Cambridge O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER					

6519004296

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

Paper 1 **October/November 2019**

2 hours

Candidates answer on the Question Paper.

Additional Materials: 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 in the space below that question.
Omission of essential working will result in loss of marks.

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

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 80.

This document consists of **20** printed pages.

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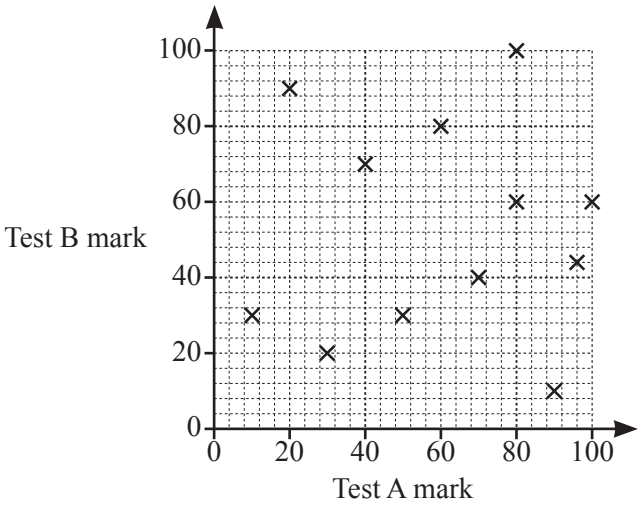
1 **(a)** Evaluate $3 \times 1\frac{4}{7}$.

..... [1]

(b) Evaluate 1.3×0.3.

..... [1]

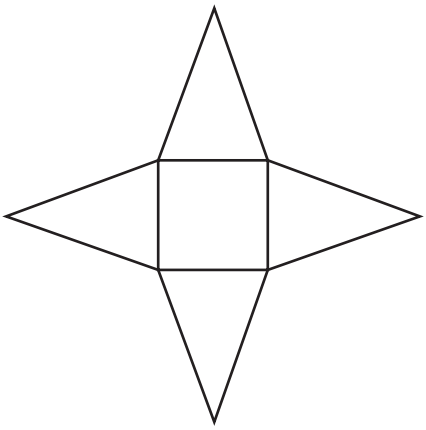
2 The scatter diagram shows the marks that 12 students each obtained in test A and test B.



Give a reason why it is not appropriate to draw a line of best fit for this diagram.

..... [1]

3 The diagram shows the net of a solid.



(a) What is the special mathematical name of the solid?

..... [1]

(b) For this solid, write down the number of vertices.

..... [1]

4 **(a)** Factorise $1 - 36p^2$.

..... [1]

(b) Factorise $4x + 3y + xy + 12$.

..... [2]

5 A television programme is 2 hours 40 minutes long.

(a) It starts at 22 45.

At what time does it finish?

..... [1]

(b) The programme contains 8 advertisement breaks, each of which lasts for 3 minutes.

Find the fraction of the 2 hours 40 minutes that is taken by advertisements.
Give your answer in its simplest form.

..... [2]

6 Write these values in order, starting with the smallest.

$\frac{1}{30}$ 0.03 $\frac{1}{10}$ 5% $\frac{2}{25}$

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

7 y is directly proportional to x.
When $x = 4$, $y = t$.

Find x, in terms of t, when $y = 2$.

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

8 By writing each number correct to 1 significant figure, estimate the value of

$$\frac{59.843^2}{20.13 \times 0.9024}.$$

..... [2]

9 Solve the simultaneous equations.

$$x + 4y = 1$$
$$3x + 2y = 8$$

$x =$ .....

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

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10 **(a)** Amir buys a camera for \$250 and sells it for \$200.

Calculate his percentage loss.

..... % [2]

(b) Meera invests some money at a rate of 2% per year **simple interest**.

How many years does it take for her investment to double in value?

..... [1]

11 **(a)** Simplify $7-3(5k-2)$.

..... [1]

(b) Solve the equation $5x^2-3x=0$.

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

12 **(a)** Evaluate $3^{-2} \times 3^{4}$.

..... [1]

(b) Evaluate $3 - 3^{0}$.

..... [1]

(c) Simplify $y^{\frac{1}{2}} \times 4y^{\frac{1}{4}}$.

..... [1]

13 **(a)** Write the number 0.000 23 in standard form.

..... [1]

(b) Evaluate $8 \times 10^{9} - 9 \times 10^{8}$.
Give your answer in standard form.

..... [2]

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14 $p = 2^3 \times 3 \times 5^2 \qquad q = 2 \times 3^2 \times 5$

(a) Find the highest common factor (HCF) of p and q.

