UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

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

Paper 1 **May/June 2009**

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.

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.

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

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

For Examiner's Use

1 **(a)** Evaluate $17 - 5 \times 3 + 1$.

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

(b) Express 0.82 as a percentage.

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

---

2 Express as a single fraction in its lowest terms,

(a) $\frac{8}{9} \times \frac{3}{4}$,

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

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

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

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3 **(a)** Write down the two cube numbers between 10 and 100.

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

(b) Write down the two prime numbers between 30 and 40.

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

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4 **(a)** Factorise $x^2 - y^2$.

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

(b) Evaluate $102^2 - 98^2$.

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

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5 **(a)** Evaluate 0.5×0.007.

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

(b) Evaluate $\frac{1}{1.25}$ as a decimal.

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

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6 **(a)** Write down all the factors of 18.

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

(b) Write 392 as the product of its prime factors.

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

For Examiner's Use

7 **(a)** Simplify $4a^3 \times a^2$.

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

(b) Simplify fully $3x(x + 5) – 2(x – 3)$.

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

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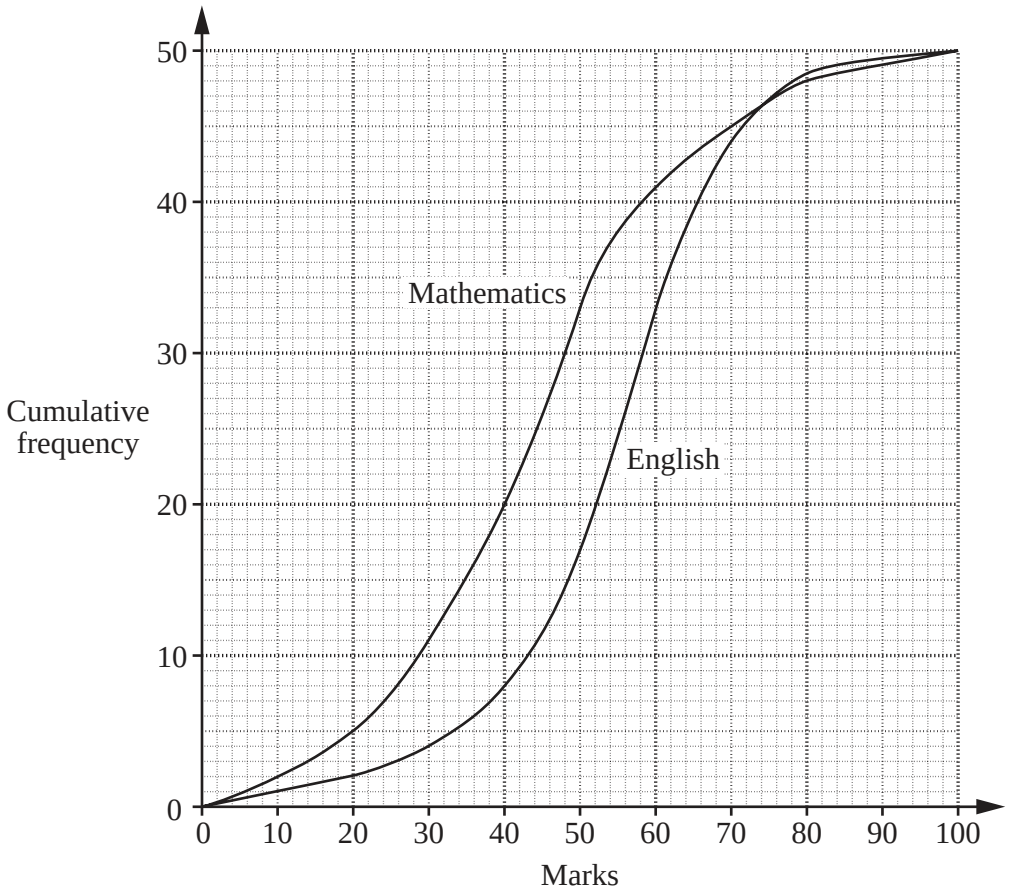
8 **(a)** Convert 0.8 kilometres into millimetres.

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

(b) Evaluate $(6.3 \times 10^6) \div (9 \times 10^2)$, giving your answer in standard form.

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

9



Fifty students each took a Mathematics and an English test. The distributions of their marks are shown in the cumulative frequency graph.

(a) Use the graph

(i) to estimate the median mark in the English test,

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

(ii) to estimate the 20th percentile mark in the Mathematics test.

