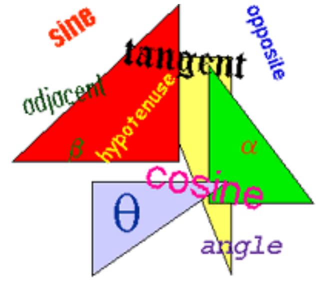
Unit 7.1-7.5 Trigonometric Functions



By the end of this unit, you should be able to:

- ☐ convert between degrees and radians (7.1)
- ☐ find arc length (7.1)
- ☐ find sector area (7.1)
- ☐ find the linear speed and angular speed of an object traveling in circular motion (7.1)
- ☐ convert units (ex – mi/hr into m/sec) (7.1)
- ☐ find the values of the six trigonometric functions of an angle (7.2)
- ☐ find exact values of expressions using fundamental identities and the complimentary angle theorem (7.2)
- ☐ use a calculator to approximate values of trigonometric functions of angles (7.3)
- ☐ model and solve applied problems involving right triangles (7.3)
- ☐ find exact values of trigonometric functions of all angles on the unit circle (7.3 – 7.4)
- ☐ find and use coterminal angles (7.4)
- ☐ find and use reference angles (7.4)
- ☐ find the values of the six trigonometric functions given a point on the terminal side of angle (7.4)
- ☐ find the quadrant in which an angle lies given signs of two trigonometric functions (7.4)
- ☐ find the values of the six trigonometric functions given the value of one trig function and the quadrant in which the angle lies or given the values of two trig functions (7.4)
- ☐ use periodic properties to find the values of trigonometric functions (7.5)
- ☐ use even-odd properties to find the values of trigonometric functions (7.5)
- ☐ simplify an expression using identities, complimentary angle theorem, periodic properties, and even-odd properties (7.2, 7.5)

By the end of this unit, you should know:

- ☐ the unit circle
- ☐ six ratios of a right triangle (sinθ, cosθ, etc.)
- ☐ reciprocal identities
- ☐ quotient identities
- ☐ Pythagorean identities (all three)
- ☐ cofunctions of complimentary angles
- ☐ periodic properties
- ☐ even-odd properties
- ☐ unit conversions

Assignments:

7.0 – Unit conversions – worksheet
7.1A – Angles/Radians/Degrees/Co-terminal angles – pg. 513 #11, 15, 19, 21, 37, 39, 42, 47, 49, 53, 59, 65, 67 and #1-4 below: Find a coterminal angle such that $0 < \theta < 360°$: 1. 912° 2. -780° Find a coterminal angle such that $0 < \theta < 2\pi$: 3. $21\pi/5$ 4. $-15\pi/6$
7.1B – Arc Length/Sector Area – pg. 514 #71, 73, 77, 79, 83, 85, 89, 91, 92, 95
7.1C – Circular Motion – pg. 515 #97 – 100, 108, 109, 111
7.2A – Right Triangle Trig – pg. 526 #13, 15, 17, 19, 27, 31, 33
7.3A – Exact Trig Values for Acute Angles – #1-6 below and pg. 536 #17-27odd Find the exact value of each expression. Do not use a calculator. 1. sin 45° 2. cos π/6 3. tan 30° 4. csc π/3 5. sec 60° 6. cot π/4
7.3B – Right Triangle Trig Applications - pg. 536 #29-45odd, 59, 61, 63, 65, 67, 69
7.4A – Using Co-terminal Angles and References Angles/Signs of Quadrants – pg. 548 #21, 23, 29, 31, 33, 35, 39, 41, 43, 47, 49, 55, 57, 61, 67, 73, 79, 81, 83
7.4B – Exact Trig Values in All Quadrants – pg. 548 #13, 15, 17, 91, 93, 99, 101, 103
7.2B – Trig Identities – pg. 526 #37-53odd, 55, 57, 59, 61, 63, 65
7.5 – Periodic and Even/Odd Properties – pg. 558 #25, 27, 29, 31, 37, 39, 45, 49, 51, 53, 55, 57, 79, 83, 85, 100, 101 and #1-3 below: Find the exact value of the following expressions: 1. $2 + \cot(-10°) + \tan(-80°)$ 2. $\sin^2 50° - \frac{1}{\csc^2(-40°)}$ 3. Given $\sec\theta = 3/5$, find a) $\sec(-\theta)$ b) $\sec(\theta + 8\pi)$ c) $\cos(-\theta)$

Review Problems

1. Convert degrees to radians and radians to degrees. Give exact answers.
   a) $\theta = 17\pi/12$ b) $\theta = 105°$ c) $\theta = 4$ d) $\theta = -855°$
2. Find the exact values of each of the following.
   a) sin(210°) b) cos(-7π/4) c) tan(510°) d) csc(π) e) sec(30°) f) cot(7π/6)
3. Find the exact values of the following expressions.
   a) $\frac{\cos(35°)}{\sin(55°)}$ b) $\sec^2(61°) + \cot^2(-29°)$
   c) $3\tan(5\pi/4) + 2\cos(\pi)$ d) $\frac{\cos(45°)}{\sin(45°)} + \cot(45°) + \frac{1}{\tan(45°)}$
4. If $\theta = -25\pi/12$, a) find a coterminal angle such that $0 < \theta < 2\pi$, and b) find the reference angle
5. Name the quadrant of θ for which $\tan\theta > 0$ and $\cos\theta < 0$.
6. Find the remaining 5 trig functions given $\sin\theta = 5/7$ and $\sec\theta < 0$. Give answer in exact form.
7. Find the exact values of each of the following given $\csc\theta = 4$.
   a) csc(-θ) b) sin θ c) sin(-θ) d) csc(θ - 4π)
   e) sec(π/2 – θ) f) $\cot^2(\theta)$ g) $\sin^2(\theta)$ h) $\cos^2(\theta)$
8. Approximate each value to 3 decimal places.
   a) cos(8π/9) b) tan(255°) c) csc(π/5)
9. The central angle of a sector measures 76°. Find the arc length and sector area. Round to 2 decimal places.
10. A yardstick is leaning against a wall. It makes an angle of 21° with the ground.
    a) Find the height at which the yard stick touches the wall in inches.
    b) Find the distance from the wall to the yardstick along the floor in inches.
11. A racecar has tires with diameter of 28 inches. The tires make 2500RPM. Find the speed of the racecar in mph.
12. A bicyclist has 26 inch wheels. He can travel 3 miles in 20 minutes. Find the angular speed of his wheels in rev/sec.
13. Michael is on the 86th floor observatory of the Empire State Building (1050 ft) and spots his friend Ellie on the sidewalk below. Ellie has to look up at an angle of 57° to wave at Michael. Then Michael spots another friend Kevin on the same sidewalk directly behind Ellie. Kevin has to look up at an angle of 52° to wave at Michael. How far apart are Kevin and Ellie?