# Cambridge IGCSE™

| CANDIDATE NAME | |
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**MATHEMATICS**                                                                          **0580/32**

Paper 3 (Core)                                                              **February/March 2022**

                                                                                          **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.

**1** **(a)** One day, Mahika records the number of teachers and students who cycle to school.

| | Tally | Frequency |
|---|---|---|
| Teachers | 卌 | |
| Students | 卌 卌 卌 卌 ||| | |

    **(i)** Complete the frequency column in the table. [1]

    **(ii)** Work out the percentage of people who cycle that are students.

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

**(b)** Mahika records how 120 students from Year 1 and Year 2 travel to school.
Each student walks, cycles or travels by bus.

- 48 students are in Year 1.
- 77 students walk.
- 5 students in Year 2 cycle.
- 36 students travel by bus.
- $\frac{4}{9}$ of the students who travel by bus are in Year 1.

    **(i)** Complete the table.

| | Walk | Cycle | Bus | Total |
|---|---|---|---|---|
| Year 1 | | | | |
| Year 2 | | | | |
| Total | | | | 120 |

[3]

    **(ii)** One of the 120 students is chosen at random.

Work out the probability that this student does not travel by bus to school.

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

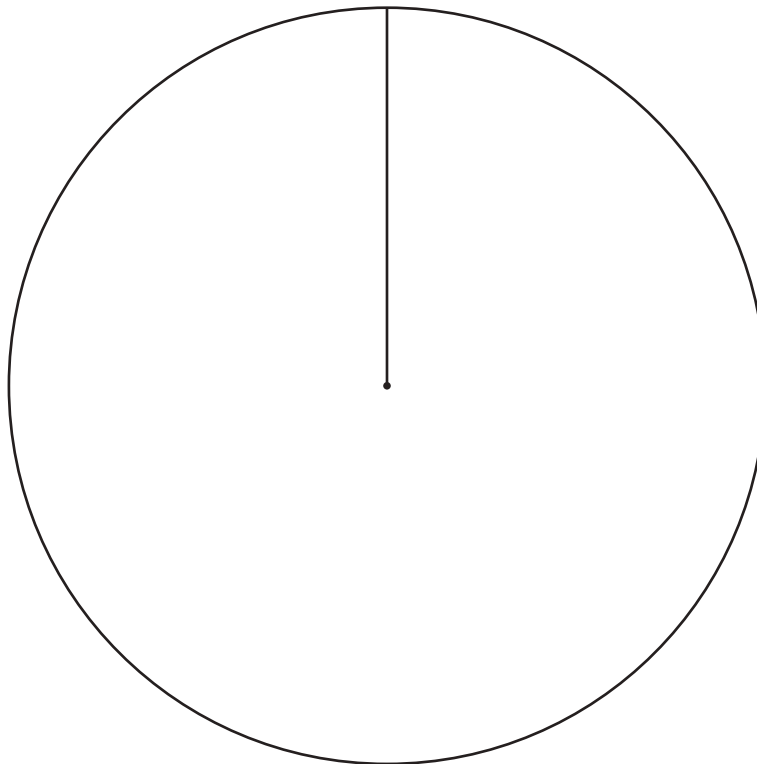**(c)** There have been 24 complaints about one of the buses.

The complaints are:
- The bus is late.
- The price is too high.
- The bus is crowded.

**(i)** Complete the table.

| Complaint | Frequency | Pie chart sector angle |
|---|---|---|
| Late | 10 | |
| Price | 6 | |
| Crowded | 8 | |

[2]

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



[2]

