TRIGONOMETRY 4 :

$a\sin\theta + b\cos\theta$ into compound angle form.

1) Solve $0^\circ \le \theta \le 360^\circ$

$$4\sin\theta + \cos\theta = 2$$

2) a) Express $4\sin x + 3\cos x$ in the form $R\sin(x+\alpha)$ α is acute.

b) Hence find the greatest value of $\dfrac{1}{4\sin x + 3\cos x + 7}$

3) Solve in the range $0^\circ \le x \le 360^\circ$

$$4\cos\theta + 2\sin\theta = 3$$

4) a) Express $3\cos x + 2\sin x$ in the form $R\cos(x-\alpha)$, $0^\circ < \alpha < 90^\circ$

b) Solve in the range 0° to 360°

$$3\cos x + 2\sin x = 1$$

5) a) Express $\cos\theta + \sqrt{3}\sin\theta$ in the form $R\cos(\theta - \alpha)$ α is acute.

b) Solve $0^\circ \le \theta \le 360^\circ$

$$\cos\theta + \sqrt{3}\sin\theta = 1$$

6) a) Express $5\sin x - 12\cos x$ in the form $R\sin(x-\alpha)$, $R>0$ and α acute

b) Hence find the least value of $\dfrac{1}{5\sin x - 12\cos x + 20}$

Write down a value for x for which this least value occurs.

7) a) Express $7\cos\theta + 24\sin\theta$ in the form $R\cos(\theta-\alpha)$, $R>0$ α is acute.

b) Hence solve $0^\circ \le \theta \le 360^\circ$

$$7\cos\theta + 24\sin\theta = 16$$

8) a) Express $\sqrt{15}\cos\theta - \sin\theta$ in the form $R\cos(x+\alpha)$, α is acute

b) Hence solve in the range 0° to 360°

$$\sqrt{15}\cos\theta - \sin\theta = 3$$

9) a) Express $8 \sin x + 15 \cos x$ in the form $R \sin(x + \alpha)$, $0° < \alpha < 90°$

b) Find all values of x, $0°$ to $360°$, satisfying

$$8 \sin x + 15 \cos x = 11$$

c) Find the greatest value possible for k such that

$$8 \sin x + 15 \cos x = k$$

has solutions. Give a reason for your answer.

10) Sketch graphs of

a) $y = 3 \sin x + 4 \cos x$ by using compound angles

b) $y = 12 \cos x - 5 \sin x$