

2.56  
= 0

$$\tan \frac{\beta}{2} = \frac{b}{a+c} = \frac{2R \sin \beta}{2R \sin \alpha + 2R \sin \gamma}$$

$$\tan \frac{\beta}{2} = \frac{\sin \beta}{\sin \alpha + \sin(\alpha + \beta)}$$

$$\frac{\sin \frac{\beta}{2}}{\cos \frac{\beta}{2}} = \frac{2 \sin \frac{\beta}{2} \cos \frac{\beta}{2}}{\sin \alpha + \sin(\alpha + \beta)}$$

ii)  $\sin \frac{\beta}{2} = 0$

$$\sin \frac{\beta}{2} = 0$$

pick  $\alpha$  or  $\beta$  or  $\gamma$   $\frac{\beta}{2} = 0$

other  $\alpha$  or  $\beta$  or  $\gamma$   $\frac{\beta}{2} = \pi$

iii)  $\cos \frac{\beta}{2} = 0$

$$\frac{1}{\cos \frac{\beta}{2}} = \frac{2 \cos \frac{\beta}{2}}{\sin \alpha + \sin(\alpha + \beta)}$$

$$\sin \alpha + \sin(\alpha + \beta) = 2 \cos \frac{\beta}{2}$$

$$2 \sin \left( \frac{2\alpha + \beta}{2} \right) \cos \frac{\beta}{2} = 2 \cos \frac{\beta}{2}$$

$$\sin \left( \frac{2\alpha + \beta}{2} \right) = \cos \frac{\beta}{2} \Rightarrow \frac{\beta}{2} = \frac{\pi}{2} + \pi k \Rightarrow \cos \frac{\beta}{2} = 0 \text{ n/a}$$

$$\sin \left( \frac{2\alpha + \beta}{2} \right) = \cos \frac{\beta}{2}$$

$$\sin \left( \frac{2\alpha + \beta}{2} \right) = \sin \left( \frac{\pi}{2} - \frac{\beta}{2} \right)$$

$$\frac{2\alpha + \beta}{2} = \frac{\pi - \beta}{2}$$

$$2\alpha + 2\beta = \pi$$

$$\alpha + \beta = \frac{\pi}{2} \rightarrow \boxed{\gamma = \frac{\pi}{2}}$$