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

(b) State, **with a reason**, which test the students found more difficult.

Answer (*b*) .....

.....

.....

..... [1]

10 Five clocks at a hotel reception desk show the local times in five different cities at the same moment.

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LONDON	MOSCOW	SYDNEY	TOKYO	NEW YORK
07 38	10 38	16 38	15 38	02 38

(a) Rosidah has breakfast at 08 00 in Moscow.
What is the local time in Sydney?

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

(b) Elias catches a plane in London and flies to New York.
He leaves London at 11 30 local time.
The flight time is 8 hours 10 minutes.
What is the local time in New York when he lands?

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

11 Similar buckets are available in two sizes.
The large bucket has height 30 cm and base diameter 16 cm.
The small bucket has base diameter 8 cm.

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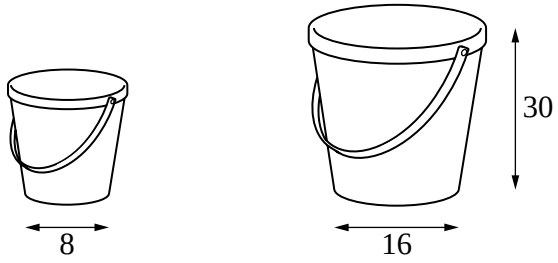

(a) Find the height of the small bucket.

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

(b) Given that the small bucket has volume 850 cm^3, find the volume of the large bucket.

Answer (*b*) ..... cm^3 [2]

12 y is directly proportional to the square root of x.
Given that $y = 12$ when $x = 36$,

find

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

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

(b) the value of x when $y = 10$.

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

For Examiner's Use

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For Examiner's Use

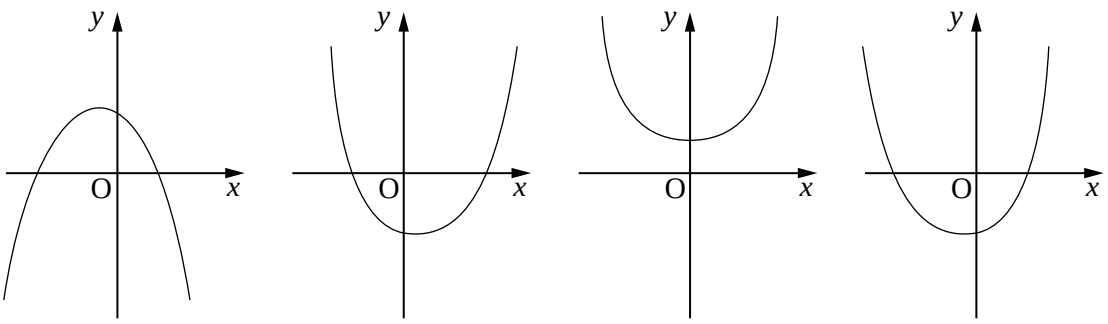

Figure 1 Figure 2 Figure 3 Figure 4

Which of the figures shown above could be the graph of

(a) $y = x^2 + 2$,

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

(b) $y = (x - 2)(x + 1)$,

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

(c) $y = 2 - x - x^2$?

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

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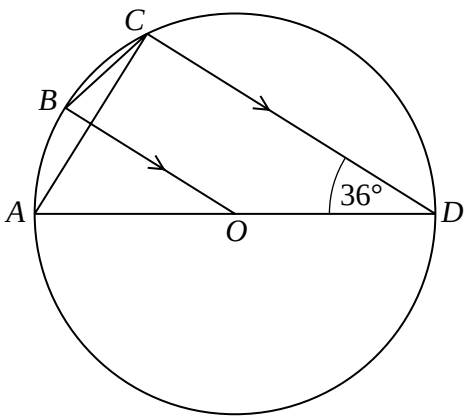

The diagram shows a circle, centre O, passing through A, B, C and D.
AOD is a straight line, BO is parallel to CD and $C\hat{D}A = 36^{\circ}$.

Find

(a) $B\hat{O}A$,

Answer (*a*) $B\hat{O}A$ ..... [1]

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

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

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

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

(d) $O\hat{B}C$.

Answer (*d*) $O\hat{B}C$ ..... [1]

15 The times taken for a bus to travel between five stops *A, B, C, D* and *E* are shown below.

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A		*B*		*C*		*D*		*E*
	4 minutes		$1\frac{1}{2}$ minutes		75 seconds		2 minutes 35 seconds	

Expressing each answer in minutes and seconds, find

(a) the total time for the journey from *A* to *E*,

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

(b) the mean time taken between the stops,

Answer (*b*) .....minutes..... seconds [2]

(c) the range of times taken between the stops.

