Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

104358955 9

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

..... [1]

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

..... [1]

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

From this list of numbers, write down

(i) a factor of 18

..... [1]

(ii) a multiple of 12

..... [1]

(iii) a square number

..... [1]

(iv) a prime number

..... [1]

(v) an irrational number.

..... [1]

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

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

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

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

..... [1]

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

..... [1]

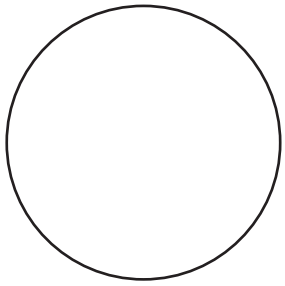
(g) Write down the value of the reciprocal of 0.5 .

..... [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.

..... [3]

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



NOT TO SCALE

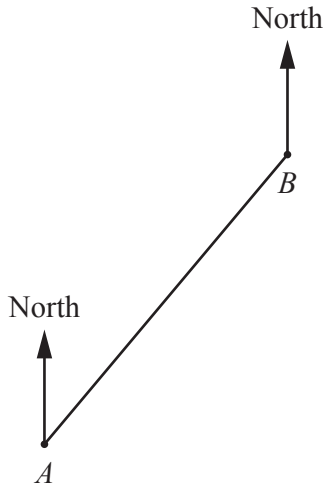
(i) The diameter of this circle is 168 mm.

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.



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]

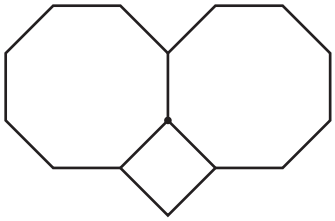
(ii) Find the actual distance of ship *C* from ship *A*.

..... km [2]

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

[1]

(ii)

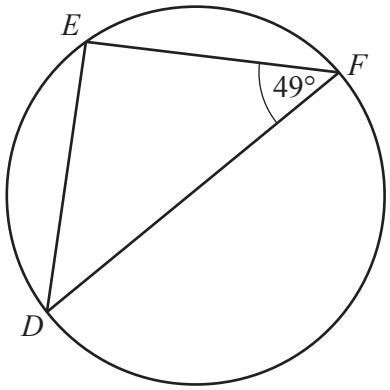


NOT TO SCALE

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

[1]

(d)



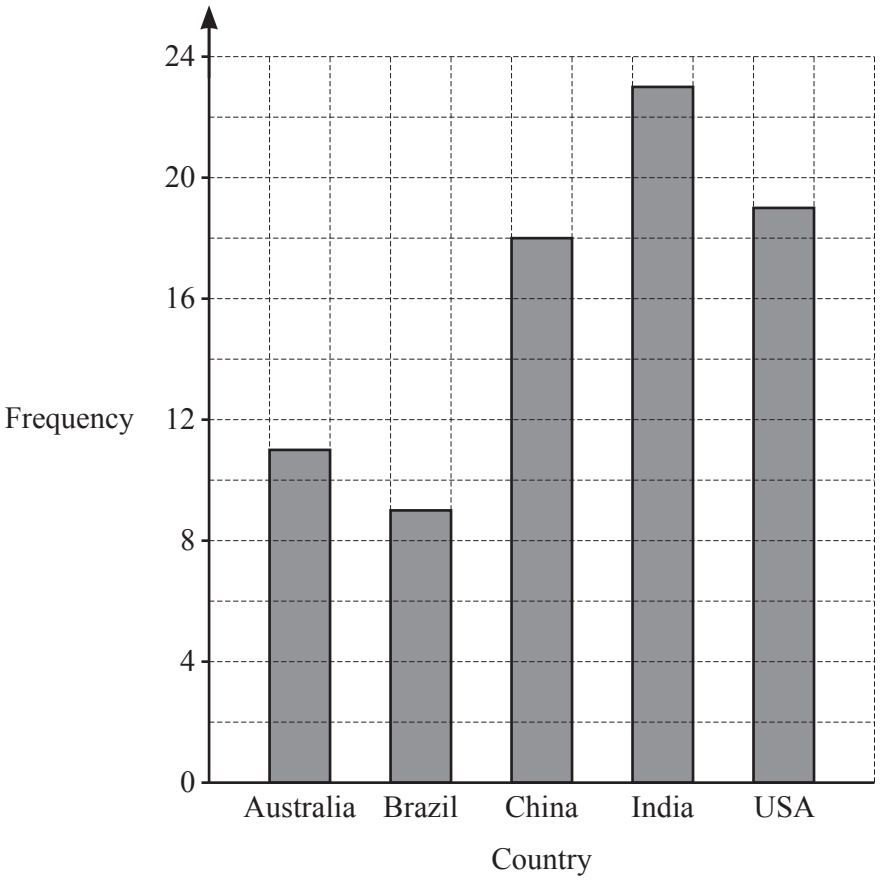
NOT TO SCALE

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.



