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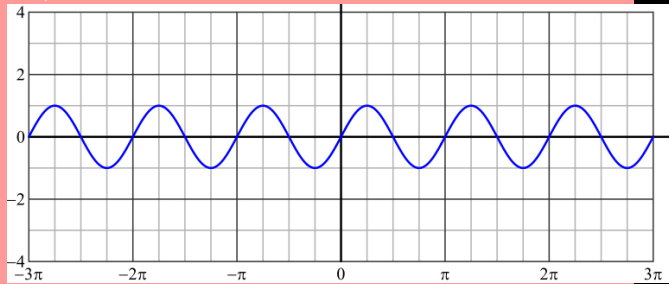
PARENT FUNCTION $\sin$

HORIZONTAL SHIFT 0

VERTICAL SHIFT 0

AMPLITUDE 1

PERIOD π



EQUATION

$$y = \sin(2x)$$

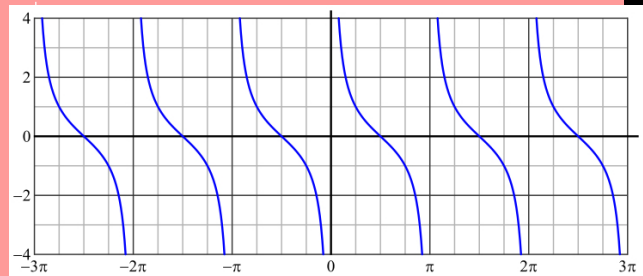
PARENT FUNCTION $\cot$

HORIZONTAL SHIFT 0

VERTICAL SHIFT 0

AMPLITUDE 1

ASYMPTOTES $n\pi$



EQUATION

$$y = \cot(x)$$

KEY

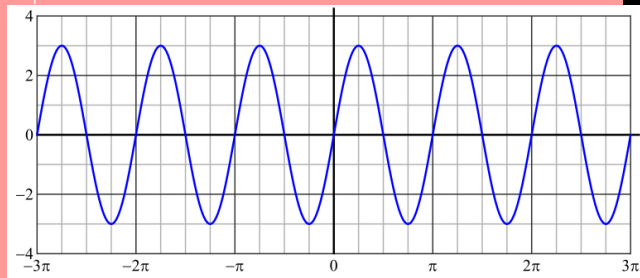
PARENT FUNCTION $\sin$

HORIZONTAL SHIFT 0

VERTICAL SHIFT 0

AMPLITUDE 3

PERIOD π



EQUATION

$$y = 3 \sin(2x)$$

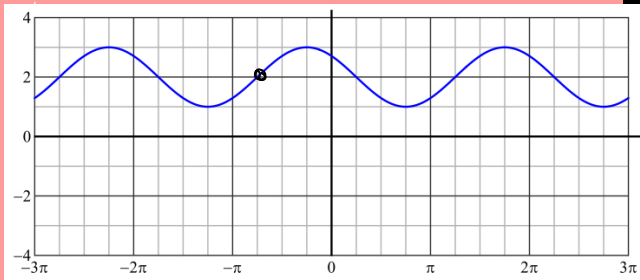
PARENT FUNCTION $\sin$

HORIZONTAL SHIFT $-\frac{3\pi}{4}$

VERTICAL SHIFT 2

AMPLITUDE 1

PERIOD 2π



EQUATION

$$y = \sin\left(x + \frac{3\pi}{4}\right) + 2$$

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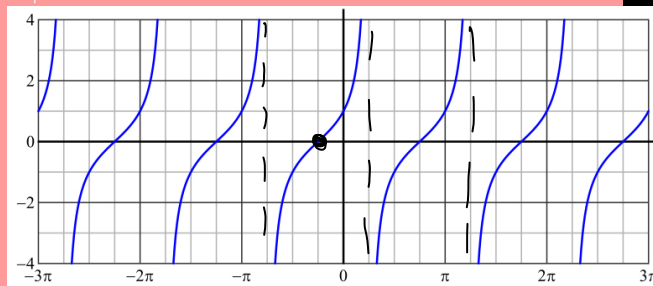
PARENT FUNCTION $\tan$

