

- 1** **a** Given that $4 \sin x + \cos x = 0$, show that $\tan x = -\frac{1}{4}$.
- b** Hence, find the values of x in the interval $0 \leq x \leq 360^\circ$ for which
- $4 \sin x + \cos x = 0$,
- giving your answers to 1 decimal place.
- 2** **a** Show that
- $5 \sin^2 x + 5 \sin x + 4 \cos^2 x \equiv \sin^2 x + 5 \sin x + 4$.
- b** Hence, find the values of x in the interval $0 \leq x \leq 360^\circ$ for which
- $5 \sin^2 x + 5 \sin x + 4 \cos^2 x = 0$
- 3** Solve each equation for x in the interval $0 \leq x \leq 360^\circ$.
Give your answers to 1 decimal place where appropriate.
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| a $2 \sin x - \cos x = 0$ | b $3 \sin x = 4 \cos x$ |
| c $\cos^2 x + 3 \sin x - 3 = 0$ | d $3 \cos^2 x - \sin^2 x = 2$ |
| e $2 \sin^2 x + 3 \cos x = 3$ | f $3 \cos^2 x = 5(1 - \sin x)$ |
| g $3 \sin x \tan x = 8$ | h $\cos x = 3 \tan x$ |
| i $3 \sin^2 x - 5 \cos x + 2 \cos^2 x = 0$ | j $2 \sin^2 x + 7 \sin x - 2 \cos^2 x = 0$ |
| k $3 \sin x - 2 \tan x = 0$ | l $\sin^2 x - 9 \cos x - \cos^2 x = 5$ |
- 4** Solve each equation for θ in the interval $-\pi \leq \theta \leq \pi$ giving your answers in terms of π .
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|------------------------------------------------------------------|--------------------------------------------------------------|
| a $4 \cos^2 \theta = 1$ | b $4 \sin^2 \theta + 4 \sin \theta + 1 = 0$ |
| c $\cos^2 \theta + 2 \cos \theta - 3 = 0$ | d $3 \sin^2 \theta - \cos^2 \theta = 0$ |
| e $4 \sin^2 \theta - 5 \sin \theta + 2 \cos^2 \theta = 0$ | f $\sin^2 \theta - 3 \cos \theta - \cos^2 \theta = 2$ |
- 5** Prove that
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|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| a $(\sin x + \cos x)^2 \equiv 1 + 2 \sin x \cos x$ | b $\frac{1}{\cos x} - \cos x \equiv \sin x \tan x, \cos x \neq 0$ |
| c $\frac{\cos^2 x}{1 - \sin x} \equiv 1 + \sin x, \sin x \neq 1$ | d $\frac{1 + \sin x}{\cos x} \equiv \frac{\cos x}{1 - \sin x}, \cos x \neq 0$ |
- 6** **a** Prove the identity
- $(\cos x - \tan x)^2 + (\sin x + 1)^2 \equiv 2 + \tan^2 x$.
- b** Hence find, in terms of π , the values of x in the interval $0 \leq x \leq 2\pi$ such that
- $(\cos x - \tan x)^2 + (\sin x + 1)^2 = 3$.
- 7** $f(x) \equiv \cos^2 x + 2 \sin x, 0 \leq x \leq 2\pi$.
- a** Prove that $f(x)$ can be expressed in the form
- $f(x) = 2 - (\sin x - 1)^2$.
- b** Hence deduce the maximum value of $f(x)$ and the value of x for which this occurs.