..... [1]

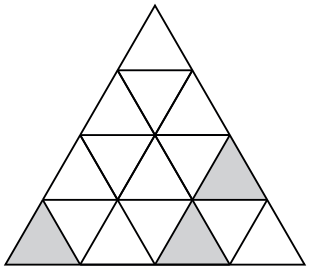
(b) Find the lowest common multiple (LCM) of p, q and 21.
Give your answer as the product of prime factors.

..... [1]

(c) Find the smallest integer N, such that pN is a square number.

$N =$ ..... [1]

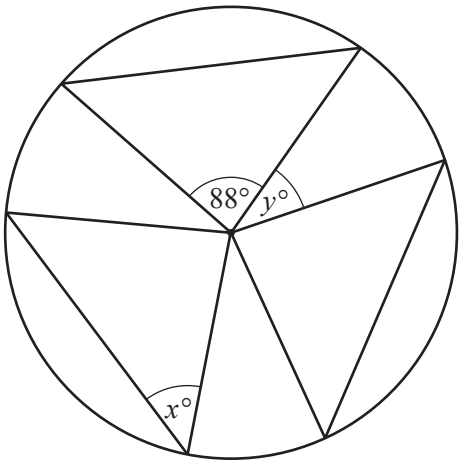
15 **(a)**



In the diagram, three small triangles are shaded.

Shade **one** more small triangle to give a diagram that has exactly one line of symmetry. [1]

(b)



NOT TO SCALE

In the diagram, the three triangles and the circle form a figure that has rotational symmetry of order 3.

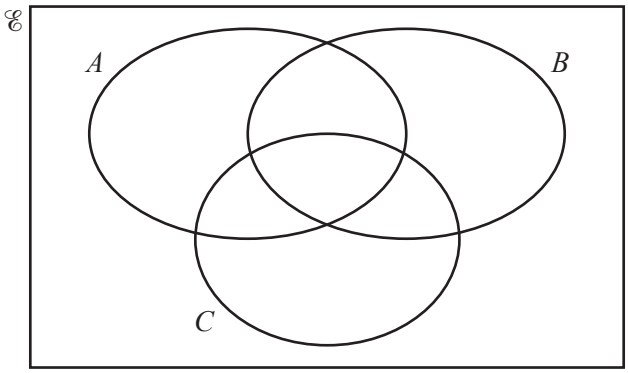
(i) Find x.

x = ... [1]

(ii) Find y.

y = ... [2]

16 **(a)** In the Venn diagram, shade the region which represents $C \cap (A \cup B)'$.



[1]

(b) $\mathscr{E} = \{ a, b, c, d, e, f, g, h, i, j \}$
$T = \{ b, d, f, h, j \}$
$V = \{ a, b, d, g, h, i \}$

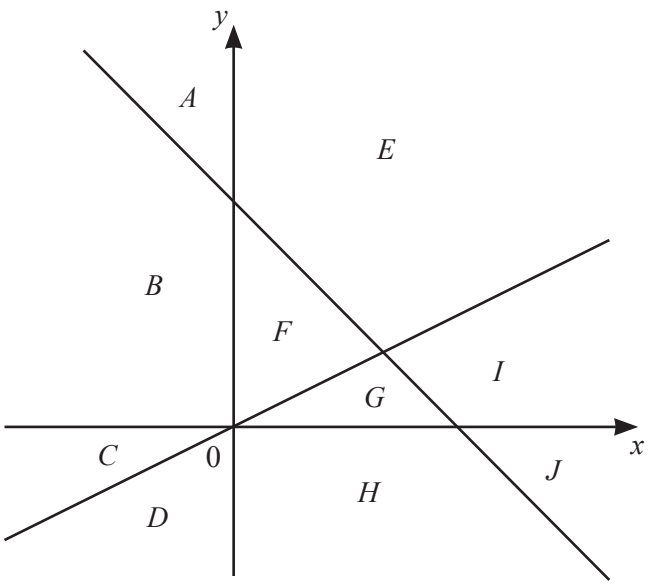
(i) List the members of $T \cap V'$.

..... [1]

(ii) Find $n(T \cup V)$.

..... [1]

17



The diagram shows the lines $x+y=8$, $y=\frac{1}{2}x$, $x=0$ and $y=0$.

The regions **between** the lines are labelled with letters.

(a) Write down the label of the region which is defined by these three inequalities.

