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CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

6161571841

MATHEMATICS **0580/31**

Paper 3 (Core) **October/November 2024**

2 hours

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 104.
- 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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[Turn over

1 **(a)** Write the number six million and thirty in figures.

..... [1]

(b) Write 7.896 correct to 2 decimal places.

..... [1]

(c)

8	24	25	36	39	41	48

From this list of numbers, write down

(i) a multiple of 16

..... [1]

(ii) a factor of 24

..... [1]

(iii) a cube number

..... [1]

(iv) a prime number.

..... [1]

(d) Put **one** pair of brackets into this calculation to make it correct.

$$10 - 12 \div 4 + 2 = 8$$

[1]

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(e) By writing each number in the calculation correct to 1 significant figure, find an estimate for the value of

$$\frac{596 \times 0.047}{\sqrt{8.65}}.$$

You must show all your working.

..... [2]

(f) Calculate $(8 \times 10^6) \times (3 \times 10^{-2})$.
Give your answer in standard form.

..... [2]

(g) $216 = 2^3 \times 3^3$

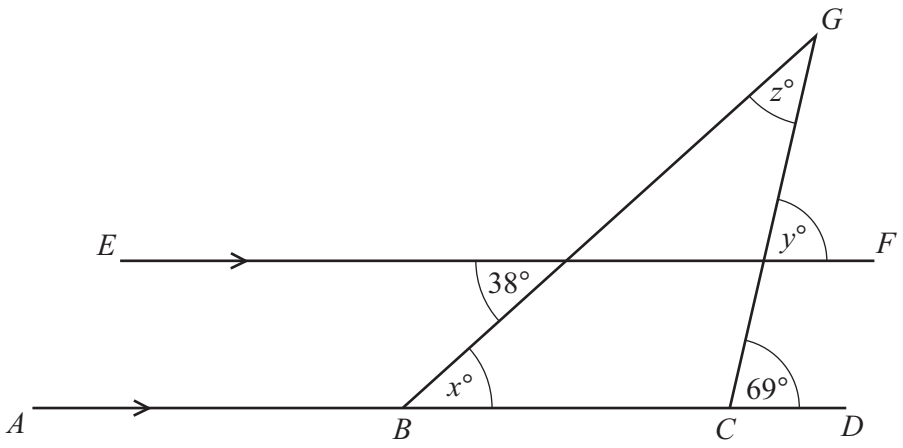
Write 2160 as a product of its prime factors.

..... [1]

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2 **(a)** In the diagram, *BCG* is a triangle.
ABCD and *EF* are parallel lines.

NOT TO SCALE



(i) Find the value of x.
Give a geometrical reason for your answer.

x = ... because..... [2]

(ii) Find the value of y.
Give a geometrical reason for your answer.

y = ... because.....

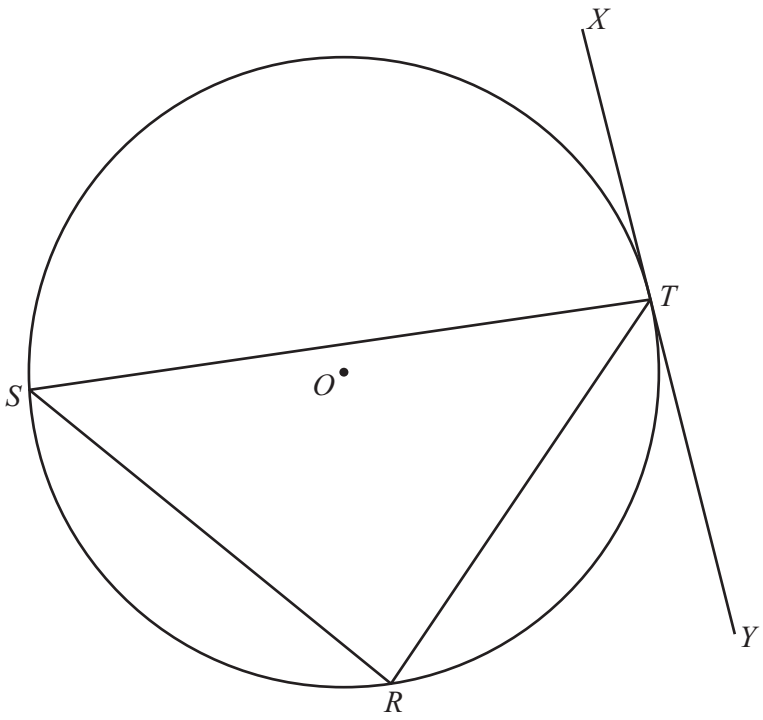
..... [2]

(iii) Find the value of z.

z = ... [2]

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(b)



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R, *S* and *T* are points on a circle, centre *O*.
Line *XY* touches the circle at *T*.

