UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

2073403047

MATHEMATICS **0580/22**

Paper 2 (Extended) **May/June 2010**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Mathematical tables (optional)
Geometrical instruments
Tracing paper (optional)

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 below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

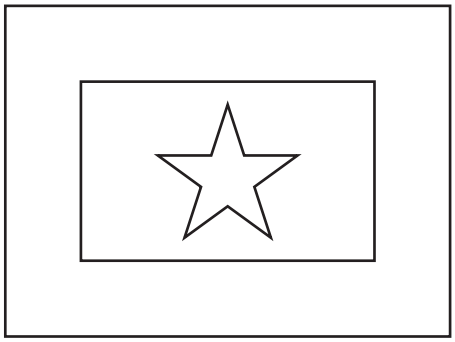
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 70.

This document consists of **12** printed pages.

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1



For the **diagram**, write down

(a) the order of rotational symmetry,

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

(b) the number of lines of symmetry.

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

---

2 Calculate $3\sin 120° - 4(\sin 120°)^3$.

Answer ..... [2]

---

3 Write the following in order of size, **smallest** first.

$$\frac{2}{\sqrt{3}} \qquad 2-\sqrt{3} \qquad \sqrt{3} \qquad 2-\frac{\sqrt{3}}{2}$$

Answer ..... < ..... < ..... < ..... [2]

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4 Write as a single fraction $\frac{3a}{8} + \frac{4}{5}$.

Answer ..... [2]

---

5 Write $2^8 \times 8^2 \times 4^{-2}$ in the form 2^n.

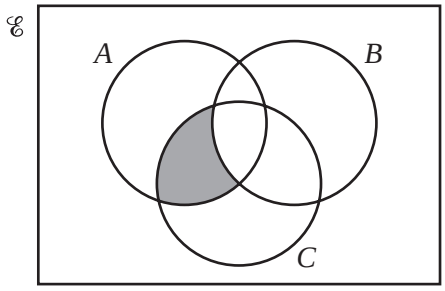
Answer ..... [2]

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6 Change 64 square metres into square millimetres.
Give your answer in standard form.

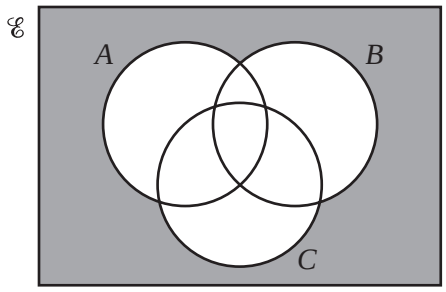
Answer ..... mm^2 [2]

7

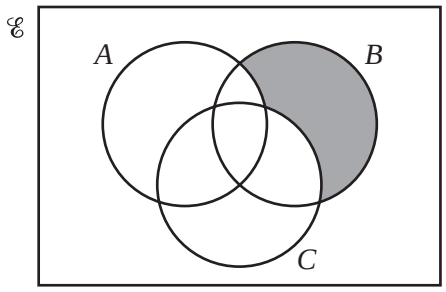


The shaded area in the diagram shows the set $(A \cap C) \cap B'$.

Write down the set shown by the shaded area in each diagram below.



.....

