

Trigonometry revision 4

1. a) Express $2 \sin \theta + \cos \theta$ in the form $R \sin(\theta + \alpha)$ where $R > 0$ and $0^\circ \leq \alpha \leq 90^\circ$, giving the exact value of R and the value of α correct to 2 decimal places.

b) Hence, solve the equation $2 \sin \theta + \cos \theta = 2$ for $0^\circ \leq \theta \leq 360^\circ$

2. Express $3 \cos \theta + \sqrt{3} \sin \theta$ in the form $R \cos(\theta - \alpha)$ where $R > 0$ and $0^\circ \leq \alpha \leq 90^\circ$, giving the exact value of R and the value of α .

b) Find the greatest and least possible values of $[(3 \cos \theta + \sqrt{3} \sin \theta)^2 - 5]$ as θ varies

3. a) Express each of the following in the form $R \cos(\theta - \alpha)$ where $R > 0$ and $0^\circ \leq \alpha \leq 90^\circ$, giving the exact value of R and the value of α to correct to 2 decimal places

i. $3 \cos \theta + 4 \sin \theta$

ii. $5 \cos \theta + 12 \sin \theta$

iii. $\sqrt{2} \cos \theta + \sin \theta$

iv. $\sin \theta + \cos \theta$

b) Find the greatest and least possible values of each of the expressions in part (a)

c) For each of the expressions in part (a) find a value of θ for which the expression has its greatest value

5.a) Express $\sin \theta + 2 \cos \theta$ in the form $R \sin(\theta + \alpha)$ where $R > 0$ and $0^\circ \leq \alpha \leq 90^\circ$, giving the exact value of R and the value of α correct to 2 decimal places.

b) Hence, solve the equation $\sin \theta + 2 \cos \theta = 1$ for $0^\circ \leq \theta \leq 360^\circ$

6. a) Express $\sqrt{3} \sin \theta - \cos \theta$ in the form $R \sin(\theta - \alpha)$ where $R > 0$ and $0^\circ \leq \alpha \leq 90^\circ$, giving the exact value of R and α .

b) Hence, solve the equation $\sqrt{3} \sin \theta - \cos \theta = 1$ for $0^\circ \leq \theta \leq 360^\circ$

c) Find the greatest and least possible values of $(\sqrt{3} \sin \theta - \cos \theta)^2$ as θ varies

7.a) Express $2 \cos \theta - 2 \sin \theta$ in the form $R \cos(\theta + \alpha)$ where $R > 0$ and $0^\circ \leq \alpha \leq 90^\circ$, giving the exact value of R and α .

b) Hence, solve the equation $\cos \theta - \sin \theta = \frac{1}{2}$ for $0^\circ \leq \theta \leq 360^\circ$

8. a) Express $4 \cos \theta + 6 \sin \theta$ in the form $R \cos(\theta - \alpha)$ where $R > 0$ and $0^\circ \leq \alpha \leq 90^\circ$, giving the exact value of R and the value of α correct to 2 decimal places.

b) Hence, solve the equation $4 \cos \theta + 6 \sin \theta = 5$ for $0^\circ \leq \theta \leq 360^\circ$

c) Find the greatest and least possible values of $[(4 \cos \theta + 6 \sin \theta)^2 + 5]$ as θ varies

9. a) Express $2 \sin 2x + \cos 2x$ in the form $R \sin(2x + \alpha)$ where $R > 0$ and $0^\circ \leq \alpha \leq 90^\circ$, giving the exact value of R and the value of α correct to 2 decimal places.

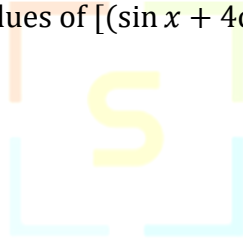
b) Hence, solve the equation $2 \sin 2x + \cos 2x = 1$ for $0^\circ \leq x \leq 360^\circ$

c) Find the greatest and least possible values of $10 - (2 \sin 2x + \cos 2x)$ as x varies

10. a) Express $\sin x + 4 \cos x$ in the form $R \sin(x + \alpha)$ where $R > 0$ and $0 \leq \alpha \leq \frac{\pi}{2}$, giving the exact value of R and the value of α correct to 3 decimal places.

b) Hence, solve the equation $\sin x + 4 \cos x = 3$ for $0 \leq x \leq 2\pi$

c) Find the greatest and least possible values of $[(\sin x + 4 \cos x)^2 - 1]$ as x varies



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