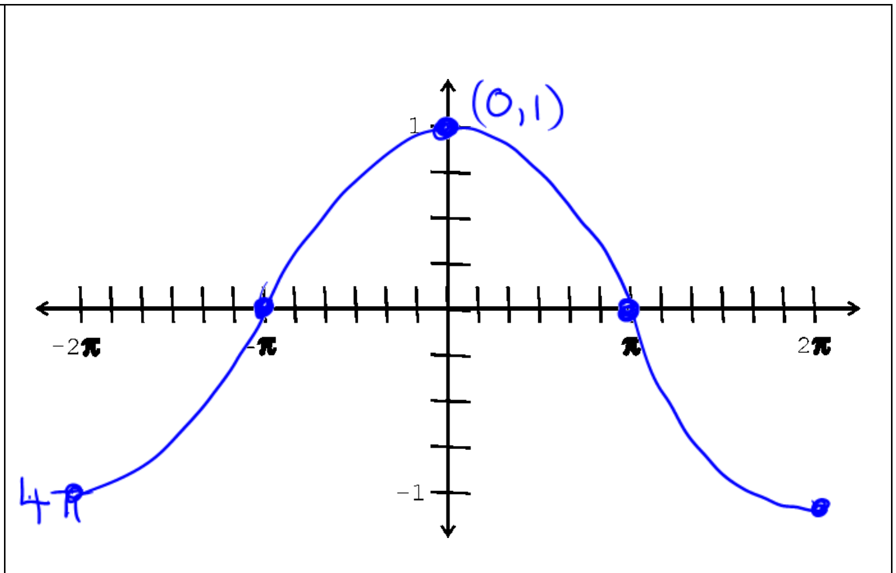
Example 2 Without using the graphing calculator, sketch the graph of $y = \cos\frac{1}{2}x$ for $-2\pi \le x \le 2\pi$.

$y = \cos\frac{1}{2}x$

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

$\text{period} = \frac{2\pi}{\left(\frac{1}{2}\right)} = 4\pi$



Describe where all the maximum values are located.

start $x=0$ | $\frac{1}{4}P$ π | $\frac{1}{2}P$ 2π | full period 4π

$x = 0 + n4\pi$ (where n is an integer)

or $x = n4\pi$

Example 3. Write the equation of a cosine function with a period of 5 and and an amplitude of 7. Where will its first minimum be, and what will the minimum value be?

$y = a\cos bx$

$\boxed{y = 7\cos\frac{2\pi}{5}x}$

minimum at $\frac{1}{2}$ period
$x = 2.5$
minimum $= -7$

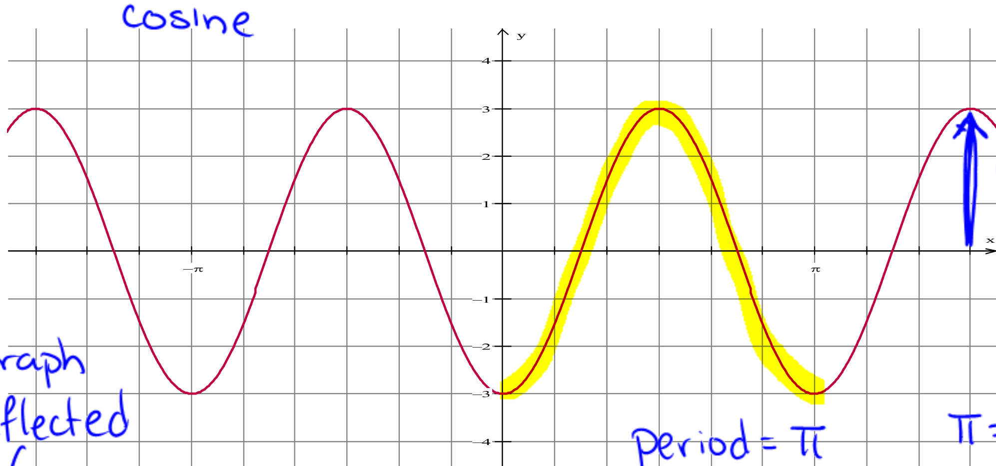
$\text{period} = \frac{2\pi}{b}$

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

$a = 7$

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

Example 4. Determine a ~~sine~~ cosine equation for the graph below.



amplitude = 3

note: graph is reflected

$y = -3\cos 2x$

period = π

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

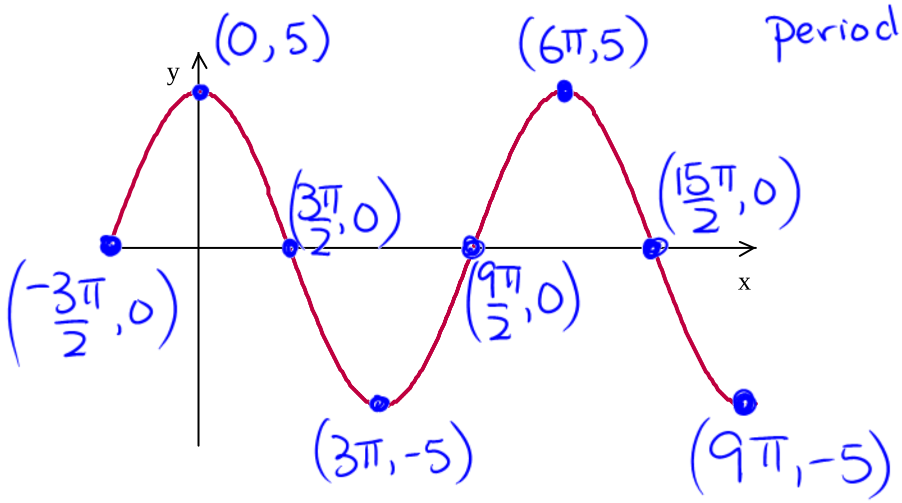
$b = 2$

Example 5:

This graph represents the function: $y = 5\cos\frac{1}{3}x$. Determine the coordinates of the key points shown on the graph (maximums, minimums and x-intercepts)

amplitude = 5

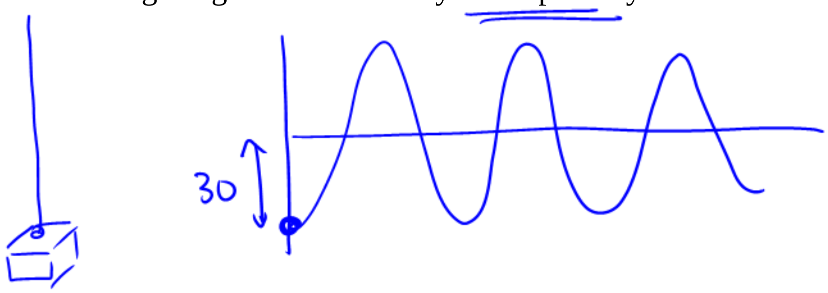
period = $\frac{2\pi}{\left(\frac{1}{3}\right)} = 6\pi$



Example 6:

A spring is hanging from the ceiling. Hanging from the bottom is a 100 gram weight, 160cm above the ground. Joe pulls the weight down 30 cm and releases it, causing it to oscillate up and down. He times the spring and finds that it takes 24 seconds to complete 5 full oscillations. Determine the period and amplitude of the bouncing weight. Are there any assumptions you have made?

assuming that it keeps bouncing



amplitude = 30.

Period = $\frac{24}{5} = \underline{\underline{4.8}}$

$\frac{2\pi}{b} = 4.8$

$b = \frac{2\pi}{4.8}$

$y = -30\cos\frac{2\pi}{4.8}(x)$