

11.1b # 19-23, 25, 27, 34, 36

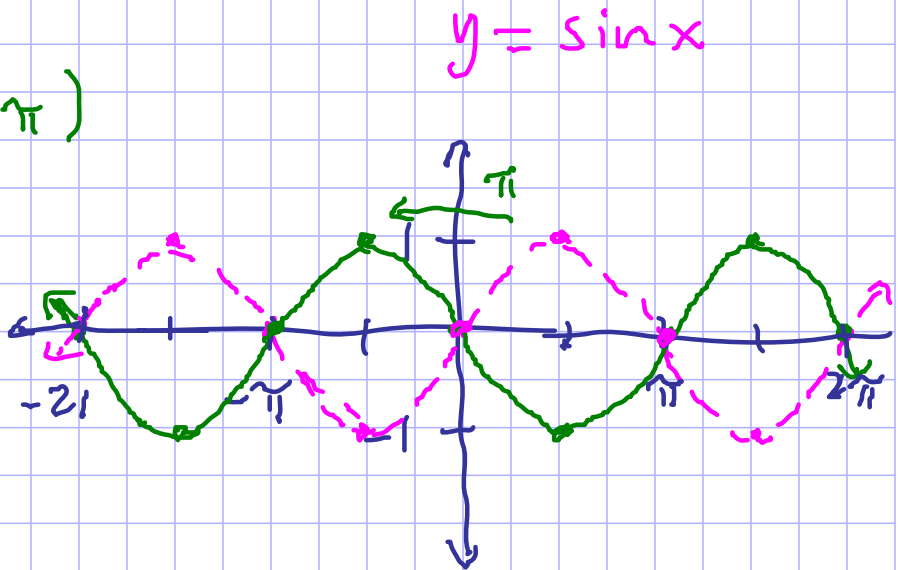
$$19. f(x) = \sin(x + \pi)$$

$$\text{amp} = |1| = 1$$

$$\text{Per} = \frac{2\pi}{|1|} = 2\pi$$

$$h = -\pi \leftarrow \pi$$

$$k = 0$$



phase shift:  $\pi$  units left

x-int:  $n\pi$   $n$  - integer

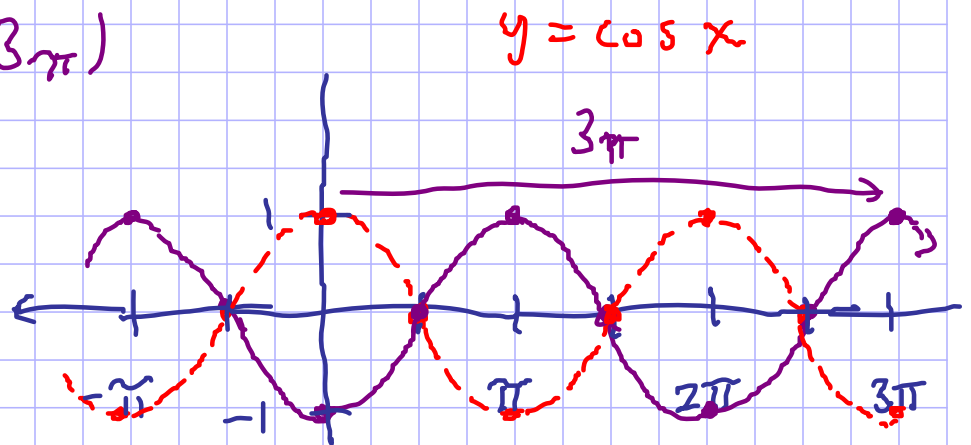
$$20. h(x) = \cos(x - 3\pi)$$

$$\text{amp} = |1| = 1$$

$$\text{Per} = \frac{2\pi}{|1|} = 2\pi$$

$$h = 3\pi \rightarrow$$

$$k = 0$$



phase shift:  $3\pi$  units right

