



Graphing Trigonometric Functions

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Trigonometric functions describe motion. These functions are symmetrical and periodic which means that the graph repeats itself. Let's take a look at the features of sine, cosine and tan trigonometric graphs.

The **general formula for trigonometric functions** is

$$f(x) = A \text{trig}(Bx - C) + D$$

trig = function (sin, cos or tan)

D = vertical shift

A = amplitude of graph

$2\pi/B$ = period (full cycle)

C = horizontal phase shift

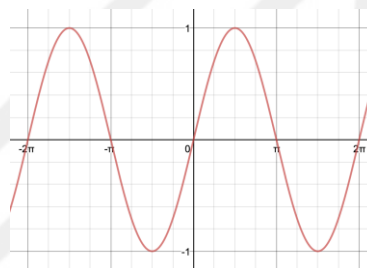
π/B = period (tan functions)

Sin(x) functions

$$f(x) = A \sin(Bx - C) + D$$

Features of sin(x):

- Wave shape
- Starts at the ORIGIN (0, 0)

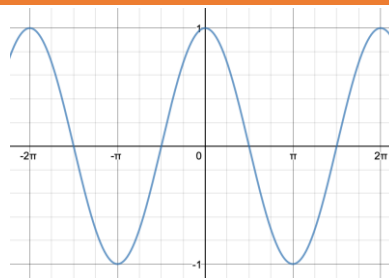


Cos(x) functions

$$f(x) = A \cos(Bx - C) + D$$

Features of cos(x):

- Wave shape
- Starts at MAXIMUM



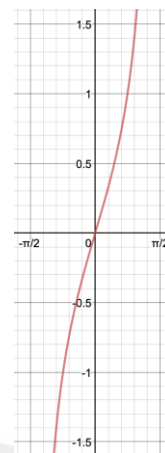


Tan(x) functions

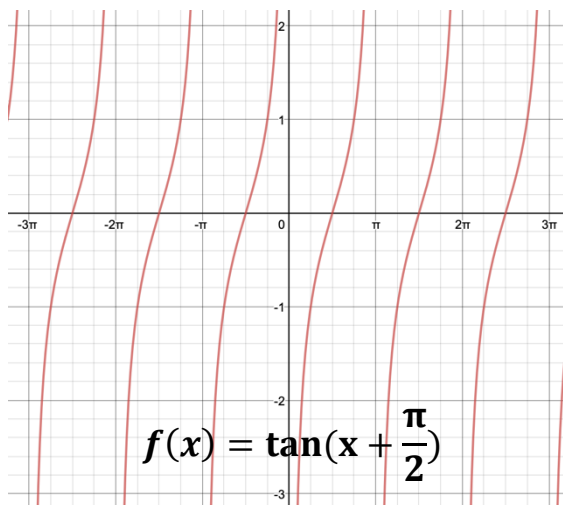
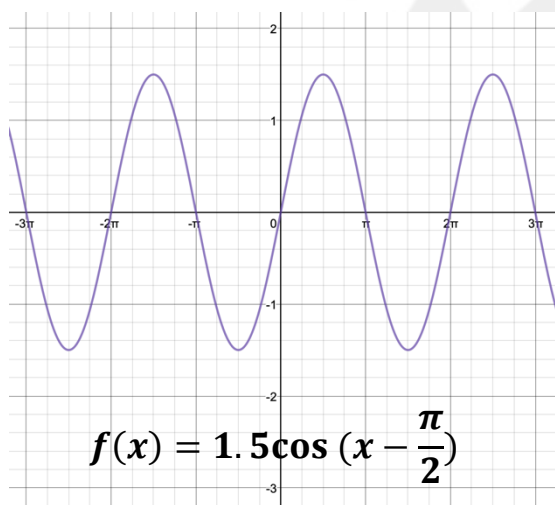
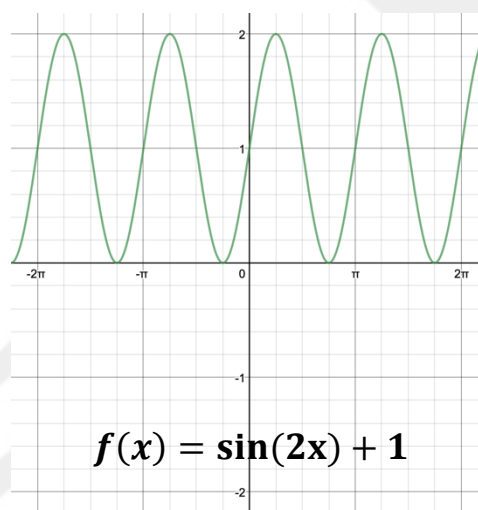
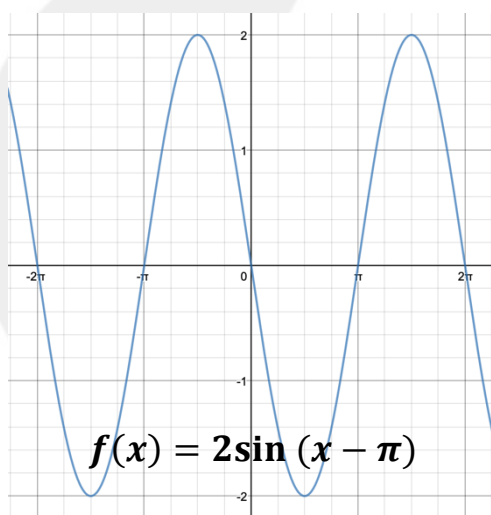
$$f(x) = A \tan(Bx - C) + D$$

