**Cambridge Assessment International Education**
Cambridge International General Certificate of Secondary Education (9–1)

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

*1313276246*

**MATHEMATICS** **0980/31**

Paper 3 (Core) **October/November 2019**

**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.

This document consists of **16** printed pages.

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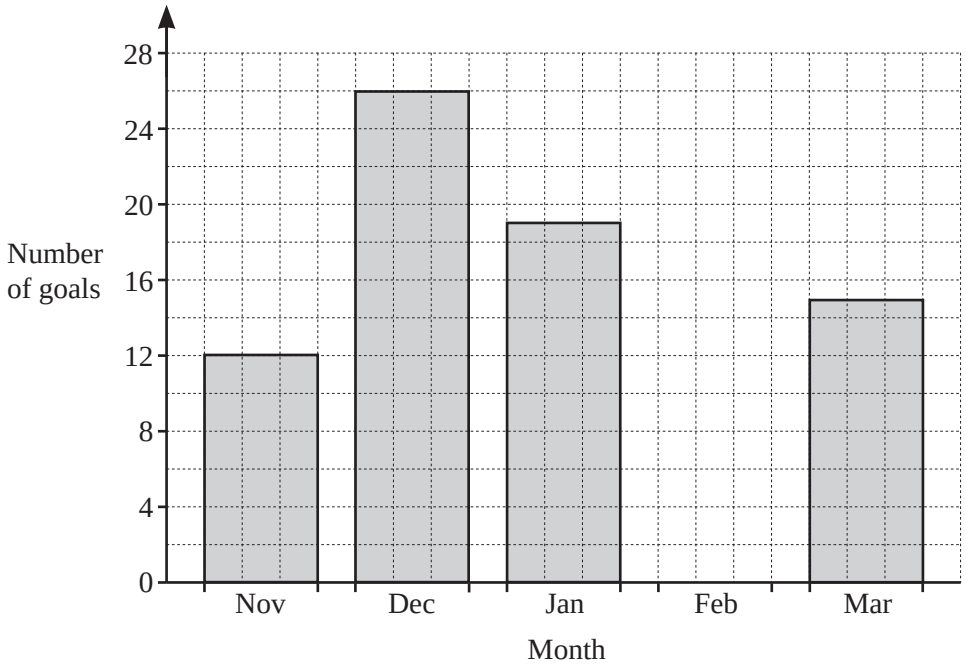
Cambridge Assessment International Education

**1** **(a)** José manages a football team.
He records the number of goals scored by the team for each of five months.
Some of the results are shown on the bar chart.




**(i)** In February, 10 goals were scored.

Complete the bar chart. [1]

**(ii)** Write down the month in which most goals were scored.

..... [1]

**(iii)** Find the total number of goals scored.

..... [1]

**(iv)** Calculate the mean number of goals scored each month.

..... [1]

**(b)** Jodie and her two children go to a football match.

**(i)** Ticket prices are $15.30 for an adult and $6.50 for a child.

Calculate the total cost of the three tickets.

$..... [2]

**(ii)** A match programme costs $3.75 .
Jodie buys two match programmes.

Calculate the change she receives from a $10 note.

$..... [2]

**(iii)** 540 tickets out of 630 are sold for this match.

Calculate the percentage of tickets sold.

..... % [1]

**(iv)** The match starts at 1455 and ends 1 hour 50 minutes later.

Work out the time the match ends.

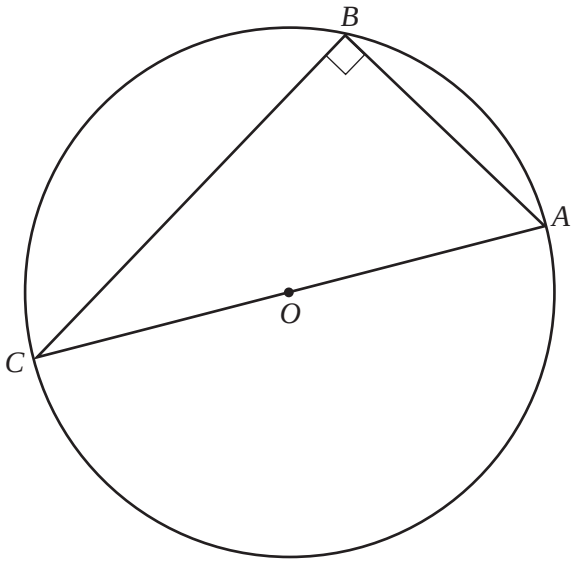
..... [1]

