Course Number
Instructor
Date

Section 4.5 Graphs of Sine and Cosine Functions

Objective: In this lesson you learned how to sketch the graphs of sine and cosine functions and translations of these functions.

Important Vocabulary Define each term or concept.

Sine curve

One cycle

Amplitude

Phase shift

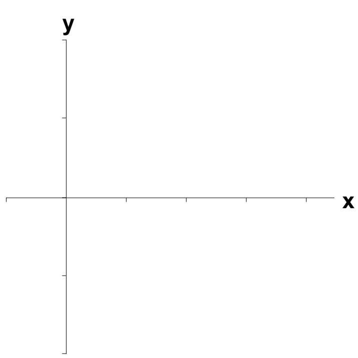
I. Basic Sine and Cosine Curves (Pages 297–298)

What you should learn
How to sketch the graphs of basic sine and cosine functions

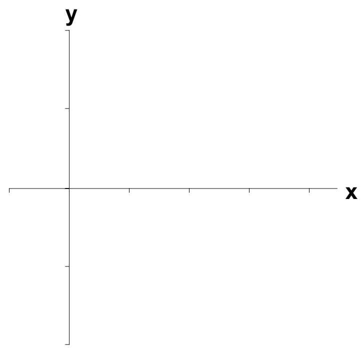
For $0 \le x \le 2\pi$, the sine function has its maximum point at ________________, its minimum point at _________________, and its intercepts at _____________________________________.

For $0 \le x \le 2\pi$, the cosine function has its maximum points at _____________________, its minimum point at ____________, and its intercepts at _________________________________.

Example 1: Sketch the basic sine curve on the interval [0, 2π].



Example 2: Sketch the basic cosine curve on the interval $[0, 2\pi]$.



II. Amplitude and Period of Sine and Cosine Curves
(Pages 299–300)

> ***What you should learn***
> How to use amplitude and period to help sketch the graphs of sine and cosine functions

The constant factor a in $y = a \sin x$ acts as . . .

If $|a| > 1$, the basic sine curve is ____________________. If $|a| < 1$, the basic sine curve is ________________. The result is that the graph of $y = a \sin x$ ranges between ________________ instead of between -1 and 1. The absolute value of a is the ________________ of the function $y = a \sin x$.

The graph of $y = -0.5 \sin x$ is a(n) ___________________ in the x-axis of the graph of $y = 0.5 \sin x$.

Let b be a positive real number. The **period** of $y = a \sin bx$ and $y = a \cos bx$ is ________________. If $0 < b < 1$, the period of $y = a \sin bx$ is ________________ than 2π and represents a ___________________________ of the graph of $y = a \sin bx$. If $b > 1$, the period of $y = a \sin bx$ is _______________ than 2π and represents a __________________________ of the graph of $y = a \sin bx$.

Example 3: Find the amplitude and the period of $y = -4\cos 3x$.

Example 4: Find the five key points (intercepts, maximum points, and minimum points) of the graph of $y = -4\cos 3x$.

III. Translations of Sine and Cosine Curves (Pages 301–302)

> ***What you should learn***
> How to sketch translations of graphs of sine and cosine functions

The constant *c* in the general equations $y = a\sin(bx - c)$ and $y = a\cos(bx - c)$ creates . . .

Comparing $y = a\sin bx$ with $y = a\sin(bx - c)$, the graph of $y = a\sin(bx - c)$ completes one cycle from _____________ to ________________. By solving for *x*, you can find the interval for one cycle is found to be ___________ to _______________. This implies that the period of $y = a\sin(bx - c)$ is _____________, and the graph of $y = a\sin(bx - c)$ is the graph of $y = a\sin bx$ shifted by the amount _____________.

Example 5: Find the amplitude, period, and phase shift of $y = 2\sin(x - \pi/4)$.

Example 6: Find the five key points (intercepts, maximum points, and minimum points) of the graph of $y = 2\sin(x - \pi/4)$.

The constant *d* in the equation $y = d + a\sin(bx - c)$ causes a(n) __________________________. For $d > 0$, the shift is ________ __________. For $d < 0$, the shift is ____________________. The graph oscillates about ____________________________.

IV. Mathematical Modeling (Page 303)

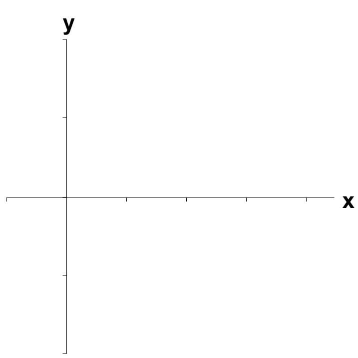
> ***What you should learn***
> How to use sine and cosine functions to model real-life data

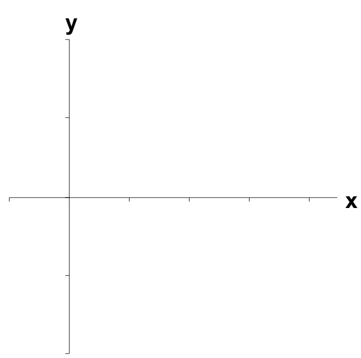
Describe a real-life situation which can be modeled by a sine or cosine function.

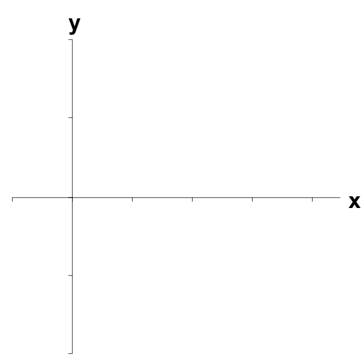
Example 7: Find a trigonometric function to model the data in the following table.

x	0	$\pi/2$	π	$3\pi/2$	2π
y	2	4	2	0	2

Additional notes







Homework Assignment

Page(s)

Exercises