

Razones trigonométricas del ángulo doble

Seno

$$\operatorname{sen}(2\alpha) = \operatorname{sen}(\alpha + \alpha) = \operatorname{sen} \alpha \cos \alpha + \cos \alpha \operatorname{sen} \alpha = 2 \operatorname{sen} \alpha \cos \alpha$$

C.Q.D.

Coseno

$$\cos(2\alpha) = \cos(\alpha + \alpha) = \cos \alpha \cos \alpha - \operatorname{sen} \alpha \operatorname{sen} \alpha = \cos^2 \alpha - \operatorname{sen}^2 \alpha$$

C.Q.D.

Tangente

$$\operatorname{tg}(2\alpha) = \operatorname{tg}(\alpha + \alpha) = \frac{\operatorname{tg} \alpha + \operatorname{tg} \alpha}{1 - \operatorname{tg} \alpha \operatorname{tg} \alpha} = \frac{2 \operatorname{tg} \alpha}{1 - \operatorname{tg}^2 \alpha}$$

C.Q.D.