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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

2934833602

MATHEMATICS (SYLLABUS D) **4024/01**

Paper 1 **May/June 2008**

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 a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, 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.

NEITHER ELECTRONIC CALCULATORS NOR MATHEMATICAL TABLES MAY BE USED IN THIS PAPER.

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 80.

For Examiner's Use

This document consists of **14** printed pages and **2** blank pages.

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NEITHER ELECTRONIC CALCULATORS NOR MATHEMATICAL TABLES MAY BE USED IN THIS PAPER.

1 Evaluate

(a) $\frac{1}{2} - \frac{3}{7}$,

(b) $2\frac{2}{3} \times 1\frac{3}{4}$.

Answer (*a*) .....[1]

(*b*) .....[1]

---

2 Evaluate

(a) 25 – 18.3,

(b) 1.7 × 0.03.

Answer (*a*) .....[1]

(*b*) .....[1]

---

3 It is given that $f(x) = 5x + 2$.

Find

(a) $f(-2)$,

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

Answer (*a*) .....[1]

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

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

$$\frac{8.62 \times 2.04^2}{0.285}.$$

Answer .....[2]

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5 It is given that $68.2 \times 0.235 = 16.027$.

Hence evaluate

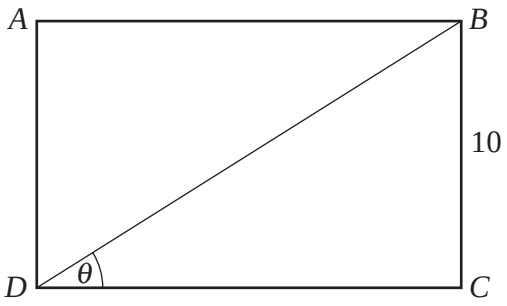
(a) 0.0682×2350,

(b) $160.27 \div 0.0235$.

Answer (*a*) .....[1]

(*b*) .....[1]

6



$\sin\theta$	$\frac{5}{13}$
$\cos\theta$	$\frac{12}{13}$
$\tan\theta$	$\frac{5}{12}$

ABCD is a rectangle with *BC* = 10 cm.

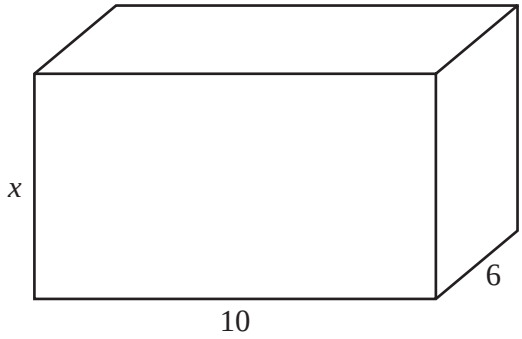
Using as much information from the table as is necessary, calculate *BD*.

Answer *BD* = ... cm [2]

---

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7 The diagram shows a solid cuboid with base 10 cm by 6 cm.
The height of the cuboid is x centimetres.



(a) Find an expression, in terms of x, for the total surface area of the cuboid.

(b) The total surface area of the cuboid is 376 cm^2.

Form an equation in x and solve it to find the height of the cuboid.

Answer (*a*) ..... cm^2 [1]

(*b*) ..... cm [2]

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8 Evaluate

(a) 9^0,

(b) 9^{-2},

(c) $9^{\frac{3}{2}}$.

Answer (*a*) .....[1]

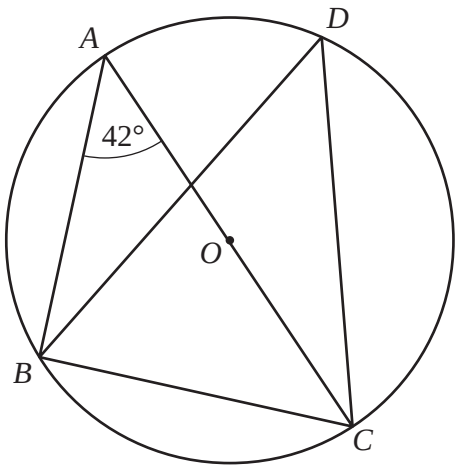
(*b*) .....[1]

(*c*) .....[1]

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9



The diagram shows a circle, centre O, passing through A, B, C and D.
AOC is a straight line and $B\hat{A}C = 42°$.

Find

(a) $B\hat{D}C$,

(b) $A\hat{B}C$,

(c) $A\hat{C}B$.

