Cambridge IGCSE

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

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

Paper 3 (Core) **May/June 2015**

**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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CAMBRIDGE International Examinations

**1** **(a)** Write down

View solution

**(i)** two factors of 12,

*Answer(a)*(i) ..... [1]

**(ii)** the next prime number after 19,

*Answer(a)*(ii) ..... [1]

**(iii)** the cube root of 64,

*Answer(a)*(iii) ..... [1]

**(iv)** two million five hundred and seven in figures,

*Answer(a)*(iv) ..... [1]

**(v)** two multiples of 75,

*Answer(a)*(v) ..... [1]

**(vi)** the value of $\pi$ correct to 5 significant figures.

*Answer(a)*(vi) ..... [1]

**(b)** Write as a percentage.

View solution

**(i)** 1.63

*Answer(b)*(i) ..... % [1]

**(ii)** $\frac{3}{40}$

*Answer(b)*(ii) ..... % [1]

**(c)** **(i)** Write 63 521.769 correct to 1 decimal place.

View solution

*Answer(c)*(i) ..... [1]

**(ii)** Write 63 521.769 correct to the nearest hundred.

View solution

*Answer(c)*(ii) ..... [1]

**(d)** **(i)** Change 234 mm into metres.

View solution

*Answer(d)*(i) ..... m [1]

**(ii)** Change 876 $m^2$ into square centimetres.

View solution

*Answer(d)*(ii) ..... $cm^2$ [1]

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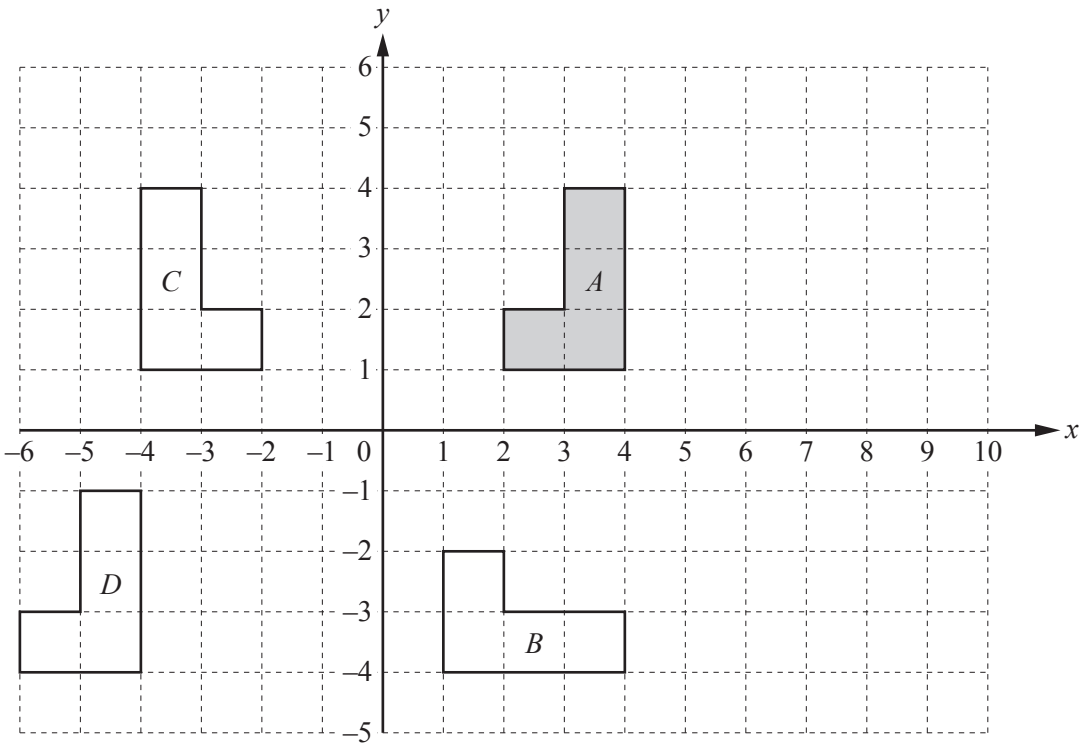
**2**




The diagram shows four shapes *A*, *B*, *C* and *D*.

**(a)** Describe fully the **single** transformation that maps **shape *A*** onto

View solution

**(i)** shape *B*,

*Answer(a)*(i) .....

..... [3]

**(ii)** shape *C*,

View solution

*Answer(a)*(ii) .....

