Cambridge IGCSE

**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

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|---|---|
| CANDIDATE NAME | |
| CENTRE NUMBER | |
| CANDIDATE NUMBER | |

*8648982373*

**MATHEMATICS** **0580/31**

Paper 3 (Core) **October/November 2016**

**2 hours**

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

**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.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For $\pi$, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 104.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **15** printed pages and **1** blank page.


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**1** **(a)** Juan and his family fly from London to Rio de Janeiro.

**(i)** The plane departs at 10 20 and arrives in Rio de Janeiro 11 hours 40 minutes later.
The local time in Rio de Janeiro is 5 hours behind the local time in London.

Work out the time in Rio de Janeiro when the plane arrives.

..... [2]

**(ii)** The total cost of the plane tickets is 3500 pounds (£).
The exchange rate is £1 = 4.45 Brazilian Real.

Calculate the cost of the tickets in Brazilian Real.

..... Real [1]

**(b)** **(i)** Juan and his family go to a soccer match.
He buys 2 adult tickets and 2 child tickets.
The price of an adult ticket is 660 Brazilian Real.
The price of a child ticket is $\frac{2}{3}$ of the price of an adult ticket.

Calculate the total cost of the tickets.

..... Real [2]

**(ii)** The length, $x$ metres, of the soccer pitch is 105 m, correct to the nearest metre.

Complete the statement about the value of $x$.

..... $\leqslant x <$ ..... [2]

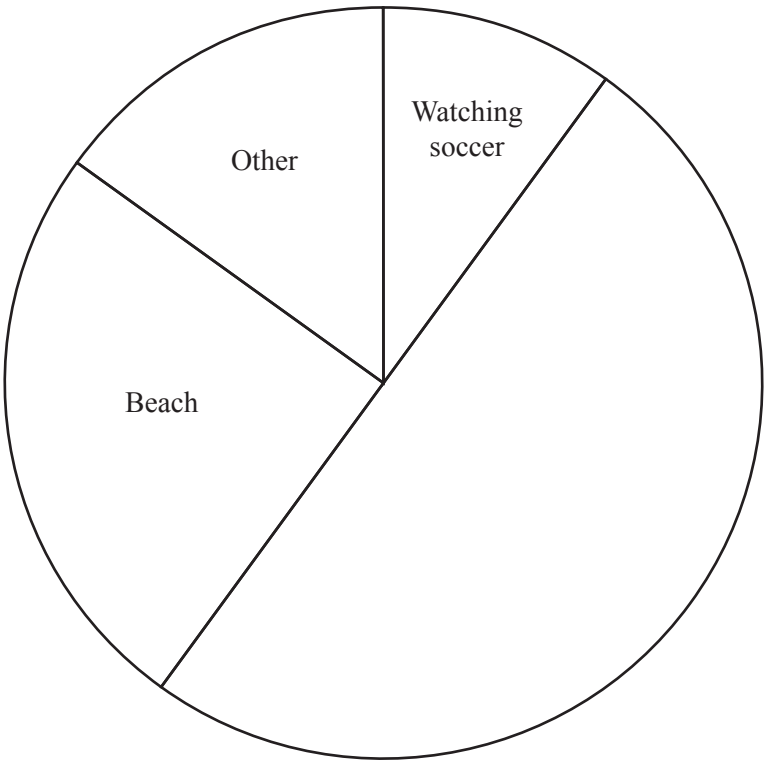
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**(c)** The table shows how Juan and his family spent their time in Rio de Janeiro.

| Activity | Percentage of time | Sector angle in a pie chart |
|---|---|---|
| Watching soccer | 10 | 36° |
| Sleeping | | 108° |
| Shopping | | |
| Beach | 25 | 90° |
| Other | 15 | 54° |

**(i)** Complete the table. [3]

**(ii)** Complete the pie chart.




[1]

**2** Javier went to a carnival with his friends.

**(a)** He played five games of darts.
These are his scores.

160 58 45 82 125

**(i)** Work out his mean score.

..... [2]

**(ii)** Find the range.

..... [1]

**(b)** The 5000 tickets for the carnival are different colours.
The table shows the number of tickets of each colour.

| Colour of ticket | Red | Green | Blue | Pink | White |
|---|---|---|---|---|---|
| Number of tickets | 370 | 560 | 1800 | 1320 | 950 |

A ticket is picked at random.

