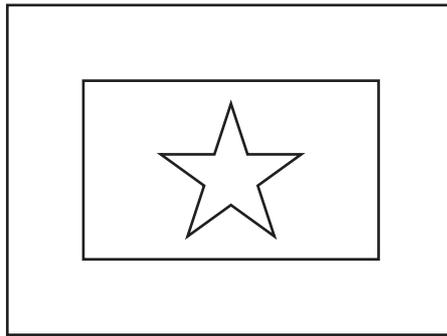


1



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 $3\sin 120^\circ - 4(\sin 120^\circ)^3$.

Answer [2]

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

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

$$2 - \sqrt{3}$$

$$\sqrt{3}$$

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

Answer < < < [2]

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

Answer [2]

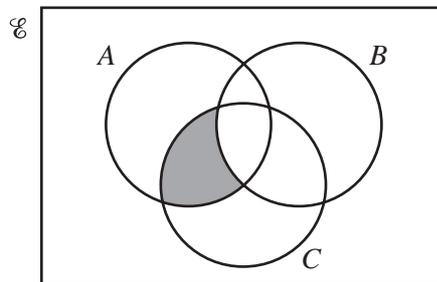
5 Write $2^8 \times 8^2 \times 4^{-2}$ in the form 2^n .

Answer [2]

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

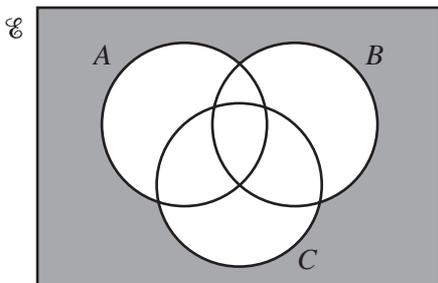
Answer mm² [2]

7

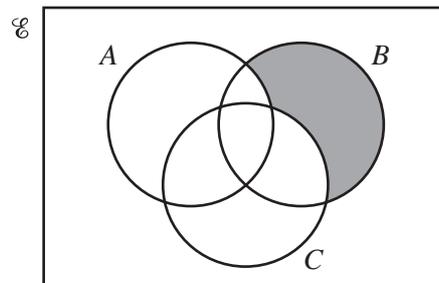


The shaded area in the diagram shows the set $(A \cap C) \cap B'$.

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



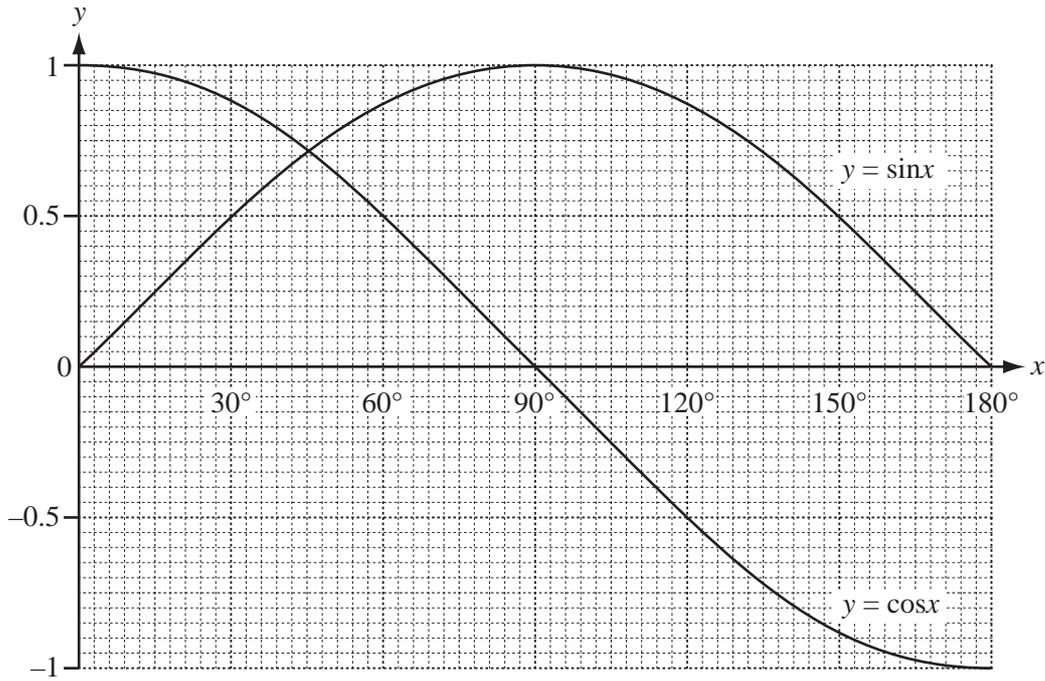
.....



