Answer on Question #51813 – Math – Trigonometry

Without using tables,find the value of sin260+cos 260

A 2
B 5
C 1
D 2

Solution:

The statement of question does not seem clear.

Case 1.

$$\sin 26° + \cos 26° \quad (1)$$

$$\cos(90° - \alpha) = \sin\alpha \Longrightarrow \mathbf{cos(26°)} = \sin(64°) \quad (2)$$

$$(2) in (1):$$

$$\sin 26° + \cos 26° = \sin 26° + \sin 64°$$

$$\sin\alpha + sin\beta = 2\sin\frac{\alpha+\beta}{2}\cos\frac{\alpha-\beta}{2} \Longrightarrow$$

$$\sin 26° + \sin 64° = -2\sin\frac{26°+64°}{2}\cos\frac{64°-26°}{2} = -2\sin 45°\cos 38°$$

$$\sin 45° = \frac{1}{\sqrt{2}}$$

We can't find value of cos 38° without using tables:

$$cos38° = 0.788$$

$$\sin 26° + \sin 64° = -2 \cdot \frac{1}{\sqrt{2}} \cdot 0.788 = -0.8111 = -1.1144$$

Answer: $\sin 26° + \cos 26° = -1.1144$

Case 2.

$$\sin 260° + \cos 260° = \sin(260° - 360°) + \cos(260° - 360°) =$$
$$= \sin(-100°) + cos\,(-100°) = \cos(100°) - \sin(100°) \quad (1)$$

$$\cos(90° - \alpha) = \sin\alpha \Longrightarrow \cos(100°) = \sin(-10°) = -\sin(10°) \quad (2)$$

$$(2) in (1):$$

$$\Longrightarrow \cos(100°) - \sin(100°) = -\sin 10° - \sin 100° = -(\sin 10° + \sin 100°)$$

$$\sin\alpha + sin\beta = 2\sin\frac{\alpha+\beta}{2}\cos\frac{\alpha-\beta}{2} \Longrightarrow$$

$-(\sin 10° + \sin 100°) = -2\sin\frac{10°+100°}{2}\cos\frac{100°-10°}{2} = -2\sin 55°\cos 45°.$
We can't find value of $\sin 55°$ without using tables:

$$\cos 45° = \frac{1}{\sqrt{2}}; \quad \sin 55° = \cos(90° - 55°) = \cos 35° \approx 0.5735764$$

$$-(\sin 10° + \sin 100°) = -2 \cdot \frac{1}{\sqrt{2}} \cdot 0.5735764 = -0.8111$$

Answer: $\sin 260° + \cos 260° = -0.8111$