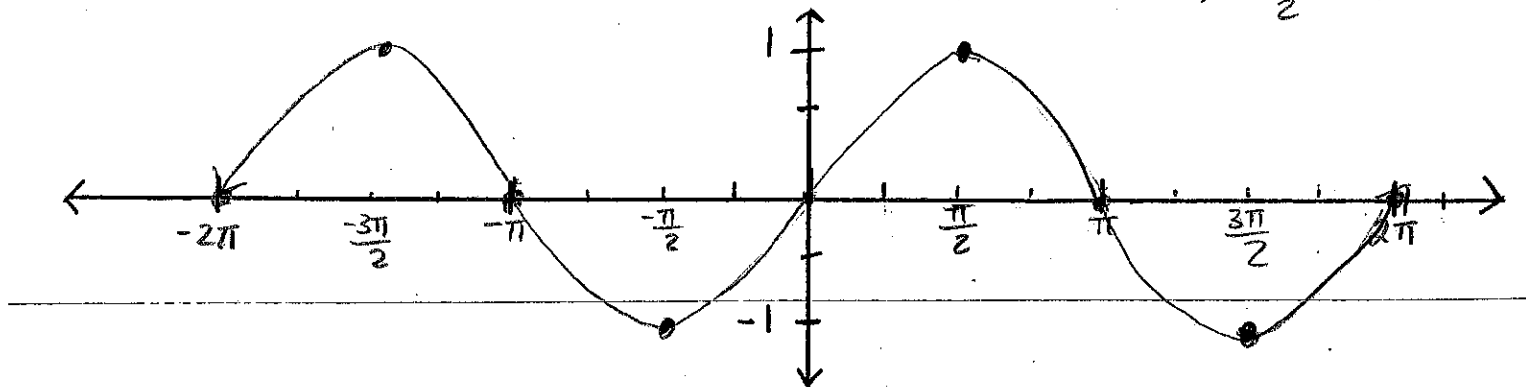


Graphs of Sine and Cosine Functions

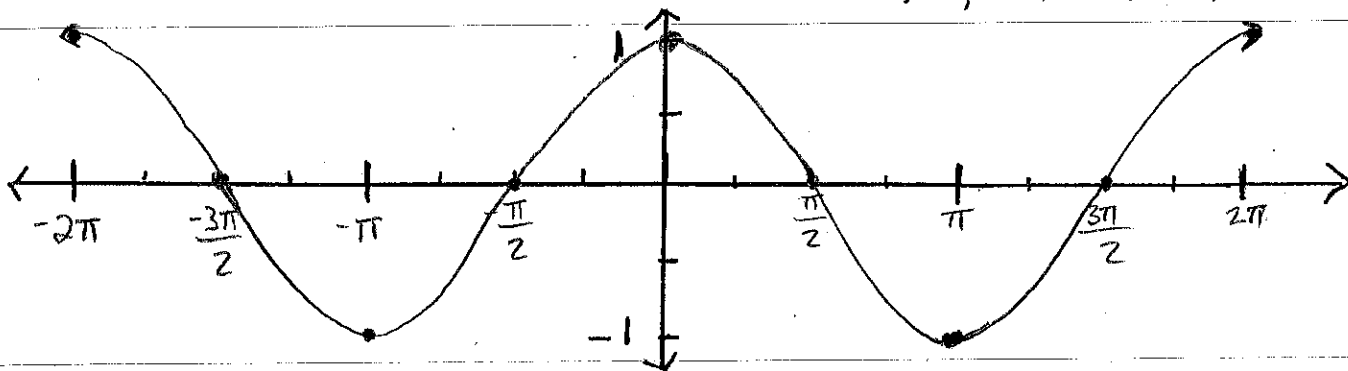
1. Properties of the Sine Functions

- A. Domain - \mathbb{R}
- B. Range - $[-1, 1]$
- C. ODD Function / sym w/resp to origin
- D. period = 2π
- E. Intercepts: x: $k\pi$ (integer multiples of π) y: zero
- F. Maximum value 1 occurs at $-\frac{3\pi}{2}, \frac{\pi}{2}, 5\pi/2, 9\pi/2; \frac{\pi}{2} + 2k\pi$
 Minimum value -1 occurs at $-\frac{\pi}{2}, 3\pi/2, 7\pi/2, 11\pi/2; -\frac{\pi}{2} + 2k\pi$