.....

[2]

8



The diagram shows accurate graphs of $y = \sin x$ and $y = \cos x$ for $0^\circ \leq x \leq 180^\circ$.

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]

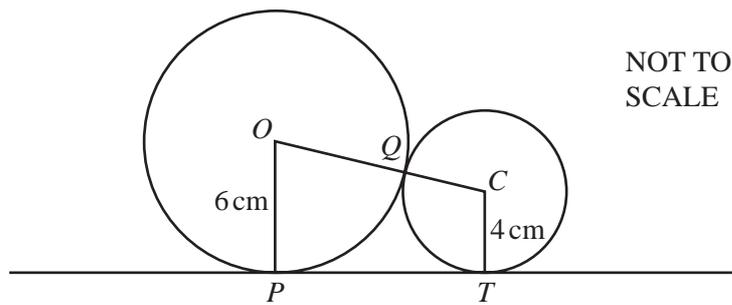
10 Make x the subject of the formula.

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

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.

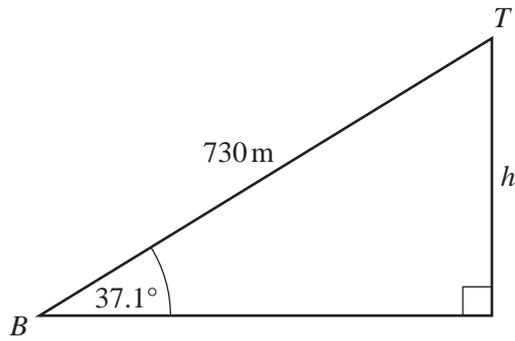
(a) Write down the distance OC .

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

(b) Calculate the distance PT .

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

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



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- (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]

