UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

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

Paper 1 **May/June 2010**

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.

For Examiner's Use

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

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

For Examiner's Use

1 Evaluate

(a) $\frac{1}{2} + \frac{2}{9}$,

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

(b) $\frac{2}{3} \div \frac{9}{11}$.

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

---

2 **(a)** Evaluate $10 - 8 \div 2 + 3$.

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

(b) Find 20% of 60 cm.

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

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3 Sara carries out a survey of the colours of cars in a car park.
She draws a pie chart to represent her results.

(a) There are 7 red cars.
The angle representing the red cars is 40°.

Calculate the total number of cars in the car park.

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

(b) Sara's pie chart is a circle with circumference 28 cm.

Find, in terms of π, the diameter of the circle.

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

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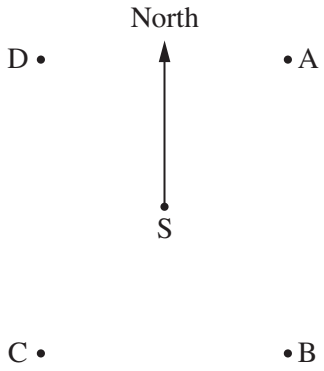
4 Ed goes on a car journey.
The first 60 km of the journey takes 45 minutes.
The remaining 20 km of the journey takes 30 minutes.

Calculate his average speed, in kilometres per hour, for the whole journey.

Answer .....km/h [2]

[Turn over

5



The bearing of a lighthouse from a ship, S, is 220°.
The position of S is marked on the diagram.

(a) Which of the four points A, B, C or D is a possible position of the lighthouse?

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

(b) Write down the bearing of S from the lighthouse.

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

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6 **(a)** Solve $6x - 5 < 9 + 2x$.

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

(b) Write down the largest integer which satisfies the inequality
$6x - 5 < 9 + 2x$.

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

---

7 Given that n is an integer and $\boldsymbol{n > 1}$, decide whether each statement in the table is **true** or **false**.

For Examiner's Use

For each statement write **true** or **false** in the table.
If you write **false**, give an example to justify your decision.

Statement	True or False	Example (if false)
$n^3 > 1$		
$\frac{1}{n} > \frac{1}{n^2}$		
$(n - 1)(n + 3)$ is always odd		

[2]

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8 **(a)** The ratio of Sayed's age to his mother's age is 2 : 7.
Sayed is 14 years old.

How old is his mother?

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

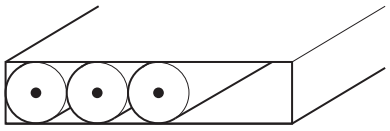
(b) The ratio of Fatima's age to her father's age is 3 : 8.
The total of their ages is 66 years.

How old is Fatima?

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

9

For Examiner's Use



Pencils are packed in a box.
Each pencil has a diameter of 7 mm, correct to the nearest millimetre.

(a) Write down the lower bound of the diameter of a pencil.

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

(b) Find the smallest width of a box that can **always** hold 8 pencils side by side.
Give your answer in centimetres.

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

---

10 Evaluate

(a) 0.2×0.06,

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

(b) $3 \div 0.01$,

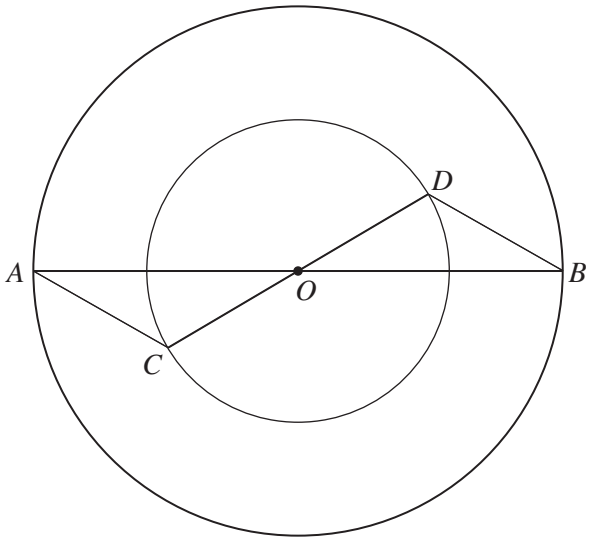
Answer (*b*) ..... [1]

(c) $27^{\frac{1}{3}}$.