..... [2]

**(iii)** shape *D*.

View solution

*Answer(a)*(iii) .....

..... [2]

**(b)** On the grid, draw the enlargement of **shape *A*** by scale factor 2 and centre (–1 , 2). [2]

View solution

**3** Sonia works in a toy shop.

**(a) (i)** One week she works for 30 hours and is paid \$180.

View solution

Calculate the amount she is paid per hour.

*Answer(a)*(i) \$..... [1]

**(ii)** The next week Sonia works for 38 hours and is paid \$220.

View solution

Find the difference in her pay per hour for these two weeks.

*Answer(a)*(ii) \$..... [2]

**(b)** The shop sells bags of 40 marbles.
One bag has marbles in the ratio red : blue : green = 1 : 3 : 4.

View solution

**(i)** Calculate the number of marbles of each colour.

*Answer(b)*(i) Red = ..... , blue = ..... , green = ..... [2]

**(ii)** A second bag of 40 marbles contains 11 red marbles, 9 blue marbles and 20 green marbles.
All the marbles from the two bags are mixed together.

View solution

Write down the ratio of marbles red : blue : green.
Give your answer in its simplest form.

*Answer(b)*(ii) ..... : ..... : ..... [2]

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**(c)** Thilo and Toby buy some boats and trains from the toy shop.
The cost of one boat is $b$ cents and the cost of one train is $t$ cents.

View solution

**(i)** Toby buys 3 boats and 4 trains for \$5.70 .

Complete this equation.

$3b + 4t =$ .....

[1]

**(ii)** Thilo buys 1 boat and 2 trains for \$2.40 .

View solution

Write this information as an equation.

..... = .....

[2]

**(iii)** Solve your two equations to find the cost of a boat and the cost of a train.
You must show all your working.

View solution

*Answer(c)*(iii) Cost of a boat = ..... cents

Cost of a train = ..... cents [3]

**(d)** Train track costs 99 cents per 20 cm.

View solution

Calculate the cost of buying 3.4 metres of train track.

*Answer(d)* \$ ..... [3]

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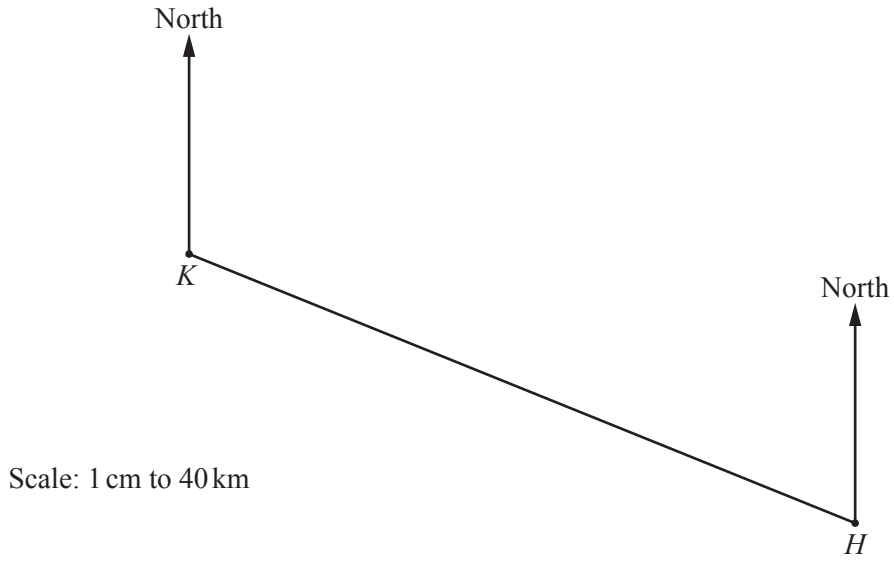
**4** The Patel family flies from their home town, *H*, to Kiruna, *K*, in Lapland.

**(a)** The scale drawing shows their journey.
The scale is 1 centimetre represents 40 kilometres.

View solution




Scale: 1 cm to 40 km

**(i)** Measure the bearing of *K* from *H*.

*Answer(a)*(i) ..... [1]

**(ii)** Work out the distance in kilometres from *H* to *K*.

View solution

*Answer(a)*(ii) ..... km [2]

**(iii)** The average speed of the plane is 450 km/h.

View solution

Find the average speed in m/s.

