UNIT CIRCLE TRIGONOMETRIC FUNCTIONS

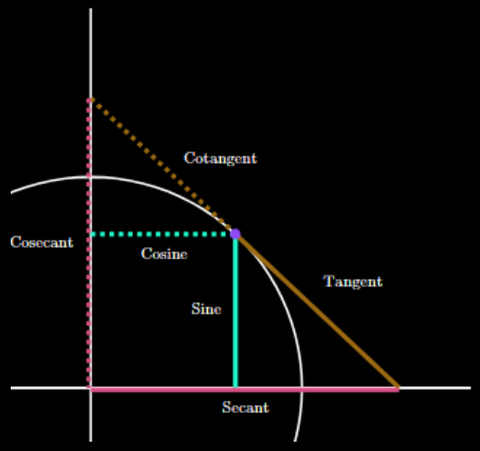
The main identity of it is
$\text{Sin}(\Theta)^2 + \text{Cos}(\Theta)^2 = 1$

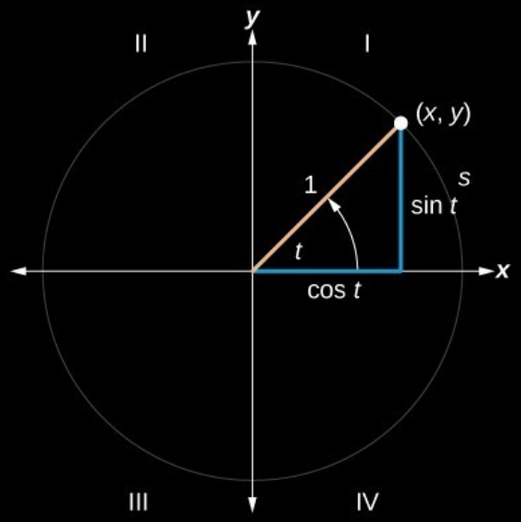
Which can give you these equations (simple ones)

$$\text{Sin}\ \theta = \frac{opp.}{hyp.} = \frac{Y}{1} = Y \qquad \text{Csc}\ \theta = \frac{1}{Sin\theta} = \frac{1}{Y}$$

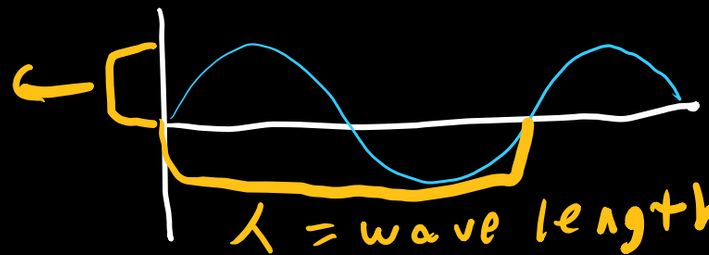
$$\text{Cos}\ \theta = \frac{adj.}{hyp.} = \frac{X}{1} = X \qquad \text{Sec}\ \theta = \frac{1}{Cos\theta} = \frac{1}{X}$$

$$\text{Tan}\ \theta = \frac{opp.}{adj.} = \frac{Y}{X} \qquad \text{Cot}\ \theta = \frac{1}{Tan\theta} = \frac{X}{Y}$$





amplitude



λ = wave length = period = cycle

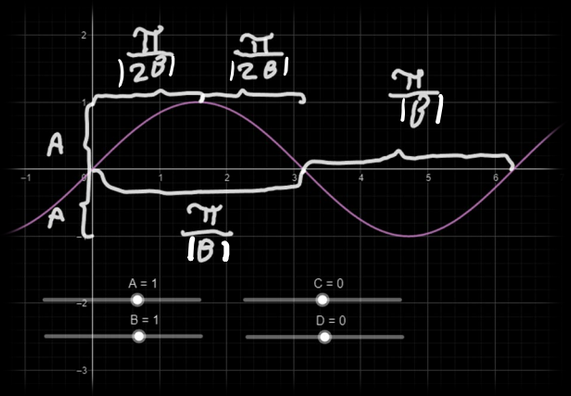
Amplitude
Is the half distance from the maximum to the minumum

GRAPHS OF SIN

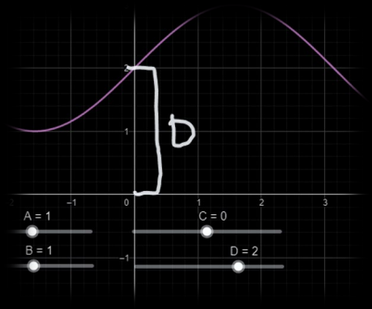
It uses the equation as a default
- **f(x) = sin(x)**

but when you want to add transformations it becomes
- **f(x) = A sin(B x + C) + D**

