Precalculus
The equation $\sin\theta = a$, special angles

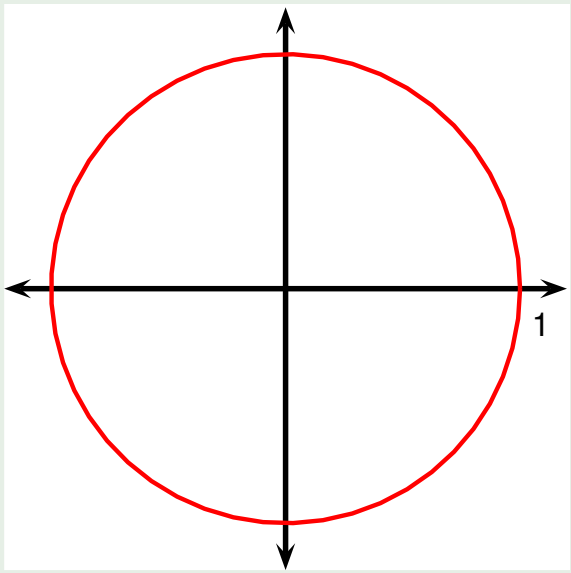
Todor Milev

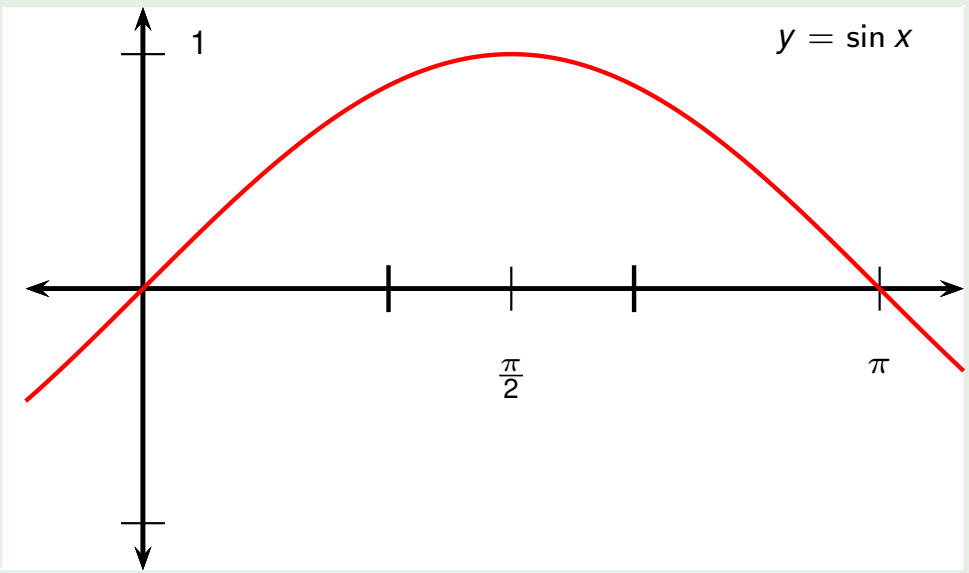
2019

Example

Find all solutions and then find those that lie between $-360°$ and $360°$.

$$\sin\theta = \frac{\sqrt{3}}{2}$$





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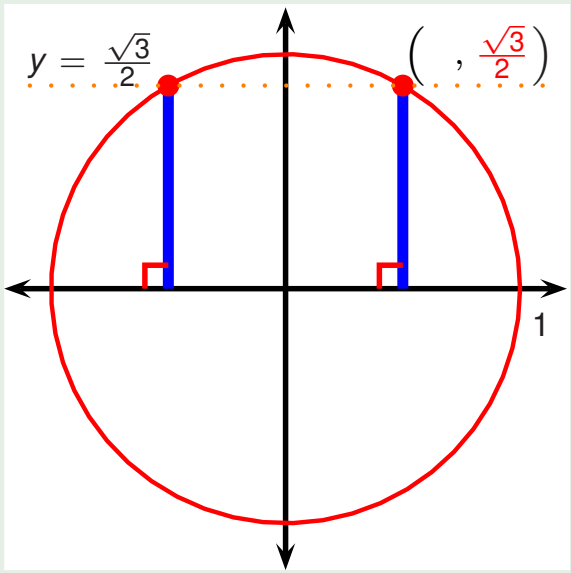

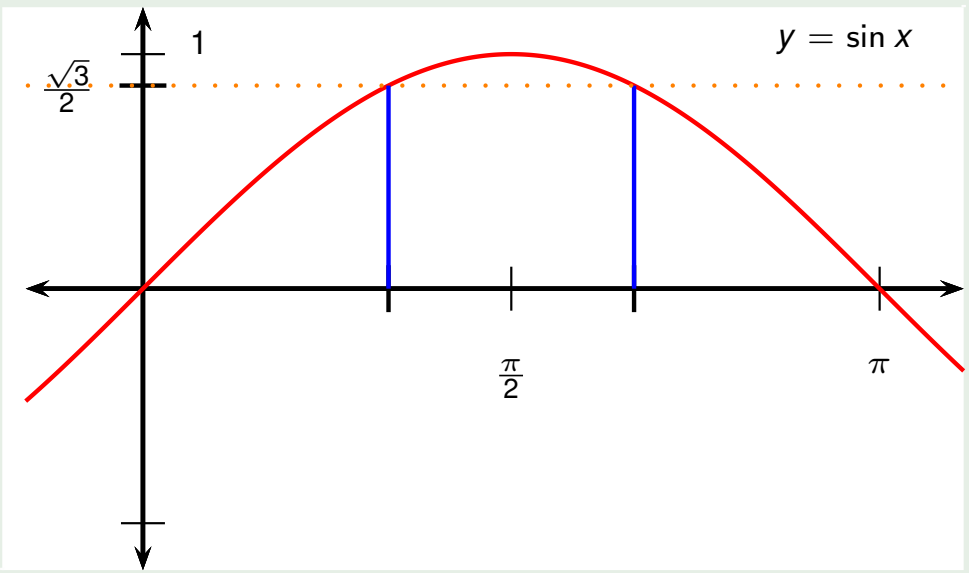

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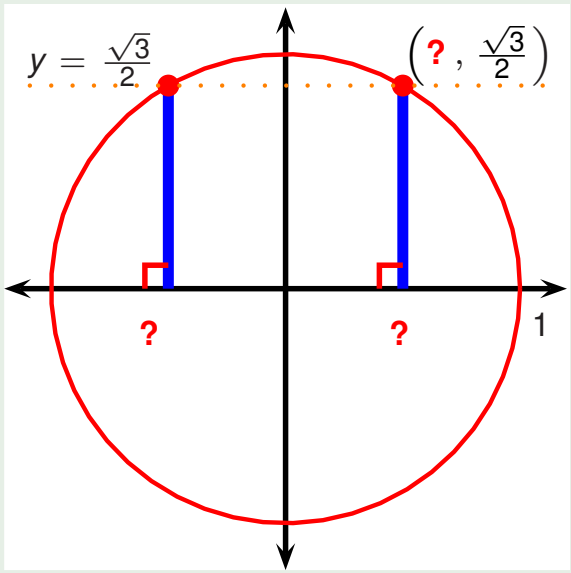