(i) Write down the mathematical name for the line *XY*.

..... [1]

(ii) Write down the mathematical name for the line *SR*.

..... [1]

(iii) Toby thinks shape *RST* is a right-angled triangle.

Give a geometrical reason why Toby is incorrect.

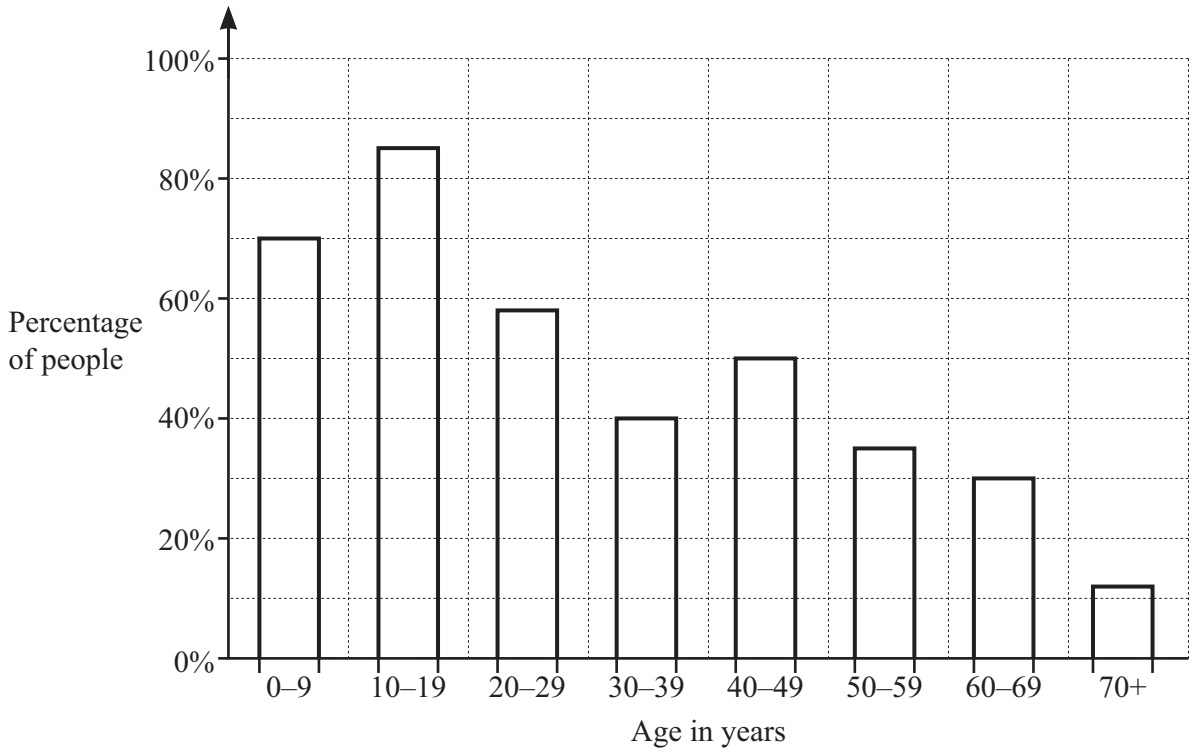
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3 Jack does a survey about cycling.

(a) The bar chart shows the percentage of people in each age group who use a bicycle.



(i) Write down the percentage of people aged 60 to 69 who use a bicycle.

..... % [1]

(ii) 980 people in the survey are in the 30–39 age group.

Work out how many of these people use a bicycle.

..... [2]

(b) Jack makes 18 cycling trips in one year.
Each cycling trip lasts 23 minutes.

Find the total time Jack spends cycling in this year.
Give your answer in hours and minutes.