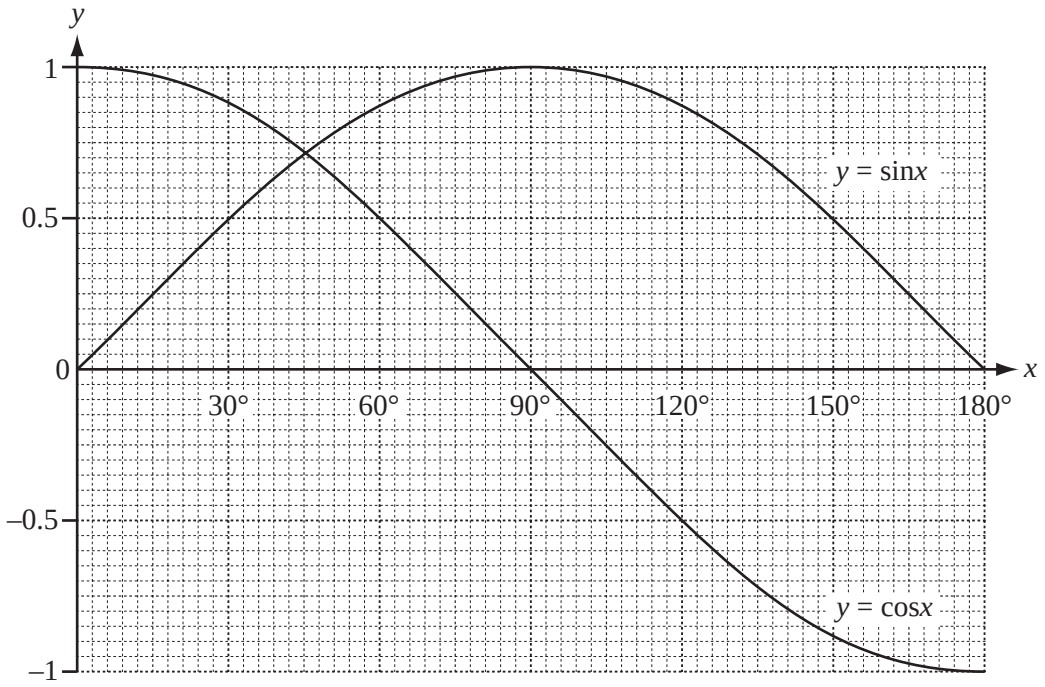


.....

[2]

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8



The diagram shows accurate graphs of $y = \sin x$ and $y = \cos x$ for $0° \leqslant x \leqslant 180°$.

Use the graph to solve the equations

(a) $\sin x - \cos x = 0$,

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

(b) $\sin x - \cos x = 0.5$.

Answer(b) $x =$ ..... [2]

---

9 A fence is made from 32 identical pieces of wood, each of length 2 metres correct to the nearest centimetre.

Calculate the lower bound for the total length of the wood used to make this fence.

Write down your full calculator display.

Answer ..... m [3]

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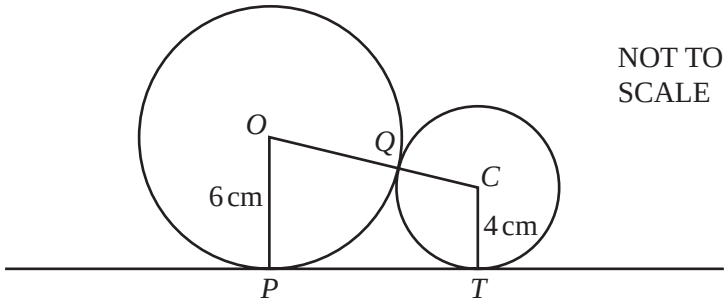
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10 Make x the subject of the formula.

$$P = \frac{x + 3}{x}$$

Answer $x =$ [4]

11



Two circles, centres O and C, of radius 6 cm and 4 cm respectively, touch at Q. PT is a tangent to both circles.

(a) Write down the distance OC.

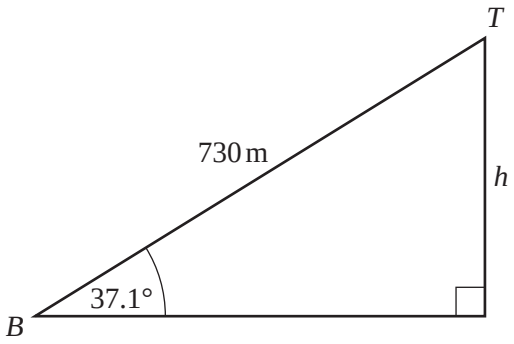
Answer(a) $OC =$ ..... cm [1]

(b) Calculate the distance PT.

Answer(b) $PT =$ ..... cm [3]

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12 The diagram represents the ski lift in Queenstown New Zealand.



NOT TO SCALE

(a) The length of the cable from the bottom, *B*, to the top, *T*, is 730 metres.

The angle of elevation of *T* from *B* is 37.1°.

