



# Cambridge IGCSE™ (9–1)

CANDIDATE  
NAME

CENTRE  
NUMBER

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**MATHEMATICS**

**0980/21**

Paper 2 (Extended)

**October/November 2020**

**1 hour 30 minutes**

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 70.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages. Blank pages are indicated.

1 Simplify.

$$3a + 7b - 4a + b$$

..... [2]

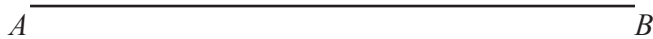
2 A field,  $ABC$ , is in the shape of a triangle.  
 $AC = 500$  m and  $BC = 650$  m.

**Using a ruler and compasses only**, complete the scale drawing of the field  $ABC$ .

Leave in your construction arcs.

Use a scale of 1 cm to represent 100 m.

The side  $AB$  has been drawn for you.



Scale: 1 cm to 100 m

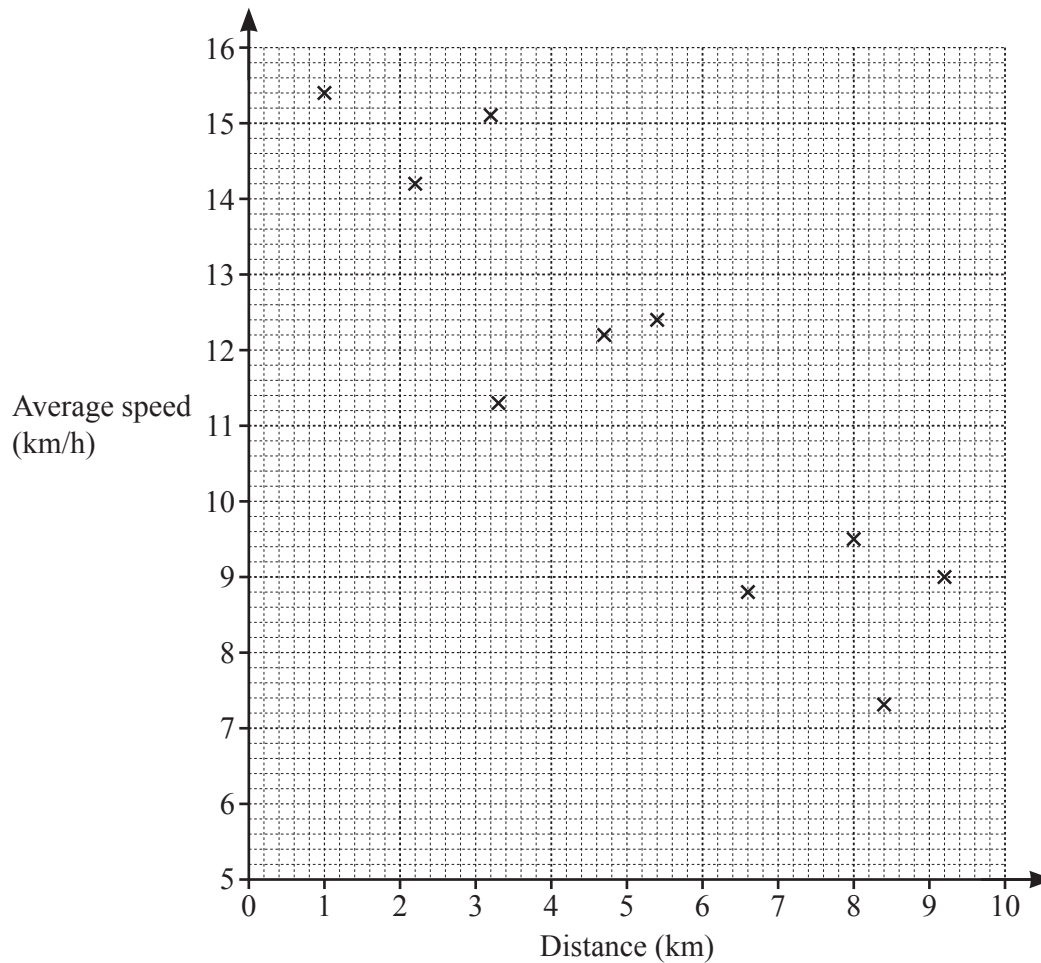
[3]

3 Rangan buys 3.6 kg of potatoes and 2.8 kg of leeks.  
 The total cost is \$13.72 .  
 Leeks cost \$2.65 per kilogram.

Find the cost of 1 kg of potatoes.