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

..... [1]

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

..... [1]

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

..... [1]

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

.....% [2]

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

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

..... °C [1]

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

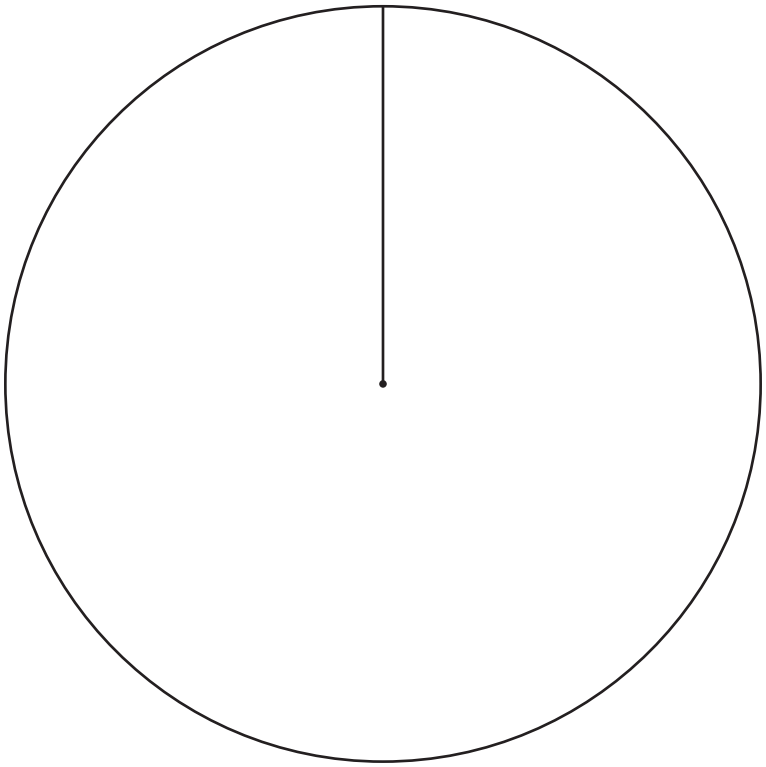
Find the temperature at 10 pm.

..... °C [1]

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

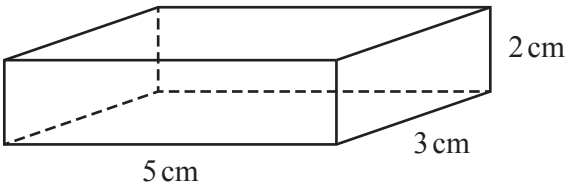
Language	Frequency
French	12
Spanish	26
English	42
Total	80

Complete the pie chart to show this information.