Calculate the change in altitude, *h* metres, from the bottom to the top.

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

(b) The lift travels along the cable at 3.65 metres per second.

Calculate how long it takes to travel from *B* to *T*.

Give your answer in minutes and seconds.

Answer(b) ..... min ..... s [2]

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$$\mathbf{M} = \begin{pmatrix} 6 & -3 \\ 4 & 5 \end{pmatrix}\begin{pmatrix} x \\ 1 \end{pmatrix}.$$

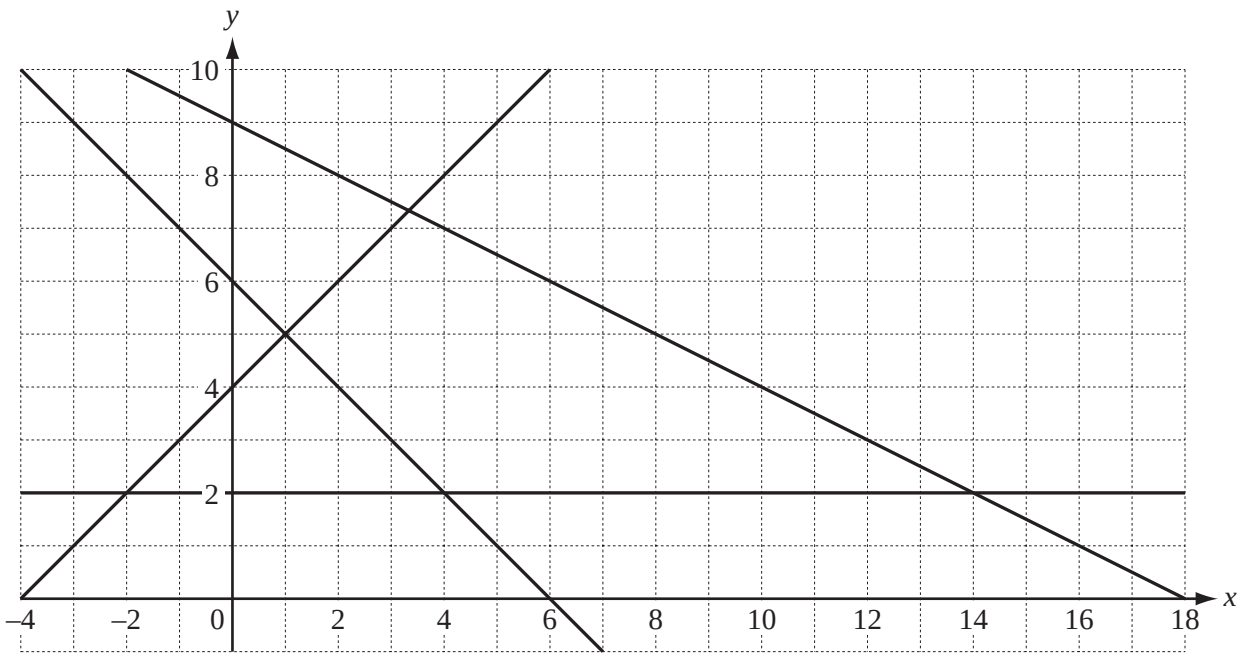
(a) Find the matrix **M**.

Answer(a) **M** = [2]

(b) Simplify $(x \quad 1)\,\mathbf{M}$.

Answer(b) [2]