*Answer(a)*(iii) ..... m/s [2]

**(b)** The probability that the plane arrives on time is 0.15 .

View solution

**(i)** Write down the probability that the plane does **not** arrive on time.

*Answer(b)*(i) ..... [1]

**(ii)** Every year there are 240 flights from *H* to *K*.

View solution

Calculate the expected number of flights that arrive on time.

*Answer(b)*(ii) ..... [1]

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**(c)** The Patel family has six suitcases.
The number of items in each suitcase is shown below.

View solution

15 16 16 18 19 21

**(i)** Find the range.

*Answer(c)*(i) ..... [1]

**(ii)** Write down the mode. View solution

*Answer(c)*(ii) ..... [1]

**(iii)** Work out the median. View solution

*Answer(c)*(iii) ..... [1]

**(iv)** Calculate the mean.

View solution

*Answer(c)*(iv) ..... [2]

**(v)** Find the probability that a suitcase chosen at random has more than 18 items. View solution

*Answer(c)*(v) ..... [1]

**(d)** Mr Patel buys a bag of sweets.
The bag of sweets costs \$3.25 .

View solution

**(i)** Calculate the cost of the sweets in euros (€) when the exchange rate is €1 = \$1.24 .

*Answer(d)*(i) € ..... [2]

**(ii)** The weight, $w$ grams, of the bag of sweets is 250 g correct to the nearest 10 g.

View solution

Complete this statement about the value of $w$.

*Answer(d)*(ii) ..... $\leqslant w <$ ..... [2]

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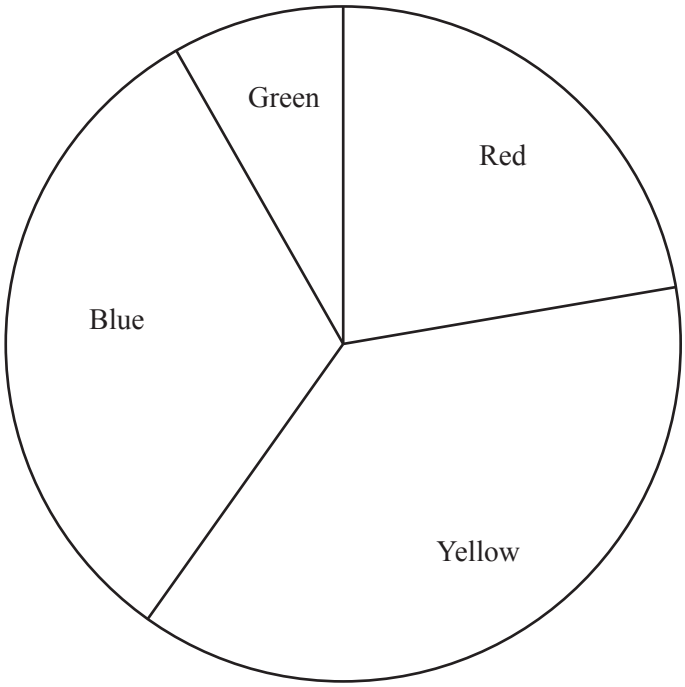
**5** All the children in a school are asked to choose their favourite colour.
The pie chart shows the results.




**(a)** Write down the least favourite colour chosen.

View solution

*Answer(a)* ..... [1]

**(b)** 27 children choose yellow as their favourite colour.

Work out the total number of children in the school.

View solution

*Answer(b)* ..... [3]

**(c)** Work out the percentage of the children in the school who choose red.

View solution

*Answer(c)* ..... % [2]

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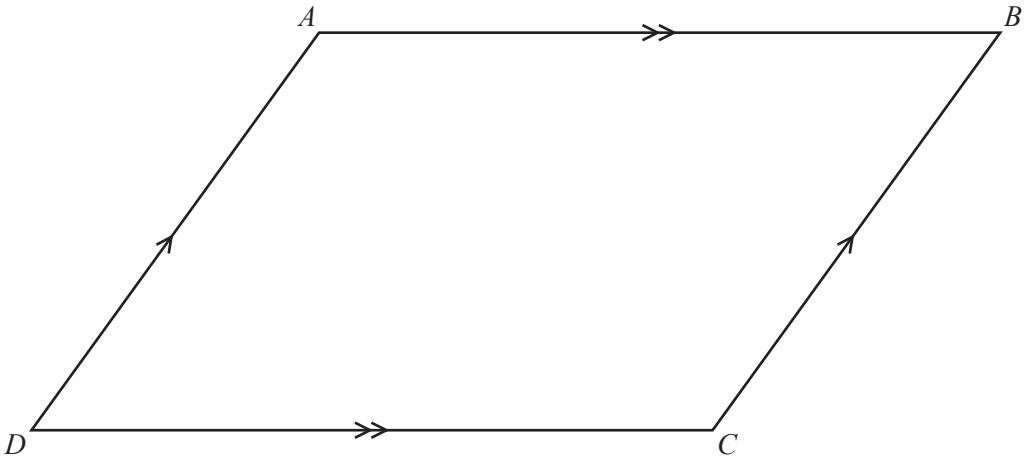
**6**




*ABCD* is a parallelogram.

