UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

0215830093

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

Paper 1 **May/June 2013**

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.

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

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For Examiner's Use

1 Evaluate

(a) $\frac{4}{7} - \frac{2}{5}$,

Answer ..... [1]

(b) $\frac{5}{8} \div \frac{2}{3}$.

Answer ..... [1]

---

2 A bag contains red counters and blue counters.
On each counter there is either an odd or an even number.
The table shows the number of counters of each type.

	Odd	Even
Red	6	9
Blue	5	3

(a) Find the fraction of the counters that are blue.

Answer ..... [1]

(b) Find the ratio of odd to even numbers.

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

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3 **(a)** Write these lengths in order of size, starting with the shortest.

500 m 5 cm 50 km 500 mm

Answer .... [1]
shortest

(b) Convert 41.6 cm^2 to mm^2.

Answer ..... mm^2 [1]

---

4 A line has equation $3y = 2 - x$.

(a) Find the gradient of the line.

Answer ..... [1]

(b) The line passes through the point (5, k).

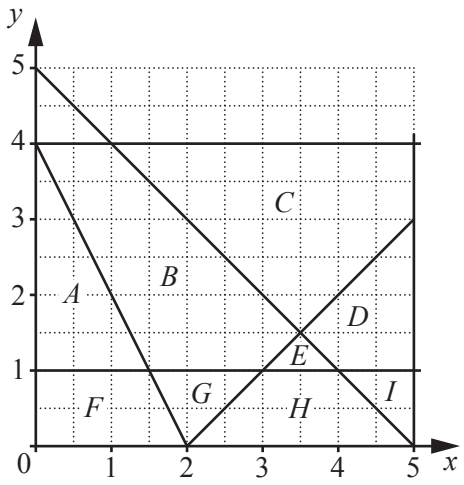
Find the value of k.

Answer $k =$ ..... [1]

---

5 The diagram shows the regions A to I.

For Examiner's Use



Give the letter of the region defined by each set of inequalities.

(a) $x > 0,\ y > 0,\ y < 1$ and $y < 4 - 2x$

Answer ..... [1]

