NAME_____

MOD _____
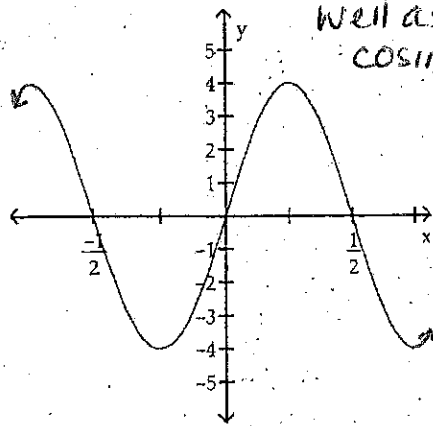
Solve the problem.

1) For what numbers x, $0 \leq x \leq 2\pi$, does cos x = –1?   1) _____

2) For what numbers x, $0 \leq x \leq 2\pi$, does sin x = 0?   2) _____

3) For what numbers x, $-2\pi \leq x \leq 2\pi$, does csc x = 1?   3) _____

4) What is the y–intercept of y = cot x?   4) _____

5) For what numbers x, $-2\pi \leq x \leq 2\pi$, does the graph of y = tan x have vertical asymptotes?   5) _____

6) For the equation $y = -\frac{1}{2}\sin(4x + 3\pi)$, identify (i) the amplitude, (ii) the phase shift, and (iii)   6) _____

the period.

7) For the equation $y = -\frac{1}{2}\cos(2x - 2\pi)$, identify (i) the amplitude, (ii) the phase shift, and (iii)   7) _____
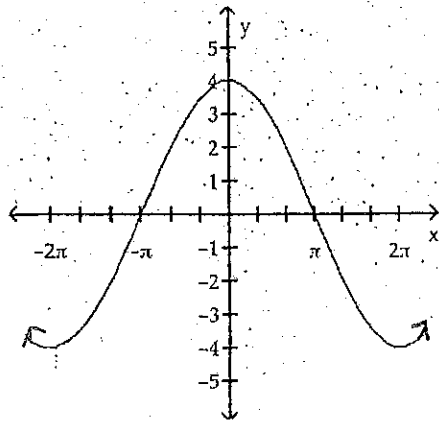
the period.

Find an equation for the graph. (WRITE a POSITIVE AND A NEGATIVE sin equation as well as a positive and negative cosine equation)

8)   8)

9)   9)

1

Write the equation of a sine function that has the given characteristics.

10) Amplitude: 5
Period: π
Phase Shift: $\dfrac{3}{2}$

Solve the problem.

11) The following data represents the average percent of possible sunshine for a certain city in Indiana.

Month, x	Average Percent of Possible Sunshine
January, 1	46
February, 2	51
March, 3	55
April, 4	60
May, 5	68
June, 6	73
July, 7	75
August, 8	74
September, 9	68
October, 10	62
November, 11	41
December, 12	38

Draw a scatter diagram of the data for one period. Find the sinusoidal function of the form $y = A \sin(\omega x - \phi) + B$ that fits the data. Draw the sinusoidal function on the scatter diagram. Use a graphing utility to find the sinusoidal function of best fit. Draw the sinusoidal function of best fit on the scatter diagram.
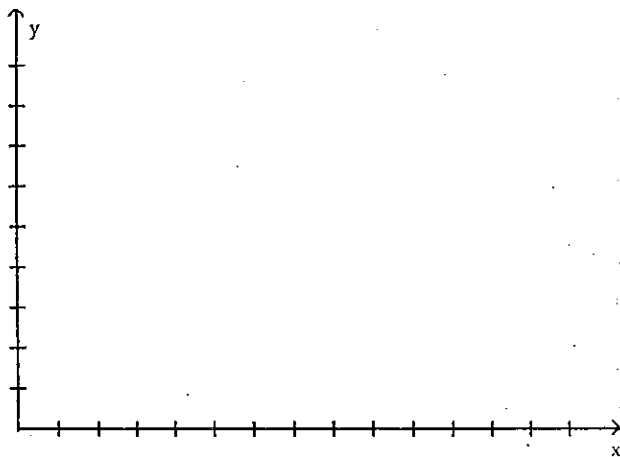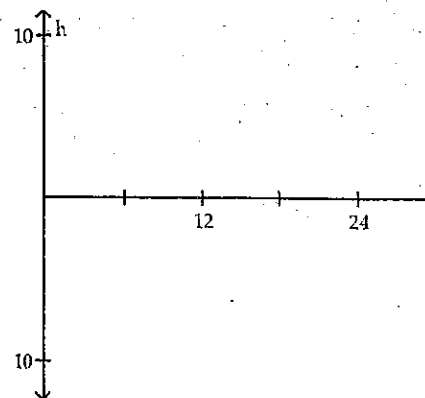
12) At a certain port, the height of a tide at any time during the day is given by

