

Graphing Trig Functions – Period

Objective: Be able to find the key information and graph trig functions with a change in the period of the function – horizontal stretches.

General form of a trig function: $f(x) = a \sin b(x-c) + d$

$|a|$ = amplitude

d = vertical shift / sinusoidal axis

c = horizontal shift

$\frac{2\pi}{b}$ = period change
 ↓
 length of one cycle

Find the key information.

1. $y = \sin 2x$

Vertical shift: none

Sinusoidal axis: $y=0$ Reflected? no

Amplitude: 1

Domain: $(-\infty, \infty)$ Range: $[-1, 1]$

Period: π

Key values on the x-axis (sinusoidal axis): $0, \frac{\pi}{4}, \frac{2\pi}{4}, \frac{3\pi}{4}, \frac{4\pi}{4}$

Period $\div 4$
 or
 period $\times \frac{1}{4}$

2. $y = -3\sin 4x$

Vertical shift: none

Sinusoidal axis: $y=0$ Reflected? yes

Amplitude: 3

Domain: $(-\infty, \infty)$ Range: $[-3, 3]$

Period: $\frac{\pi}{2}$

Key values on the x-axis (sinusoidal axis): $0, \frac{\pi}{8}, \frac{2\pi}{8}, \frac{3\pi}{8}, \frac{4\pi}{8}$

$\frac{\pi}{2} \cdot \frac{1}{4} = \frac{\pi}{8}$

3. $y = 1 + 2\cos 3x$

Vertical shift: up 1

Sinusoidal axis: $y=1$ Reflected? no

Amplitude: 2

Domain: $(-\infty, \infty)$ Range: $[-1, 3]$

Period: $\frac{2\pi}{3}$

Key values on the x-axis (sinusoidal axis): $0, \frac{\pi}{6}, \frac{2\pi}{6}, \frac{3\pi}{6}, \frac{4\pi}{6}$

$\frac{2\pi}{3} \cdot \frac{1}{4} = \frac{2\pi}{12} = \frac{\pi}{6}$

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

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

$\frac{2\pi}{b}$
 $\frac{2\pi}{3}$

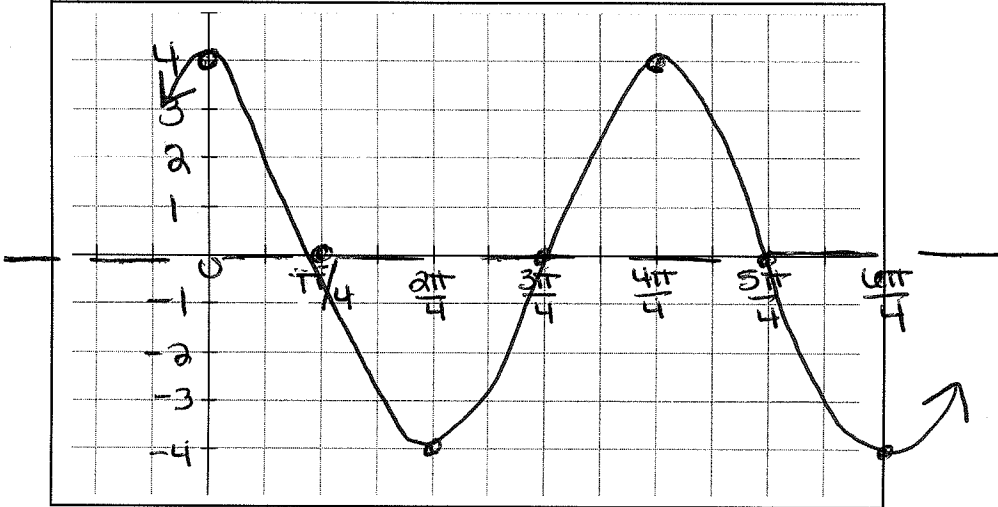
Find the key information and sketch the graph of the function.