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

11

For Examiner's Use



The diagram shows two circles, both with centre O.
CD is a diameter of the small circle and AB is a diameter of the large circle.

Using congruent triangles, show that $BD = AC$.
State your reasons clearly.

In triangles ..... and .....

.....

.....

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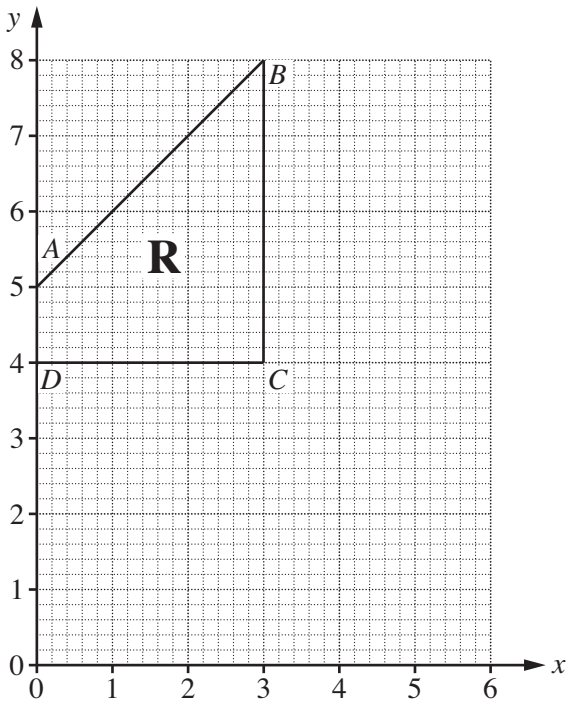
.....[3]

12

For Examiner's Use



In the diagram, the region, **R**, is bounded by the lines *AB*, *BC*, *CD* and *DA*.

(a) Write down the coordinates of the midpoint of *AB*.

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

(b) Region **R** is defined by four inequalities.
One of these is $y \leqslant x + 5$.

Write down the other three inequalities.

Answer (*b*) .....

.....

..... [2]

13 Two families ordered three basic food items from their local shop.
The Jones family ordered 1 bag of sugar, 4 cartons of milk and 3 loaves of bread.
The Singh family ordered no sugar, 3 cartons of milk and 5 loaves of bread.
Their orders can be represented by the matrix **A** where

$$\mathbf{A} = \begin{pmatrix} 1 & 0 \\ 4 & 3 \\ 3 & 5 \end{pmatrix}.$$

The cost of a bag of sugar is 80 cents, the cost of a carton of milk is 50 cents and the cost of a loaf of bread is 40 cents.
This information can be represented by the matrix **B** where

$$\mathbf{B} = (\ 80 \quad 50 \quad 40\ ).$$

(a) Work out **BA**.

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

(b) What does the matrix **BA** represent?

Answer (*b*) .....

.....

.....