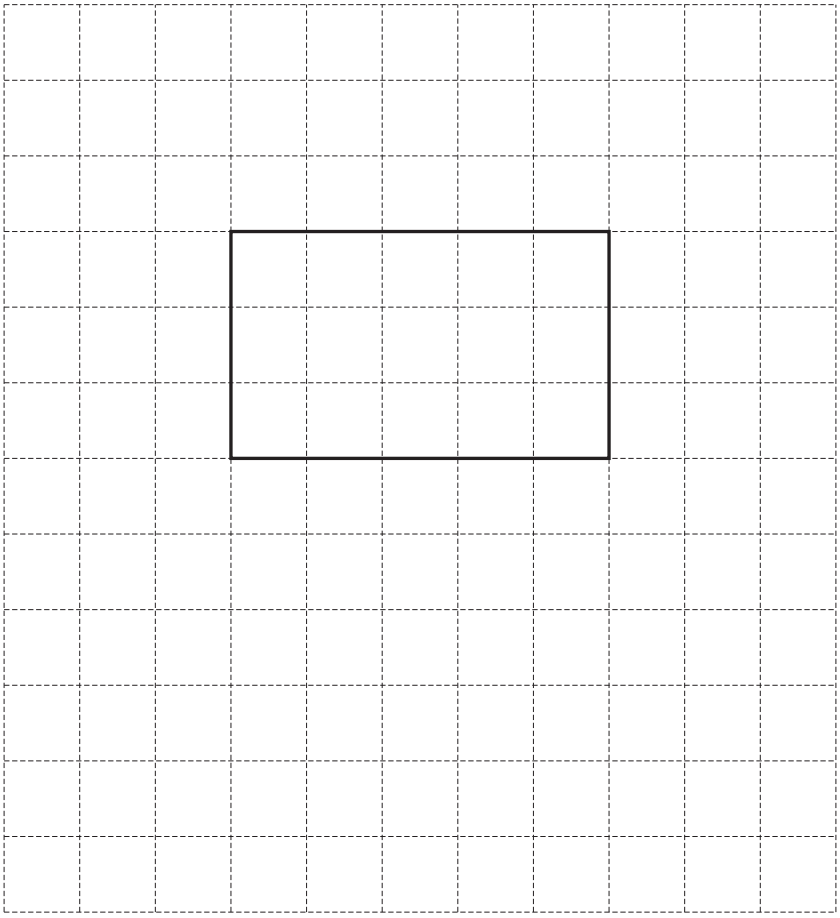
[4]

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



NOT TO SCALE

(i) On the 1cm^2 grid, complete the net of the cuboid.
One face has been drawn for you.

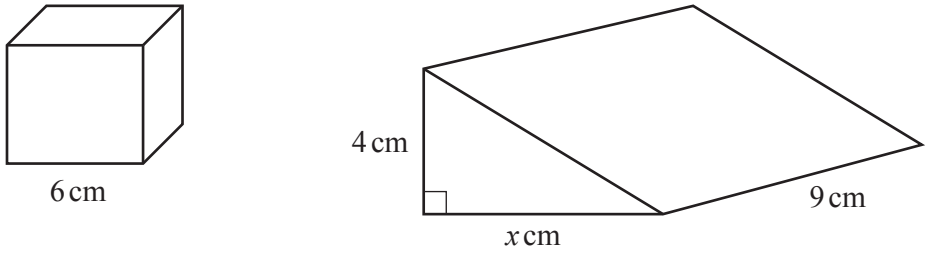


[3]

(ii) Calculate the surface area of the cuboid.

..... cm^2 [2]

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



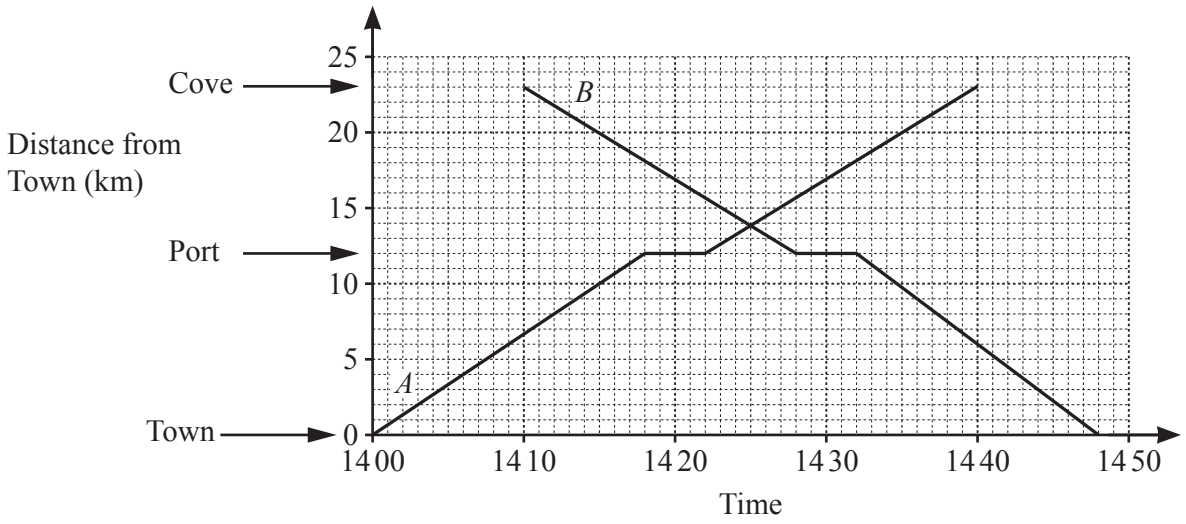
NOT TO SCALE

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.