14

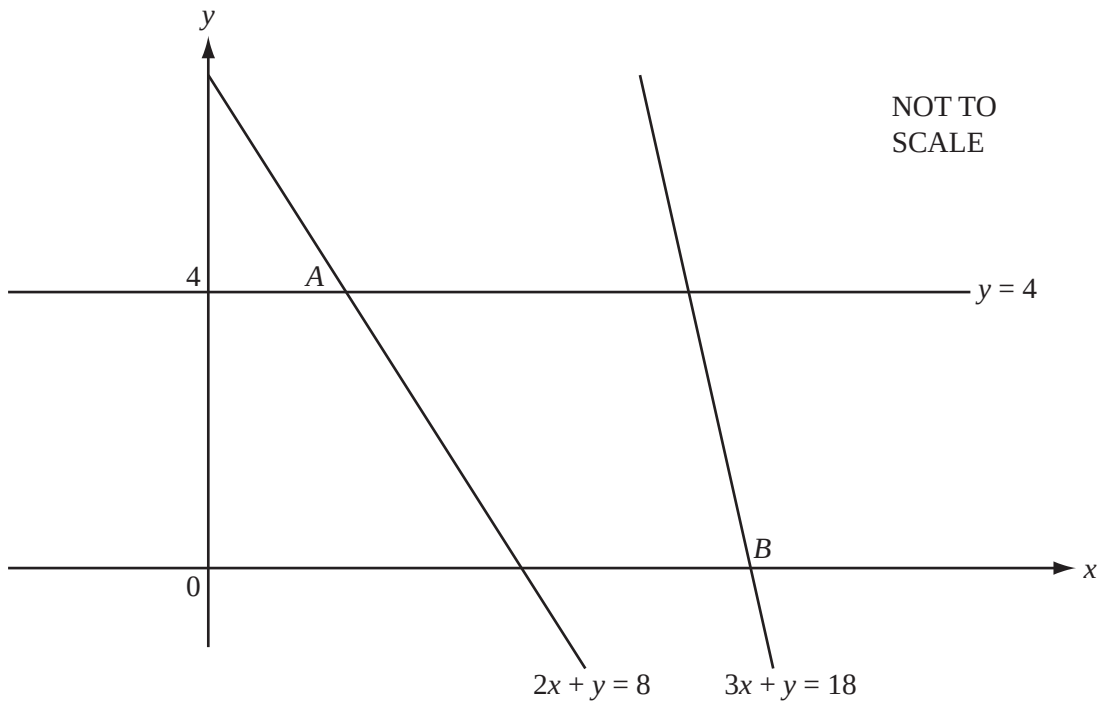


By shading the **unwanted** regions of the grid above, find and label the region R which satisfies the following four inequalities.

$y \geqslant 2$ $\quad x + y \geqslant 6$ $\quad y \leqslant x + 4$ $\quad x + 2y \leqslant 18$ [4]

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15



(a) The line $y = 4$ meets the line $2x + y = 8$ at the point A.
Find the co-ordinates of A.

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

(b) The line $3x + y = 18$ meets the x axis at the point B.
Find the co-ordinates of B.

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

(c) **(i)** Find the co-ordinates of the mid-point M of the line joining A to B.

Answer(c)(i) M (..... , ...) [1]

(ii) Find the equation of the line through M parallel to $3x + y = 18$.

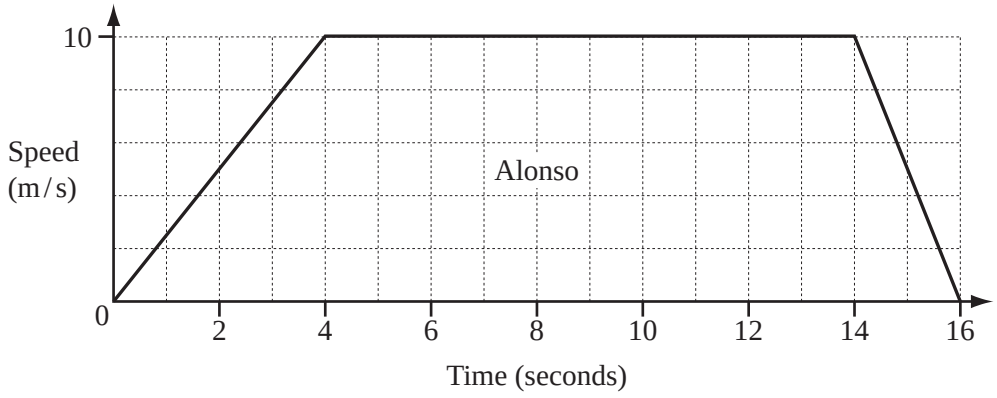
Answer(c)(ii) ..... [2]

