UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

* 0 7 2 5 0 5 2 7 3 2 *

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

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.

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1 Evaluate

(a) $1.5 - 0.2 \times 4$,

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

(b) $4.2 \div 0.07$.

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

---

2 Express as a single fraction

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

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

(b) $1\frac{1}{5} \div 2\frac{1}{3}$.

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

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3 **(a)** In a town, 11 000 people out of the total population of 50 000 are aged under 18.

What percentage of the population is aged under 18?

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

(b) A company employing 1200 workers increased the number of workers by 15%.

How many workers does it now employ?

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

---

4 Evaluate

(a) $9^1 + 9^0$,

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

(b) $\left(\frac{1}{9}\right)^{\frac{1}{2}}$.

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

---

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

$$\frac{48.9 \times 0.207^2}{3.94}.$$

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Answer ..... [2]

---

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

Answer $(a)\ x =$ .....[1]

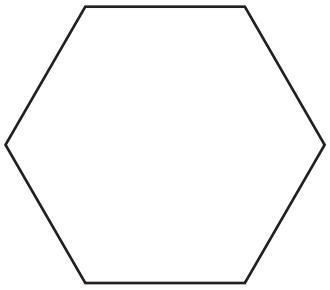
(b) Given that $p = 2t - r$, express t in terms of p and r.

Answer $(b)\ t =$ ..... [1]

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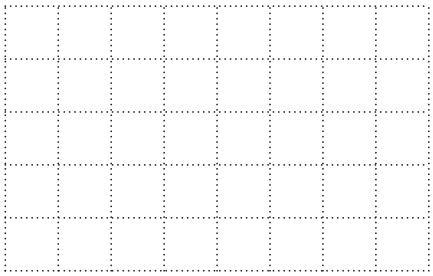
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7 **(a)** On the regular hexagon below, draw all the lines of symmetry.



[1]

(b) On the grid below, draw a quadrilateral with rotational symmetry of order 2.



[1]

---

8 The table shows the record minimum monthly temperatures, in °C, in Vostok and London.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Vostok	–36	–47	–64	–70	–71	–71	–74	–75	–72	–61	–45	–35
London	–10	–9	–8	–2	–1	5	7	6	3	–4	–5	–7

Find

(a) the difference between the temperatures in Vostok and London in July,

Answer (*a*) ..... °C [1]

(b) the difference between the temperatures in Vostok in February and June.

Answer (*b*) ..... °C [1]

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[Turn over

9 Written as a product of prime factors, $168 = 2^3 \times 3 \times 7$.

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(a) Express 140 as a product of its prime factors.

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

(b) Find the highest common factor of 168 and 140.

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

(c) Find the smallest positive integer, n, such that $168n$ is a square number.

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

---

10 **(a)** Jane and Ken share some money in the ratio 5 : 3.
Ken's share is \$16 less than Jane's share.

Find each person's share.

Answer (*a*) Jane \$ .....

Ken \$ ..... [2]

(b) The scale of a map is 1 : 25 000.
The distance between two villages is 10 cm on the map.

Find the actual distance, in kilometres, between the villages.

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

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11 Given that $f(x) = \frac{5 - 2x}{3x}$, find

(a) f(–2),

Answer (*a*) f(–2) = ... [1]

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

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

---

12 It is given that y is inversely proportional to the square of x and that $y = 48$ when $x = \frac{1}{2}$.

Find

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

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

(b) the values of x when $y = 3$.

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

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[Turn over

13 Solve the simultaneous equations.

$$3x + 2y = 7$$
$$x - 3y = 17$$

Answer $x =$ .....

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

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14 A straight line passes through the points $P(-8, 10)$ and $Q(4, 1)$.

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Find

(a) the coordinates of the midpoint of PQ,

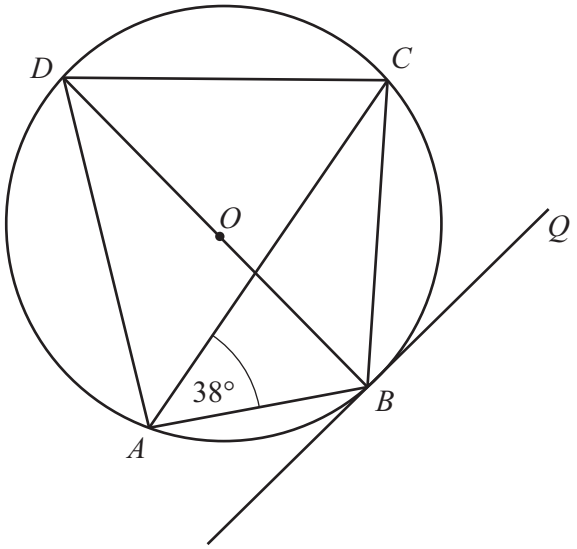
Answer (*a*) (..... , ...) [1]

(b) the equation of PQ.

