

1. State the Amplitude and Period of this Cosine function: $y = 11 \cos \frac{x}{5}$ Give the period in terms of π and if necessary as a fraction in reduced form.

Amplitude = 11

$a = 11$

Amplitude = $|a| = |11| = 11$

Period = 10π

$\frac{x}{5} = \left(\frac{1}{5}\right)x$
 $\hookrightarrow b = \frac{1}{5}$

$$\begin{aligned} \text{period} &= \frac{2\pi}{b} \\ &= \frac{2\pi}{\frac{1}{5}} \\ &= \frac{2\pi \cdot 5}{1} \\ &= 10\pi \end{aligned}$$

For 2&3 write the equation of each transformed Cosine function in the form: $y = a \cos bx$ 2. Graph is half as tall, there is an x-axis reflection, and the period = $\frac{4\pi}{7}$

EQ:

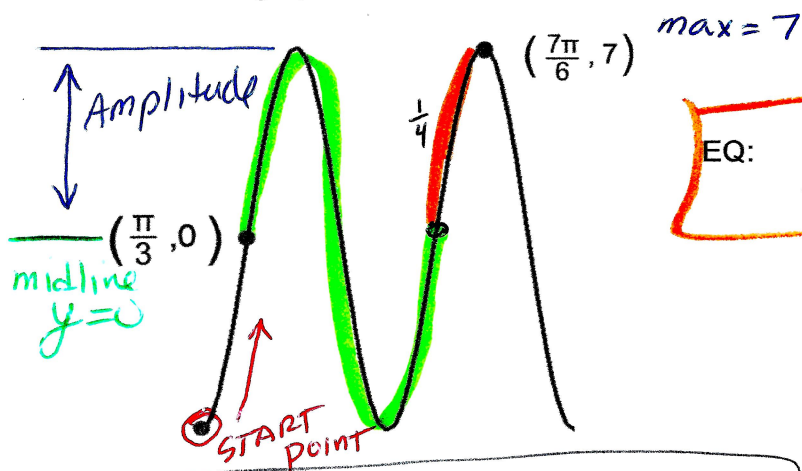
$$y = -\frac{1}{2} \cos\left(\frac{7}{2}x\right)$$

or
$$-\frac{1}{2} \cos \frac{7x}{2}$$

$a = -\frac{1}{2}$

$$\begin{aligned} \hookrightarrow b &= \frac{2\pi}{\text{period}} = \frac{2\pi}{\frac{4\pi}{7}} \\ &= 2\pi \cdot \frac{7}{4\pi} \\ b &= \frac{7}{2} \end{aligned}$$

3. Use this graph:



EQ: $y = -7 \cos 3x$

Amplitude = $7 - 0 = 7$
DISTANCE FROM MIDLINE TO MAX

Since graph starts at a min
it is upside down a is neg

$a = -7$

period = $\frac{\text{TOTAL WIDTH}}{\# \text{ cycles}}$

TOTAL WIDTH = $\frac{7\pi}{6} - \frac{\pi}{3} \cdot \frac{2}{2}$

$= \frac{7\pi}{6} - \frac{2\pi}{6} = \frac{5\pi}{6}$

cycles = $1\frac{1}{4}$ cycles
 $= \frac{5}{4}$

period = $\frac{\frac{5\pi}{6}}{\frac{5}{4}} = \frac{5\pi \cdot 4}{6 \cdot 5}$
 $= \frac{2\pi}{3}$

$b = \frac{2\pi}{\text{period}} = \frac{2\pi}{\frac{2\pi}{3}} = 2\pi \cdot \frac{3}{2\pi} = 3$

For the remaining problems write the equation of the transformed Cosine functions in $y = a \cos bx + k$ form.

