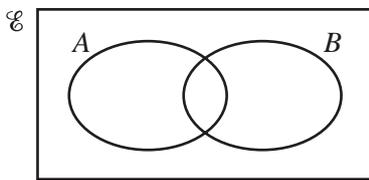


- 1 A concert hall has 1540 seats.

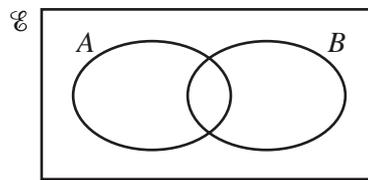
Calculate the number of people in the hall when 55% of the seats are occupied.

Answer [1]

- 2 Shade the required region on each Venn diagram.



$A \cup B'$



$(A \cap B)'$

[2]

- 3 Calculate $81^{0.25} \div 4^{-2}$.

Answer [2]

- 4 (a) Find m when $4^m \times 4^2 = 4^{12}$.

Answer(a) $m =$ [1]

- (b) Find p when $6^p \div 6^5 = \sqrt{6}$.

Answer(b) $p =$ [1]

5 A hummingbird beats its wings 24 times per second.

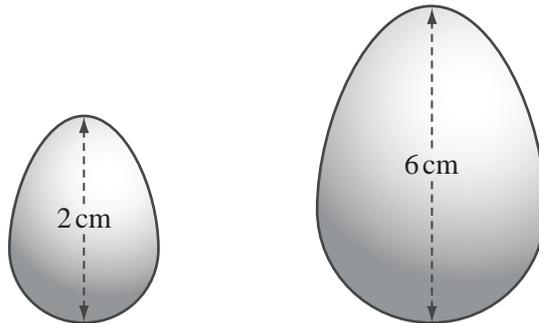
(a) Calculate the number of times the hummingbird beats its wings in one hour.

Answer(a) [1]

(b) Write your answer to **part (a)** in standard form.

Answer(b) [1]

6



NOT TO
SCALE

A company makes solid chocolate eggs and their shapes are mathematically similar.

The diagram shows eggs of height 2 cm and 6 cm.

The mass of the small egg is 4 g.

Calculate the mass of the large egg.

Answer g [2]

7 Find the length of the straight line from $Q(-8, 1)$ to $R(4, 6)$.

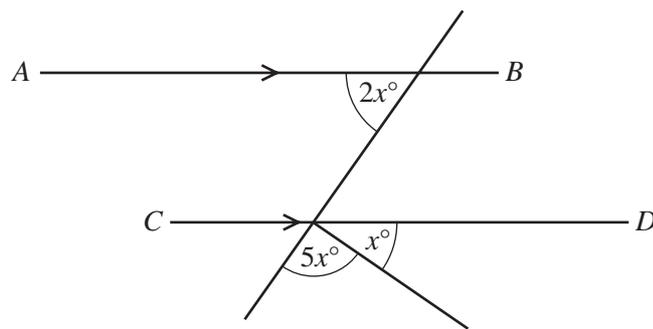
Answer $QR =$ [3]

8 Calculate the radius of a sphere with volume 1260 cm^3 .

[The volume, V , of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

Answer cm [3]

9



NOT TO
SCALE

AB is parallel to CD .
Calculate the value of x .

Answer $x =$ [3]

10 Solve the simultaneous equations.

$$\begin{aligned} 3x + y &= 30 \\ 2x - 3y &= 53 \end{aligned}$$

Answer $x =$

$y =$ [3]

- 11 A rectangular photograph measures 23.3 cm by 19.7 cm, each correct to 1 decimal place. Calculate the lower bound for

(a) the perimeter,

Answer(a) cm [2]

(b) the area.

Answer(b) cm² [1]

- 12 A train leaves Barcelona at 21 28 and takes 10 hours and 33 minutes to reach Paris.

(a) Calculate the time the next day when the train arrives in Paris.

Answer(a) [1]

(b) The distance from Barcelona to Paris is 827 km.

Calculate the average speed of the train in kilometres per hour.

Answer(b) km/h [3]

13 The scale on a map is 1: 20 000.

- (a) Calculate the actual distance between two points which are 2.7 cm apart on the map.
Give your answer in kilometres.