\$ ..... [3]

- 4 Aisha records the distance she runs and her average speed. The results are shown in the scatter diagram.



- (a) The table shows the results of four more runs.

|                      |      |      |     |     |
|----------------------|------|------|-----|-----|
| Distance (km)        | 4.2  | 5.7  | 7.1 | 8.8 |
| Average speed (km/h) | 13.4 | 11.8 | 9.8 | 8.3 |

On the scatter diagram, plot these points.

[2]

- (b) What type of correlation is shown in the scatter diagram?

..... [1]

- (c) On the scatter diagram, draw a line of best fit.

[1]

- (d) Use your line of best fit to estimate her average speed when she runs a distance of 6 km.

..... km/h [1]

5 
$$T = \frac{49.2 - 9.59}{4.085 \times 2.35}$$

By writing each number correct to 1 significant figure, work out an estimate for  $T$ .  
You must show all your working.

..... [2]

6 **Without using a calculator**, work out  $2\frac{2}{3} \times 2\frac{3}{4}$ .

You must show all your working and give your answer as a mixed number in its simplest form.

..... [3]

7 Make  $x$  the subject of this formula.

$$2y = 5x - 7$$

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

- 8 (a) 1, 2, 3, 5 and 7 are all common factors of two numbers.

Write down the digit that the two numbers must end in.

..... [1]

- (b) Write 84 as a product of its prime factors.

..... [2]

- 9 (a) Ahmed increases 40 by 300%.

From this list, put a ring around the correct calculation.

$40 \times 1.300$

$40 \times 3$

$40 \times 400$

$40 \times 4$

$40 \times 300$

[1]

- (b) Ahmed finds the magnitude of the vector  $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$ .

From this list, put a ring around the correct calculation.

$\sqrt{2^2 + -3^2}$

$2^2 - 3^2$

$\sqrt{2^2 - 3^2}$

$2^2 + (-3)^2$

$\sqrt{2^2 + (-3)^2}$

[1]

- 10 A town has a population of 45 000.

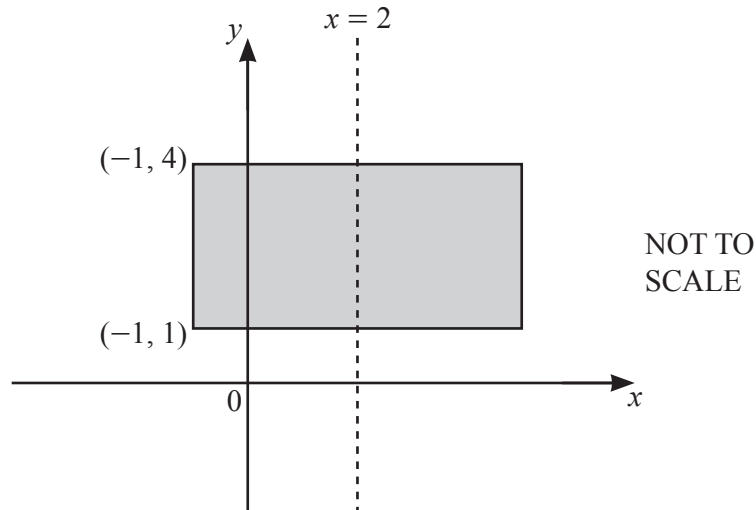
This population increases exponentially at a rate of 1.6% per year.

Find the population of the town at the end of 5 years.

Give your answer correct to the nearest hundred.

..... [3]

11



The diagram shows a rectangle with a line of symmetry at  $x = 2$ .  
Two vertices of the rectangle are at  $(-1, 1)$  and  $(-1, 4)$ .

The shaded region is defined by the inequalities  $a \leq x \leq b$  and  $c \leq y \leq d$ .