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

15

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The diagram shows a circle, centre O, passing through A, B, C and D.
BOD is a straight line and $B\hat{A}C = 38°$.
The line BQ is a tangent to the circle at B.

Find

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

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

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

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

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

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

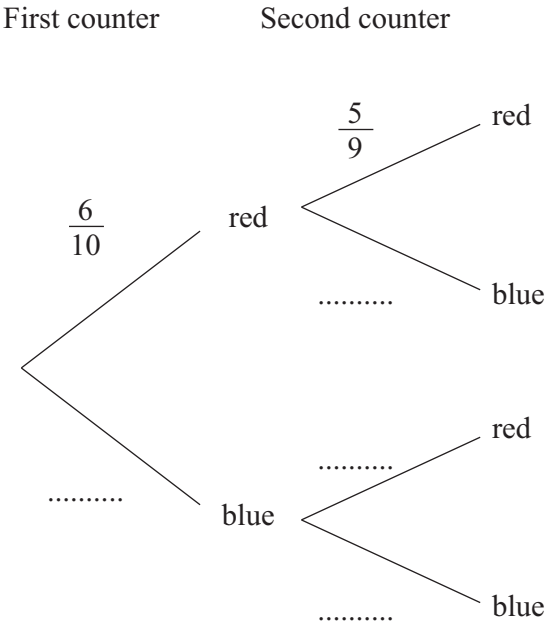
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16 A bag contains 6 red counters and 4 blue counters.
Two counters are taken from the bag at random, without replacement.

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(a) Complete the tree diagram below that represents these events.

Answer (a)



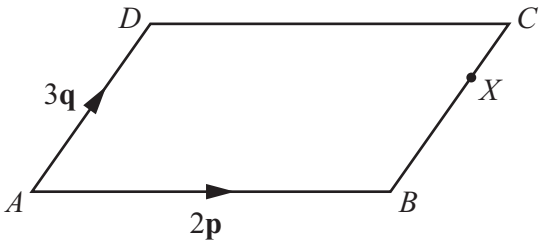
[1]

(b) Expressing your answer as a fraction in its simplest form, calculate the probability that both counters are the same colour.

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

17

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$ABCD$ is a parallelogram.
X is the point on BC such that $BX : XC = 2 : 1$.
$\overrightarrow{AB} = 2\mathbf{p}$ and $\overrightarrow{AD} = 3\mathbf{q}$.

Find, in terms of **p** and **q**,

(a) $\overrightarrow{AC}$,

Answer (*a*) $\overrightarrow{AC}$ = ...[1]

(b) $\overrightarrow{AX}$,

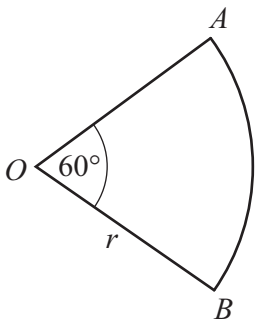
Answer (*b*) $\overrightarrow{AX}$ = ... [1]

(c) $\overrightarrow{XD}$.

Answer (*c*) $\overrightarrow{XD}$ = ... [1]

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18 OAB is the sector of a circle of radius r cm.
$A\hat{O}B = 60°$.



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Find, in its simplest form, an expression in terms of r and π for

(a) the area of the sector,

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

(b) the perimeter of the sector.

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

---

19 $\mathbf{A} = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$ and $\mathbf{B} = \begin{pmatrix} 0 & 2 \\ -1 & 3 \end{pmatrix}$.