**(v)** Jodie travels 66 km to get home after the match.
She leaves at 5 pm and arrives home at 6.12 pm.

Calculate her average speed in kilometres per hour.

..... km/h [3]

**2 (a)**




In the diagram, *A*, *B* and *C* are points on the circle, centre *O*.

**(i)** On the diagram, draw a chord. [1]

**(ii)** Explain why angle *ABC* is 90°.

..... [1]

**(b)** The length of the edge of a cube is 8 cm.

Calculate the surface area of this cube.

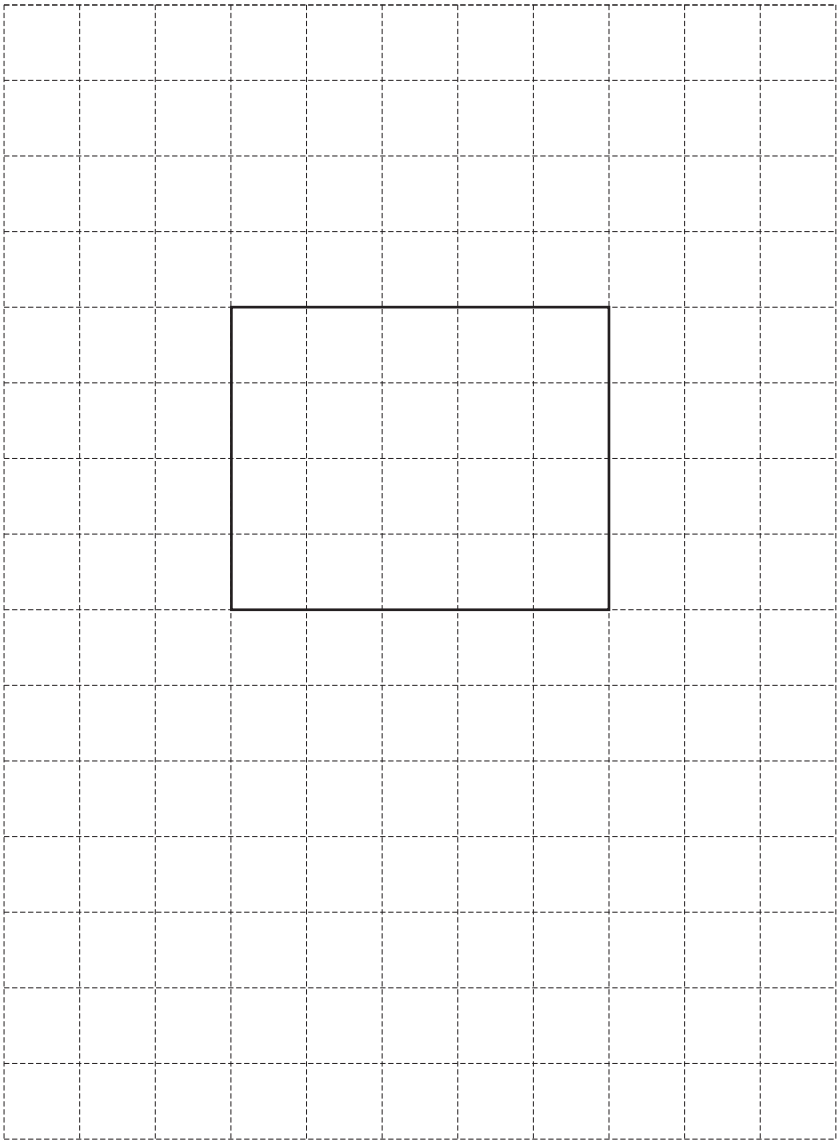
..... $cm^2$ [2]