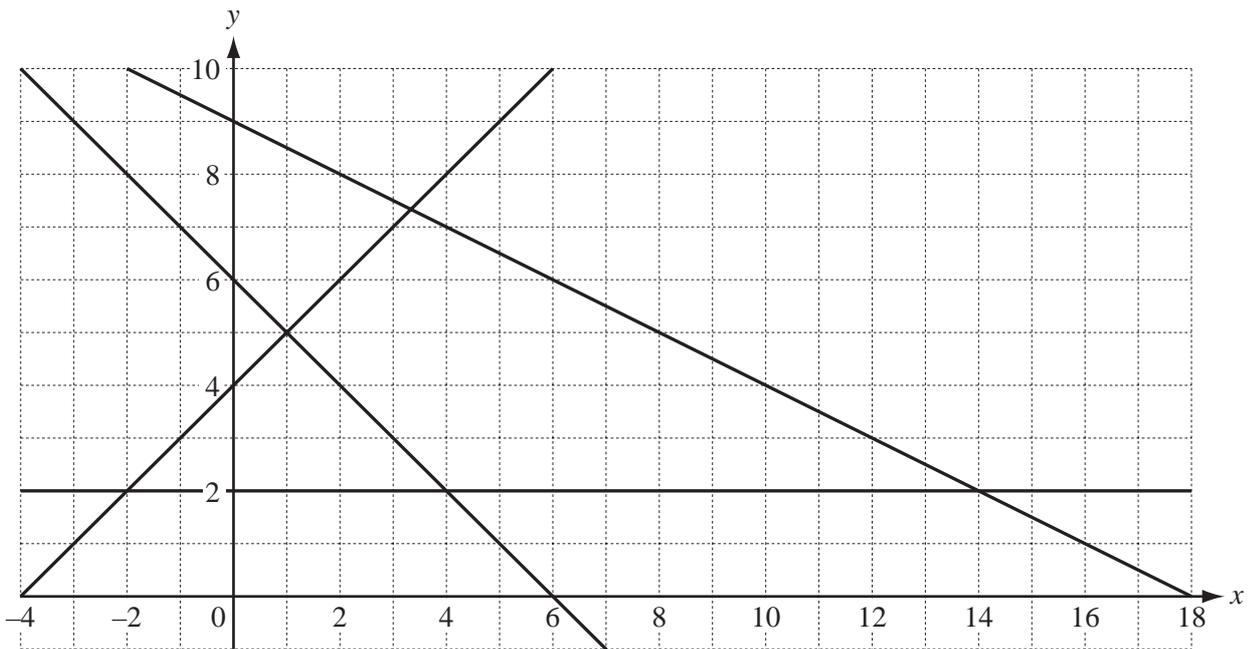
13

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

(a) Find the matrix \mathbf{M} .Answer(a) $\mathbf{M} =$ [2](b) Simplify $(x \ 1) \mathbf{M}$.

Answer(b) [2]

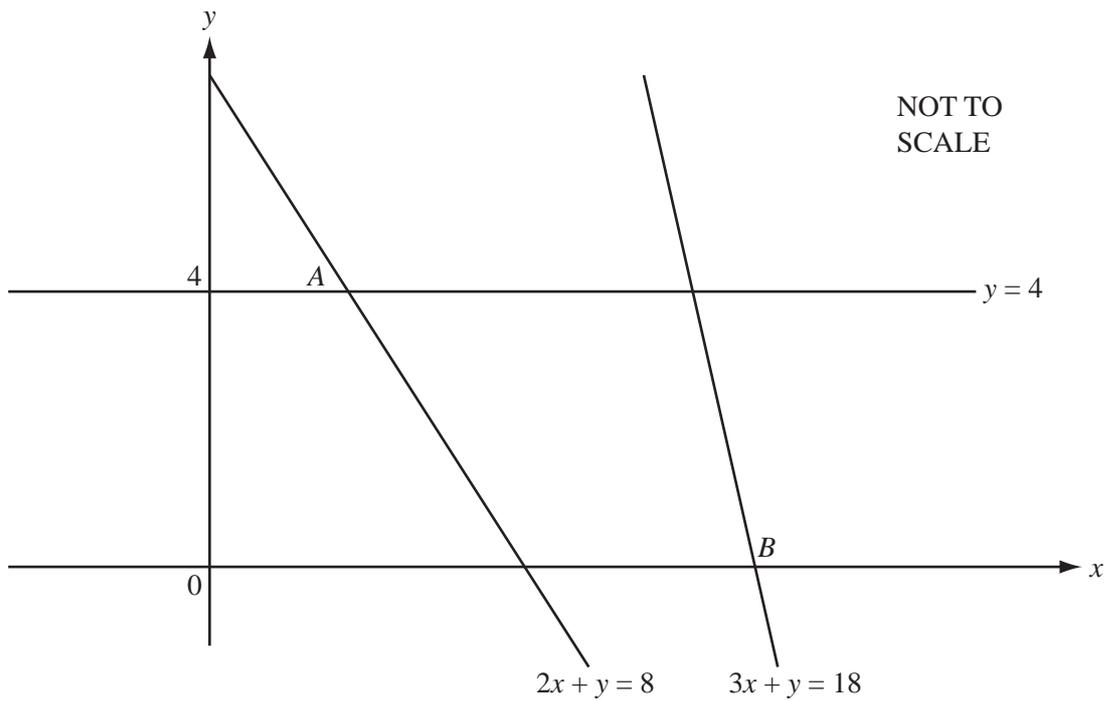
14



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

$$y \geq 2 \qquad x + y \geq 6 \qquad y \leq x + 4 \qquad x + 2y \leq 18 \qquad [4]$$

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 .

