

Week 4 SI Answers

1. a. $\cos(-135^\circ) = \cos(225^\circ) = -\frac{\sqrt{2}}{2}$
* -135 is coterminal with 225

$$\cos(2 \cdot 135^\circ) = \cos(270^\circ) = 0$$

$$\cos^2(135) = (\cos(135^\circ))^2 = \left(\frac{\sqrt{2}}{2}\right)^2 = \frac{1}{2}$$

b. $\sin(-\frac{\pi}{4}) = \sin(\frac{7\pi}{4}) = -\frac{\sqrt{2}}{2}$

$$\sin^2 \frac{\pi}{4} = \left(\sin \frac{\pi}{4}\right)^2 = \left(\frac{\sqrt{2}}{2}\right)^2 = \frac{1}{2}$$

$$\sin 2 \cdot \frac{\pi}{4} = \sin \frac{\pi}{2} = 1$$

2. a. $a=4$, $b=3$, $c=-\frac{\pi}{2}$, $d=3$

$$\Rightarrow \text{Amp: } |a| \therefore A = 4$$

$$\Rightarrow \text{P.S.: } \frac{c}{b} \therefore \text{P.S.} = \frac{-\frac{\pi}{2}}{3} = -\frac{\pi}{6}$$

$$\Rightarrow T: \frac{2\pi}{b} \therefore T = \frac{2\pi}{3}$$

b. $a=-3$ $b=3$ $c=\frac{\pi}{4}$ $d=-1$

$$\Rightarrow \text{Amp: } |a| \therefore 1-3 = 3$$

$$\Rightarrow \text{P.S.: } \frac{c}{b} \therefore \frac{\frac{\pi}{4}}{3} = \frac{\pi}{12}$$

$$\Rightarrow T: \frac{2\pi}{b} \therefore \frac{2\pi}{3}$$

3. a. use the format $d = a \cos b t$ [No d value given]

- find $a + b$

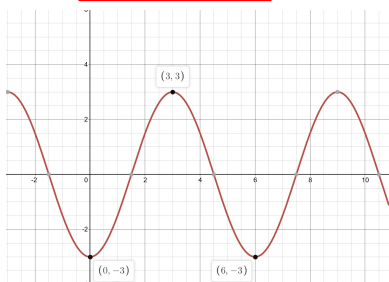
$\Rightarrow$ amplitude given as 3cm, so $|a| = 3$

- but, were given that it starts at -3 cm, so

$$a = -3$$

$\Rightarrow$ were given the period (6s), so $\frac{2\pi}{b} = 6 \Rightarrow b = \frac{2\pi}{6} = \frac{\pi}{3}$

$$\therefore d = -3 \cos\left(\frac{\pi}{3} t\right)$$



b. - again, find $a + b$ in for $d = -15 \sin\left(\frac{\pi}{2} t\right)$

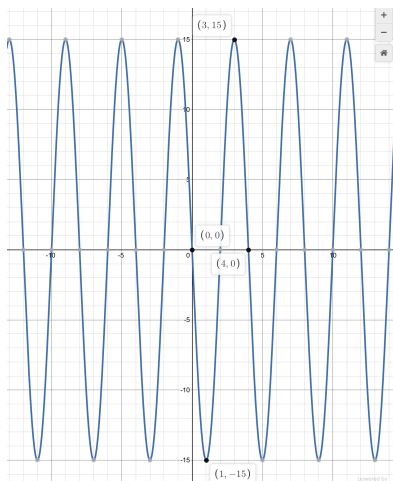
$\Rightarrow a$ is given as 15, so $|a| = 15$

- but, it says it initially moves downwards (negative),

so a must be -15

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

$$\therefore d = -15 \sin\left(\frac{\pi}{2} t\right)$$



$$2\pi = \frac{5\pi}{4}$$

$$0 < \frac{3}{4}x + \frac{\pi}{4} < 2\pi$$

$$\frac{4}{3} \cdot -\frac{\pi}{4} < \frac{3}{4}x < \frac{2\pi}{4} \cdot \frac{4}{3}$$

