UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

7468497684

MATHEMATICS (SYLLABUS D) **4024/12**

Paper 1 **May/June 2011**

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.

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.

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[Turn over

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

1 **(a)** Evaluate $12 + 6 \div 2 - 8$.

Answer ..... [1]

(b) Evaluate 2.6×0.2 .

Answer ..... [1]

---

2 **(a)** It is given that $\frac{1}{5} < n < \frac{1}{4}$.

Write down a decimal value of n that satisfies this inequality.

Answer ..... [1]

(b) Express $\frac{48}{60}$ as a percentage.

Answer ..... % [1]

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3 **(a)** Evaluate $\frac{2}{3} - \frac{3}{8}$.

Answer ..... [1]

(b) Evaluate $1\frac{3}{4} \times \frac{2}{9}$, giving your answer as a fraction in its lowest terms.

Answer ..... [1]

---

4 **(a)** Solve $5y - 3 > 3y + 12$.

Answer y ..... [1]

(b) Write down all the integers that satisfy the inequality $-6 \leqslant 3x < 6$.

Answer ..... [1]

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5 $\mathbf{c} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ $\mathbf{d} = \begin{pmatrix} 8 \\ -6 \end{pmatrix}$

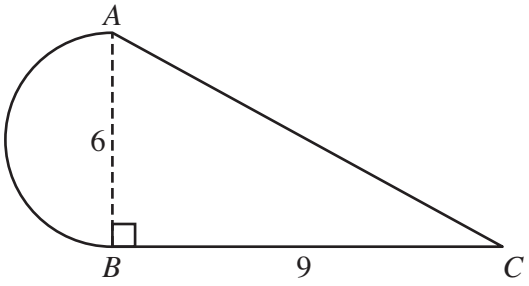
(a) Calculate $2\mathbf{c} - \mathbf{d}$.

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

(b) Calculate $|\mathbf{d}|$.

Answer ..... [1]

6



ABC is a right-angled triangle with $AB = 6$ cm and $BC = 9$ cm.
A semicircle of diameter 6 cm is joined to the triangle along *AB*.

Find an expression, in the form $a + b\pi$, for the **total** area of the shape.

Answer ..... cm^2 [2]

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7 **(a)** The ratio of boys to girls in a class is $4 : 5$.

What fraction of the class are boys?

Answer ..... [1]

(b) The ratio of boys to girls in a school is $3 : 4$.
There are 120 more girls than boys.

How many students are in the school?

Answer ..... [1]

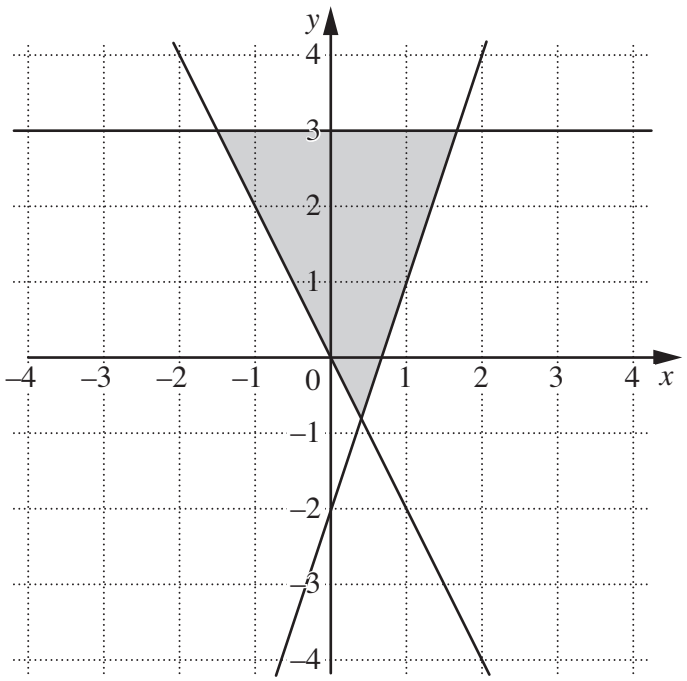
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8 y is directly proportional to the square of x.

Given that $y = 2$ when $x = 4$, find y when $x = 10$.

