Precalculus
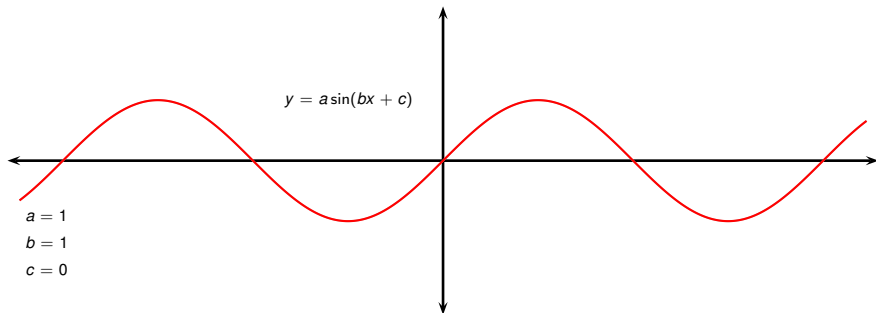## Generate a formula from sine/cosine graph, amplitude modified

Todor Milev

2019

- The graph of $a\sin(bx + c)$ is referred to as a "wave".
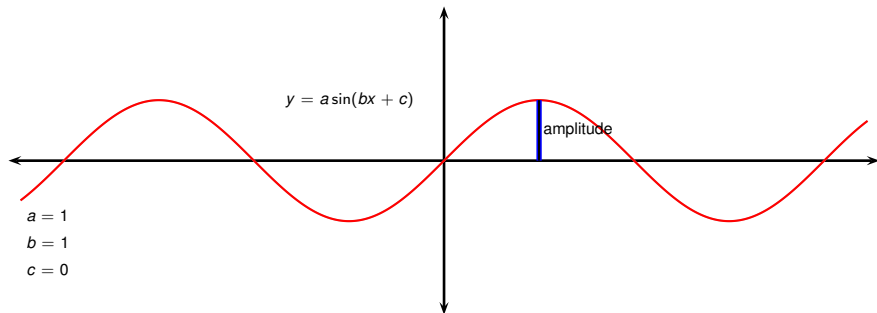
Definition (Phase, period, frequency, amplitude of a wave)

$y = a\sin(bx + c)$

$a = 1$
$b = 1$
$c = 0$

- The graph of $a\sin(bx + c)$ is referred to as a "wave".

Definition (Phase, period, frequency, amplitude of a wave)

In the function $a\sin(bx + c)$, the number $|a|$ is called the *amplitude* of the wave,

$y = a\sin(bx + c)$

amplitude

$a = 1$
$b = 1$
$c = 0$

- The graph of $a\sin(bx + c)$ is referred to as a "wave".

> ## Definition (Phase, period, frequency, amplitude of a wave)
>
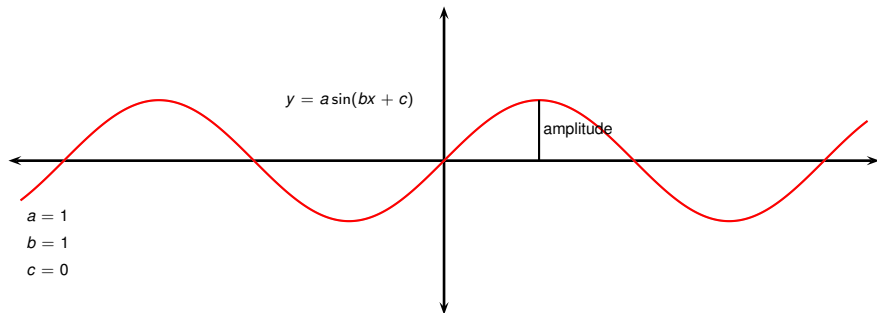> In the function $a\sin(bx + c)$, the number $|a|$ is called the *amplitude* of the wave, the number $\frac{b}{2\pi}$ is called the *frequency* of the wave,

$y = a\sin(bx + c)$

amplitude

$a = 1$
$b = 1$
$c = 0$

- The graph of $a\sin(bx + c)$ is referred to as a "wave".