Find

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

Answer (*a*) $\begin{pmatrix} & \\ & \end{pmatrix}$ [1]

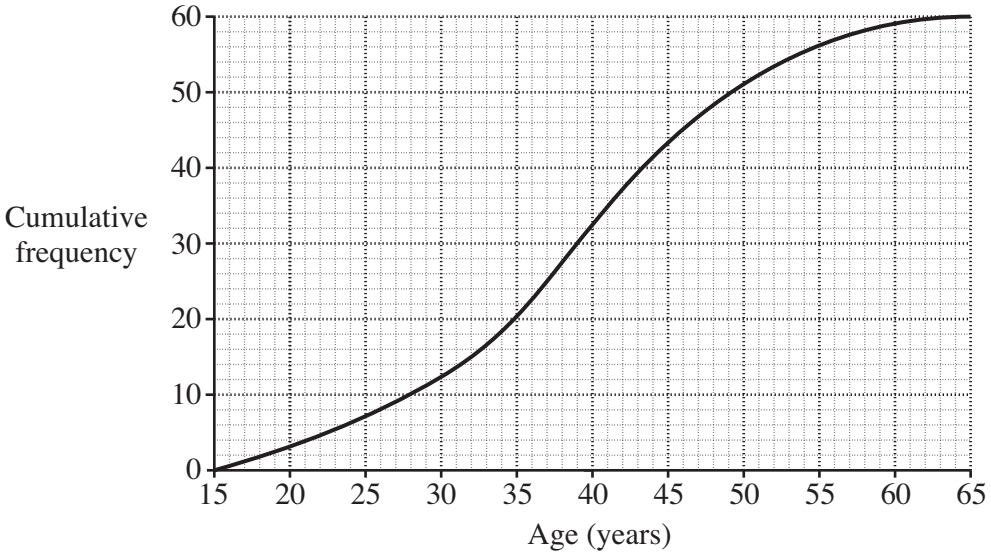
(b) $\mathbf{B}^{-1}$.

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

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20 The graph shows the cumulative frequency curve for the ages of 60 employees.

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Use the graph to estimate

(a) the median,

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

(b) the interquartile range,

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

(c) the number of employees aged over 50.

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

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21 **(a)** Factorise completely

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(i) $3x^2 - 12x$,

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

(ii) $x^2 - xy - 2y^2$.

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

(b) Simplify $\frac{x^2 + 4x}{x^2 - 16}$.

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

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22 **(a)** A box has volume $2.5\,m^3$.

Express this volume in cm^3.

Answer (*a*) ..... cm^3 [1]

(b) John has a length of string.
The string is 4 m long, correct to the nearest 10 cm.

(i) Write down the lower bound of the length of the string.
Give your answer in centimetres.

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

(ii) John cuts off ten pieces of string.
Each piece is 5 cm long, correct to the nearest centimetre.

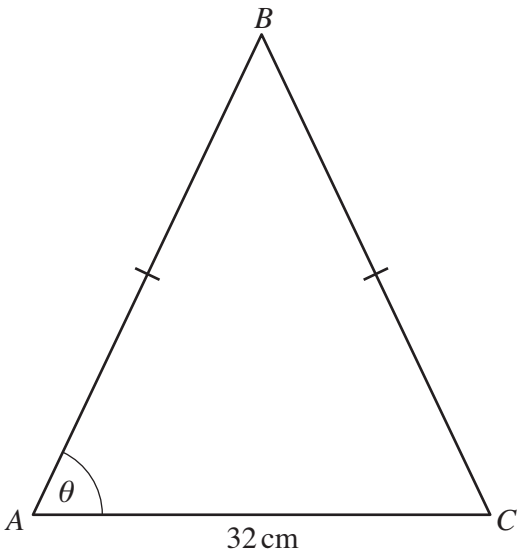
Find the minimum possible length of string remaining.
Give your answer in centimetres.

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

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sin θ	$\frac{15}{17}$
cos θ	$\frac{8}{17}$
tan θ	$\frac{15}{8}$

ABC is an isosceles triangle with $AB = BC$ and $AC = 32\,\text{cm}$.

Using as much information from the table as is necessary, calculate

(a) *AB*,

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

(b) the area of triangle *ABC*.

