

86 growth of decay

Bella
Went's to Graduate?

Quad min at 2009
Bar: Always increasing

Data	
4	6
1/2	7
3	6
4	7
5	6

In 2016 by Quad Reg 70%
by Bar Reg 80%

To Get 95% Great Rate Quad 2025
Bar 2018

Half Angle Identities

$$\cos 2x = 1 - 2\sin^2 x$$

$$\cos 2x = 2\cos^2 x - 1$$

$$\sin x = \pm \sqrt{\frac{1 - \cos 2x}{2}}$$

$$\cos x = \pm \sqrt{\frac{1 + \cos 2x}{2}}$$

$$\sin\left(\frac{u}{2}\right) = \pm \sqrt{\frac{1 - \cos u}{2}}$$

$$\cos\left(\frac{u}{2}\right) = \pm \sqrt{\frac{1 + \cos u}{2}}$$

$$\cos(15^\circ) = \cos\left(\frac{30^\circ}{2}\right) = \pm \sqrt{\frac{1 + \cos 30^\circ}{2}}$$

In Quad I \cos is +

$$15^\circ \oplus = \sqrt{\frac{1 + \frac{\sqrt{3}}{2}}{2}}$$

$$\cos(15^\circ) = .96\dots$$

$$\sqrt{\left(\frac{1 + \frac{\sqrt{3}}{2}}{2}\right)} = .96\dots$$

Half-angle identities: Problem type 1

Use a half-angle formula to find the exact value of $\cos 112.5^\circ$.

$$\cos\left(\frac{225^\circ}{2}\right) = \pm \sqrt{\frac{1 + \cos(225^\circ)}{2}}$$

$$= \pm \sqrt{\frac{1 + -\sqrt{2}/2}{2}}$$

$\cos(112.5^\circ)$
in QII
cos is \ominus

$$\pm \sqrt{\frac{2 - \sqrt{2}}{4}}$$

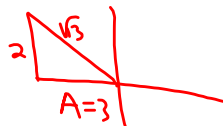
$$\pm \frac{\sqrt{2 - \sqrt{2}}}{2}$$

$$\cos(112.5^\circ) = -.382\dots$$

$$\sqrt{(2 - \sqrt{2})}/2 = -.382\dots$$

Half-angle identities: Problem type 2

Suppose that $\sin \alpha = \frac{2}{\sqrt{13}}$ and $\frac{\pi}{2} < \alpha < \pi$.



Find the exact values of $\sin \frac{\alpha}{2}$ and $\tan \frac{\alpha}{2}$.

$$A^2 + 4 = 13$$

$$A^2 = 9$$

$$A = -3$$

$$\cos \alpha = \frac{A}{H} = \frac{-3}{\sqrt{13}}$$

$$\sin\left(\frac{\alpha}{2}\right) = \pm \sqrt{\frac{1 - \cos \alpha}{2}}$$

In Q I

$$\sin \frac{\alpha}{2} \text{ is } \oplus \quad \oplus \sqrt{\frac{1 - 2/\sqrt{13}}{2}}$$

$$\cos\left(\frac{\alpha}{2}\right) = \oplus \sqrt{\frac{1 + 2/\sqrt{13}}{2}}$$

In Q I
cos is \oplus

$$\tan\left(\frac{\alpha}{2}\right) = \frac{\sqrt{\frac{1 - 2/\sqrt{13}}{2}}}{\sqrt{\frac{1 + 2/\sqrt{13}}{2}}} = \sqrt{\frac{1 - 2/\sqrt{13}}{1 + 2/\sqrt{13}}}$$