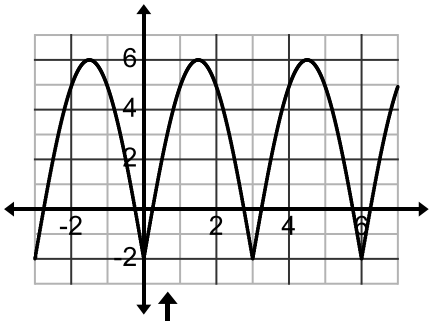
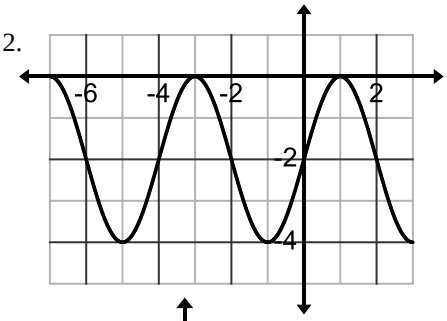
Algebra 2CP
Trig Unit 9 Worksheet

For each of the five graphs below a) draw one cycle b) find the period c) write the equation of the center line axis d) find the amplitude e) find the frequency

1.



2.



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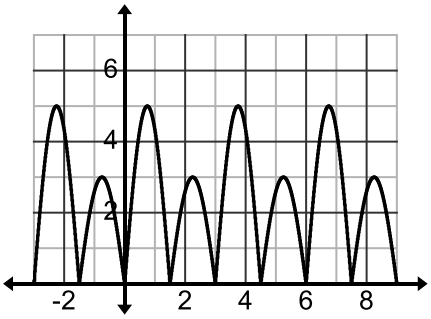

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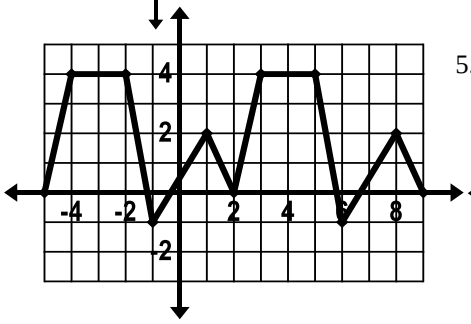

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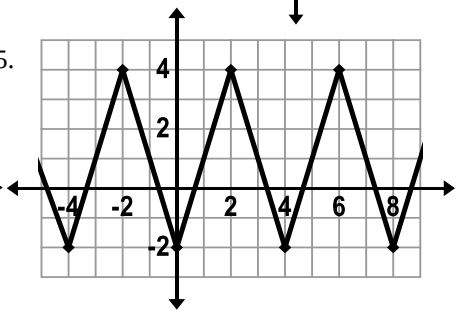

6. Redraw Graph 1 with a vertical translation of -2.
7. Redraw Graph 2 with a period that is doubled.
8. Redraw Graph 3 with a horizontal translation of 2.
9. Redraw Graph 3 with a period that is cut in half.

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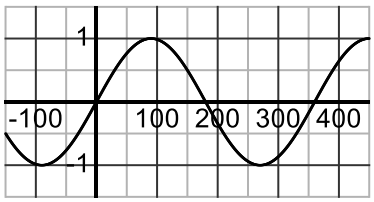
10. For each of the following, find the domain values $0° < x < 360°$ for which the graph of
    a) $y = \sin(x)$ decreases from 1 to 0
    b) $y = \cos(x)$ decreases from 1 to 0
    c) $y = \sin(x)$ increases from -1 to 0
    d) $y = \cos(x)$ increases from -1 to 0
    e) $y = \sin(x)$ increases from 0 to 1
    f) $y = \cos(x)$ increases from 0 to 1
    g) $y = \sin(x)$ decreases from 0 to -1
    h) $y = \cos(x)$ decreases from 0 to -1

11. Tell whether each of the following statements describes a characteristic of the sine function, the cosine function, both functions or neither function.
    a) The function increases throughout the interval $180° < x < 360°$.
    b) The domain of the function is all real numbers.
    c) The graph crosses the x-axis at multiples of $180°$.
    d) The amplitude of the function is -1.
    e) The function has a period of $180°$.
    f) The function passes through (0,1)
    g) The function is increasing on the interval $0° < x < 90°$.
    h) The center line axis of the function is y = 0.
    i) The maximum value is 1.
    j) The range of the function is $-1 \le y \le 1$.

