

Wave Equation Examples

1. a) Express $f(x) = 6 \cos x + 3 \sin x$ in the form $R \cos(x + \alpha)$
b) State the maximum value of $f(x)$ and the value of x at which this maximum occurs.
c) Hence solve the equation $6 \cos x + 3 \sin x = -5$
2. a) Express $f(x) = \cos 2x + 5 \sin 2x$ in the form $R \sin(2x + \alpha)$.
b) Hence solve the equation $\cos 2x + 5 \sin 2x = 2.5$
3. Solve the equation $3 \cos 3x + \sin 3x = -2$
4. Solve the equation $25 \cos x + 15 \sin x = 10$
5. a) Consider the function $f(x) = 8 \cos x + 10 \sin x$. State the minimum value of $f(x)$ and the corresponding value of x .
b) Solve the equation $f(x) = -5$

Answers

1. a) $\sqrt{45} \cos(x + 333.4)^\circ$ b) $3\sqrt{5}$ 26.6° c) $164.8^\circ, 248.4^\circ$
2. a) $\sqrt{26} \sin(2x + 11.3)^\circ$ b) $9, 69.7, 189, 249.7$
3. $49.2, 83.1, 169.2, 203.1, 289.2, 323.1$
4. $101.0, 321.0$
5. a) $-2\sqrt{41}$ 231.3 b) $164.3, 298.3$

