Cambridge Assessment International Education

# Cambridge IGCSE™

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

Paper 3 (Core) **October/November 2023**

**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 $\pi$, 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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**1** **(a)** Write the number six and a half million in figures.

View solution

..... [1]

**(b)** Write 37 508 correct to the nearest thousand.

View solution

..... [1]

**(c)** 6 9 $\sqrt{100}$ 28 31 $\sqrt{1000}$ 32 36

View solution

From this list of numbers, write down

**(i)** a factor of 18

..... [1]

**(ii)** a multiple of 12

View solution

..... [1]

**(iii)** a square number

View solution

..... [1]

**(iv)** a prime number

View solution

..... [1]

**(v)** an irrational number.

View solution

..... [1]

**(d)** Put one pair of brackets in each statement to make it correct.

View solution

**(i)** $24 - 4 \times 3 + 2 = 62$ [1]

**(ii)** $24 - 4 \times 3 + 2 = 4$ [1]

View solution

**(e)** Write $\frac{3}{4}$ as a decimal.

View solution

..... [1]

**(f)** Work out $\frac{3}{7}$ of 126.

View solution

..... [1]

**(g)** Write down the value of the reciprocal of 0.5 .

View solution

..... [1]

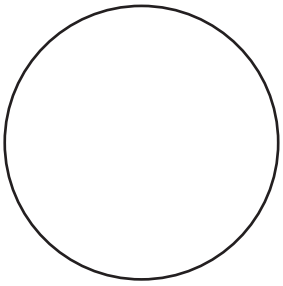
**(h)** **Without using a calculator**, work out $5\frac{2}{3} - 2\frac{1}{5}$ .
You must show all your working and give your answer as a mixed number in its simplest form.

View solution

..... [3]

**2** **(a)** The diagram shows a circle.

View solution



NOT TO SCALE

**(i)** The diameter of this circle is 168 mm.

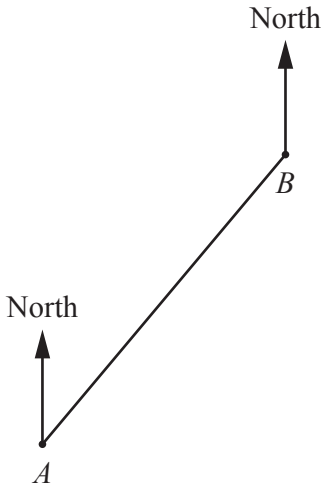
Write down the radius of this circle.

..... mm [1]

**(ii)** On the diagram, draw a chord of this circle. [1]

**(b)** The scale drawing shows the position of ship *A* and the position of ship *B*.
The scale is 1 cm represents 6 km.

View solution




Scale : 1 cm to 6 km

Another ship, *C*, is 45 km from ship *B* on a bearing of 124°.

**(i)** On the scale drawing, mark the position of ship *C*. [2]

**(ii)** Find the actual distance of ship *C* from ship *A*.

View solution

..... km [2]

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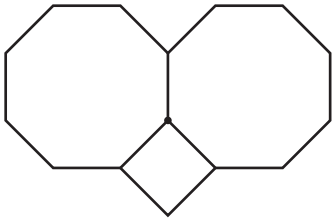
**(c) (i)** Show that the interior angle of a regular octagon is 135°.

View solution

[1]

**(ii)**



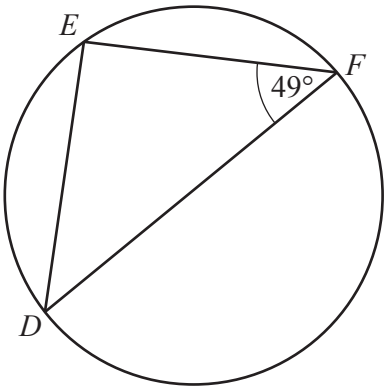
NOT TO SCALE

View solution

Show that two regular octagons and a square meet at a point without any gaps.