**(a)** Write down

**(i)** the order of rotational symmetry of *ABCD*,

*Answer(a)*(i) ..... [1]

**(ii)** the number of lines of symmetry of *ABCD*,

*Answer(a)*(ii) ..... [1]

**(iii)** the sum of the interior angles of *ABCD*.

*Answer(a)*(iii) ..... [1]

**(b) (i) Complete this part using a straight edge and compasses only.**
**All construction arcs must be clearly shown.**

On the diagram, construct the bisector of angle *BAD*.
Extend this bisector to cut *DC* at *E*. Mark *E* on your diagram. [2]

**(ii)** Edelgard knows that angle *BAE* is the same size as angle *AED*.

Explain how Edelgard knows this is true without measuring the angles.

*Answer(b)*(ii) ..... [1]

**(iii)** Write down the mathematical name for the triangle *ADE* and give a reason for your answer.

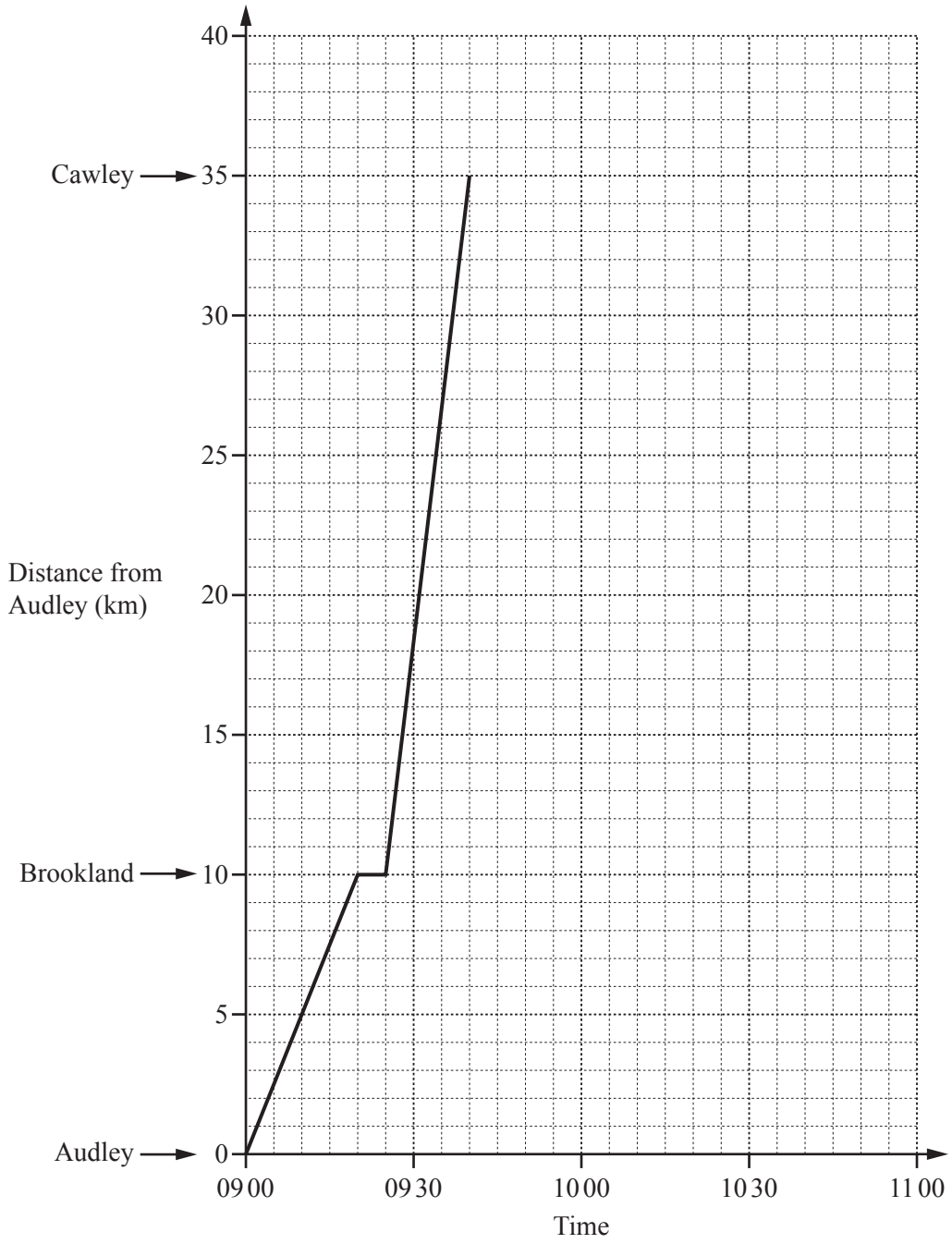
*Answer(b)*(iii) Name ..... because .....