**2** **(a)** Calculate the interior angle of a regular pentagon.

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

**(b)** The diagram shows three congruent regular pentagons and a triangle.
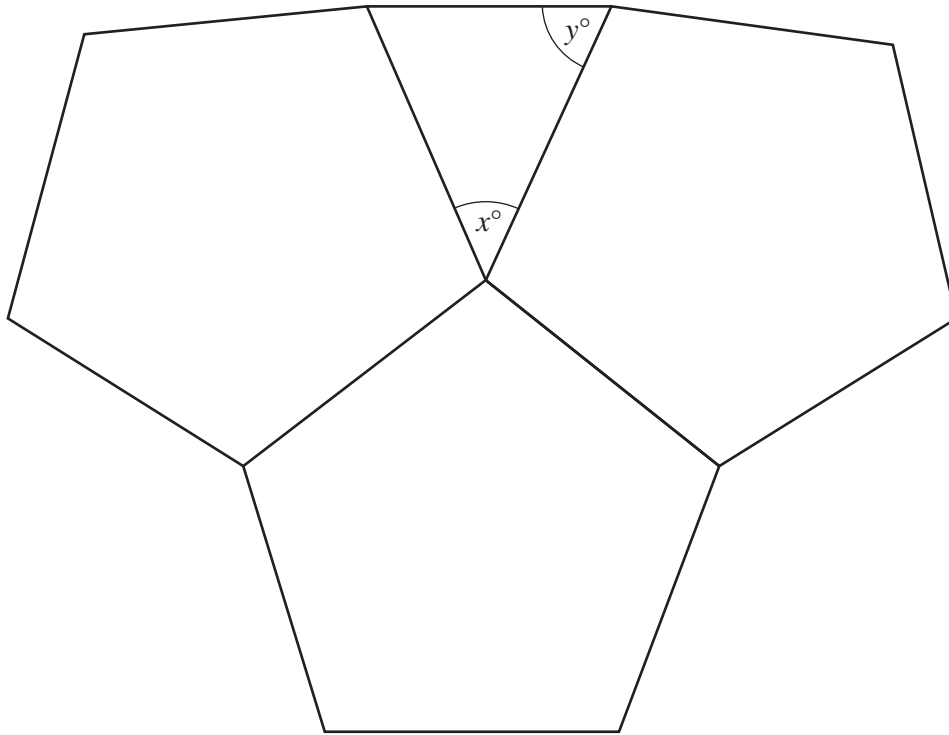


NOT TO
SCALE

**(i)** Work out the value of *x*.
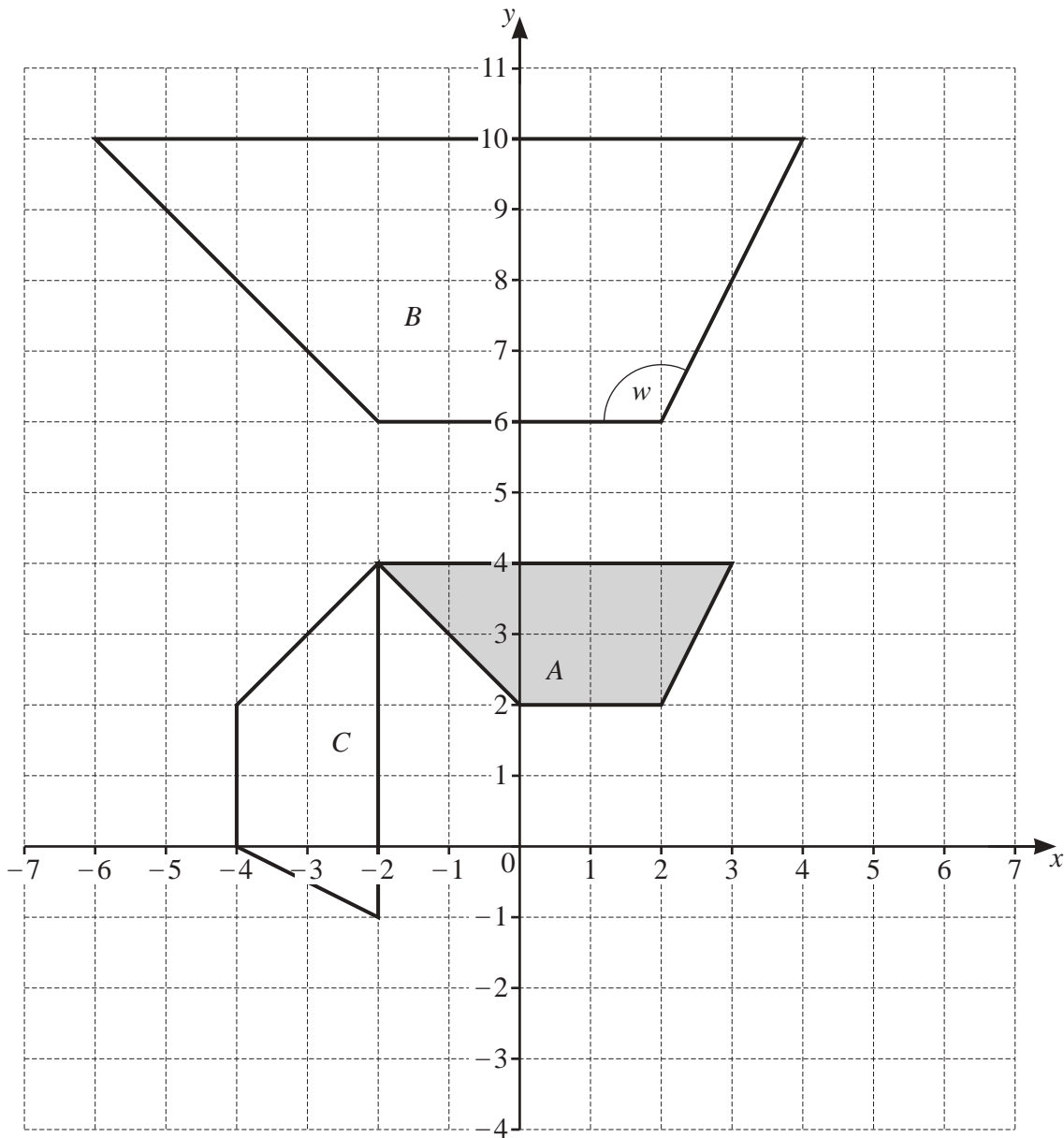Give a geometrical reason for your answer.

*x* = .................... because ...........................................................................................................

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

**(ii)** Work out the value of $y$.
Give a geometrical reason for your answer.

$y =$ ................... because ......................................................................................................

.............................................................................................................................. [3]

**(iii)** Find the ratio $x : y$.
Give your answer in its simplest form.

....................... : ....................... [1]

**3** **(a)** The diagram shows three quadrilaterals, *A*, *B* and *C*, on a 1cm$^2$ grid.



**(i)** **(a)** Write down the mathematical name for quadrilateral *B*.

.................................................. [1]

**(b)** Work out the area of quadrilateral *B*.
Give the units of your answer.

................................. ................ [3]

**(ii)** Measure angle *w*.

Angle *w* = .............................................. [1]

**(iii)** Describe fully the **single** transformation that maps

    **(a)** quadrilateral *A* onto quadrilateral *B*,

    ..................................................................................................................................

    .......................................................................................................................... [3]

    **(b)** quadrilateral *A* onto quadrilateral *C*.

    ..................................................................................................................................

    .......................................................................................................................... [3]