[1]

**(d)**




NOT TO SCALE

View solution

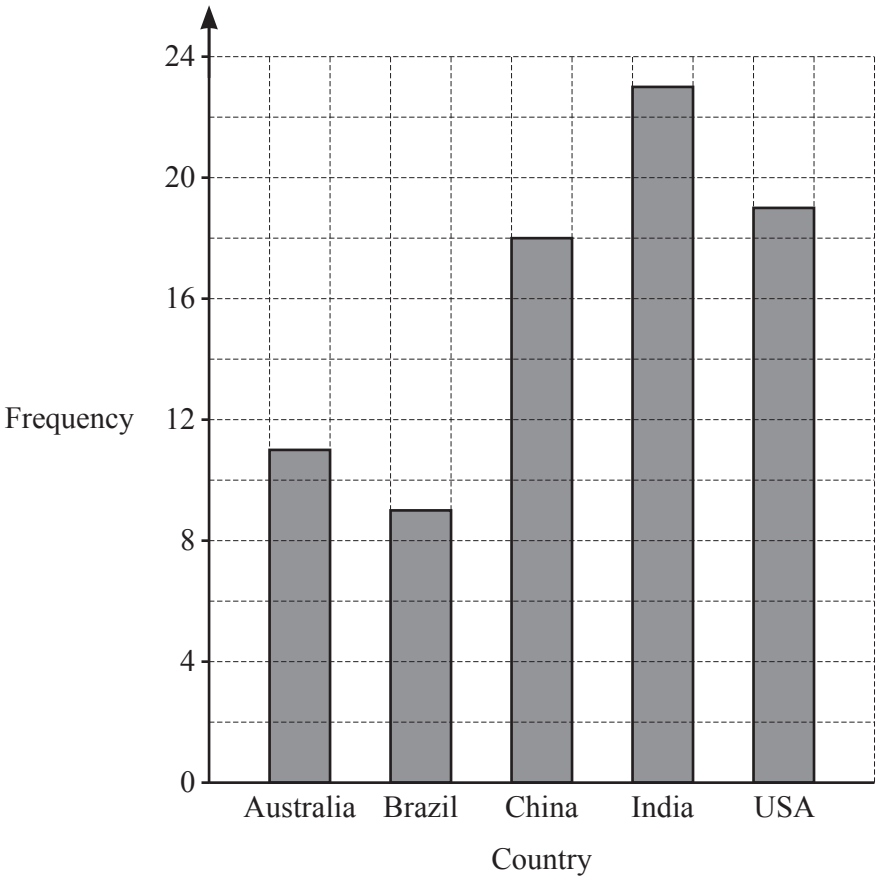
The diagram shows points $D$, $E$ and $F$ on the circumference of a circle.
$DF$ is a diameter of the circle.

Find angle $EDF$.

Angle $EDF$ = ..... [2]

**3** **(a)** The bar chart shows the country in which each of 80 students live.

View solution




**(i)** How many of these students live in Brazil?

..... [1]

**(ii)** In which country do the largest number of these students live?

View solution

..... [1]

**(iii)** How many more of these students live in China than live in Australia?

View solution

..... [1]

**(iv)** Find the percentage of these students who live in the USA.

View solution

.....% [2]

**(b)** In Hobart, the temperature at 8 am was −3 °C and the temperature at 3 pm was 7 °C.

View solution

**(i)** Find the difference in the temperatures between 8 am and 3 pm.

..... °C [1]

View solution

**(ii)** The temperature at 10 pm was 12 °C lower than at 3 pm.

Find the temperature at 10 pm.