2. Properties of the Cosine Functions

- A. Domain - \mathbb{R}
- B. Range - $[-1, 1]$
- C. Even function / sym w/resp to y-axis
- D. Period = 2π
- E. Intercepts: x: $\frac{\pi}{2} + 2k\pi$ y: one
- F. Maximum value 1 occurs at $2k\pi$ ($-2\pi, 0, 2\pi, 4\pi, \dots$)
 Minimum value -1 occurs at $\pi + 2k\pi$ ($-\pi, \pi, 3\pi, 5\pi, \dots$)



3. Properties of Sinusoidal Graphs

- A. General Equations $y = A \sin(bx) + D$ $y = A \cos(bx) + D$
- B. Amplitude $|A|$
- C. Period $\frac{2\pi}{b}$
- D. Keypoints (period = increment, To get 5 key points,

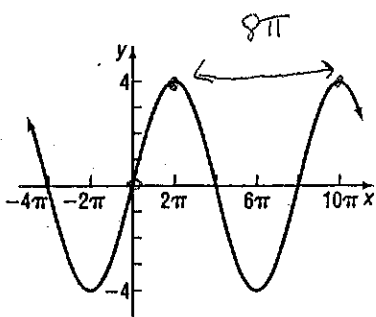
• plot the 5 keypoints + connect w/a smooth curve.
 • plot one more full period either forward or backwards.
 Start at zero and add your increment 4 times to get the x-coordinates of your key points. Sub in these x-values to get corresponding y-values

WS# 5:4B

$$b = \frac{2\pi}{\text{period}}$$

period = 8π

76.



$$y = A \sin(bx)$$

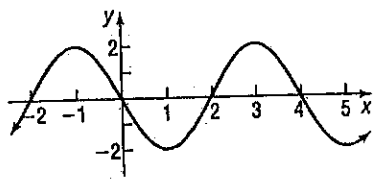
$$y = 4 \sin\left(\frac{1}{4}x\right)$$

$$\frac{2\pi}{b} = 8\pi$$

$$2\pi = 8\pi b$$

$$b = \frac{2\pi}{8\pi} = \frac{1}{4}$$

78.



$p = 4$

$$\frac{2\pi}{4} = \frac{\pi}{2} = b$$

$A = 2$

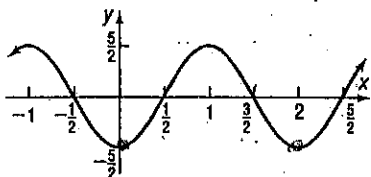
$$y = -2 \sin\left(\frac{\pi}{2}x\right)$$

$$\frac{2\pi}{b} = p$$

$$2\pi = pb$$

$$b = \frac{2\pi}{\text{period}}$$

80.



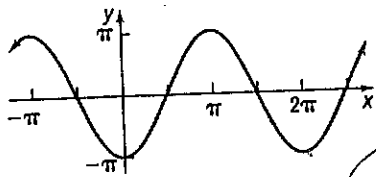
period = 2

$$y = A \cos(bx)$$

$$y = -\frac{5}{2} \cos(\pi x)$$

$$\frac{2\pi}{2} = \pi \quad b = \pi$$

82.



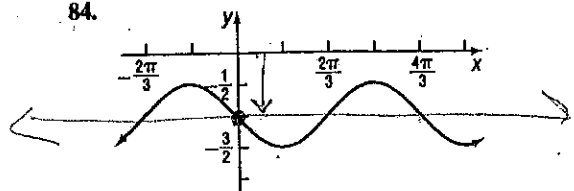
period = 2π

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

$$\frac{2\pi}{2\pi} = 1$$

$$b = 1$$

84.



$$y = -A \sin(bx) - 1$$

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

$$\frac{2\pi}{\frac{4\pi}{3}}$$

period = $\frac{4\pi}{3}$

$$\frac{2\pi \cdot 3}{1 \cdot 4\pi} = \frac{6\pi}{4\pi} = \frac{3}{2}$$

$$\frac{-\frac{1}{2} + \frac{3}{2}}{2} = \frac{\frac{2}{2}}{2} = \frac{1}{2}$$