..... [2]

**(iv)** Write down the mathematical name of the quadrilateral *ABCE*.

*Answer(b)*(iv) ..... [1]

**7**




The grid shows the travel graph for a train travelling from Audley to Cawley, stopping at Brookland.

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**(a)** **(i)** Between which two towns is the train journey fastest?
Give a reason for your answer.

View solution

*Answer(a)*(i) From ..... to ..... is fastest because

..... [1]

**(ii)** Calculate the speed of the train, in kilometres per hour, between Brookland and Cawley.

View solution

*Answer(a)*(ii) ..... km/h [2]

**(b)** When the train reaches Cawley, it waits for 10 minutes.
It then returns to Audley without stopping at Brookland.
The return speed of the train is 70 km/h.

View solution

**(i)** Complete the travel graph for this train. [2]

**(ii)** Write down the time this train arrives at Audley.

View solution

*Answer(b)*(ii) ..... [1]

**(c)** Trains leave Audley for Cawley every 100 minutes.
The first train of the day is the 09 00 train.

View solution

Write down the time that the fourth train leaves Audley for Cawley.

*Answer(c)* ..... [2]

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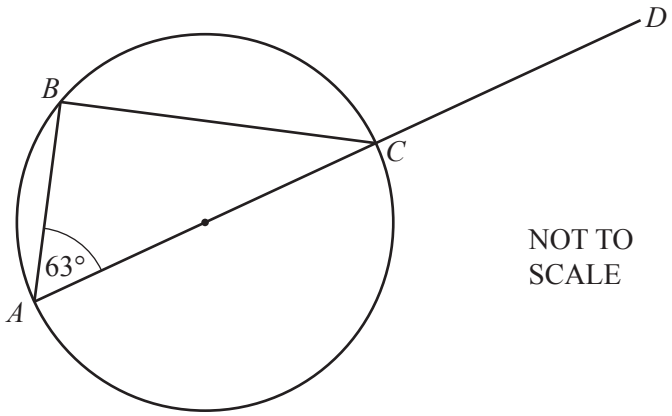
**8 (a)**

View solution




NOT TO SCALE

$A$, $B$ and $C$ lie on a circle with diameter $AC$.
$AC$ is extended to $D$ and angle $BAC = 63°$.

Work out angle $BCD$.
Give reasons to explain your answer.

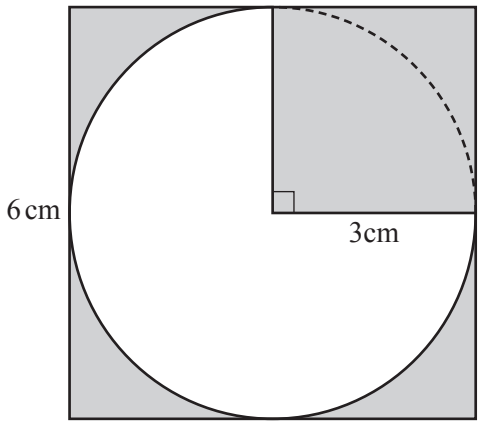
*Answer(a)* Angle $BCD$ = ..... because .....

.....

..... [4]

**(b)**

View solution




NOT TO SCALE

The diagram shows a circle with radius 3 cm inside a square of side 6 cm.

Calculate the shaded area.