4. $y = 4 \cos 2x$

Vertical shift: none Sinusoidal axis: $y = 0$ Reflected? no

Amplitude: 4 Domain: $(-\infty, \infty)$ Range: $[-4, 4]$

Period: π Key values on the x-axis (sinusoidal axis): $0, \frac{\pi}{4}, \frac{2\pi}{4}, \frac{3\pi}{4}, \frac{4\pi}{4}$
 $\frac{2\pi}{2}$

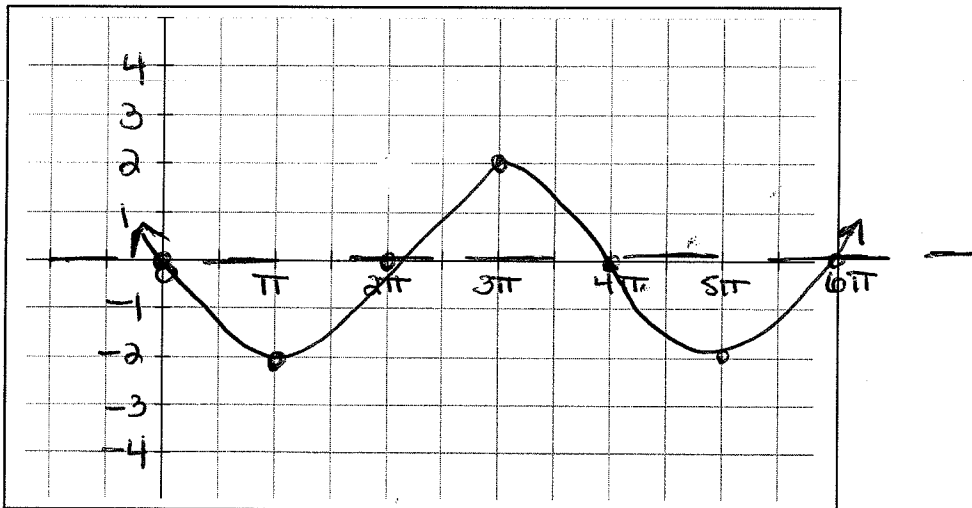


5. $y = -2 \sin \frac{x}{2}$

Vertical shift: none Sinusoidal axis: $y = 0$ Reflected? yes

Amplitude: 2 Domain: $(-\infty, \infty)$ Range: $[-2, 2]$

Period: 4π Key values on the x-axis (sinusoidal axis): $0, \pi, 2\pi, 3\pi, 4\pi$
 $\frac{2\pi}{\frac{1}{2}} \rightarrow 2\pi \cdot 2$
 $\frac{4\pi}{4} = \pi$



Find the key information and sketch the graph of the function.

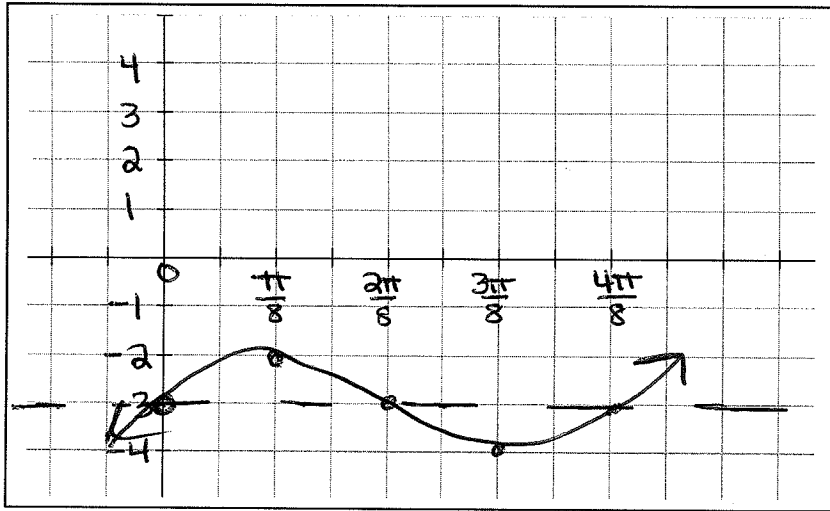
6. $y = -3 + \sin 4x$

Vertical shift: down 3 Sinusoidal axis: $y = -3$ Reflected? no

Amplitude: 1 Domain: $(-\infty, \infty)$ Range: $[-4, -2]$

Period: $\frac{\pi}{2}$ Key values on the x-axis (sinusoidal axis): $0, \frac{\pi}{8}, \frac{2\pi}{8}, \frac{3\pi}{8}, \frac{4\pi}{8}$
 $\frac{\pi}{2} \cdot \frac{1}{4} = \frac{\pi}{8}$