**(b)** The diagram shows a parallelogram and a line *AB* on a 1cm$^2$ grid.
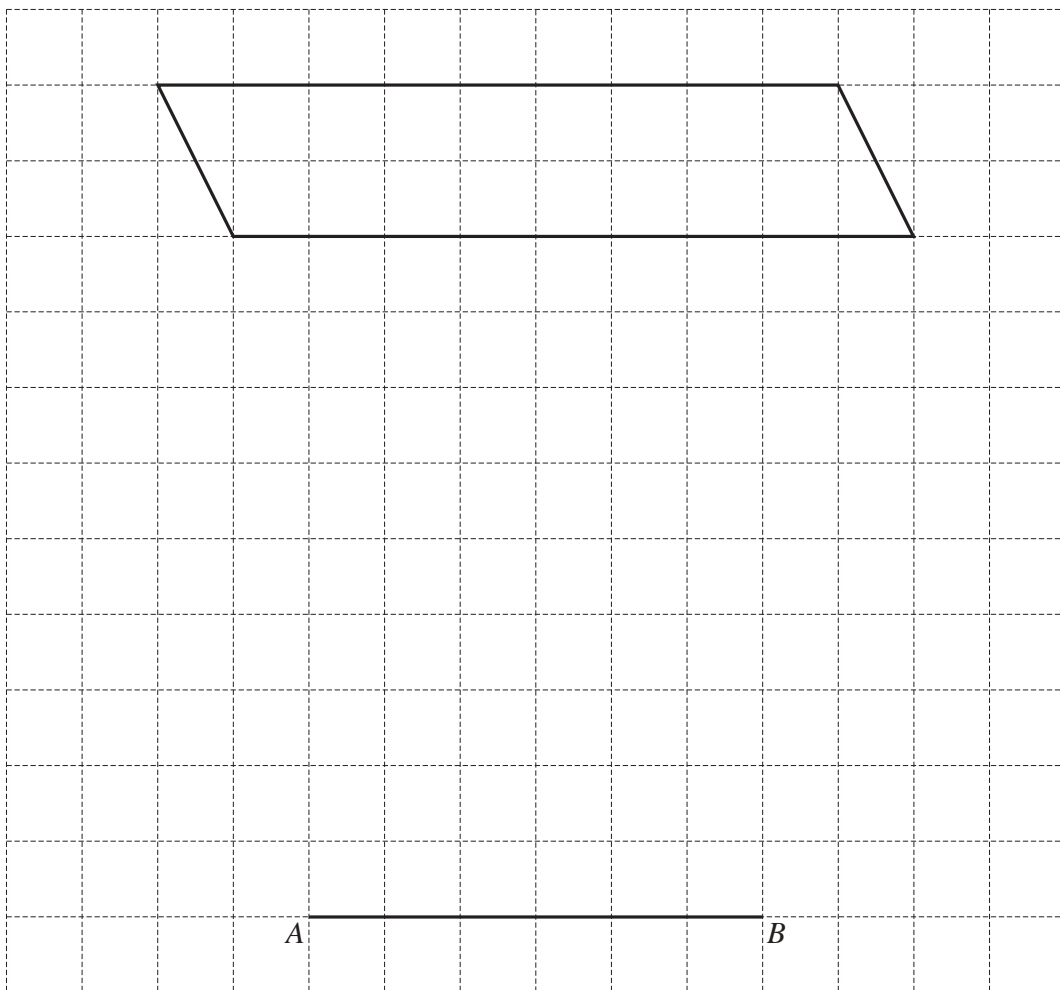


On the grid, complete a triangle, *ABC*, that has the same area as the parallelogram.

[2]

**4** **(a)**
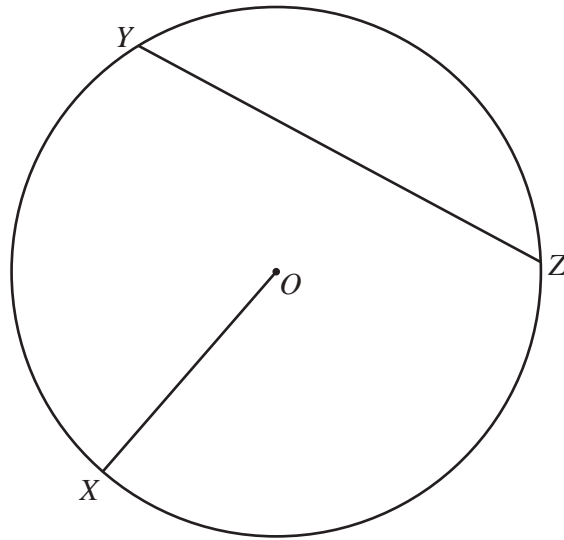


*X*, *Y* and *Z* lie on a circle, centre *O*.

**(i)** Write down the mathematical name of the line

**(a)** *OX*,

................................................ [1]

**(b)** *YZ*.

................................................ [1]

**(ii)** Measure the length of *OX*.

............................................ cm [1]

**(b)** Another circle has a radius of 18 cm.

Calculate the circumference of this circle.

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

**(c)** In this part, all angles are in degrees.
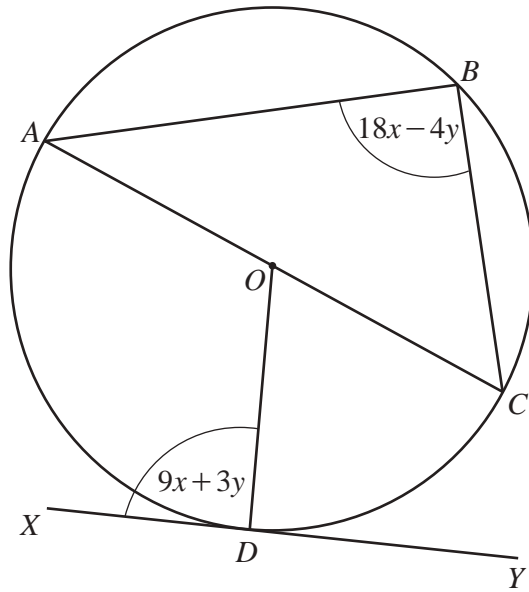


NOT TO SCALE

$A$, $B$, $C$ and $D$ lie on a circle, centre $O$, diameter $AC$.
$XY$ is a tangent to the circle at $D$.