..... [1]

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

..... min [1]

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

..... min [2]

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

..... [1]

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

..... km/h [3]

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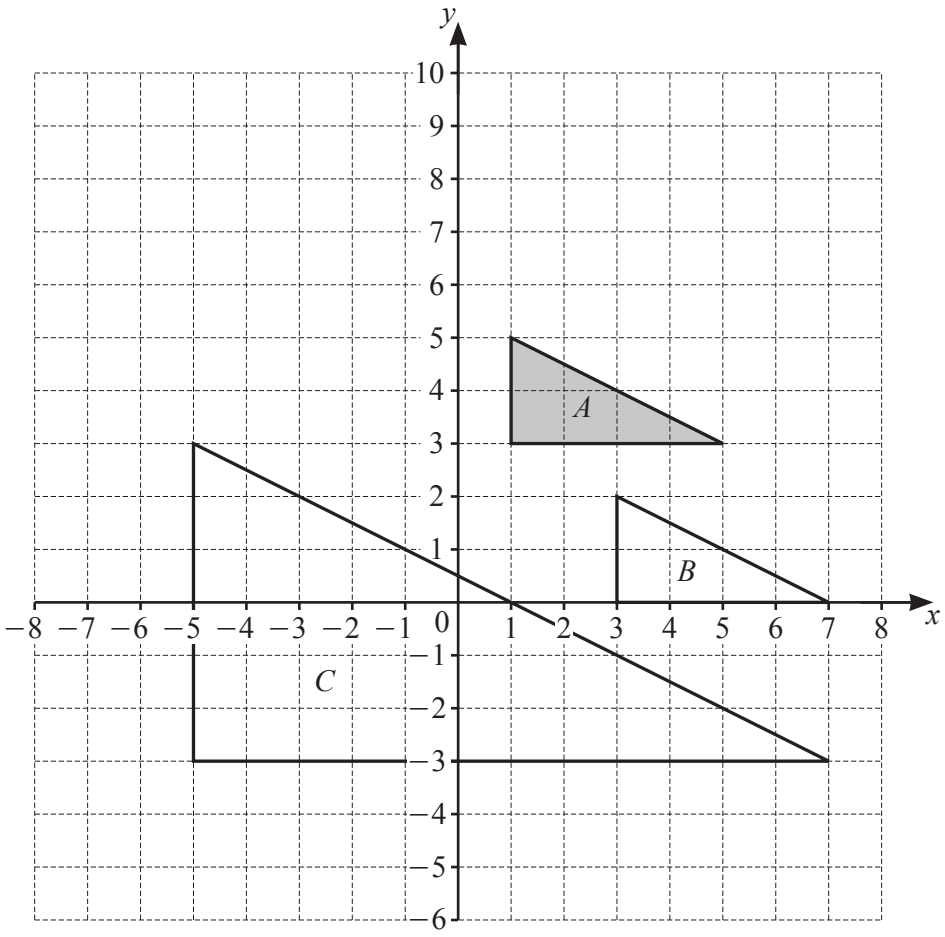
6



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

.....

..... [2]

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

.....

..... [3]

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

7 **(a)** Simplify.

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

..... [2]

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

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

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

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

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

(d) Multiply out and simplify.

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

..... [2]

