20/11/2023

14) $\sin^3\theta - \cos^3\theta = (\sin\theta - \cos\theta)(1 + \sin\theta \cdot \cos\theta)$

$a = \sin\theta,\ b = \cos\theta$

$L.H.S = (\sin\theta - \cos\theta)(\sin^2\theta + \sin\theta \cdot \cos\theta + \cos^2\theta)$

$= (\sin\theta - \cos\theta)(1 + \sin\theta \cdot \cos\theta)$

$= R.H.S$ ✓

15) $\sqrt{\dfrac{1 - \sin\theta}{1 + \sin\theta}} = \sec\theta - \tan\theta$

$a + b \rightarrow a - b$

$a - b \rightarrow a + b$

$1 + \sin\theta \longrightarrow 1 - \sin\theta$

$\sin\theta - \tan^4\theta \rightarrow \sin\theta + \tan^4\theta$

$L.H.S = \sqrt{\dfrac{1 - \sin\theta}{1 + \sin\theta}} \times 1$

$= \sqrt{\dfrac{(1 - \sin\theta)}{(1 + \sin\theta)} \times \dfrac{1}{1}}$

$= \sqrt{\dfrac{(1 - \sin\theta)}{(1 + \sin\theta)} \times \dfrac{(1 - \sin\theta)}{(1 - \sin\theta)}}$ $\qquad \dfrac{\sin\theta}{1 + \cos\theta} =$

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$= \sqrt{\dfrac{(1 - \sin\theta)^2}{1^2 - \sin^2\theta}}$

$= \sqrt{\dfrac{(1 - \sin\theta)^2}{1 - \sin^2\theta}}$

$= \sqrt{\dfrac{(1 - \sin\theta)^2}{\cos^2\theta}}$

$= \dfrac{1 - \sin\theta}{\cos\theta}$

$= \dfrac{1}{\cos\theta} - \dfrac{\sin\theta}{\cos\theta}$

$= \sec\theta - \tan\theta$

$= R.H.S$ //.

16) $\sqrt{\dfrac{1 + \cos\theta}{1 - \cos\theta}} = \operatorname{cosec}\theta + \cot\theta$

$L.H.S =$ ✓

17) $\dfrac{\sin A}{1 + \cos A} + \dfrac{1 + \cos A}{\sin A} = 2\operatorname{cosec} A$

18) $(\sec A + \cos A)(\sec A - \cos A) = \tan^2 A + \sin^2 A$

19) $\dfrac{\sec A - \tan A}{\sec A + \tan A} = 1 - 2\sec A \cdot \tan A + 2\tan^2 A$

20) $\sin^2 A \cdot \tan A + \cos^2 A \cdot \cot A + 2\sin A \cos A = \tan A + \cot A$

$\dfrac{1}{\sin A \cdot \cos A}$

$\tan A + \cot A = \dfrac{\sin A}{\cos A} + \dfrac{\cos A}{\sin A}$

$= \dfrac{\sin^2 A + \cos^2 A}{\cos A \cdot \sin A}$