

Algebra 2 Honors

Sine Function



PROPERTIES OF SINE FUNCTIONS

$$y = a \sin b\theta, \text{ with } a \neq 0, b > 0, \theta \text{ in radians}$$

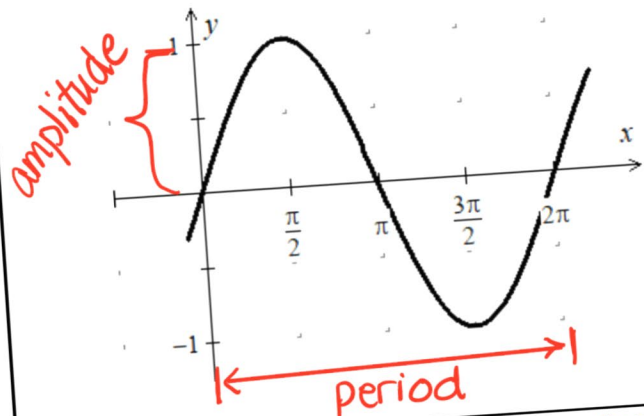
Verbal Vocabulary

$|a|$ is the amplitude of the function

b is the number of cycles in the interval from 0 to 2π

$\frac{2\pi}{b}$ is the period of the function

Visual Vocabulary



FIVE KEY POINTS IN ONE CYCLE:

intercept $(0,0)$ maximum $(\frac{\pi}{2},1)$
intercept $(\pi,0)$ minimum $(\frac{3\pi}{2},-1)$
intercept $(2\pi,0)$

Completely Editable

11.4

Lesson 4: The Sine Function

Vocabulary

Sine function – matches the measure of an angle in standard position with the y-coordinate of a point on the unit circle. This point is where the terminal side of the angle intersects the unit circle.

Sine curve – the graph of a sine function

Sine of θ – the y-coordinate of the point at which the terminal side of the angle intersects the unit circle.

PROPERTIES OF SINE FUNCTIONS

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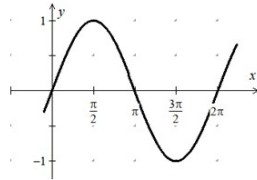
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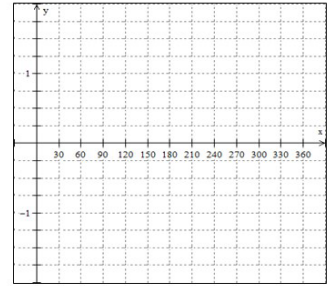
FIVE KEY POINTS IN ONE CYCLE:

Interpreting the Sine Function in Degrees

EX #1: Make a table of values from the unit circle.

θ	0°	30°	60°	90°	180°	225°	270°	330°	360°
$\sin \theta$									

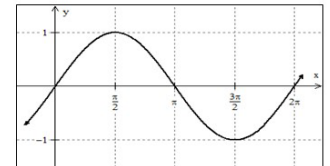
Plot each ordered pair from the previous table on the grid at right:



Estimating Sine Values in Radians

EX #2: Use the graph of the sine function below to answer each of the following:

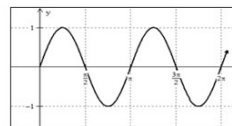
- Find the amplitude
- Find the period of the function in degrees and in radians
- Find the domain and range
- Estimate $\sin 2$, plot your estimate.
- Use a calculator, in radian mode, to find $\sin 2$.



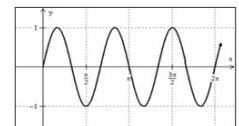
Finding the Period of a Sine Curve

EX #3: Use the graph to find the period of each function.

A.



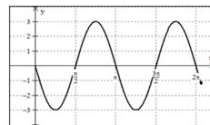
B.



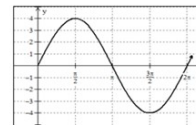
Finding the Amplitude of a Sine Curve

EX #4: Find the amplitude for the graphs below.

A.



B.



Writing Equations for Sine Curves

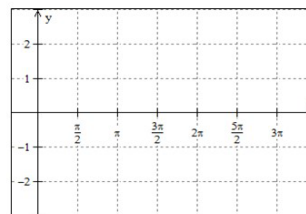
EX #5: Sketch one cycle of a sine curve with amplitude 2 and period π . Write an equation for the graph.

Equation: _____

Amplitude: _____

Period: _____

Key points: Int–Max–Int–Min–Int



Graphing from a Function Rule

Key points: Int–Min–Int–Max–Int

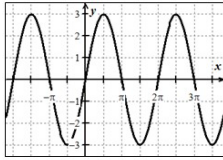


NOTES

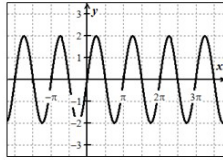
The Sine Function Practice

Problems 1 – 4, find the amplitude and period of each sine curve. Then write an equation for each curve.

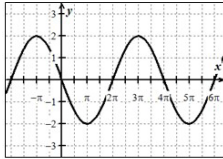
1.