Find the probability that this ticket is Blue.

..... [1]

**(c)** Five different types of food are sold at the carnival.
Javier chooses one of these types of food.
The table shows the probability that he chooses each type of food.

| Type of food | Curry | Fries | Pasta | Burger | Salad |
|---|---|---|---|---|---|
| Probability | 0.15 | 0.23 | 0.4 | | 0.07 |

Complete the table. [2]

**(d)** Javier hires a four-seater bike.
The hire cost is $8.50 for the first hour and then $7.75 for each extra hour.

Calculate the cost of hiring the bike for 5 hours.

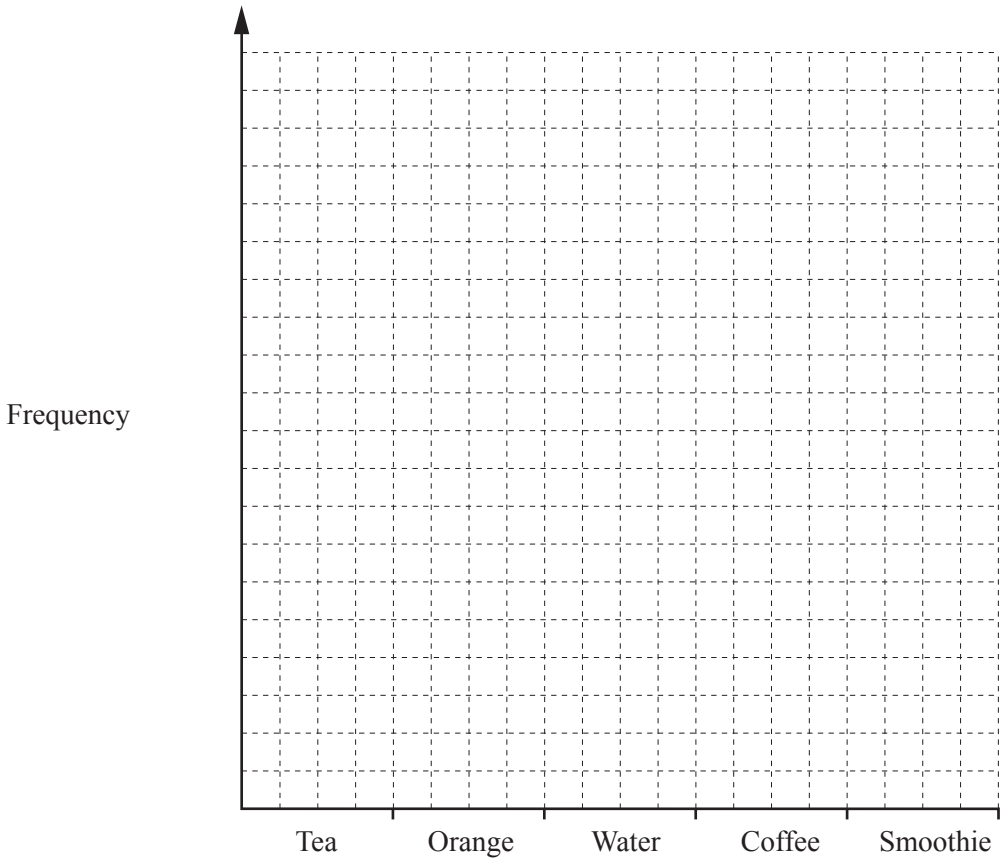
$..... [2]

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**(e)** The table shows the number of drinks sold by one stall at the carnival.

| Drink | Number sold |
|---|---|
| Tea | 70 |
| Orange | 60 |
| Water | 120 |
| Coffee | 180 |
| Smoothie | 40 |

Draw a bar chart to show this information.
Complete the scale on the frequency axis.