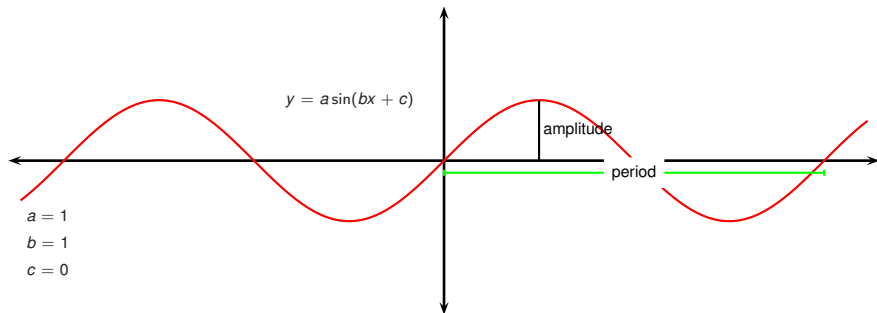## Definition (Phase, period, frequency, amplitude of a wave)

In the function $a\sin(bx + c)$, the number $|a|$ is called the *amplitude* of the wave, the number $\frac{b}{2\pi}$ is called the *frequency* of the wave, the number $\frac{2\pi}{b}$ is called the *period* of the wave,

$y = a\sin(bx + c)$

amplitude

period

$a = 1$
$b = 1$
$c = 0$

- The graph of $a\sin(bx + c)$ is referred to as a "wave".

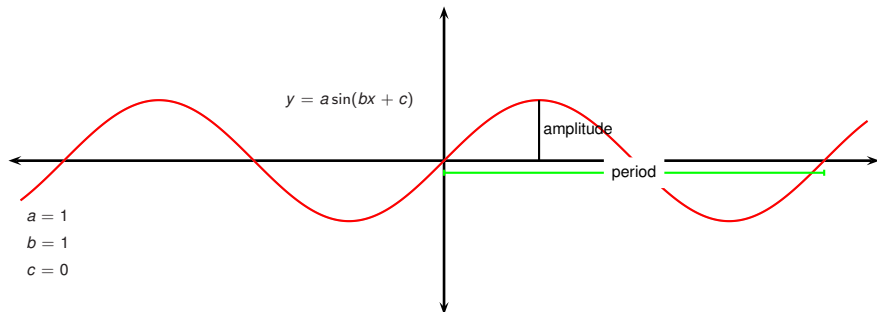## Definition (Phase, period, frequency, amplitude of a wave)

In the function $a\sin(bx + c)$, the number $|a|$ is called the *amplitude* of the wave, the number $\frac{b}{2\pi}$ is called the *frequency* of the wave, the number $\frac{2\pi}{b}$ is called the *period* of the wave, the number c is called the *phase* of the wave.

$y = a\sin(bx + c)$

amplitude

period

$a = 1$
$b = 1$
$c = 0$

- The graph of $a\sin(bx + c)$ is referred to as a "wave".

Definition (Phase, period, frequency, amplitude of a wave)

In the function $a\sin(bx + c)$, the number $|a|$ is called the *amplitude* of the wave, the number $\frac{b}{2\pi}$ is called the *frequency* of the wave, the number $\frac{2\pi}{b}$ is called the *period* of the wave, the number c is called the *phase* of the wave.
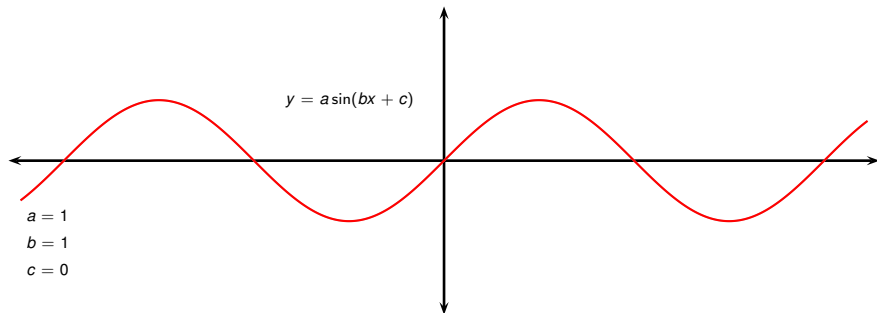
- What happens when we change the amplitude? The frequency/period? The phase?

