

5.2b Transforming Sinusoidal Functions

For the graph provided, determine:

- The period
- The amplitude
- Domain
- Range
- Vertical Displacement

period: π

amplitude: 3

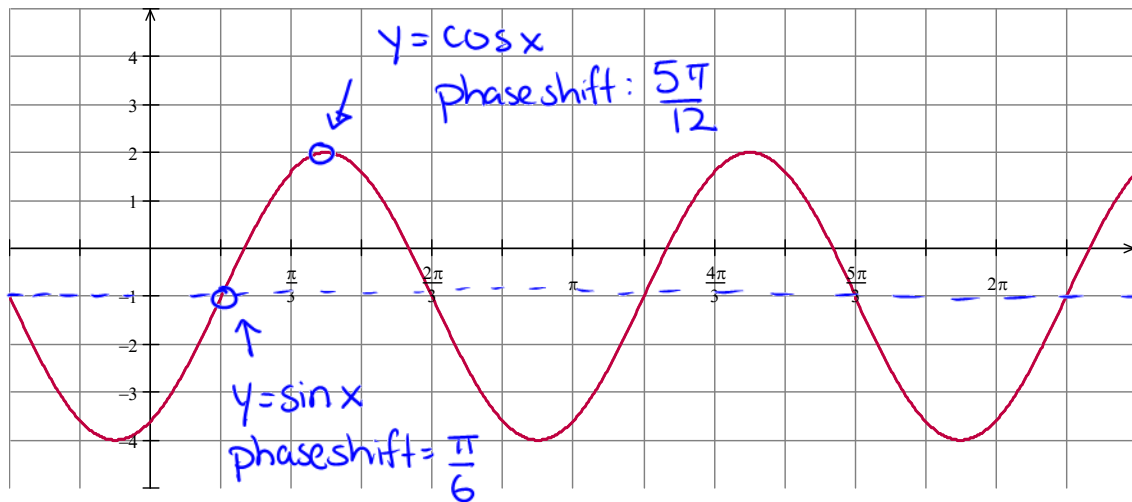
domain: $x \in \mathbb{R}$

v. displ. = -1

range: $-4 \leq y \leq 2$

We can't determine the phase shift yet because

phase shift depends on whether $\pm \sin$ or $\pm \cos$.



Determine an equation for this function in the format

a) $y = a \sin b(x - c) + d$

b) $y = a \cos b(x - c) + d$

$y = 3 \sin 2(x - \frac{\pi}{6}) - 1$

$y = 3 \cos 2(x - \frac{5\pi}{12}) - 1$

Example 2. Determine an equation for each of the trigonometric functions graphed below. Indicate on the graph a reference point you used to help determine the equation.