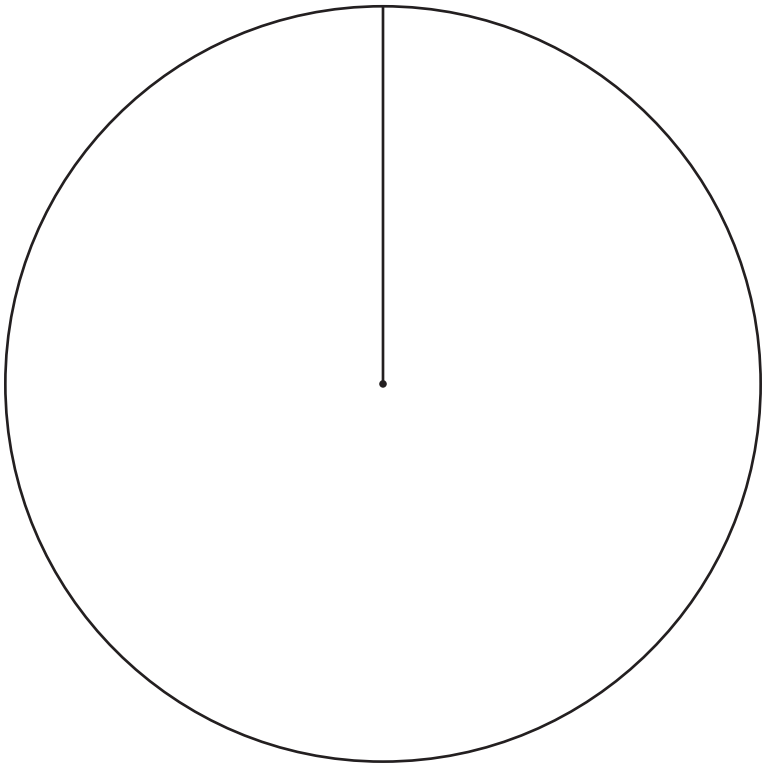
..... °C [1]

View solution

**(c)** The table shows the favourite language that each of 80 students studies.

| Language | Frequency |
|---|---|
| French | 12 |
| Spanish | 26 |
| English | 42 |
| Total | 80 |

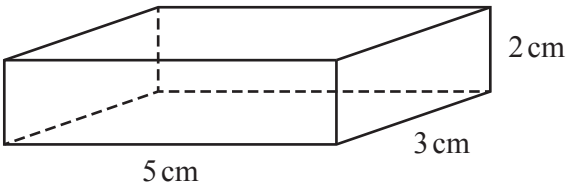
Complete the pie chart to show this information.



[4]

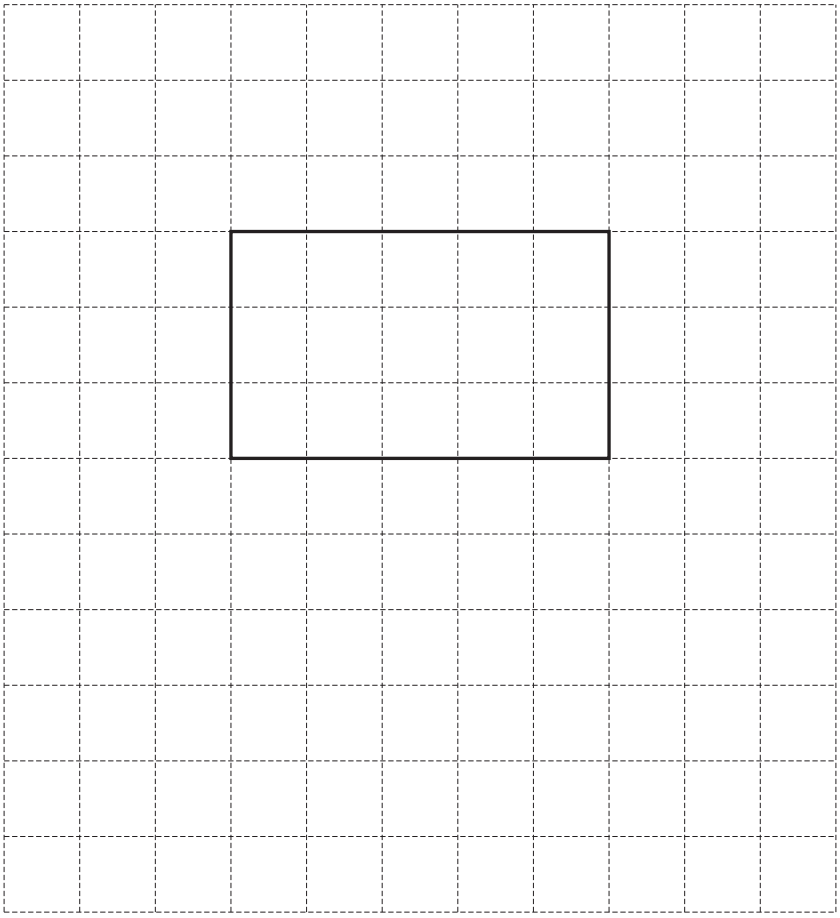
**4** **(a)** The diagram shows a cuboid.