Answer $y =$ ..... [2]

9



The shaded region on the diagram is represented by three inequalities.

One of these is $y \geqslant 3x - 2$.

Write down the other two inequalities.

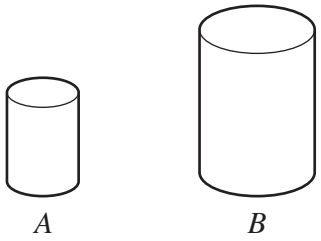
Answer .....

..... [2]

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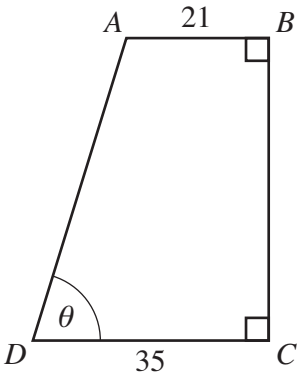
10 These two cylinders are similar.
The ratio of their volumes is 8 : 27.
The height of cylinder *A* is 12 cm.

Find the height of cylinder *B*.



Answer ..... cm [2]

11



$\sin\theta$	$\frac{24}{25}$
$\cos\theta$	$\frac{7}{25}$
$\tan\theta$	$\frac{24}{7}$

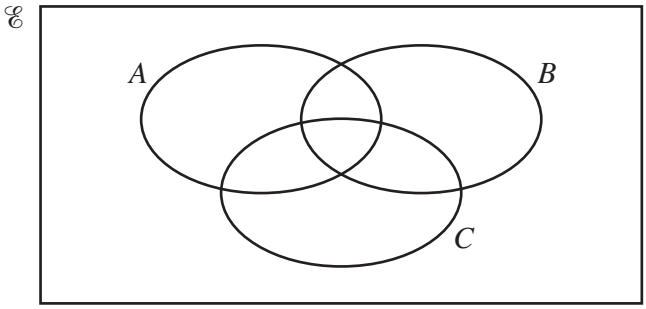
ABCD is a trapezium with $AB = 21$ cm and $CD = 35$ cm.
$A\hat{B}C = B\hat{C}D = 90°$ and $A\hat{D}C = \theta$.

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

Answer ..... cm [2]

---

12 **(a)** On the Venn diagram, shade the set $A \cap B \cap C'$.



[1]

(b) $\mathscr{E} = \{2, 3, 4, 5, 6, 7, 8, 9, 10\}$
$P = \{x : x \text{ is a prime number}\}$
$Q = \{x : x \geqslant 5\}$

(i) Find the value of $\text{n}(P \cap Q)$.

Answer ..... [1]

(ii) List the elements of $P \cup Q'$.

Answer ..... [1]

13 **(a)** The mass of one grain of rice is 0.000 02 kg.

Write 0.000 02 in standard form.

Answer ..... [1]

(b) The table shows the amount of rice grown in some countries in 2002.

	China	Brazil	India	Vietnam
Amount (tonnes)	1.2×10^8	7.6×10^6	8.0×10^7	2.1×10^7

(i) Write these amounts in order, smallest first.

Answer ..... , ... , ... , ... [1]
smallest

(ii) Calculate the difference in the amount of rice grown in Brazil and Vietnam.
Give your answer in standard form.

Answer ..... tonnes [1]

14 **(a)** Express 108 as a product of its prime factors.

Answer ..... [1]

(b) Written as products of their prime factors, $N = 2^p \times 5^q \times 7^r$ and $500 = 2^2 \times 5^3$.

The highest common factor of N and 500 is $2^2 \times 5^2$.
The lowest common multiple of N and 500 is $2^3 \times 5^3 \times 7$.

Find p, q and r.

Answer $p =$ ..... , $q =$ ..... , $r =$ ..... [2]

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15 **(a)** Factorise completely $9pq - 12q^2$.