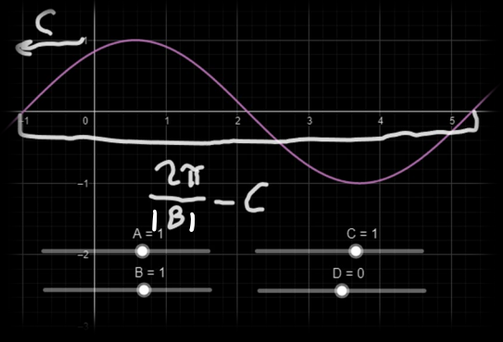
Here
- amplitude is equal to **A**
- Cycle is equal to $\frac{2\pi}{|B|}$
- Half cycle is equal to $\frac{\pi}{|B|}$



TRANSITIONS
you can shift the graph up and down by **D amount**

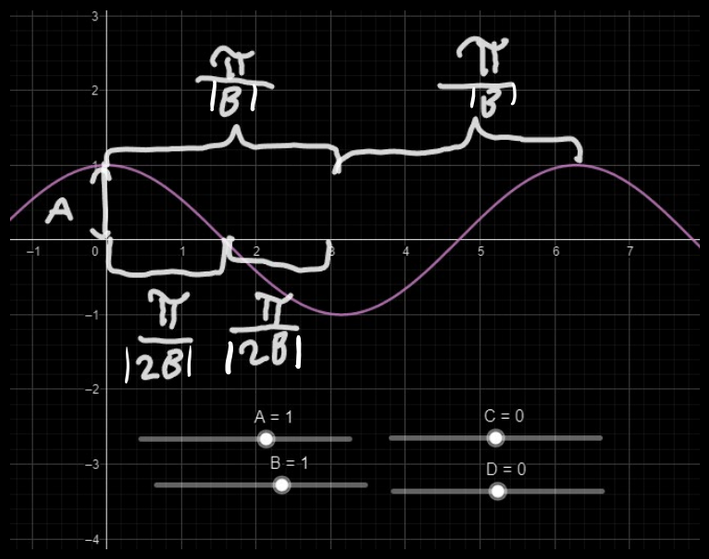


You can shift the graph left and right by **C amount**
C increase -> graph goes left
C decrease -> graph goes right



COSINE GRAPHS

It is basically a sin graph but it starts with the crest, not the x intersection



It uses the equation as a default
- **f(x) = cos(x)**

but when you want to add transformations it becomes
- **f(x) = A cos(B x + C) + D**

Here
- amplitude is equal to **A**
- Cycle is equal to $\frac{2\pi}{|B|}$
- Half cycle is equal to $\frac{\pi}{|B|}$

TRANSITIONS
you can shift the graph up and down by **D amount**

You can shift the graph left and right by **C amount**
C increase -> graph goes left
C decrease -> graph goes right

NOTE
- IN **COS GRAPH,** If u set C into $-\frac{\pi}{2}$, the cos graph becomes a sin graph, because
  - cos(Θ-90 or Θ $-\frac{\pi}{2}$) equals sin(Θ)
- IN **SIN GRAPH,** If u set C into $+\frac{\pi}{2}$, the sin graph becomes a cos graph, because
  - sin(Θ+90 or Θ $+\frac{\pi}{2}$) equals cos(Θ)

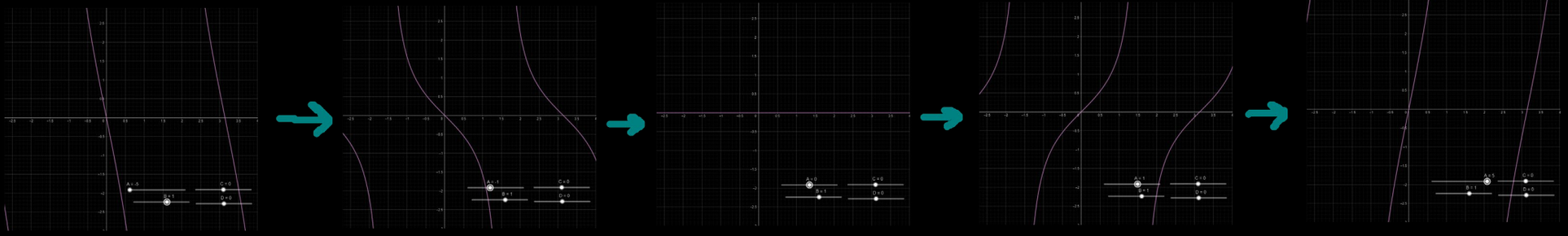
NOTE : the functions afterwards are not going to have an amplitude as they stretch out to infity vertically