**(c)** A cuboid measures 5 cm by 4 cm by 2 cm.

**(i)** Calculate the volume of this cuboid.
Give the units of your answer.

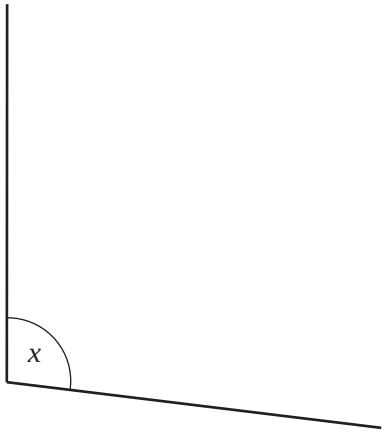
..... ..... [3]

**(ii)** On the 1 $cm^2$ grid, draw an accurate net of this cuboid.
One face has been drawn for you.



[3]

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



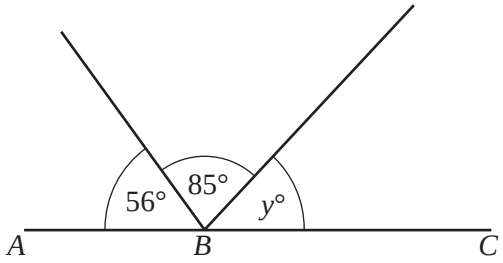

**(i)** Measure the size of angle $x$.

..... [1]

**(ii)** Write down the mathematical name of this type of angle.

..... [1]

**(b)** $ABC$ is a straight line.

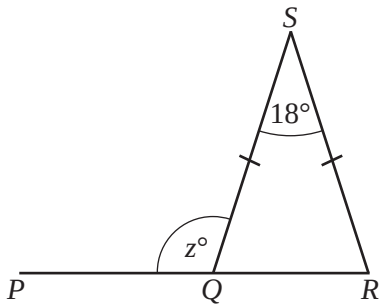



NOT TO SCALE

Find the value of $y$.

$y =$ ..... [1]

**(c)** *QRS* is an isosceles triangle and *PQR* is a straight line.




NOT TO SCALE

Find the value of $z$.

$z =$ ..... [2]

**(d)** Find the size of one interior angle of a regular octagon.

..... [3]

**4** **(a)** Write the number four hundred and eighteen thousand and seventy two in figures.

..... [1]

**(b)** Write down all the factors of 16.

..... [2]

**(c)** Write down a prime number between 30 and 40.

..... [1]

**(d)** Find the value of

**(i)** $\sqrt{729}$,

..... [1]

**(ii)** $18^3$,

..... [1]

**(iii)** $7^0$.

..... [1]

**(e)** Saskia has \$600.

She spends $\frac{1}{5}$ of the \$600 on a coat and gives $\frac{1}{3}$ of the \$600 to her son.

What fraction of the \$600 does she have left?
Give your answer in its simplest form.

..... [3]

**(f)** Find the lowest common multiple (LCM) of 15 and 27.

..... [2]

