatter diagram?

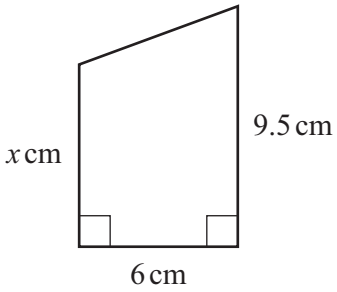
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5 Convert $7.51\,m^2$ into cm^2.

..... cm^2 [1]

6 The diagram shows a trapezium.



NOT TO SCALE

The area of the trapezium is $42\,cm^2$.

Calculate the value of x.

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

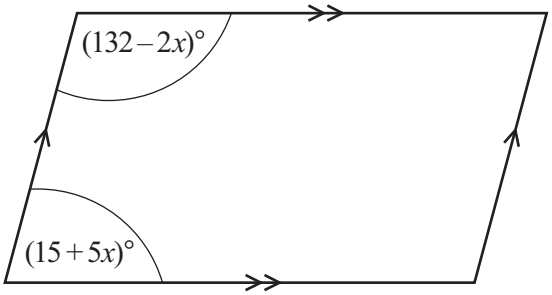
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7 **Without using a calculator**, work out $\frac{2}{7} \div \frac{6}{11}$.

You must show all your working and give your answer as a fraction in its simplest form.

..... [2]

8 The diagram shows a parallelogram.



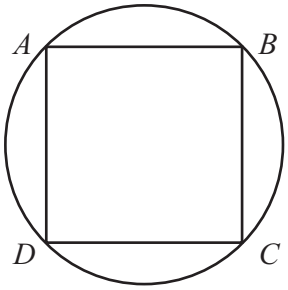
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Work out the size of the smallest interior angle of the parallelogram.

..... [4]

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9



NOT TO SCALE

Points A, B, C and D lie on a circle.
$ABCD$ is a square with area $72\,\text{cm}^2$.

Calculate the area of the circle.
Give your answer as a multiple of π.

..... cm^2 [3]

10 Calculate $\sqrt[3]{1+10.9\times0.4^2}$.

..... [1]

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11 Factorise fully.

(a) $24x^2 - 9xy$

..... [2]

(b) $63x^2 - 28y^2$

..... [3]

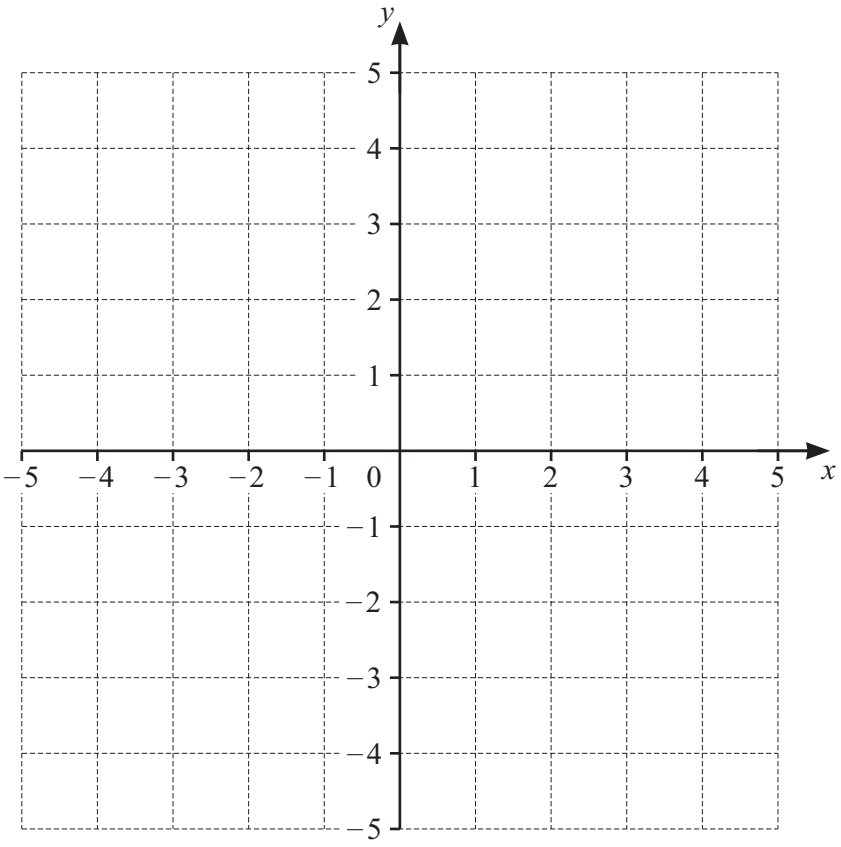
12 y is directly proportional to the square root of $x + 1$.
$y = 10.5$ when $x = 8$.

Find y when $x = 1.56$.

$y =$ ..... [3]

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The region R satisfies these inequalities.