Answer (*a*) $B\hat{D}C$ = ...[1]

(*b*) $A\hat{B}C$ = ...[1]

(*c*) $A\hat{C}B$ = ...[1]

---

10 It is given that y is directly proportional to the square of x and that $y = 1$ when $x = \frac{1}{2}$.

Find

(a) the formula for y in terms of x,

(b) the values of x when $y = 9$.

Answer (*a*) y = ...[2]

(*b*) x = ...[1]

---

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11 The following list gives the names of six shapes.

Square	Rectangle	Equilateral triangle
Kite	Trapezium	Parallelogram

From this list, write down the name of the shape which always has

(a) rotational symmetry of order 3,

(b) rotational symmetry of order 2 and exactly 2 lines of symmetry,

(c) one line of symmetry only.

Answer (*a*) .....[1]

(*b*) .....[1]

(*c*) .....[1]

---

12 Solve the simultaneous equations

$$2x - 3y = 13,$$
$$3x + y = 3.$$

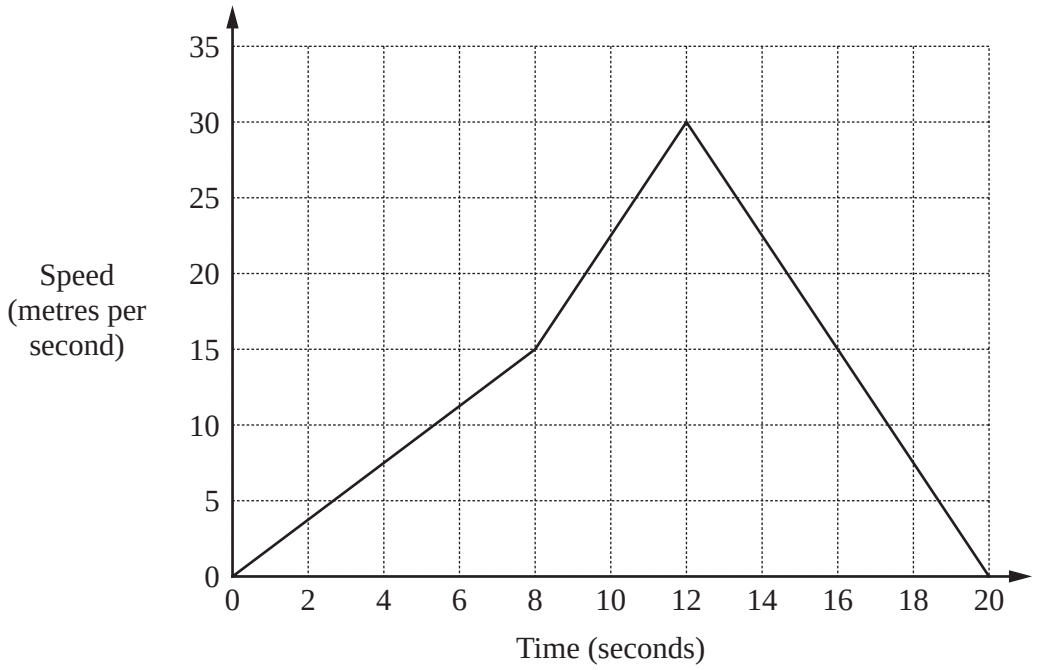
Answer $x =$ .....

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

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13 The diagram is the speed-time graph of the first 20 seconds of a motorcyclist's journey.



(a) Calculate the motorcyclist's retardation during the final 8 seconds.

(b) Calculate the distance travelled in the 20 seconds.

Answer (*a*) ..... m/s^2 [1]

(*b*) ..... m [2]

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14 **(a)** A jar contained 370 g of jam.
Usman ate 30% of the jam.

What mass of jam remained in the jar?

(b) In 2006 the population of a town was 30 000.
This was 5000 more than the population in 1999.

Calculate the percentage increase in population.

Answer (*a*) ..... g [1]

(*b*) ..... % [2]