**(g)** Write 432 as the product of its prime factors.

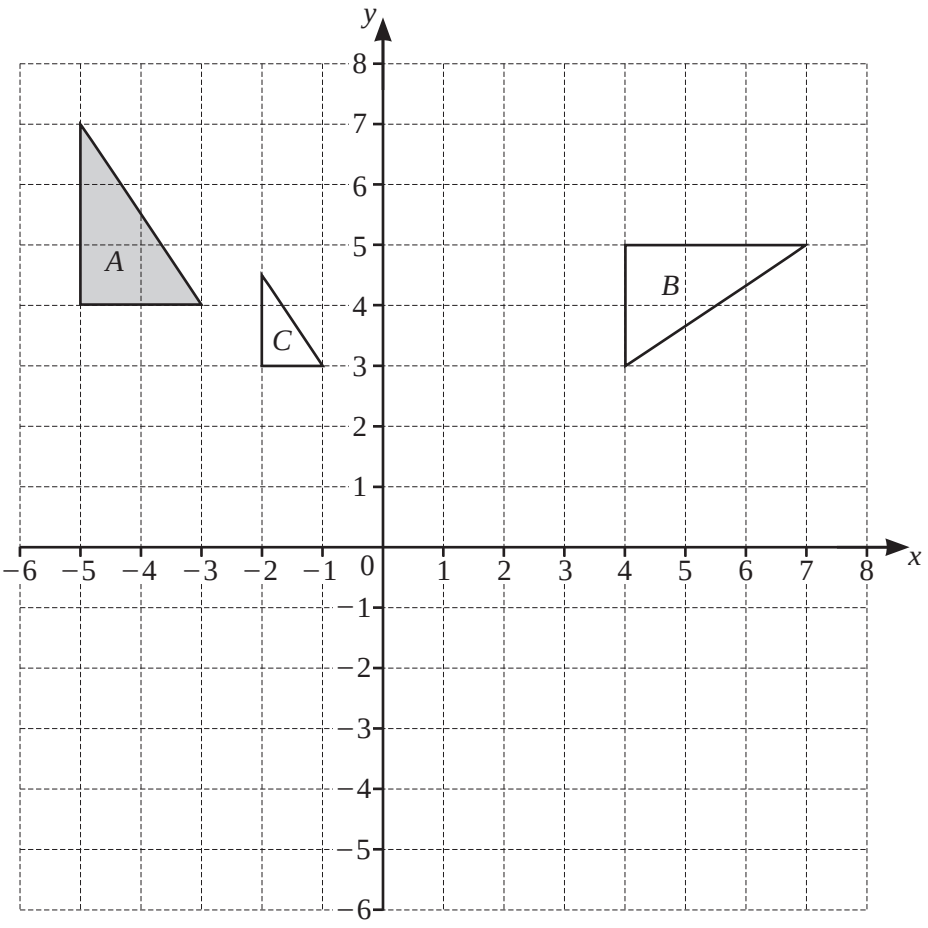
..... [2]

**(h)** Ella invests $4000 for 3 years at a rate of 1.2% per year compound interest.

Calculate the value of her investment at the end of the 3 years.

$..... [3]

**5** Triangles *A*, *B* and *C* are shown on the grid.




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

**(i)** triangle *A* onto triangle *B*,

.....

..... [3]

**(ii)** triangle *A* onto triangle *C*.

.....

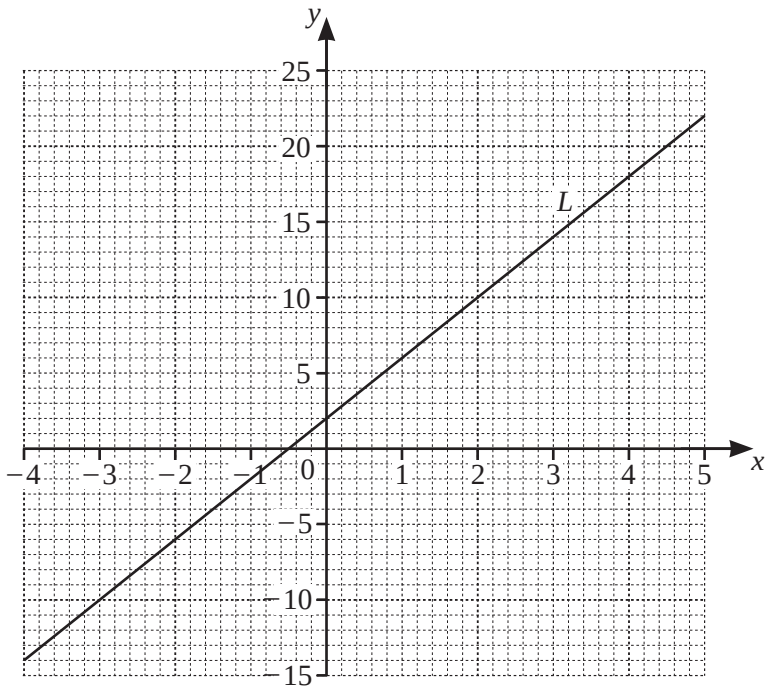
..... [3]