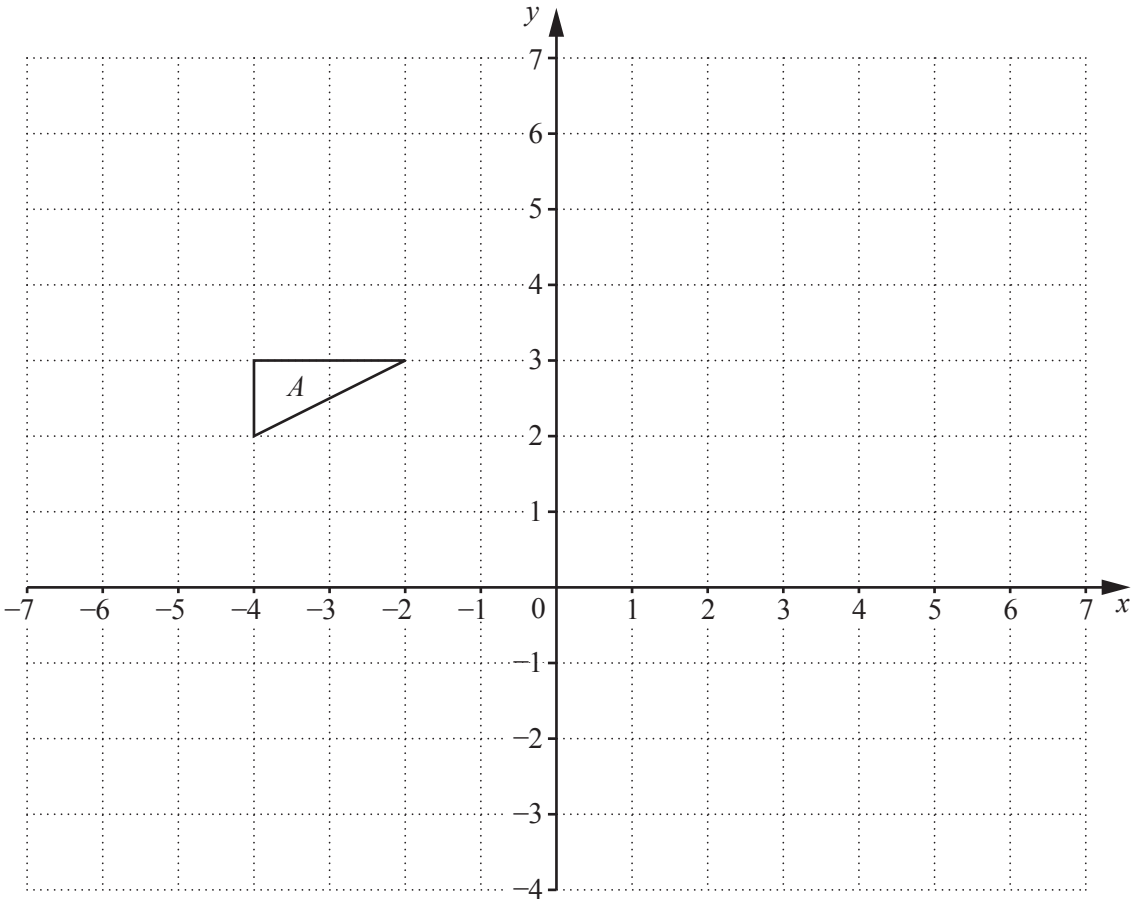
(b) $y > 1,\ y < x - 2$ and $y < 5 - x$

Answer ..... [1]

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6 The diagram shows triangle A.

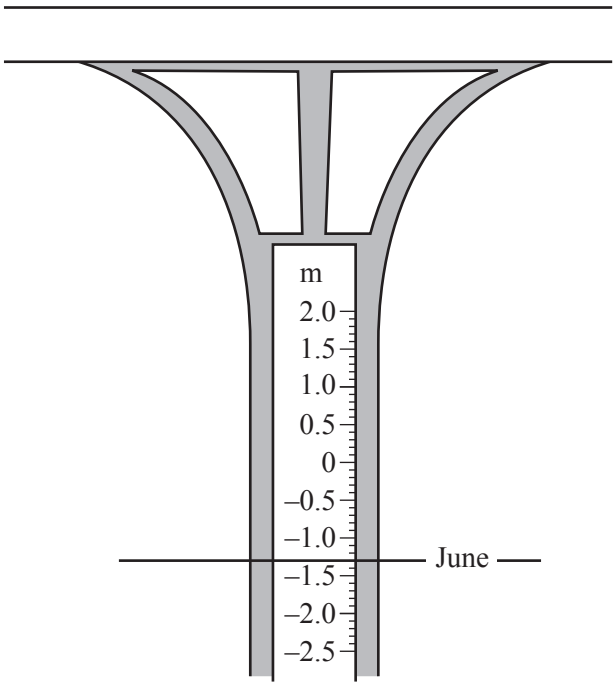
For Examiner's Use



(a) Reflect triangle A in the line $x = 1$.
Label the image B. [1]

(b) Rotate triangle A through 90° clockwise about the point (–1, 3).
Label the image C. [1]

7 The diagram shows a scale used to measure the water level in a river.



The table shows the reading, in metres, at the beginning of each month.

Month	January	February	March	April	May	June	July
Reading (m)	0.8	1.2	1.3	0.5	–0.1		–1.9

(a) The diagram shows the water level at the beginning of June.

Complete the table with the June reading. [1]

(b) Work out the difference between the highest and lowest levels shown in the table.

Answer ..... m [1]

(c) The August reading was 0.4 m higher than the July reading.

Work out the reading in August.

Answer ..... m [1]

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8 **(a)** James thinks of a **two-digit** number.
It is a cube number.
It is an even number.

What is his number?

Answer ..... [1]

(b) Omar thinks of a **two-digit** number.
It is a factor of 78.
It is a prime number.

What is his number?

Answer ..... [1]

(c) Write down an irrational number between 1 and 2.

Answer ..... [1]

---

9 **(a)** Write 0.004 075 1 correct to two significant figures.

Answer ..... [1]

(b) $\sqrt{131}$ lies between two consecutive integers.
Complete the inequality below with these integers.