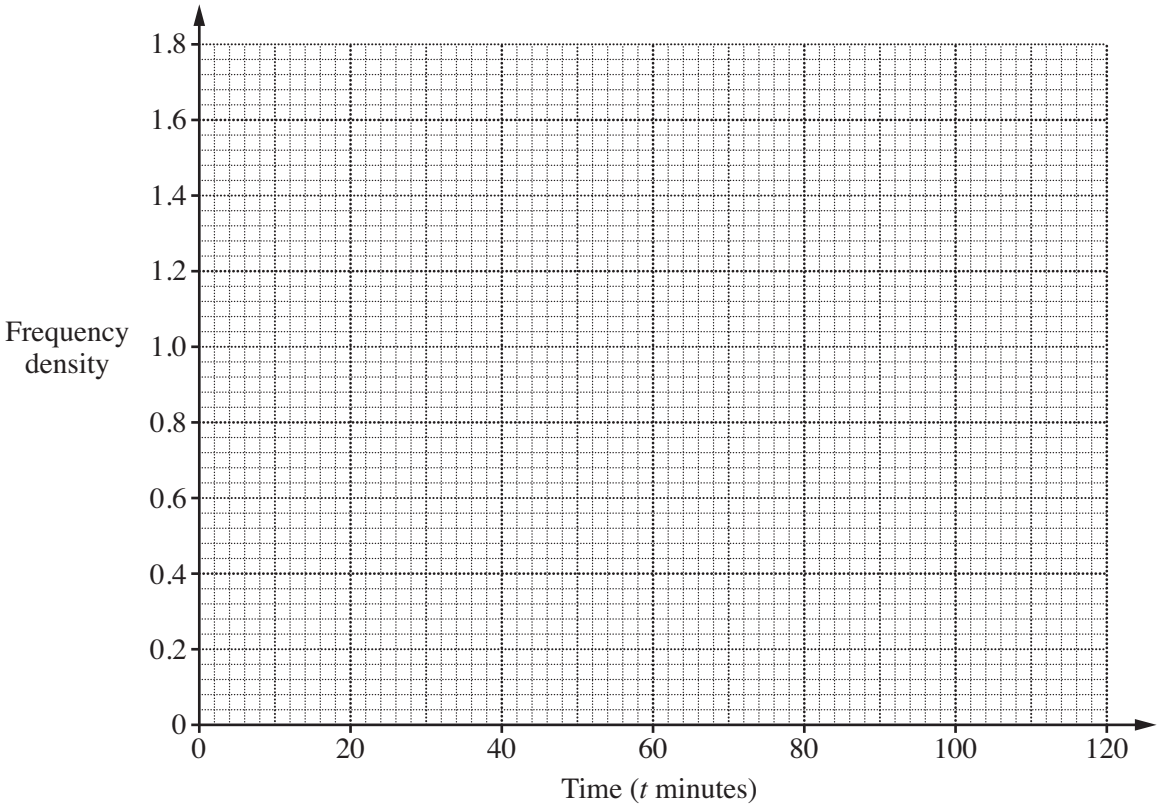
.....[1]

14 Ida keeps a record of time spent on the internet each day.
Her results are summarised in the table.

For Examiner's Use

Time (t minutes)	Frequency
$0 \leqslant t < 10$	4
$10 \leqslant t < 30$	20
$30 \leqslant t < 60$	39
$60 \leqslant t < 100$	32
$100 \leqslant t < 120$	6

On the axes below, draw a histogram to show these results.



[3]

15 Ahmed goes shopping.

For Examiner's Use

(a) In one shop he buys shorts for $26.84 and a shirt for $13.97.

How much does Ahmed spend altogether?

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

(b) In another shop he buys 15 postcards for 46 cents each.

(i) Calculate the total cost, in dollars, of the postcards.

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

(ii) The rate of exchange between pounds (£) and dollars ($) was £1 = $2.50.

Calculate the total cost of the postcards in pounds.

Answer (*b*)(ii) £..... [2]

16 Dai played three games of cricket.
His mean score was 9 runs.
His median score was 8 runs.
His highest score was 7 runs more than his lowest score.

For Examiner's Use

(a) Find the number of runs he scored in each of the three games.

Answer (*a*) ..... , ... , ... [3]

(b) Dai batted in a fourth game.
The mean of his four scores was 11 runs.

Find the number of runs that Dai scored in the fourth game.

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

17 y is inversely proportional to x^2.
Some values of y and x are given in the table below.