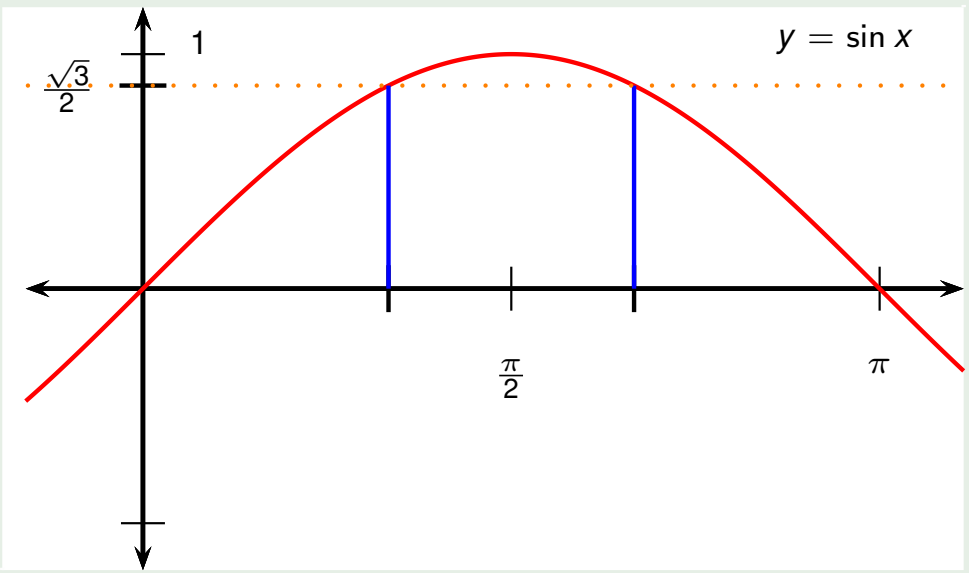

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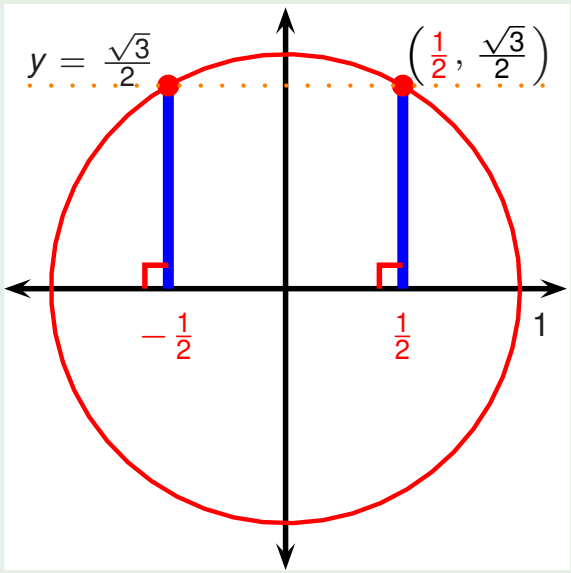
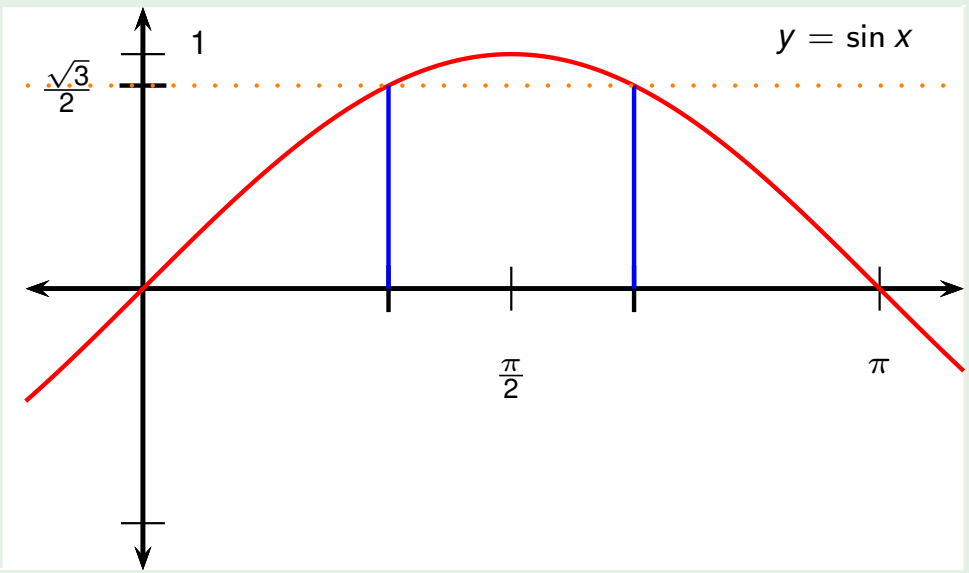