[3]

**3** **(a)**

6 144 63 11 288 72 8

From the list, write down

**(i)** the multiple of 7,

..... [1]

**(ii)** the cube of 2,

..... [1]

**(iii)** the prime number,

..... [1]

**(iv)** the lowest common multiple (LCM) of 16 and 18.

..... [1]

**(b)** Without using a calculator explain why the square of 4.86 must be between 16 and 25.

..... [1]

**(c)** Find the value of

**(i)** $4^7$,

..... [1]

**(ii)** $12^0$,

..... [1]

**(iii)** $8.3^2 + \sqrt{27}$.

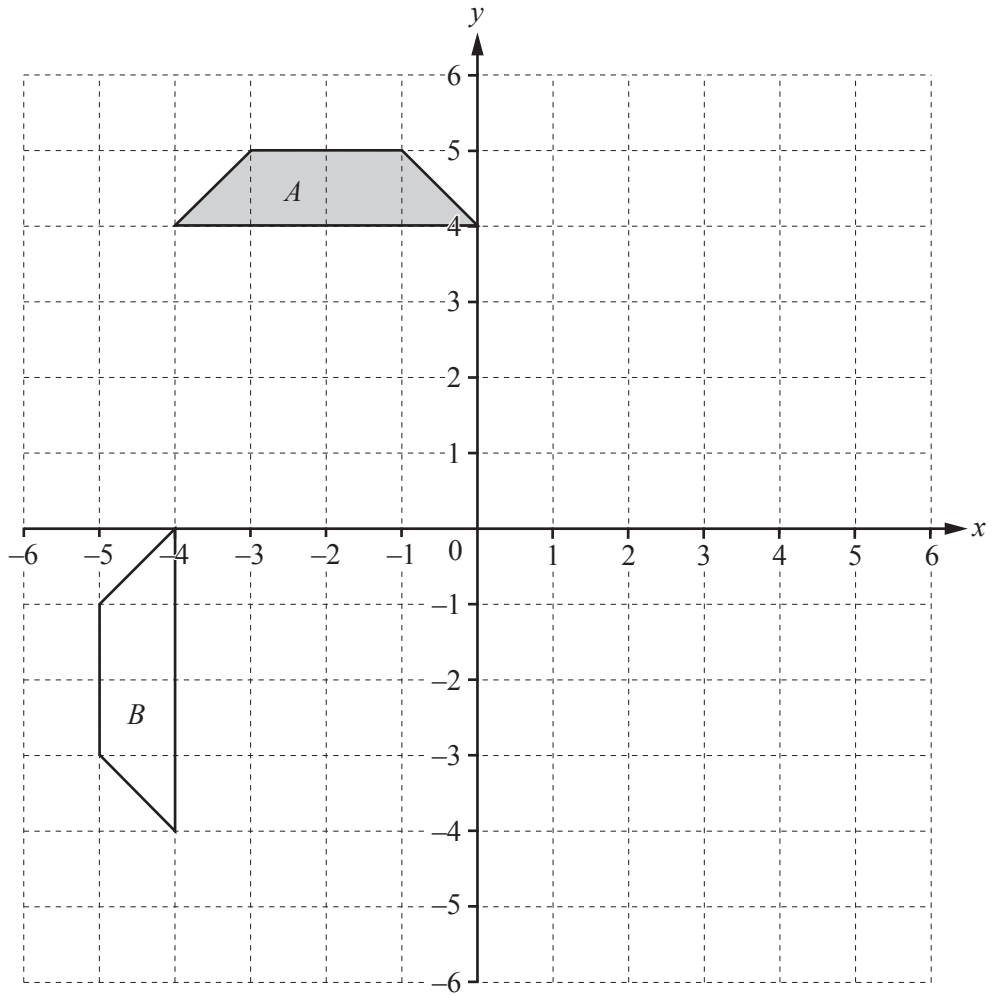
..... [1]

**(d)** Write 90 as the product of its prime factors.

..... [2]

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**4**




The diagram shows two trapeziums, $A$ and $B$, on a 1 cm$^2$ grid.