*Answer(b)* ..... $cm^2$ [5]

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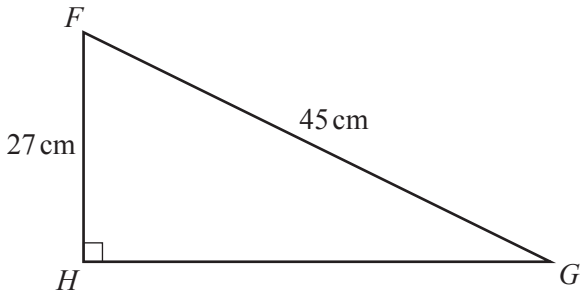
**(c)**




NOT TO SCALE

View solution

*FGH* is a right-angled triangle.

Calculate

**(i)** *GH*,

*Answer(c)*(i) *GH* = ..... cm [3]

**(ii)** the perimeter of the triangle,

View solution

*Answer(c)*(ii) ..... cm [1]

**(iii)** the area of the triangle.

View solution

*Answer(c)*(iii) ..... $cm^2$ [2]

**9** **(a)** **(i)** Complete the table of values for $y = -x^2 + 5x$ .

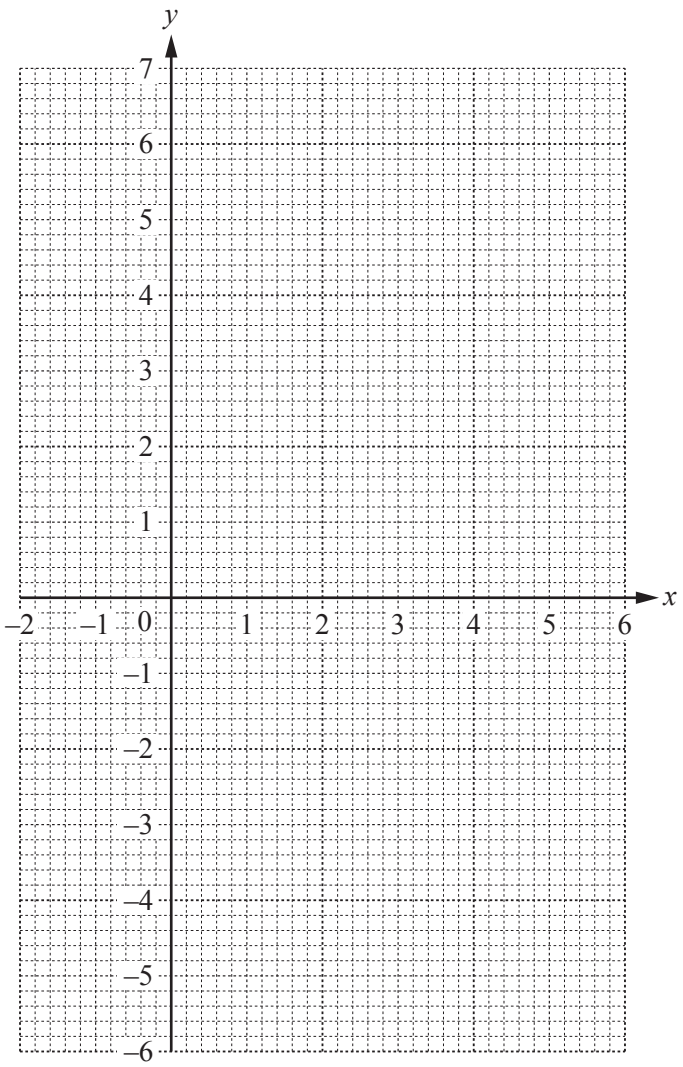
View solution

| $x$ | –1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| $y$ | –6 | | 4 | | | 4 | 0 | |

[2]

**(ii)** On the grid, draw the graph of $y = -x^2 + 5x$ for $-1 \leqslant x \leqslant 6$ .

View solution




[4]

**(b)** Write down the co-ordinates of the highest point on the graph.

View solution

*Answer(b)* (..... , .....) [1]

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**(c)** Use your graph to solve the equation $-x^2 + 5x = -3$.

View solution

*Answer(c)* $x =$ ..... or $x =$ ..... [2]

**(d) (i)** On the grid, draw the line of symmetry for the graph. [1]

**(ii)** Write down the equation of the line of symmetry for the graph.

View solution

*Answer(d)*(ii) ..... [1]

**(iii)** The curve passes through the points $(-10, -150)$ and $(k, -150)$.

Use the symmetry of the curve to find the value of $k$.

*Answer(d)*(iii) $k =$ ..... [1]

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