..... h ..... min [2]

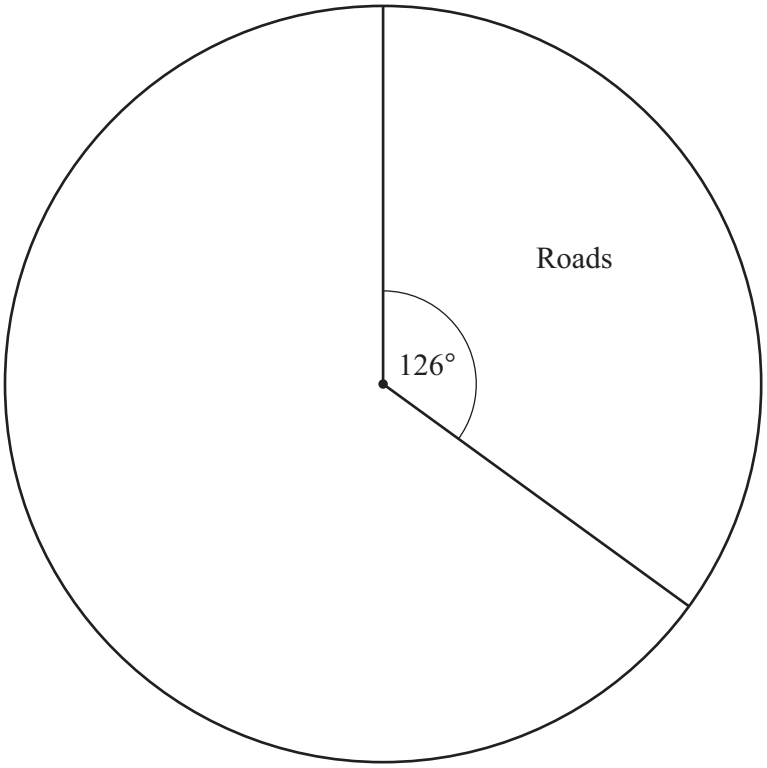
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(c) The table shows where 240 people cycle the most.

	Number of people	Pie chart sector angle
Roads	84	126°
Cycle paths	72	
Parks	48	
Other	36	

(i) Complete the table. [2]

(ii) Complete the pie chart to show this information.



[2]

(d) A bicycle costs $720.
Carlo pays one-fifth of the cost as a deposit.
He pays the rest of the money in equal monthly payments of $16.

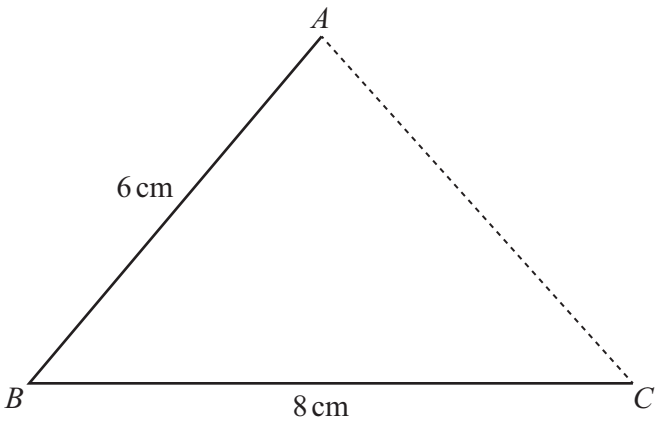
Work out how many monthly payments Carlo makes.

..... [3]

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4 **(a)** A parallelogram *ABCD* has sides 8 cm and 6 cm.
Lines *AB* and *BC* have been drawn.

