

Algebra 2 Honors

Cosine Function



PROPERTIES OF COSINE FUNCTIONS

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

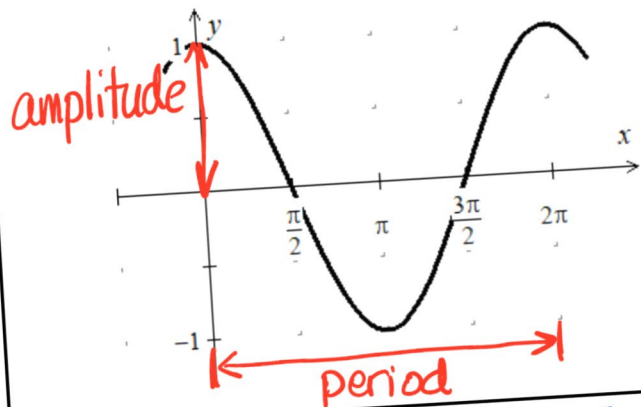
Verbal Vocabulary

$|a|$ 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:

max $(0, 1)$ intercept $(\frac{\pi}{2}, 0)$
min $(\pi, -1)$ intercept $(\frac{3\pi}{2}, 0)$
max $(2\pi, 1)$

Completely Editable

11.5

Lesson 5: The Cosine Function

Vocabulary

Cosine function – $y = \cos \theta$ matches the measure θ of an angle in standard position with the x -coordinate of a point on the unit circle. This point is where the terminal side of the angle intersects the unit circle.

Cosine curve – the graph of a cosine function

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

PROPERTIES OF COSINE FUNCTIONS

$y = \cos b\theta$, with $a \neq 0$, $b > 0$, θ in radians

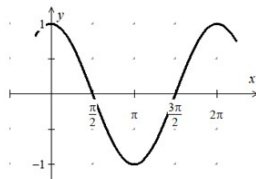
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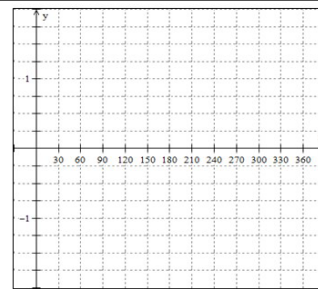
FIVE KEY POINTS IN ONE CYCLE:

Interpreting the Cosine Function in Degrees

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

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

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



Estimating Cosine Values in Radians

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

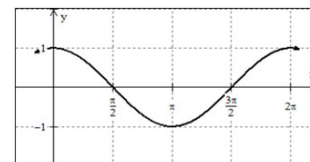
A. Find the amplitude

B. Find the period of the function in degrees and in radians

C. Find the domain and range

D. Estimate $\cos 4$, plot your estimate.

E. Use a calculator, in radian mode, to find $\cos 4$.



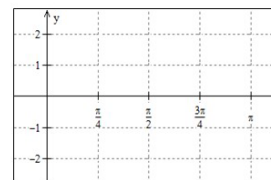
Sketching a Cosine Curve

EX #3: Sketch the graph of $y = 1.5\cos(2\theta)$

Amplitude: _____

Period: _____

Key points: Max–Int–Min–Int–Max



Writing Equations for Cosine Curves

EX #4: Write a cosine function for each description. Choose $a > 0$.

A. amplitude 4; period 6π

B. amplitude 2.5; period 8

Solving a Cosine Equation

EX #5: Find all solutions in the interval from 0 to 2π for $3\cos 2t = -2$.

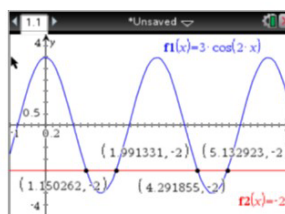
1. Use two equations in the graph window.

$$Y_1 = 3\cos(2x)$$

$$Y_2 = -2$$

2. Use the INTERSECT feature to find the points at which the two graphs intersect on the interval.

3. The four solutions shown are:



Analyzing a Cosine Function

Range: _____

Key points: Int–Min–Int–Max–Int

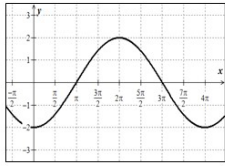


NOTES

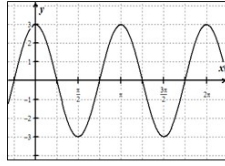
The Cosine Function Practice

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

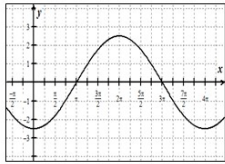
1.