$y = a\sin(bx + c)$

$a = 1$
$b = 1$
$c = 0$

- The graph of $a\sin(bx + c)$ is referred to as a "wave".

Definition (Phase, period, frequency, amplitude of a wave)

In the function $a\sin(bx + c)$, the number $|a|$ is called the *amplitude* of the wave, the number $\frac{b}{2\pi}$ is called the *frequency* of the wave, the number $\frac{2\pi}{b}$ is called the *period* of the wave, the number c is called the *phase* of the wave.

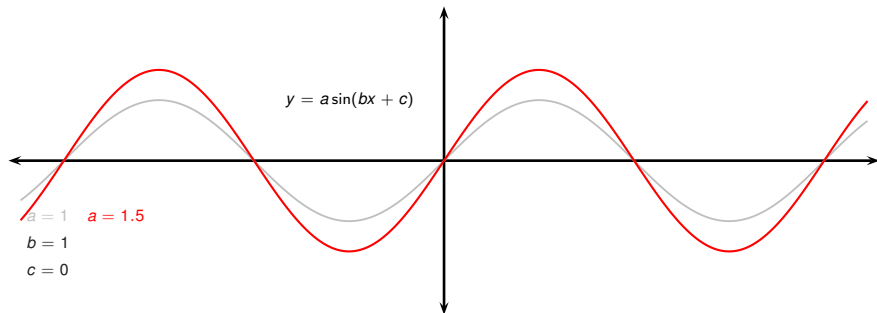- What happens when we change the amplitude? The frequency/period? The phase?

$y = a\sin(bx + c)$

$a = 1$ $a = 1.5$
$b = 1$
$c = 0$

- The graph of $a\sin(bx + c)$ is referred to as a "wave".

Definition (Phase, period, frequency, amplitude of a wave)

In the function $a\sin(bx + c)$, the number $|a|$ is called the *amplitude* of the wave, the number $\frac{b}{2\pi}$ is called the *frequency* of the wave, the number $\frac{2\pi}{b}$ is called the *period* of the wave, the number c is called the *phase* of the wave.

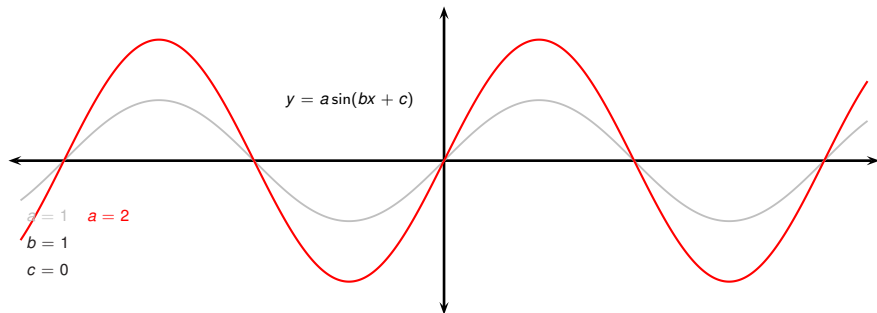- What happens when we change the amplitude? The frequency/period? The phase?

$y = a\sin(bx + c)$

$a = 1$ $a = 2$
$b = 1$
$c = 0$

- The graph of $a\sin(bx+c)$ is referred to as a "wave".

Definition (Phase, period, frequency, amplitude of a wave)

In the function $a\sin(bx+c)$, the number $|a|$ is called the *amplitude* of the wave, the number $\frac{b}{2\pi}$ is called the *frequency* of the wave, the number $\frac{2\pi}{b}$ is called the *period* of the wave, the number c is called the *phase* of the wave.