View solution




NOT TO SCALE

**(i)** On the $1\text{cm}^2$ grid, complete the net of the cuboid.
One face has been drawn for you.



[3]

**(ii)** Calculate the surface area of the cuboid.

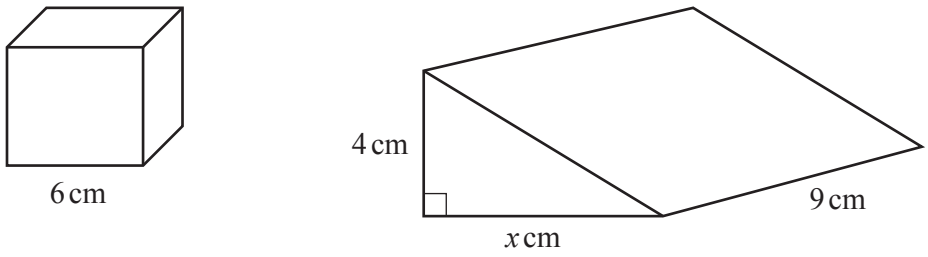
View solution

..... $\text{cm}^2$ [2]

**(b)** The diagram shows two solids: a cube and a right-angled triangular prism.

View solution

NOT TO SCALE

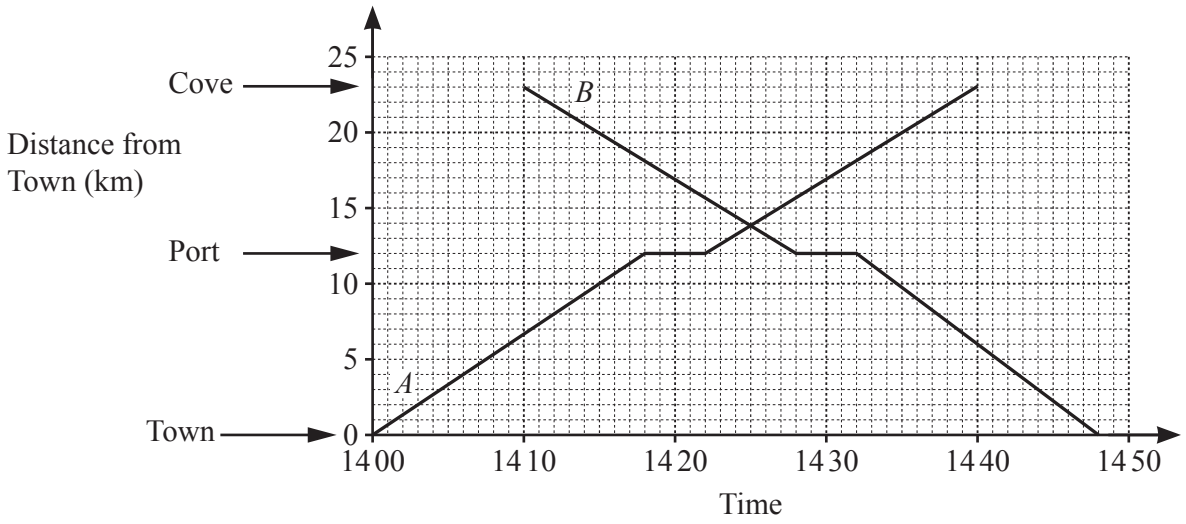



Both solids have the same volume.

