

4.2 Answers

Answer 1

$$\text{LHS} = \sin 15^\circ$$

$$= \sin(45 - 30)$$

$$= \sin 45 \cos 30 - \cos 45 \sin 30$$

$$= \frac{\sqrt{2}}{2} \times \frac{\sqrt{3}}{2} - \frac{\sqrt{2}}{2} \times \frac{1}{2}$$

$$= \frac{\sqrt{6} - \sqrt{2}}{4}$$

$$= \text{RHS} \quad \square$$

$$\text{LHS} = \sin 15$$

$$= \sin(60 - 45)$$

$$= \sin 60 \cos 45 - \cos 60 \sin 45$$

$$= \frac{\sqrt{3}}{2} \times \frac{\sqrt{2}}{2} - \frac{1}{2} \times \frac{\sqrt{2}}{2}$$

$$= \frac{\sqrt{6} - \sqrt{2}}{4}$$

$$= \text{RHS} \quad \square$$

[5 marks]

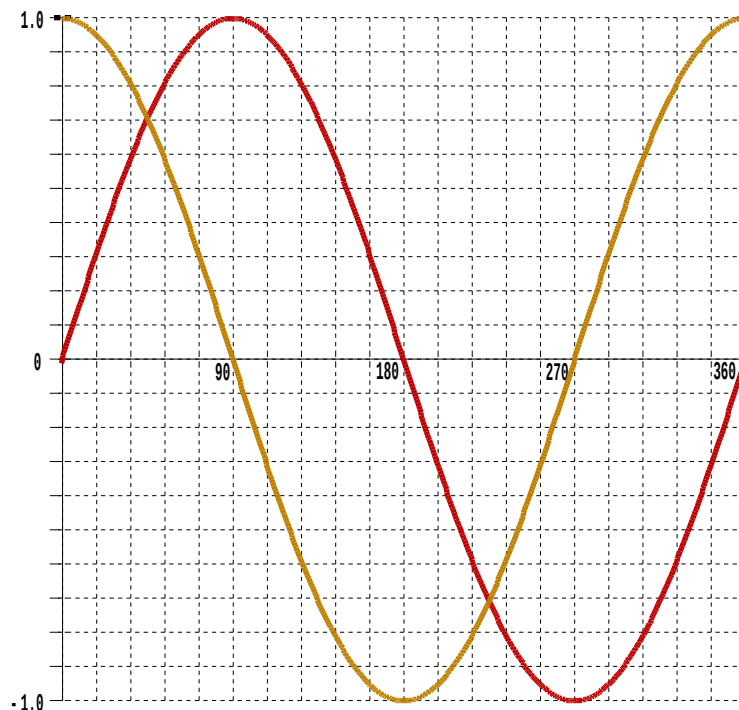
Answer 2

(a) (i) $\sin 45^\circ = \frac{\sqrt{2}}{2}$

(ii) $\cos 45^\circ = \frac{\sqrt{2}}{2}$

[2 marks]

(b)



[2 marks]

(c)

$$\begin{aligned}\text{LHS} &= \sin(\theta + 45^\circ) \\ &= \sin \theta \cos 45 + \cos \theta \sin 45 \\ &= \sin \theta \sin 45 + \cos \theta \cos 45 \\ &= \cos \theta \cos 45 + \sin \theta \sin 45 \\ &= \cos(\theta - 45) \\ &= \text{RHS} \quad \square\end{aligned}$$

[5 marks]

Answer 3

$$\begin{aligned}\text{LHS} &= \frac{\cos A}{\sin B} - \frac{\sin A}{\cos B} \\ &= \frac{\cos A}{\sin B} \times \frac{\cos B}{\cos B} - \frac{\sin A}{\cos B} \times \frac{\sin B}{\sin B} \\ &= \frac{\cos A \cos B - \sin A \sin B}{\sin B \cos B} \\ &= \frac{\cos(A + B)}{\sin B \cos B} \\ &= \text{RHS} \quad \square\end{aligned}$$

[5 marks]

Answer 4

$$\begin{aligned}\text{LHS} &= \cos(A + B)\cos(A - B) \\ &= (\cos A \cos B - \sin A \sin B)(\cos A \cos B + \sin A \sin B) \\ &\quad \text{Difference of two squares} \\ &= \cos^2 A \cos^2 B - \sin^2 A \sin^2 B \\ &= \cos^2 A (1 - \sin^2 B) - (1 - \cos^2 A) \sin^2 B \\ &= \cos^2 A - \cos^2 A \sin^2 B - \sin^2 B + \cos^2 A \sin^2 B \\ &= \cos^2 A - \sin^2 B \\ &= \text{RHS} \quad \square\end{aligned}$$

[5 marks]

Answer 5

$$\begin{aligned}
\text{LHS} &= \frac{1 - \cos 2\theta}{\sin 2\theta} \\
&= \frac{\cos^2 \theta + \sin^2 \theta - (\cos^2 \theta - \sin^2 \theta)}{2 \sin \theta \cos \theta} \\
&= \frac{2 \sin^2 \theta}{2 \sin \theta \cos \theta} \\
&= \frac{\sin \theta}{\cos \theta} \\
&= \tan \theta \\
&= \text{RHS} \quad \square
\end{aligned}$$

[5 marks]**Answer 6**

$$\begin{aligned}
\text{LHS} &= 2 \cos^3 \theta \sin \theta + 2 \sin^3 \theta \cos \theta \\
&= 2 \sin \theta \cos \theta (\cos^2 \theta + \sin^2 \theta) \\
&= 2 \sin \theta \cos \theta \\
&= \sin 2\theta \\
&= \text{RHS} \quad \square
\end{aligned}$$

[5 marks]**Answer 7**

$$\begin{aligned}
\text{LHS} &= \frac{\sin 3\theta}{\sin \theta} - \frac{\cos 3\theta}{\cos \theta} \\
&= \frac{\sin 3\theta}{\sin \theta} \times \frac{\cos \theta}{\cos \theta} - \frac{\cos 3\theta}{\cos \theta} \times \frac{\sin \theta}{\sin \theta} \\
&= \frac{\sin 3\theta \cos \theta - \cos 3\theta \sin \theta}{\sin \theta \cos \theta} \\
&= \frac{\sin (3\theta - \theta)}{\sin \theta \cos \theta} \\
&= \frac{\sin 2\theta}{\sin \theta \cos \theta} \\
&= \frac{2 \sin \theta \cos \theta}{\sin \theta \cos \theta} \\
&= 2 \\
&= \text{RHS} \quad \square
\end{aligned}$$

[6 marks]