Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER					

8762544580

MATHEMATICS (SYLLABUS D) **4024/11**

Paper 1 **May/June 2020**

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.
- Calculators must **not** be used in this paper.
- You may use tracing paper.
- You must show all necessary working clearly.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **16** pages. Blank pages are indicated.

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ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

1 **(a)** Write $\frac{23}{5}$ as a mixed number.

..... [1]

(b) Work out $\frac{3}{8} \div 6$.

..... [1]

2

H A N G E R

From the word above, write down

(a) all the letters which have line symmetry,

..... [1]

(b) all the letters which have rotational symmetry.

..... [1]

3 The numbers in this sequence increase by the same amount each time.

..... 1.4 2.3 3.2 .....

Fill in the missing numbers. [2]

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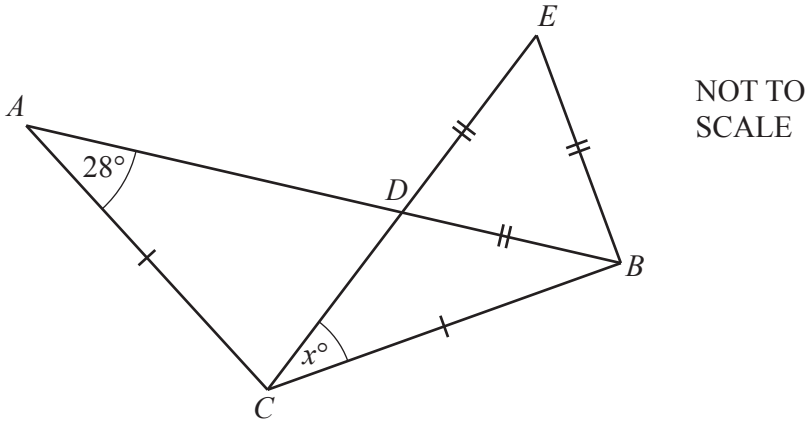
4 **(a)** Write $\frac{11}{25}$ as a percentage.

..... % [1]

(b) Find 12% of 40.

..... [2]

5



The diagram shows an isosceles triangle ABC and an equilateral triangle BDE.
D is the intersection of AB and CE .
Angle $BAC = 28°$.

Calculate x.

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

6 Safoora is buying some apples, bananas and peaches.
She can buy

- packs of 6 apples
- packs of 5 bananas
- packs of 12 peaches.

She needs to buy the **same** number of each fruit.

Calculate the smallest number of packs of apples, bananas and peaches that she needs to buy.

..... packs of apples

..... packs of bananas

.....packs of peaches [2]

7 Factorise.

(a) $6c^3 + 9c$

..... [1]

(b) $5ay - 2bx - 2by + 5ax$

..... [2]

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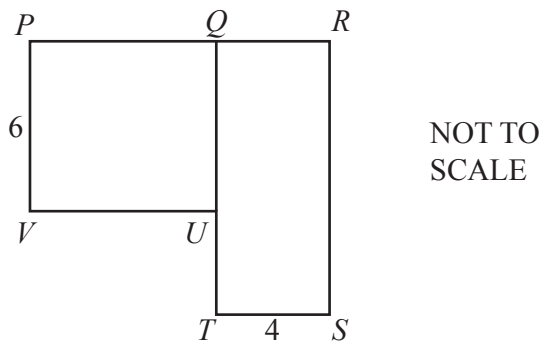
8



PQUV is a square with side 6 cm.
QRST is a rectangle with width 4 cm.
The area of the square is equal to the area of the rectangle.

Work out the perimeter of the shape *PRSTUV*.

..... cm [3]

9 **(a)** Write the ratio 75 g : 3 kg in its simplest form.