Answer ..... $< \sqrt{131} <$ ..... [1]

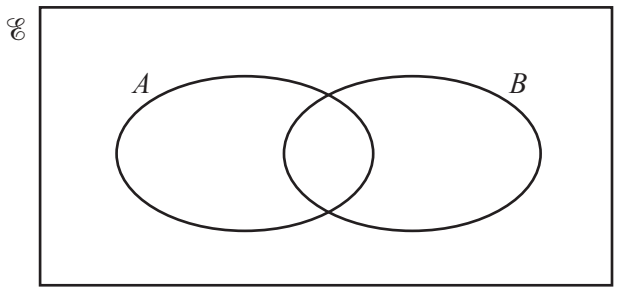
(c) Add brackets to the statement below to make it correct.

$3 \times 2 + 1^2 = 49$ [1]

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10 $\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
$A = \{\text{odd numbers}\}$
$B = \{\text{multiples of } 3\}$

(a) Complete the Venn diagram to illustrate this information.



[1]

(b) Find the value of $\text{n}(A \cup B)$.

Answer ..... [1]

(c) List the elements of the set $A \cap B'$.

Answer ..... [1]

---

11 A photo is 10 cm long.
It is enlarged so that all dimensions are increased by 20%.

(a) Find the length of the enlarged photo.

Answer ..... cm [1]

(b) Find the ratio of the area of the enlarged photo to the area of the original photo.
Give your answer in the form k : 1.

Answer ..... : 1 [2]

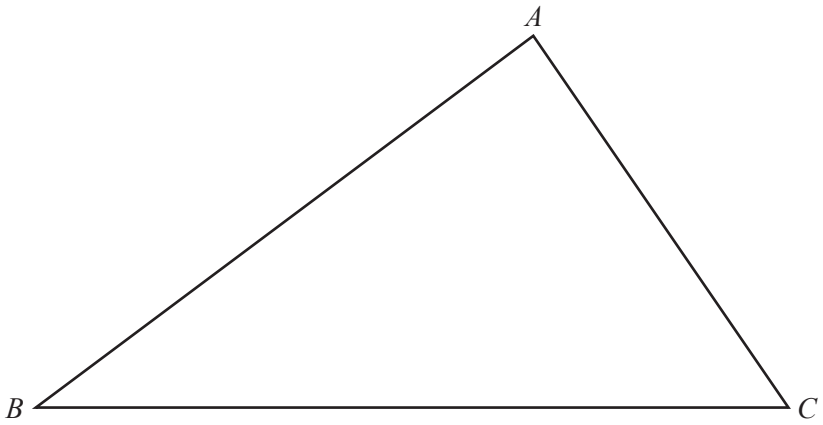
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12 The diagram below shows triangle ABC.

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(a) Construct the perpendicular bisector of AB. [1]

(b) Shade the region inside the triangle containing points that are closer to A than to B and **more than** 6 cm from C. [2]



13 $\mathbf{A} = \begin{pmatrix} 2 & 3 \\ -2 & 0 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} -2 & 4 \\ -3 & 1 \end{pmatrix}$

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

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

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

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

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14 **(a)** Sofia earns $7.60 for each hour she works.
She starts work at 7.45 a.m. and finishes at 4.30 p.m.
She stops work for half an hour for lunch.

How much does she earn for the day?

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Answer $ ..... [2]

(b) Marlon earns $1500 each month.
He pays rent of $525 each month.

Find the amount he pays in rent as a percentage of his earnings.

Answer .....% [1]

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15 P is directly proportional to the square of Q.
When $P = 9$, $Q = 6$.

(a) Find the formula for P in terms of Q.

Answer $P =$ ..... [1]

(b) Find the values of Q when $P = 25$.

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

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16 **(a)** Evaluate 4^{-2}.

Answer ..... [1]

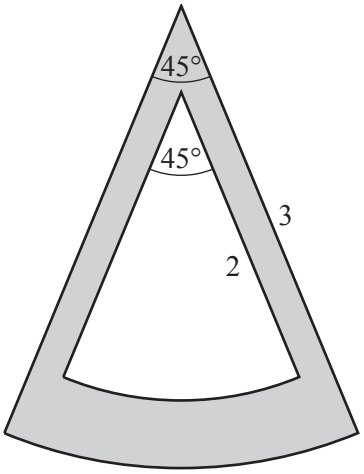
(b) Simplify $\left(\frac{9xy^6}{x^3y^2}\right)^{\frac{1}{2}}$.

