

- 1 (a) Express $\sin x^\circ - 2 \cos x^\circ$ in the form $k \cos(x + \alpha)^\circ$, $k > 0$, $0 \leq \alpha \leq 360$
- (b) Express $3 \cos x + 5 \sin x$ in the form $k \sin(x - \alpha)$, $k > 0$, $0 \leq \alpha \leq 2\pi$
- (c) Express $\sqrt{3} \sin 3x + \cos 3x$ in the form $k \sin(3x - \alpha)$, $k > 0$, $0 \leq \alpha \leq 2\pi$
- 2 Find the maximum value of $5 \cos x + 5 \sin x$.
- 3 Solve the equation $6 \cos x^\circ + 2 \sin x^\circ - 5 = 0$, $0 \leq x \leq 360$
- 4 (a) Express $\sin x + \sqrt{3} \cos x$ in the form $k \cos(x - a)$, $k > 0$ and $0 \leq a \leq 2\pi$.
- (b) Hence, sketch the graph of the function $f(x) = 4 + \sin x + \sqrt{3} \cos x$, $0 \leq x \leq 2\pi$
- 5 The power, P units, produced by a tidal electric sub-station can be expressed in the form $P = 8 \cos \frac{1}{2}t - 6 \sin \frac{1}{2}t$, where t is the time in hours with $t > 0$.
- (a) Express P in the form $k \cos(\frac{1}{2}t + \alpha)$, where $k > 0$ and $0 < \alpha < \frac{\pi}{2}$.
- (b) Hence write down the maximum power produced and the first time this maximum power will occur.