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MATHEMATICS

0580/21

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 π , 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]

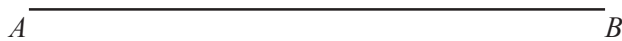
2 A field, ABC , is in the shape of a triangle.
 $AC = 500$ m and $BC = 650$ m.

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

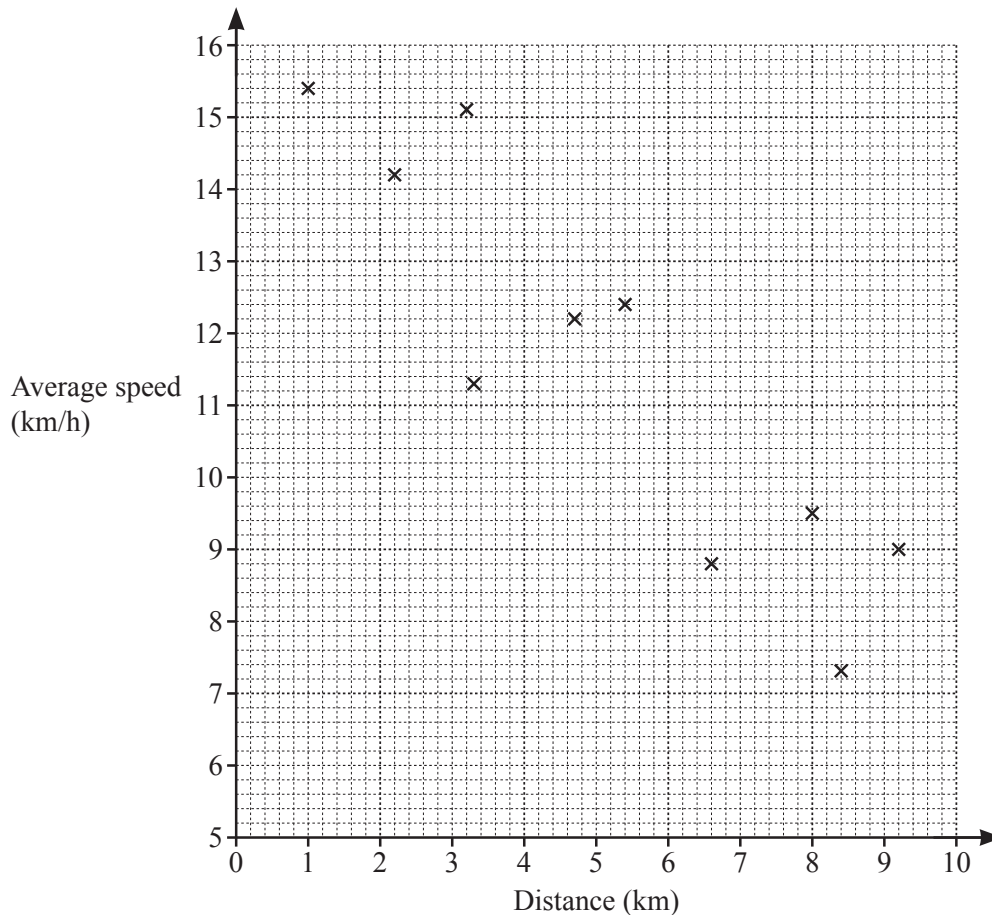
[3]

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.

40×1.300

40×3

40×400

40×4

40×300

[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.

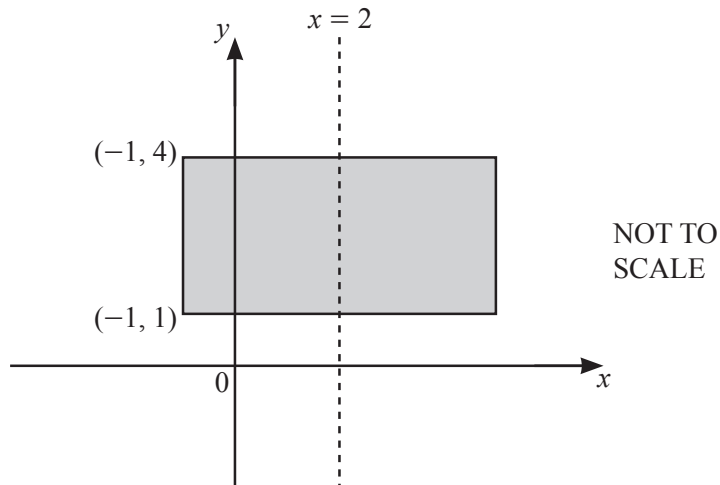
This population increases exponentially at a rate of 1.6% per year.

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° .

Work out the value of n .