**(a)** Find the area of trapezium $A$.
Give the units of your answer.

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

**(b)** **(i)** Describe fully the **single** transformation that maps trapezium $A$ onto trapezium $B$.

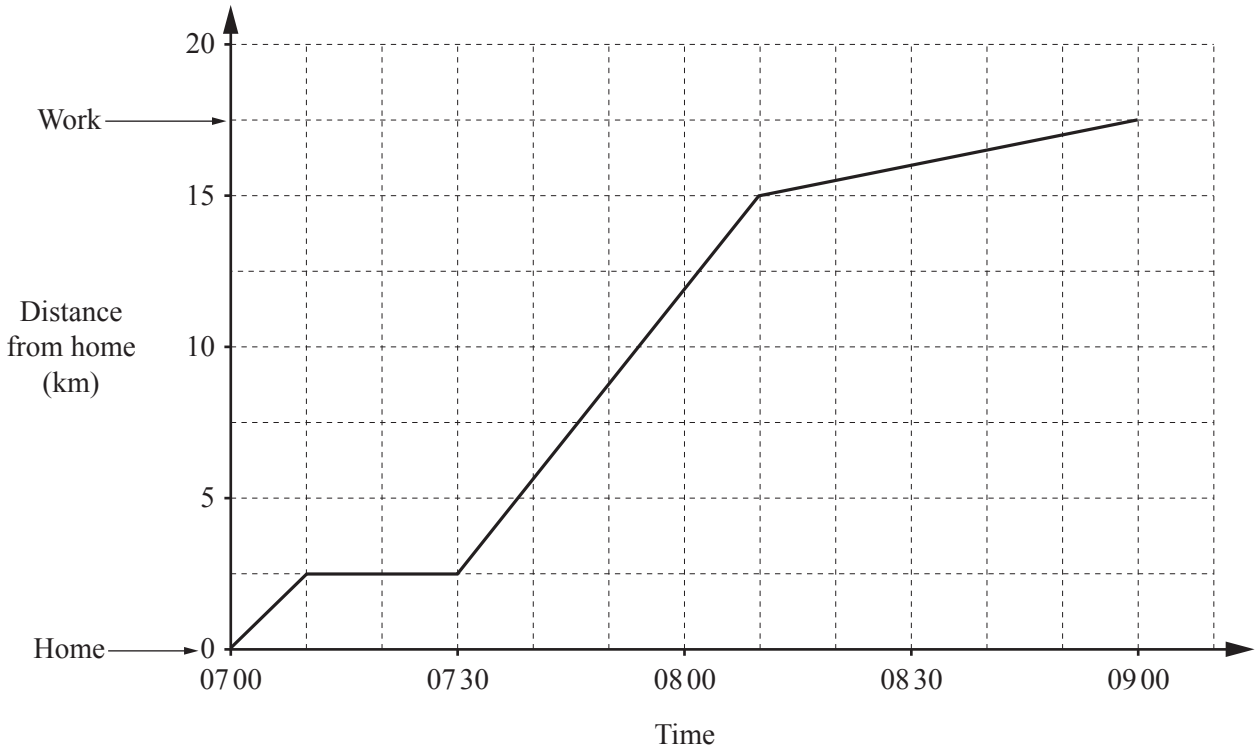
.....

..... [3]

**(ii)** On the grid, translate trapezium $A$ by the vector $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$. [2]

**(iii)** On the grid, enlarge trapezium $A$ with centre (0, 0) and scale factor 0.5 . [2]

**5** **(a)** This graph shows Gianna's journey to work.




**(i)** How far did Gianna travel to work?

.....km [1]

**(ii)** Explain what happened at 07 10.

..... [1]

**(iii)** Calculate the average speed for Gianna's journey to work.

.....km/h [2]

**(b)** Gianna earns $1320 each month.
She divides her money in the ratio Bills : Leisure : Other = 12 : 5 : 7.

Work out how much she spends on each.

Bills = $.....

Leisure = $.....

Other = $..... [3]

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**(c)** Gianna invests $5000 for 3 years at a rate of 2.1% per year compound interest.

Calculate the amount she will have at the end of the 3 years.
Give your answer correct to 2 decimal places.

