Name _____ Class _____ Date _____

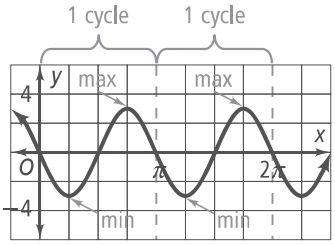
13-4 Reteaching

The Sine Function

A sine curve is the graph of a sine function. You can identify a sine curve by its *amplitude* and *period*. Amplitude is one-half the vertical distance between the maximum and minimum values. The period is the horizontal length of one cycle.

Problem

Use the graph of $y = -3\sin 2x$, where x is measured in radians, at the right. What are the amplitude and period of the sine curve?



Amplitude

The maximum value of the sine curve is 3.

The minimum value of the sine curve is -3.

One-half the difference of these values is $\frac{(3 - (-3))}{2} = \frac{6}{2} = 3$.

The amplitude of the curve is 3.

The **amplitude** equals the absolute value of the coefficient of the function.

Period

Between 0 and 2π, the graph cycles 2 times.

To get the length of one cycle, divide 2π by the number of cycles between 0 and 2π.

The period of the curve is $\frac{2\pi}{2} = \pi$.

The **number of cycles** between 0 and 2π equals the coefficient of x in the function.

Summary

For all sine functions written in the form $y = a \sin b\theta$, where $a \neq 0$, $b > 0$, and θ is measured in radians:

$$\text{amplitude} = |a| \qquad \text{period} = \frac{2\pi}{b}$$

Exercises

Find the amplitude and period of each sine function.

1. $y = \frac{1}{2}\sin 3\theta$ $\frac{1}{2}$; $\frac{2\pi}{3}$
2. $y = \sin 5\theta$ 1; $\frac{2\pi}{5}$
3. $y = 4\sin\frac{4}{3}\pi\theta$ 4; $\frac{3}{2}$
4. $y = \frac{3}{2}\sin\theta$ $\frac{3}{2}$; 2π
5. $y = -2\sin\frac{3}{4}\theta$ 2; $\frac{8\pi}{3}$
6. $y = \pi\sin 2\theta$ π, π

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13-4 Reteaching (continued)

The Sine Function

Problem

What is the graph of two cycles of $y = 2 \sin \frac{1}{2}\theta$?

Step 1 Compare the function to $y = a \sin b\theta$. $a = 2$ and $b = \frac{1}{2}$

Find the amplitude. $|a| = |2| = 2$

Find the period of the curve. $\frac{2\pi}{b} = \frac{2\pi}{\frac{1}{2}} = 4\pi$

Step 2 Find the minimum and maximum of the curve.
Because the amplitude is 2, the maximum is 2 and the minimum is -2.

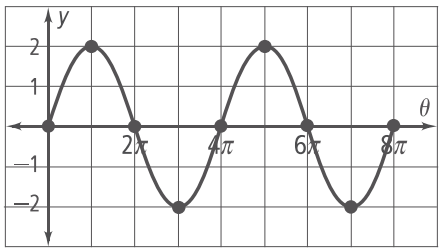
Step 3 Make a table of values. Choose θ-values at intervals of one-fourth the period: $\frac{4\pi}{4} = \pi$.

The y-values cycle through the pattern *zero-max-zero-min-zero*.

θ	0	π	2π	3π	4π	5π	6π	7π	8π
y	0	2	0	-2	0	2	0	-2	0

Step 4 Plot the points from the table.

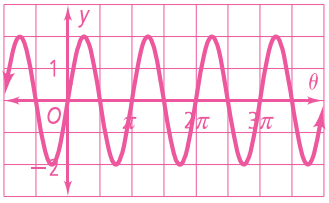
Step 5 Draw a smooth curve through the points.



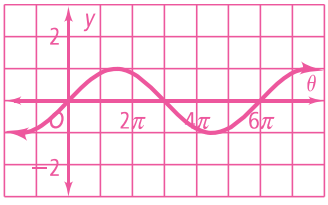
Exercises

Graph each function.

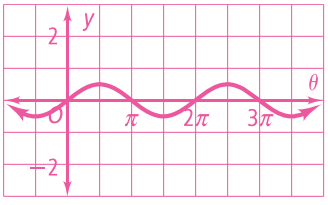
7. $y = 2 \sin 2\theta$



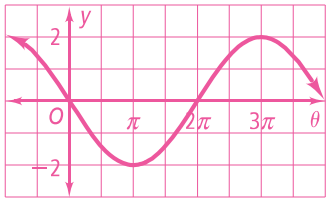
8. $y = \sin \frac{1}{3}\theta$



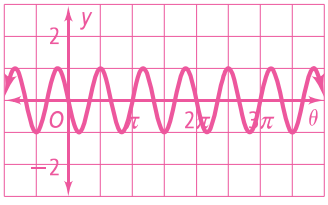
9. $y = \frac{1}{2} \sin \theta$



10. $y = -2 \sin \frac{1}{2}\theta$



11. $y = -\sin 3\theta$



12. $y = -\frac{1}{4} \sin \theta$