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

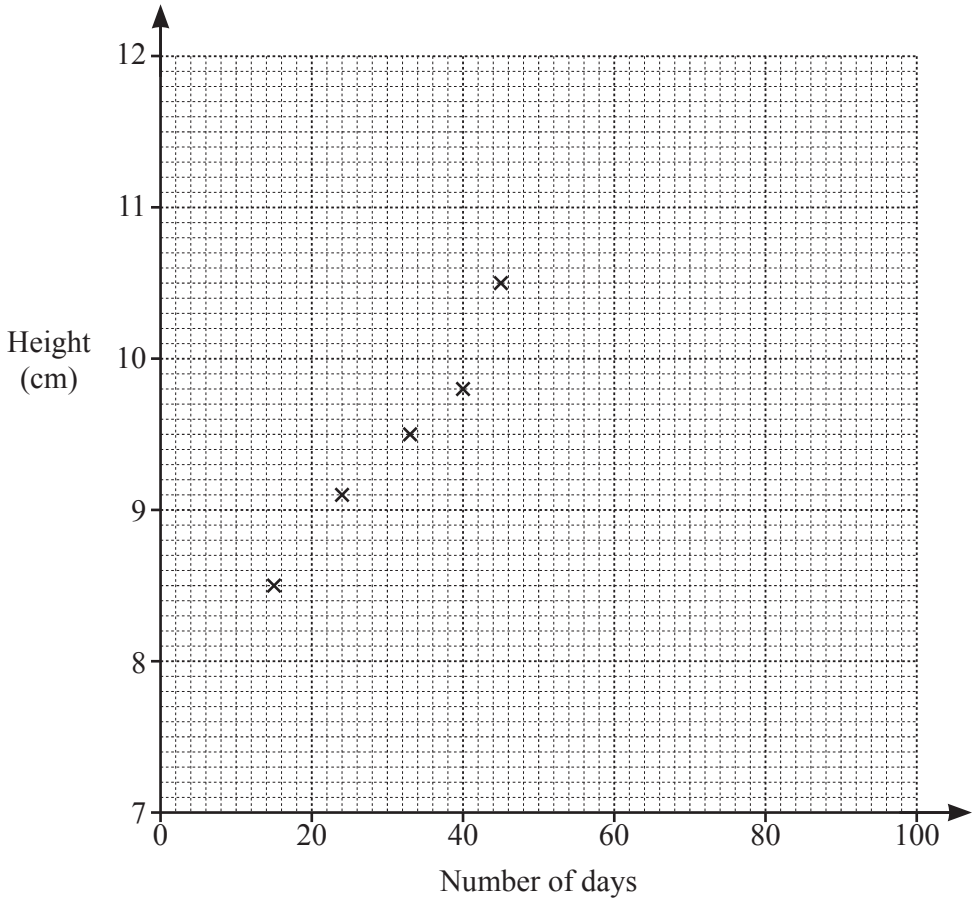
(b) In a tennis club the ratio number of junior members : number of senior members = 7 : 10.
There are 18 more senior members than junior members.

Calculate the **total** number of club members.

..... [2]

10 The table below shows the height of a plant, in centimetres, and the number of days after planting.

Number of days	15	24	33	40	45	51	62	68	73	80
Height (cm)	8.5	9.1	9.5	9.8	10.5	10.8	11.3	11.4	11.8	11.8



(a) On the grid, complete the scatter diagram.
The first five points have been plotted for you. [2]

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

..... [1]

(c) Draw a line of best fit. [1]

(d) Can the scatter diagram be used to predict the height of this plant 100 days after planting?
Give a reason for your answer.

.....

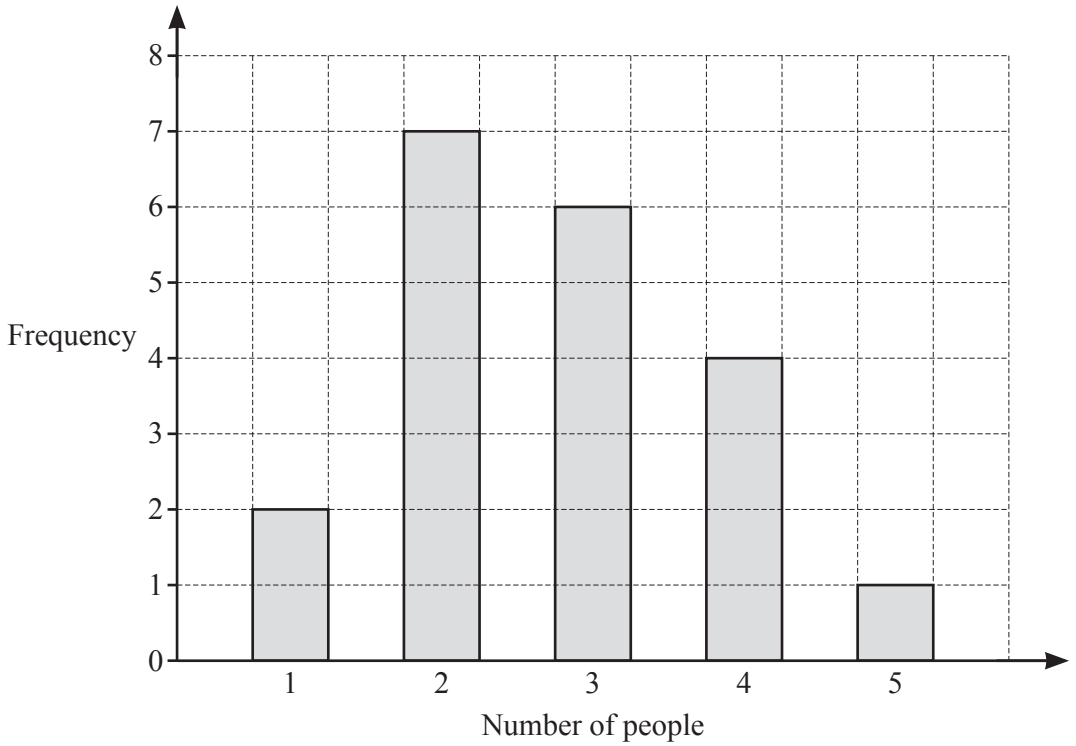
..... [1]