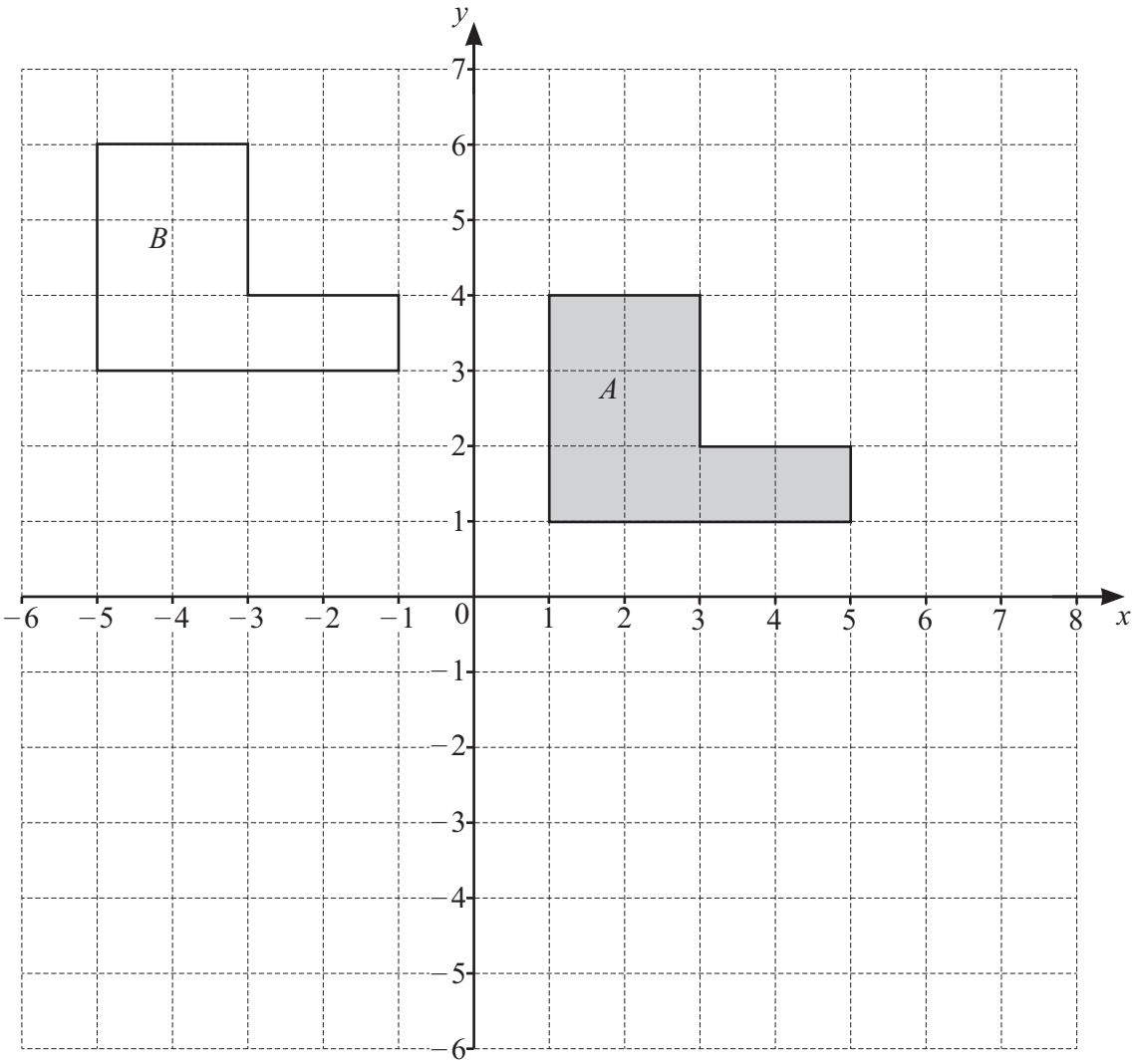
By constructing triangle *ACD*, complete the parallelogram.
Use a ruler and compasses only and leave in your construction arcs.



[2]

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(b)



(i) Describe fully the **single** transformation that maps shape *A* onto shape *B*.

