Acc GSE PreCalculus | Name: ______________________

Unit 2 Study Guide | Date: ______________ Per: ______

I. Evaluate. (Exact values)

1. $arcsin\left(\frac{1}{2}\right)$

2. $\arctan\left(\frac{\sqrt{3}}{3}\right)$

3. $arccos\left(-\frac{\sqrt{2}}{2}\right)$

II. Identify the amplitude, period, midline, and phase shift.

4. $y = cos(x - \pi)$

5. $y = -5cos\left(\frac{x}{4} - \pi\right) + 4$

6. $y = \frac{1}{2}sin\left(2x - \frac{\pi}{3}\right)$

7. $y = -3 + sin\left(3x + \frac{\pi}{2}\right)$

III. Graph the functions below.

8. $y = cos\left(2x - \frac{\pi}{2}\right)$

9. $y = cot\left(x + \frac{\pi}{2}\right)$

10. $y = -2csc(4x)$

11. $y = -sin\left(2x - \frac{\pi}{3}\right)$

12. $y = sec4x$

13. $y = -2cos(3x)$

IV. Identify the domain, range, period, and asymptotes of each graph.

14. $y = 3cos(3x + \pi)$

15. $y = 4cot(3x)$

16. $y = cot\left(\frac{x}{4}\right)$

V. Sketch the parent graphs of all 6 trigonometric functions.

17. – 22.

VI. Write the equation of a cosine function with the following conditions.

23. amplitude = 2, period = $\frac{\pi}{2}$, phase shift = $-\frac{\pi}{4}$

24. period = 2π, phase shift = -1, vertical shift = -4

VII. Find two angles, θ, between $[0°,360°)$ that satisfy the given equation.

25. $cot\theta = -1.456$

26. $sin\theta = .9564$

27. $tan\theta = 0.3519$

28. $sec\theta = -2.6571$

VIII. Solve the word problems below.

29. A man that is 6 feet tall casts a shadow 14 feet long. Find the angle of elevation of the sun.

30. From a point on a cliff 75 feet above water level an observer can see a ship. Find the angle of depression to the ship if the ship is 400 feet from the base of the cliff.

31. A ladder is leaning against a wall. The base of the ladder is 5 feet from the wall and makes an angle of 39° with the ground. Find the length of the ladder.

32. Find the altitude of a scalene triangle if one of the base angles measures 70° and its adjacent side (not the base) is 9 cm.

IX. Evaluate.

33. $arcsin(sin3\pi)$

34. $cos\left(arccos\left(-\frac{\sqrt{3}}{2}\right)\right)$

35. $arctan\left(tan\left(\frac{11\pi}{6}\right)\right)$

1. The temperature in Syracuse varies throughout the year. A sinusoidal equation provides a good model for the average temperature throughout the year. The equation: $f(t) = 24.032\cos(0.503t) + 47.364$ represents the average temperature in Syracuse as a function of time, t in months. Note: t = 0 represents January 1st.
   a. What is the maximum temperature in Syracuse according to this model?
   b. What is the minimum temperature in Syracuse according to this model?
   c. What is the amplitude and what does it represent in the context of the problem?

2. The average annual snowfall is a certain region is modeled by the function $S(t) = 20 + 10\cos\left(\frac{\pi}{5}t\right)$ where S represents the annual snowfall, in inches, and t represents the number of years since 1970.
   a. According to this model, what is the minimum annual snowfall, in inches, for this region?
   b. In which years between 1970 and 2000 did the minimum amount of snowfall occur?

3. The depth of the water on the shore of a beach varies as the tide moves in and out. The equation: $D(t) = 0.75\cos\left(\frac{\pi}{6}x\right) + 1.5$ models the depth of the water, D(t), in feet and t as time in hours.
   a. What is the amplitude of the equation?
   b. What is the period of the equation?
   c. In how many hours will the tide be at its lowest?
   d. How deep will the water be 2 hours after the high tide?

4. A grandfather clock has a pendulum that moves from its central position according to the function $P(t) = -3.5\sin\left(\frac{\pi}{2}t\right)$ where t represents time in seconds. How many seconds does it take the clock to complete one full cycle from center to the left then the right and then back to center?

5. For several hundred years, astronomers have kept track of the number of solar flares, or "sunspots," that occur on the surface of the sun. The number of sunspots in a given year varies periodically, from a minimum of about 10 per year to a maximum of about 110. Between 1750 and 1948 there were exactly 18 complete cycles.
   a. What is the period of a sunspot cycle?
   b. Assume that the number of sunspots per year is sinusoidal function of time and that the maximum occurred in 1948. Sketch a graph of this sinusoid for two cycles.
   c. Find a particular equation for the number of sunspots per year as a function of years since 1948.
   d. How many sunspots will there be in the year 2013?