Features of tan(x):

- Not a wave shape
- Period found through π/B
- One point of inflection
- Two vertical asymptotes
(lines that a curve approaches but do not meet)

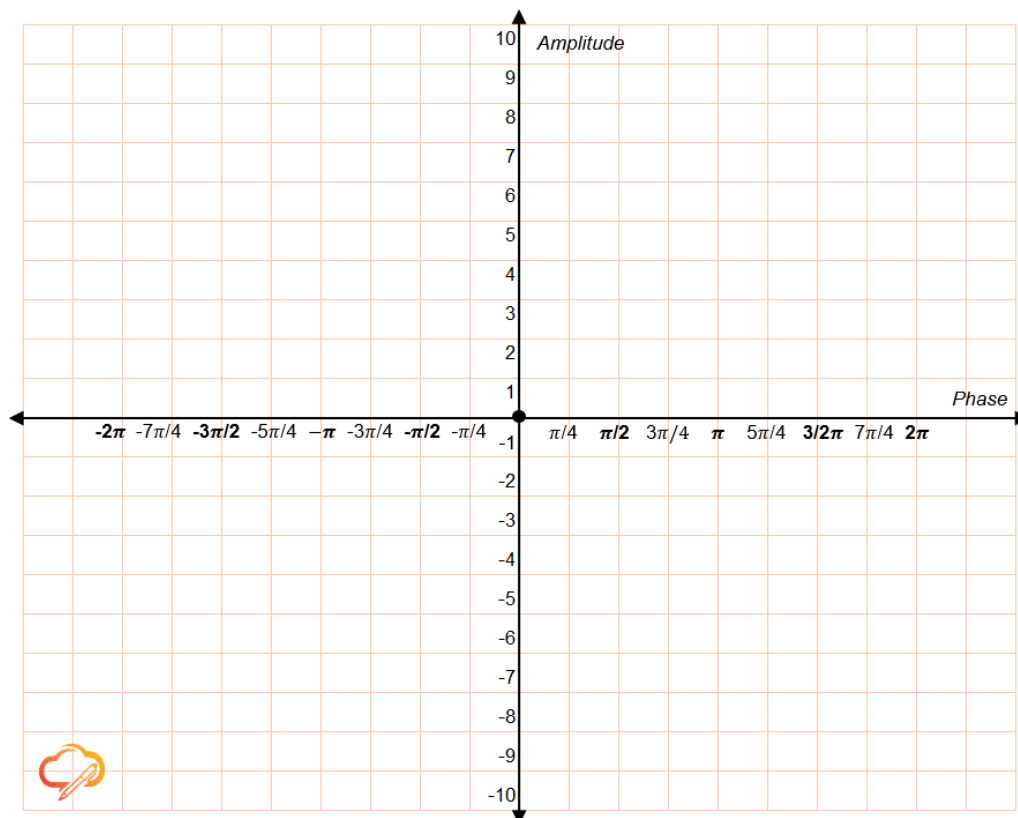
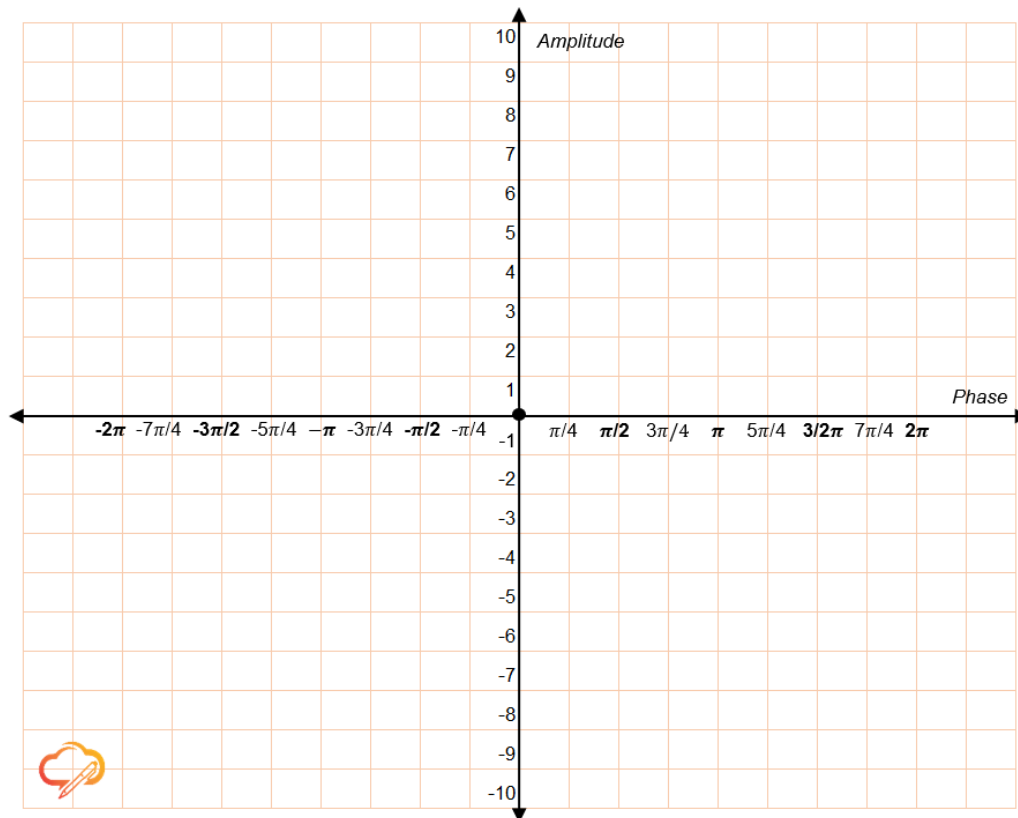