$..... [4]

**6** **(a)** Here are the first four terms of a sequence.

18 25 32 39

**(i)** Write down the next term.

..... [1]

**(ii)** Explain how you worked out your answer.

..... [1]

**(b)** The $n$th term of another sequence is $n^2 + 3$.

Write down the first three terms of this sequence.

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

**(c)** Simplify.

**(i)** $6a + 5h - 4a - 8h$

..... [2]

**(ii)** $5(x + 3) + 4(2x - 6)$

..... [2]

**(d)** Factorise.

$6g + 15$

..... [1]

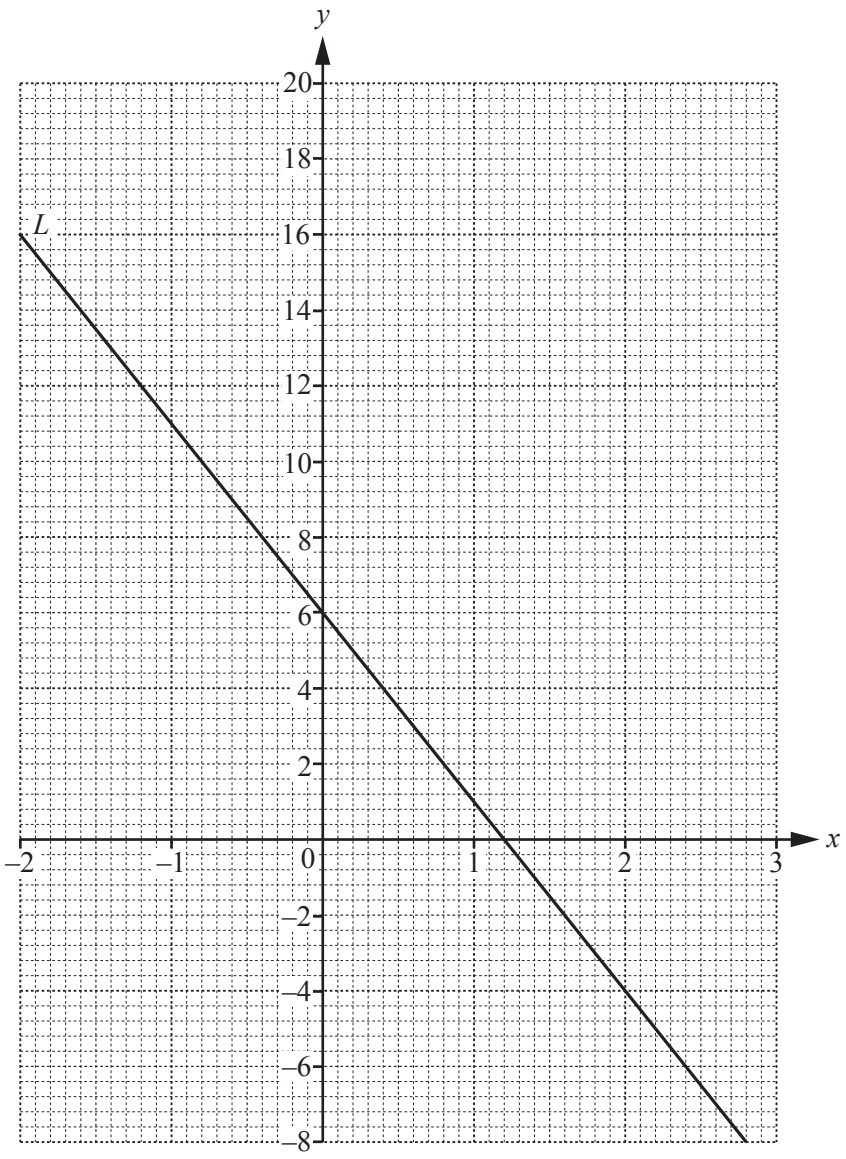
**(e)** A rectangle has length $(x + 6)$ cm and width 5 cm.
The area of this rectangle is 85 cm$^2$.

Find the value of $x$.

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

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**7**




**(a)** The line $L$ is drawn on the grid.

Find the equation of the line in the form $y = mx + c$.