Answer(a) km [2]

- (b) A field has an area of $64\,400\text{ m}^2$.
Calculate the area of the field on the map in cm^2 .

Answer(b) cm^2 [2]

14 Solve the equation $2x^2 + 3x - 6 = 0$.
Show all your working and give your answers correct to 2 decimal places.

Answer $x =$ or $x =$ [4]

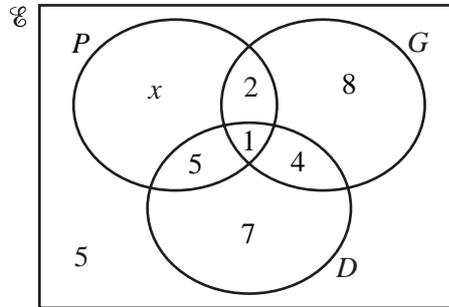
- 15 A teacher asks 36 students which musical instruments they play.

$$P = \{\text{students who play the piano}\}$$

$$G = \{\text{students who play the guitar}\}$$

$$D = \{\text{students who play the drums}\}$$

The Venn diagram shows the results.



- (a) Find the value of x .

Answer(a) $x =$ [1]

- (b) A student is chosen at random.

Find the probability that this student

- (i) plays the drums but **not** the guitar,

Answer(b)(i) [1]

- (ii) plays only 2 different instruments.

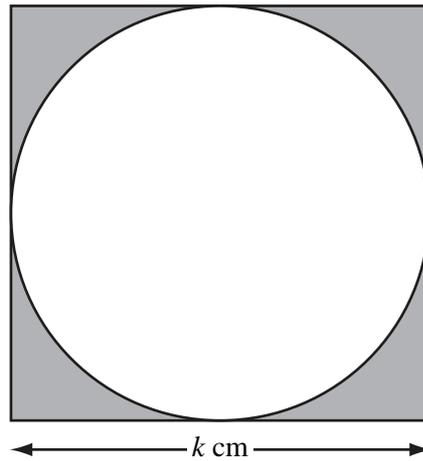
Answer(b)(ii) [1]

- (c) A student is chosen at random from those who play the guitar.

Find the probability that this student plays no other instrument.

Answer(c) [1]

16



The diagram shows a square of side k cm.

The circle inside the square touches all four sides of the square.

(a) The shaded area is A cm².

Show that $4A = 4k^2 - \pi k^2$.

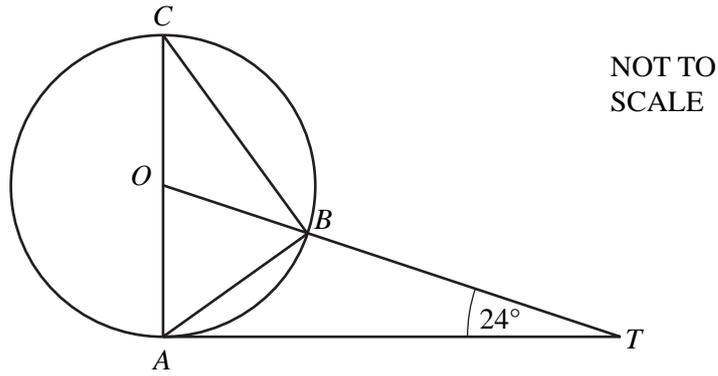
Answer (a)

[2]

(b) Make k the subject of the formula $4A = 4k^2 - \pi k^2$.

Answer(b) $k =$ [3]

17



A , B and C are points on a circle, centre O .
 TA is a tangent to the circle at A and OBT is a straight line.
 AC is a diameter and angle $OTA = 24^\circ$.