**(i)** Use the information in the diagram to complete these two simultaneous equations.

$$9x + 3y = \text{.......................}$$

$$18x - 4y = \text{.......................}$$

[2]

**(ii)** Solve your simultaneous equations.
You must show all your working.

$x = $ .................................................

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

**5** **(a)** A closed box, in the shape of a cuboid, has length 5 cm, width 4 cm and height 2 cm.

**(i)** Draw a net of the box on the 1cm$^2$ grid.
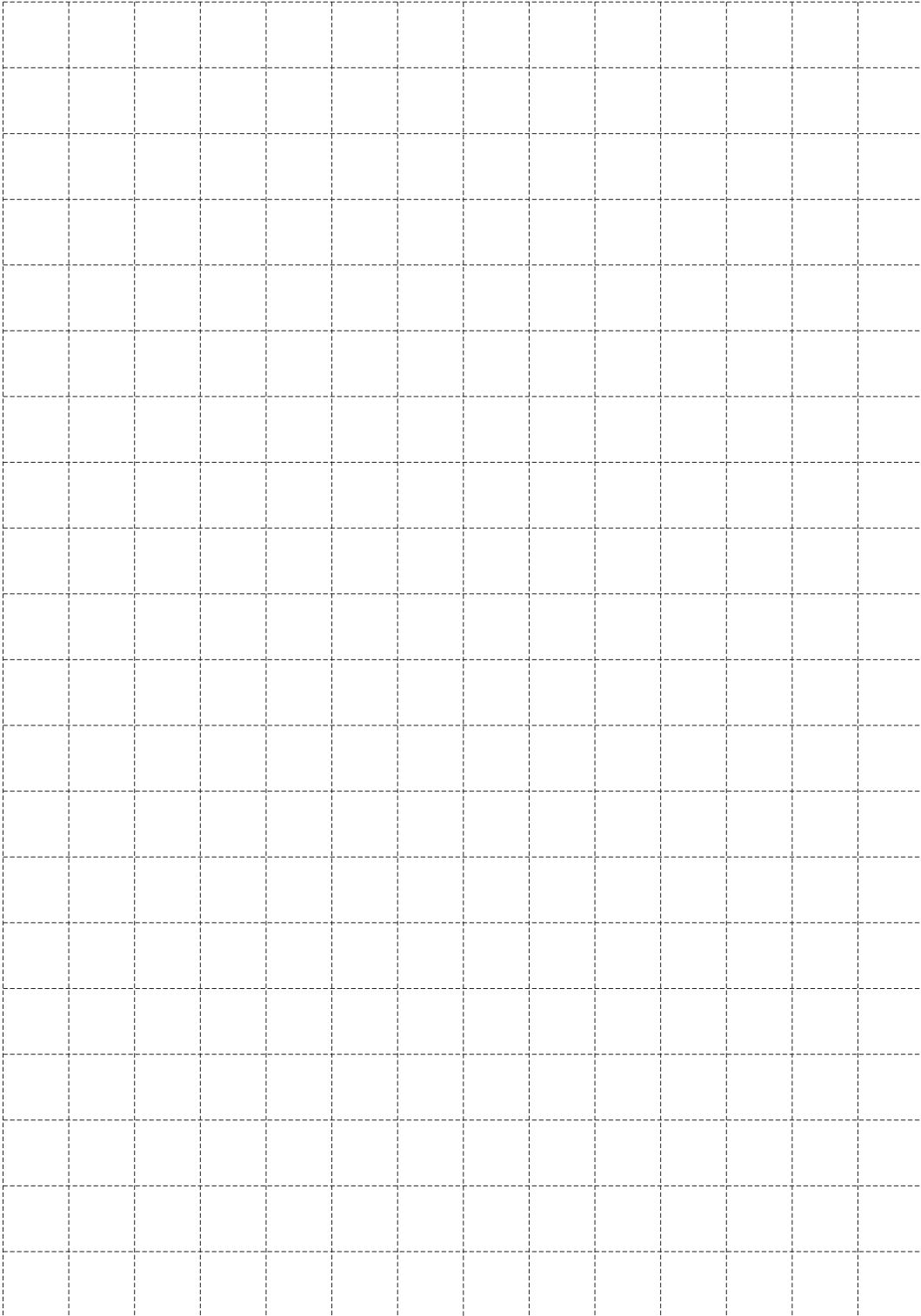
[3]

**(ii)** A container is a cube with volume $1\text{m}^3$.

Work out the maximum number of these boxes that can be packed into this container.

