



Trigonometric Ratios of multiple and Sub multiple Angles Ex 9.1 Q16

$$\begin{aligned}
 \text{LHS} &= \cos^2\left(\frac{\pi}{4} - \theta\right) - \sin^2\left(\frac{\pi}{4} - \theta\right) \\
 &= \cos 2\left(\frac{\pi}{4} - \theta\right) && \left[\because \cos 2\theta = \cos^2\theta - \sin^2\theta\right] \\
 &= \cos\left(\frac{\pi}{2} - 2\theta\right) && \left[\because \cos\left(\frac{\pi}{2} - \theta\right) = \sin\theta\right] \\
 &= \sin 2\theta \\
 &= \text{RHS}
 \end{aligned}$$

Trigonometric Ratios of multiple and Sub multiple Angles Ex 9.1 Q17

$$\begin{aligned}
 \text{LHS} &= \cos 4A \\
 &= \cos 2 \cdot 2A \\
 &= 2 \cos^2 2A - 1 \left[\because \cos 2\theta = 2 \cos^2 \theta - 1\right] \\
 &= 2 \left(2 \cos^2 A - 1\right)^2 - 1 \\
 &= 2 \left(4 \cos^4 A - 4 \cos^2 A + 1\right) - 1 \\
 &= 8 \cos^4 A - 8 \cos^2 A + 1 \\
 &= 1 - 8 \cos^2 A + 8 \cos^4 A \\
 &= \text{RHS}
 \end{aligned}$$

Trigonometric Ratios of multiple and Sub multiple Angles Ex 9.1 Q18

$$\begin{aligned}
 \text{LHS} &= \sin 4A \\
 &= \sin 2 \cdot 2A \\
 &= 2 \sin 2A \cos 2A \\
 &= 2 \left(2 \sin A \cos A\right) \cdot \left(\cos^2 A - \sin^2 A\right) \\
 &= 4 \sin A \cos^3 A - 4 \sin^3 A \cos A \\
 &= \text{RHS}
 \end{aligned}$$

Trigonometric Ratios of multiple and Sub multiple Angles Ex 9.1 Q19

$$\begin{aligned}
\text{LHS} &= 3(\sin x - \cos x)^4 + 6(\sin x + \cos x)^2 + 4(\sin^6 x + \cos^6 x) \\
&= 3[\sin^4 x - 4\sin^3 x \cos x + 6\sin^2 x \cos^2 x - 4\sin x \cos^3 x + \cos^4 x] \\
&\quad + 6[\sin^2 x + 2\sin x \cos x + \cos^2 x] + 4[\sin^6 x + \cos^6 x] \\
&\quad \left[ \because (a-b)^4 = a^4 - 4a^3b + 6a^2b^2 - 4ab^3 + b^4 \text{ by binomial expansion} \right] \\
&= 3[\sin^4 x + \cos^4 x - 4\sin x \cos x (\sin^2 x + \cos^2 x) + 6\sin^2 x \cos^2 x] \\
&\quad + 6[1 + 2\sin x \cos x] + 4[(\cos^2 x + \sin^2 x)(\cos^4 x - \cos^2 x \sin^2 x + \sin^4 x)] \\
&\quad \left[ \because a^3 + b^3 = (a+b)(a^2 - ab + b^2) \right] \\
&= 7[\sin^4 x + \cos^4 x] + 18\sin^2 x \cos^2 x - 4\sin^2 x \cos^2 x + 6 \\
&= 7[\sin^4 x + \cos^4 x + 2\sin^2 x \cos^2 x] + 6 \\
&= 7[\sin^2 x + \cos^2 x]^2 + 6 \\
&= 7 + 6 \\
&= 13 \\
&= \text{RHS}
\end{aligned}$$

Trigonometric Ratios of multiple and Sub multiple Angles Ex 9.1 Q20

$$\begin{aligned}
\text{L.H.S} &= 2(\sin^6 x + \cos^6 x) - 3(\sin^4 x + \cos^4 x) + 1 \\
&= 2\left[(\sin^2 x)^3 + (\cos^2 x)^3\right] - 3(\sin^4 x + \cos^4 x) + 1 \quad \left[ \because a^3 + b^3 = (a+b)(a^2 - ab + b^2) \right] \\
&= 2[(\sin^2 x + \cos^2 x)(\sin^4 x - \sin^2 x \cos^2 x + \cos^4 x)] - 3(\sin^4 x + \cos^4 x) + 1 \\
&= -[\sin^4 x + \cos^4 x + 2\sin^2 x \cos^2 x] + 1 \\
&= -[\sin^2 x + \cos^2 x] + 1 \\
&= -1 + 1 \\
&= 0 \\
&= \text{RHS}
\end{aligned}$$

\*\*\*\*\* END \*\*\*\*\*