C2 TRIGONOMETRY *Worksheet I*

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

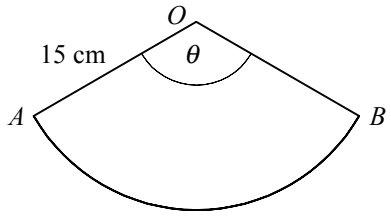
a $\cos(x + 40°) = 0.3$, **(3)**

b $2 + \tan 2x = 0$. **(5)**

2 Find, to 1 decimal place, the values of x in the interval $0 \leq x \leq 360$ for which

$$2\tan^2 x° - 4\tan x° + 1 = 0.$$ **(6)**

3



The diagram shows sector OAB of a circle, centre O, radius 15 cm.

Given that $\angle AOB = \theta$ radians and that the length of the arc AB is 32.1 cm,

a find the value of θ, **(2)**

b find the area of sector OAB. **(2)**

4 Solve, for x in the interval $0 \leq x \leq \pi$, the equation

$$\sin(2x - \tfrac{\pi}{3}) = \tfrac{1}{2},$$

giving your answers in terms of π. **(6)**

5 **a** Given that $\sin A = 1 - \sqrt{2}$, show that $\cos^2 A + 2\sin A = 0$. **(4)**

b Sketch the curve $y = \sin(x + \tfrac{\pi}{3})$ for x in the interval $0 \leq x \leq 2\pi$.

Label on your sketch

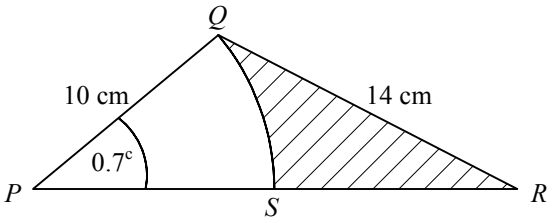
i the value of x at each point where the curve intersects the x-axis,

ii the coordinates of the maximum and minimum points of the curve. **(5)**

6 Find the values of x in the interval $0 \leq x \leq 360°$ for which

$$2\sin^2 x + \sin x + 1 = \cos^2 x.$$ **(8)**

7



The diagram shows triangle PQR in which $PQ = 10$ cm, $QR = 14$ cm and $\angle QPR = 0.7$ radians.

a Find the size of $\angle PRQ$ in radians to 2 decimal places. **(3)**

The point S lies on PR such that $PS = 10$ cm. The shaded region is bounded by the straight lines QR and RS and the arc QS of a circle, centre P.

b Find the area of the shaded region. **(6)**

8 **a** Given that $0 < A < 90°$, and that $\sin A = \frac{\sqrt{5}}{3}$,

i show that $\cos A = \frac{2}{3}$,

ii find the exact value of $\tan A$. **(5)**

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

$$5 \sin x \cos x + \cos x = 0.$$ **(6)**

9 Find the values of θ in the interval $0 \leq \theta \leq 180$ for which

$$\cos (2\theta + 30)° = -\tfrac{1}{2}.$$ **(6)**

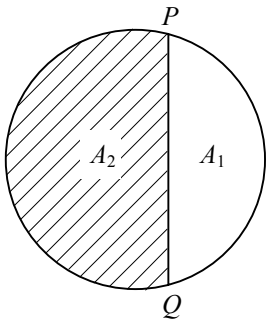
10 **a** Sketch the curve $y = \cos (x - 30)°$ for x in the interval $-180 \leq x \leq 180$, showing the coordinates of any maximum or minimum points on the curve. **(4)**

b Find the x-coordinates of the points where the curve intersects the line $y = 0.2$ in this interval, giving your answers to 1 decimal place. **(3)**

11 Find the values of x in the interval $0 \leq x \leq 360°$ for which

$$4 \cos^2 x - \cos x - 2 \sin^2 x = 0.$$ **(8)**

12



The diagram shows a circle of radius r cm. The chord PQ divides the circle into the unshaded minor segment of area A_1 and the shaded major segment of area A_2.

Given that PQ subtends an angle of θ radians at the centre of the circle,

a find an expression for A_1 in terms of r and θ. **(3)**

Given also that $\theta = \frac{5\pi}{6}$,

b show that $A_1 : A_2 = (5\pi - 3) : (7\pi + 3)$. **(6)**

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

$$3 \tan x - 2 \cos x = 0.$$ **(7)**

14 In triangle ABC, $AB = 5$ cm, $AC = 7$ cm and $BC = 8$ cm.

a Find the value of $\cos (\angle ABC)$. **(3)**

b Show that the area of triangle ABC is $10\sqrt{3}$ cm^2. **(5)**

15 **a** Show that

$$(2 + \cos^2 \theta)(1 + \tan^2 \theta) \equiv 3 + 2 \tan^2 \theta.$$ **(3)**

b Hence find the values of θ in the interval $0 \leq \theta \leq 360°$ for which

$$(2 + \cos^2 \theta)(1 + \tan^2 \theta) = 7.$$ **(5)**