**(b)** On the grid,

**(i)** translate triangle *A* by the vector $\begin{pmatrix} 6 \\ -2 \end{pmatrix}$, [2]

**(ii)** reflect triangle *A* in the line $y = 1$. [2]

**6** The line $L$ is shown on the grid.




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

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

**(b)** The equation of a different line is $y = 3x - 4$.

**(i)** Write down the gradient of this line.

..... [1]

**(ii)** Write down the co-ordinates of the point where this line crosses the $y$-axis.

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

**(c)** On the grid, draw the graph of $y = -2x + 1$ for $-4 \leqslant x \leqslant 5$. [3]

**7** **(a)** Soraya makes rectangular flags.

**(i)** On the rectangle, draw the lines of symmetry. [2]

**(ii)** Each flag measures 1.2 m by 1.8 m.

Calculate the area of one flag.

..... $m^2$ [2]

**(b)** Each flag costs \$15 to make.
Soraya sells one flag for \$21.

Calculate the percentage profit.

..... % [3]

**(c)** Soraya makes 30 flags.
11 flags are pink, 7 are yellow, 5 are blue, 4 are silver and 3 are green.
Soraya takes a flag at random.

Find the probability that the flag she takes is

**(i)** pink,

..... [1]

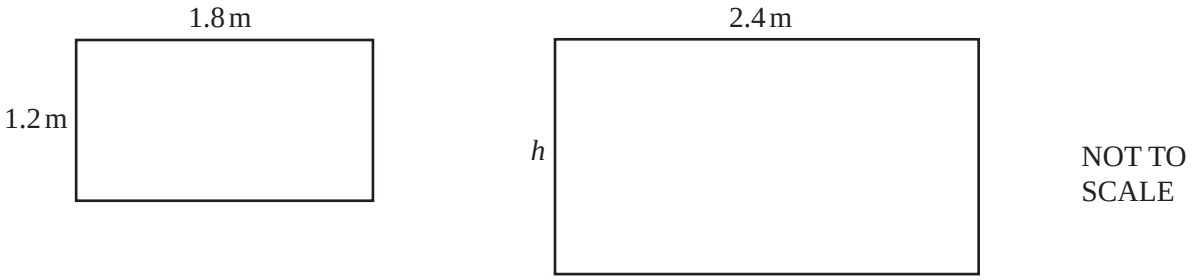
**(ii)** not blue,

..... [1]

**(iii)** red.

..... [1]

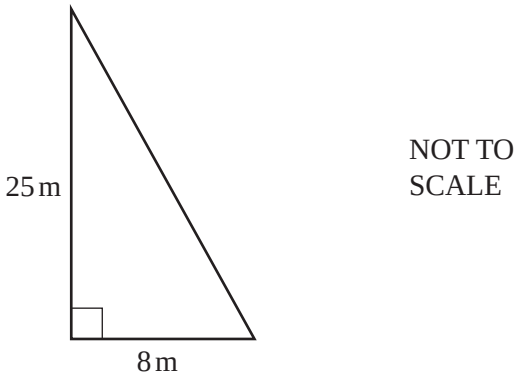
**(d)** Soraya decides to make a mathematically similar flag.




Calculate the height, $h$, of the new flag.