.................................................. [3]

**(b)** A shop sells three different sized boxes of rice.
The boxes all have the same cost per kilogram.

NOT TO SCALE

Box *A*

80 rupees

750 g

Box *B*

1.35 kg

Box *C*

$3.50
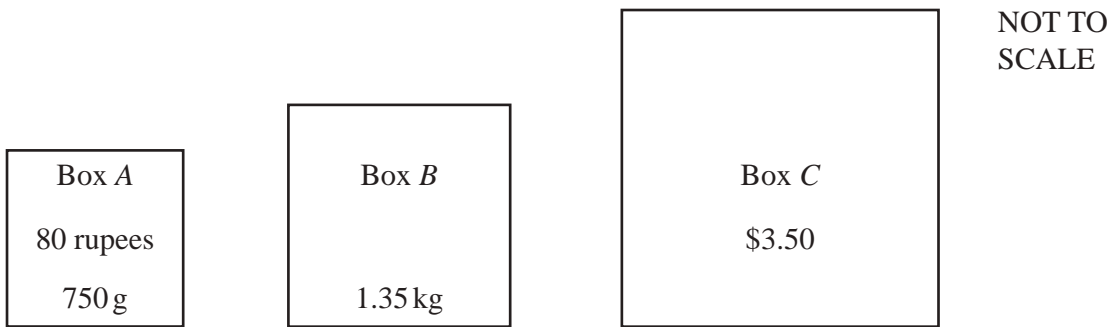
**(i)** Work out the cost in rupees of box *B*.

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

**(ii)** $1 = 64 rupees.

Calculate the mass of box *C*.
Give your answer in kilograms.

........................................... kg  [3]

**(c)** Change $75\text{cm}^3$ into litres.
Give your answer in standard form.

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

**6 (a)**
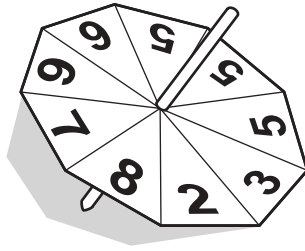


The diagram shows a fair 9-sided spinner.
The numbers on the spinner are 2, 3, 5, 5, 5, 6, 6, 7 and 8.

**(i)** The spinner is spun once.

Write down the probability that the spinner lands on

**(a)** the number 8,

.................................................. [1]

**(b)** a number less than 7.

.................................................. [1]

**(ii)** The spinner is spun 135 times.

Work out the expected number of times the spinner lands on the number 6.

.................................................. [1]

**(b)** Hitesh throws a dice 80 times.
The results are shown in the table.

| Number thrown | Frequency |
|---|---|
| 1 | 15 |
| 2 | 16 |
| 3 | 14 |
| 4 | 11 |
| 5 | 9 |
| 6 | 15 |

    **(i)** Write down the mode.

................................................. [1]

    **(ii)** Work out the range.

................................................. [1]

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

................................................. [1]

   **(iv)** Calculate the mean.

................................................. [3]

**7** **(a)**  1 mile = 1.609344 kilometres

Change 6 miles into **metres**.
Give your answer correct to the nearest metre.

.......................................... m [3]

**(b)** **(i)** The bearing of a boat from a harbour is 322°.

Work out the bearing of the harbour from the boat.

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

**(ii)** The boat is 12 km from the harbour.
At 2.30 pm the boat starts to sail to the harbour.
The speed of the boat is 5 km/h.

Work out the time the boat arrives at the harbour.

.................................................. [3]

**(c)** The scale drawing shows the positions of Shakti's house, *S*, and Mairi's house, *M*, on a map.
The scale is 1 cm represents 4 km.