Calculate the value of $x$.

$x =$ ..... [4]

**5** A railway line has three stations, Town, Port and Cove.
Train *A* leaves Town for Cove and train *B* leaves Cove for Town.
Both trains stop at Port.




**(a)** Write down the time that train *B* leaves Cove.

View solution

..... [1]

**(b)** Write down how long train *A* stops at Port.

View solution

..... min [1]

**(c)** How many more minutes does train *A* take to complete the whole journey than train *B*?

View solution

..... min [2]

**(d)** Write down the time that the two trains pass each other.

View solution

..... [1]

**(e)** Work out the average speed of train *A* between Town and Cove in kilometres per hour.

View solution

..... km/h [3]

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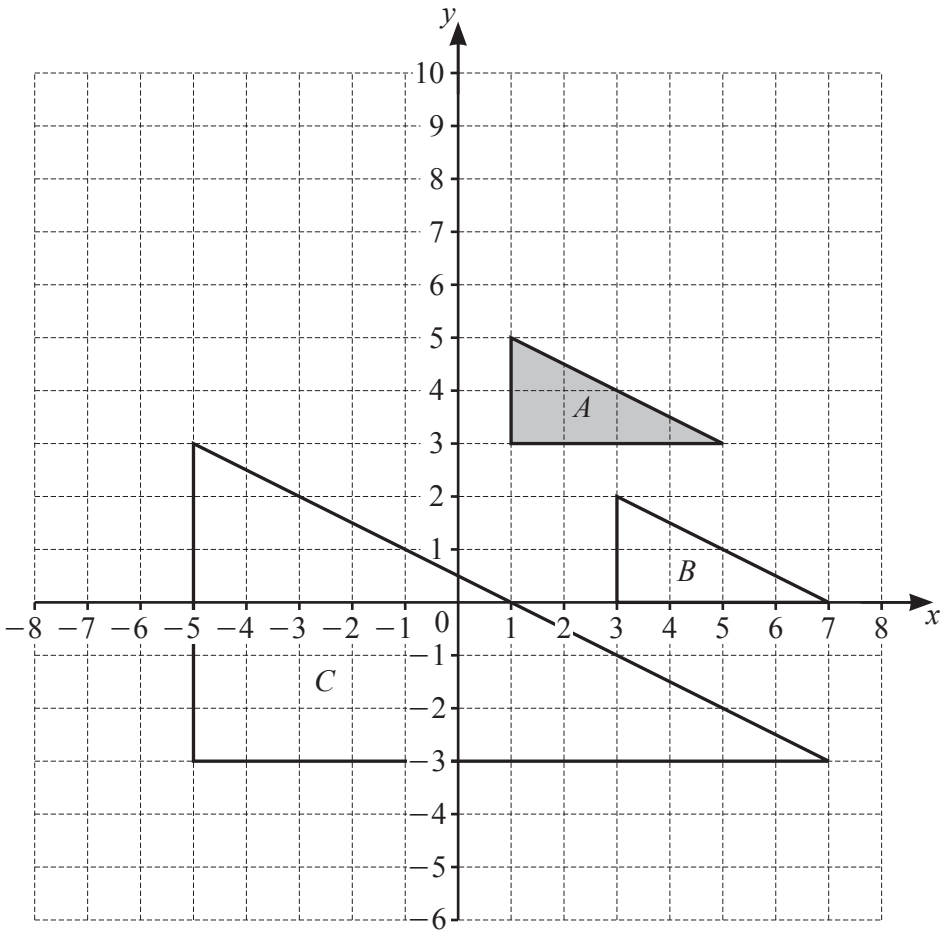
**6**




**(a)** Describe fully the **single** transformation that maps triangle $A$ onto triangle $B$.

View solution

.....