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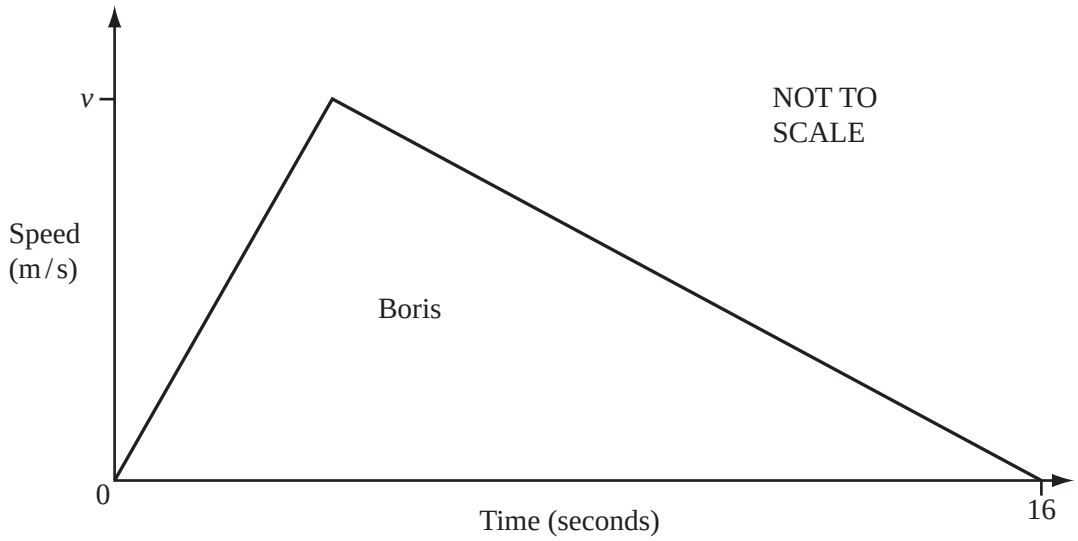
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16 The graphs show the speeds of two cyclists, Alonso and Boris.

Alonso accelerated to 10 m/s, travelled at a steady speed and then slowed to a stop.



Boris accelerated to his maximum speed, v m/s, and then slowed to a stop.



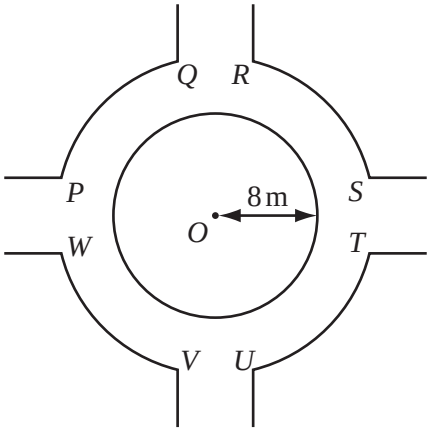
Both cyclists travelled the same distance in the 16 seconds.

Calculate the maximum speed for Boris.
Show all your working.

Answer ..... m/s [5]

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17



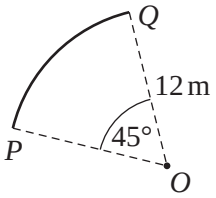
NOT TO SCALE

The diagram shows the junction of four paths.
In the junction there is a circular area covered in grass.
This circle has centre O and radius 8 m.

(a) Calculate the area of grass.

Answer(a) ..... m^2 [2]

(b)



NOT TO SCALE

The arc PQ and the other three identical arcs, RS, TU and VW are each part of a circle, centre O, radius 12m.
The angle POQ is 45°.
The arcs PQ, RS, TU, VW and the circumference of the circle in **part(a)** are painted white.
Calculate the total length painted white.

Answer(b) ..... m [4]

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18 **(a)** $f(x) = 1 - 2x$.

(i) Find f(-5).

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

(ii) $g(x) = 3x - 2$.

Find $gf(x)$. Simplify your answer.

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

(b) $h(x) = x^2 - 5x - 11$.

Solve $h(x) = 0$.

Show all your working and give your answer correct to 2 decimal places.

Answer(b) $x =$ ..... or $x =$ ..... [4]

Question 19 is printed on the next page.