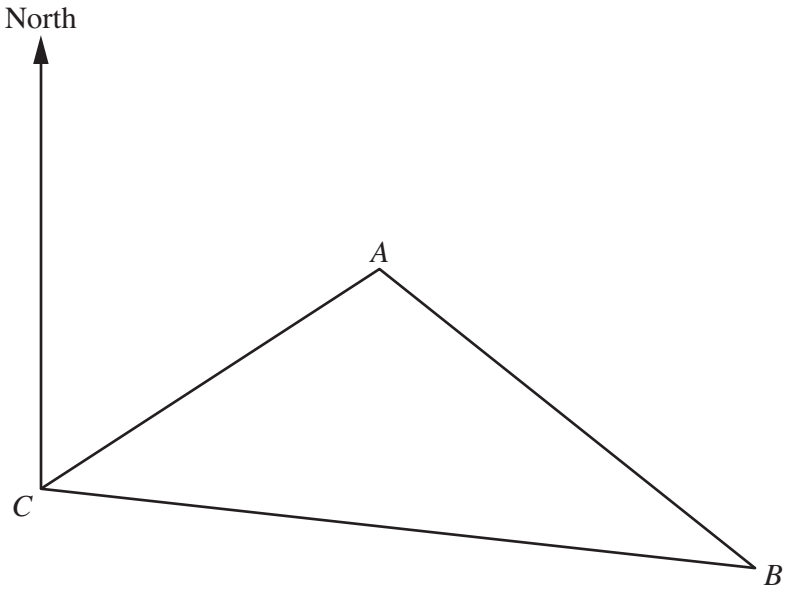
Answer ..... [1]

(b) Factorise completely $8px + 4py - 6x - 3y$.

Answer ..... [2]

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16 The scale drawing shows three towns, A, B and C.
The scale of the drawing is 1 cm to 25 km.



(a) Measure the bearing of A from C.

Answer ..... [1]

(b) Find the bearing of C from A.

Answer ..... [1]

(c) Find the actual distance, in kilometres, from B to C.

Answer ..... km [1]

17 The table shows the height, in metres, above sea level of the highest and lowest points in some continents.
A negative value indicates a point below sea level.

	Asia	Africa	Europe	South America
Highest point (m)	8850	5963	5633	6959
Lowest point (m)	–409	–156	–28	–40

(a) What is the height above sea level of the highest point in Africa?
Give your answer in **kilometres**.

Answer ..... km [1]

(b) In South America, how much higher is the highest point than the lowest point?
Give your answer in metres.

Answer ..... m [1]

(c) How much higher is the lowest point in Europe than the lowest point in Asia?
Give your answer in metres.

Answer ..... m [1]

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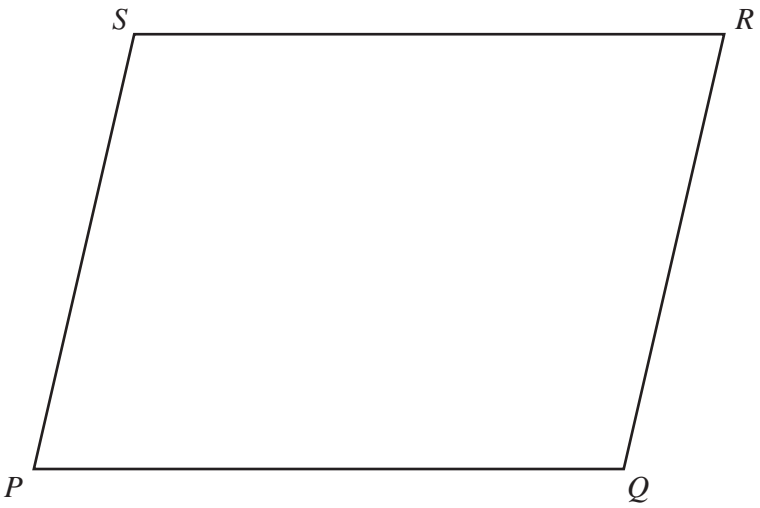
18 The diagram below shows the quadrilateral $PQRS$.

(a) On the diagram, construct

(i) the bisector of $S\hat{P}Q$, [1]

(ii) the perpendicular bisector of QR. [1]

(b) On the diagram, shade the region inside the quadrilateral containing the points that are closer to PQ than to PS and nearer to Q than to R. [1]



19 **(a)** Express $0.047\,852$ correct to two decimal places.