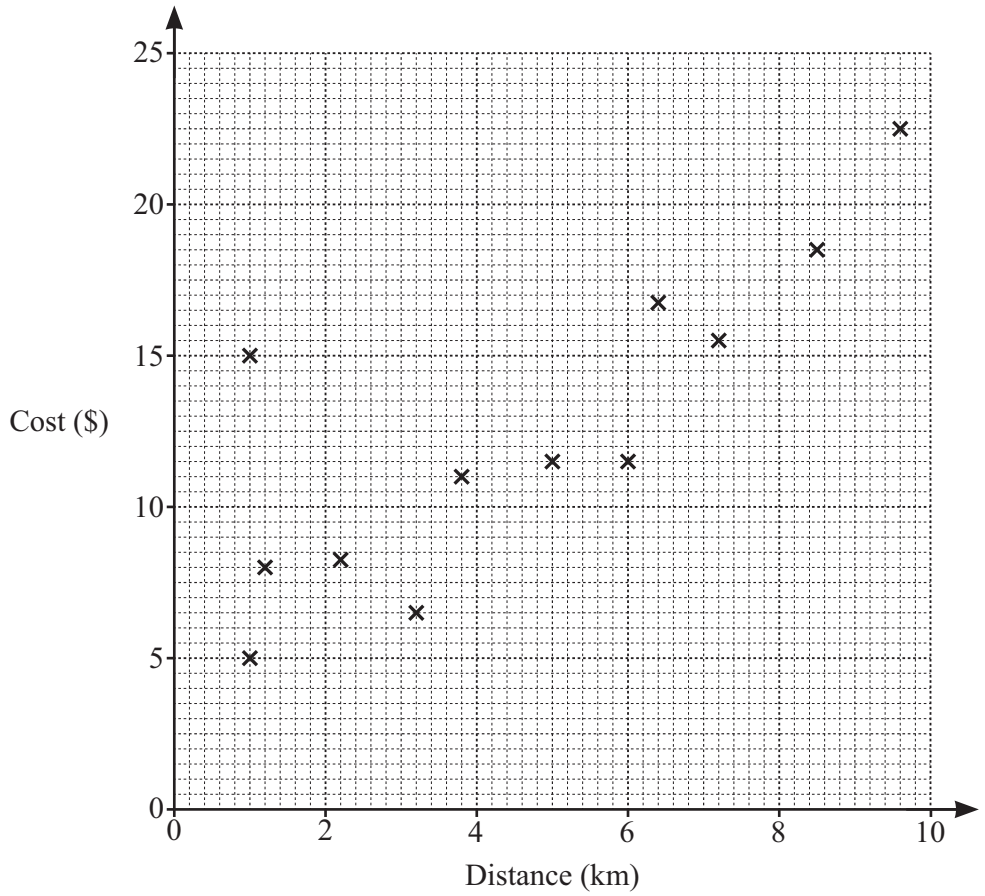
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..... [2]

(ii) On the grid, draw the image of shape *A* after a rotation, 90° anticlockwise, centre (5, 1). [2]

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5 **(a)** The scatter diagram shows the distance travelled and the cost for each of 12 taxi journeys.



(i) 'The scatter diagram shows positive correlation.'

Is this statement true or false?
Give a reason for your answer.

..... because .....

..... [1]

(ii) On one journey, the cost per kilometre travelled was much more expensive than on all of the other journeys.

Draw a ring around this point on the scatter diagram. [1]

(iii) Draw a line of best fit on the scatter diagram. [1]

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(iv) Another journey is 8 km long.

Use your line of best fit to find an estimate for the cost of this journey.

$ ..... [1]

(b) Arit, Luke and Marie share the cost of a taxi journey.
The cost is $26.40 .

(i) Calculate how much Arit pays if they share the cost equally.

$ ..... [1]

(ii) They decide to share the cost in proportion to the distance they each travel in the taxi.
Arit travels 12 km, Luke travels 3 km and Marie travels 7.5 km.

(a) Write the ratio 12 : 3 : 7.5 in its simplest form.

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

(b) Calculate how much more Arit pays than if they share the cost equally.

$ ..... [3]

(c) Jin invests some money from his taxi company.
He invests $18 600 at a rate of 1.7% per year compound interest.

Calculate the value of the investment at the end of 6 years.
Give your answer correct to the nearest dollar.

$ ..... [3]

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6 **(a)** This is a recipe to make ice cream for 6 people.

270 ml cream
270 ml milk
100 g sugar
4 egg yolks

Tom makes ice cream for 10 people.

(i) Work out how much milk he uses.

..... ml [2]

(ii) The mass of all the ingredients Tom uses is 1100 g.
After Tom heats the mixture, this mass reduces by 15%.

Find the mass of the mixture after heating.

..... g [2]

(iii) Tom lets the mixture cool to 5°C.
He then puts it into a freezer to cool to −18°C.

Find the difference in these temperatures.

..... °C [1]

(b) **(i)** In a factory, a machine fills 25 920 tubs of ice cream in 8 hours.