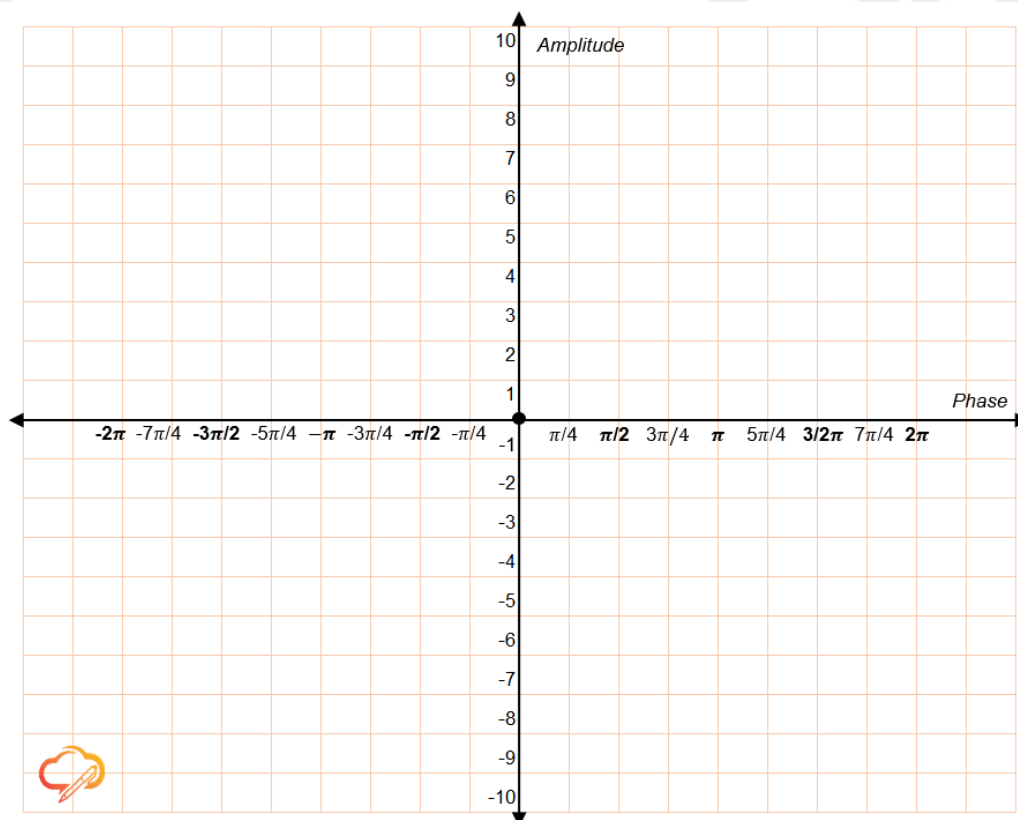
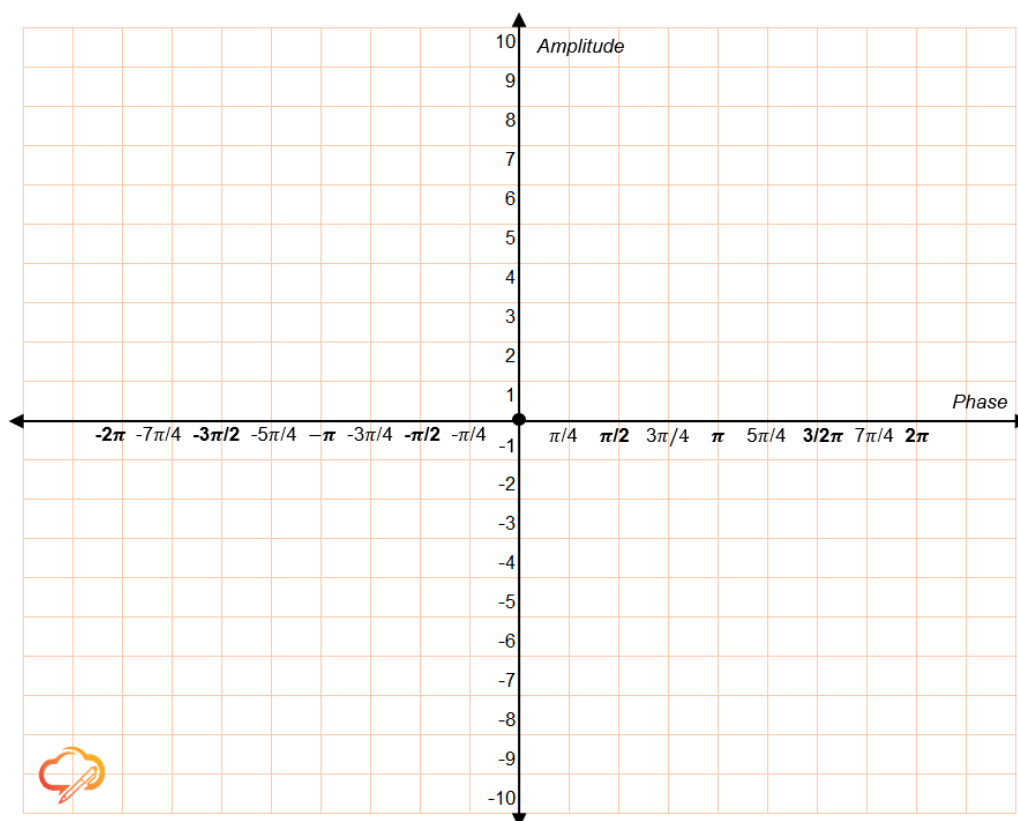
EXAMPLES OF TRANSFORMATIONS

