14.2 Translate and Reflect Trigonometric Graphs

pp. 915–922

EXAMPLE

Graph $y = 3 \cos (x - \pi) - 1$.

To graph $y = 3 \cos (x - \pi) - 1$, start with the graph of $y = 3 \cos x$. Then, translate the graph right π units and down 1 unit.
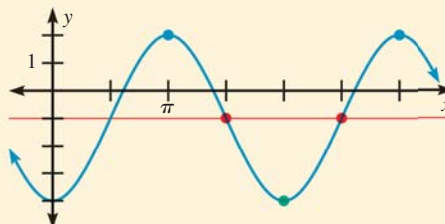
Amplitude: $|3| = 3$ **Period:** 2π

Horizontal shift: π **Vertical shift:** -1

On $y = k$: $\left(\dfrac{3\pi}{2}, -1\right); \left(\dfrac{5\pi}{2}, -1\right)$

Minimum: $(2\pi, -4)$

Maximums: $(\pi, 2); (3\pi, 2)$

EXERCISES

Graph the function.

EXAMPLES 1, 2, and 4 on pp. 915–917 for Exs. 10–15

10. $f(x) = \cos 2x + 4$

11. $y = \dfrac{1}{2} \sin 5(x - \pi)$

12. $y = 2 \sin\left(x - \dfrac{\pi}{2}\right) + 3$

13. $y = 2 \cos \dfrac{1}{3}x + 3$

14. $g(x) = -1 - 3 \cos 4x$

15. $y = 4 - \sin 3\left(x - \dfrac{\pi}{3}\right)$

14.3 Verify Trigonometric Identities

pp. 924–930

EXAMPLE

Verify the identity $\dfrac{\cot^2 \theta}{\csc \theta} = \csc \theta - \sin \theta$.

$\dfrac{\cot^2 \theta}{\csc \theta} = \dfrac{\csc^2 \theta - 1}{\csc \theta}$ **Pythagorean identity**

$= \dfrac{\csc^2 \theta}{\csc \theta} - \dfrac{1}{\csc \theta}$ **Write as separate fractions.**

$= \csc \theta - \dfrac{1}{\csc \theta}$ **Simplify.**

$= \csc \theta - \sin \theta$ **Reciprocal identity**

EXERCISES

Simplify the expression.

EXAMPLES 2, 3, 4, and 5 on pp. 925–926 for Exs. 16–20

16. $-\cos x \tan (-x)$

17. $\sec x \tan^2 x + \sec x$

18. $\sin\left(\dfrac{\pi}{2} - x\right) \tan x$

Verify the identity.

19. $\dfrac{\sin^2 (-x) - 1}{\cot^2 x} = -\sin^2 x$

20. $\tan\left(\dfrac{\pi}{2} - x\right) \cot x = \csc^2 x - 1$