- What happens when we change the amplitude? The frequency/period? The phase?

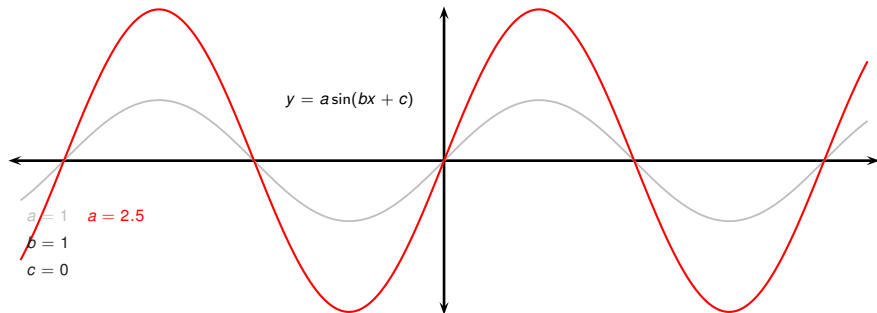- The graph of $a\sin(bx + c)$ is referred to as a "wave".

Definition (Phase, period, frequency, amplitude of a wave)

In the function $a\sin(bx + c)$, the number $|a|$ is called the *amplitude* of the wave, the number $\frac{b}{2\pi}$ is called the *frequency* of the wave, the number $\frac{2\pi}{b}$ is called the *period* of the wave, the number c is called the *phase* of the wave.

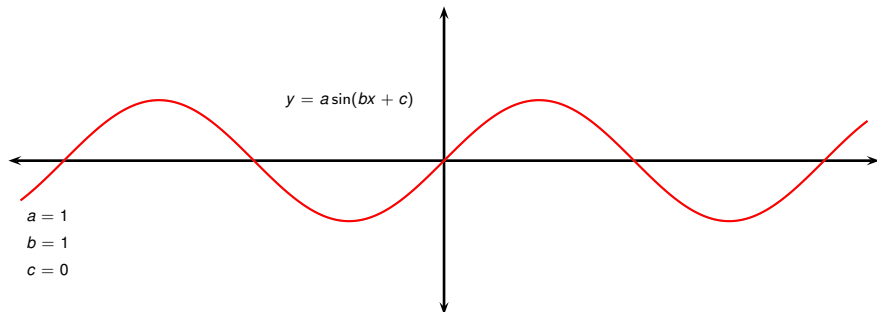- What happens when we change the amplitude? The frequency/period? The phase?

$y = a\sin(bx + c)$

$a = 1$
$b = 1$
$c = 0$

- The graph of $a\sin(bx + c)$ is referred to as a "wave".

Definition (Phase, period, frequency, amplitude of a wave)

In the function $a\sin(bx + c)$, the number $|a|$ is called the *amplitude* of the wave, the number $\frac{b}{2\pi}$ is called the *frequency* of the wave, the number $\frac{2\pi}{b}$ is called the *period* of the wave, the number c is called the *phase* of the wave.

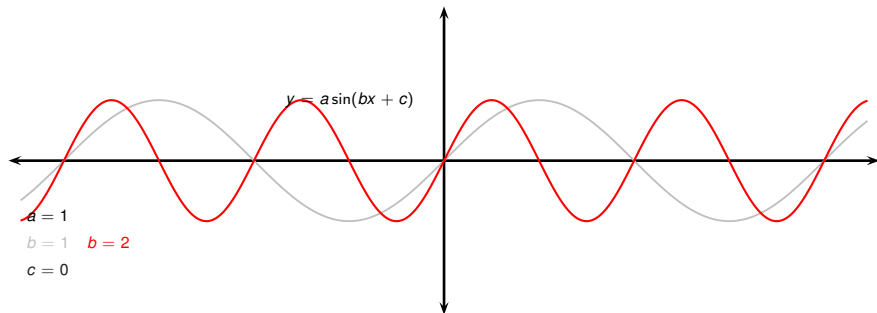- What happens when we change the amplitude? The frequency/period? The phase?

