

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.

Course Number

Instructor

Date

Important Vocabulary

Define each term or concept.

Amplitude

Phase shift

I. Basic Sine and Cosine Curves (Pages 390–391)

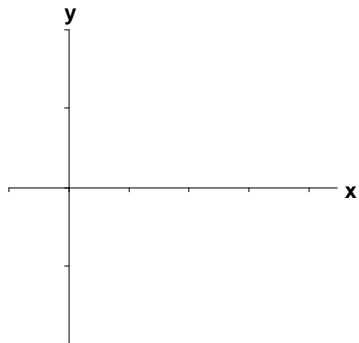
For $0 \leq x \leq 2\pi$, the sine function has its maximum point at _____, its minimum point at _____, and its intercepts at _____.

For $0 \leq x \leq 2\pi$, the cosine function has its maximum points at _____, its minimum point at _____, and its intercepts at _____.

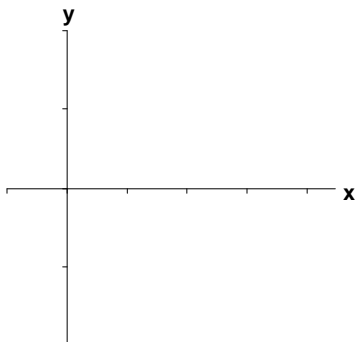
What you should learn

How to sketch the graphs of basic sine and cosine functions

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



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



II. Amplitude and Period (Pages 392–393)

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 $y = -4 \cos 3x$.

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

III. Translations of Sine and Cosine Curves (Pages 394–395)

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 , the interval for one cycle is found to be _____ to _____. This implies that the graph of $y = a \sin(bx - c)$ is the graph of $y = a \sin bx$ shifted by the amount _____.

The period of the graph of $y = a \cos(bx - c)$ is _____.

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

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

What you should learn

How to sketch translations of the graphs of sine and cosine functions

IV. Mathematical Modeling (Page 396)

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

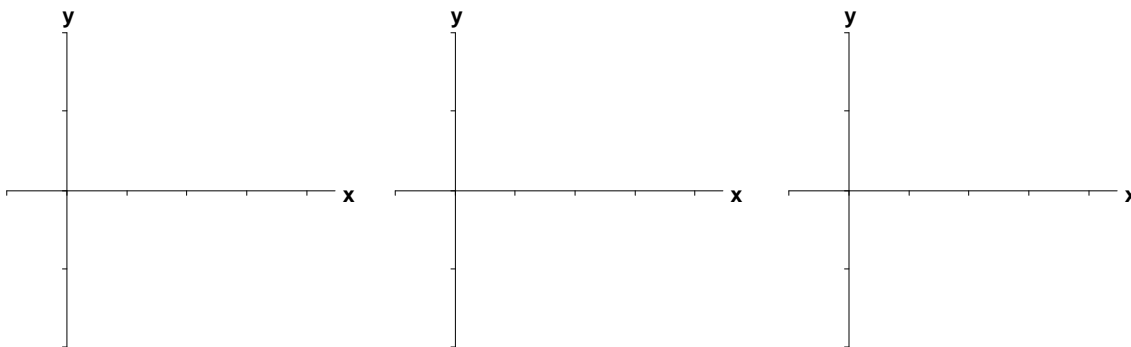
What you should learn

How to use sine and cosine functions to model real-life data

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

x	0	$\frac{p}{2}$	p	$\frac{3p}{2}$	$2p$
y	2	4	2	0	2

Additional notes



Homework Assignment

Page(s)

Exercises