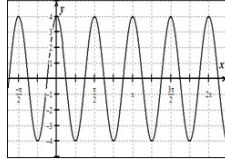
2.



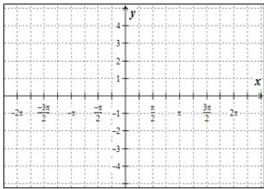
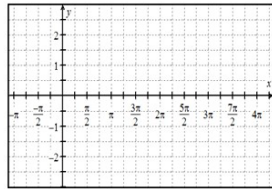
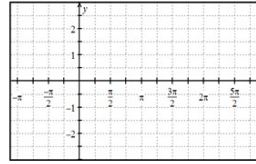
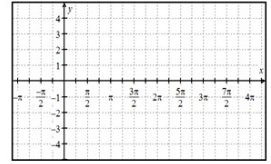
3.



4.



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

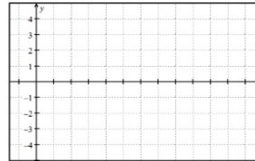
5. amplitude 2; period π 6. amplitude 2.5; period 3π 7. amplitude 1.5; period 2π 8. amplitude 3; period 4π 

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

9. $y = -4 \cos \theta$

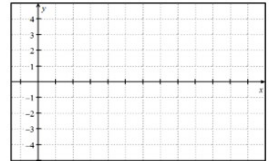
Amplitude:

Period:

10. $y = 2 \cos \left(\frac{\theta}{2} \right)$

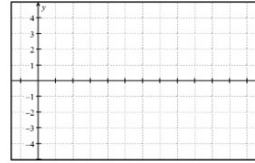
Amplitude:

Period:

11. $y = -\frac{7}{2} \cos(2\theta)$

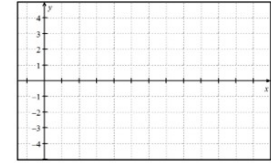
Amplitude:

Period:

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

Amplitude:

Period:



Problems 13 – 16, identify the period, range, and amplitude of each function.

13. $y = 9 \cos \left(\frac{3\pi}{2} t \right)$

14. $y = 7 \cos \left(-\frac{\theta}{3} \right)$

15. $y = 0.4 \cos(\pi t)$

16. $y = \frac{1}{5} \cos \left(\frac{\theta}{6} \right)$

Problems 17 – 24, solve each equation in the interval from 0 to 2π . Round to the nearest hundredth.

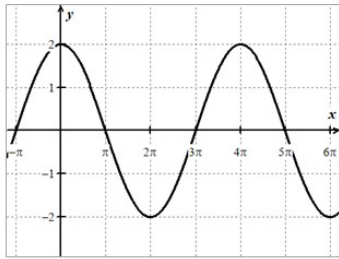
17. $16 \cos \theta = -4$

18. $3 \cos \left(\frac{t}{4} \right) = 2$

19. $-2 \cos(3\theta) = -1$

20. $\cos \left(\frac{t}{2} \right) = 1$

Lesson Warm-Ups



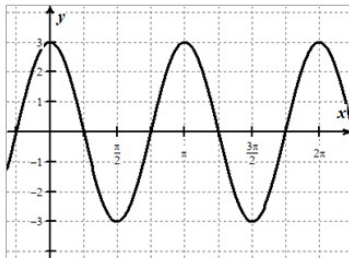
3. Use the graph at left to determine the y -value when $\theta = 10\pi$

Name _____ Date _____ Period _____

Lesson 11.5: The Cosine Function

Warm-Up #2

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



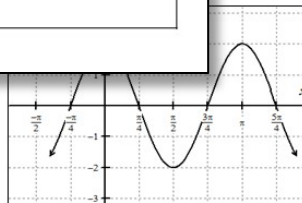
2. Use the graph at left to determine the y -value when $\theta = 4\pi$

3. Use the graph at left to determine the y -value when $\theta = \frac{7\pi}{2}$

Form A

Period _____

below to



1. Find the amplitude.

2. Find the period.

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

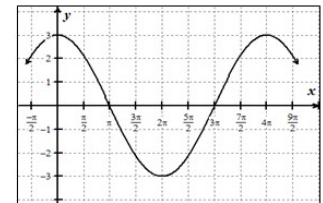
11.5 The Cosine Function

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:
Max-Int-Min-Int-Max

Daily Lesson Quiz

Grade: _____

Grade: _____