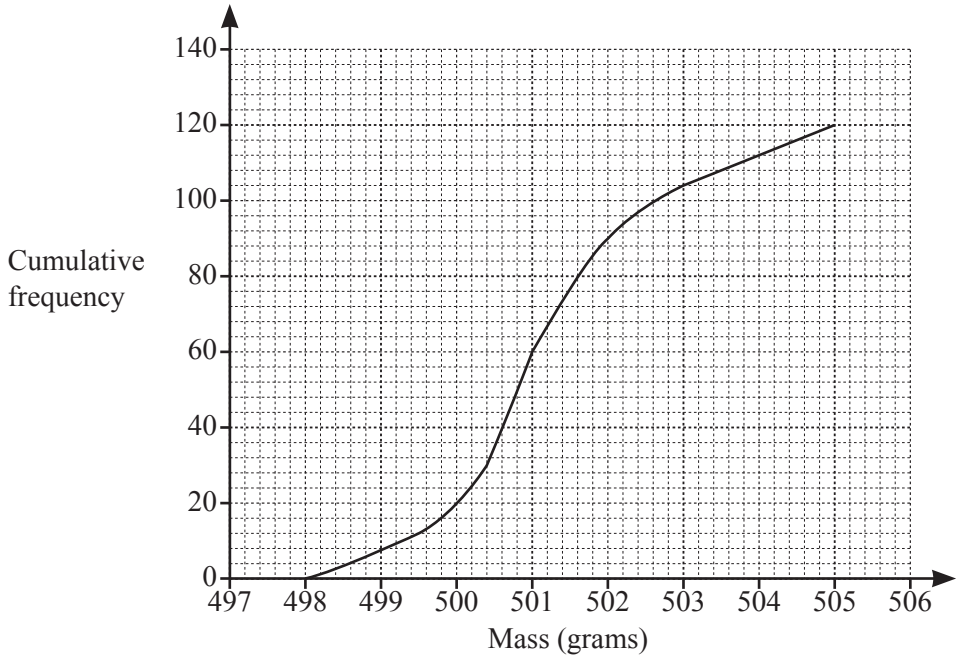
$$x+y<8$$
$$y<\frac{1}{2}x$$
$$y>0$$

..... [1]

(b) Write down **all** the inequalities which define region E.

..... [2]

18 The masses of 120 cereal packets were measured.
The results are summarised in the cumulative frequency diagram.



(a) Use the diagram to estimate

(i) the median,

..... g [1]

(ii) the interquartile range.

..... g [2]

(b) The measuring scales used were faulty.
The measured masses were all 0.8 g more than the actual masses.

Write down the median and the interquartile range of the actual masses.

Median = ... g Interquartile range = ... g [2]

19 $f(x) = \dfrac{5-x}{x}$

(a) Evaluate $f\left(\dfrac{1}{2}\right)$.

..... [1]

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

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

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20 The table shows the results when a dice is thrown 300 times.

Number on dice	1	2	3	4	5	6
Frequency	55	42	45	p	50	q

The relative frequency of throwing a 4 is 0.2 .

(a) Find the value of p and the value of q.

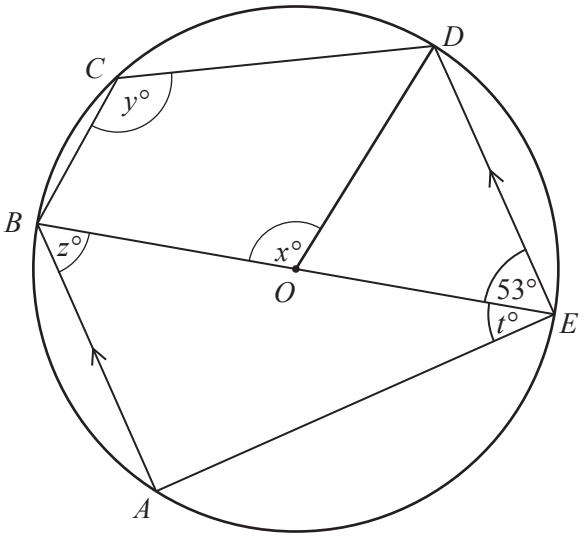
p = ...

q = ... [2]

(b) How many times would you expect to throw a 2 when this dice is thrown 1000 times?

..... [1]

21



NOT TO SCALE

In the diagram, the points A, B, C, D and E lie on the circle, centre O.
The points B, O and E lie on a straight line.

AB is parallel to ED and $D\hat{E}O = 53°$.

(a) Find x.

$x =$ ..... [1]

(b) Find y.

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

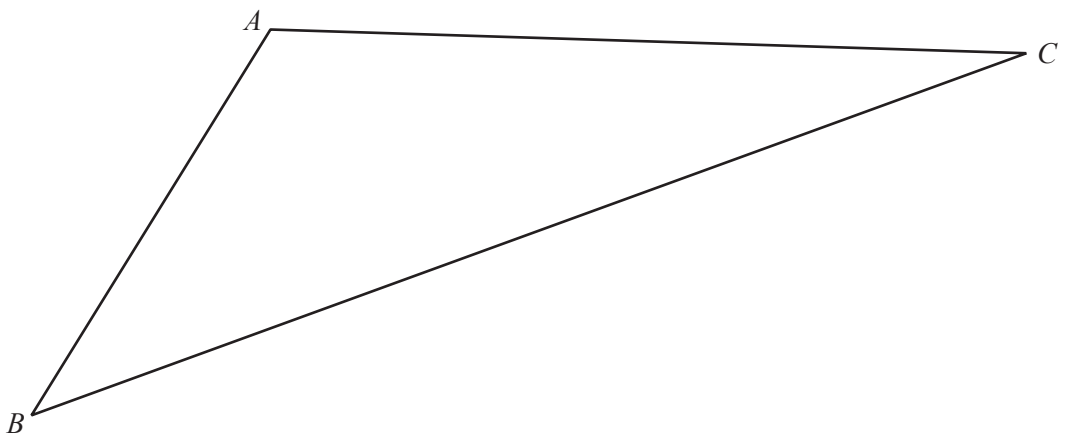
(c) Find z.