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

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[Turn over

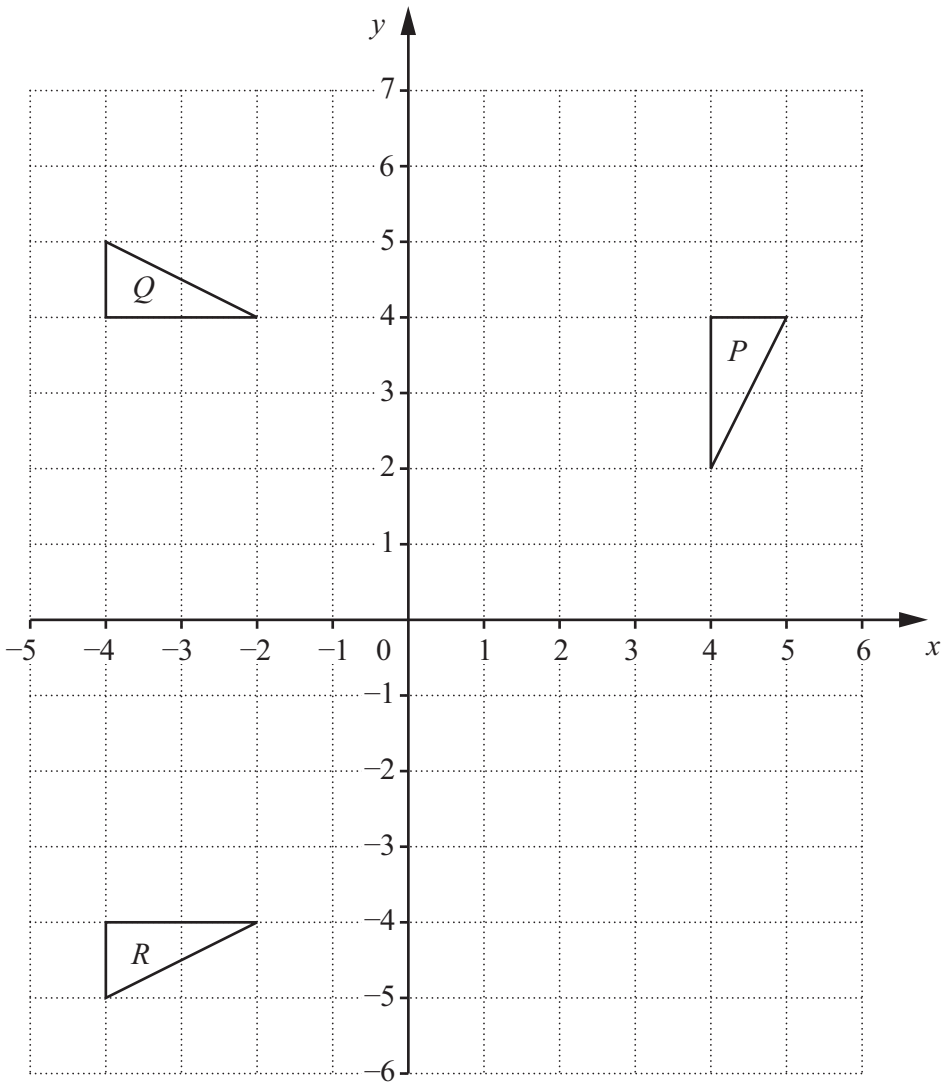
24 The diagram below shows three triangles, P, Q and R.

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(a) Triangle T is the image of triangle P under an enlargement with centre (5, 2) and scale factor 2.

Draw and label triangle T on the diagram.

Answer (a)



[2]

(b) Describe fully the **single** transformation that maps triangle P onto triangle Q.

Answer (b) .....

..... [2]