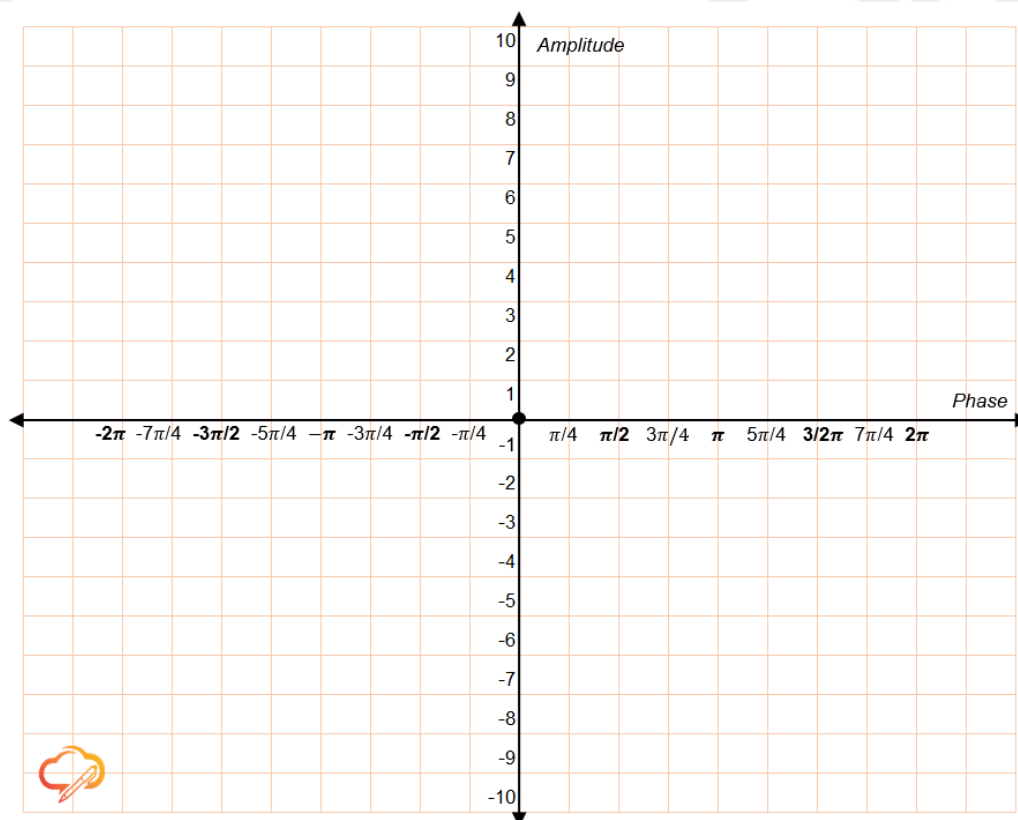
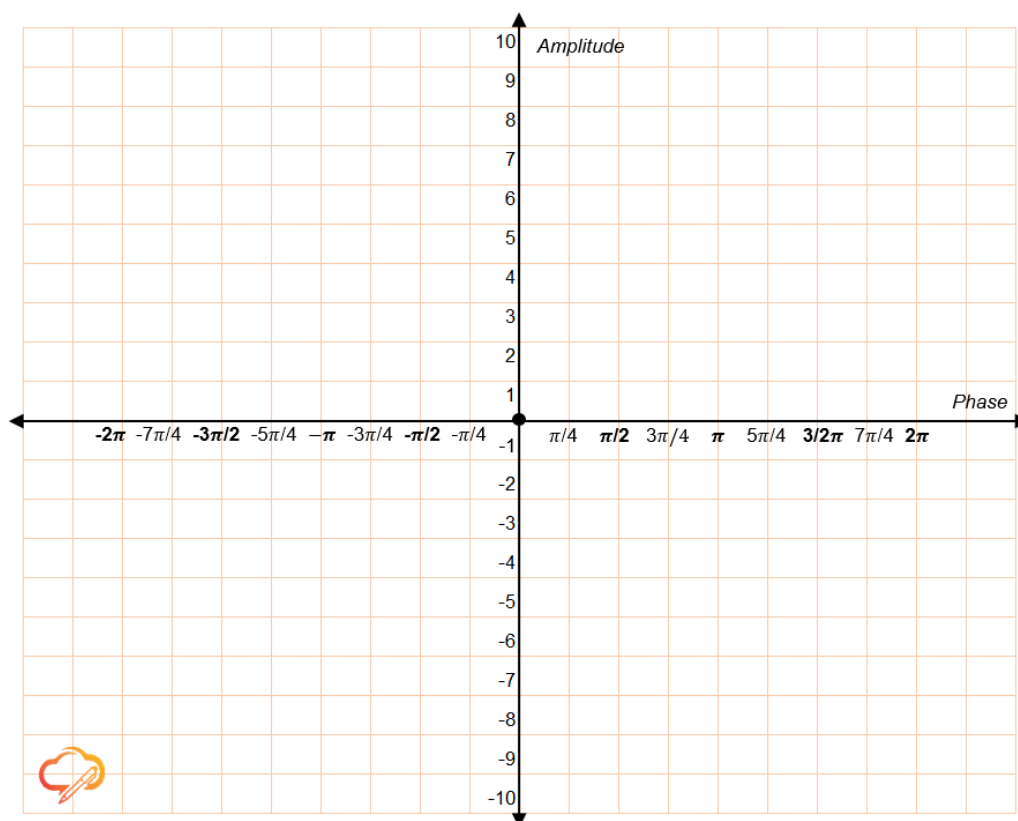