Work out the number of tubs the machine fills in 1 minute.

..... [1]

(ii) A pack of ice cream contains 6 tubs.
There are 120 packs on a tray.
There are 24 trays on a truck.

Work out how many tubs of ice cream are on the truck.

..... [1]

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(c) Mario sells ice creams in five flavours.
The table shows the relative frequency of some of the ice cream flavours Mario sells.

	Vanilla	Chocolate	Strawberry	Coconut	Banana
Relative frequency	0.34		0.18	0.12	

Mario sells three times as many chocolate ice creams as banana ice creams.

(i) Complete the table.

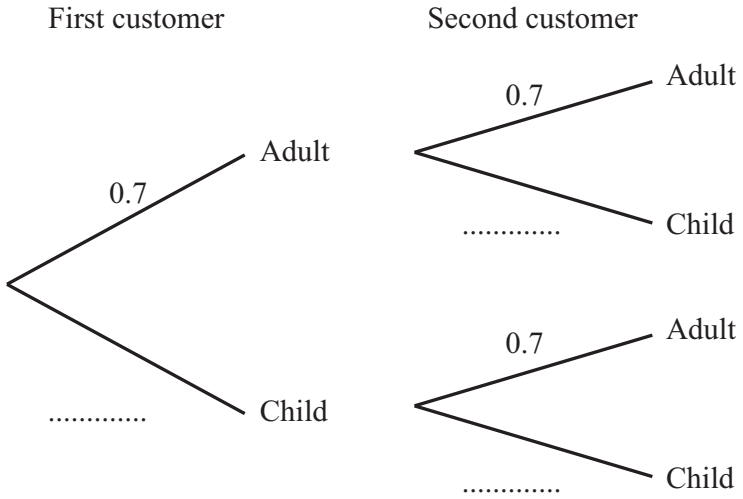
[3]

(ii) One week Mario sells 450 ice creams.

Find how many strawberry ice creams Mario expects to sell.

..... [1]

(iii) The probability that any customer is an adult is 0.7 .



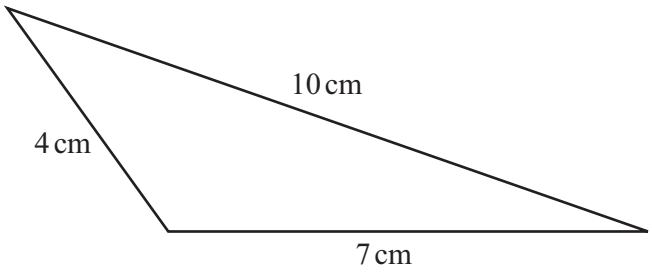
(a) Complete the tree diagram. [1]

(b) Find the probability that the first two customers are adults.

..... [2]

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7 (a)

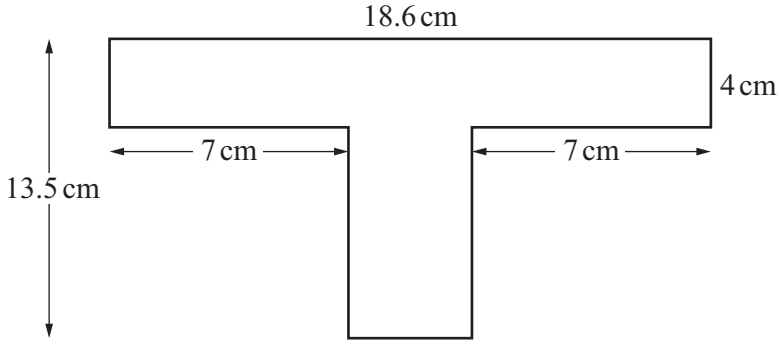


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Find the perimeter of the triangle.

..... cm [1]

(b) The diagram shows a shape made from rectangles.



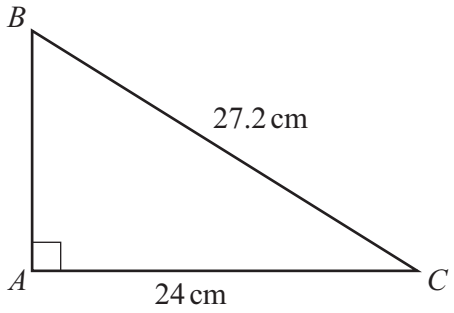
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Calculate the area of the shape.