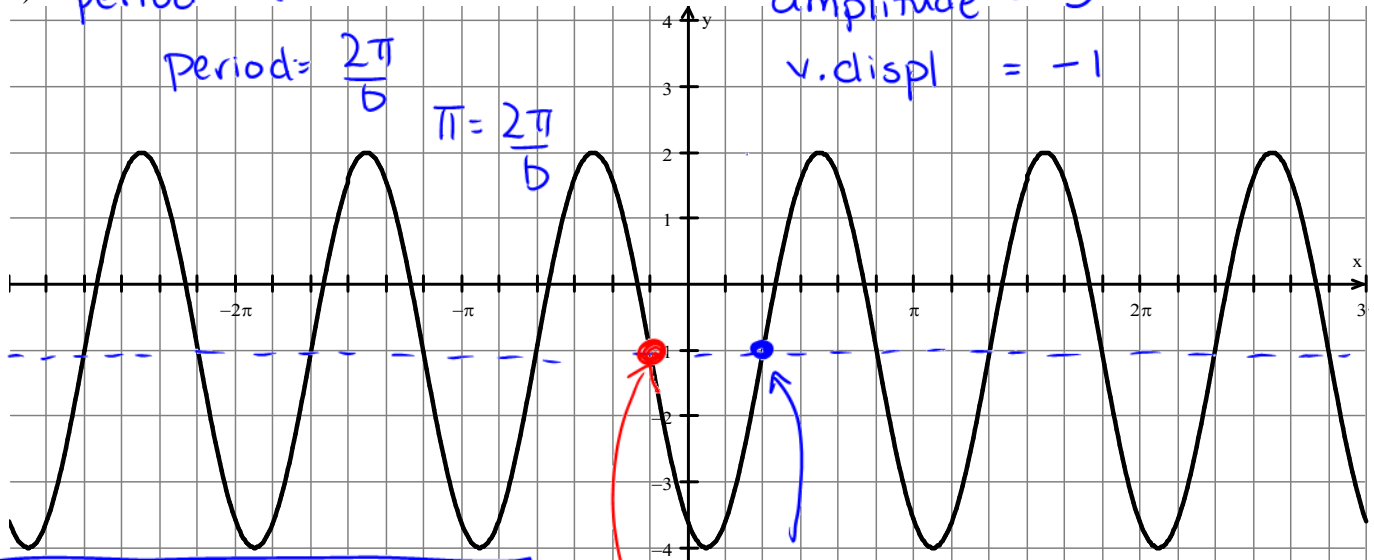
a) period = π

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

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

amplitude = 3

v. displ = -1



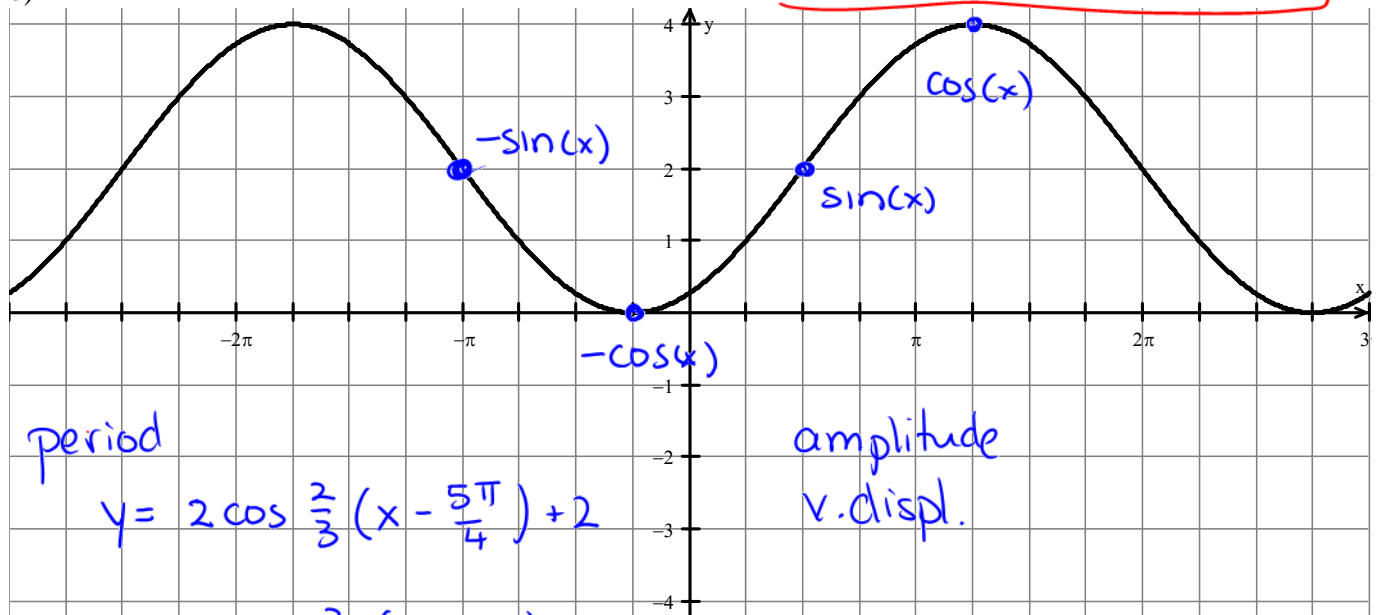
$y = 3 \sin 2(x - \frac{2\pi}{6}) - 1$

$y = \sin(x)$ phase shift = $+\frac{2\pi}{6}$

$y = -\sin(x)$ phase shift = $-\frac{\pi}{6}$

$y = -3 \sin 2(x + \frac{\pi}{6}) - 1$

b)