North

*S*

North

*M*
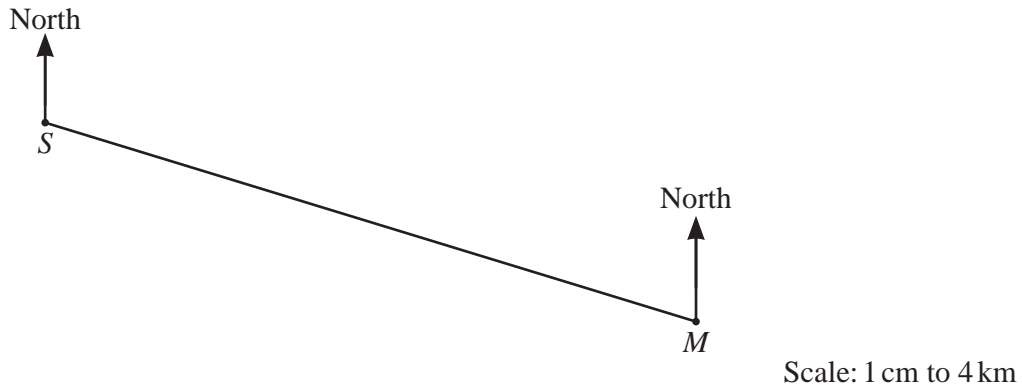
Scale: 1 cm to 4 km

**(i)** Measure the bearing of *M* from *S*.

.................................................. [1]

**(ii)**

North

*S*

Scale: 1 cm to 5 km

This scale drawing shows another map with Shakti's house, *S*, marked on it.
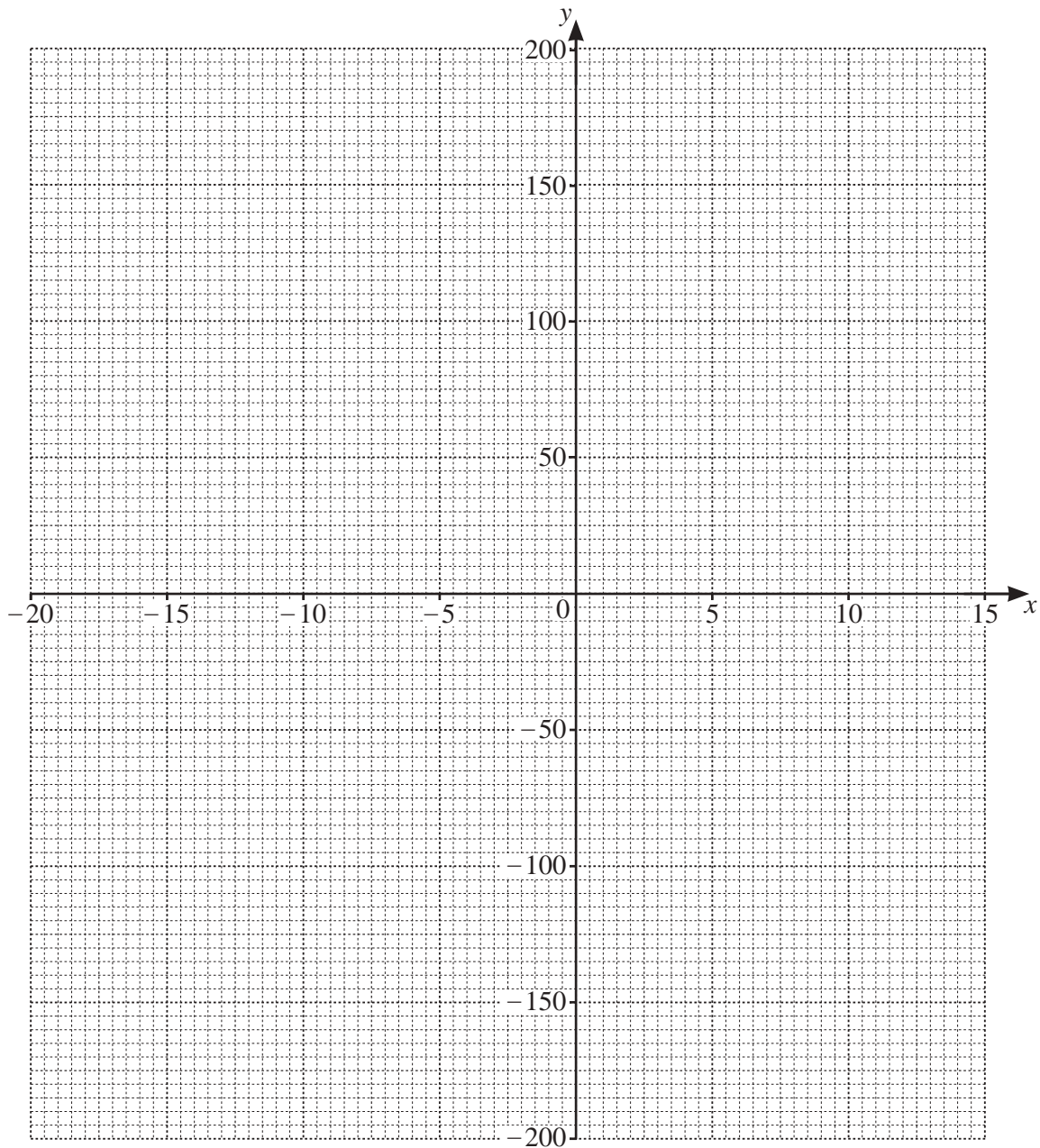The scale of this map is 1 cm represents 5 km.