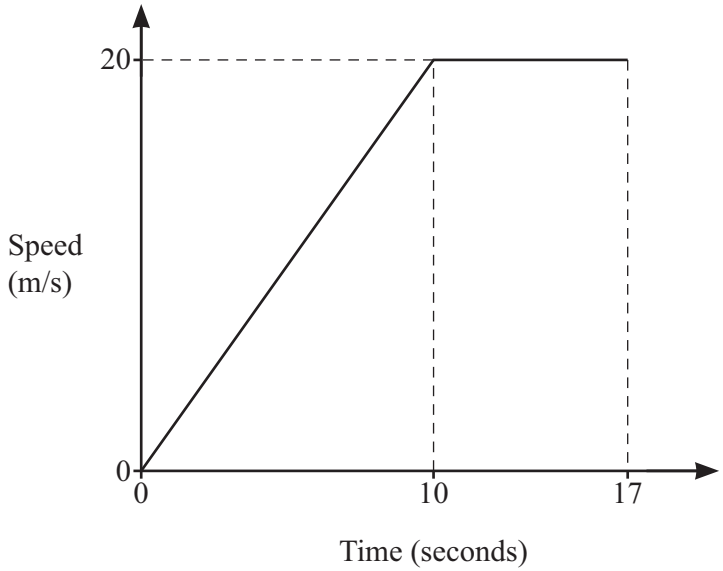
$$-3 < y \leqslant 2 \qquad\qquad y \leqslant x - 1$$

By drawing suitable straight lines and shading **unwanted** regions, find and label the region R.

[4]

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14



NOT TO
SCALE

The diagram shows the speed–time graph for 17 seconds of a car journey.

(a) Find the acceleration of the car during the first 10 seconds.

..... m/s^2 [1]

(b) Calculate the total distance travelled by the car during the 17 seconds.

..... m [3]

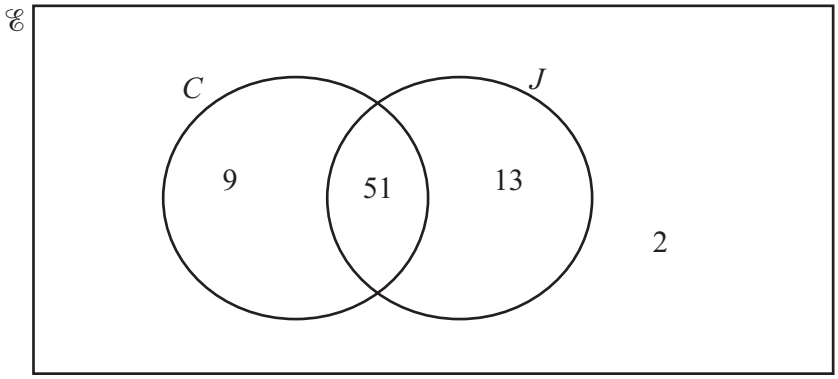
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15 At the start of an experiment there are 40 000 bacteria.
The number of bacteria increases at a rate of 15% per hour.

Calculate the number of bacteria after 3 hours.

..... [2]

16 75 people are asked if they have a car, C, and if they have a job, J.
The Venn diagram shows the results.



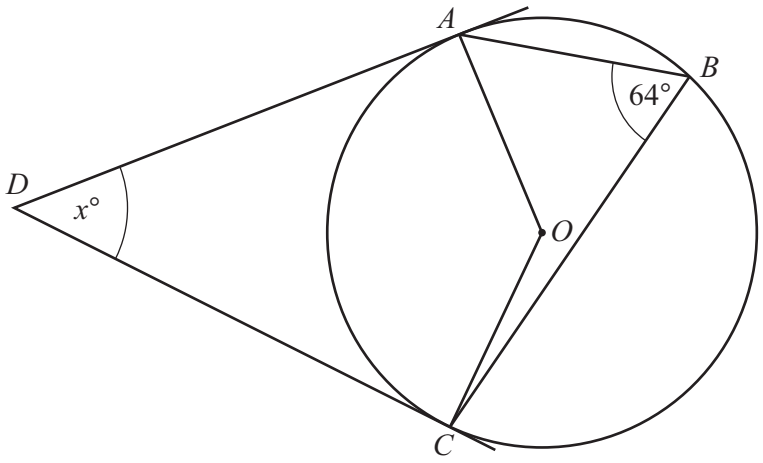
A person is chosen at random from those who have a car.

Find the probability that this person also has a job.

..... [1]

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17



NOT TO SCALE

A, B and C are points on the circumference of a circle with centre O.
DA and DC are tangents to the circle.
Angle $ABC = 64°$.

