



### Transformation Formulae Ex 8.2 Q1

$$\begin{aligned}
 \text{(i) } \sin 12\theta + \sin 4\theta & \quad \left[ \because \sin C + \sin D = 2 \sin \frac{C+D}{2} \cos \frac{C-D}{2} \right] \\
 &= 2 \sin \left( \frac{12\theta + 4\theta}{2} \right) \cos \left( \frac{12\theta - 4\theta}{2} \right) \\
 &= 2 \sin 8\theta \cos 4\theta
 \end{aligned}$$

$$\begin{aligned}
 \text{(ii) } \sin 5\theta - \sin \theta & \quad \left[ \because \sin C - \sin D = 2 \sin \frac{C+D}{2} \sin \frac{C-D}{2} \right] \\
 &= 2 \cos \left( \frac{5\theta + \theta}{2} \right) \sin \left( \frac{5\theta - \theta}{2} \right) \\
 &= 2 \sin 2\theta \cos 3\theta
 \end{aligned}$$

$$\begin{aligned}
 \text{(iii) } \cos 12\theta + \cos 8\theta & \quad \left[ \because \cos C + \cos D = 2 \cos \frac{C+D}{2} \cos \frac{C-D}{2} \right] \\
 &= 2 \cos 10\theta \cos 2\theta
 \end{aligned}$$

$$\begin{aligned}
 \text{(iv) } \cos 12\theta - \cos 4\theta & \quad \left[ \because \cos D - \cos C = -2 \sin \frac{C+D}{2} \sin \frac{C-D}{2} \right] \\
 &= -2 \sin \left( \frac{12\theta + 4\theta}{2} \right) \sin \left( \frac{12\theta - 4\theta}{2} \right) \\
 &= -2 \sin 8\theta \sin 4\theta
 \end{aligned}$$

$$\begin{aligned}
 \text{(v) } \sin 2\theta + \cos 4\theta & \\
 &= \sin 2\theta + \sin (90^\circ - 4\theta) \\
 &= 2 \sin \frac{(2\theta + 90^\circ - 4\theta)}{2} \cos \frac{(2\theta - 90^\circ + 4\theta)}{2} \\
 &= 2 \sin \left( \frac{\pi}{4} + \theta \right) \cos \left( \frac{\pi}{4} - 3\theta \right)
 \end{aligned}$$

### Transformation Formulae Ex 8.2 Q2

$$\begin{aligned}
 \sin 38^\circ + \sin 22^\circ &= \sin 82^\circ \\
 \text{LHS} &= \sin 38^\circ + \sin 22^\circ \\
 \therefore \sin C + \sin D &= 2 \sin \frac{C+D}{2} \cos \frac{C-D}{2} \\
 \Rightarrow \sin 38^\circ + \sin 22^\circ &= 2 \sin \frac{60^\circ}{2} \cos \frac{16^\circ}{2} \\
 &= 2 \sin 30^\circ \cos 8^\circ \\
 &= 2 \times \frac{1}{2} \cos 8^\circ \\
 &= \cos (90^\circ - 82^\circ) \\
 &= \sin 82^\circ = \text{RHS} \quad \left[ \because \cos \theta = \sin (90^\circ - \theta) \right]
 \end{aligned}$$

### Transformation Formulae Ex 8.2 Q2(i)

$$\begin{aligned}
 \cos 100^\circ + \cos 20^\circ &= \cos 40^\circ \\
 \text{LHS} &= \cos 100^\circ + \cos 20^\circ \quad \left[ \because \cos C + \cos D = 2 \cos \frac{C+D}{2} \cos \frac{C-D}{2} \right] \\
 \Rightarrow 2 \cos \frac{(100^\circ + 20^\circ)}{2} \cos \frac{(100^\circ - 20^\circ)}{2} & \\
 &= 2 \cos 60^\circ \cos 40^\circ \\
 &= 2 \times \frac{1}{2} \cos 40^\circ \quad \left[ \because \cos 60^\circ = \frac{1}{2} \right] \\
 &= \cos 40^\circ = \text{RHS}
 \end{aligned}$$

### Transformation Formulae Ex 8.2 Q2(ii)

$$\begin{aligned}
 \sin 50^\circ + \sin 10^\circ &= \cos 20^\circ \\
 \text{LHS} &= \sin 50^\circ + \sin 10^\circ \quad \left[ \because \sin C + \sin D = 2 \sin \frac{C+D}{2} \cos \frac{C-D}{2} \right] \\
 \sin 50^\circ + \sin 10^\circ &= 2 \sin \frac{60^\circ}{2} \cos 20^\circ \\
 &= 2 \sin 30^\circ \cos 20^\circ \\
 &= 2 \times \frac{1}{2} \cos 20^\circ \\
 &= \cos 20^\circ = \text{RHS} \quad \left[ \because \sin 30^\circ = \frac{1}{2} \right]
 \end{aligned}$$

### Transformation Formulae Ex 8.2 Q2(iii)

$$\sin 30^\circ + \sin 37^\circ = \cos 7^\circ$$

$$\text{LHS} = \sin 23^\circ + \sin 37^\circ$$

$$= 2 \sin \left( \frac{23^\circ + 37^\circ}{2} \right) \cos \left( \frac{23^\circ - 37^\circ}{2} \right)$$

$$= 2 \sin(30^\circ) \cos(-7^\circ)$$

$$= 2 \times \frac{1}{2} \cos 7^\circ$$

$$= \cos 7^\circ = \text{RHS}$$

$$\left[ \because \sin C + \sin D = 2 \sin \frac{C+D}{2} \cos \frac{C-D}{2} \right]$$

$$\left[ \because \cos(-\theta) = \cos \theta, \sin 30^\circ = \frac{1}{2} \right]$$

Transformation Formulae Ex 8.2 Q2(iv)

$$\text{LHS} = \sin 105^\circ + \cos 105^\circ$$

$$= \sin 105^\circ + \cos(90^\circ + 15^\circ)$$

$$= \sin 105^\circ - \sin 15^\circ$$

$$= 2 \sin \left( \frac{105^\circ - 15^\circ}{2} \right) \cos \left( \frac{105^\circ + 15^\circ}{2} \right)$$

$$= 2 \sin 45^\circ \cos 60^\circ$$

$$= 2 \times \frac{1}{\sqrt{2}} \times \frac{1}{2}$$

$$= \frac{1}{\sqrt{2}}$$

$$= \cos 45^\circ$$

Transformation Formulae Ex 8.2 Q2(v)

$$\sin 40^\circ + \sin 20^\circ = \cos 10^\circ$$

$$\text{LHS} = \sin 40^\circ + \sin 20^\circ$$

$$= 2 \sin \left( \frac{40^\circ + 20^\circ}{2} \right) \cos \left( \frac{40^\circ - 20^\circ}{2} \right)$$

$$= 2 \sin 30^\circ \cos 10^\circ$$

$$= 2 \times \frac{1}{2} \cos 10^\circ$$

$$= \cos 10^\circ$$

$$= \text{RHS}$$

$$\left[ \because \sin C + \sin D = 2 \sin \frac{C+D}{2} \cos \frac{C-D}{2} \right]$$

$$\left[ \because \sin 30^\circ = \frac{1}{2} \right]$$

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