Find the values of  $a$ ,  $b$ ,  $c$  and  $d$ .

$$a = \dots\dots\dots$$

$$b = \dots\dots\dots$$

$$c = \dots\dots\dots$$

$$d = \dots\dots\dots [2]$$

12 The interior angle of a regular polygon with  $n$  sides is  $156^\circ$ .

Work out the value of  $n$ .

$$n = \dots\dots\dots [2]$$

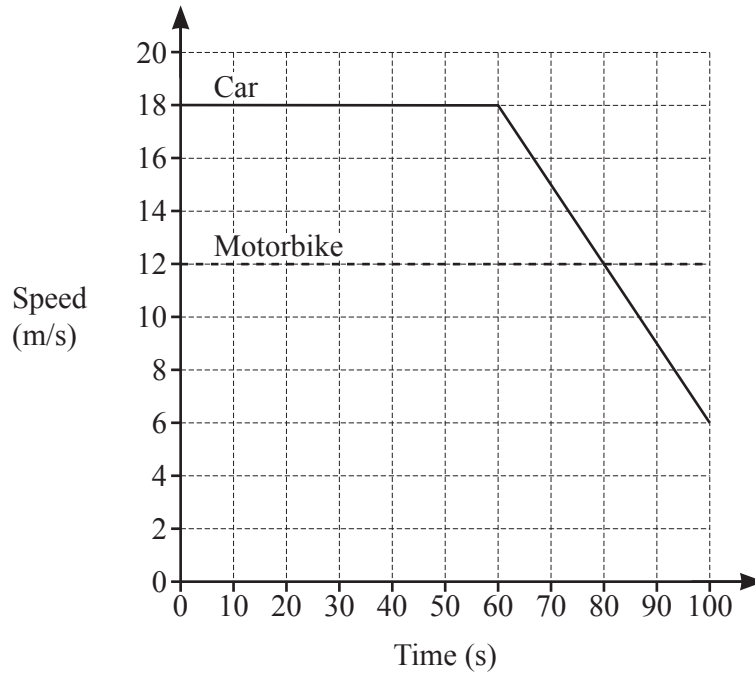
13 Write the recurring decimal  $0.1\dot{7}$  as a fraction in its simplest form.  
You must show all your working.

$$\dots\dots\dots [3]$$

14 Find the gradient of a line that is perpendicular to  $8y + 4x = 5$ .

..... [2]

15



The diagram shows the speed–time graph for 100 seconds of the journey of a car and of a motorbike.

(a) Find the deceleration of the car between 60 and 100 seconds.

.....  $\text{m/s}^2$  [1]

(b) Calculate how much further the car travelled than the motorbike during the 100 seconds.

..... m [3]

16 Factorise  $6x^2 + 7x - 20$ .

..... [2]

17 (a)  $f(x) = 3x^2 + a$  where  $a$  is an integer.  
 $f(-2) = 19$

Find the value of  $a$ .

$a =$  ..... [2]

(b)  $g(x) = 2x + 7$        $h(x) = 3x - 8$

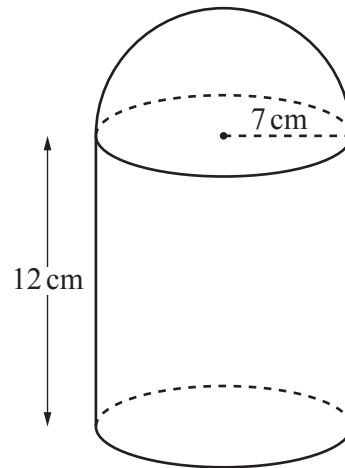
(i) Find  $gh(x)$  in its simplest form.

..... [2]

(ii) Find  $g^{-1}(x)$ .

$g^{-1}(x) =$  ..... [2]





NOT TO  
SCALE

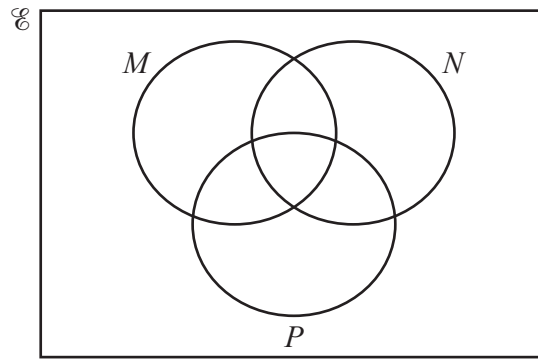
The diagram shows a solid made from a cylinder and a hemisphere, both of radius 7 cm. The cylinder has length 12 cm.