11 By writing each number correct to one significant figure, estimate the value of

$$21.86 - 9.64 \div 2.47.$$

..... [2]

12 Aadil observed the number of people in each of 20 cars entering a car park.
The results are shown in the bar chart below.



(a) Write down the mode.

..... [1]

(b) Calculate the mean number of people in each car.

..... [2]

13 **(a)** During 2018, the population of a village increased from 200 to 250.

Calculate the percentage increase in population.

..... % [1]

(b) The length of a rectangle is **increased** by 10%.
The width of the same rectangle is **decreased** by 10%.

Find the area of the new rectangle as a percentage of the area of the original rectangle.

..... % [2]

14 In a survey, some students were asked about their favourite type of music.
They could choose Classical, Folk, Reggae or Rock.
The following relative frequencies were calculated from the results.

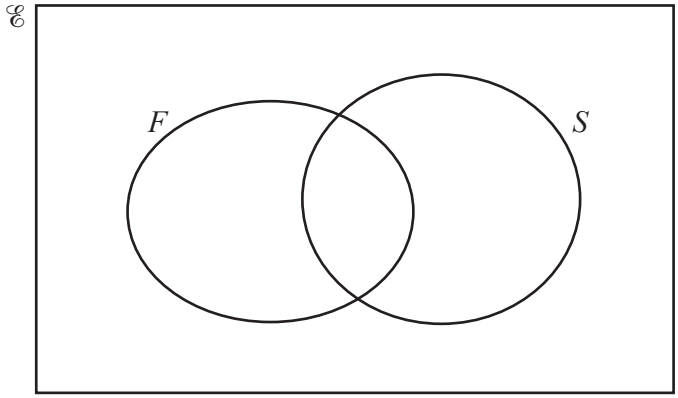
Type of music	Classical	Folk	Reggae	Rock
Relative frequency	0.15	0.22		0.39

300 students took part in this survey.

Calculate the number of students who chose Reggae.

..... [3]

15 **(a)** $\mathscr{E} = \{ x : x \text{ is an integer and } 1 \leqslant x \leqslant 10 \}$
$F = \{ x : x \text{ is a factor of } 24 \}$
$S = \{ x : x \text{ is a square number} \}$

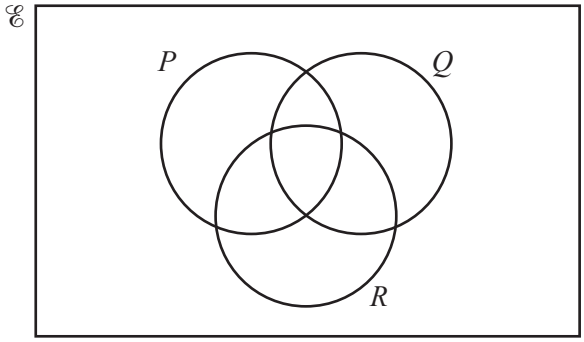


(i) Complete the Venn diagram. [2]

(ii) Find $n(F \cup S)'$.

..... [1]

(b) In the Venn diagram, shade the region represented by $P \cap Q \cap R'$.



[1]

16 **(a)** Solve the equation $5 - 2x = 12$.

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

(b) Find the integers that satisfy $-5 \leqslant 3x \leqslant 6$.

..... [2]

17 $\mathrm{f}(x) = 5 - 4x$

(a) Find $\mathrm{f}(-3)$.

..... [1]

(b) Find $\mathrm{f}^{-1}(x)$.