x-int:  $\frac{\pi}{2} + n\pi$   $n$  - integer

$$y = \sin x$$

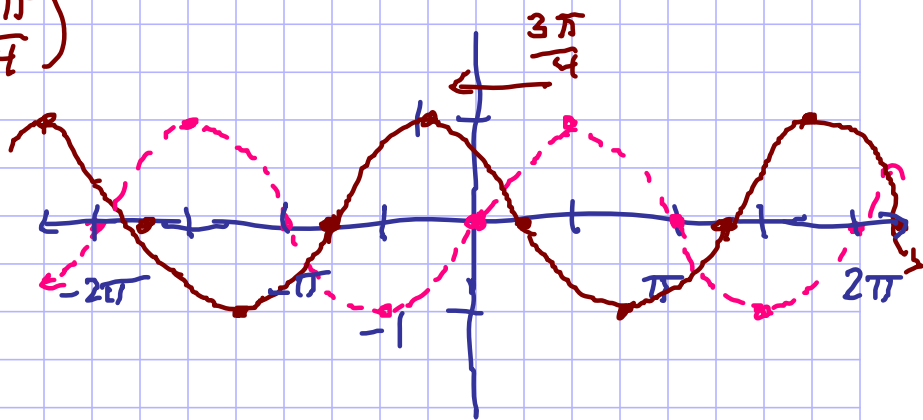
$$21. g(x) = \sin\left(x + \frac{3\pi}{4}\right)$$

$$\text{amp} = |1| = 1$$

$$\text{per} = \frac{2\pi}{|1|} = 2\pi$$

$$h = -\frac{3\pi}{4} \leftarrow$$

$$k = 0$$



Phase shift  $\frac{3\pi}{4}$  units left

$$x\text{-int: } \frac{\pi}{4} + n\pi \quad n\text{-integer}$$

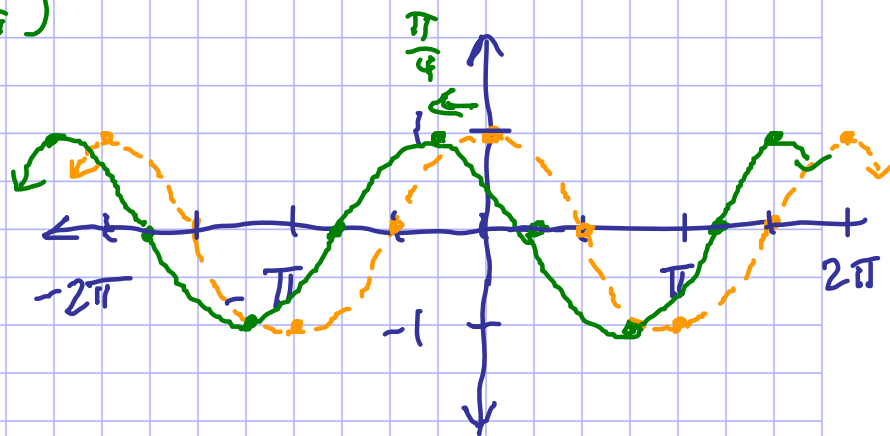
$$22. j(x) = \cos\left(x + \frac{\pi}{4}\right)$$