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19 The braking distance, d metres, for Alex's car travelling at v km/h is given by the formula

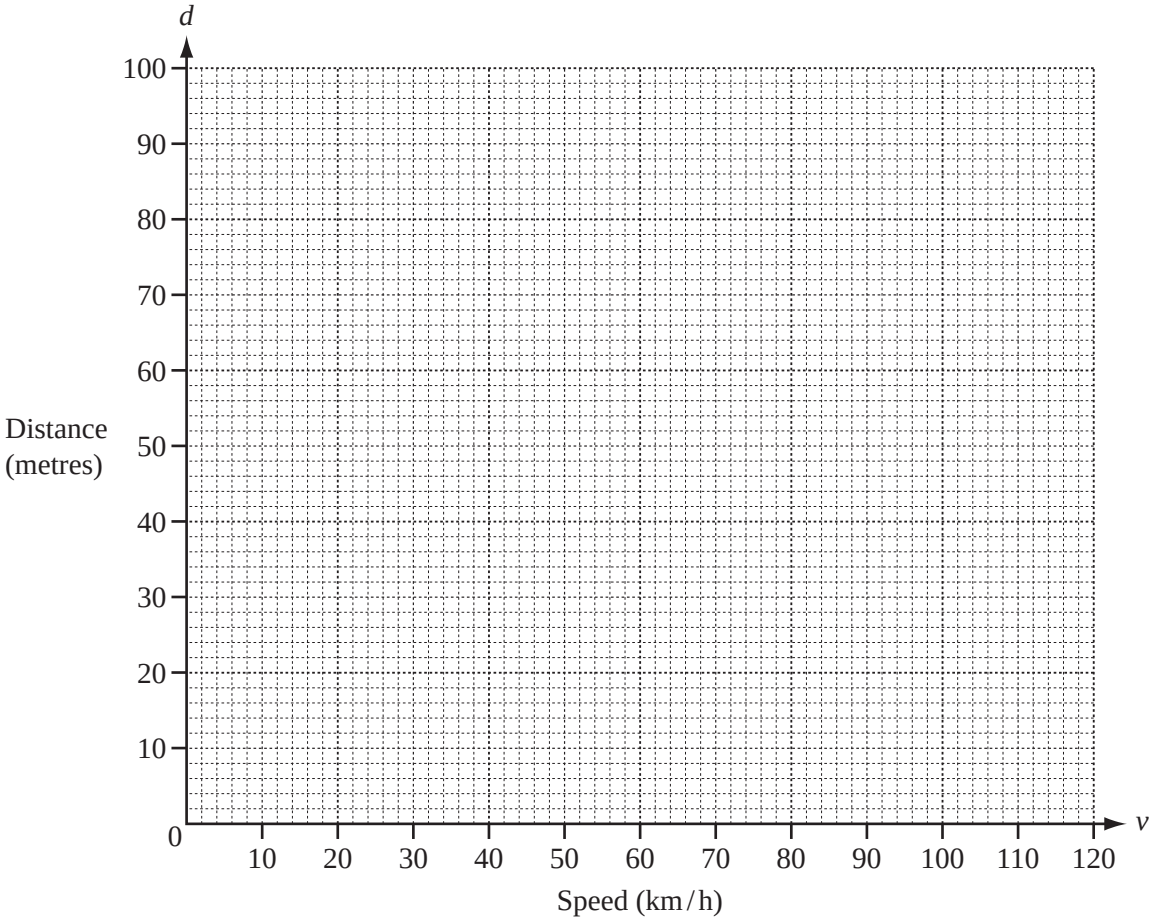
$$200d = v(v + 40).$$

(a) Calculate the missing values in the table.

v (km/h)	0	20	40	60	80	100	120
d (metres)	0		16		48		96

[2]

(b) On the grid below, draw the graph of $200d = v(v + 40)$ for $0 \leqslant v \leqslant 120$.



[3]

(c) Find the braking distance when the car is travelling at 110 km/h.

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

(d) Find the speed of the car when the braking distance is 80 m.

Answer(d) ..... km/h [1]

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