---

15 Express as a single fraction in its simplest form

$$\frac{3}{2t-1} - \frac{2}{t+2}.$$

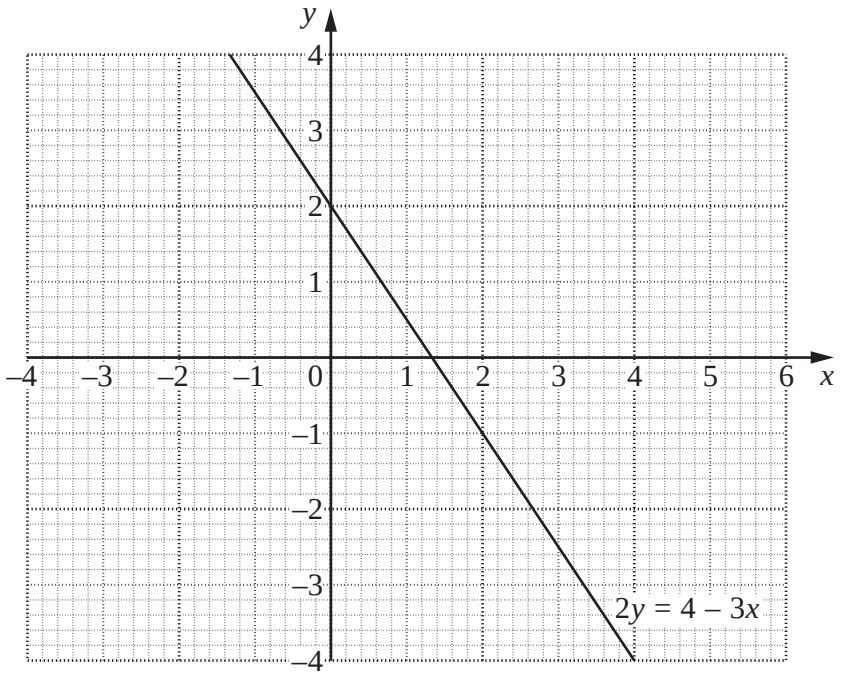
Answer .....[3]

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16 The diagram below shows the line $2y = 4 - 3x$.

Answer (*a*), (*b*)



On this diagram,

(a) draw the line $y = \frac{1}{2}x - 2$, [1]

(b) shade and label the region, R, defined by the following inequalities.

$x \geqslant 0$ $2y \leqslant 4 - 3x$ $y \geqslant \frac{1}{2}x - 2$

[2]

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17 A straight line passes through the points P (1, 2) and Q (5, –14).

Find

(a) the coordinates of the midpoint of PQ,

(b) the gradient of PQ,

(c) the equation of PQ.

Answer (*a*) (..... , ...) [1]

(*b*) .....[1]

(*c*) .....[2]

---

18 The Earth is 1.5×10^8 kilometres from the Sun.

(a) Mercury is 5.81×10^7 kilometres from the Sun.

How much nearer is the Sun to Mercury than to the Earth?
Give your answer in standard form.

(b) A terametre is 10^{12} metres.

Find the distance of the Earth from the Sun in terametres.

Answer (*a*) ..... km [2]

(*b*) ..... terametres [2]

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19 **(a)** Factorise completely

(i) $15x^2 + 10x$,

(ii) $t^2 - 2t - 15$.

(b) Solve $4(x - 0.3) = 3(x - 0.2)$.

Answer (*a*)(i) .....[1]

(ii) .....[1]

(*b*) $x =$ .....[2]

---

20 It is given that

$$\mathbf{A} = \begin{pmatrix} 5 & -1 \\ 2 & 3 \end{pmatrix} \qquad \mathbf{B} = \begin{pmatrix} 2 & -2 \\ 0 & 1 \end{pmatrix} \qquad \mathbf{C} = \begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}.$$

Find

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

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

Answer (*a*) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(*b*) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

---

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21 **(a)** Solve $8 - 3t > 14 + t$.

(b) Evaluate $x^2 - 6xy + 2y^2$ when $x = 2$ and $y = -3$.

Answer (*a*) t .....[2]

(*b*) .....[2]

---

22 **(a)** The nth term of a sequence is $7 - 2n$.

Write down the 23rd term in this sequence.

Answer (*a*) .....[1]

(b) **(i)** The first five terms of another sequence are

4 7 10 13 16.

Write down an expression, in terms of n, for the nth term of this sequence.

(ii) The first five terms of another sequence are

$$\frac{4}{1} \quad \frac{7}{4} \quad \frac{10}{9} \quad \frac{13}{16} \quad \frac{16}{25}.$$

(a) Write down the next term in this sequence.

(b) Write down an expression, in terms of n, for the nth term of this sequence.

Answer (*b*) (i) .....[1]

(*b*)(ii)(*a*) .....[1]

(*b*)(ii)(*b*) .....[1]

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23 A map is drawn to a scale of 1 cm to 3 km.
The diagram below shows the positions of two villages *A* and *B* on the map.