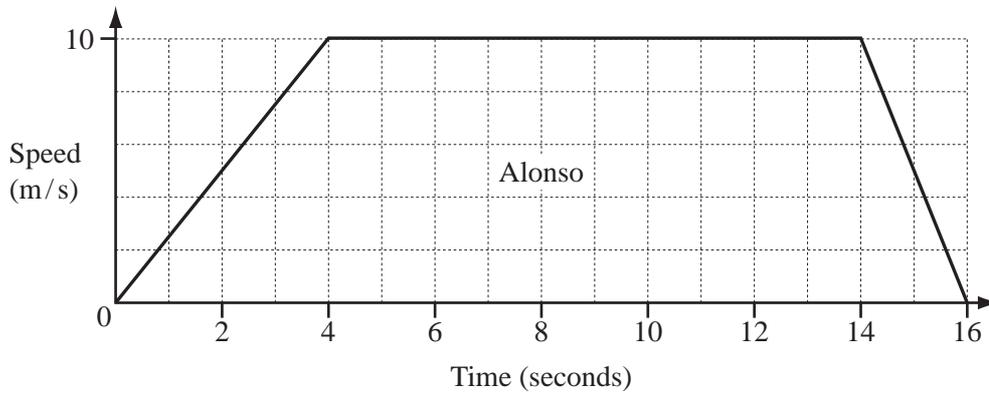
Answer(c)(i) M (..... ,) [1]

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

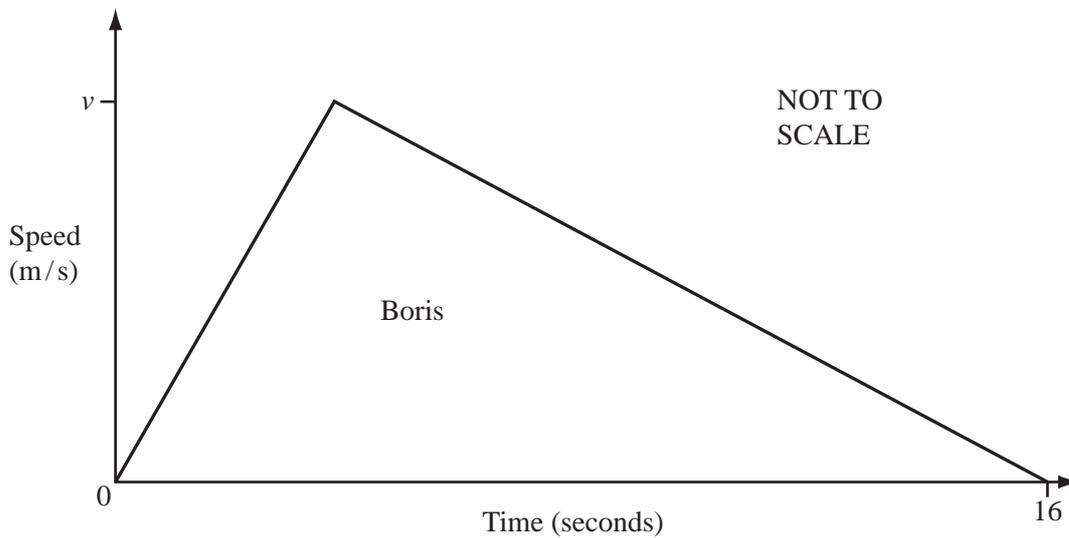
Answer(c)(ii) [2]

- 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.

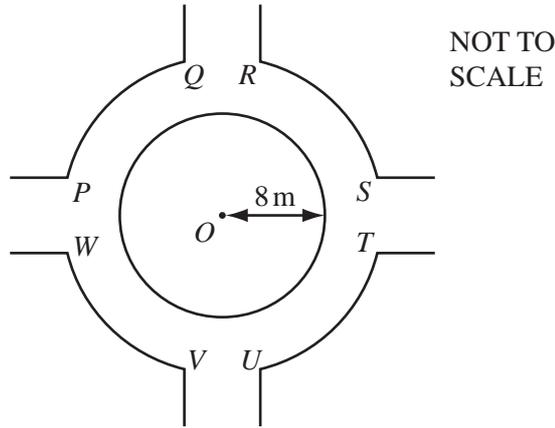


Both cyclists travelled the same distance in the 16 seconds.