Instructions: Graph the trigonometric functions below.

1	$f(x) = 3 \sin(x) - 1$	10	$f(x) = 3 \cos\left(x - \frac{\pi}{4}\right) + 2.5$
2	$f(x) = 2 \cos(x) + 2$	11	$f(x) = -2 \sin(2x) + 3$
3	$f(x) = 6.5 \sin(x) - 3$	12	$f(x) = 5 \cos(2x - \pi)$
4	$f(x) = \tan\left(x - \frac{\pi}{2}\right)$	13	$f(x) = -3 \cos(4x)$
5	$f(x) = 2 \sin(x - \pi)$	14	$f(x) = \tan(4x)$
6	$f(x) = 5 \cos\left(x - \frac{\pi}{2}\right) + 4$	15	$f(x) = 4 \sin\left(\frac{1}{2}x\right) - 1.5$
7	$f(x) = 2 \tan(x)$	16	$f(x) = 3 \sin\left(2x + \frac{\pi}{2}\right)$
8	$f(x) = \frac{1}{2} \tan(x)$	17	$f(x) = -5 \sin\left(2x - \frac{\pi}{2}\right)$
9	$f(x) = 4 \sin\left(x + \frac{\pi}{4}\right)$	18	$f(x) = -2 \cos(2x + \pi)$









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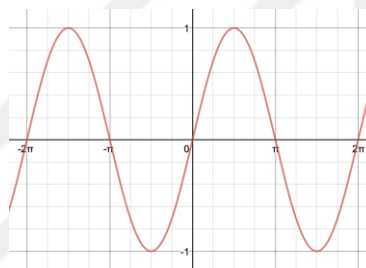
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$$f(x) = A \sin(Bx - C) + D$$

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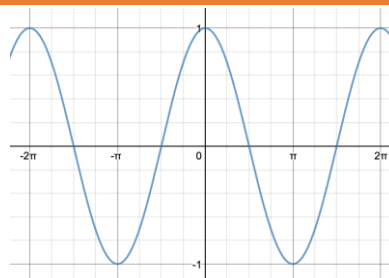


Cos(x) functions

$$f(x) = A \cos(Bx - C) + D$$

Features of cos(x):