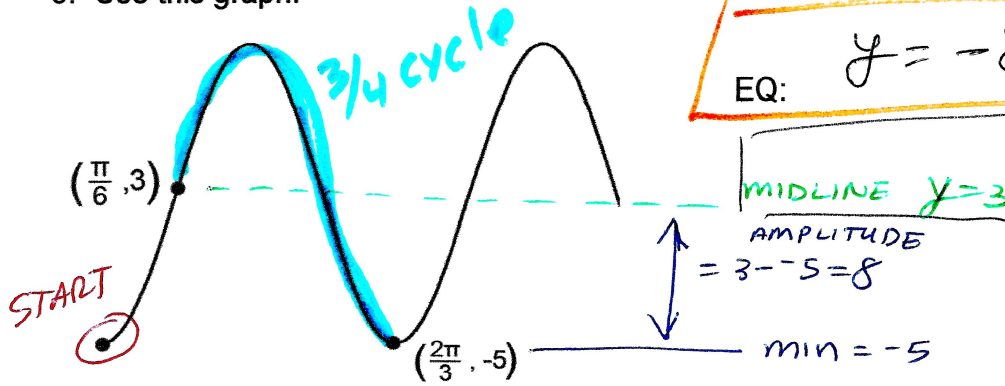
4. Graph is three times taller, period = $\frac{2\pi}{11}$, and equation of the midline is $y = 8$. $k = 8$

EQ:

$$b = \frac{2\pi}{\frac{2\pi}{11}} = 2\pi \cdot \frac{11}{2\pi} = 11$$

$$y = 3 \cos 11x + 8$$

5. Use this graph:



$$\text{EQ: } y = -8 \cos 3x + 3$$

MIDLINE $y = 3$

$$k = 3$$

$$\text{AMPLITUDE} = 3 - (-5) = 8$$

$$\text{min} = -5$$

Amplitude = 8

Graph starts at min so

Graph is upside down

a is neg

$$a = -8$$

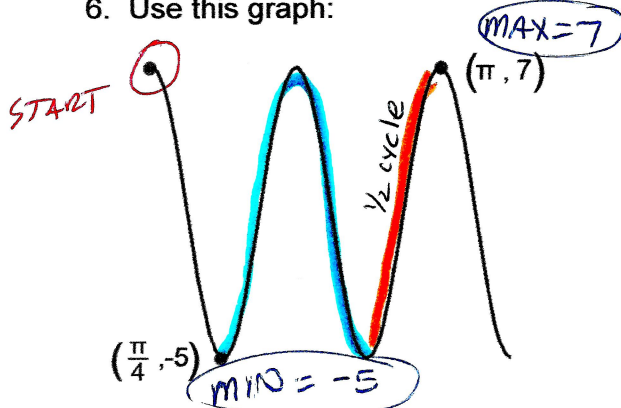
$$\text{TOTAL WIDTH} = \frac{2\pi}{3} - \frac{\pi}{6} = \frac{4\pi}{6} - \frac{\pi}{6} = \frac{3\pi}{6} = \frac{\pi}{2}$$

$$\# \text{ cycles} = \frac{3}{4}$$

$$\text{period} = \frac{\frac{\pi}{2}}{\frac{3}{4}} = \frac{\pi}{2} \cdot \frac{4}{3} = \frac{2\pi}{3}$$

$$b = \frac{2\pi}{\text{period}} = \frac{2\pi}{\frac{2\pi}{3}} = 2\pi \cdot \frac{3}{2\pi} = 3$$

6. Use this graph:



$$\text{EQ: } y = 6 \cos 4x + 1$$

$$\text{MIDLINE: } y = \frac{7 + (-5)}{2} = \frac{2}{2} = 1$$

$$k = 1$$

$$\text{TOTAL WIDTH} = \pi - \frac{\pi}{4} = \frac{4\pi}{4} - \frac{\pi}{4} = \frac{3\pi}{4}$$

$$\# \text{ cycles} = 1\frac{1}{2} = \frac{3}{2}$$

$$\text{period} = \frac{\frac{3\pi}{4}}{\frac{3}{2}} = \frac{3\pi}{4} \cdot \frac{2}{3} = \frac{\pi}{2}$$

$$b = \frac{2\pi}{\text{period}} = \frac{2\pi}{\frac{\pi}{2}} = 2\pi \cdot \frac{2}{\pi} = 4$$

$$\text{Amplitude} = \frac{7 - (-5)}{2} = \frac{12}{2} = 6$$

Graph starts at a max

so it's NOT upside down

a is pos

$$a = +6$$