Answer ..... [2]

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17

For Examiner's Use



The diagram shows part of an earring.
It is in the shape of a sector of a circle of radius 3 cm and angle 45°,
from which a sector of radius 2 cm and angle 45° has been removed.

(a) Calculate the shaded area.

Give your answer in the form $\frac{a\pi}{b}$, where a and b are integers and as small as possible.

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

(b) The earring is cut from a sheet of silver.
The mass of 1 cm^2 of the silver sheet is 1.6 g.

By taking the value of π to be 3, estimate the mass of the earring.

Answer ..... g [1]

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[Turn over

18 The table shows information about the annual coffee production of some countries in 2010.

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Country	Number of bags per year
Brazil	
Vietnam	1.85×10^7
Colombia	9.2×10^6
Indonesia	8.5×10^6

(a) In 2010, Brazil produced 48 million bags of coffee.

Complete the table with the coffee production for Brazil, using standard form. [1]

(b) How many more bags of coffee were produced in Vietnam than in Colombia?

Answer ..... [2]

(c) The mass of a bag of coffee is 60 kg.

Work out the number of kilograms of coffee produced in Indonesia.
Give your answer in standard form.

Answer ..... kg [1]

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19 **(a)** Keith records the number of letters he receives each day for 20 days.
His results are shown in the table.

Number of letters	Frequency
0	4
1	6
2	3
3	2
4	1
5	4

(i) Write down the mode.

Answer ..... [1]

(ii) Work out the mean.

Answer ..... [2]

(b) Over the same 20 days, Emma received a mean of 1.7 letters each day.

How many letters did Emma receive altogether?

Answer ..... [1]

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[Turn over

20 **(a)** Solve $\frac{3x}{4} + \frac{2x-1}{2} = 3$.

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

(b) Write as a single fraction in its simplest form

$$\frac{5}{x+4} + \frac{2}{x-1}.$$

Answer ..... [2]

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21 A group of 80 students took a Physics test.
This table shows the distribution of their marks.

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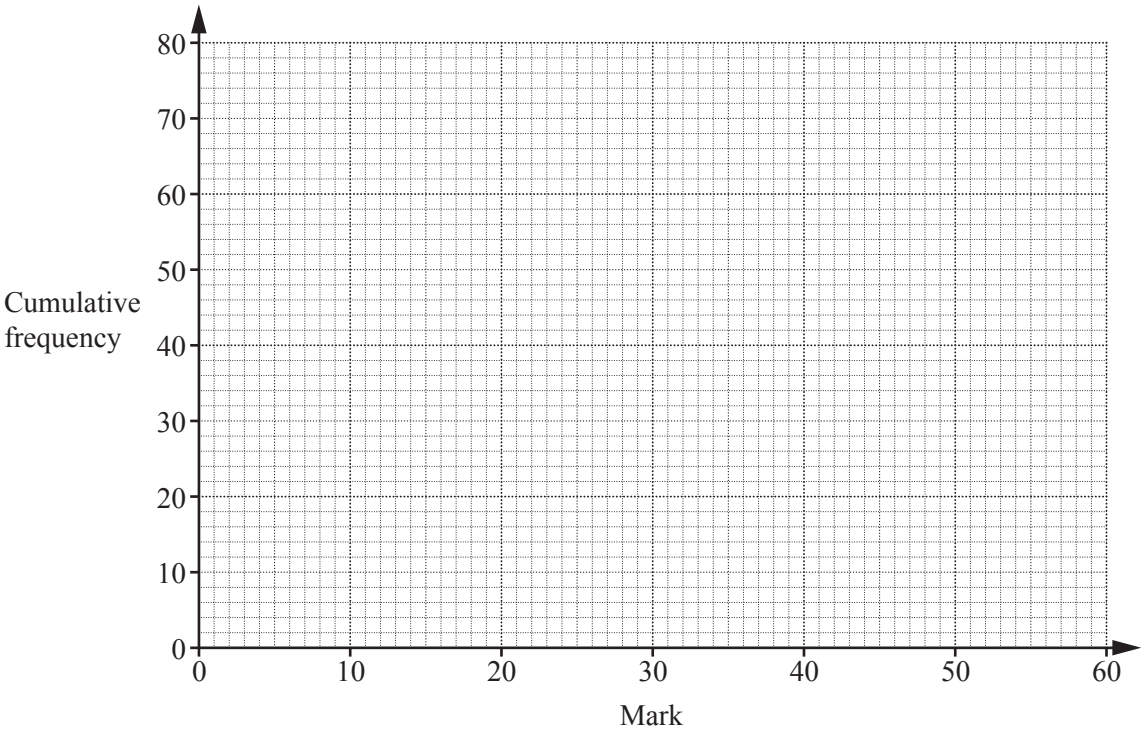
Mark (m)	$0 < m \leqslant 10$	$10 < m \leqslant 20$	$20 < m \leqslant 30$	$30 < m \leqslant 40$	$40 < m \leqslant 50$	$50 < m \leqslant 60$
Frequency	4	12	14	22	18	10