TAN GRAPHS

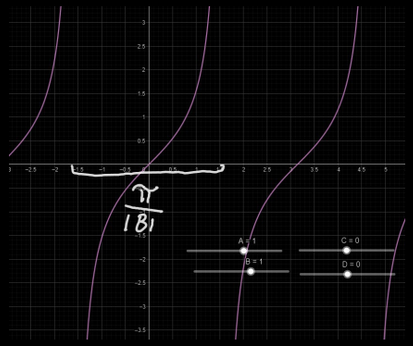
It uses this equation as a default
- **f(x) = tan(x)**

But when you want to add transformations, it becomes
- **f(x) = A tan(B x + C) + D**

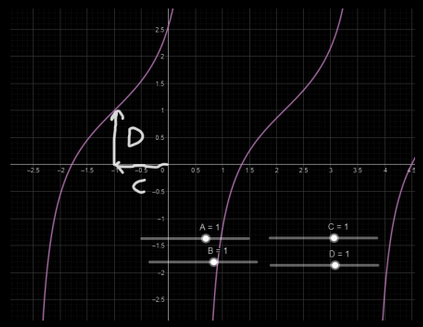
How **A** changes the graph (compression vertically)



you can shift the graph up and down by **D amount**
D increase -> graph goes up
D decrease -> graph goes down



You can shift the graph left and right by **C amount**
C increase -> graph goes left
C decrease -> graph goes right



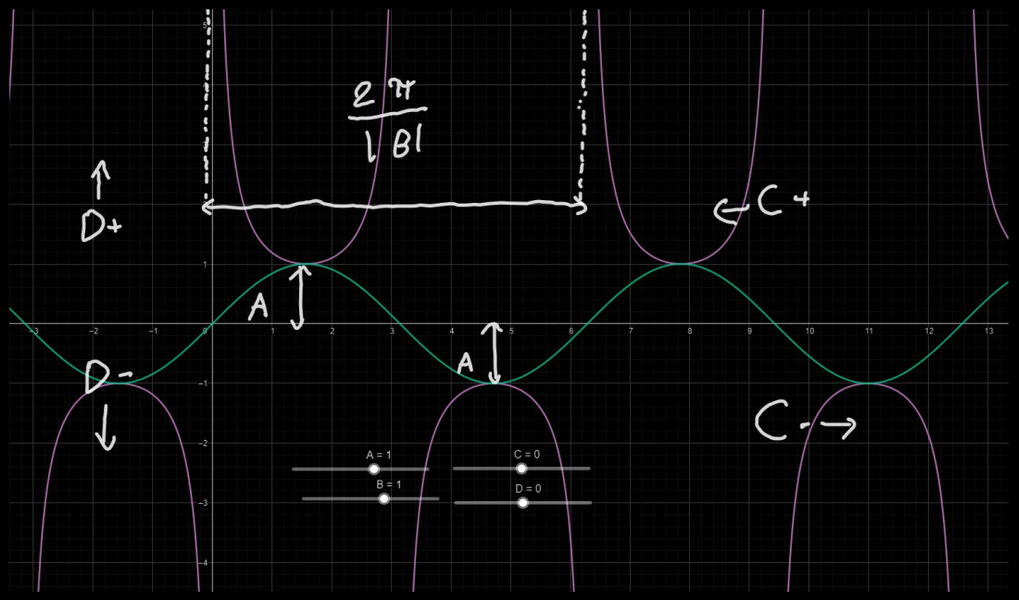
To make a cosecant graph, just replace sin with csc

You would see that the graph does not have an amplitude but its closest to center point starts from the amplitude, and then it goes to infinity

The period of it the length from crest to crest or toe to toe
Which is equal to a sin graph

It has the same transformations as a sin graph

COSECANT vs SIN GRAPH



COSINE VS SECANT GRAPH

A cosine/secant graph is the same but you go left by $\frac{\pi}{2}$

It is the opposite of a tan graph
It has the same transformations and everything tho

When there is a center for the tan graph
Two cotan graphs are at their asymptotes (where they meet infinity)
And vise versa

COTAN GRAPH