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

**(b)** **(i)** Complete the table of values for $y = x^2 + 2x + 4$.

| $x$ | −2 | −1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|
| $y$ | 4 | | 4 | 7 | | 19 |

[2]

**(ii)** On the grid above, draw the graph of $y = x^2 + 2x + 4$ for $-2 \leqslant x \leqslant 3$. [4]

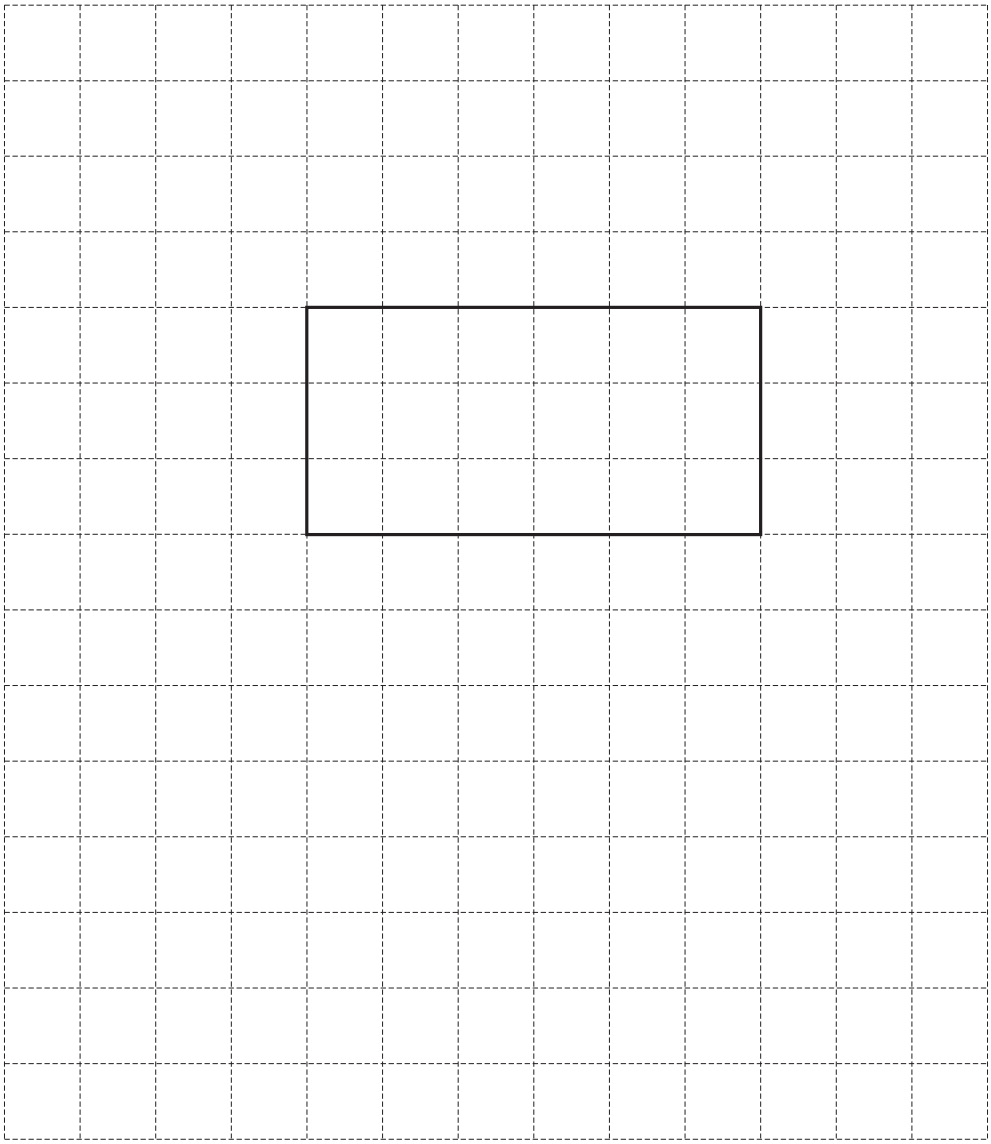
**(c)** For $-2 \leqslant x \leqslant 3$, write down the $x$ co-ordinate of the point of intersection of the curve $y = x^2 + 2x + 4$ with the line $L$.