HORIZONTAL SHIFT $-\frac{\pi}{4}$

VERTICAL SHIFT 0

AMPLITUDE 1

ASYMPTOTES $\frac{\pi}{4} + n\pi$



EQUATION

$$y = \tan\left(x + \frac{\pi}{4}\right)$$

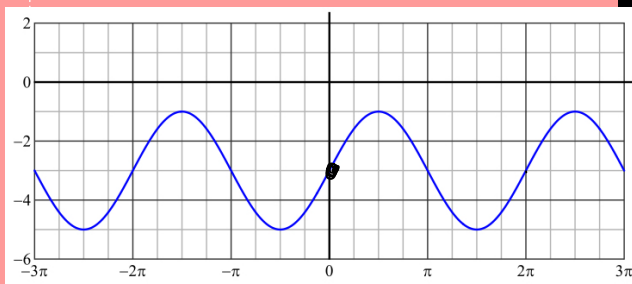
PARENT FUNCTION $\sin$

HORIZONTAL SHIFT 0

VERTICAL SHIFT -3

AMPLITUDE 2

PERIOD 2π



EQUATION

$$y = 2 \sin(x) - 3$$

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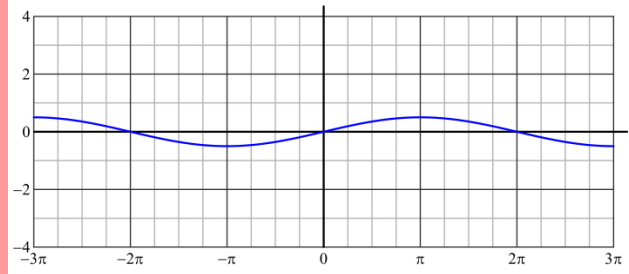
PARENT FUNCTION $\sin$

HORIZONTAL SHIFT 0

VERTICAL SHIFT 0

AMPLITUDE $\frac{1}{2}$

PERIOD 4π



EQUATION

$$y = \frac{1}{2} \sin\left(\frac{1}{2}x\right)$$

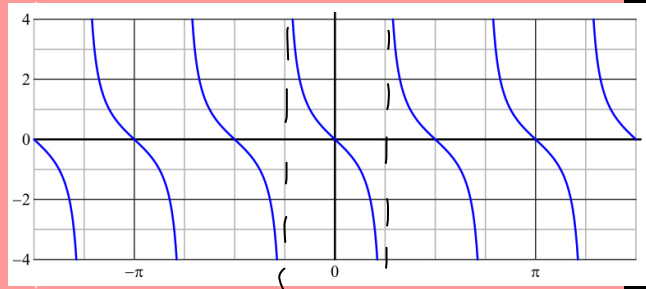
PARENT FUNCTION $\tan$

HORIZONTAL SHIFT 0

VERTICAL SHIFT 0

AMPLITUDE -1

ASYMPTOTES $\frac{\pi}{4} + \frac{n\pi}{2}$



EQUATION

$$y = -\tan(2x)$$

$$\begin{aligned}\tan &= \frac{\sin}{\cos} \\ \cot &= \frac{\cos}{\sin} \\ \sec &= \frac{1}{\cos} \\ \csc &= \frac{1}{\sin}\end{aligned}$$