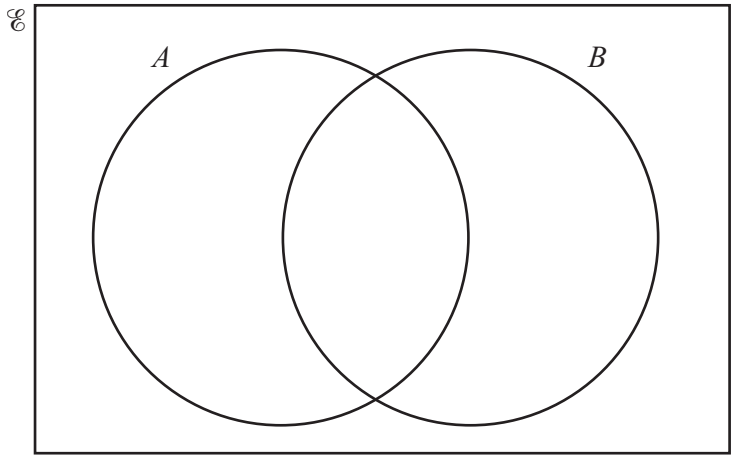
Work out the value of x.

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

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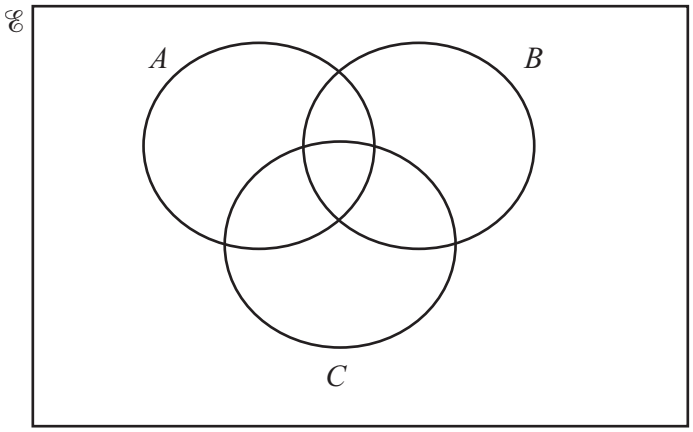
18 **(a)** $\mathscr{E} = \{8 \times 10^{-1}, \quad 0.\dot{8}, \quad 8\%, \quad \sqrt{0.08}\}$

$A = \{ a: 0.08 < a \leqslant 0.8\}$
$B = \{ b: b \geqslant 0.8\}$



Complete the Venn diagram. [3]

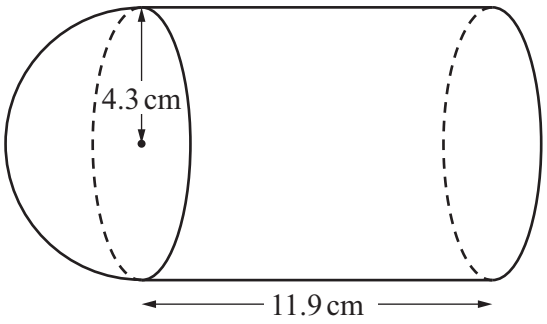
(b) Shade the region $(A \cup C) \cap B'$ in the Venn diagram.



[1]

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19



NOT TO SCALE

A solid is made from a cylinder and a hemisphere, both of radius 4.3 cm.
The cylinder has length 11.9 cm.

(a) Calculate the volume of the solid.
[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

..... cm^3 [3]

(b) Calculate the total surface area of the solid.
[The surface area, A, of a sphere with radius r is $A = 4\pi r^2$.]

..... cm^2 [4]

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20 Find an expression for the nth term of this sequence.

$$\frac{1}{7}, \quad 1, \quad 7, \quad 49, \quad 343, \quad 2401, \quad \ldots$$

..... [2]

21 Expand and simplify.

$$(x+3)(x+5)(2x+1)$$

..... [3]

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22 A is the point $(17, 9)$ and B is the point $(23, 39)$.

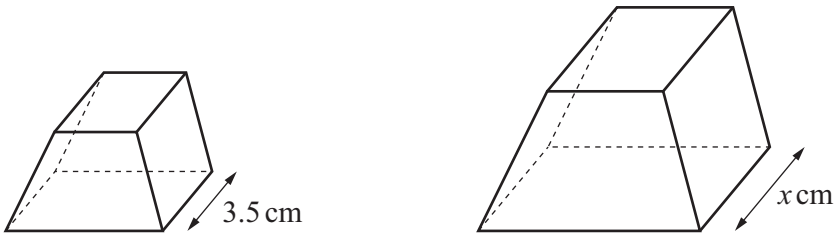
Find the equation of the perpendicular bisector of line AB.
Give your answer in the form $y = mx + c$.

$y =$ ..... [5]

Question 23 is printed on the next page.

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23



Small box Large box

NOT TO SCALE

The small box is mathematically similar to the large box.
The volume of the large box is 72.8% greater than the volume of the small box.
The small box has length 3.5 cm and the large box has length x cm.

Calculate the value of x.

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

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