**Precalculus Unit 5 Notes—Graphing Sinusoids**

**Definition**: A function is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ if it can be written in the form 🡪 *f* (*x*) = a•sin (b*x* + c) + d

 (where a, b, c, and d are constants and neither a nor b is 0) **OR** *f* (*x*) = a•cos (b*x* + c) + d

**Definition**: The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a sinusoid of the form form 🡪 *f* (*x*) = a•sin (b*x* + c) + d **OR** *f* (*x*) = a•cos (b*x* + c) + d

is \_\_\_\_. Graphically, the amplitude is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

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is \_\_\_\_. Graphically, the period is the length of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Definition**: The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a sinusoid of the form form 🡪 *f* (*x*) = a•sin (b*x* + c) + d **OR** *f* (*x*) = a•cos (b*x* + c) + d

is \_\_\_\_. Graphically, the frequency is the number of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Things to keep in mind . . .

* The basic graphs of sine and cosine have a period of 2$π$.
* Changes in amplitude and period as well as phase shifts are nothing more than transformations you’ve seen before; they have just been given new names for trig functions.
* Changes in amplitude are vertical stretches or shrinks/compressions
* Changes in period are horizontal stretches or shrinks/compressions
* Phase shifts are horizontal (left or right) shifts
* These graphs can also be shifted vertically







Graph  Graph 







**Example 1** Find the amplitude of each of the following sinusoids & then use the language of transformations to describe how the graphs of b and c are related to a.

 **a)**  *f* (*x*) = cos *x* **b)**  *y* = ½cos *x* **c)** *y* = –3cos *x*

 amp = \_\_\_\_\_ amp = \_\_\_\_\_ amp = \_\_\_\_\_

**Example 2** Find the period of each of the following sinusoids & then use the language of transformations to describe how the graphs of b and c are related to a.

 **a)**  *f* (*x*) = sin *x* **b)**  *y* = 3sin (–2*x*) **c)** *y* = –2sin

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**Example 3** Find the amplitude, period, and frequency of the function *f* (*x*) = 4 sin. Sketch the graph.

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**Example 4** Find the amplitude, period, phase shift, vertical shift, and any reflection.



**Example 5** Find the amplitude, period, phase shift, vertical shift, and any reflection. Then graph one complete period.



 A.

 B. $y=-2\cos(\left(x\right))+3$



 C.

**Example 6 **Write an equation in the form y = Asin(Bx) or y = Acos(Bx) for each graph.

 A.

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 B.

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 C.

**Example 7** Write an equation for each description or graph.

 A. sine function; amplitude = 2, period = , shifted down 1 unit

 B. cosine function; amplitude = 4, period = 3, shifted right  units, shifted up 2 units

 C. sine equation D. cosine equation