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



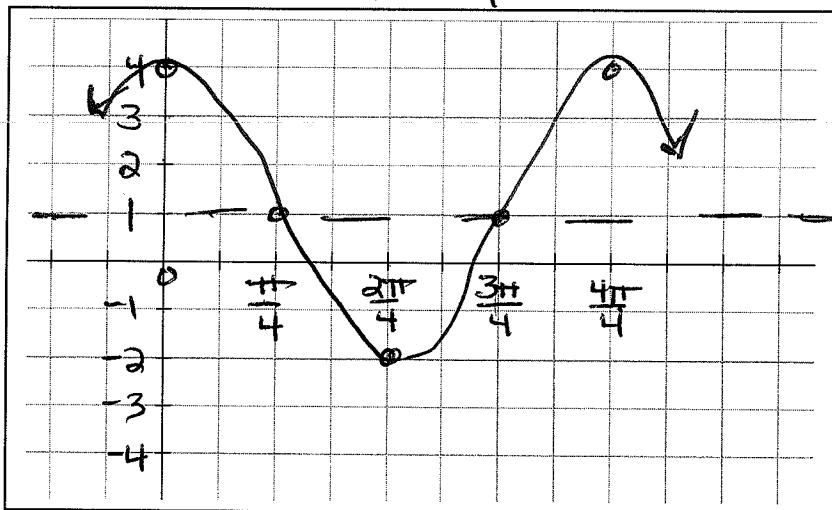
7. $y = 1 + 3\cos 2x$

Vertical shift: up 1 Sinusoidal axis: $y = 1$ Reflected? no

Amplitude: 3 Domain: $(-\infty, \infty)$ Range: $[-2, 4]$

Period: π Key values on the x-axis (sinusoidal axis): $0, \frac{\pi}{4}, \frac{2\pi}{4}, \frac{3\pi}{4}, \frac{4\pi}{4}$
 $\pi \cdot \frac{1}{4} = \frac{\pi}{4}$

$\frac{2\pi}{2}$



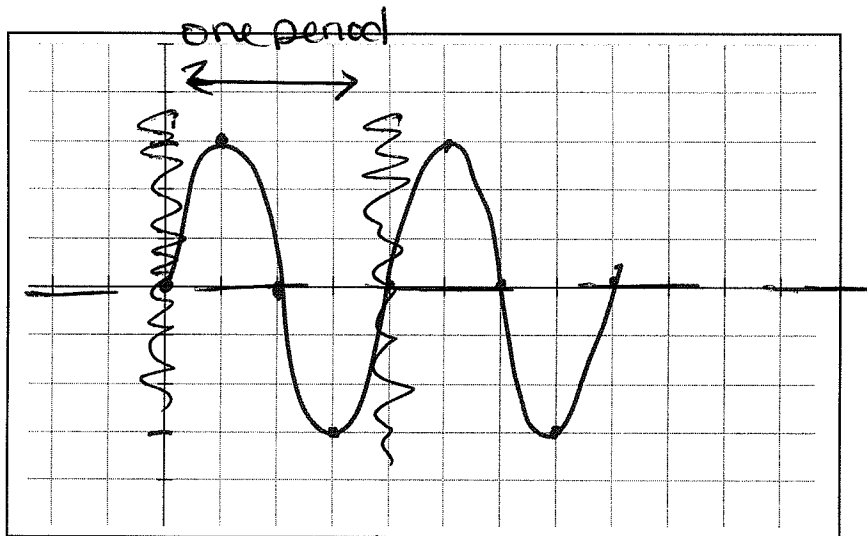
Use the graph to find the key information and write the equation of the function.

8. Equation: $f(x) = 3\sin 2x$

Vertical shift: none Sinusoidal axis: $y=0$ Reflected? no

Amplitude: 3 Domain: $(-\infty, \infty)$ Range: $[-3, 3]$

Period: π $\frac{2\pi}{b} = \pi \rightarrow b=2$



9. Equation: $f(x) = 1 + 2\cos 3x$

Vertical shift: up 1 Sinusoidal axis: $y=1$ Reflected? no

Amplitude: 2 Domain: $(-\infty, \infty)$ Range: $[-1, 3]$

Period: $\frac{2\pi}{3}$ $\frac{2\pi}{b} = \frac{2\pi}{3} \rightarrow b=3$