$$h = 6.4 \sin\left(\frac{\pi}{6}t\right)$$

Here, h is the height in feet above or below a central line and t is the hour of the day with t = 0 corresponding to midnight.
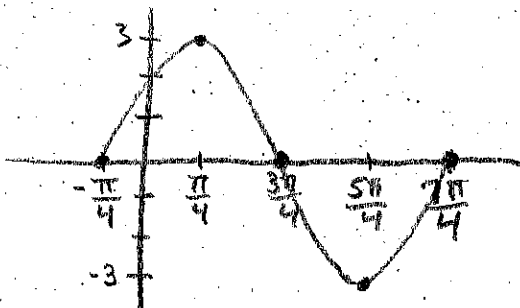What is the amplitude? What is the period?
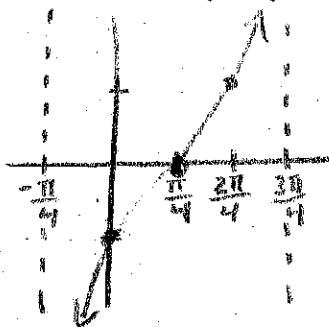Graph h over two periods beginning at t = 0.

Graph the function. Show at least one period.

13) $y = -3\cos(x - \pi)$

14) $y = 3\csc\left(x + \dfrac{\pi}{4}\right) \rightarrow y = 3\sin\left(x + \dfrac{\pi}{4}\right)$; Amp $= |3| = 3$; per $= 2\pi$; inc $= \dfrac{per}{4}$

$PS = \dfrac{c}{b} = \dfrac{-\frac{\pi}{4}}{1} = \boxed{\dfrac{-\pi}{4}}$; inc $= \dfrac{2\pi}{4} = \boxed{\dfrac{\pi}{2}}$

15) $y = \tan\left(x - \dfrac{\pi}{4}\right)$ $A = 1$; per $= 2\pi$; $PS = \dfrac{\pi}{4}$ midpoint: $\dfrac{-\frac{\pi}{4} + \frac{3\pi}{4}}{2} = \boxed{\dfrac{\pi}{4}}$

$-\dfrac{\pi}{2} = x - \dfrac{\pi}{4}$ $\dfrac{\pi}{2} = x - \dfrac{\pi}{4}$

$\boxed{-\dfrac{\pi}{4} = x}$ (circled) $\boxed{\dfrac{3\pi}{4} = x}$ (circled)   L mid $= \dfrac{-\frac{\pi}{4} + \frac{\pi}{4}}{2} = \boxed{0}$

Left VA   Right VA   R mid $= \dfrac{\frac{\pi}{4} + \frac{3\pi}{4}}{2} = \boxed{\dfrac{\pi}{2}}$

16) $y = -\cot(4x)$ $A = -1$; per $= \dfrac{2\pi}{4} = \dfrac{\pi}{2}$; $PS = 0$; midpoint: $\dfrac{0 + \frac{\pi}{4}}{2} = \boxed{\dfrac{\pi}{8}}$
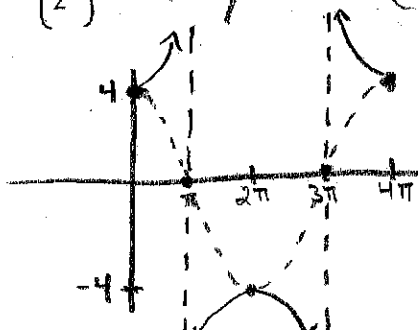
$\dfrac{0}{4} = \dfrac{4x}{4}$ $\dfrac{\pi}{4} = \dfrac{4x}{4}$ L mid $= \dfrac{0 + \frac{\pi}{8}}{2} = \boxed{\dfrac{\pi}{16}}$

$\boxed{0 = x}$ $\boxed{\dfrac{\pi}{4} = x}$
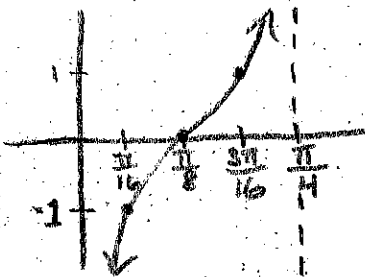
L VA   R VA   R mid $= \dfrac{\frac{\pi}{8} + \frac{\pi}{4}}{2} = \boxed{\dfrac{3\pi}{16}}$

17) $y = 4\sec\left(\dfrac{1}{2}x\right) \rightarrow y = 4\cos\left(\dfrac{1}{2}x\right)$; $A = 4$; per $= \dfrac{2\pi}{\frac{1}{2}} = \boxed{4\pi}$; inc $= \dfrac{per}{4}$

inc $= \dfrac{4\pi}{4} = \boxed{\pi}$

1) π

2) $0, \pi, 2\pi$

3) $-\dfrac{3\pi}{2}, \dfrac{\pi}{2}$

4) none

5) $-\dfrac{3\pi}{2}, -\dfrac{\pi}{2}, \dfrac{\pi}{2}, \dfrac{3\pi}{2}$
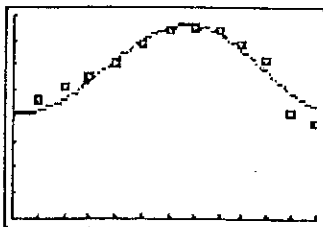
6) (i) $\dfrac{1}{2}$ \qquad (ii) $-\dfrac{3\pi}{4}$ \qquad (iii) $\dfrac{\pi}{2}$

