GSE PreCalculus: Graphing Trig Functions Name_____
WS 4.4 Application Sine/Cosine Date_____Period_____

You must do all your work on your own sheet of graph paper!!!

1. **Ferris Wheel Problem** As you ride the Ferris wheel, your distance from the ground varies sinusoidally with time. Let *t* be the number of seconds that have elapsed since the Ferris wheel started. You find that it takes you 3 seconds to reach the top, 43 feet above the ground, and that the wheel makes a revolution once every 8 seconds. The diameter of the wheel is 40 feet.
   a. Sketch a graph of this sinusoid.
   b. Write an equation of the sinusoid.
   c. What is the lowest you go as the Ferris wheel turns, and why is this number greater than zero?
   d. Predict your height above the ground when
      i. $t = 6$
      ii. $t = 9$
      iii. $t = 0$

2. **Extraterrestrial Being Problem** Researchers find a being from an alien planet. Its body temperature is varying sinusoidally with time. 35 minutes after they start timing, it reaches a high of 120° F. 20 minutes after that it reaches its next low 104° F.
   a. Sketch a graph of this sinusoid.
   b. Write an equation expressing temperature in terms of minutes since they started timing.
   c. What was its temperature when they first started timing (when t=0)?

3. **Tarzan Problem** Tarzan is swinging back and forth on his grapevine. As he swings, he goes back and forth across the riverbank, going alternatively over land and water. Jane decides to model mathematically his motion and starts her stopwatch. Let *t* be the number of seconds the stopwatch reads and y be the number of meters Tarzan is from the river bank. Assume that y varies sinusoidally with *t*, and that *y* is positive when Tarzan is over water and negative when he is over land.
   Jane finds that when $t = 2$, Tarzan is at one end of his swing, where $y = -23$. She finds that when $t = 5$ he reaches the other end of his swing and $y = 17$.
   a. Sketch a graph of this sinusoid.
   b. Write an equation expressing Tarzan's distance from the riverbank in terms of *t*.
   c. Predict y when
      i. $t = 2.8$
      ii. $t = 6.3$
      iii. $t = 15$

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4. **Steamboat Problem** Mark Twain sat on the deck of a river steamboat. As the paddlewheel turned, a point on the paddle blade moved in such a way that its distance , d, from the water'ssurface was a sinusoidal function of time. When his stopwatch read 4 s, the point was at its highest, 16 ft above the waters surface. The wheels diameter was 18 ft, and it completed a revolution every 10 s.
   a. Sketch a graph of the sinusoid.
   b. Writhe the equation of the sinusoid.
   c. How far above the surface was the point when Mark's stopwatch read:
      i. 5 s
      ii. 17 s

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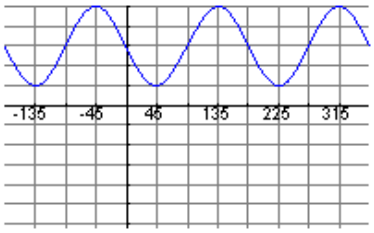
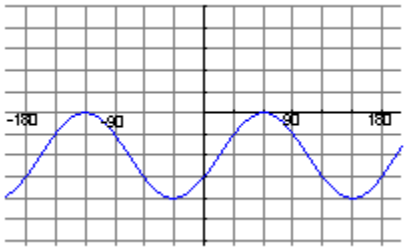
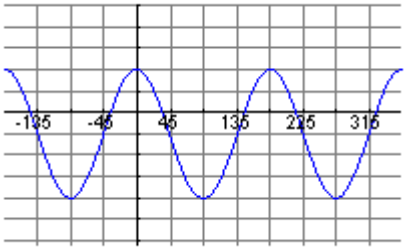
Find the equation of each:

7. 	a. Write equation as a positive sine graph b. Write equation as a positive cosine graph
8. 	a. Write equation as a positive sine graph b. Write equation as a positive cosine graph
11. 	Write equation (either sine or cosine)