Section 13.3 Notes: Transformations of Sine and Cosine

Vertical Translations

$$y = \sin x + k \text{ or } y = \cos x + k$$

Transformation: vertical translation of k
Axis: y = k

k moves the parent function up or down.
Therefore k changes the axis and the maximum/minimum values

Horizontal Translations

$$y = \sin(x - h) \text{ or } y = \cos(x - h)$$

Transformation: horizontal translation of h (called a **phase shift**)
Phase shift: h units

h moves the parent function right or left.
Therefore h changes the starting point of the graph and the zeros.

Vertical Dilations

$$y = A\sin x \text{ or } y = A\cos x$$

Transformations: vertical stretch by a factor of |A|
Amplitude: |A|

A **changes the amplitude and the maximum/minimum values**

Horizontal Dilations

$$y = \sin Bx \text{ or } y = \cos Bx$$

Transformations: horizontal stretch of $\frac{1}{|B|}$

Period: $\frac{2\pi}{|B|}$ if in radians $\frac{360^\circ}{|B|}$ if in degrees

B **changes the period of the function**

All Transformations

$$y = A\sin(B(x - h)) + k \text{ or } y = A\cos(B(x - h)) + k$$