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

Answer m/s [5]

17

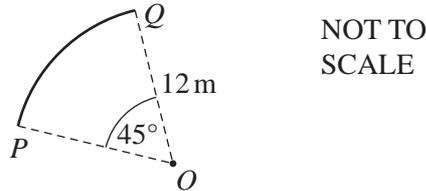


The diagram shows the junction of four paths.
In the junction there is a circular area covered in grass.
This circle has centre O and radius 8 m.

(a) Calculate the area of grass.

Answer(a) m² [2]

(b)



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]

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.

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

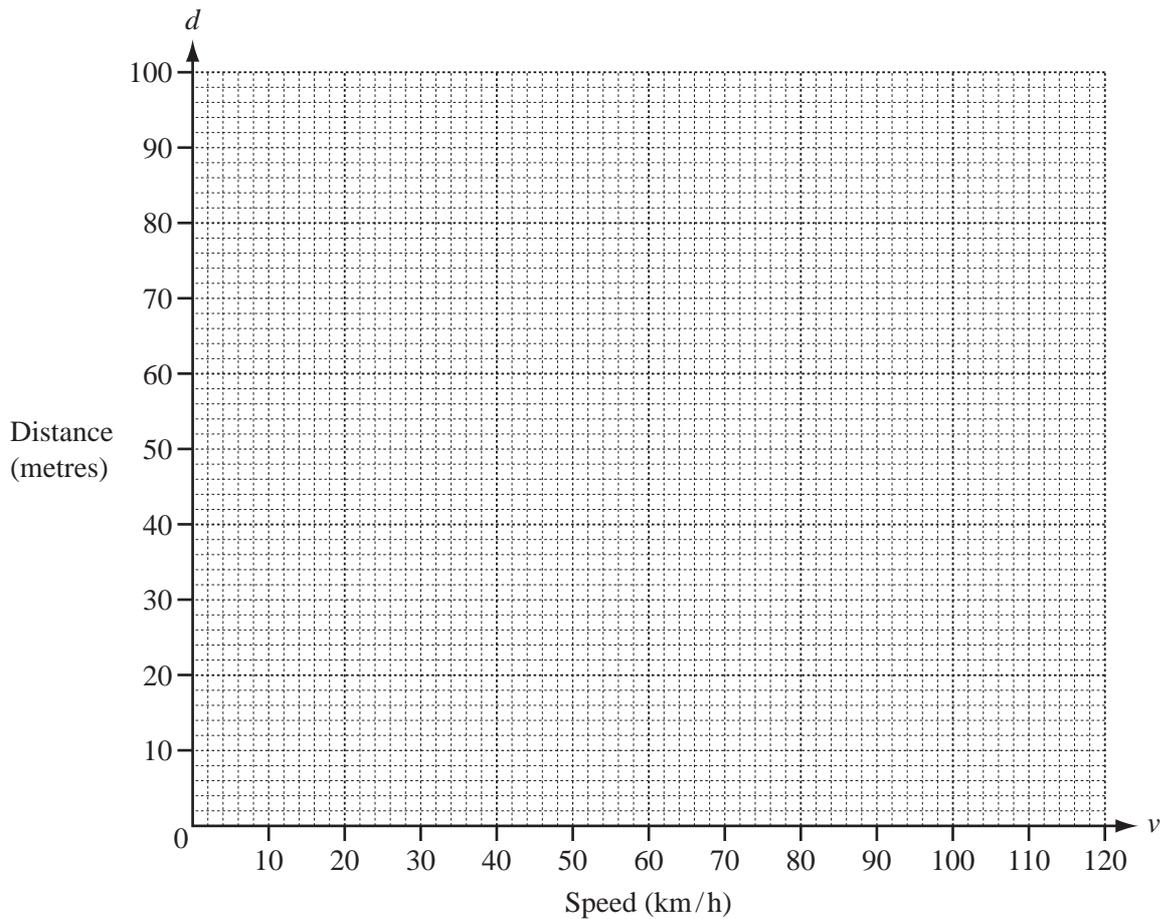
$$200d = v(v + 40).$$

(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 $0 \leq v \leq 120$.



[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]