

Student Teacher: Christina Bifulco

Class: Pre-Calculus

Date: Tuesday, February 26, 2008

Topic:

Graphing Sine and Cosine Using With Varying Period and Amplitude

New Jersey Core Curriculum Standards:

4.3.12.B. Functions and Relationships, Grade 12

- Analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing techniques

4.5.E. Representations, Grade 2-12

- Create and use representations to organize, record, and communicate mathematical ideas.

Objectives:

1. Students will be able to define amplitude and period of sine and cosine curves.
2. Students will be able to identify the max, min, and intercepts of the sine and cosine curves.
3. Students will be able to determine types of vertical and horizontal stretching based on the equation for a function.

Materials:

- Blackboard and chalk
- Laptop
- Projector
- PowerPoint presentation hand-out
- Graphing sine and cosine hand-out

Motivation:

Students will complete a do-now at the beginning of class. What is the range of the sine and cosine functions?

Procedure:

1. Go over do-now. (This topic was covered previously so students should know).
2. Teacher will introduce the basic sine and cosine curves to students pointing out the key points of the curve (max/mins/intercepts). Remind students of period of the curves and what it means to be a periodic function.
 - i. What are the units of the axis?

- ii. How do the graphs make sense in relation to the unit circle and the values of the special angles?
 - iii. Where is cosine/sine zero on the unit circle?
 - iv. What does a periodic function mean and what does it mean in relation to the graphs of the functions?
3. Define and graph image curves of sine and cosine.
4. Steps two and three will be completed with the use of a PowerPoint presentation. Students will be given hand-outs of slides with key information that they will be responsible for filling in during class.
5. Introduce amplitude of curves, and how the amplitude will change the height of the curve.
6. Introduce period of curves, and how this affects the length of the curve (the length of one cycle of the curve).
7. Students will be given hand-out of simplified ways in which to graph sine and cosine functions using quarters of the given period.
8. Complete examples of amplitude and period, $y = \sin x$, $y = 2\sin x$, $y = \frac{5}{2}\sin x$, $y = -2\sin x$, $y = \cos x$, $y = \cos 2x$, $y = \cos x/2$. Graph functions on same coordinate axis so students can see similarities and differences. Students will complete last two examples of their own and will be reviewed as class at the end of the period.
 - i. What can you see when you graph the functions on the same coordinate axis?
 - ii. How does a higher amplitude or period affect the graphs of the functions?

Assessments:

Students will complete graphs of $y = \cos 2x$ and $y = \cos x/2$, which will be reviewed at the end of class. Teacher will walk around class while students are working to assess progress.

Homework:

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Typical and Image Sine and Cosine Curves

Standard form of equations:

$y = A \sin Bx$

Amplitude = $|A|$

$y = A \cos Bx$

Period = $\frac{2\pi}{|B|}$

Typical sine curve: $y = A \sin Bx$

A and B have the same sign

$A > 0$ and $B > 0$, or $A < 0$ and $B < 0$

Zeros occur at beginning, middle and end of the cycle

Maximum point occurs $\frac{1}{4}$ of the cycle

Minimum point occurs $\frac{3}{4}$ of the cycle

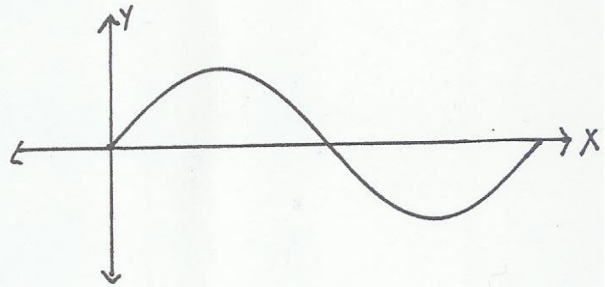


Image Sine Curve: $y = A \sin Bx$

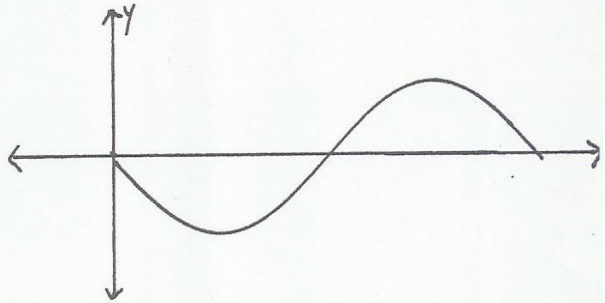
A and B have opposite signs

$A > 0$ and $B < 0$, or $A < 0$ and $B > 0$

Zeros occur at beginning, middle and end of the cycle

Maximum point occurs $\frac{3}{4}$ of the cycle

Minimum point occurs $\frac{1}{4}$ of the cycle



Typical Cosine Curve: $y = A \cos Bx$

A is positive and B can be either positive or negative

$A > 0$ and $B > 0$, or $A > 0$ and $B < 0$

Zeros occur $\frac{1}{4}$ of the cycle and $\frac{3}{4}$ of the cycle

Maximum point occur at the beginning and end of the cycle

Minimum point occur at the middle of the cycle

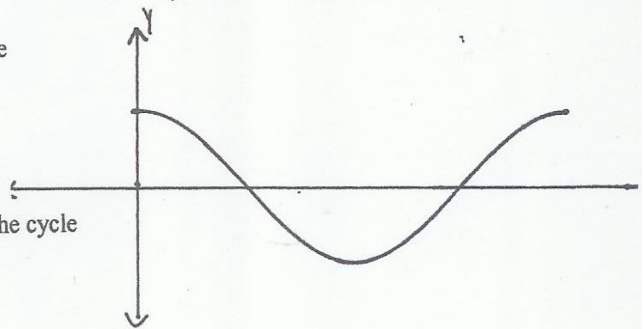


Image Cosine Curve: $y = A \cos Bx$

A is negative and B can be either positive or negative

$A < 0$ and $B > 0$, or $A < 0$ and $B < 0$

Zeros occur $\frac{1}{4}$ of the cycle and $\frac{3}{4}$ of the cycle

Maximum point occur at the middle of the cycle

Minimum point occur at the beginning and end of the cycle