- Wave shape
- Starts at MAXIMUM



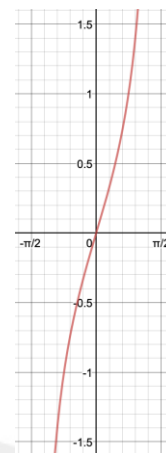


Tan(x) functions

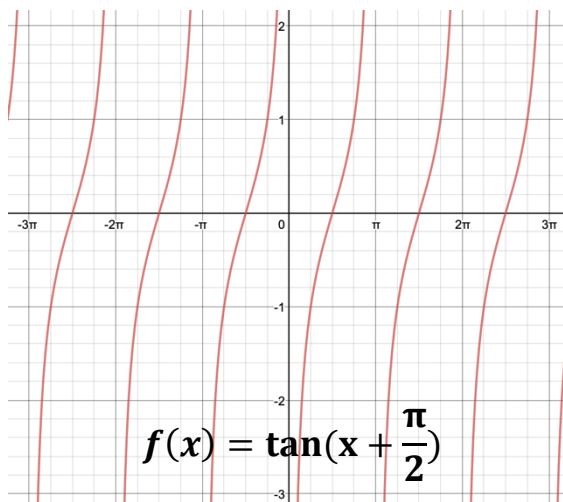
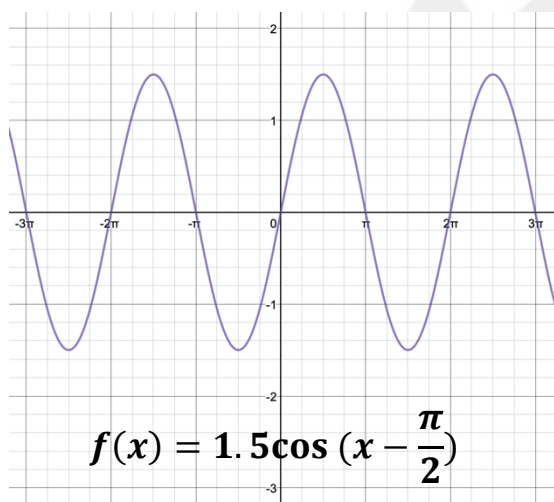
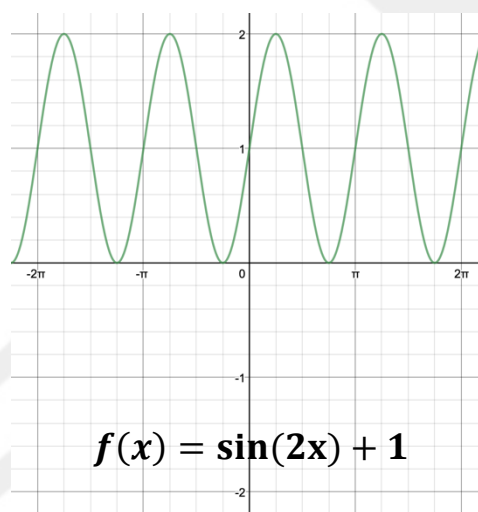
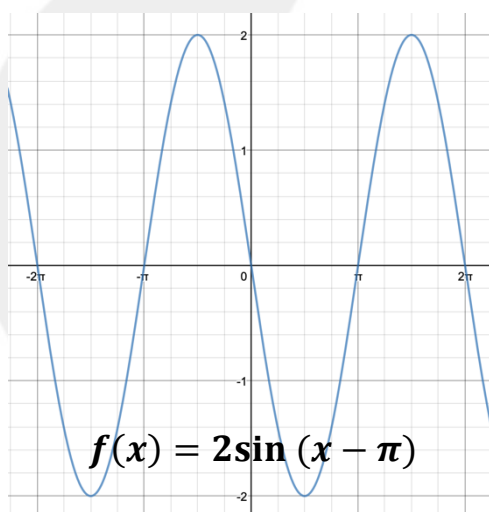
$$f(x) = A \tan(Bx - C) + D$$

Features of tan(x):

- Not a wave shape
- Period found through π/B
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- Two vertical asymptotes
(lines that a curve approaches but do not meet)



EXAMPLES OF TRANSFORMATIONS





Instructions: Graph the trigonometric functions below.

1	$f(x) = 4.5 \sin(x) + 3$	10	$f(x) = -4 \cos(2x)$
2	$f(x) = -2 \cos(2x)$	11	$f(x) = 9 \sin\left(x + \frac{3\pi}{2}\right)$
3	$f(x) = 3 \tan(x)$	12	$f(x) = -1.5 \cos(2\pi) + 3$
4	$f(x) = 5 \sin(2x) + 1$	13	$f(x) = 4 \tan(2x)$
5	$f(x) = \frac{1}{4} \tan(x)$	14	$f(x) = 6 \sin(4x) - 2$
6	$f(x) = -2 \sin(4x)$	15	$f(x) = -\tan(4x)$
7	$f(x) = 3 \cos\left(\frac{1}{2}x\right)$	16	$f(x) = -7 \cos\left(\frac{1}{2}x\right) + 1$
8	$f(x) = 1.5 \sin\left(x - \frac{\pi}{4}\right)$	17	$f(x) = -2 \sin\left(\frac{1}{2}x + \frac{\pi}{4}\right) - 4$
9	$f(x) = 7.5 \sin(x + \pi) - 1$	18	$f(x) = 8 \cos\left(\frac{1}{2}x - \pi\right) + 1.5$

