$$\boxed{\text{Prove that } \sin\alpha + \sin\theta = 2\sin\left(\frac{\alpha+\theta}{2}\right)\cdot\cos\left(\frac{\alpha-\theta}{2}\right)}$$

Our goal is to see if we can replace α and θ on the left side w̄ some sum/difference and then we could use compound angle identity (which is one of our tools)

> We can consider arguments/inputs of sine/cosine functions on the right side! the benefit is introducing those arguments into consideration and expressing easily α and θ.

$$\frac{\alpha+\theta}{2} + \frac{\alpha-\theta}{2} = \alpha \quad \text{(simplifies to alpha!)}$$

$$\frac{\alpha+\theta}{2} - \frac{\alpha-\theta}{2} = \theta$$

Then...

$$L.S. = \sin\alpha + \sin\theta =$$

$$= \sin\left[\frac{\alpha+\theta}{2} + \frac{\alpha-\theta}{2}\right] + \sin\left[\frac{\alpha+\theta}{2} - \frac{\alpha-\theta}{2}\right]$$

and

$$\sin(A\pm B) = \sin A\cos B \pm \cos A\sin B$$

$$= \sin\left(\frac{\alpha+\theta}{2}\right)\cos\left(\frac{\alpha-\theta}{2}\right) + \cancel{\cos\left(\frac{\alpha+\theta}{2}\right)\sin\left(\frac{\alpha-\theta}{2}\right)} + \sin\left(\frac{\alpha+\theta}{2}\right)\cos\left(\frac{\alpha-\theta}{2}\right) -$$

$$\cancel{\cos\left(\frac{\alpha+\theta}{2}\right)\sin\left(\frac{\alpha-\theta}{2}\right)} = 2\sin\left(\frac{\alpha+\theta}{2}\right)\cos\left(\frac{\alpha-\theta}{2}\right)$$