

28/11/2023

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

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

$$\begin{aligned} L.H.S &= (\sin \theta - \cos \theta)(\sin^2 \theta + \sin \theta \cdot \cos \theta + \cos^2 \theta) \\ &= (\sin \theta - \cos \theta)(1 + \sin \theta \cdot \cos \theta) \\ &= R.H.S \checkmark \end{aligned}$$

$$15) \sqrt{\frac{1-\sin \theta}{1+\sin \theta}} = \sec \theta - \tan \theta \quad \begin{array}{l} a+b \rightarrow a-b \\ a-b \rightarrow a+b \end{array}$$

$$\begin{aligned} L.H.S &= \sqrt{\frac{1-\sin \theta}{1+\sin \theta}} \times \frac{1}{1} \quad \begin{array}{l} 1+\sin \theta \rightarrow 1-\sin \theta \\ \sin \theta - \tan^2 \theta \rightarrow \sin \theta + \tan^2 \theta \end{array} \\ &= \sqrt{\frac{(1-\sin \theta)}{(1+\sin \theta)}} \times \frac{1}{1} \\ &= \sqrt{\frac{(1-\sin \theta)}{(1+\sin \theta)}} \times \frac{(1-\sin \theta)}{(1-\sin \theta)} \cdot \frac{\sin \theta}{1+\cos \theta} = \end{aligned}$$

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

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

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

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

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

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

$$= R.H.S //$$

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

$$L.H.S = \checkmark$$

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

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

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

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

$$\begin{aligned} &\tan A + \cot A \\ &\frac{1}{\sin A \cdot \cos A} \quad \tan A + \cot A = \frac{\sin A}{\cos A} + \frac{\cos A}{\sin A} \\ &= \frac{\sin^2 A + \cos^2 A}{\cos A \cdot \sin A} \end{aligned}$$