Answer (*c*) .....minutes..... seconds [1]

16 It is given that f(x) = 12 – 5x.

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Find

(a) f(4) ,

Answer (*a*) f(4) =.....[1]

(b) the value of x for which f(x) = 17,

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

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

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

---

17 **(a)** Solve $\frac{3x-2}{5} = \frac{x}{3}$.

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

(b) Given that y is an integer and $-3 < 2y - 6 < 4$, list the possible values of y.

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

---

18 **(a)** $\mathscr{E}$ = { 1, 2, 3, 4, 5 },
A = { 1, 2, 3 },
B = { 5 },
C = { 3, 4 }.

List the elements of

(i) $A \cup C$,

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

(ii) $B' \cap C'$.

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

(b) A group of 60 children attend an after school club.
Of these, 35 children play football and 29 play hockey.
3 children do not play either football or hockey.

By drawing a Venn diagram, or otherwise, find the number of children who play only hockey.

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

19

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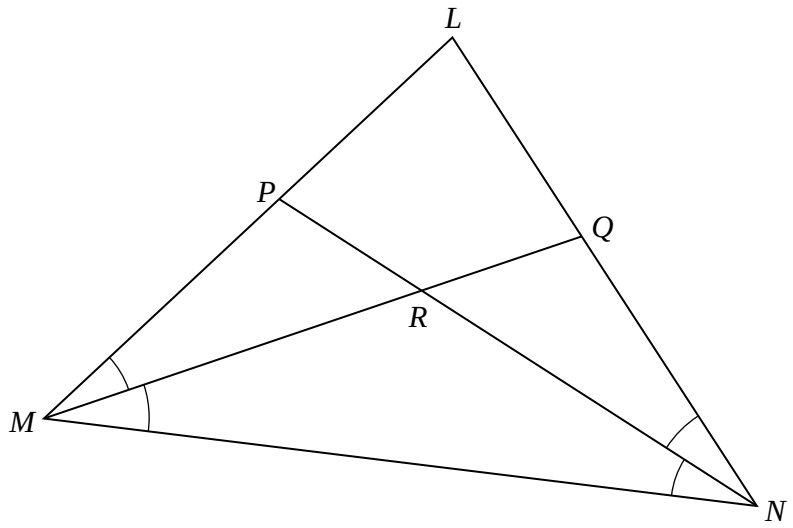

In the diagram, $L\hat{M}Q = Q\hat{M}N = M\hat{N}P = P\hat{N}L$.

(a) Show that triangles LMQ and LNP are congruent.

[3]

(b) Show that $M\hat{P}N = M\hat{Q}N$.

[1]

(c) The straight lines MQ and NP intersect at R.

State the name of the special quadrilateral $LPRQ$.

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

20 *Answer (a), (b)*

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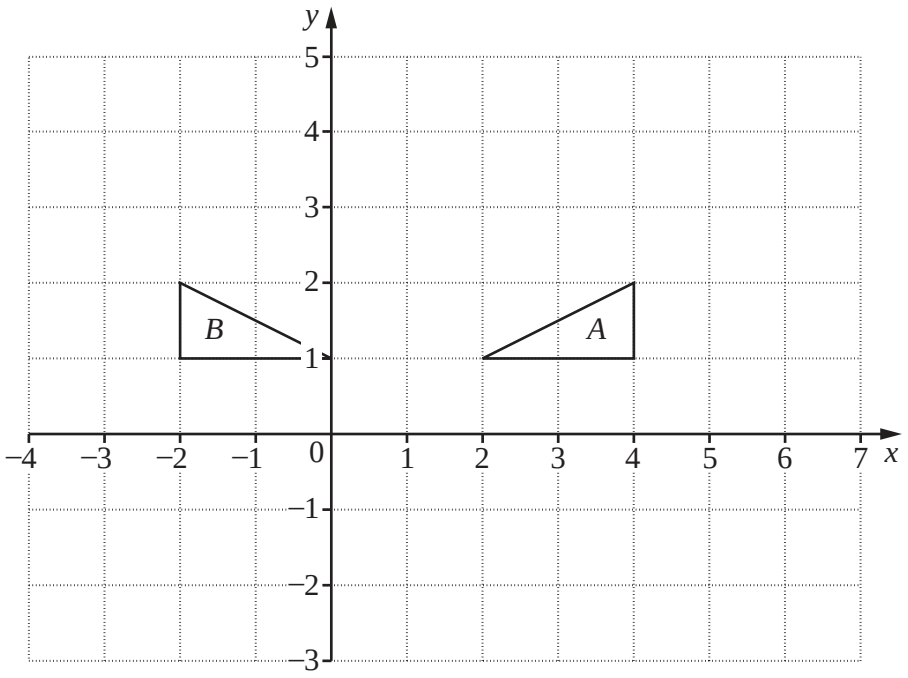

The diagram shows triangles *A* and *B*.