$y = a\sin(bx + c)$

$a = 1$
$b = 1$ $b = 2$
$c = 0$

- The graph of $a\sin(bx + c)$ is referred to as a "wave".

Definition (Phase, period, frequency, amplitude of a wave)

In the function $a\sin(bx + c)$, the number $|a|$ is called the *amplitude* of the wave, the number $\frac{b}{2\pi}$ is called the *frequency* of the wave, the number $\frac{2\pi}{b}$ is called the *period* of the wave, the number c is called the *phase* of the wave.

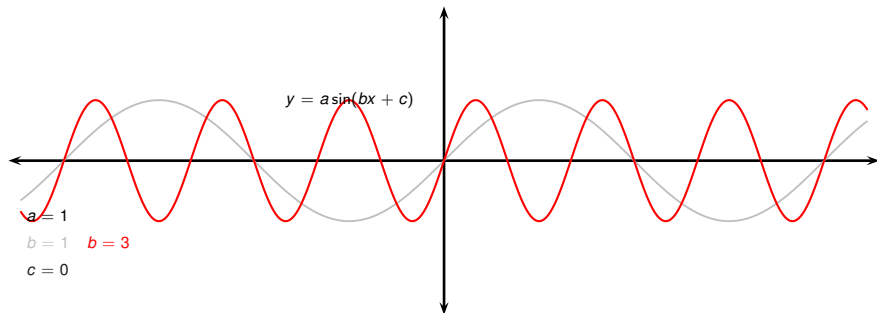- What happens when we change the amplitude? The frequency/period? The phase?

$y = a\sin(bx + c)$

$a = 1$
$b = 1$ $b = 3$
$c = 0$

- The graph of $a\sin(bx + c)$ is referred to as a "wave".

Definition (Phase, period, frequency, amplitude of a wave)

In the function $a\sin(bx + c)$, the number $|a|$ is called the *amplitude* of the wave, the number $\frac{b}{2\pi}$ is called the *frequency* of the wave, the number $\frac{2\pi}{b}$ is called the *period* of the wave, the number c is called the *phase* of the wave.

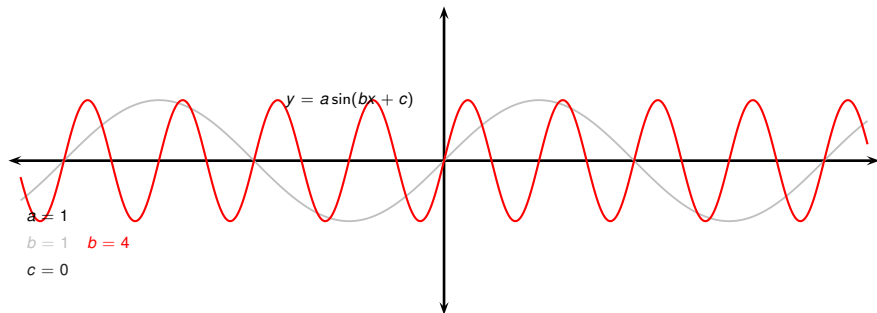- What happens when we change the amplitude? The frequency/period? The phase?

$y = a\sin(bx + c)$

$a = 1$
$b = 1$ $b = 4$
$c = 0$

- The graph of $a\sin(bx + c)$ is referred to as a "wave".

Definition (Phase, period, frequency, amplitude of a wave)

In the function $a\sin(bx + c)$, the number $|a|$ is called the *amplitude* of the wave, the number $\frac{b}{2\pi}$ is called the *frequency* of the wave, the number $\frac{2\pi}{b}$ is called the *period* of the wave, the number c is called the *phase* of the wave.