Work out the total surface area of the solid.

[The surface area,  $A$ , of a sphere with radius  $r$  is  $A = 4\pi r^2$ .]

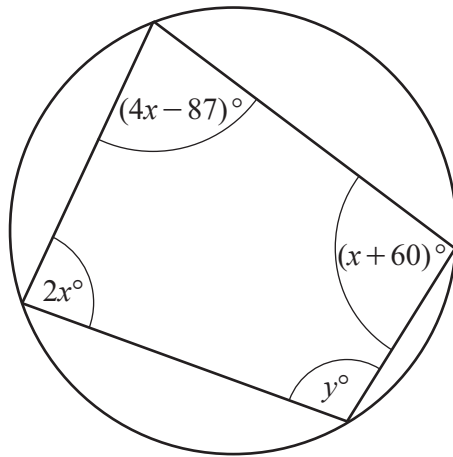
..... cm<sup>2</sup> [4]

19 In this Venn diagram, shade the region  $M'UNUP$ .



[1]

20



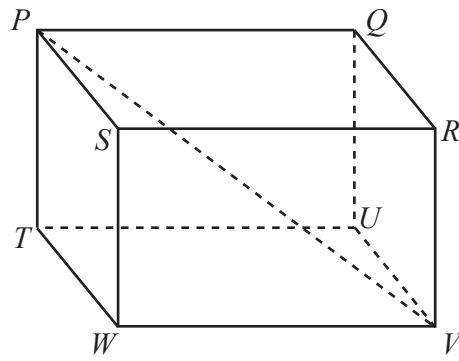
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The diagram shows a cyclic quadrilateral.

Find the value of  $y$ .

$y = \dots\dots\dots$  [4]

21



NOT TO  
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The diagram shows a cuboid  $PQRSTUWV$ .

$PV = 17.2$  cm

The angle between the line  $PV$  and the base  $TUVW$  of the cuboid is  $43^\circ$ .

Calculate  $PT$ .

$PT = \dots\dots\dots$  cm [3]

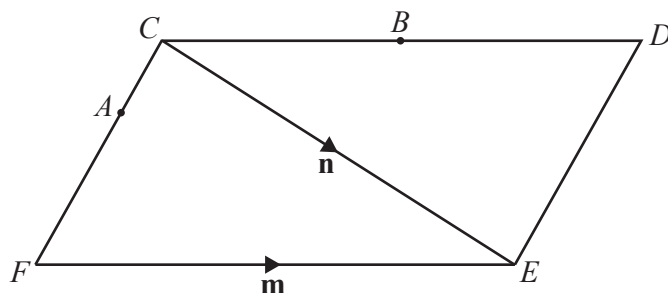
22 Simplify.

$$\frac{x^2 - 5x}{2x^2 - 50}$$

$\dots\dots\dots$  [4]

**Question 23 is printed on the next page.**

23 (a)

NOT TO  
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The diagram shows a parallelogram CDEF.

$\overrightarrow{FE} = \mathbf{m}$  and  $\overrightarrow{CE} = \mathbf{n}$ .

B is the midpoint of CD.

$FA = 2AC$

Find an expression, in terms of  $\mathbf{m}$  and  $\mathbf{n}$ , for  $\overrightarrow{AB}$ .  
Give your answer in its simplest form.

$\overrightarrow{AB} = \dots\dots\dots$  [3]

(b)  $\overrightarrow{GH} = \frac{5}{6}(2\mathbf{p} + \mathbf{q})$        $\overrightarrow{JK} = \frac{5}{18}(2\mathbf{p} + \mathbf{q})$

Write down **two** facts about vectors  $\overrightarrow{GH}$  and  $\overrightarrow{JK}$ .

.....

..... [2]

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