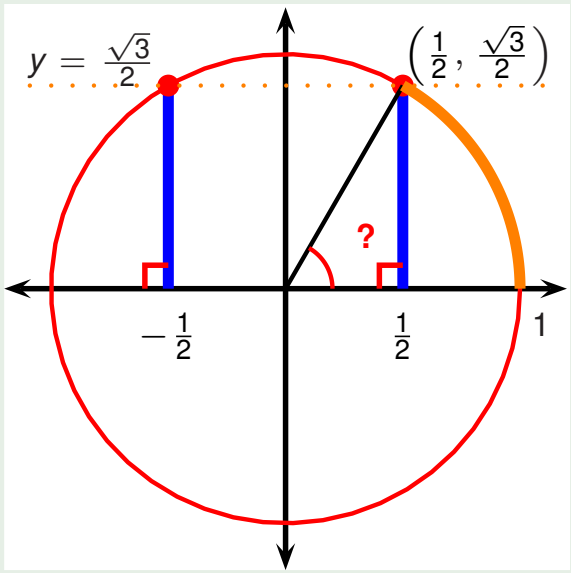


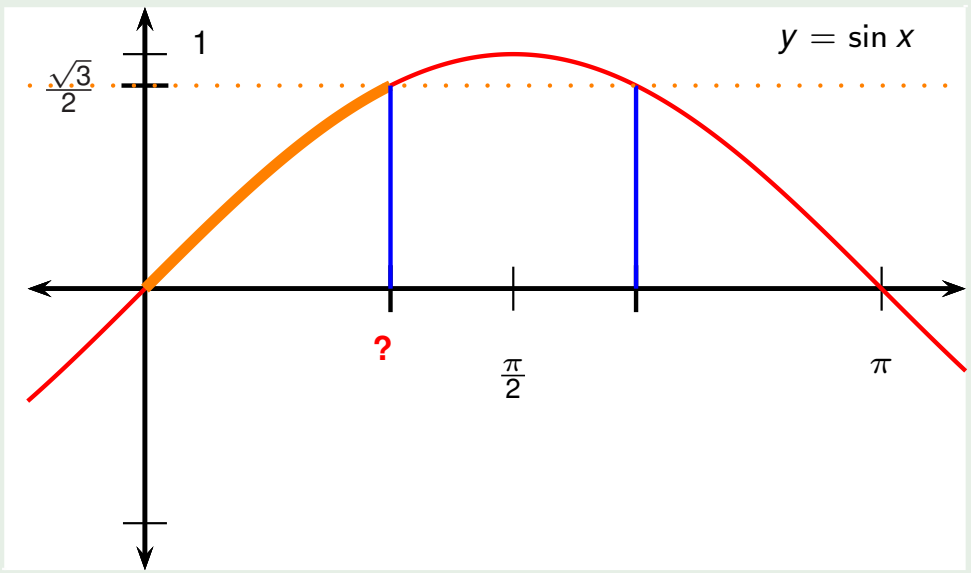
Example

Find all solutions and then find those that lie between $-360°$ and $360°$.

$$\sin\theta = \frac{\sqrt{3}}{2}$$

$$\theta = \text{?}$$

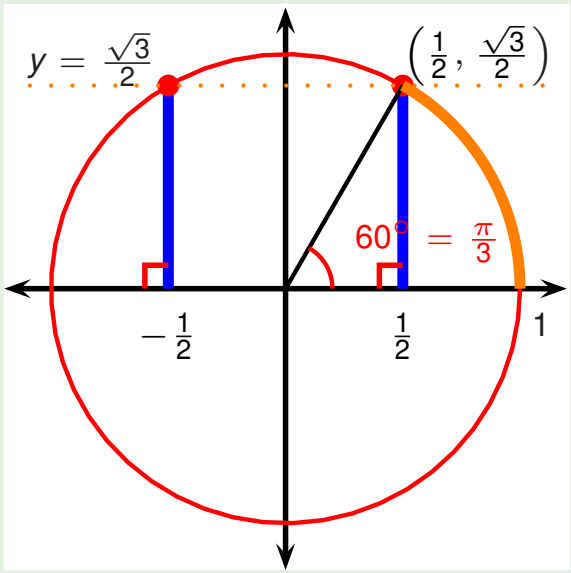


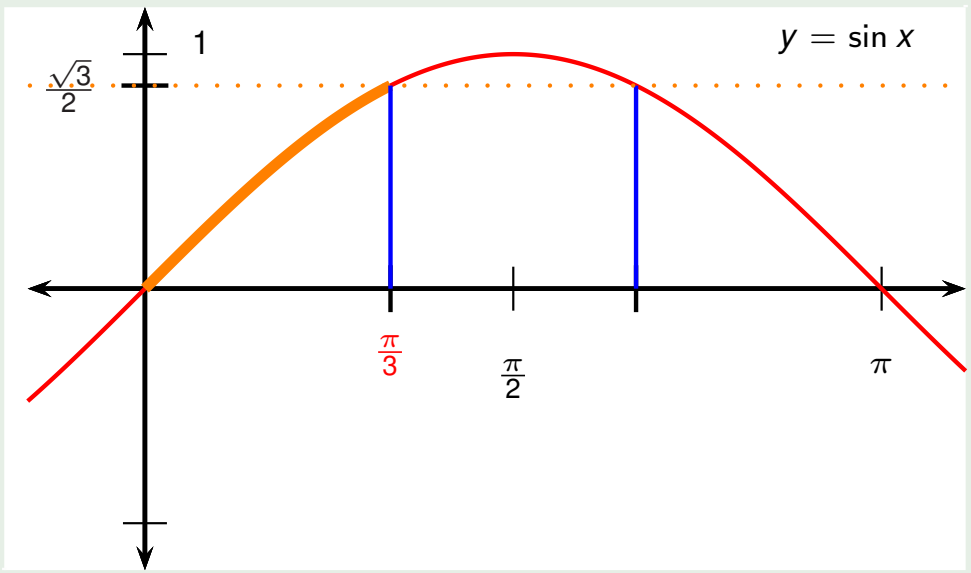


Example

Find all solutions and then find those that lie between $-360°$ and $360°$.

$$\sin\theta = \frac{\sqrt{3}}{2}$$
$$\theta = 60°$$





Example

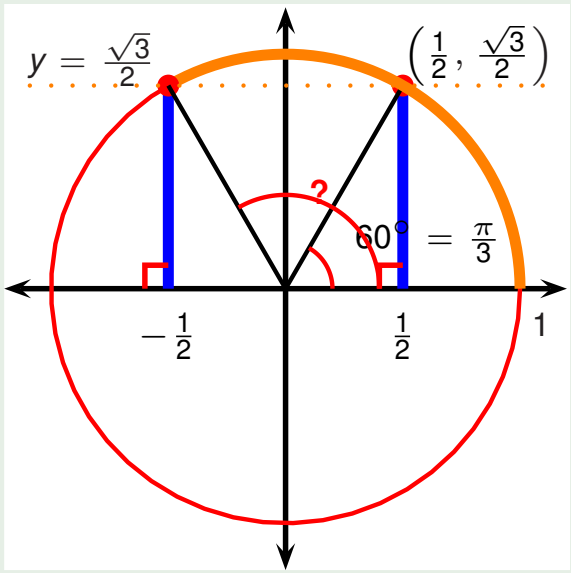
Find all solutions and then find those that lie between $-360°$ and $360°$.