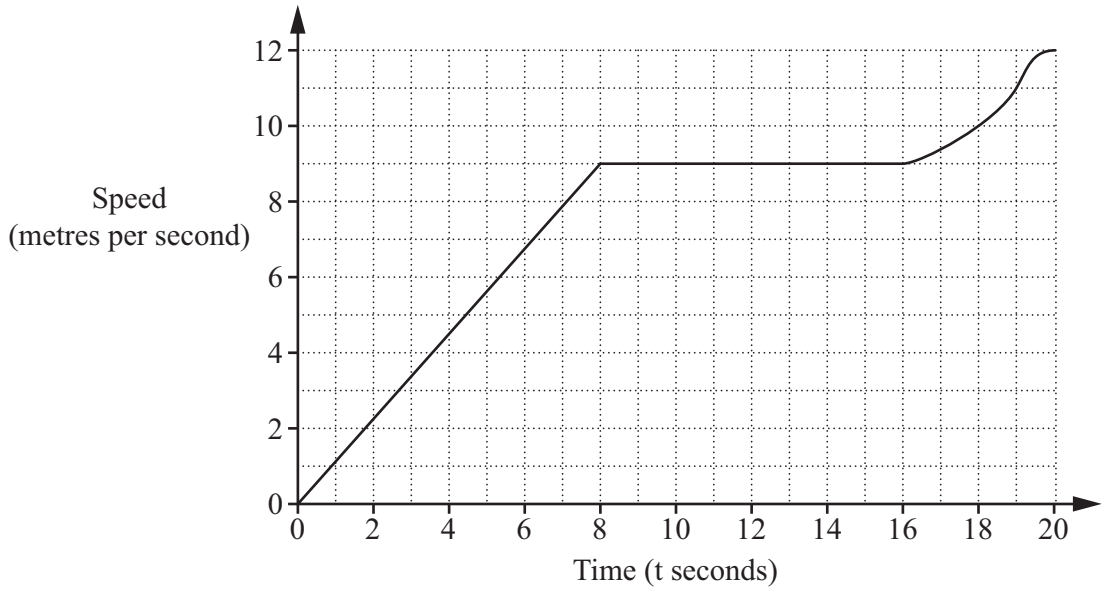
(c) Find the matrix representing the transformation that maps triangle Q onto triangle R.

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

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25 The diagram is the speed-time graph for the first 20 seconds of a cyclist's journey.

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(a) Calculate the distance travelled in the first 16 seconds.

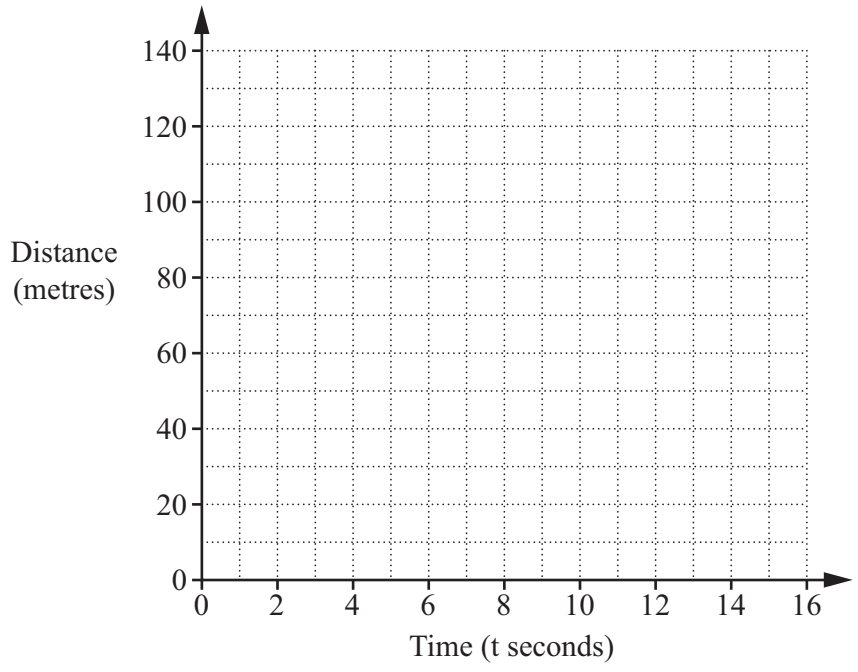
Answer (*a*) ..... m [1]

(b) By drawing a tangent, find the acceleration of the cyclist when $t = 18$.

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

(c) On the grid in the answer space, sketch the distance-time graph for the first 16 seconds of the cyclist's journey.

Answer (c)



[2]

26 A map is drawn to a scale of 1 cm to 5 km.
The diagram below shows the positions of two radio masts *A* and *B* on the map.

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Answer (a), (b)



(a) A third radio mast, *C*, is north of the line *AB*.
It is 40 km from *A* and 50 km from *B*.

Using ruler and compasses, construct triangle *ABC*. [2]

(b) A house *D*, inside the triangle, is more than 35 km from *B* and closer to *B* than to *A*.

Shade the region on your diagram that represents the possible positions of the house *D*. [3]

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