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

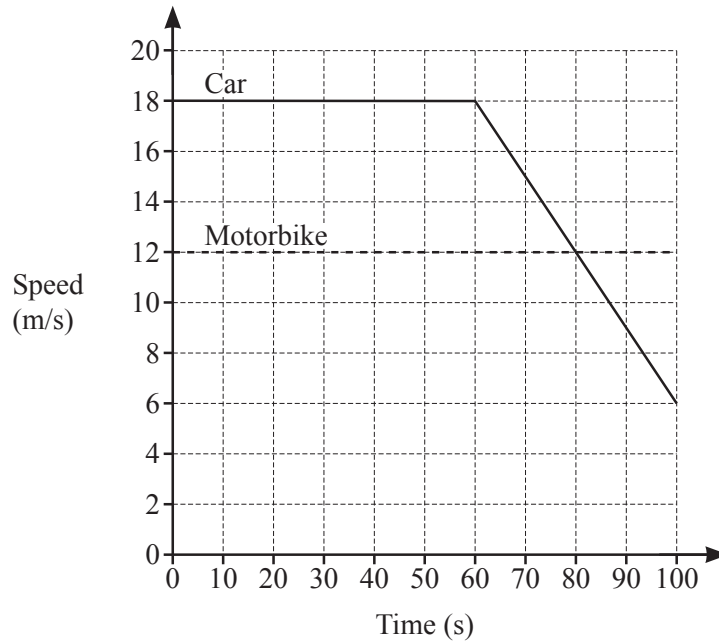
13 Write the recurring decimal $0.\dot{1}7$ as a fraction in its simplest form.
You must show all your working.

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

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.

..... m/s² [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) $g(x) = 2x + 7$ $h(x) = 3x - 8$

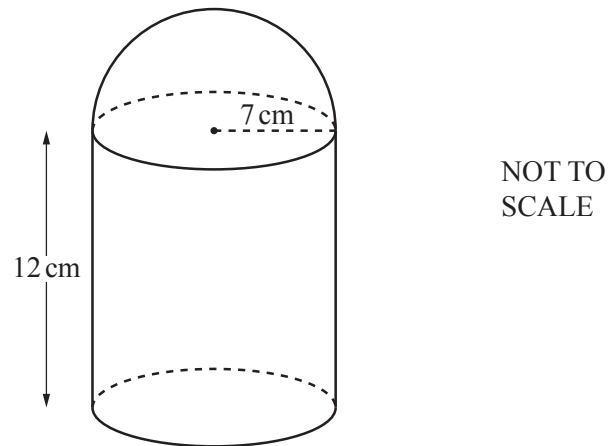
(i) Find $gh(x)$ in its simplest form.

..... [2]

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

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

18



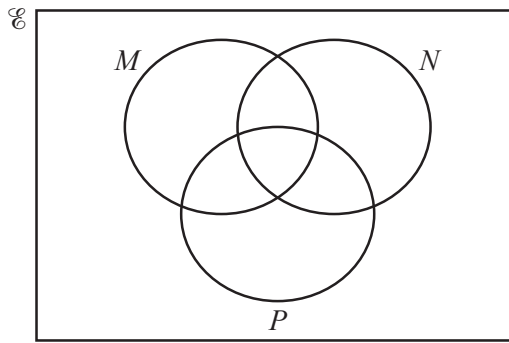
The diagram shows a solid made from a cylinder and a hemisphere, both of radius 7 cm. The cylinder has length 12 cm.

Work out the total surface area of the solid.

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

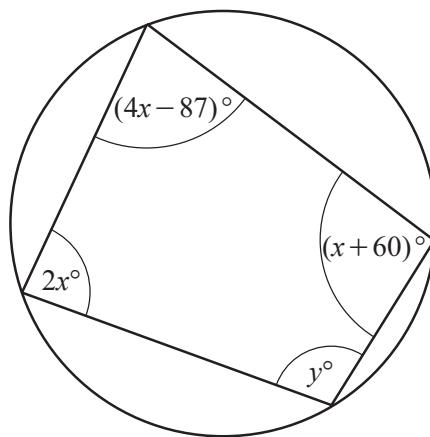
..... cm² [4]

19 In this Venn diagram, shade the region $M' \cup N \cup P$.



[1]

20



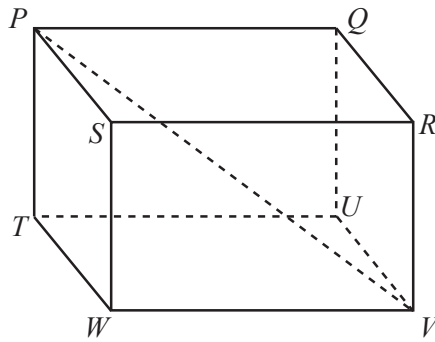
NOT TO SCALE

The diagram shows a cyclic quadrilateral.

Find the value of y .

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

21

NOT TO
SCALE

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° .

Calculate PT .

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

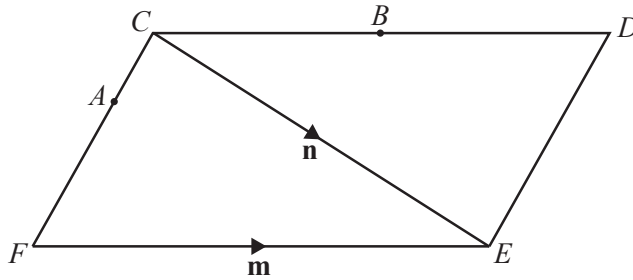
22 Simplify.

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

$\dots\dots\dots$ [4]

Question 23 is printed on the next page.

23 (a)

NOT TO
SCALE

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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