Worksheet

Name: _____

Date: _____ Period: _____

1. Find an x -value where the trigonometric function has a vertical asymptote.

$$y = 4 \csc\left(\frac{1}{3}x\right)$$

$$0 = 4 \csc\left(\frac{1}{3}x\right)$$

$$0 = \csc\left(\frac{1}{3}x\right)$$

$$0 = \frac{1}{\sin\left(\frac{1}{3}x\right)}$$

$$\sin\left(\frac{1}{3}x\right) = 0$$

$$\frac{1}{3}x = n\pi$$

$$x = 3n\pi$$

3. Find an x -value where the trigonometric function has a vertical asymptote.

$$y = -2 \csc(3x)$$

$$0 = -2 \csc(3x)$$

$$0 = \csc(3x)$$

$$0 = \frac{1}{\sin(3x)}$$

$$\sin(3x) = 0$$

$$3x = n\pi$$

$$x = \frac{n\pi}{3}$$

5. Find an x -value where the trigonometric function has a vertical asymptote.

$$y = -4 \tan\left(\frac{1}{2}x\right)$$

$$0 = -4 \frac{\sin\left(\frac{1}{2}x\right)}{\cos\left(\frac{1}{2}x\right)}$$

$$\frac{1}{2}x = \frac{\pi}{2} + n\pi$$

$$x = \pi + 2n\pi$$

$$\cos\left(\frac{1}{2}x\right) = 0$$

7. Find an x -value where the trigonometric function has a vertical asymptote.

$$y = 3 \tan\left(\frac{1}{4}x\right)$$

$$\frac{\sin\left(\frac{1}{4}x\right)}{\cos\left(\frac{1}{4}x\right)} = 0$$

$$\cos\left(\frac{1}{4}x\right) = 0$$

$$\frac{1}{4}x = \frac{\pi}{2} + n\pi$$

$$x = 2\pi + 4n\pi$$

2. Find an x -value where the trigonometric function has a vertical asymptote.

$$y = 4 \csc\left(\frac{1}{4}x\right)$$

$$0 = 4 \csc\left(\frac{1}{4}x\right)$$

$$0 = \csc\left(\frac{1}{4}x\right)$$

$$0 = \frac{1}{\sin\left(\frac{1}{4}x\right)}$$

$$\sin\left(\frac{1}{4}x\right) = 0$$

$$\frac{1}{4}x = n\pi$$

$$x = 4n\pi$$

4. Find an x -value where the trigonometric function has a vertical asymptote.

$$y = -3 \csc\left(\frac{1}{4}x - \frac{5\pi}{6}\right) + 3$$

$$0 = -3 \csc\left(\frac{1}{4}x - \frac{5\pi}{6}\right) + 3$$

$$-3 = -3 \csc\left(\frac{1}{4}x - \frac{5\pi}{6}\right)$$

$$1 = \csc\left(\frac{1}{4}x - \frac{5\pi}{6}\right)$$

$$\frac{1}{4}x - \frac{5\pi}{6} = n\pi$$

$$x = 4(n\pi + \frac{5\pi}{6})$$

6. Find an x -value where the trigonometric function has a vertical asymptote.

$$y = -\tan(2x)$$

$$\frac{-\sin(2x)}{\cos(2x)}$$

$$\cos(2x) = 0$$

$$2x = \frac{\pi}{2} + n\pi$$

$$x = \frac{\pi}{4} + \frac{n\pi}{2}$$

8. Find an x -value where the trigonometric function has a vertical asymptote.

$$y = 2 \left[\tan\left(2x - \frac{2\pi}{3}\right) \right] - 2$$

$$\frac{\sin\left(2x - \frac{2\pi}{3}\right)}{\cos\left(2x - \frac{2\pi}{3}\right)} = 0$$

$$\cos\left(2x - \frac{2\pi}{3}\right) = 0$$

$$2x - \frac{2\pi}{3} = \frac{\pi}{2} + n\pi$$

$$2x = \frac{7\pi}{6} + n\pi$$

$$x = \frac{7\pi}{12} + \frac{1}{2}n\pi$$

9. Find an x -value where the trigonometric function has a vertical asymptote.

$$y = -2 \left[\sec \left(4x + \frac{\pi}{4} \right) \right] - 4 \quad x = \frac{3\pi}{16} + \frac{n\pi}{4}$$

$$\frac{1}{\cos(4x + \frac{\pi}{4})} = 0$$

$$4x + \frac{\pi}{4} = \frac{\pi}{2} + n\pi$$

11. Find an x -value where the trigonometric function has a vertical asymptote.

$$y = -2 \left[\sec \left(3x + \frac{\pi}{6} \right) \right] - 1$$

$$\frac{1}{\cos(3x + \frac{\pi}{6})} = 0$$

$$3x + \frac{\pi}{6} = \frac{\pi}{2} + n\pi$$

$$x = \frac{2\pi}{9} + \frac{n\pi}{3}$$

13. Find an x -value where the trigonometric function has a vertical asymptote.

$$y = -3 \left[\cot \left(2x - \frac{\pi}{6} \right) \right] - 4$$

$$\frac{\cos(2x - \frac{\pi}{6})}{\sin(2x - \frac{\pi}{6})} = 0$$

$$2x - \frac{\pi}{6} = n\pi$$

$$x = \frac{n\pi}{2} + \frac{\pi}{12}$$

15. Find an x -value where the trigonometric function has a vertical asymptote.

$$y = -4 \left[\cot \left(4x + \frac{2\pi}{3} \right) \right] + 1$$

$$\frac{\cos(\sim)}{\sin(4x + \frac{2\pi}{3})} = 0$$

$$4x + \frac{2\pi}{3} = n\pi$$

$$x = \frac{n\pi}{4} - \frac{\pi}{6}$$

10. Find an x -value where the trigonometric function has a vertical asymptote.

$$y = 4 \left[\sec \left(3x - \frac{\pi}{2} \right) \right] - 3 \quad x = \frac{\pi}{3} + \frac{n\pi}{3}$$

$$\frac{1}{\cos(3x - \frac{\pi}{2})} = 0$$

$$3x - \frac{\pi}{2} = \frac{\pi}{2} + n\pi$$

12. Find an x -value where the trigonometric function has a vertical asymptote.

$$y = 4 \left[\sec \left(\frac{1}{4}x - \frac{\pi}{4} \right) \right] - 4$$

$$\frac{1}{\cos(\frac{1}{4}x - \frac{\pi}{4})} = 0$$

$$\frac{1}{4}x - \frac{\pi}{4} = \frac{\pi}{2} + n\pi$$

$$x = 3\pi + 4n\pi$$

14. Find an x -value where the trigonometric function has a vertical asymptote.

$$y = 3 \left[\cot \left(2x - \frac{\pi}{4} \right) \right] - 4$$

$$\frac{\cos(\sim)}{\sin(2x - \frac{\pi}{4})} = 0$$

$$2x - \frac{\pi}{4} = n\pi$$

$$x = \frac{n\pi}{2} + \frac{\pi}{8}$$

16. Find an x -value where the trigonometric function has a vertical asymptote.

$$y = -2 \left[\cot \left(4x - \frac{2\pi}{3} \right) \right] + 3$$

$$\frac{\cos(\sim)}{\sin(4x - \frac{2\pi}{3})} = 0$$

$$4x - \frac{2\pi}{3} = n\pi$$

$$x = \frac{n\pi}{4} + \frac{\pi}{6}$$