..... cm^2 [3]

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(c) The diagram shows a right-angled triangle ABC.



NOT TO SCALE

Calculate the area of the triangle.

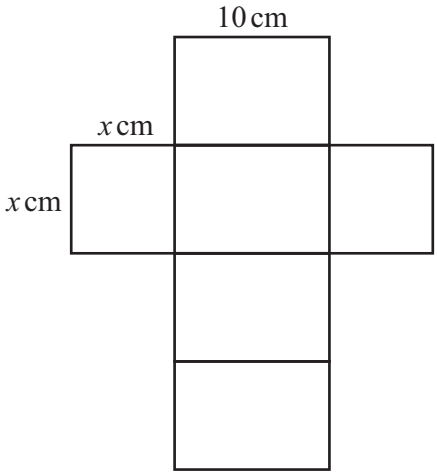
..... cm^2 [5]

(d) Calculate the volume of a sphere with diameter 5.25 cm.
[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

..... cm^3 [2]

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8 **(a)** The diagram shows the net of a solid.



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(i) Write down the mathematical name of the solid.

..... [1]

(ii) Find the volume of the solid when $x = 4$.

..... cm^3 [2]

(iii) Write down an expression, in terms of x, for the volume of the solid.

..... cm^3 [1]

(iv) Find the value of x when the volume of the solid is $360\,cm^3$.

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

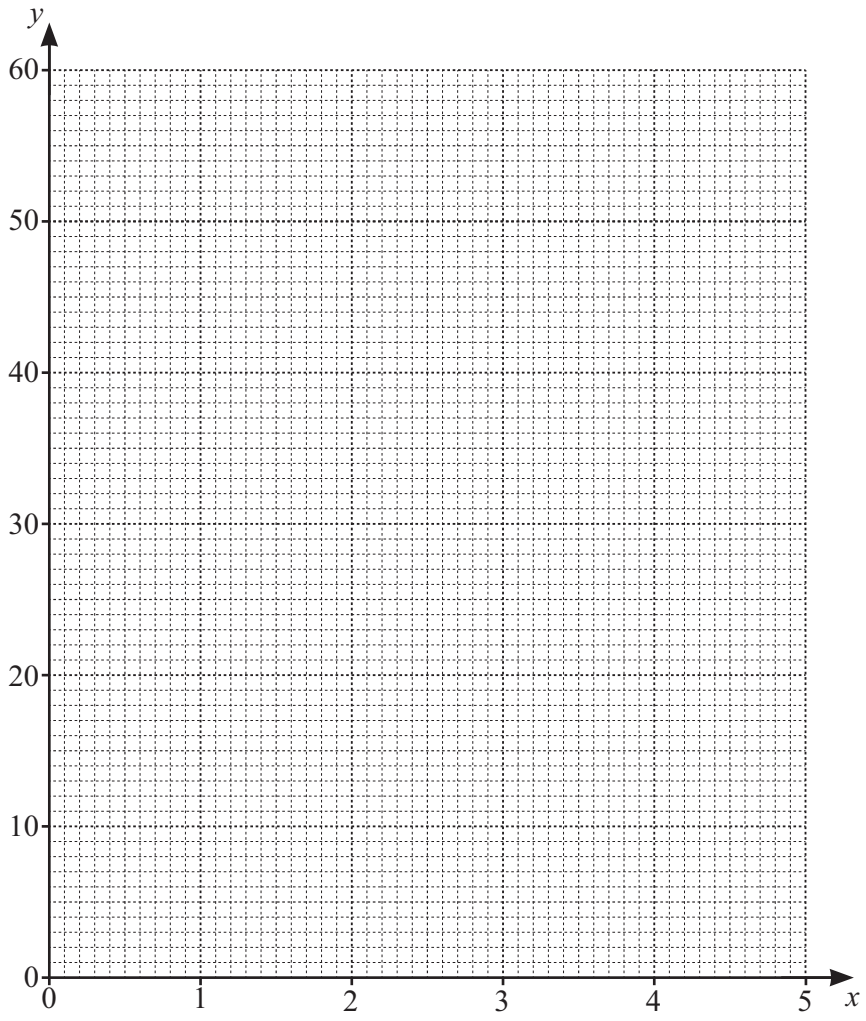
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(b) (i) Complete the table of values for $y = 2x^2 + x$.

x	0	1	2	3	4	5
y	0	3	10			

[2]

(ii) On the grid, draw the graph of $y = 2x^2 + x$ for $0 \leqslant x \leqslant 5$.