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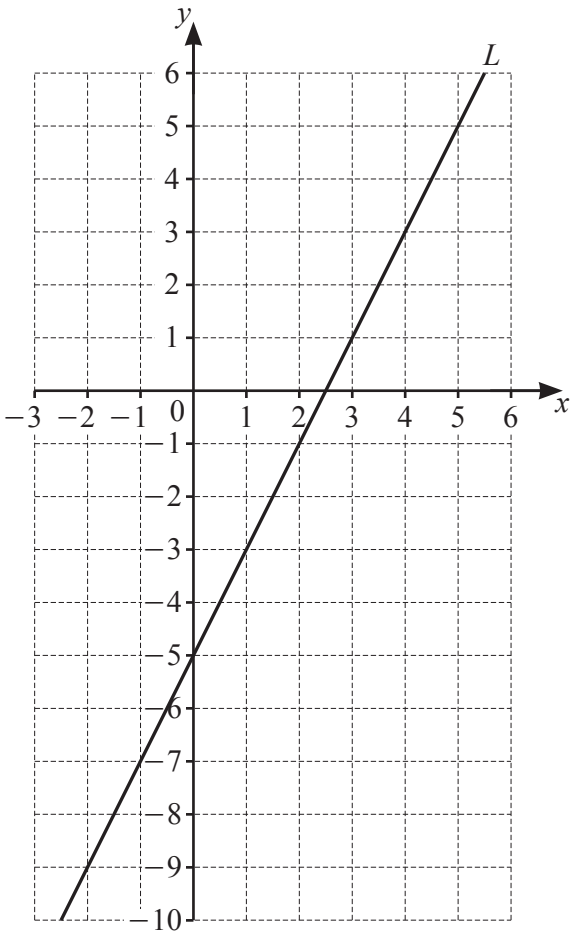
(e) Nasser has x marbles.
Selina has 15 more marbles than Nasser.
Hanif has 3 times as many marbles as Selina.
In total they have 150 marbles.

Find the value of x.

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

8



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

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

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

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

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

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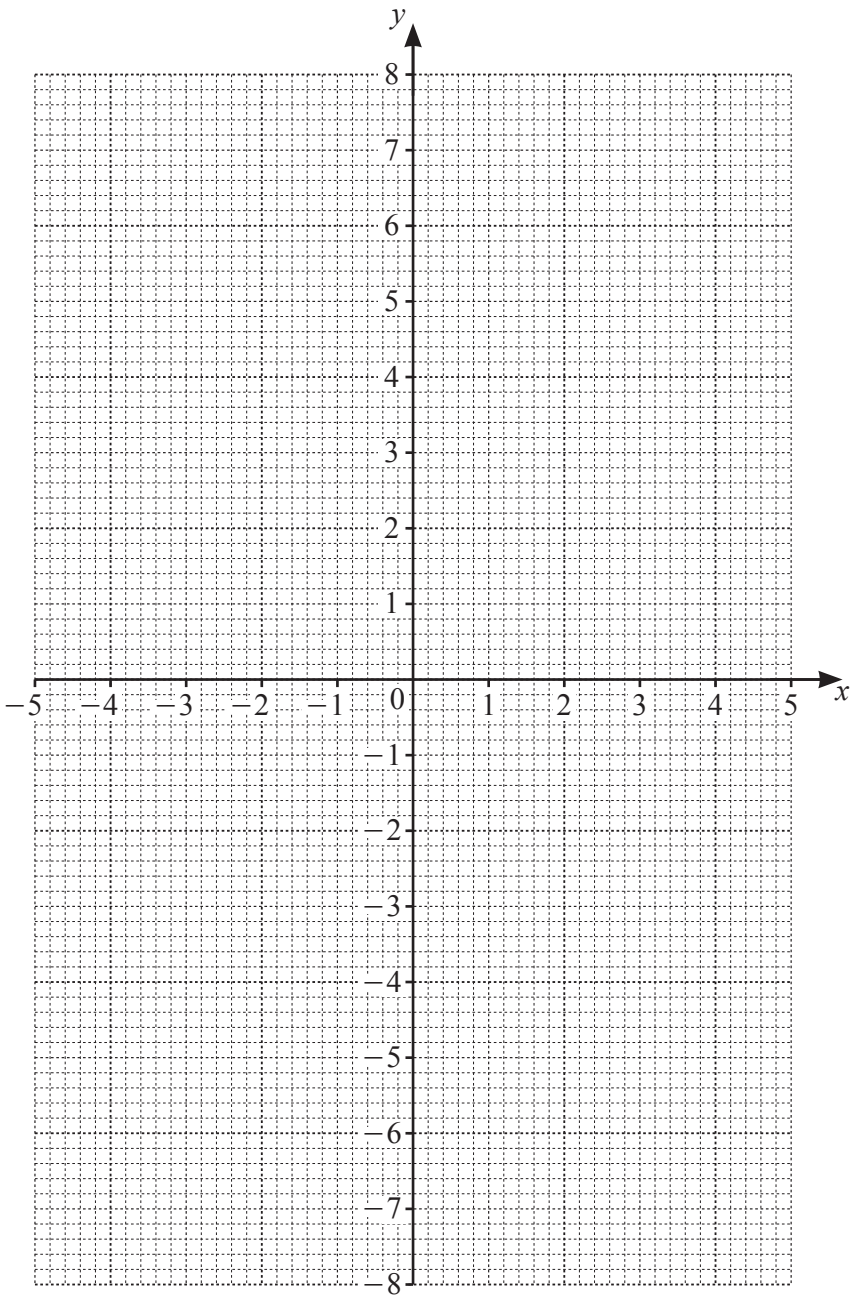
(c) (i) Complete the table of values for $y = \frac{8}{x}$.