Mark the position of Mairi's house, *M*, on this map.

[4]

**8** **(a) (i)** Complete the table of values for $y = x^2 + 6x - 160$.

| $x$ | $-20$ | $-15$ | $-10$ | $-5$ | $0$ | $5$ | $10$ | $15$ |
|---|---|---|---|---|---|---|---|---|
| $y$ | 120 | | $-120$ | $-165$ | $-160$ | $-105$ | | |

[3]

**(ii)** On the grid, draw the graph of $y = x^2 + 6x - 160$ for $-20 \leqslant x \leqslant 15$.



[4]

**(iii)** **(a)** Write down the equation of the line of symmetry of the graph.

................................................. [1]

**(b)** Find the coordinates of the lowest point on the graph.

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

**(iv)** Use your graph to solve the equation $x^2 + 6x - 160 = 0$.

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

**(b)** Rearrange the formula $y = mx + c$ to make $x$ the subject.

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

**9** Tarak has two fields.
He grows wheat, barley and corn in his fields.

**(a)**
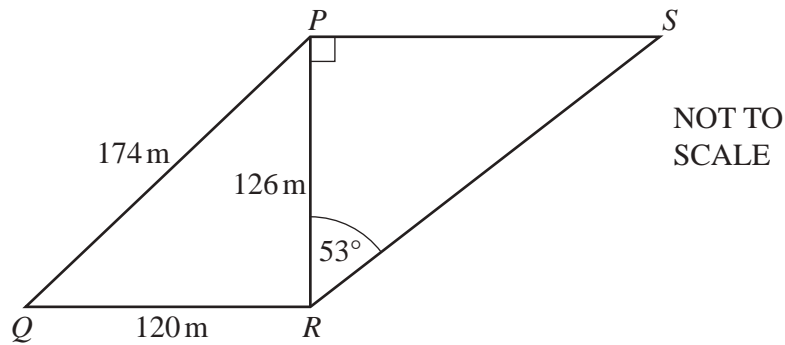


The diagram shows Tarak's two triangular fields, *PQR* and *PRS*.
Angle *RPS* = 90° and angle *PRS* = 53°.
*PQ* = 174 m, *QR* = 120 m and *PR* = 126 m.

**(i)** Show that angle *PRQ* = 90°.

[2]

**(ii)** Calculate the area of the quadrilateral *PQRS*.
Give your answer correct to 4 significant figures.

........................................... m² [5]

**(b) (i)** The mass, *m* tonnes, of wheat grown in 2021 is 4.3 tonnes, correct to 1 decimal place.

Complete this statement about the value of *m*.

........................ ⩽ *m* < ........................  [2]

**(ii)** In 2020, 2.6 tonnes of barley is grown.
In 2021, 3.25 tonnes of barley is grown.

Show that the percentage increase in barley grown from 2020 to 2021 is 25%.

[1]

**(iii)** In 2019, 2.4 tonnes of corn is grown.
In 2020, 20% more corn is grown than in 2019.
In 2021, 20% less corn is grown than in 2020.

Calculate the amount of corn grown in 2021.

...................................... tonnes [3]

**20**

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