1 Find, in terms of π, the values of x in the interval $0 \le x \le 2\pi$ for which

a $3\tan x - \sqrt{3} = 0$,

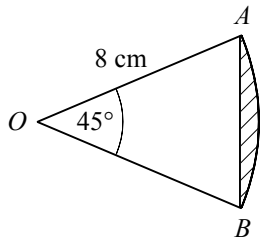
b $2\cos(x + \frac{\pi}{3}) + \sqrt{3} = 0$.

2 Given that $\cos A = \sqrt{3} - 1$,

a find the value of $\sin^2 A$ in the form $p\sqrt{3} + q$ where p and q are integers,

b show that $\tan^2 A = \frac{\sqrt{3}}{2}$.

3



The diagram shows sector OAB of a circle, centre O, radius 8 cm, in which $\angle AOB = 45°$.

a Find the perimeter of the sector in centimetres to 1 decimal place.

b Show that the area of the shaded segment is $8(\pi - 2\sqrt{2})$ cm^2.

4 Find, to 1 decimal place, the values of θ in the interval $0 \le \theta \le 360°$ for which

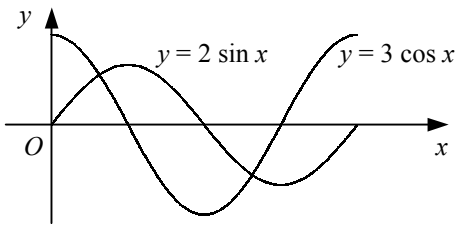
$$2\sin^2\theta + \sin\theta - \cos^2\theta = 2.$$

5 Solve, for x in the interval $-\pi \le x \le \pi$, the equation

$$3\sin^2 x = 4(1 - \sin x),$$

giving your answers to 2 decimal places.

6



The diagram shows the curves $y = 2\sin x$ and $y = 3\cos x$ for x in the interval $0 \le x \le 2\pi$.
Find, to 2 decimal places, the coordinates of the points where the curves intersect in this interval.

7 **a** Sketch the curve $y = \cos 2x°$ for x in the interval $0 \le x \le 360$.

b Find the values of x in the interval $0 \le x \le 360$ for which

$$\cos 2x° = -\tfrac{1}{2}.$$

8 Solve, for θ in the interval $0 \le \theta \le 360$, the equation

$$12\cos\theta° = 7\tan\theta°,$$

giving your answers to 1 decimal place.

9 Given that $\tan 15° = \dfrac{\tan 60° - \tan 45°}{1 + (\tan 60° \times \tan 45°)}$,

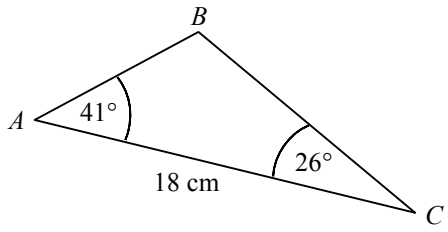
a show that $\tan 15° = 2 - \sqrt{3}$,

b find the exact value of $\tan 345°$.

10 Find, to an appropriate degree of accuracy, the values of x in the interval $0 \le x \le 360°$ for which

$$\sin^2 x + 5 \cos x - 3 \cos^2 x = 2.$$

11



The diagram shows triangle ABC in which $AC = 18$ cm, $\angle BAC = 41°$ and $\angle ACB = 26°$.

Find to 3 significant figures

a the length BC,

b the area of triangle ABC.

12 Solve, for θ in the interval $0 \le \theta \le 360°$, the equation

$$(6 \cos \theta - 1)(\cos \theta + 1) = 3.$$

13 Find, in degrees to 1 decimal place, the values of x in the interval $-180° \le x \le 180°$ for which

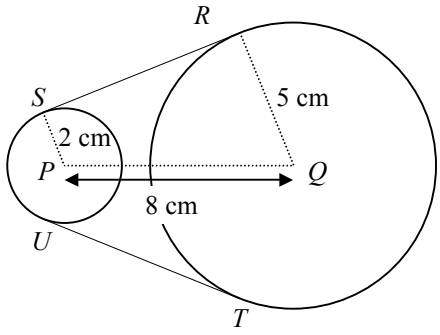
$$\sin^2 x + 5 \sin x = 2 \cos^2 x.$$

14 Prove that

a $\sin^4 \theta - 2 \sin^2 \theta \equiv \cos^4 \theta - 1$,

b $\dfrac{\sin\theta}{1+\cos\theta} + \dfrac{1+\cos\theta}{\sin\theta} \equiv \dfrac{2}{\sin\theta}$, for $\sin \theta \neq 0$.

15



The gears in a toy are shown in the diagram above.

A thin rubber band passes around two circular discs. The centres of the discs are at P and Q where $PQ = 8$ cm and their radii are 2 cm and 5 cm respectively. The sections of the rubber band not in contact with the discs, RS and TU, are assumed to be taught.

a Show that $\angle PQR = 1.186$ radians to 3 decimal places.

b Find the length RS.

c Find the length of the rubber band in this situation.