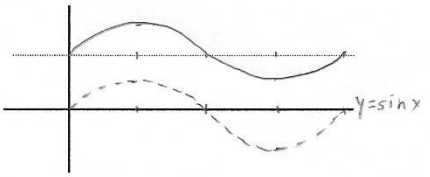
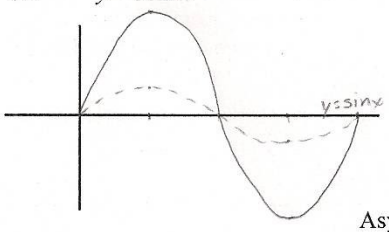
Anatomy of a Trig Function

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

Central Axis
The central axis or axis of oscillation is normally the x-axis. If this term is present, the new central axis is the line $y = c$.
ex: $y = 3 + \sin x$



Amplitude
For functions having a maximum and/or minimum value, |a| is the distance of dividing these values from the central axis of the functions.
ex: $y = 3\sin x$



Asymptotes located at endpoints of the period
Asymptotes located at end & mid points of period.

Phase shift
d is the starting point of the period of the function.
ex:
1. for $(x - \pi)$, d = π the period will be moved π units to the right.
2. for $(x + \pi/3)$, d = $-\pi/3$ the period will be moved $\pi/3$ units to the left.

Period
b alters the length of the period. The new period is found by the normal period by b.

Normal Periods

function	interval	length
$y = \sin x$	$0 \le x \le 2\pi$	2π
$y = \cos x$	$0 \le x \le 2\pi$	2π
$y = \tan x$	$-\pi/2 \le x \le \pi/2$	π
$y = \cot x$	$0 \le x \le \pi$	π
$y = \csc x$	$0 \le x \le 2\pi$	2π
$y = \sec x$	$-\pi/2 \le x \le 3\pi/2$	2π

ex: $y = \sin(2x - \pi/4)$

$b(x - d) = 2x - \pi/4 = 2(x - \pi/8)$

$d = \pi/8$; per = $2\pi/2 = \pi$

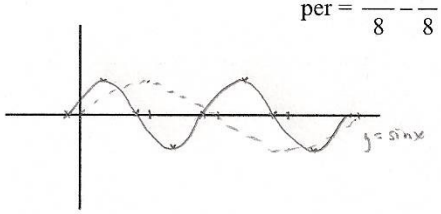
or:

$0 \le 2x - \pi/4 \le 2\pi$

$\pi/4 \le 2x \le 9\pi/4$

$\pi/8 \le x \le 9\pi/8$

$\text{per} = \frac{9\pi}{8} - \frac{\pi}{8} = \pi$



NOTE

Phase shift & period can be found simultaneously by replacing x in these inequalities with the expression b(x - d), then solving for x.