..... [2]

**(b)** Describe fully the **single** transformation that maps triangle $A$ onto triangle $C$.

View solution

.....

..... [3]

**(c)** On the grid, draw the image of triangle $A$ after a reflection in the line $y = 6$. [2]

View solution

**7** **(a)** Simplify.

$$5a + 3b + 2a - 4b$$

View solution

..... [2]

**(b)** $P = 8x + 3y$

View solution

Find the value of $x$ when $P = 21$ and $y = -5$.

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

**(c)** Make $v$ the subject of the formula $S = kv^2$.

View solution

$v =$ ..... [2]

**(d)** Multiply out and simplify.

$$(x - 3)(x + 5)$$

View solution

..... [2]

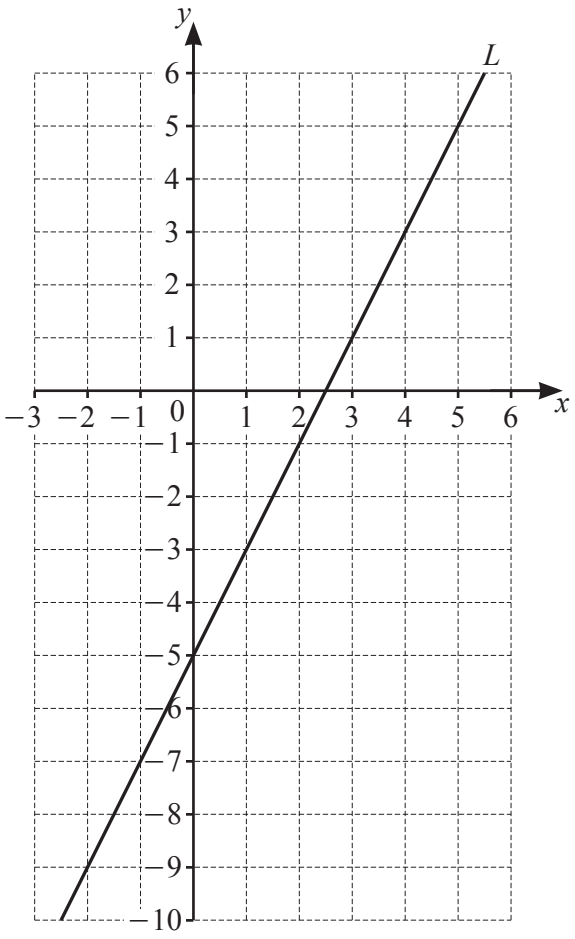
**(e)** Nasser has $x$ marbles.
Selina has 15 more marbles than Nasser.
Hanif has 3 times as many marbles as Selina.
In total they have 150 marbles.

Find the value of $x$.

View solution

$x =$ ..... [5]

**8**




**(a)** Find the equation of line $L$ in the form $y = mx + c$.

View solution

$y =$ ..... [2]

**(b)** **(i)** On the grid, draw the line $y = x$. [1]

View solution

**(ii)** Write down the coordinates of the point where the line $y = x$ intersects line $L$.

View solution

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

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**(c) (i)** Complete the table of values for $y = \frac{8}{x}$.