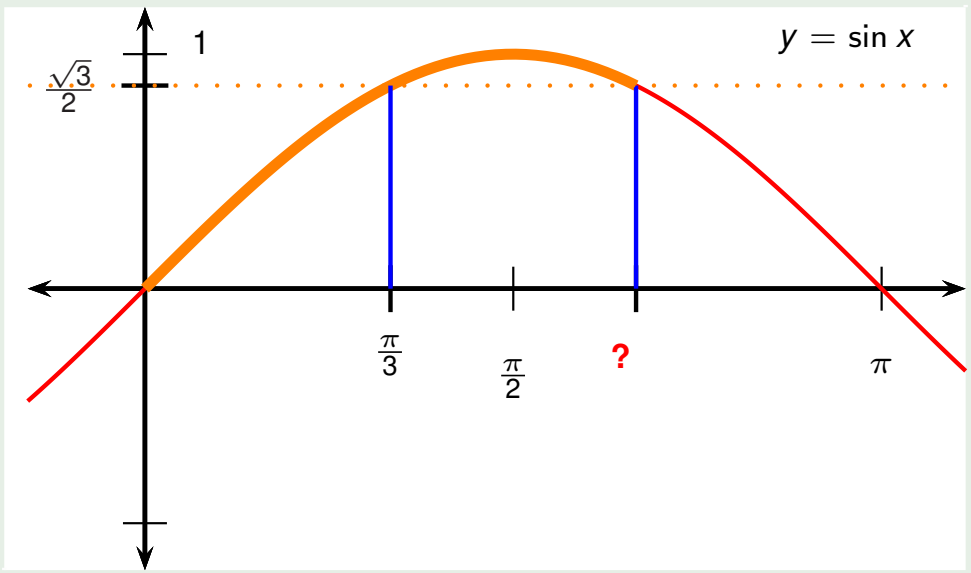
$$\sin\theta = \frac{\sqrt{3}}{2}$$

$$\theta = 60°$$

or

?





Example

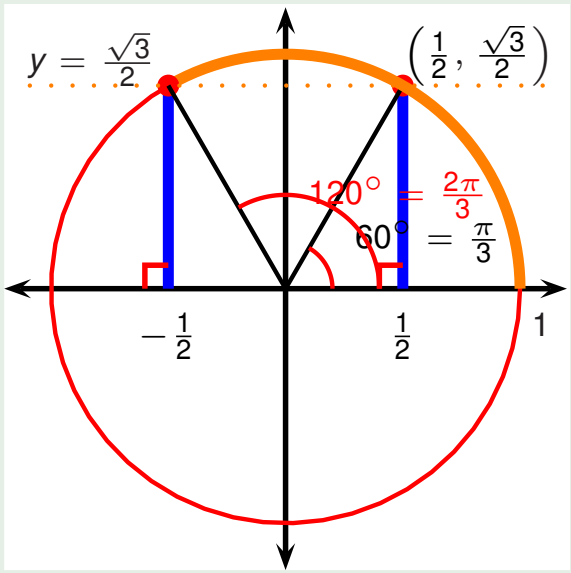
Find all solutions and then find those that lie between $-360°$ and $360°$.

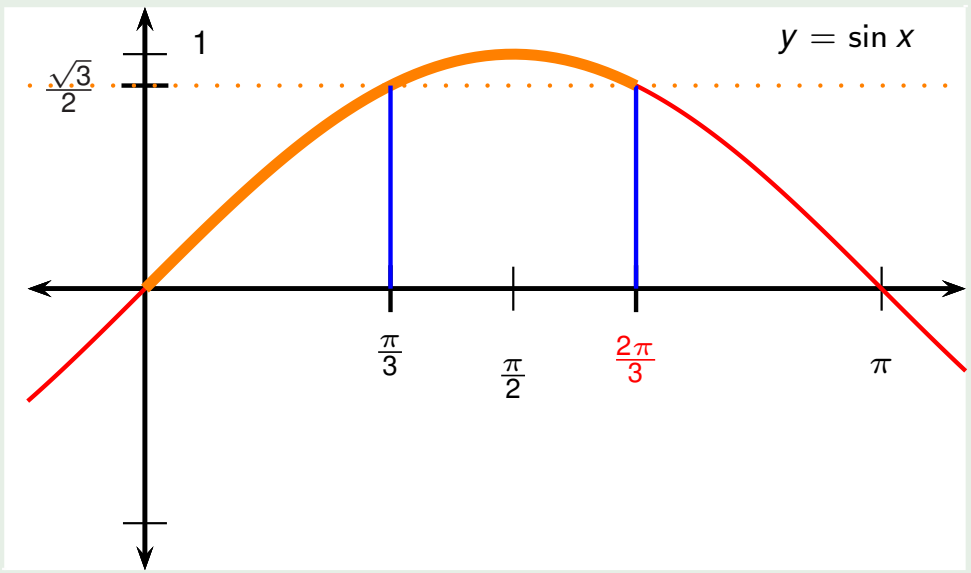
$$\sin\theta = \frac{\sqrt{3}}{2}$$

$$\theta = 60°$$

or

$120°$





Example

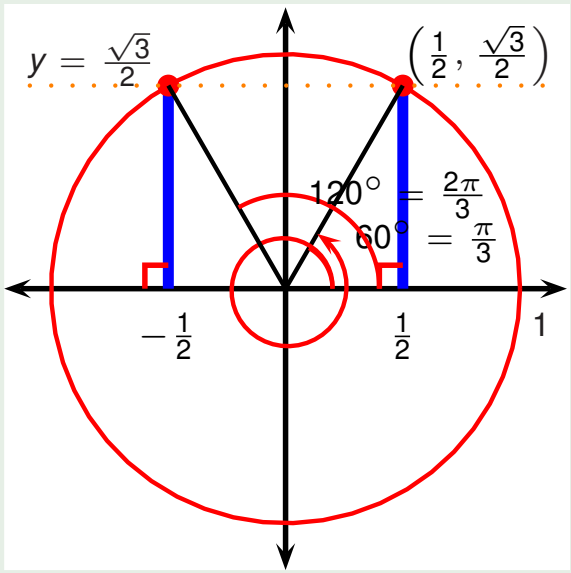
Find all solutions and then find those that lie between -360° and 360°.

