

Lesson Plan 5 Math 48C Mitchell Schoenbrun

- 1) Attendance
- 2) Return Quiz, ask questions
- 3) Explain about Angular Velocity Redux

Angular Velocity

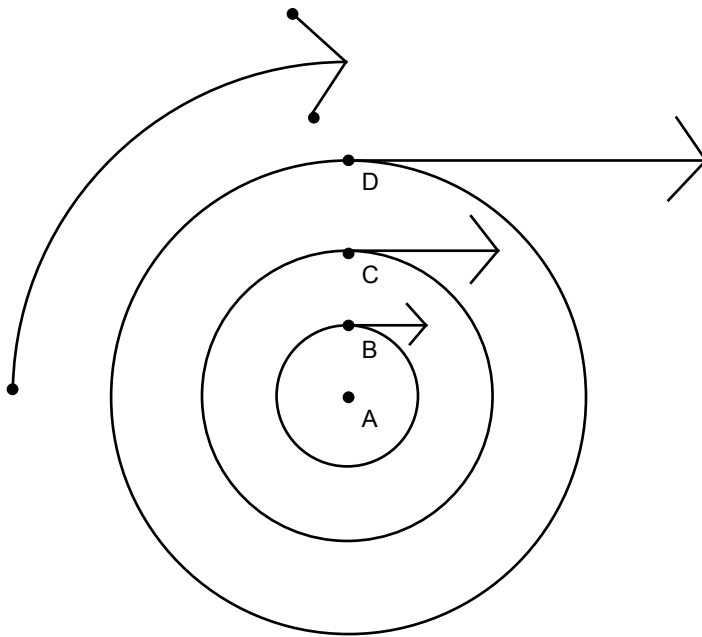
Definition: A revolution, One time around

How many radians per revolution? 2π

Definition RPM: Revolutions Per Minute

Question: Express 1 RPM in Radians/sec

$$1RPM = \frac{2\pi}{60} \text{ per/second}$$



Assume this is turning at 1 rpm, with $AB = 1$, $AC = 2$, and $AD=3$

What is the angular velocity in radians per minute? $2\pi/\text{min}$.

What is the linear speed at point A? _____

What is the linear speed at point B? _____

What is the linear speed at Point C? _____

What is the linear speed at Point D? _____

So linear speed $V = r\omega$ where r is the radius and ω is the angular speed in radians/time.

Have students do Problems 1 and 2 from the Handout

Short Break

Graphing the Sine and Cosine function

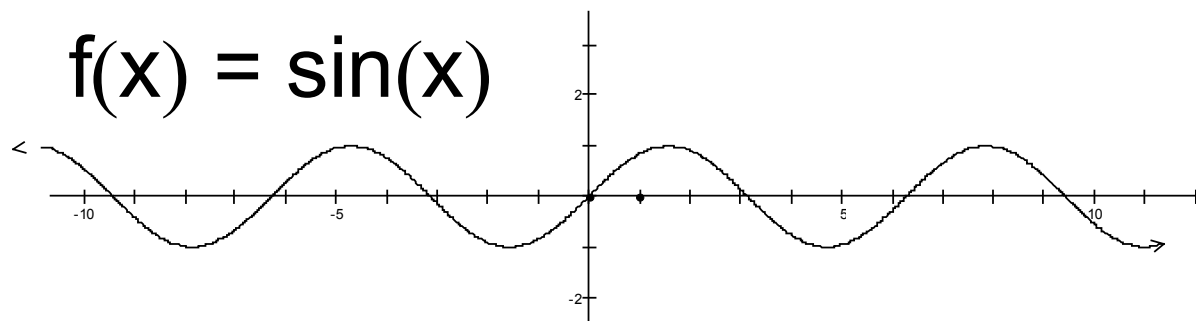
Demonstrate how to graph a function on the calculator

We want to write a very general form of these functions and understand it.

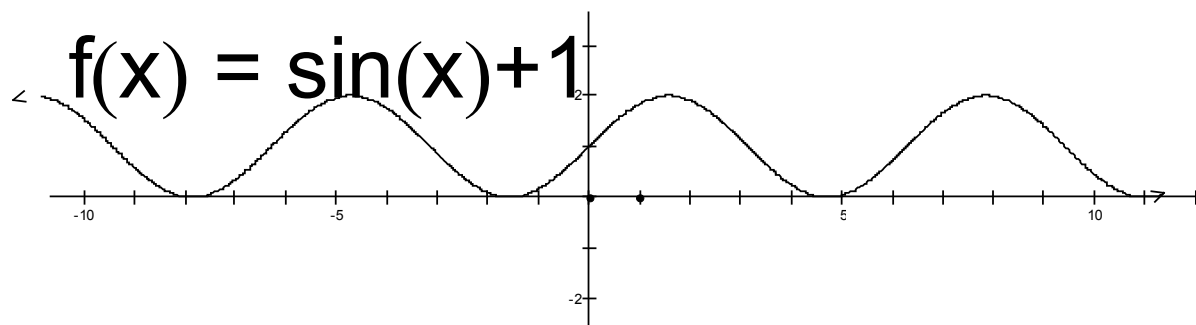
$$f(\theta) = A \sin(B(\theta - C)) + D$$

$$f(\theta) = A \cos(B(\theta - C)) + D$$

Start with a simple sine function!