7) (i) $\dfrac{1}{2}$ \qquad (ii) π \qquad (iii) π

8) $y = 4\sin(2\pi x)$ \quad $y = -4\sin\left[2\pi\left(x + \dfrac{1}{2}\right)\right]$

9) $y = 4\cos\left(\dfrac{1}{2}x\right)$ \quad $y = -4\cos\left[\dfrac{1}{2}(x + 2\pi)\right]$
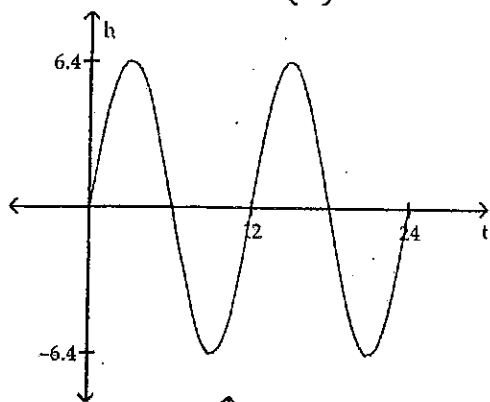
or $-4\cos\left[\dfrac{1}{2}(x - 2\pi)\right]$

10) $y = 5\sin(2x - 3)$

11) $y = 15.99\sin(0.57x - 2.29) + 60.62$

$y = 4\sin\left[\dfrac{1}{2}(x + \pi)\right]$
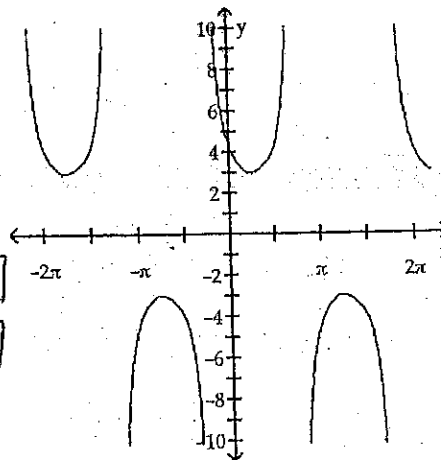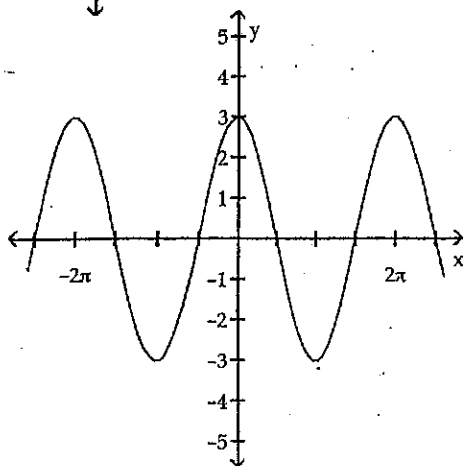
$y = -4\sin\left[\dfrac{1}{2}(x - \pi)\right]$
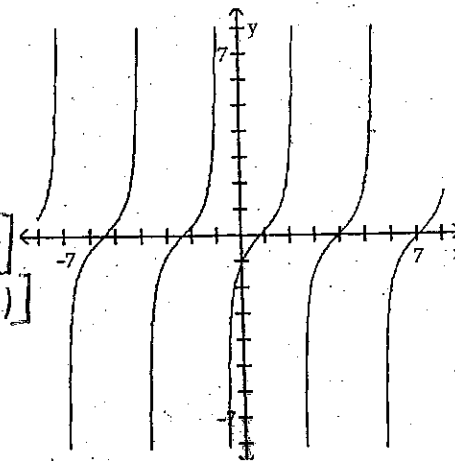

12) amplitude = 6.4, period = 12
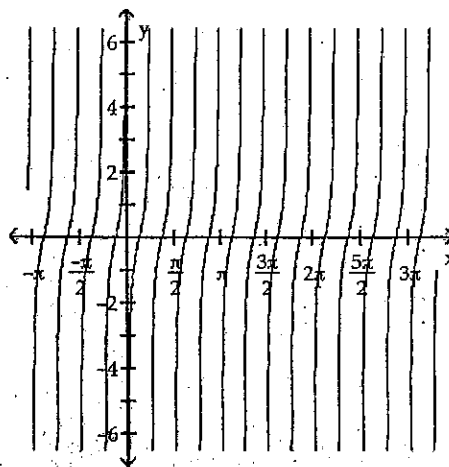
$$h = 6.4\sin\left(\dfrac{\pi}{6}t\right)$$

13)

$y = -4\cos\left[2\pi\left(x + \dfrac{1}{4}\right)\right]$

$y = 4\cos\left[2\pi\left(x - \dfrac{1}{4}\right)\right]$

15)

16)

17)