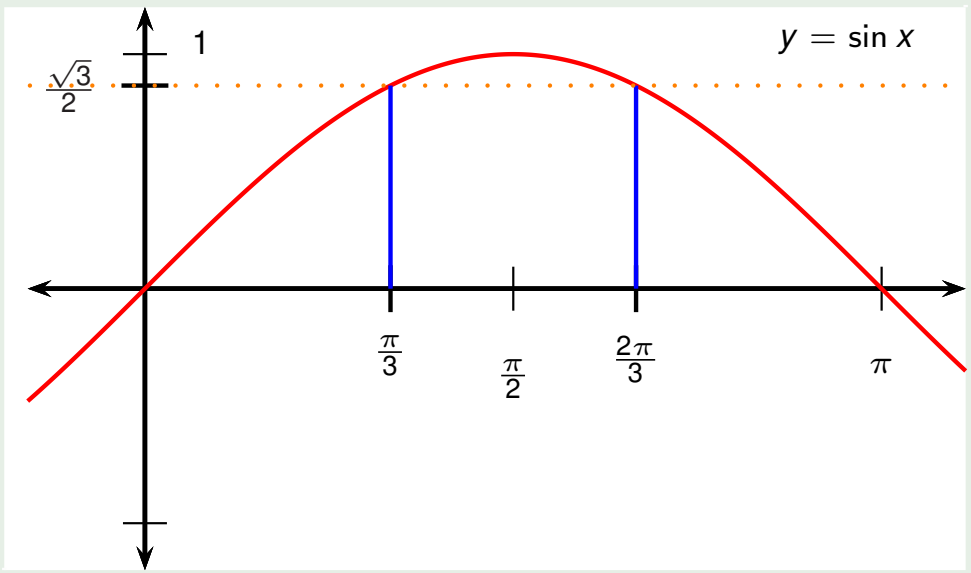
$$\sin\theta = \frac{\sqrt{3}}{2}$$

$$\theta = 60^\circ + k \cdot 360^\circ$$

or

$$120^\circ$$





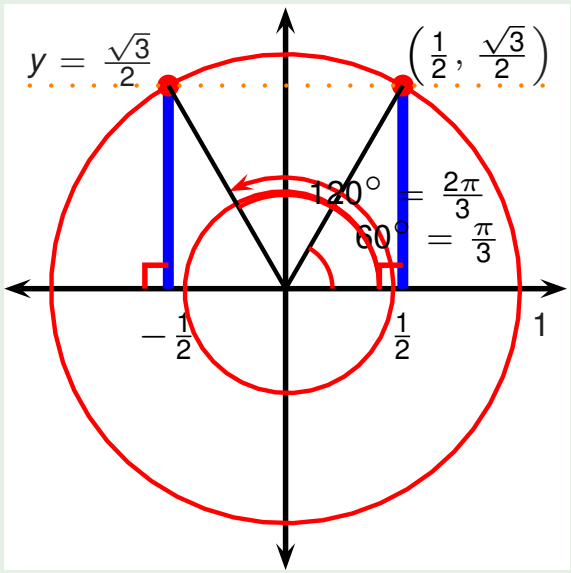
Example

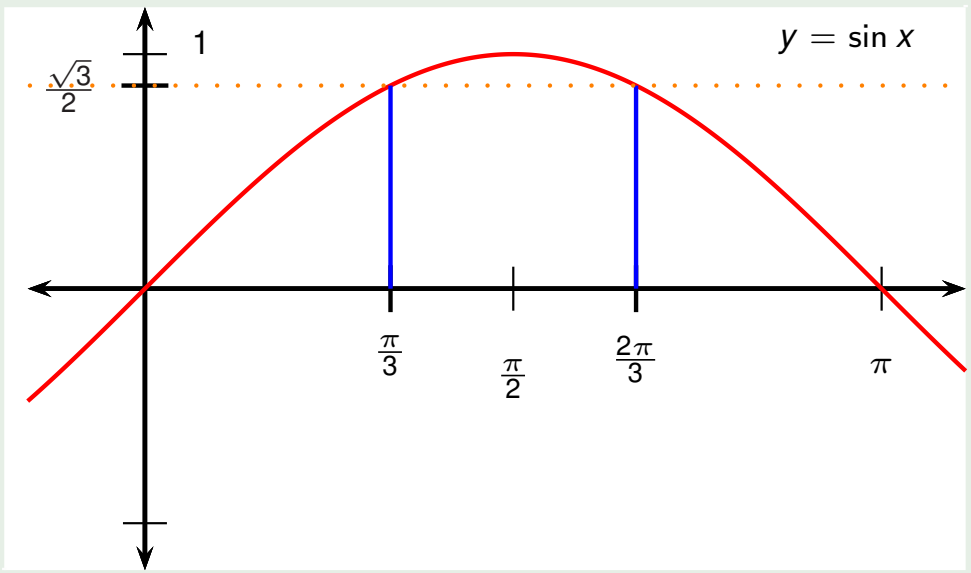
Find all solutions and then find those that lie between -360° and 360°.

$$\begin{aligned} \sin\theta &= \frac{\sqrt{3}}{2} \\ \theta &= 60^\circ + k \cdot 360^\circ \end{aligned}$$

or

$$120^\circ + k \cdot 360^\circ$$





Example

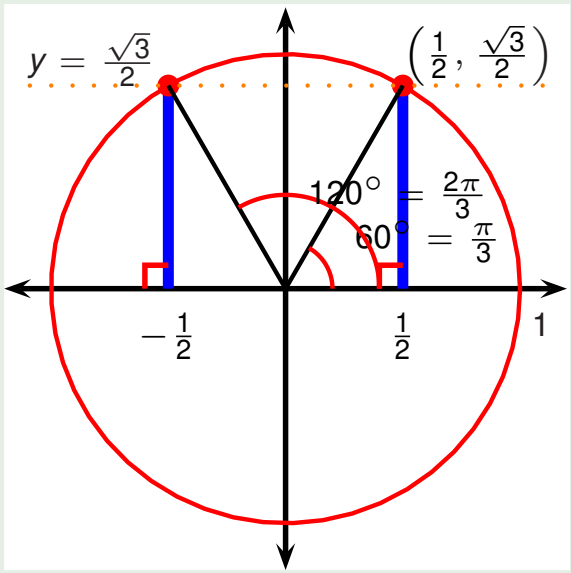
Find all solutions and then find those that lie between -360° and 360°.

