

Math 4
Chapter 6
Review #6

Chapter 6 – Trigonometric Functions

Cosine and Sine

unit circle: $x^2 + y^2 = 1$

$x = \cos \theta; y = \sin \theta$

$\cos^2 \theta + \sin^2 \theta = 1$

Circle with center (0,0) radius r:

$x^2 + y^2 = r^2$

$x = r \cos \theta; y = r \sin \theta$

Other Trigonometric Functions

$\tan \theta = \frac{\sin \theta}{\cos \theta}; \cot \theta = \frac{\cos \theta}{\sin \theta}$

$\sec \theta = \frac{1}{\cos \theta}; \csc \theta = \frac{1}{\sin \theta}$

(Graphs have vertical asymptotes.)

Radian Measure

$\pi \text{ rad} = 180^\circ$

$s = \theta r$

Inverse Trig Functions

$\cos^{-1} y = t \leftrightarrow y = \cos t$ for $0 \leq t \leq \pi$

$\sin^{-1} y = t \leftrightarrow y = \sin t$ for $-\frac{\pi}{2} \leq t \leq \frac{\pi}{2}$

$\tan^{-1} y = t \leftrightarrow y = \tan t$ for $-\frac{\pi}{2} < t < \frac{\pi}{2}$

Sinusoidal Functions

$y = A \sin [B(t - h)] + k$

$y = A \cos [B(t - h)] + k$

Amplitude = $|A|$; period = $\frac{2\pi}{|B|}$

midline: $y = k$; horizontal shift = h

Exercises

1. State the period, amplitude, and midline in each of the following.

a. $y = -4 \cos [2(x + 1.5)] + 6$

b. $y = 10 \sin (3x) - 5$

2. The equation of the midline of the function $f(x) = 3 \sin [2(x + 1)] + 4$ is

(1) $y = 1$

(2) $y = 2$

(3) $y = 3$

(4) $y = 4$ _____

3. The *maximum* value of the function $g(t) = 40 \cos \left[\frac{2\pi}{365} (t - 91.25) \right] - 100$ is

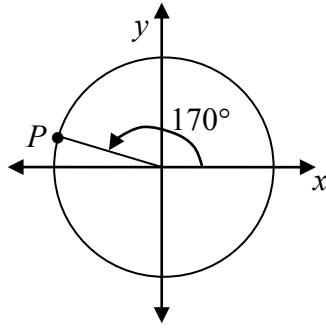
(1) 140

(2) 60

(3) -60

(4) 91.25 _____

4. As shown in the diagram below, an angle in standard position with degree measure 170° intersects the unit circle with center $(0, 0)$ at point P . To the *nearest hundredth*, determine the x - and y -coordinates of point P .



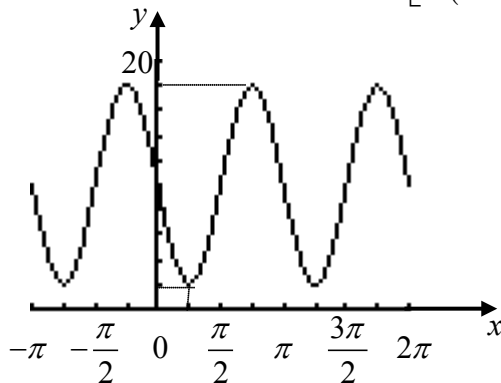
5. Convert to degree measure: (a) $\frac{5\pi}{6}$ (b) $\frac{7\pi}{12}$

6. Convert to radian measure: (a) 240° (b) 150°
(Leave in terms of π .)

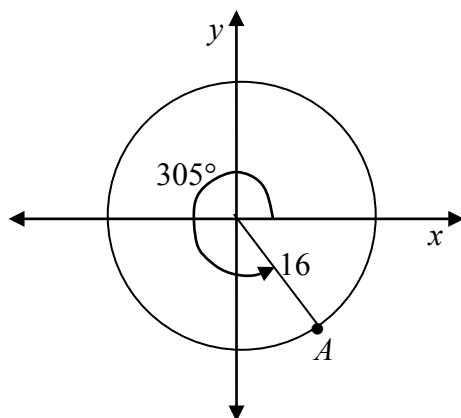
7. Find a formula, using the sine function, for your height above the ground after t minutes on the given ferris wheel:

The ferris wheel is 28 meters in diameter and boarded at a height 6 meters above the ground. The wheel completes one full revolution every 10 minutes. At $t = 0$, you are in the three o'clock position and ascending.

8. Write an equation, using cosine, for the function whose graph is shown below. Your equation must be of the form $y = A \cos[B(x-h)] + k$.



9. Find, to the *nearest hundredth*, the coordinates of point A in the diagram below.



10. Solve for the *smallest* positive value of θ :

a. $5 + 2 \cos(3\theta) = 6$

b. $4 - 2 \tan(2\theta - 5) = 12$

11. Solve for all values of x , where $0 \leq x < 2\pi$:

a. $2 \sin^2 x + 7 \sin x + 3 = 0$

b. $2 \sin x \cos x - \sin x = 0$

12. Which of the following vertical lines is an asymptote for the graph of $f(x) = \csc x$?

(1) $x = \frac{\pi}{2}$

(2) $x = -\frac{3\pi}{2}$

(3) $x = \pi$

(4) $x = \frac{\pi}{4}$ _____

13. Express in terms of **one** trigonometric function only: $\sec \theta \cdot \tan \theta \cdot \cos^2 \theta$