period

$y = 2 \cos \frac{2}{3}(x - \frac{5\pi}{4}) + 2$

amplitude

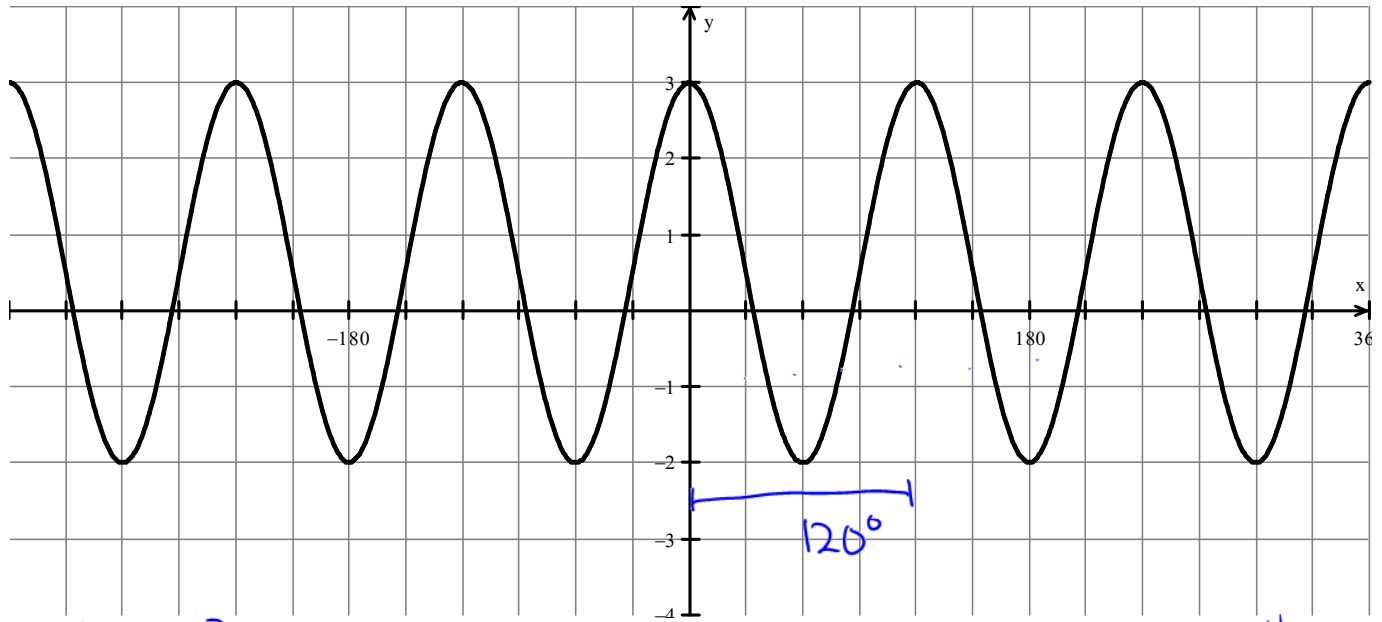
v. displ.

$y = -2 \cos \frac{2}{3}(x + \frac{\pi}{4}) + 2$

$y = 2 \sin \frac{2}{3}(x - \frac{\pi}{2}) + 2$

$y = -2 \sin \frac{2}{3}(x + \pi) + 2$

c)



max = 3
min = -2

amplitude = $\frac{3 - (-2)}{2} = 2.5$

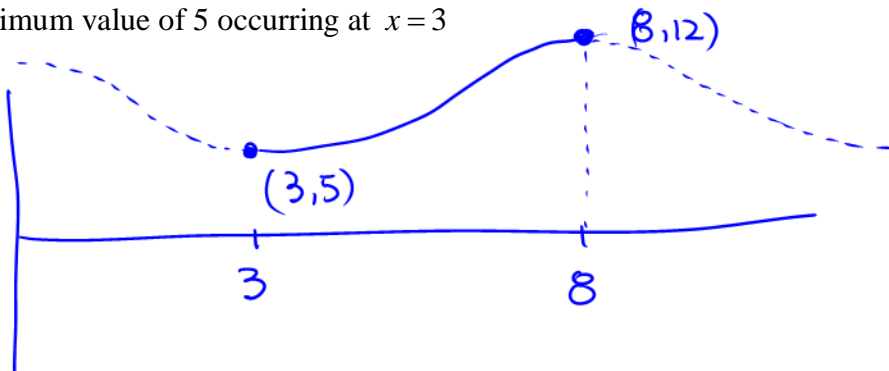
$y = \cos x$ with no phase shift

v. displ = $\frac{3 + (-2)}{2} = 0.5$

$y = 2.5 \cos \frac{3}{2}x + 0.5$

period = 120° so $120 = \frac{180}{b}$ $b = \frac{3}{2}$

d) Write the equation of a trigonometric function with a maximum value of 12 at $x = 8$ with the nearest minimum value of 5 occurring at $x = 3$



amplitude = $\frac{\text{max} - \text{min}}{2}$
 $= \frac{12 - 5}{2}$
 $= 3.5$

period = $\frac{1}{2}$ period from 3 to 8
 $\frac{1}{2}$ period = 5
 full period = 10 = $\frac{2\pi}{b}$

v. displ = $\frac{\text{max} + \text{min}}{2}$
 $= \frac{12 + 5}{2} = 8.5$

$b = \frac{2\pi}{10}$

$y = -3.5 \cos \frac{2\pi}{10}(x - 3) + 8.5$

or $y = 3.5 \cos \frac{2\pi}{10}(x - 8) + 8.5$

P251 #7, 9, 13-15, 17, 19-21