3 Solve $\cot x = \sqrt{3}$ for $-\pi \leqslant x \leqslant \pi$.

4 Solve exactly:

a $\arcsin x = \frac{\pi}{3}$ **b** $\arctan(x-2) = \frac{\pi}{6}$

5 Simplify:

a $\operatorname{cosec} x \tan x$ **b** $\dfrac{\tan x}{\sec x}$ **c** $\sec x - \tan x \sin x$

6 Simplify:

a $\cos^3\theta + \sin^2\theta\cos\theta$ **b** $\dfrac{\cos^2\theta - 1}{\sin\theta}$ **c** $5 - 5\sin^2\theta$

d $\dfrac{\sin^2\theta - 1}{\cos\theta}$ **e** $\dfrac{\tan\theta + \cot\theta}{\sec\theta}$ **f** $\cos^2\theta(\tan\theta + 1)^2 - 1$

7 If $\sin A = \frac{5}{13}$ and $\cos A = \frac{12}{13}$, find:

a $\sin 2A$ **b** $\cos 2A$ **c** $\tan 2A$

8 Show that:

a $\dfrac{\cos\theta}{1+\sin\theta} + \dfrac{1+\sin\theta}{\cos\theta} = 2\sec\theta$ **b** $\left(1 + \dfrac{1}{\cos\theta}\right)\left(\cos\theta - \cos^2\theta\right) = \sin^2\theta$

9 Show that $\sin\frac{\pi}{8} = \frac{1}{2}\sqrt{2-\sqrt{2}}$ using a suitable double angle identity.

10 Solve:

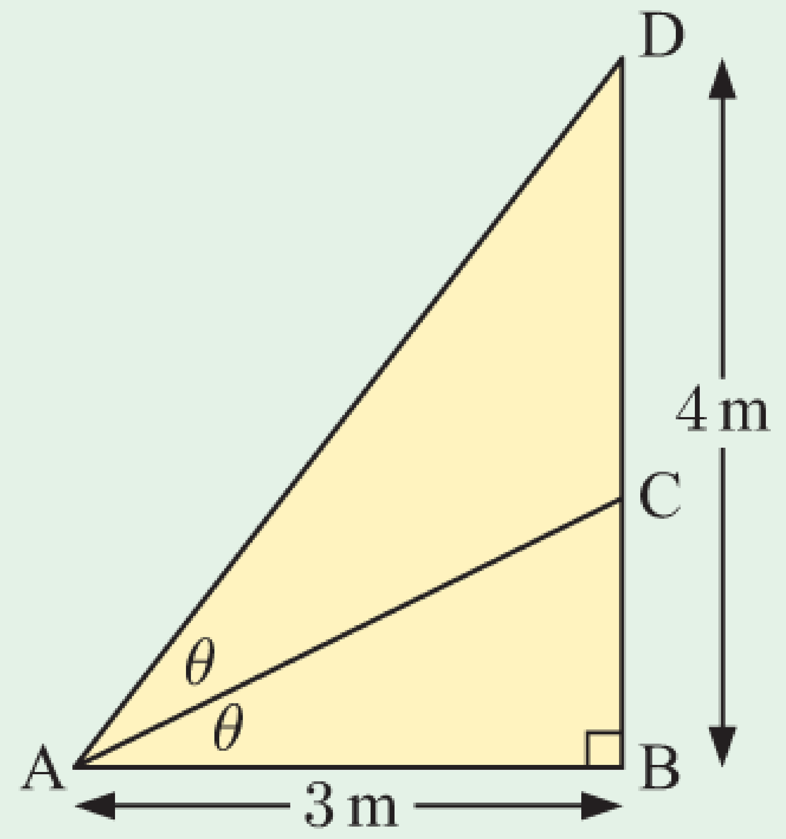
a $\sqrt{3}\cos x + \sin 2x = 0$ for $-\pi \leqslant x \leqslant \pi$ **b** $\dfrac{1-\cos 2\theta}{\sin 2\theta} = \sqrt{3}$ for $0 < \theta < \frac{\pi}{2}$.

11 Given $\sin\theta = \frac{3}{4}$ and $\frac{\pi}{2} < \theta < \pi$, find $\sin\left(\theta + \frac{\pi}{6}\right)$.

12 Consider the figure in the **Opening Problem** on page **18**. Find $\tan\theta$ using the ratios $\tan\phi$ and $\tan(\theta+\phi)$.

13 Write $3\sin x + 4\cos x$ in the form $k\sin(x+a)$, where $k > 0$ and $0 < a < 2\pi$.

14 Find exactly the length of [BC].



15 **a** Show that $\dfrac{1}{1+\sqrt{2}\sin x} + \dfrac{1}{1-\sqrt{2}\sin x} = 2\sec 2x$.

b Hence explain why $\dfrac{1}{1+\sqrt{2}\sin x} + \dfrac{1}{1-\sqrt{2}\sin x} = 1$ has no solutions.

16 Prove that if A, B, and C are the angles of a triangle, then
$\sin 2A + \sin 2B + \sin 2C = 4\sin A\sin B\sin C$.