(a) The translation $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$ maps ΔA onto ΔC.

On the diagram, draw and label ΔC. [1]

(b) The rotation 90° clockwise, centre (2, 0), maps ΔA onto ΔD.

On the diagram, draw and label ΔD. [2]

(c) Describe **fully** the **single** transformation which maps ΔA onto ΔB.

Answer (c) .....

..... [2]

21 The nth term of a sequence is $\frac{4}{n^2}$.

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(a) Write down the first three terms of the sequence, expressing each term in its simplest form.

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

(b) The kth term in the sequence is $\frac{1}{100}$.

Find the value of k.

Answer (*b*) k = ...[2]

(c) Given that the mth term of the sequence is less than 0.0064, find the smallest value of m.

Answer (*c*) m = ...[2]

[Turn over

22

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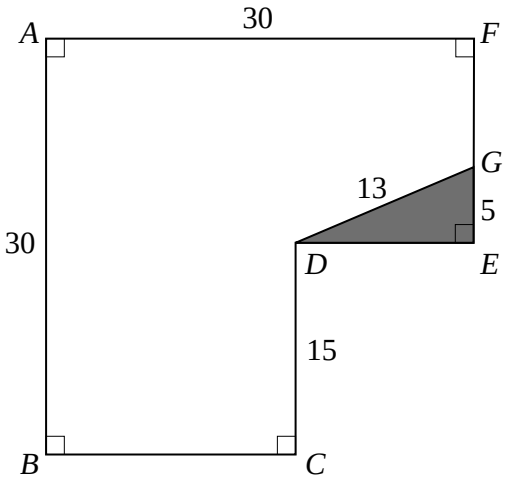

ABCDEF represents an L-shaped piece of glass with $AB = AF = 30$ cm and $CD = 15$ cm.
The glass is cut to fit the window in a door and the shaded triangle *DEG* is removed.
$DG = 13$ cm and $EG = 5$ cm.

(a) Show that DE = 12 cm.

Answer (*a*) .....

.....

.....

..... [1]

(b) For the remaining piece of glass *ABCDGF*, find

For Examiner's Use

(i) its perimeter,

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

(ii) its area.

Answer (*b*)(ii) ..... cm^2 [2]

(c) State the value of cos $D\hat{G}F$.

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

23 A sailing club has five moorings in the river at *A, B, C, D* and *E*.
A and *B* are 12 metres apart.
The positions of *A* and *B* are shown in the scale drawing below.

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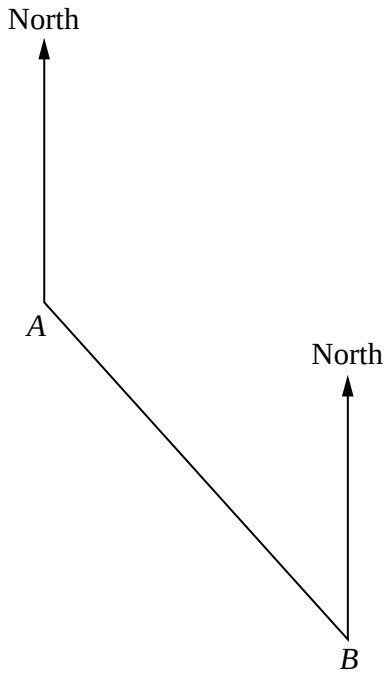
Answer (b), (c), (d)



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

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

(b) *C* is due west of *B* and on a bearing of 210° from *A*.

Find and label the position of *C*. [2]

(c) *D* lies north of the line *AB* .
The triangle *ABD* is equilateral.

Using ruler and compasses only, construct triangle *ABD*.
Show your construction arcs clearly. [1]

(d) The bearing of *E* from *A* is the same as the bearing of *B* from *A*.

Given that *AB* : *AE* = 3 : 5, find and label the position of *E*. [2]