Warm up

1. Simplify the following
   a) \( \frac{1}{2} \)  
   b) \( \frac{1}{\sqrt{3}} \)  
   c) \( \frac{1}{\sqrt{2}} \)  
   d) \( \frac{1}{\sqrt{3}} \)  
   e) \( \frac{\sqrt{3}}{2} \)

2. Find the following when \( 0 \leq \theta \leq 2\pi \)
   a) \( \csc \theta = -2 \)  
   b) \( \tan \theta = \sqrt{3} \)  
   c) \( \sec 2\sqrt{3} \)
**Homework:**

In Exercises 7–12, find the period of the function and use the language of transformations to describe how the graph of the function is related to the graph of \( y = \cos x \).

11. \( y = 3 \cos 2x \)  \hspace{1cm} **Amp: 3** \hspace{1cm} **Period: \pi**

In Exercises 13–16, find the amplitude, period, and frequency of the function and use this information (not your calculator) to sketch a graph of the function in the window \([-3\pi, 3\pi]\) by \([-4, 4]\).

16. \( y = -4 \sin \frac{2x}{3} \)  \hspace{1cm} **Amp: 4** \hspace{1cm} **Period: 3\pi**

**Reflection across x-axis**

\[ \frac{\pi}{3} \quad \frac{2\pi}{3} \quad \frac{5\pi}{3} \quad \frac{8\pi}{3} \]

61. Amplitude 2, period 2\( \pi \), phase shift \( \frac{\pi}{4} \), vertical translation 1 unit up

62. Amplitude 3.5, period \( \pi \), phase shift \( \frac{\pi}{4} \), vertical translation 1 unit down

63. Amplitude 5, period \( \frac{2\pi}{3} \), phase shift \( \frac{\pi}{18} \), vertical translation 0.5 unit up
Objective: To graph Sine and Cosine Functions and their reciprocal functions

The Unit Circle
Transformation of the Sin and cosine Functions

\[ y = a \text{ "trig" } \left( b\theta + c \right) + d \]

The four parts:

- \( \frac{-c}{b} \)

- The amplitude is \(|a|\)  
  - how far from the center to the max or min

- The period is \(2\pi/b\)  
  - the measure of one cycle

- The phase shift is \(-c/b\)  
  - the translation to the left or right

- The vertical shift is \(d\)  
  - the translation up or down
\[ y = -4 \sin(\pi x) - 1 \]

amplitude: \(4\)
period: \(2\)
phase shift: 
reflection: over \(x\)
vertical shift: down 1
\[ y = -2 \cos(2\pi x - \pi/2) + 1 \]

- Amplitude: \[ 2 \]
- Period: \[ \frac{\pi}{2} \]
- Phase shift: \[ +\frac{\pi}{4} \]
- Reflection: \[ \text{over } x \]
- Vertical shift: \[ 1 \]
Graphs of secant and cosecant functions

1. Graph its reciprocal
2. Place an asymptote where it equals 0 before vertical transformations
3. Flip the curves
4. Write the equations for the asymptotes in terms of \( n \)

\[
\csc = \frac{1}{\sin}
\]
\[
\sec = \frac{1}{\cos}
\]
7. Graph

\[ f(x) = \csc(x) \]

\[ x = \sin \]

\[ x = 0 + \pi n \]

1. Graph its reciprocal
2. Place an asymptote where it equals 0 before vertical transformations
3. Flip the curves
4. Write the equations for the asymptotes in terms of \( n \)
8. Graph $f(x) = \sec(x)$

1. Graph its reciprocal
2. Place an asymptote where it equals 0 before vertical transformations
3. Flip the curves
4. Write the equations for the asymptotes in terms of $n$
$y = 2 \sin (4x)$

- Amplitude: __________
- Period: __________
- Phase shift: __________
- Reflection: __________
- Vertical shift: __________

$x = 0 + \frac{\pi}{4}n$
$y = 4 \sec(\pi x) - 1$

- Amplitude: $4$
- Period: $2$
- Phase shift: $0$
- Reflection: $y$
- Vertical shift: $\downarrow 1$
- Asymptotes: $x = \frac{1}{2} + n$
$y = -\sec(2\pi x - \pi/2) + 1$

- amplitude: 
- period: 
- phase shift: 
- reflection: 
- vertical shift: 

[Graph of the function]
\[ y = -2 \csc(\theta + \pi) \]

- Amplitude: \\
- Period: \\
- Phase shift: \\
- Reflection: \\
- Vertical shift: \\
- Asymptotes:
Practice:

1) \( y = 4 \csc(\theta/2 + \pi) - 1 \)

2) \( y = -2 \sec(\pi \theta - \pi) \)