

Precalculus

Computing sine, cosine of a half-angle

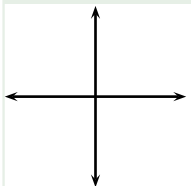
Todor Milev

2019

Example

Using radicals, find the exact value of the trigonometric expression.

$$\cos 105^\circ$$

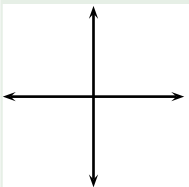


Recall the half angle formula $\cos \alpha = \pm \sqrt{\frac{1 + \cos(2\alpha)}{2}}$.

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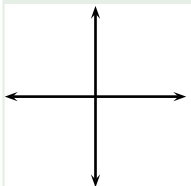


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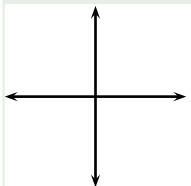


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$$\cos 105^\circ = \pm \sqrt{\frac{1 + \cos(2 \cdot 105^\circ)}{2}} \quad \left| \quad \cos 105^\circ ? 0 \right.$$

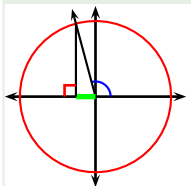


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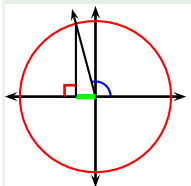


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$$\begin{aligned} \cos 105^\circ &= \pm \sqrt{\frac{1 + \cos(2 \cdot 105^\circ)}{2}} & \left| \cos 105^\circ < 0 \right. \\ &= - \sqrt{\frac{1 + \cos(210^\circ)}{2}} \end{aligned}$$

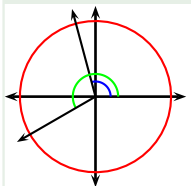


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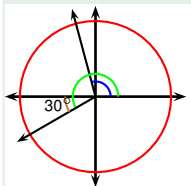


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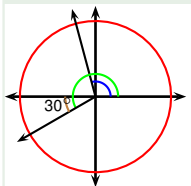


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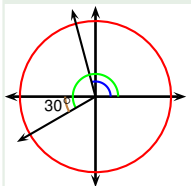


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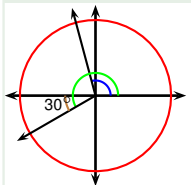


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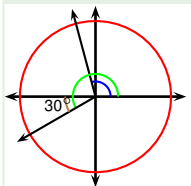


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