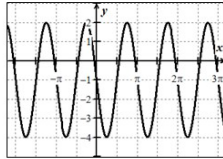
2.



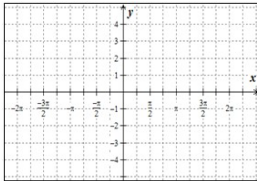
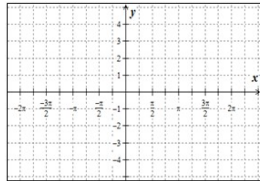
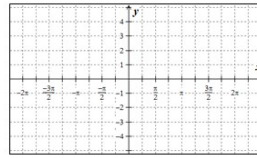
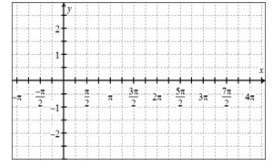
3.



4.



Problems 5 – 8, sketch one cycle of each sine curve. Assume $a > 0$. Write an equation for each graph.

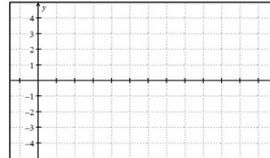
5. amplitude 3; period 2π 6. amplitude 2; period π 7. amplitude 2; period 4π 8. amplitude 1.5; period 3π 

Problems 9 – 12, sketch one cycle of the graph of each sine function.

9. $y = 2 \sin \theta$

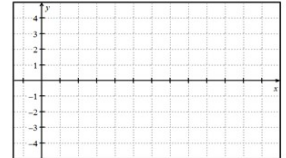
Amplitude:

Period:

10. $y = -3 \sin \left(\frac{\theta}{2} \right)$

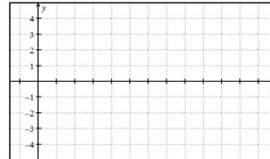
Amplitude:

Period:

11. $y = \frac{5}{2} \sin (2\theta)$

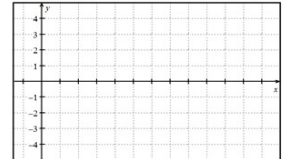
Amplitude:

Period:

12. $y = -2 \sin \left(\frac{2}{3} \theta \right)$

Amplitude:

Period:



Problems 13 – 16, solve.

The period and frequency of a pitch are reciprocals of each other:

$$\text{Period} = \frac{\text{seconds}}{\text{cycle}} \quad \text{and} \quad \text{frequency} = \frac{\text{cycles}}{\text{second}}$$

13. A tuning fork vibrating at 256 hertz (Hz) gives the tone middle C represented by the equation: $y = 0.005 \sin(2\pi)(256t)$, where amplitude is in centimeters (cm) and time is in seconds. Find the amplitude and frequency of the wave.

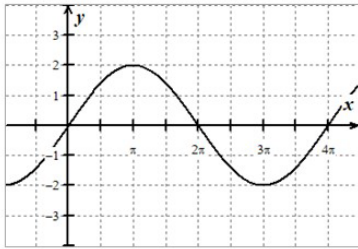
14. When playing the music note A above middle C, the function which models this sound is $y = 0.001 \sin(880\pi\theta)$.

- Find the period of the function.
- Find the frequency of the function.
- What is the amplitude of the function?
- How many cycles of the graph are between 0 and 2π ?

16. The equation $y = \sin(240,000\pi\theta)$ models the highest pitch heard by bats. Find the period and frequency if θ = time in seconds.

Practice Sets

Lesson Warm-Ups



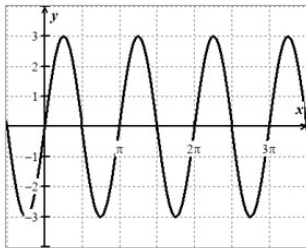
3. Use the graph at left to determine the y -value when $\theta = 6\pi$

Name _____ Date _____ Period _____

Lesson 11.4: The Sine Function

Warm-Up #2

1. State the amplitude and period of the sine function shown below $y = 3 \sin(2\theta)$



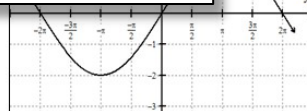
2. Use the graph at left to determine the y -value when $\theta = \frac{3\pi}{4}$

3. Use the graph at left to determine the y -value when $\theta = \frac{5\pi}{4}$

Form A

Period _____

h below to



1. Find the amplitude.

2. Find the period.

3. State the five key points of one cycle:
Int-Min-Int-Max-Int

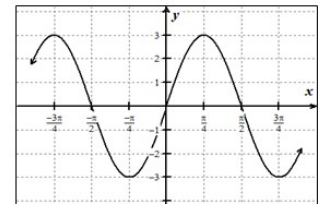
11.4 The Sine Function

Form B

Name _____

Date _____ Period _____

Questions #1-3: Use the graph below to answer the questions.



1. Find the amplitude.

2. Find the period.

3. State the five key points of one cycle:
Int-Min-Int-Max-Int

Daily Lesson Quiz

Grade: _____

Grade: _____