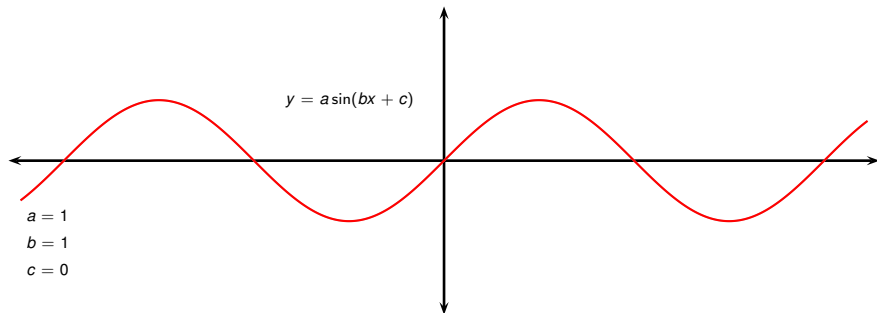- What happens when we change the amplitude? The frequency/period? The phase?

$y = a\sin(bx + c)$

$a = 1$
$b = 1$
$c = 0$

- The graph of $a\sin(bx + c)$ is referred to as a "wave".

Definition (Phase, period, frequency, amplitude of a wave)

In the function $a\sin(bx + c)$, the number $|a|$ is called the *amplitude* of the wave, the number $\frac{b}{2\pi}$ is called the *frequency* of the wave, the number $\frac{2\pi}{b}$ is called the *period* of the wave, the number c is called the *phase* of the wave.

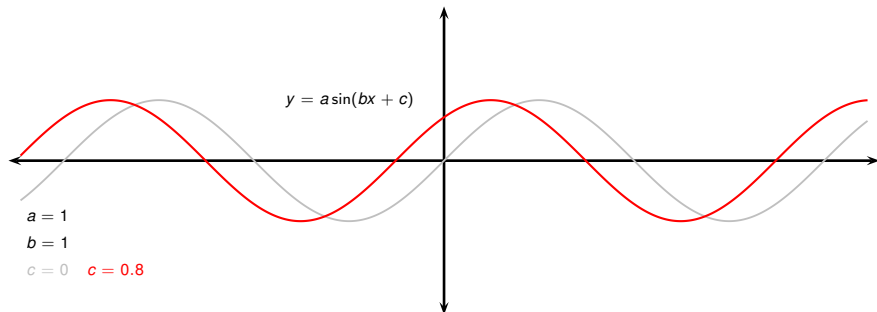- What happens when we change the amplitude? The frequency/period? The phase?

$y = a\sin(bx + c)$

$a = 1$
$b = 1$
$c = 0$ $c = 0.8$

- The graph of $a\sin(bx + c)$ is referred to as a "wave".

Definition (Phase, period, frequency, amplitude of a wave)

In the function $a\sin(bx + c)$, the number $|a|$ is called the *amplitude* of the wave, the number $\frac{b}{2\pi}$ is called the *frequency* of the wave, the number $\frac{2\pi}{b}$ is called the *period* of the wave, the number c is called the *phase* of the wave.

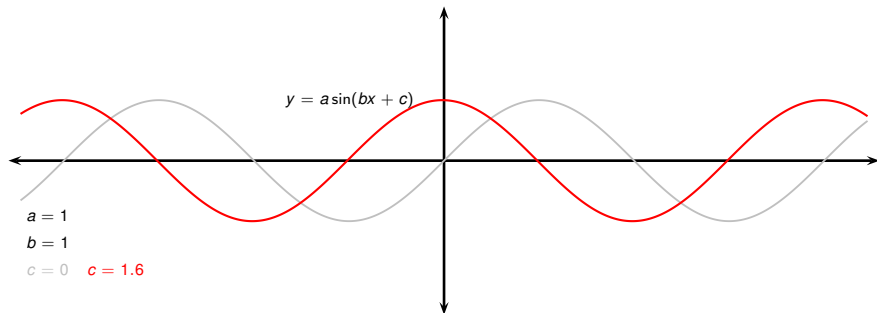- What happens when we change the amplitude? The frequency/period? The phase?