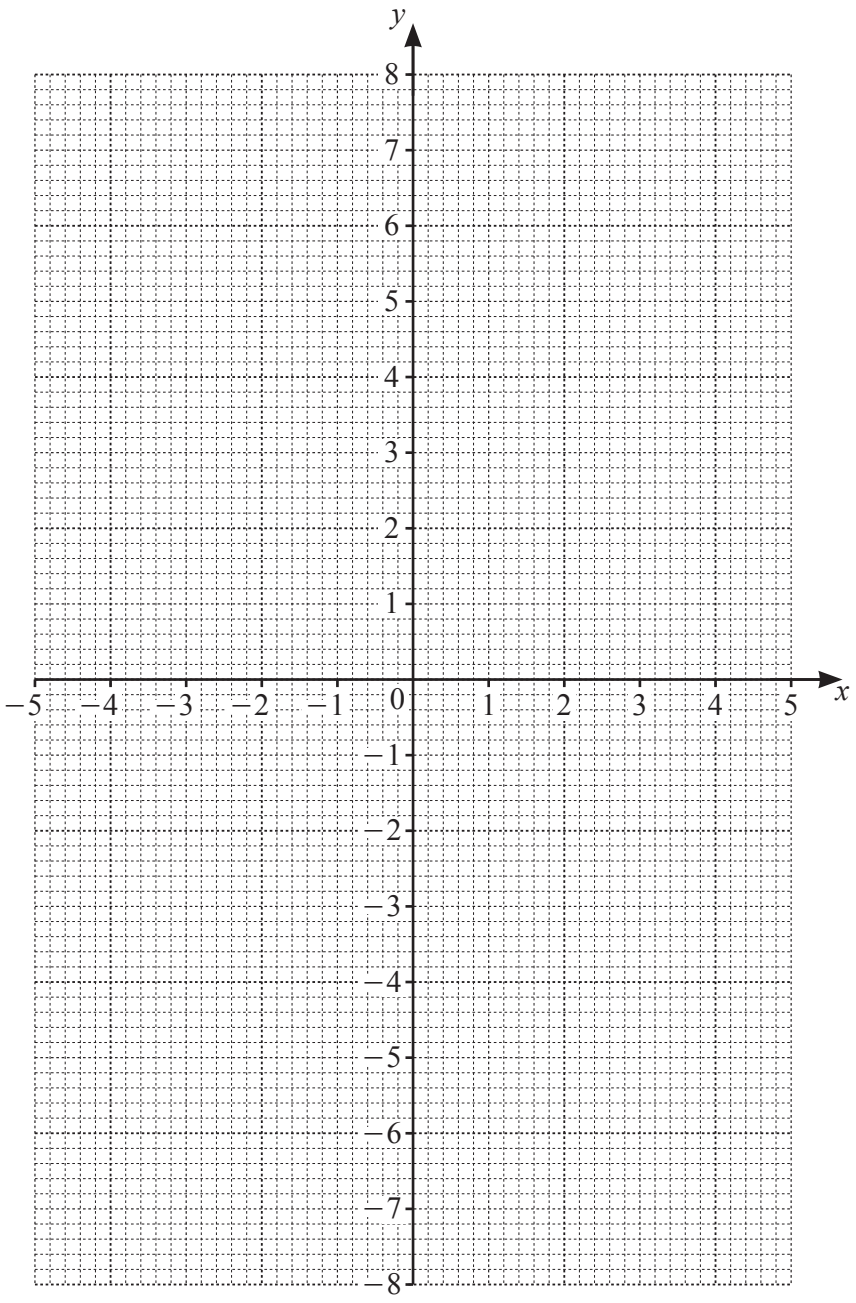
View solution

| $x$ | −5 | −4 | −3 | −2 | −1 | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $y$ | −1.6 | | −2.7 | | | | | | 2.7 | | 1.6 |

[3]

**(ii)** On the grid, draw the graph of $y = \frac{8}{x}$ for $-5 \leqslant x \leqslant -1$ and $1 \leqslant x \leqslant 5$.

View solution




[4]

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**9** **(a)** Pure gold costs \$42 per gram.

View solution

The fraction of pure gold in an object is measured in carats.
One carat means $\frac{1}{24}$ of the mass of an object is pure gold.

Henry buys a 9-carat gold bracelet weighing 16 g.
The price of the bracelet is \$204.

Is the price of the bracelet more or less than the cost of the pure gold in it?
You must show your working.

[4]

**(b)** A clock made of metals has a mass of 1080 g.
The mass of each metal in the clock is in the ratio

copper : zinc : other metals = 21 : 14 : 1.

View solution

Calculate the mass of copper in this clock.