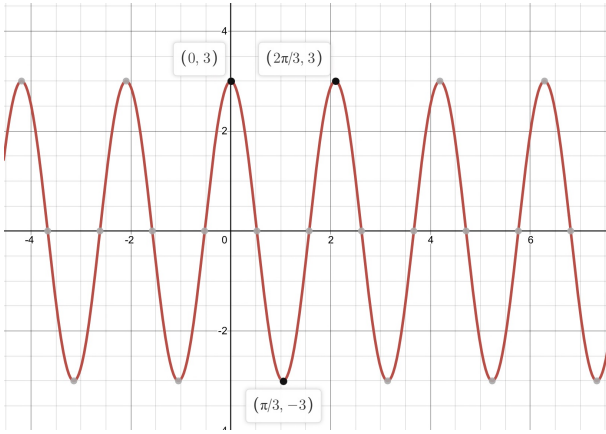
$$-\frac{4\pi}{12} < x < \frac{28\pi}{12}$$

$$-\frac{2\pi}{6} < x < \frac{14\pi}{6}$$

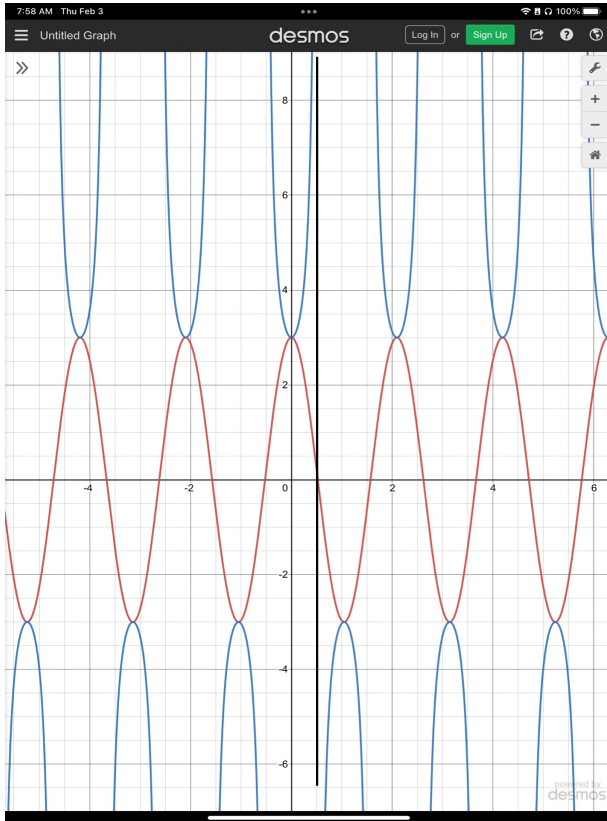
$$-\frac{\pi}{3} < x < \frac{7\pi}{3}$$

4. First, draw the graph of $y = 3\sin(3x + \frac{\pi}{2})$ for a guide

$$0 < 3x + \frac{\pi}{2} < 2\pi \Rightarrow -\frac{\pi}{6} < x < \frac{11}{6}$$

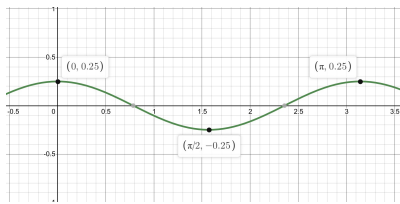


$\Rightarrow$ Next, draw asymptotes at every point the graph crosses 0, + draw U shapes at the max + min points



b. $y = -\frac{1}{4} \cos(2x - \pi)$

$$0 < 2x - \pi < 2\pi \Rightarrow \frac{\pi}{2} < x < \frac{3\pi}{2}$$



$\Rightarrow$ then draw asymptotes
 @ 0 points, & make
 U shapes at max + min
 points