$$\text{amp} = |1| = 1$$

$$\text{per} = \frac{2\pi}{|1|} = 2\pi$$

$$h = -\frac{\pi}{4} \leftarrow$$

$$k = 0$$



Phase shift  $\frac{\pi}{4}$  units left

$$x\text{-int: } \frac{\pi}{4} + n\pi \quad n\text{-integer}$$

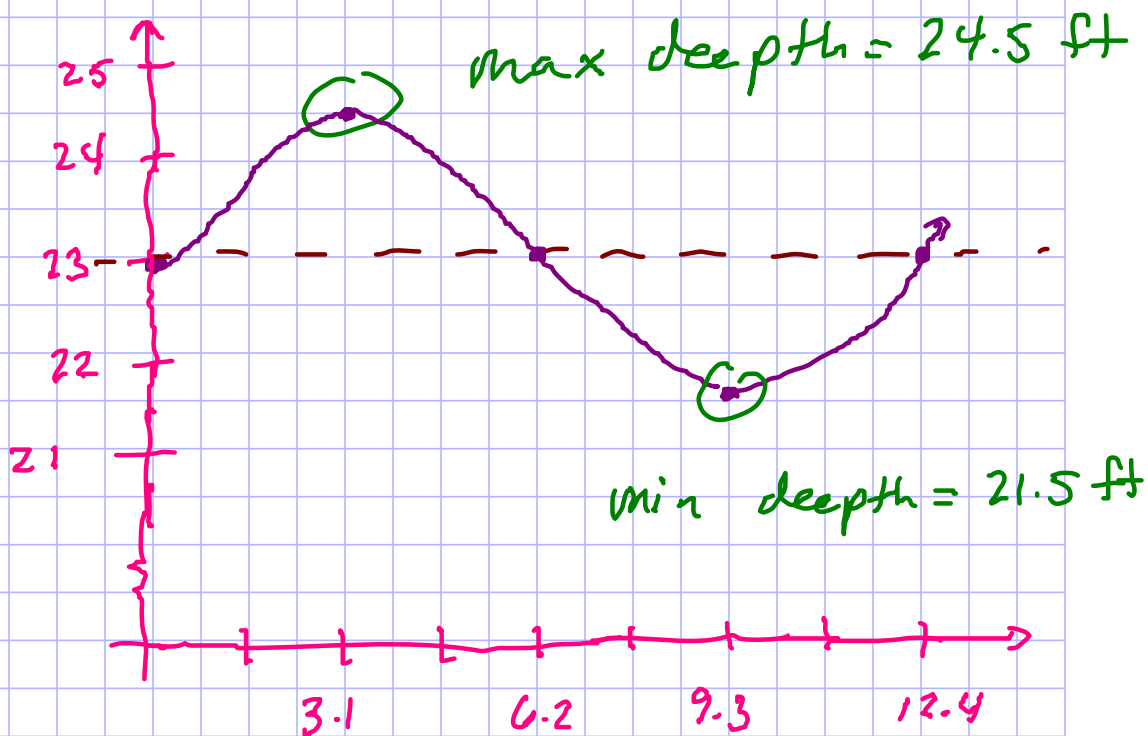
$$23. d(t) = \frac{3}{2} \sin\left(\frac{5\pi}{31}t\right) + 23$$

$$\text{amp} = \left|\frac{3}{2}\right| = \frac{3}{2}$$

$$\text{per} = \frac{2\pi}{\left|\frac{5\pi}{31}\right|} = \frac{2\pi}{1} \cdot \frac{31}{5\pi} = \frac{62}{5} = 12.4$$

$$h = 0$$

$$k = 23 \quad \uparrow$$



$$25. f(x) = \sin\left(x + \frac{\pi}{4}\right) - 1$$

$$\text{amp} = |1| = 1$$

$$\text{per} = \frac{2\pi}{|1|} = 2\pi$$

$$h = -\frac{\pi}{4} \quad \leftarrow$$

$$k = -1 \quad \downarrow$$

The graph is shifted  $\frac{\pi}{4}$  units left and 1 unit down.

$$27. h(x) = \cos(2\pi x) - 2$$

$$\text{amp } p = |1| = 1$$

$$\text{per} = \frac{2\pi}{|2\pi|} = 1$$

$$h = 0$$

$$k = -2 \downarrow$$

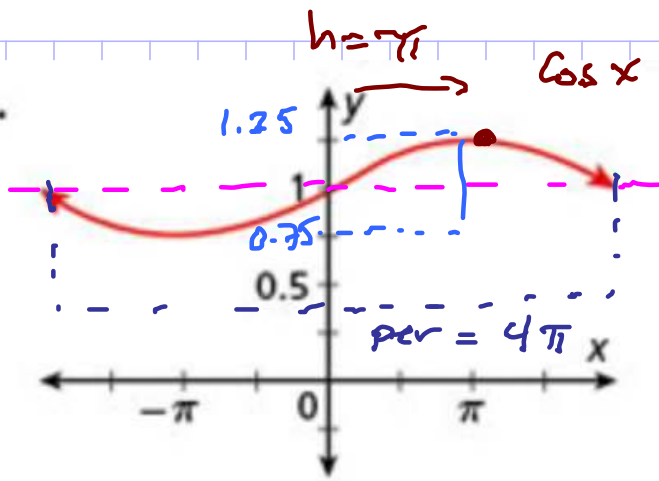
The graph is horizontally compressed by a factor of 2 and shifted down 2 units.

$$34. \text{amp} = \frac{1}{4}; \text{phase shift} = -\frac{2\pi}{3}$$

$$f(x) = \frac{1}{4} \sin\left(x - \left(-\frac{2\pi}{3}\right)\right) = \frac{1}{4} \sin\left(x + \frac{2\pi}{3}\right)$$

$$g(x) = \frac{1}{4} \cos\left(x + \frac{2\pi}{3}\right)$$

36.



$$k = 1$$

$$a = 0.25$$

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

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

$$f(x) = 0.25 \sin\left(\frac{x}{2}\right) + 1$$

$$g(x) = 0.25 \cos\left(\frac{1}{2}(x - \pi)\right) + 1$$