

Simplifying \sin +/- \cos Functions

Difficulty: Easy

Question Paper 2

Level	A Level
Subject	Maths Pure 3
Exam Board	CIE
Topic	Trigonometry
Sub-Topic	Simplifying \sin +/- \cos functions
Difficulty	Easy
Booklet	Question Paper 2

Time allowed: 57 minutes

Score: /41

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E
>90%	81%	70%	58%	46%	34%

Question 1

- (i) Express $3 \sin e + 2 \cos e$ in the form $R \sin(\theta + \alpha)$, where $R > 0$ and $0^\circ < \alpha < 90^\circ$, stating the exact value of R and giving the value of α correct to 2 decimal places. [3]

- (ii) Hence solve the equation

$$3 \sin \theta + 2 \cos \theta = 1,$$

for $0^\circ < \theta < 180^\circ$.

[3]

Question 2

By expressing $8 \sin \theta - 6 \cos \theta$ in the form $R \sin(\theta - \alpha)$, solve the equation

$$8 \sin \theta - 6 \cos \theta = 7,$$

for $0^\circ \leq \theta \leq 360^\circ$.

[7]

Question 3

- (i) Express $5 \sin x + 12 \cos x$ in the form $R \sin(x + \alpha)$, where $R > 0$ and $0^\circ < \alpha < 90^\circ$, giving the value of α correct to 2 decimal places. [3]

- (ii) Hence solve the equation

$$5 \sin 2\theta + 12 \cos 2\theta = 11,$$

giving all solutions in the interval $0^\circ < \theta < 180^\circ$. [5]

Question 4

(i) Express $\cos x + 3 \sin x$ in the form $R \cos(x - \alpha)$, where $R > 0$ and $0^\circ < \alpha < 90^\circ$, giving the exact value of R and the value of α correct to 2 decimal places. [3]

(ii) Hence solve the equation $\cos 2\theta + 3 \sin 2\theta = 2$, for $0^\circ < \theta < 90^\circ$. [5]

Question 5

(i) Express $8 \cos \theta + 15 \sin \theta$ in the form $R \cos(\theta - \alpha)$, where $R > 0$ and $0^\circ < \alpha < 90^\circ$. Give the value of α correct to 2 decimal places. [3]

(ii) Hence solve the equation $8 \cos \theta + 15 \sin \theta = 12$, giving all solutions in the interval $0^\circ < \theta < 360^\circ$. [4]

Question 6

(i) Express $24 \sin \theta - 7 \cos \theta$ in the form $R \sin(\theta - \alpha)$, where $R > 0$ and $0^\circ < \alpha < 90^\circ$. Give the value of α correct to 2 decimal places. [3]

(ii) Hence find the smallest positive value of θ satisfying the equation

$$24 \sin \theta - 7 \cos \theta = 17. \quad [2]$$