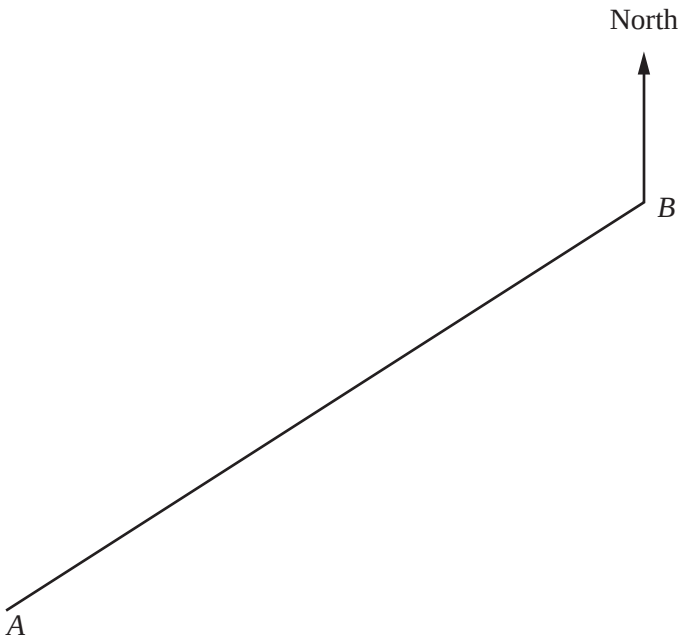
(a) **(i)** Write the scale in the form 1 : *n* .

(ii) Find the actual distance, in kilometres, between the villages *A* and *B*.

Answer (*a*)(i) 1 : .....[1]

(ii) ..... km [1]

Answer (*b*), (*c*), (*d*)



[4]

(b) A third village, *C*, lies north of the line *AB*.
It is 21 km from *A* and 18 km from *B*.

Using ruler and compasses only, construct triangle *ABC*.

(c) Construct the perpendicular bisector of *AB*.

(d) A petrol station is to be built so that it is equidistant from *A* and *B* and 9 km from *C*.

Mark with letters *F* and *G* the two possible positions of the petrol station.

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24 **(a)** Fifty students were asked how many books they each took to school on Monday. The results are summarised in the table below.

Number of books	0	1	2	3	4	5	6	7
Frequency	10	11	8	3	6	7	4	1

(i) Write down the median.

(ii) Calculate the mean number of books.

(iii) What is the probability that two students, chosen at random, both took 5 books to school?
Give your answer as a fraction in its simplest form.

Answer (*a*)(i) .....[1]

(ii) .....[3]

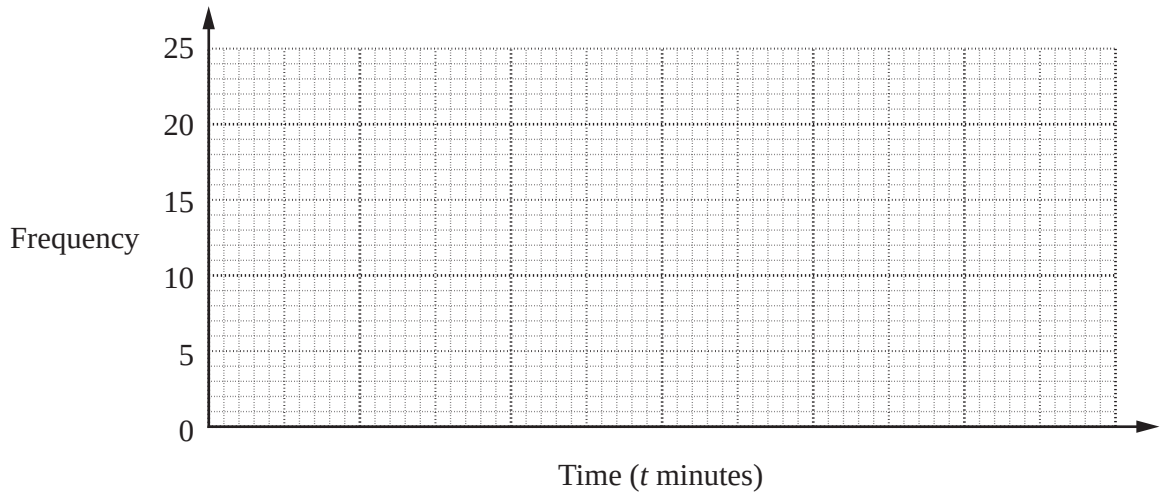
(iii) .....[2]

(b) The fifty students were also asked how long they each took to travel to school. The results are summarised in the table below.

Time of travel (t minutes)	$4 \leqslant t < 6$	$6 \leqslant t < 8$	$8 \leqslant t < 10$	$10 \leqslant t < 12$
Frequency	21	11	13	5

Draw a frequency polygon on the grid below to illustrate this data.

Answer (*b*)



[2]

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