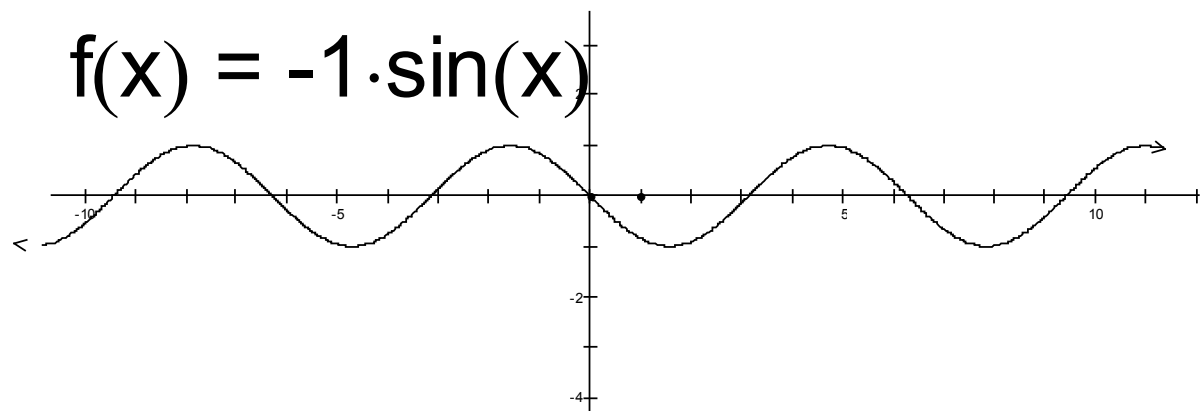
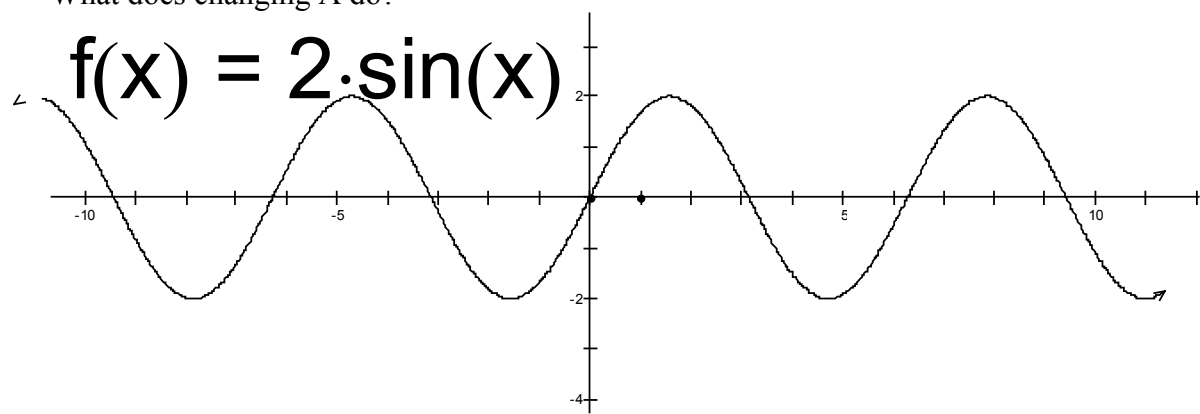


What does having $D \neq 0$ do?



So D moves the function up and down. It changes the MIDLINE! This is a Vertical Translation.

What does changing A do?

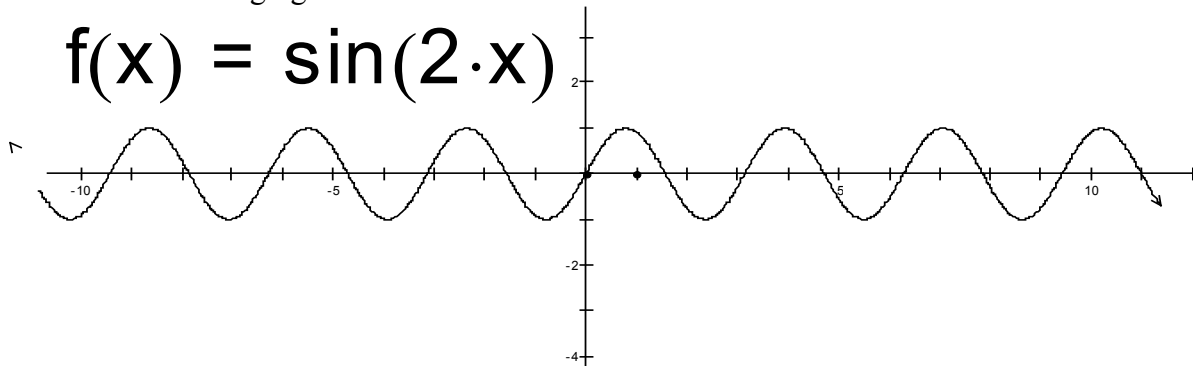


So A controls the AMPLITUDE!