$\mathrm{f}^{-1}(x) =$ ..... [2]

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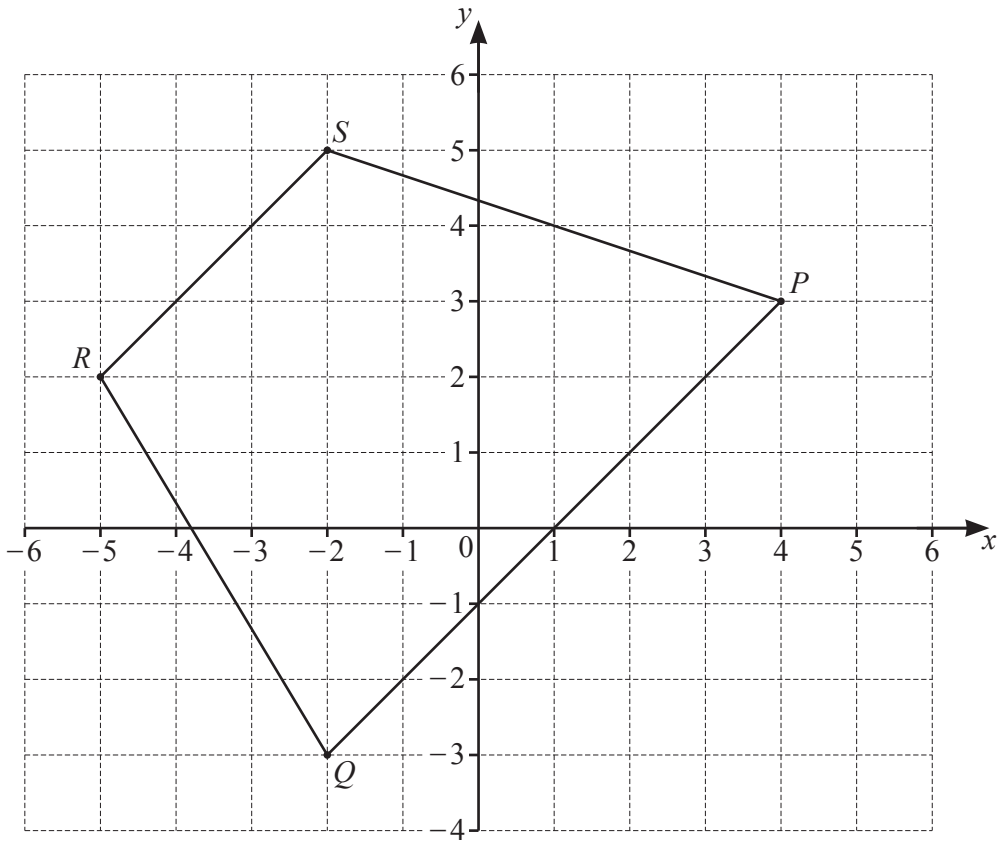
18 The quadrilateral *PQRS* is drawn on a 1 cm square grid.



(a) Write down the name of this special quadrilateral.

..... [1]

(b) Find the coordinates of the midpoint of *QR*.

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

(c) The length *PS* is equal to $\sqrt{m}$ cm.

Find the value of *m*.

m = ... [2]

19 $\mathbf{P} = \begin{pmatrix} 4 & -2 \\ -1 & 3 \end{pmatrix}$ $\mathbf{Q} = \begin{pmatrix} 0 & -1 \\ 5 & 4 \end{pmatrix}$ $\mathbf{R} = \begin{pmatrix} 4 & 1 \\ t & 2 \end{pmatrix}$

(a) Find $\mathbf{P} - 3\mathbf{Q}$.

$\begin{pmatrix} \quad & \quad \\ \quad & \quad \end{pmatrix}$ [2]

(b) **(i)** The determinant of **R** is 11.

Find t.

$t =$ ..... [1]

(ii) Find $\mathbf{R}^{-1}$.

$\begin{pmatrix} \quad & \quad \\ \quad & \quad \end{pmatrix}$ [1]

20

x	4	9	d
y	3	c	0.6

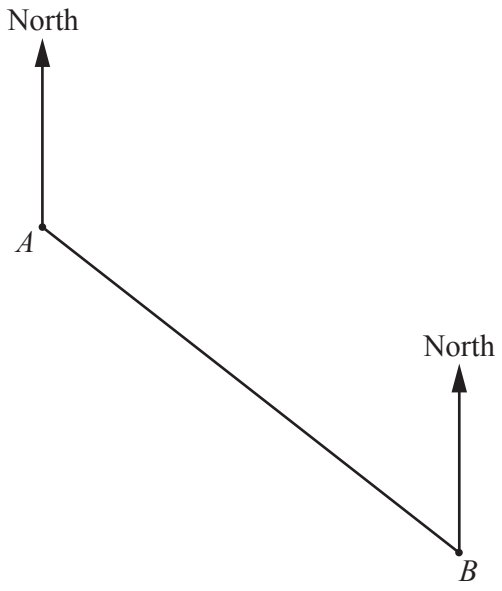
y is inversely proportional to the square root of x.