[3]

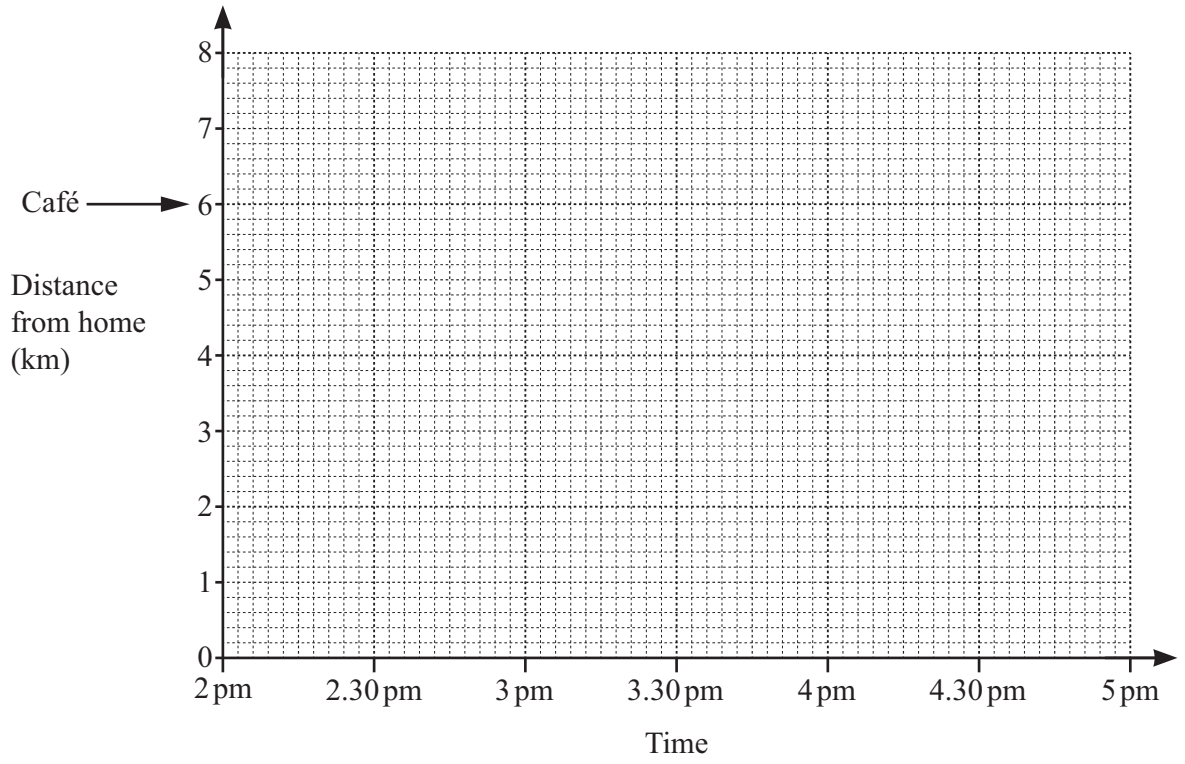
(iii) Use your graph to solve the equation $2x^2 + x = 30$ for $0 \leqslant x \leqslant 5$.

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

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9 Samir leaves home at 2 pm.
He jogs 6 km to a café at a constant speed of 8 km per hour.
He stops to rest for 1 hour.
He then walks back home at a constant speed and arrives at 4.36 pm.

(a) On the grid, draw a travel graph to show Samir's whole journey.



[3]

(b) Calculate Samir's average speed for the **whole** journey.

..... km/h [3]

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10 **(a)** Solve.

$4x - 7 = 3$

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

(b) Simplify.

(i) $(x^6)^2$

..... [1]

(ii) $(5x^3y^4) \times (2x^2y^2)$

..... [2]

(c) Expand and simplify.

(i) $4a + 5 - 2(a - 1)$

..... [2]

(ii) $(d + 7)(d - 3)$

..... [2]

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