$h$ = ..... m [2]

**(e)**

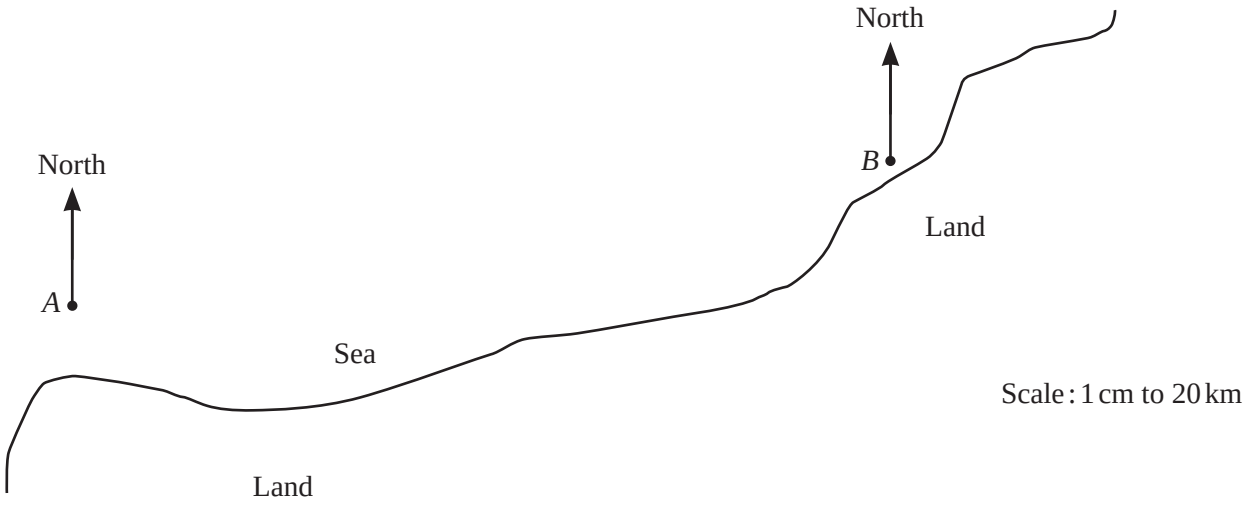



The diagram shows a flagpole in Soraya's garden.
The flagpole has height 25 m.
A rope from the top of the flagpole is tied to the ground 8 m from its base.

Calculate the length of this rope.

..... m [2]

**8** **(a)** The scale drawing shows the positions of two buoys, *A* and *B*, in the sea.
The scale is 1 centimetre represents 20 kilometres.




**(i)** Work out the actual distance between buoy *A* and buoy *B*.

..... km [2]

**(ii)** Measure the bearing of buoy *B* from buoy *A*.

..... [1]

**(iii)** Buoy *C* is 120 km from buoy *B* on a bearing of 300°.

On the scale drawing, mark the position of buoy *C*. [2]

**(iv)** Marco sails his boat so that he is always equidistant from buoy *A* and buoy *B*.

On the scale drawing, **use a straight edge and compasses only** to construct the path of the boat.
Show all your construction arcs. [2]

**(b)** The amount of fuel, $t$ litres, in the boat's fuel tank is 135 litres, correct to the nearest litre.

Complete the statement about the value of $t$.

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

**(c)** Marco has ropes of four different colours.
He takes a rope at random.

| Colour | Brown | White | Red | Green |
|---|---|---|---|---|
| Probability | 0.35 | | 0.04 | 0.2 |

Complete the table. [2]

**(d)** When Marco arrives at a port the temperature is 5 °C.
At midnight the temperature has fallen by 7 °C.

Find the temperature at midnight.

..... °C [1]

**(e)** Last year the cost to keep a boat at the port was $14 per night.
This year the cost has increased by 12%.

Calculate the cost this year.

$..... [2]

**(f)** Marco watched 25 boats enter the port, of which 9 had a mast.
There are a total of 200 boats in the port.

Calculate an estimate of the number of boats in the port that have a mast.

..... [2]

**Question 9 is printed on the next page.**

**9** **(a)** These are the first four terms of a sequence.

29 32 35 38

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

..... [1]

**(ii)** Write down the rule for continuing this sequence.

..... [1]

**(b)** The *n*th term of another sequence is $n^2 + 5$.

**(i)** Find the first three terms.

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

**(ii)** Show that 261 is a term in this sequence.

.....

..... [2]

**(c)** These are the first four terms of a different sequence.

27 33 39 45

Find the *n*th term of this sequence.

..... [2]