Find the value of c and the value of d.

$c =$ .....

$d =$ ..... [3]

21 The diagram shows the positions of two ships, A and B, drawn to a scale of 2 cm to 1 km.



Scale: 2 cm to 1 km

(a) Measure the bearing of B from A.

..... [1]

(b) Find the distance between the two ships, A and B, in km.

..... km [1]

(c) A buoy, X, is

- equidistant from A and B

and

- on a bearing of 260° from B.

By making an accurate drawing, mark the position of X on the diagram. [2]

22 One solution of the equation $\sin m° = 0.63$ is $m = 141$, correct to the nearest whole number.

Find the solution when $0 < m < 90$.
Give your answer correct to the nearest whole number.

$m =$ ..... [1]

23 **(a)** The formula for the nth term of a sequence is $2n^3$.

Find the 3rd term of this sequence.

..... [1]

(b) Here are the first four terms of another sequence.

$$\frac{4}{3} \qquad \frac{9}{5} \qquad \frac{16}{7} \qquad \frac{25}{9}$$

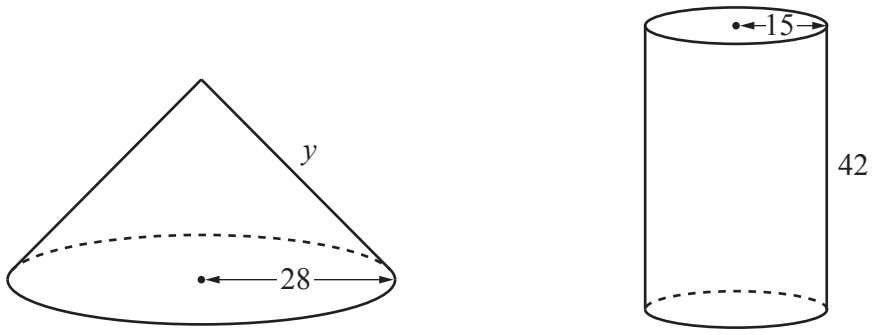
(i) Write down the next term of this sequence.

..... [1]

(ii) Find a formula for the nth term of this sequence.

..... [3]

24 **[Curved surface area of a cone = πrl]**



The diagram shows a cone and a cylinder.
The cone has radius 28 cm and slant height y cm.
The cylinder has radius 15 cm and height 42 cm.
The **curved** surface area of the cone and the cylinder are equal.

Find the value of y.

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

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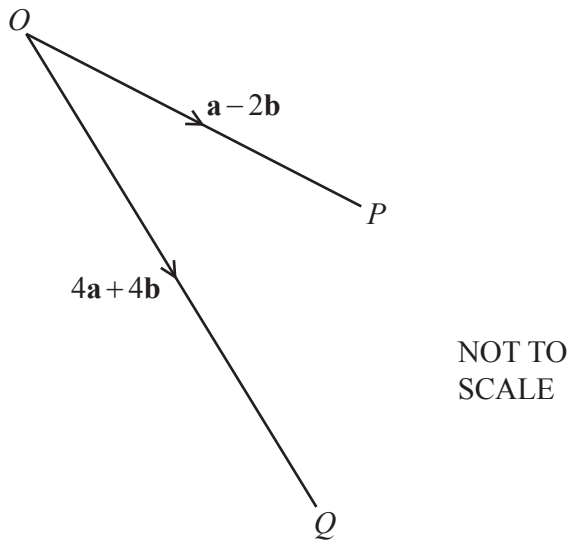
25 O, P and Q are points as shown in the diagram.



$\overrightarrow{OP} = \mathbf{a} - 2\mathbf{b}$ and $\overrightarrow{OQ} = 4\mathbf{a} + 4\mathbf{b}$.

Express $\overrightarrow{PQ}$, as simply as possible, in terms of **a** and **b**.

$\overrightarrow{PQ} =$ ..... [2]

Question 26 is printed on the next page.

26 Write as a single fraction in its simplest form.

$$\frac{2x+3}{x+4} - \frac{5}{3x-2}$$

..... [4]

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