Calculate

(a) angle AOT ,

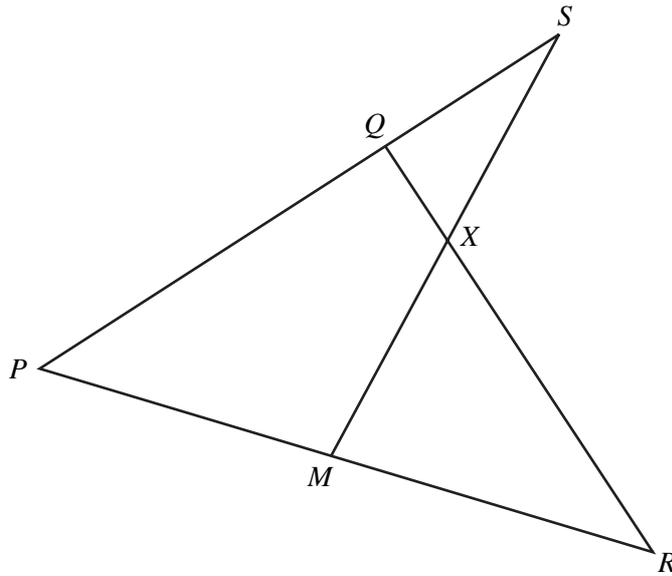
Answer(a) Angle $AOT = \dots\dots\dots$ [2]

(b) angle ACB ,

Answer(b) Angle $ACB = \dots\dots\dots$ [1]

(c) angle ABT .

Answer(c) Angle $ABT = \dots\dots\dots$ [2]



NOT TO SCALE

In the diagram, PQS , PMR , MXS and QXR are straight lines.

$PQ = 2 QS$.

M is the midpoint of PR .

$QX : XR = 1 : 3$.

$\vec{PQ} = \mathbf{q}$ and $\vec{PR} = \mathbf{r}$.

(a) Find, in terms of \mathbf{q} and \mathbf{r} ,

(i) \vec{RQ} ,

Answer(a)(i) $\vec{RQ} = \dots\dots\dots$ [1]

(ii) \vec{MS} .

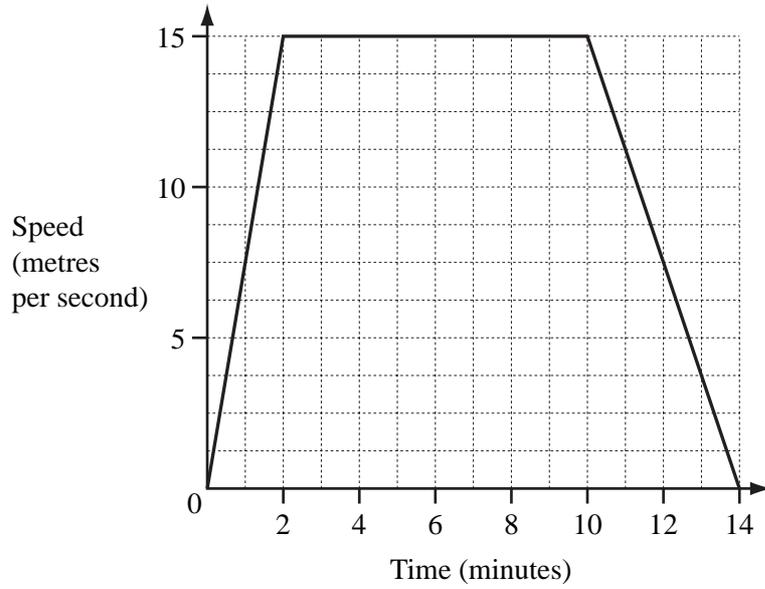
Answer(a)(ii) $\vec{MS} = \dots\dots\dots$ [1]

(b) By finding \vec{MX} , show that X is the midpoint of MS .

Answer (b)

[3]

19



The diagram shows the speed-time graph of a train journey between two stations. The train accelerates for two minutes, travels at a constant maximum speed, then slows to a stop.

(a) Write down the number of **seconds** that the train travels at its constant maximum speed.

Answer(a) s [1]

(b) Calculate the distance between the two stations **in metres**.

Answer(b) m [3]

(c) Find the acceleration of the train in the **first two minutes**.
Give your answer in **m/s²**.

Answer(c) m/s² [2]

20

$f(x) = x^3$

$g(x) = 2x - 3$

(a) Find

(i) $g(6)$,*Answer(a)(i)* [1](ii) $f(2x)$.*Answer(a)(ii)* [1](b) Solve $fg(x) = 125$.*Answer(b)* $x =$ [3](c) Find the inverse function $g^{-1}(x)$.*Answer(c)* $g^{-1}(x) =$ [2]