(a) Complete the cumulative frequency table.

Mark (m)	$m \leqslant 10$	$m \leqslant 20$	$m \leqslant 30$	$m \leqslant 40$	$m \leqslant 50$	$m \leqslant 60$
Cumulative frequency						

[1]

(b) Draw a cumulative frequency curve for this information.



[2]

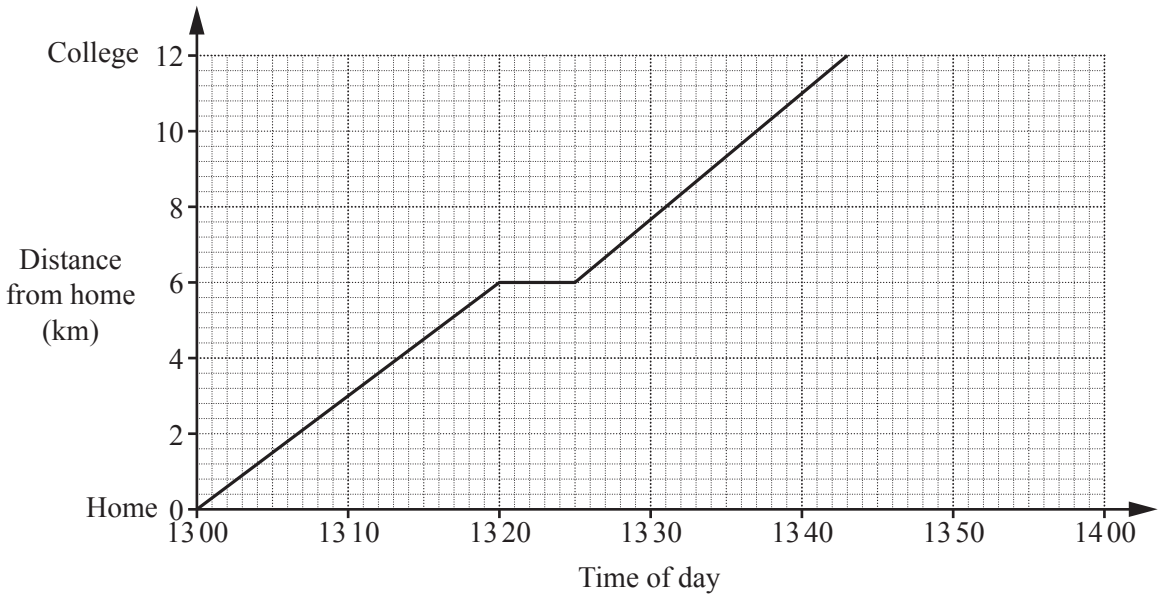
(c) The pass mark for the test is 45.
Use your cumulative frequency curve to estimate the number of students who passed.

Answer .....[2]

22 Varun leaves home at 13 00 and cycles 12 km to college.
The distance-time graph below shows Varun's journey.

His sister Kiran leaves college at 13 10 and cycles home on the same road at a constant speed of 16 km/h.

(a) On the same grid, draw the distance-time graph for Kiran's journey.