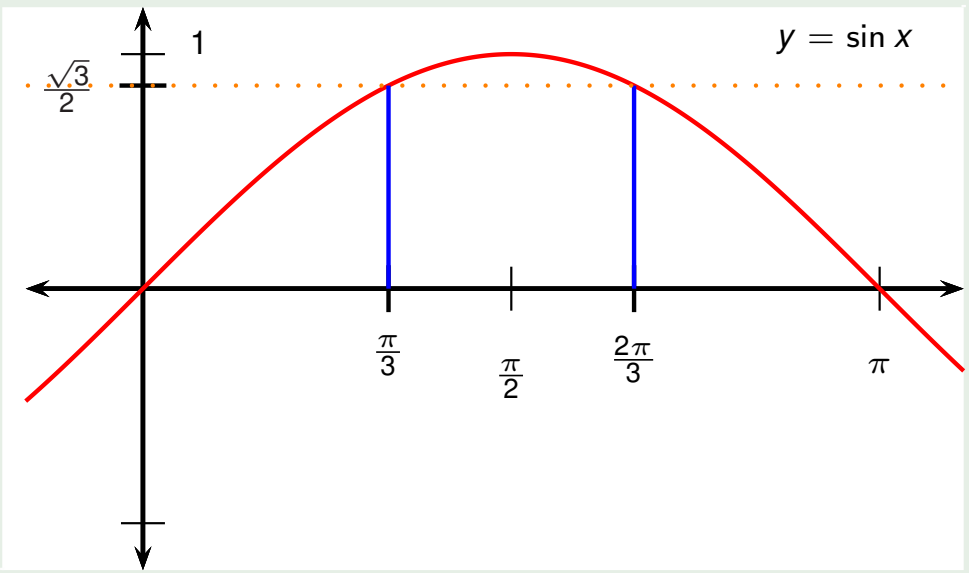
$$\sin\theta = \frac{\sqrt{3}}{2}$$

$$\theta = 60^\circ + k \cdot 360^\circ = \ldots\ -660^\circ,$$

or $\ldots\ k{=}{-}2$

$$120^\circ + k \cdot 360^\circ = \ldots\ -600^\circ,$$





Example

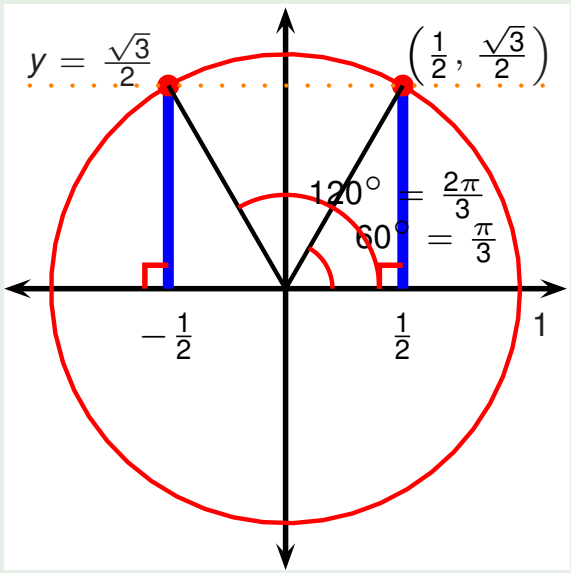
Find all solutions and then find those that lie between -360° and 360°.

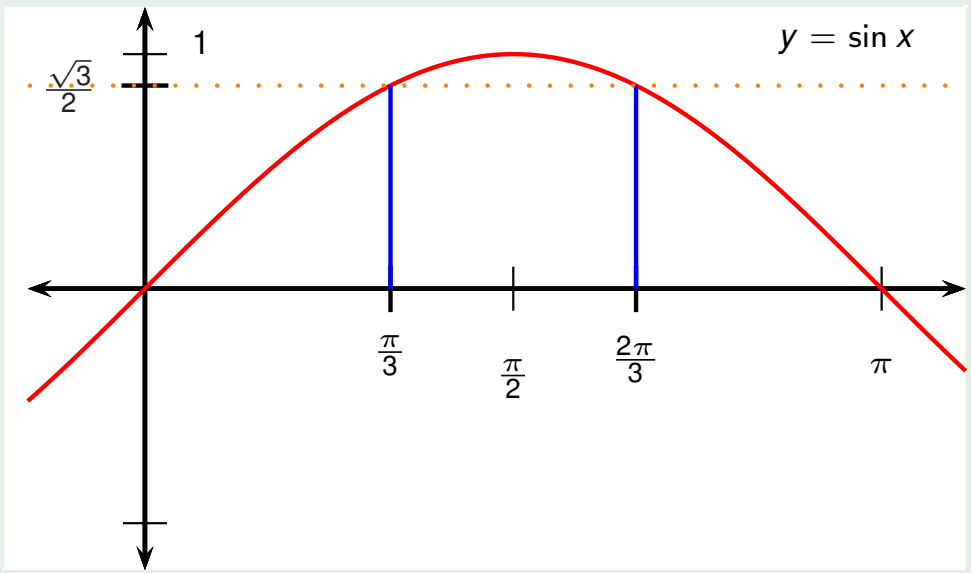
$$\sin\theta = \frac{\sqrt{3}}{2}$$

$$\theta = 60^\circ + k\cdot 360^\circ = \ldots \underset{k=-2}{-660^\circ}, \underset{k=-1}{-300^\circ},$$

or

$$120^\circ + k\cdot 360^\circ = \ldots -600^\circ, -240^\circ,$$





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Find all solutions and then find those that lie between -360° and 360°.