$y = a\sin(bx + c)$

$a = 1$
$b = 1$
$c = 0$ $c = 1.6$

- The graph of $a\sin(bx + c)$ is referred to as a "wave".

Definition (Phase, period, frequency, amplitude of a wave)

In the function $a\sin(bx + c)$, the number $|a|$ is called the *amplitude* of the wave, the number $\frac{b}{2\pi}$ is called the *frequency* of the wave, the number $\frac{2\pi}{b}$ is called the *period* of the wave, the number c is called the *phase* of the wave.

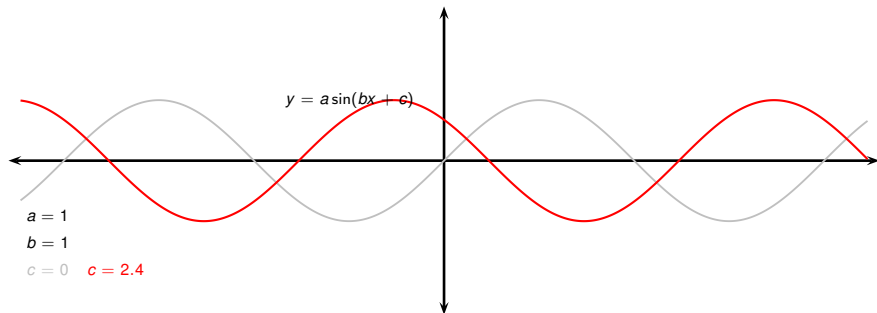- What happens when we change the amplitude? The frequency/period? The phase?

$y = a\sin(bx + c)$

$a = 1$
$b = 1$
$c = 0$ $c = 2.4$

- The graph of $a\sin(bx + c)$ is referred to as a "wave".

Definition (Phase, period, frequency, amplitude of a wave)

In the function $a\sin(bx + c)$, the number $|a|$ is called the *amplitude* of the wave, the number $\frac{b}{2\pi}$ is called the *frequency* of the wave, the number $\frac{2\pi}{b}$ is called the *period* of the wave, the number c is called the *phase* of the wave.

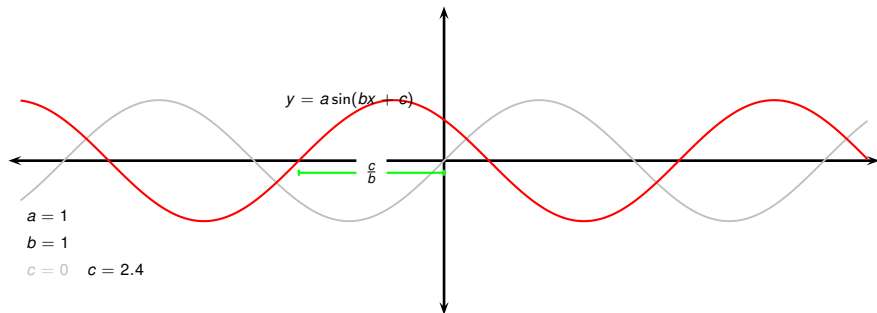- What happens when we change the amplitude? The frequency/period? The phase?

$y = a\sin(bx + c)$

$\frac{c}{b}$

$a = 1$
$b = 1$
$c = 0 \quad c = 2.4$

- The graph of $a\sin(bx + c)$ is referred to as a "wave".

Definition (Phase, period, frequency, amplitude of a wave)

In the function $a\sin(bx + c)$, the number $|a|$ is called the *amplitude* of the wave, the number $\frac{b}{2\pi}$ is called the *frequency* of the wave, the number $\frac{2\pi}{b}$ is called the *period* of the wave, the number c is called the *phase* of the wave.

- What happens when we change the amplitude? The frequency/period? The phase?

$y = a\sin(bx + c)$

$\frac{c}{b}$

$a = 1$

$b = 1$ $b = 1.5$

$c = 0$ $c = 2.4$