For Examiner's Use

x	3	2	q
y	4	p	1

Find

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

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

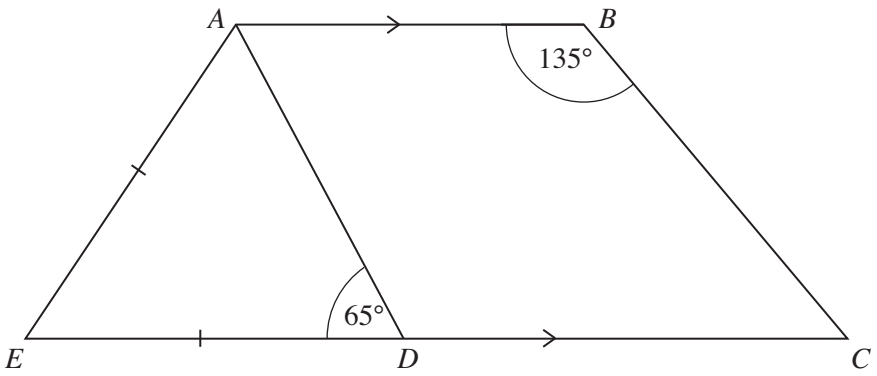
(b) the value of p,

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

(c) the two values of q.

Answer (*c*) $q =$ ..... , ... [1]

18



In the diagram, AB is parallel to EC.
D is the point on EC such that $ED = EA$.
$A\hat{B}C = 135°$ and $A\hat{D}E = 65°$.

Find

(a) $A\hat{E}D$,

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

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

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

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

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

(d) reflex $A\hat{B}C$.

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

19 Some data about two planets, Earth and Mars, is shown in the table.

For Examiner's Use

Planet	Average temperature (°C)	Mass (tonnes)	Volume (km^3)
Earth	15	5.98×10^{21}	1.08×10^{12}
Mars	–63	6.58×10^{20}	162 000 million

(a) How much greater is the average temperature on Earth than that on Mars?

Answer (*a*) .....°C [1]

(b) Write down the volume of Mars in standard form.

Answer (*b*) ..... km^3 [1]

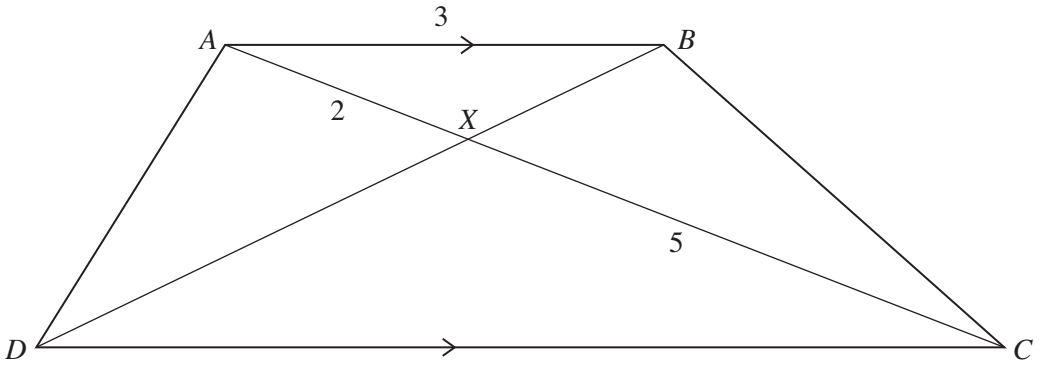
(c) Calculate the difference in mass between Earth and Mars.
Give your answer in standard form.

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

[Turn over

20

For Examiner's Use



In the diagram, AC and BD intersect at X.
Triangle ABX is similar to triangle CDX.
$AB = 3$ cm, $AX = 2$ cm and $XC = 5$ cm.

(a) Find the ratio of the area of triangle ABX to the area of triangle CDX.

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

(b) Find the ratio of the area of triangle ABX to the area of triangle BCX.

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

(c) Calculate CD.

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

21 **(a)** Write down, in terms of n, an expression for the nth term of the sequence

For Examiner's Use

19 16 13 10 ..... .