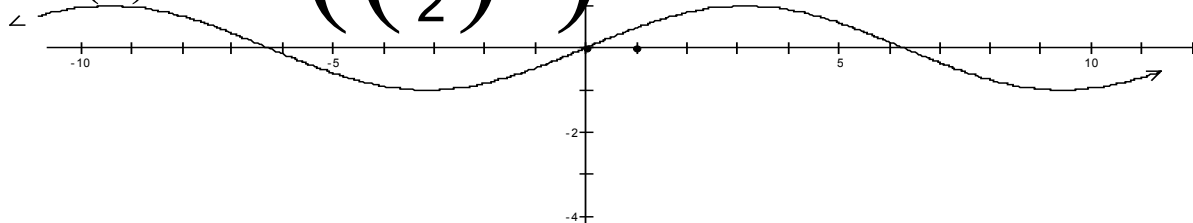
Note that if A is negative, the function is flipped along the X axis

What does changing B do?

$$f(x) = \sin(2 \cdot x)$$



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



So B changes the PERIOD or the FREQUENCY! Note the inverse relationship to Period.

$$B = 1 \text{ Period} = 2\pi$$

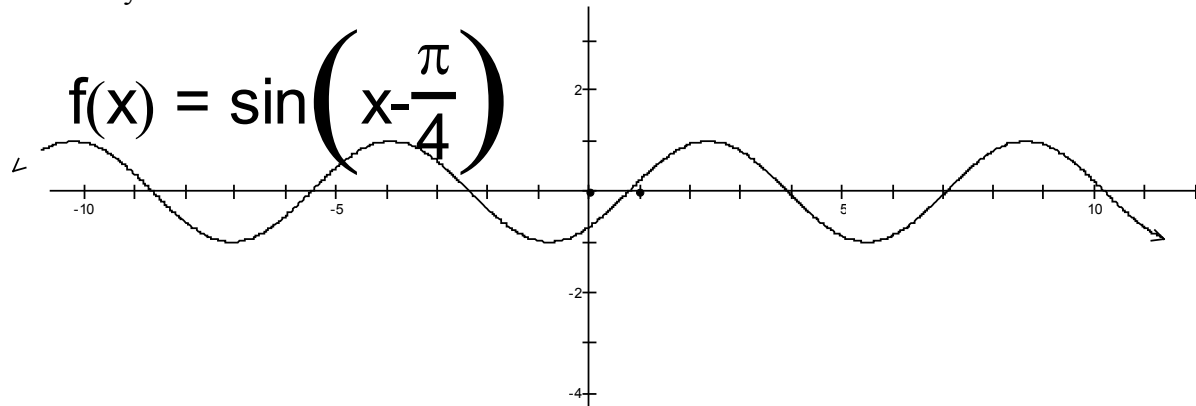
$$B = 2 \text{ Period} = \pi$$

$$B = 1/2 \text{ Period} = 4\pi$$

So the Period of a Sine or Cosine function is $2\pi/B$.

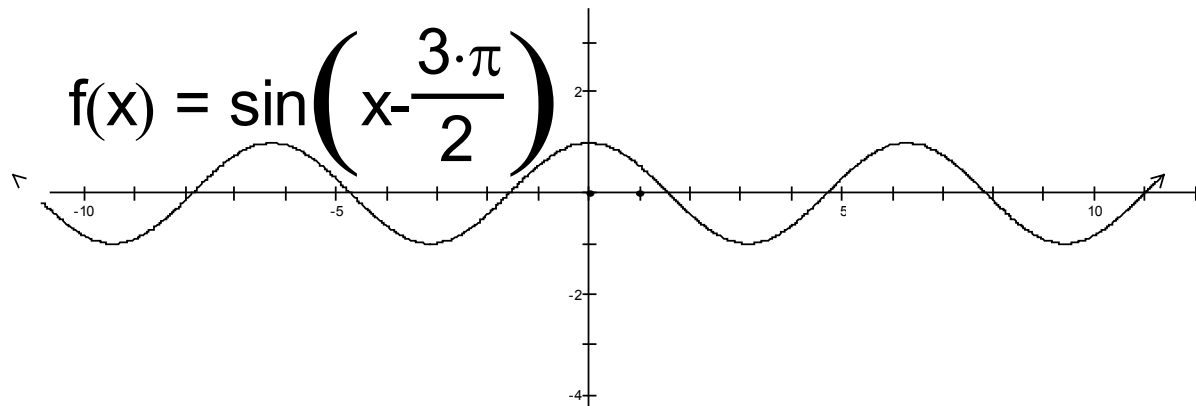
What is the Frequency? $B/2\pi$

Finally what does C do?



Notice the starting point (0,0) has now moved to the right $(\pi/4, 0)$. This is a horizontal translation. It is also known as a **PHASE SHIFT!**

Definition: A Phase shift is the portion of one period shifted horizontally. Note that a Phase shift of $\frac{3\pi}{2}$ of a sine function gives you a cosine function



Do problems 3, 4, and 5 on handout