Answer ..... [1]

(b) Estimate the value of $\sqrt{200}$, giving your answer correct to two significant figures.

Answer ..... [1]

(c) By writing each number correct to one significant figure, estimate the value of

$$\frac{212 \times 1.97^2}{0.763}.$$

Answer ..... [2]

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20 The table shows the distribution of the number of complete lengths swum by a group of swimmers.

Number of complete lengths (n)	$0 < n \leqslant 20$	$20 < n \leqslant 40$	$40 < n \leqslant 60$	$60 < n \leqslant 80$
Frequency	5	20	10	5

(a) Find the modal class.

Answer ..... [1]

(b) Calculate an estimate of the mean.

Answer ..... [3]

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21 **(a)** Evaluate $\left(\frac{1}{4}\right)^{-2}$.

Answer ..... [1]

(b) Evaluate $64^{\frac{2}{3}}$.

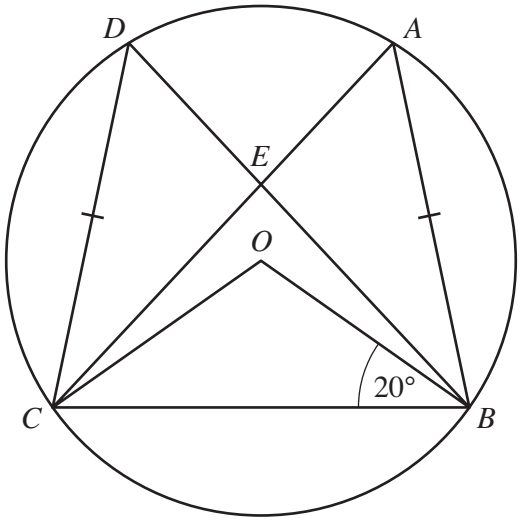
Answer ..... [1]

(c) Simplify $\left(\frac{4x^2 y^9}{x^4 y}\right)^{\frac{1}{2}}$.

Answer ..... [2]

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22



Points A, B, C and D lie on the circumference of a circle, centre O, and $AB = CD$.
AC and BD intersect at E.
$O\hat{B}C = 20°$.

(a) Calculate $B\hat{O}C$.

Answer $B\hat{O}C =$ ..... [1]

(b) Calculate $C\hat{A}B$.

Answer $C\hat{A}B =$ ..... [1]

(c) Show that triangles AEB and DEC are congruent.

Answer .....

.....

.....

.....

..... [3]

23 **(a)** Imran is paid $16 per hour.

(i) One week he works 35 hours.

Calculate the amount he is paid for the week.

Answer $..... [1]

(ii) Imran is paid 20% extra per hour for working at weekends.

Work out the total amount Imran is paid for working 4 hours at the weekend.

Answer $..... [2]

(b) The exchange rate between pounds and dollars is £1 = $1.80.
Anna converts $270 into pounds.

Calculate the number of pounds Anna receives.

Answer £..... [2]

24 P is the point $(-2, 1)$ and Q is the point $(3, 7)$.

(a) M is the midpoint of PQ.

Find the coordinates of M.

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

(b) Find the gradient of the line PQ.

Answer ..... [1]

(c) The line with equation $2y + 3x + k = 0$ passes through the point P.

(i) Find k.

Answer $k =$ ..... [2]

(ii) Find the gradient of this line.

Answer ..... [1]

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25 **(a)** Solve $10 - 3(2x - 1) = 3x + 1$.

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

(b) Solve the simultaneous equations.

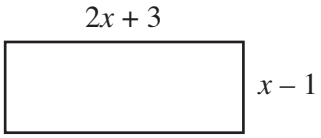
$$4x + 3y = 11$$
$$2x - 5y = 25$$

Answer $x =$ .....

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

Question 26 is printed on the following page.

26 The diagram shows a rectangle with length $(2x + 3)$ cm and width $(x - 1)$ cm.



(a) The area of the rectangle is $12\,\text{cm}^2$.

Form an equation in x and show that it reduces to $2x^2 + x - 15 = 0$.

[2]

(b) Solve $2x^2 + x - 15 = 0$.

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

(c) Find the perimeter of the rectangle.

Answer ..... cm [1]

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