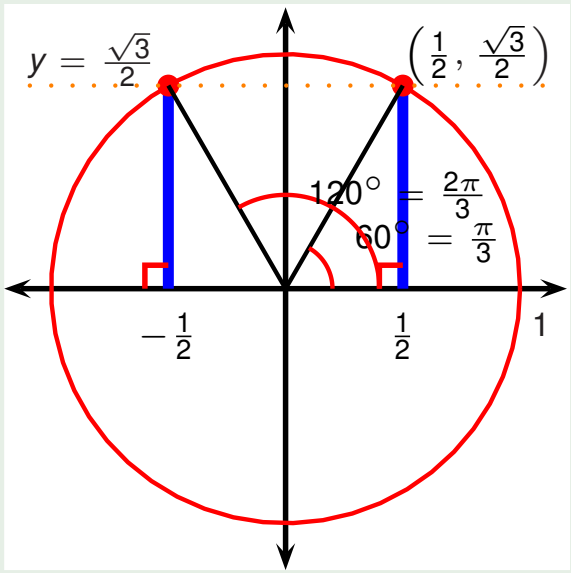
$$\sin\theta = \frac{\sqrt{3}}{2}$$

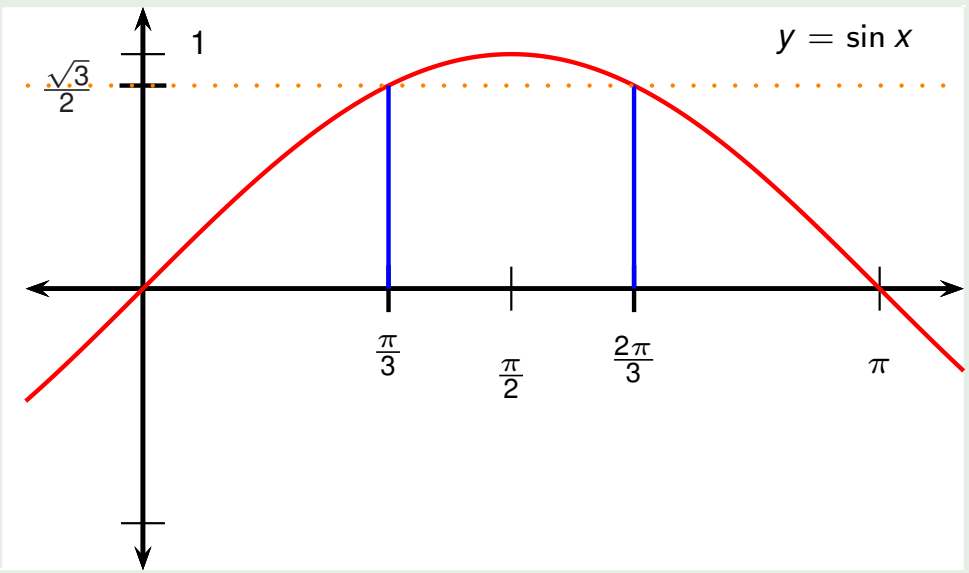
$$\theta = 60^\circ + k\cdot 360^\circ = \ldots\ -660^\circ,\ -300^\circ,\ 60^\circ,$$

or

$$\cdots \quad k{=}{-}2 \quad k{=}{-}1 \quad k{=}0$$

$$120^\circ + k\cdot 360^\circ = \ldots\ -600^\circ,\ -240^\circ,\ 120^\circ,$$





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Find all solutions and then find those that lie between $-360°$ and $360°$.

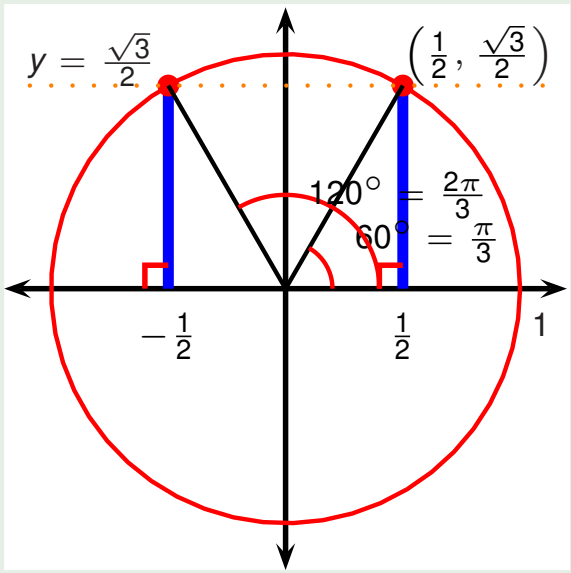
$$\sin\theta = \frac{\sqrt{3}}{2}$$

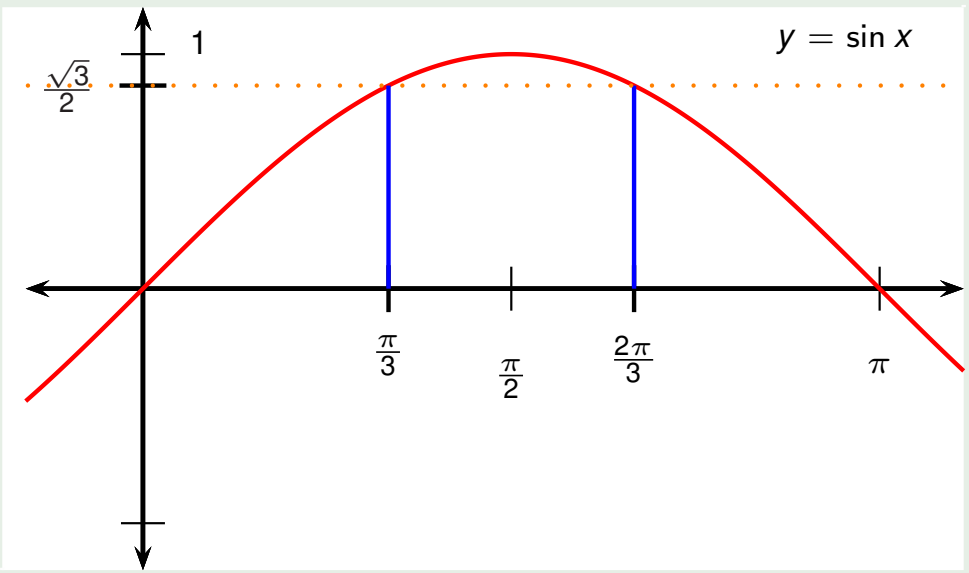
$$\theta = 60° + k \cdot 360° = \ldots \; -660°, \; -300°, \; 60°, \; 420°, \; \ldots$$