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

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**8** **(a)** A cuboid measures 6 cm by 3 cm by 2 cm.

**(i)** On this 1 $cm^2$ grid, complete the net of the cuboid.

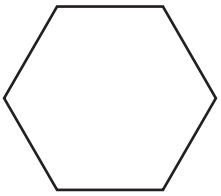


[3]

**(ii)** Calculate the volume of the cuboid.

..... $cm^3$ [2]

**(b)**



Write down the mathematical name of this shape.

..... [1]

**(c)**



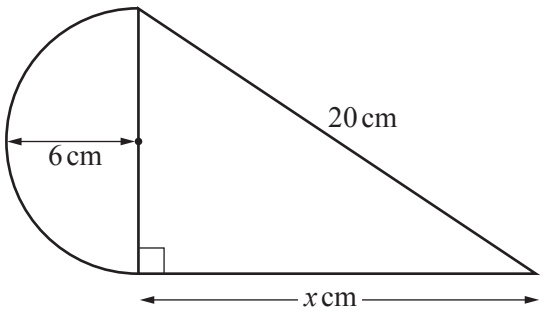
Mark an obtuse angle on this trapezium. [1]

**(d)** A regular polygon has an exterior angle of 22.5°.

Work out how many sides this polygon has.

..... [2]

**(e)**




The diagram shows a shape made from a semi-circle, radius 6 cm, and a right-angled triangle.

**(i)** Show that $x = 16$.

[2]

**(ii)** Calculate the area of the shape.

..... $cm^2$ [5]

**9** **(a)** The area of Cuba, in square kilometres, is one hundred and five thousand eight hundred and six.

Write this number in figures.

..... [1]

**(b)** The population of an island is 103 000.

Write this number in standard form.

..... [1]

**(c)** The table shows some populations in 2014.

| | Population |
|---|---|
| Puerto Rico | $3.68 \times 10^6$ |
| St Maarten | $4.61 \times 10^4$ |
| Haiti | $1.05 \times 10^7$ |
| US Virgin Islands | $1.07 \times 10^5$ |

**(i)** Write the population of St Maarten as an ordinary number.

..... [1]

**(ii)** Complete the statement.

The population of Haiti is approximately ..... times the population of the US Virgin Islands. [1]

**(iii)** Find the difference between the population of Haiti and the population of Puerto Rico. Give your answer in standard form.

..... [2]

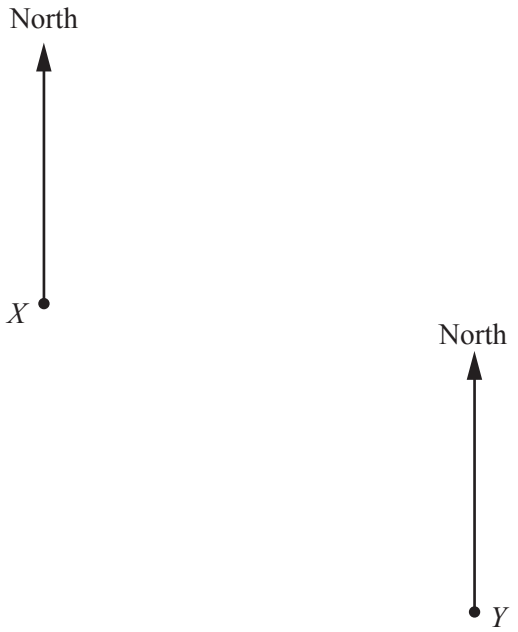
**(d)** In 2013 the population of a town was 30 405.
In 2014 the population was 30 851.

Calculate the percentage increase in the population.

.....% [3]

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**10** The scale drawing shows the positions of two towns, *X* and *Y*.
The scale is 1 centimetre represents 5 kilometres.




Scale: 1 cm to 5 km

**(a)** Work out the actual distance from town *X* to town *Y*.

..... km [2]

**(b)** Measure the bearing of town *X* from town *Y*.

..... [1]

**(c)** An airport, *A*, is 22.5 km from town *Y* on a bearing of 050°.

Mark and label the position of *A* on the scale drawing. [2]

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