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

(b) Factorise completely

(i) $4x^2 - 25y^2$,

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

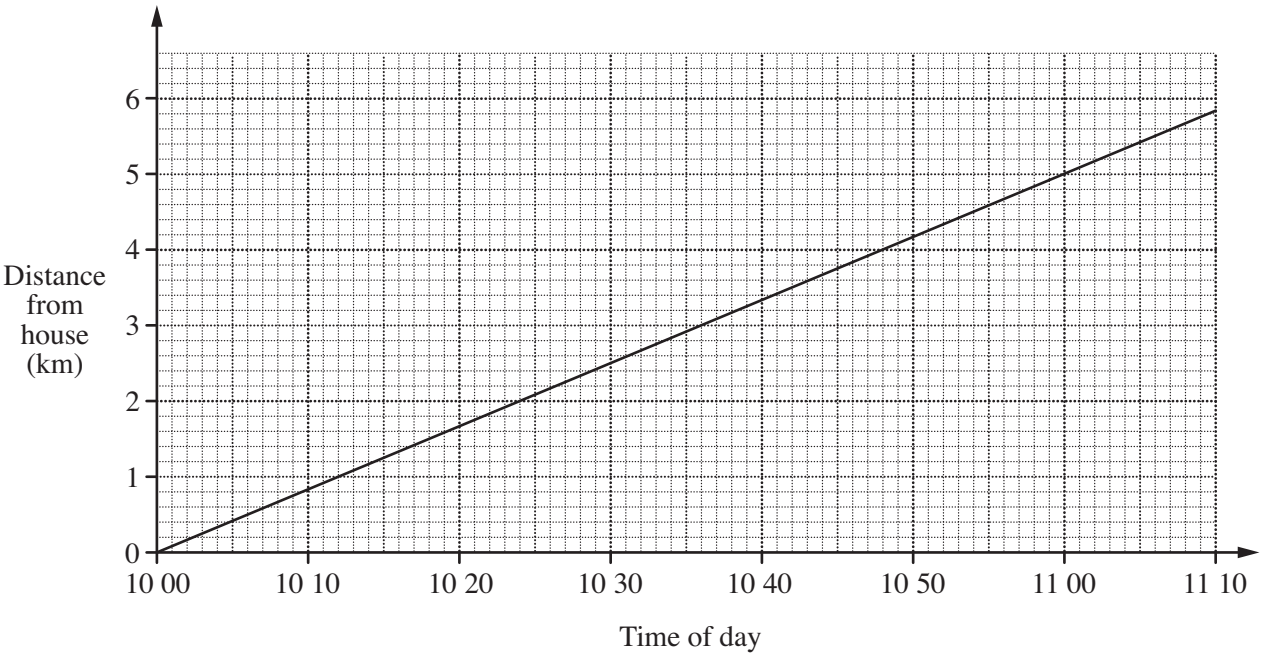
(ii) $5ax - 5a^2 - 2x + 2a$.

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

22 A walker leaves his house at 10 00 and walks towards a shopping centre at a constant speed of 5 km/h.
A cyclist leaves the same house 10 minutes later.
He travels along the same road at a constant speed of 20 km/h until he reaches the shopping centre which is 6 km from the house.
The cyclist stops at the shopping centre for 14 minutes.
He then returns to the house along the same road at a constant speed of 20 km/h.

(a) The distance-time graph for the walker is drawn below.

On the same axes, draw the distance-time graph for the cyclist.



[3]

(b) Using the graphs, find

(i) the time when the cyclist, on his return journey, meets the walker,

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

(ii) the distance from the house when this meeting takes place.

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

23 A stone is thrown vertically upwards from the ground so that its height above the ground after t seconds is $(20t - 5t^2)$ metres.

For Examiner's Use

(a) (i) Show that the values of t when the stone is 15 metres above the ground satisfy the equation

$$t^2 - 4t + 3 = 0.$$

[1]

(ii) Find the values of t when the stone is 15 metres above the ground.

Answer (*a*)(ii) t = ... and ..... [2]

(b) Find the value of t when the stone hits the ground.

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

Question 24 is printed on the following page

24 **(a)** Solve

For Examiner's Use

(i) $5 - 2\,(3x - 1) = 2x + 1$,

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

(ii) $\frac{2}{5t} = \frac{3}{4}$.

Answer (*a*)(ii) $t =$ ..... [2]

(b) Solve the simultaneous equations

$$5x - 2y = 16,$$
$$2x - 3y = 13.$$

Answer (*b*) $x =$ .....

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