$$\ldots \quad k{=}{-2} \quad k{=}{-1} \quad k{=}0 \quad k{=}1 \quad \ldots$$

or

$$120° + k \cdot 360° = \ldots \; -600°, \; -240°, \; 120°, \; 480°, \; \ldots$$





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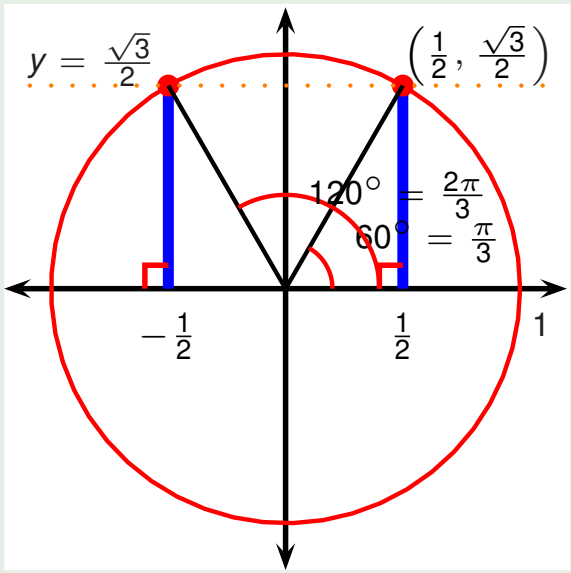
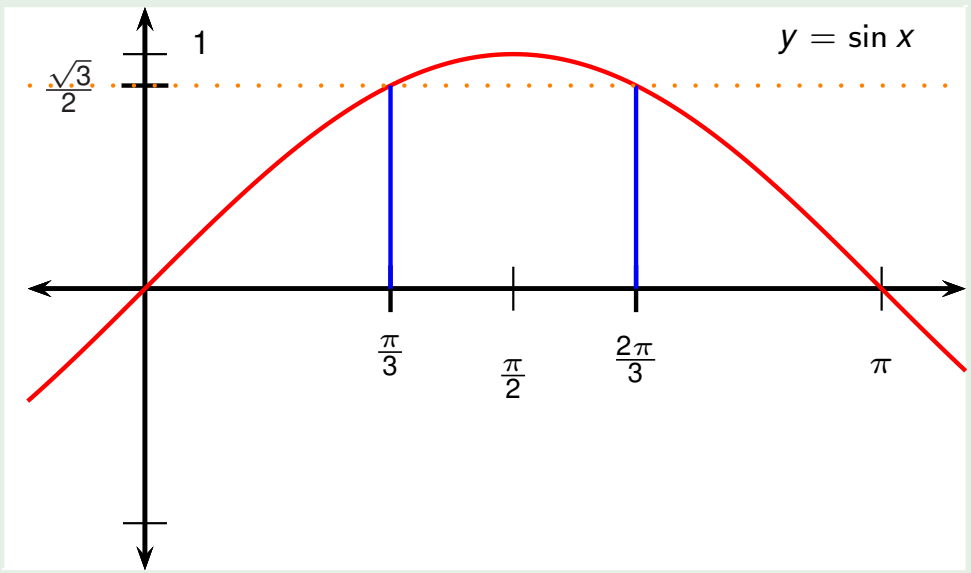
$$\sin\theta = \frac{\sqrt{3}}{2}$$

$$\theta = 60^\circ + k\cdot 360^\circ = \ldots\ -660^\circ,\ -300^\circ,\ 60^\circ,\ 420^\circ,\ \ldots$$

$$\text{or} \qquad \ldots\quad k{=}{-2}\quad k{=}{-1}\quad k{=}0\quad k{=}1\quad \ldots$$

$$120^\circ + k\cdot 360^\circ = \ldots\ -600^\circ,\ -240^\circ,\ 120^\circ,\ 480^\circ,\ \ldots$$





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or

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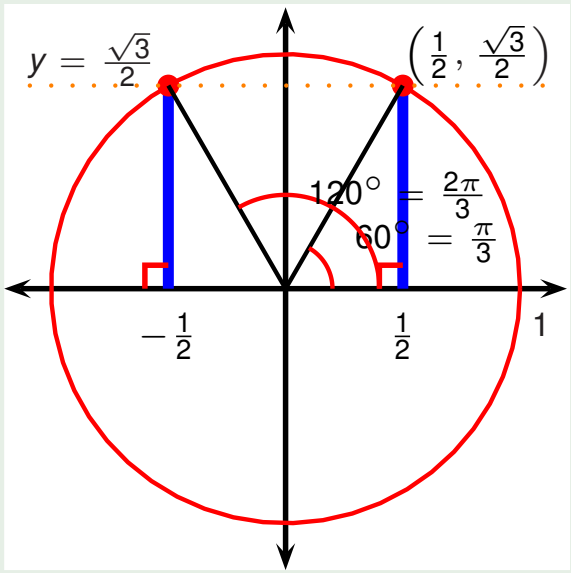
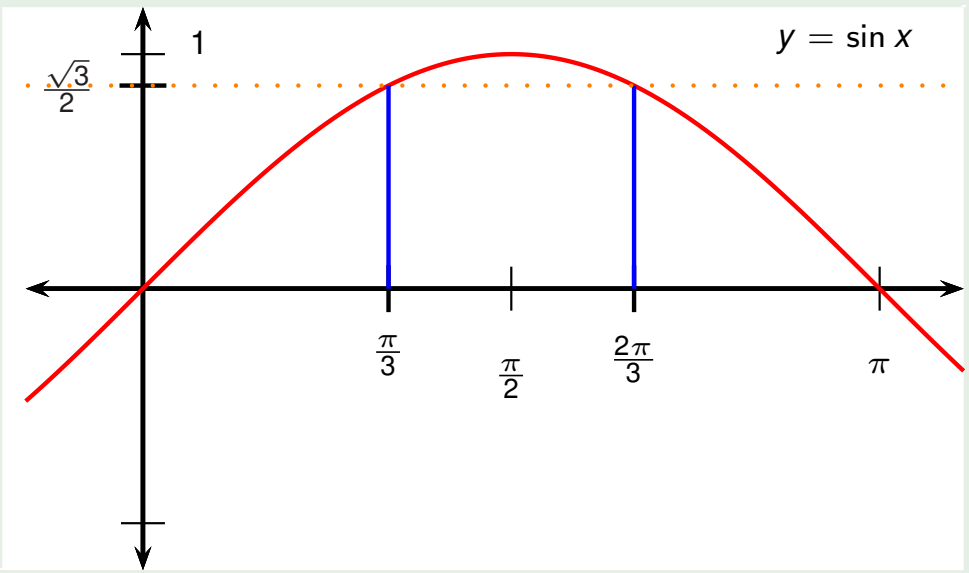
$$120° + k \cdot 360° = \ldots\ -600°,\ -240°,\ 120°,\ 480°,\ \ldots$$

$$\theta = \ldots\ -660°,\ -300°,\ 60°,\ 420°,\ \ldots$$

$$\ldots\ -600°,\ -240°,\ 120°,\ 480°,\ \ldots$$





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$$\text{or} \qquad \ldots \quad k{=}{-2} \quad k{=}{-1} \quad k{=}0 \quad k{=}1 \quad \ldots$$

$$120^\circ + k\cdot 360^\circ = \ldots\ -600^\circ,\ -240^\circ,\ 120^\circ,\ 480^\circ,\ \ldots$$

$$\theta = \ldots\ \cancel{-660^\circ},\ -300^\circ,\ 60^\circ,\ \cancel{420^\circ},\ \ldots$$

$$\ldots\ \cancel{-600^\circ},\ -240^\circ,\ 120^\circ,\ \cancel{480^\circ},\ \ldots$$