

Answer to Question #88848 – Math – Trigonometry

Question

$$(\sin^3 a + \cos^3 a) / (\sin a + \cos a) = 1 - \frac{1}{2} \sin 2a$$

Solution

As we know $(x^3 + y^3) = (x + y)(x^2 + y^2 - xy)$

Let us assume: $x = \sin a$ And $y = \cos a$

So, putting the values of (x, y) into this general expression, we get:

$$(\sin^3 a + \cos^3 a) = (\sin a + \cos a)(\sin^2 a + \cos^2 a - \sin a \cos a)$$

So, the given expression can be simplified as:

$$\begin{aligned} & \frac{(\sin^3 a + \cos^3 a)}{(\sin a + \cos a)} \\ &= \frac{(\sin a + \cos a)(\sin^2 a + \cos^2 a - \sin a \cos a)}{(\sin a + \cos a)} \\ &= (\sin^2 a + \cos^2 a - \sin a \cos a) \\ &= (1 - \sin a \cos a) \quad [\text{As we know } (\sin^2 a + \cos^2 a) = 1] \\ &= 1 - \frac{2 \sin a \cos a}{2} \\ &= 1 - \frac{\sin 2a}{2} \end{aligned}$$

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