12. Use the graph of $y = \sin(x)$ to estimate the value of each of the following.
    a) sin(35°) b) sin(115°) c) sin(235°) d) sin(335°)



13. A vertical gear of an old clock makes one counterclockwise revolution every 60 seconds. Suppose there is a catch on the side of the gear that is at its rightmost position at the time $t = 0$ and suppose the vertical position of the catch at this time is called $h = 0$.
    a) If the vertical position of the catch after 5 seconds is $h = 4mm$, after how many more seconds will it again be at $h = 4mm$?
    b) Name two times during the first 60 seconds that its vertical position will be $h = -4mm$.

For each of the following find the equation of the center line axis, the period, the amplitude and the phase shift. Draw each function showing at least one cycle. Label the high, low and center line points of one cycle. Check your answers on the graphing calculator. REMEMBER: The $\theta - axis$ is the same as the $x - axis$.

14. $y = 3\sin\left(\frac{1}{2}\theta\right)$

15. $y = 5\sin(\theta) + 3$

16. $y = \cos(2\theta) - 1$

17. $y = 1.4\cos(\theta + 45°)$

18. $y = -\sin(2(\theta - 60°))$

19. $y = 4\sin\left(\frac{1}{2}(\theta - 45°)\right)$

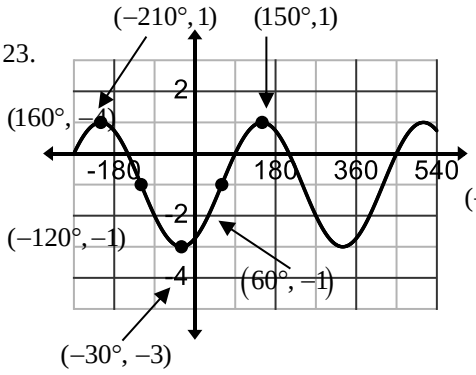
20. $y = -6\cos(3\theta) + 1$

21. $y = 3\cos(4(\theta + 30°)) - 1$

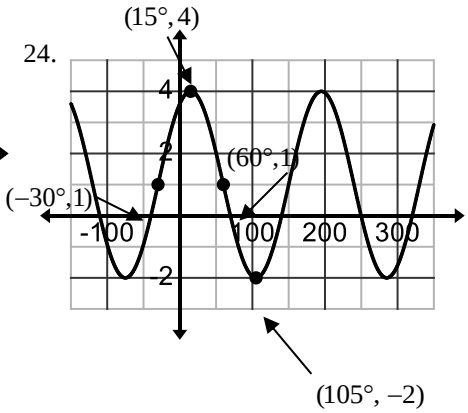
22. $y = 8\sin(1.5(\theta - 90°)) + 3$

Write both a sine equation and a cosine equation for each of the following graphs.

23.



24.



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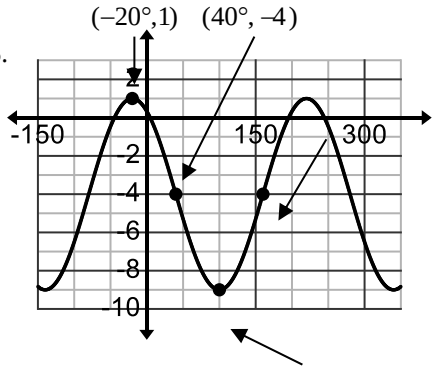

(100°, –9)

Write an equation for each of the following. Graph each equation.

26. a sine function with amplitude 3, period $120°$, translated 3 units down and translated $50°$ to the left

27. a cosine function, reflected over its center line axis with amplitude 7.5, period $450°$, translated vertically 5 units and horizontally $20°$

Your height above the ground (in feet) on a Ferris wheel with a radius 20 feet and loading platform 5 feet above the ground can be modeled by the equation $h(t) = -20\cos(9t) + 25$ where t is measured in seconds and h is measured in feet.

28. How long does it take for the Ferris wheel to make one complete revolution?
29. How many revolutions does the Ferris wheel make in 1 minute?
30. How many feet above the ground are you a) 15 seconds after the Ferris wheel starts? b) 40 seconds after the Ferris wheel starts? c) 60 seconds after the Ferris wheel starts?
31. Graph the equation.
32. At what times will you be at the point closest to the ground? highest above the ground?

For each of the following, write a new equation, based on the changes made to the properties of the Ferris wheel.

33. The Ferris wheel's loading platform is 8 feet off the ground.
34. The Ferris wheel makes one revolution in 36 seconds.
35. The radius of the Ferris wheel is 30 feet.

The table below gives the monthly mean temperatures in the Dallas-Ft. Worth area.

Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
43	48	57	66	73	81	85	85	77	67	56	47

36. Draw a scatter plot of the data using 1 for January, 2 for February, 3 for March and so on.

37. Assume the following facts: (1) The lowest temperature occurs in January. (2) The highest temperature occurs in July. (3) The graph is periodic with a period of 12. Model the data with a) a sine function b) a cosine function