$z =$ ..... [1]

(d) Find t.

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

22



The diagram shows triangle *ABC*.

(a) **Using a pair of compasses and a straight edge**, construct

(i) the perpendicular bisector of *AC*. [2]

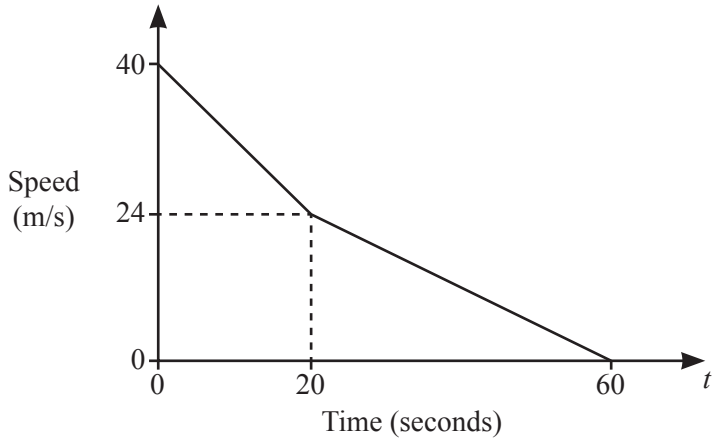
(ii) the locus of the points that are equidistant from *AB* and *AC*. [1]

(b) The perpendicular bisector of *AC* meets *BC* at *P*.
Q is the point on *BC* that is equidistant from *AB* and *AC*.

Mark, and label, the points *P* and *Q* on the diagram and measure *PQ*.

PQ = ... cm [1]

23 The diagram is the speed–time graph representing part of a train's journey.



NOT TO SCALE

The train slows down uniformly from a speed of 40 m/s to a speed of 24 m/s in a time of 20 seconds. It then slows down uniformly for a further 40 seconds, until it stops.

(a) Find the deceleration between $t = 20$ and $t = 60$.

..... m/s^2 [1]

(b) Find the speed when $t = 50$.

..... m/s [1]

(c) Find the distance travelled from $t = 0$ to $t = 20$.

..... m [2]

24 $\mathbf{A} = \begin{pmatrix} 3 & 1 \\ -2 & 0 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} -2 & 1 \\ 3 & 0 \end{pmatrix}$

(a) Evaluate $2\mathbf{A} - \mathbf{B}$.

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

(b) Find $\mathbf{A}^{-1}$.

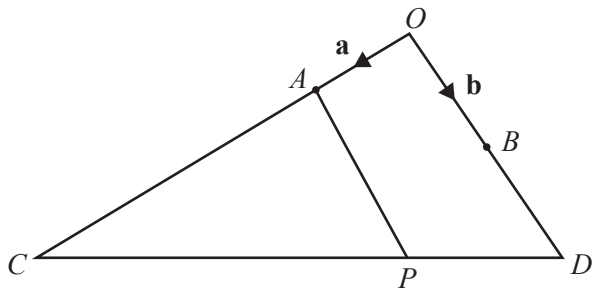
$\begin{pmatrix} \quad & \quad \\ \quad & \quad \end{pmatrix}$ [2]

(c) Find the matrix $\mathbf{X}$ such that $\mathbf{AX} = \begin{pmatrix} 3 \\ -4 \end{pmatrix}$.

[2]

Question 25 is printed on the next page.

25



NOT TO SCALE

In the diagram, B is the midpoint of OD and $OA : AC = 1 : 3$.
$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.

(a) Express, as simply as possible, in terms of **a** and/or **b**

(i) $\overrightarrow{OC}$,

$\overrightarrow{OC} =$ ..... [1]

(ii) $\overrightarrow{CD}$.

$\overrightarrow{CD} =$ ..... [1]

(b) P is the point on CD where $CP = \frac{3}{4}CD$.

(i) Express $\overrightarrow{AP}$, as simply as possible, in terms of **a** and/or **b**.

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

(ii) Find $AP : BD$.

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

(iii) What special type of quadrilateral is $ABDP$?

..... [1]

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