..... g [2]

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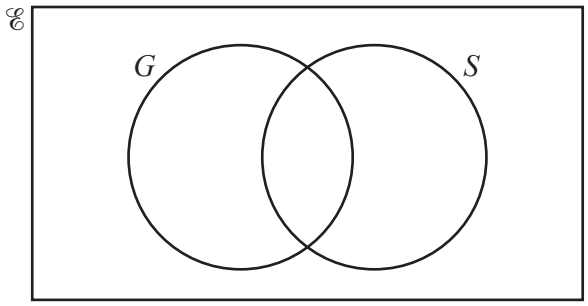
**(c)** There are 110 people in a group.
$G$ = { people who own gold jewellery }
$S$ = { people who own silver jewellery }

View solution

18 people own both gold jewellery and silver jewellery.
46 people own gold jewellery.
11 people own no gold jewellery and no silver jewellery.




**(i)** Complete the Venn diagram. [2]

**(ii)** Write down $n(G \cap S)$.

View solution

..... [1]

**(iii)** One of the 110 people is chosen at random.

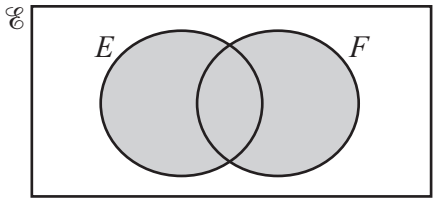
View solution

Write down the probability that this person owns gold jewellery but not silver jewellery.

..... [1]

**(d)**

View solution

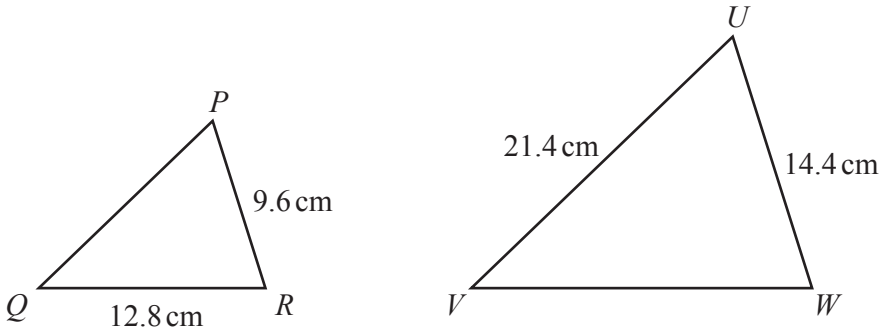



Use set notation to describe the shaded region.

..... [1]

**10 (a)**

View solution




NOT TO SCALE

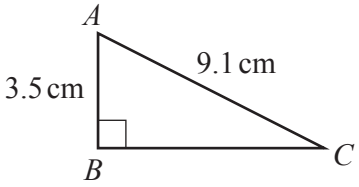
Triangle $PQR$ is mathematically similar to triangle $UVW$.

Calculate $VW$.

$VW =$ ..... cm [2]

**(b)** $ABC$ is a right-angled triangle.

View solution




NOT TO SCALE

Calculate $BC$.

$BC =$ ..... cm [3]

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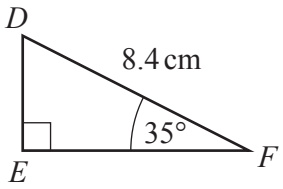
**(c)** *DEF* is a right-angled triangle.

View solution



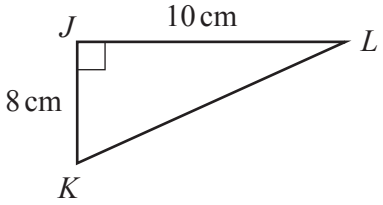

NOT TO SCALE

Calculate *EF*.

*EF* = .....cm [2]

**(d)** *JKL* is a right-angled triangle.

View solution




NOT TO SCALE

Calculate angle *JKL*.

Angle *JKL* = ..... [2]

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