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 $1 \leqslant x \leqslant 5$.



[4]

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

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]

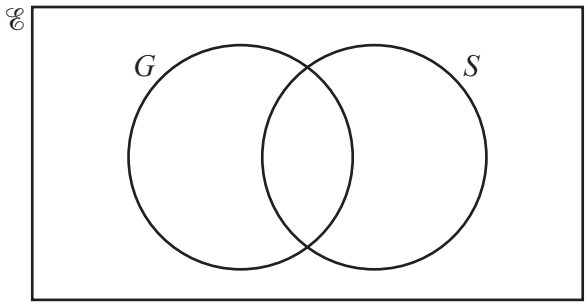
(b) A clock made of metals has a mass of 1080 g.
The mass of each metal in the clock is in the ratio
copper : zinc : other metals = 21 : 14 : 1.

Calculate the mass of copper in this clock.

..... g [2]

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

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 $\mathrm{n}(G \cap S)$.

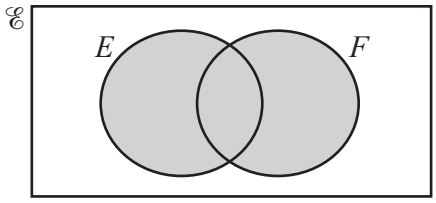
..... [1]

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

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

..... [1]

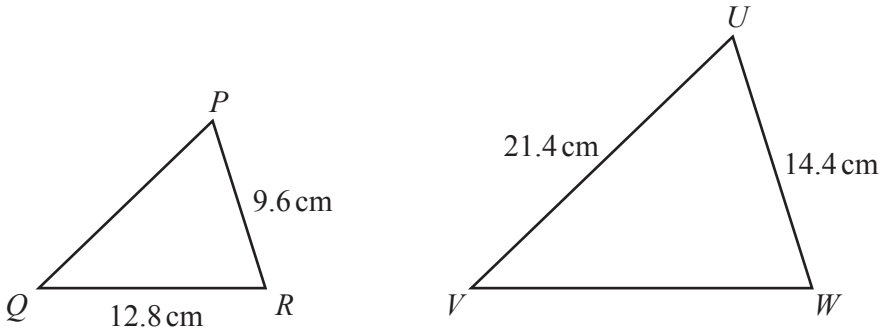
(d)



Use set notation to describe the shaded region.

..... [1]

10 (a)



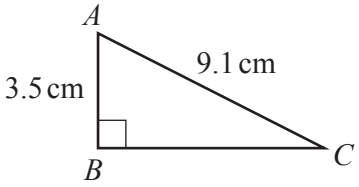
NOT TO SCALE

Triangle PQR is mathematically similar to triangle UVW.

Calculate VW.

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

(b) ABC is a right-angled triangle.



NOT TO SCALE

Calculate BC.

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

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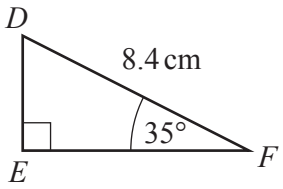
(c) *DEF* is a right-angled triangle.

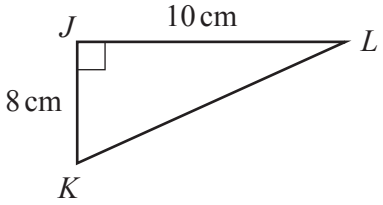


NOT TO SCALE

Calculate *EF*.

EF = ...cm [2]

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



NOT TO SCALE

Calculate angle *JKL*.

Angle *JKL* = ... [2]

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