[2]

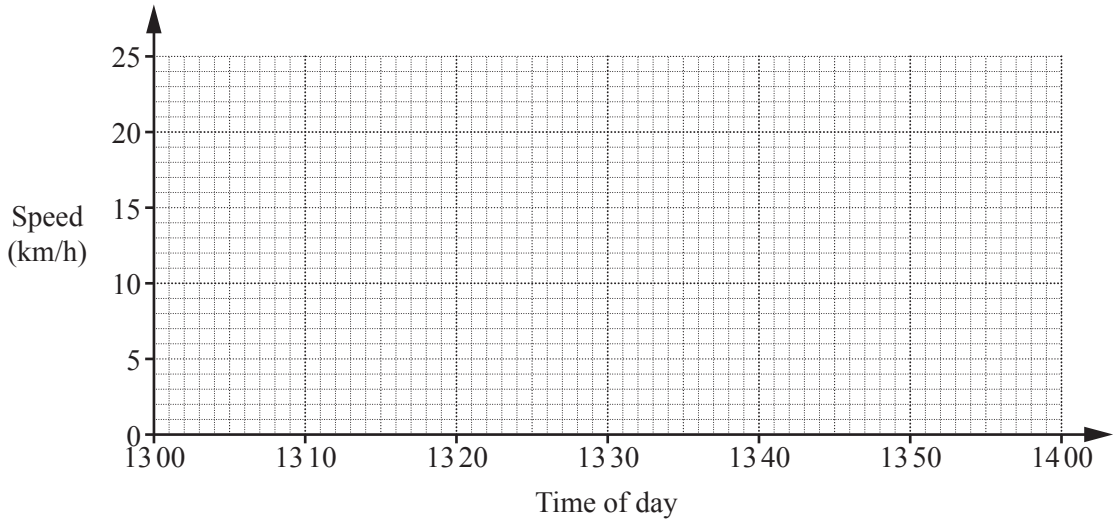
(b) How far was Kiran from home when she passed Varun?

Answer .....km [1]

(c) Find Varun's speed for the first 20 minutes of his journey.
Give your answer in kilometres per hour.

Answer .....km/h [1]

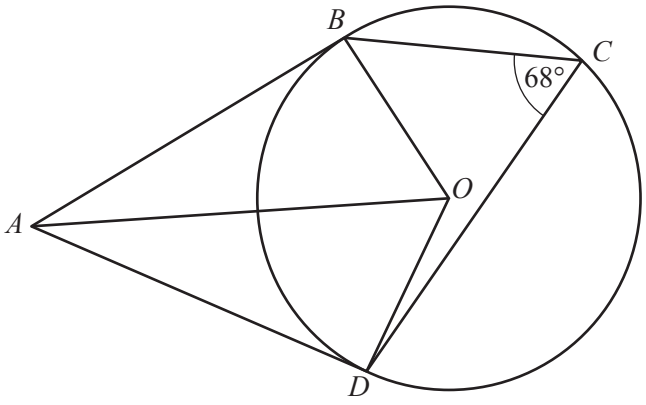
(d) On the grid below, draw the speed-time graph for Varun's journey.



[2]

23

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B, *C* and *D* are points on the circle, centre *O*.
BA and *DA* are tangents to the circle at *B* and *D*.

(a) Show that triangles *ABO* and *ADO* are congruent.

.....

.....

.....

.....

.....

..... [3]

(b) What type of special quadrilateral is *ABOD*?

Answer ..... [1]

(c) Angle *BCD* = 68°.

Find angle *BAD*.

Answer Angle *BAD* = ... [2]

Question 24 is printed on the following page.

24 **(a)** Expand and simplify $(t - 5)(t + 3)$.

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Answer ..... [1]

(b) Factorise $64x^2 - 9y^2$.

Answer ..... [1]

(c) Factorise $6ab - 2a - 3a^2 + 4b$.

Answer ..... [2]

(d) **(i)** Write $x^2 - 6x + 3$ in the form $(x - a)^2 + b$.

Answer ..... [1]

(ii) Hence solve $x^2 - 6x + 3 = 0$ leaving your answer in the form $p \pm \sqrt{q}$.

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

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