

Homework Take-Up

How are the sine and cosine graphs the same?

- both have min values of -1 and max values of 1
- both have periods of 360°

How are they different?

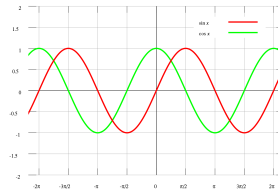
- Sine starts and ends at 0; Cosine starts and ends at 1
- Sine has 3 x-intercepts (zeros) in one cycle and Cosine only has 2 zeros
- At the beginning of the cycle, Sine increases but Cosine decreases
- Cosine's minimum point is halfway through its cycle; Sine's minimum point is $3/4$ the way through its cycle
- Cosine's maximum point is at the beginning and end of its cycle; Sine's is $1/4$ the way through

UNIT #6: Trigonometric Transformations

Stretches & Compressions of Periodic Functions

Learning Goal:

I will learn how to graph the stretches and compressions of a sine and cosine function.

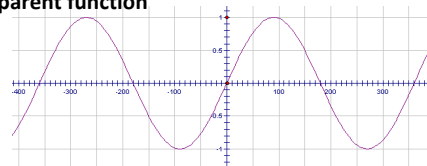


Graphing Parent Functions:

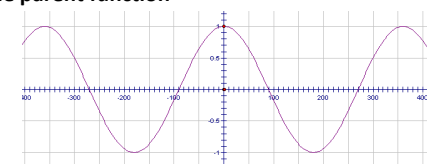
The simplest way to sketch the parent function for sine or cosine is to use 5 key points at 90° intervals ($0^\circ, 90^\circ, 180^\circ, 270^\circ, 360^\circ$).

x-value	sin x	cos x
0°	0	1
90°	1	0
180°	0	-1
270°	-1	0
360°	0	1

sine parent function



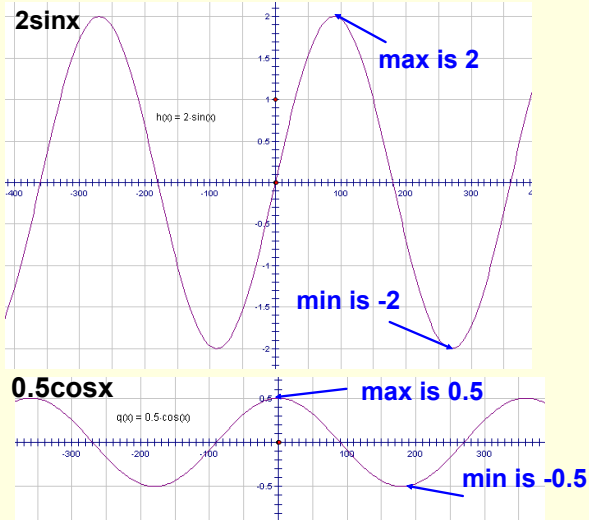
cosine parent function



Stretches of Periodic Functions (Lesson Notes).notebook

Vertical Stretches and Compressions

For the functions $f(x) = a \sin x$ and $f(x) = a \cos x$, the graphs are **stretched** in the y direction if $a > 1$ or $a < -1$ and **compressed** in the y direction if $-1 < a < 1$.



Horizontal Stretches and Compressions

Functions of the form $y = \sin kx$:

$$\text{Period} = \frac{360}{k}$$

One complete cycle occurs in the period. Five key points divide the cycle into four sections:

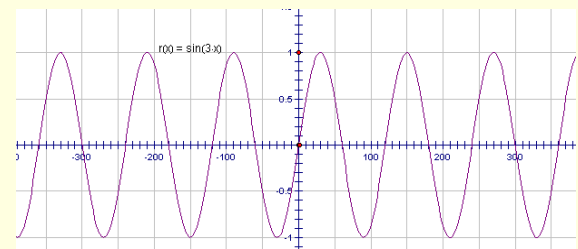
Example 1: $f(x) = \sin 3x$ $\text{Period} = \frac{360}{3} = 120^\circ$

Five key points:

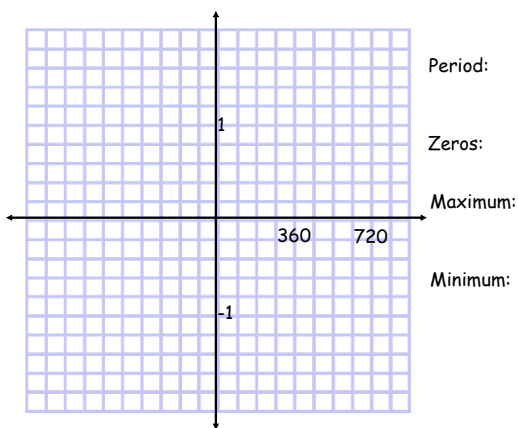
Zeros: occur at $x = 0^\circ$ and 120° and halfway between 0° and 120° at 60° .

Maximum of 1 occurs at 30° and the

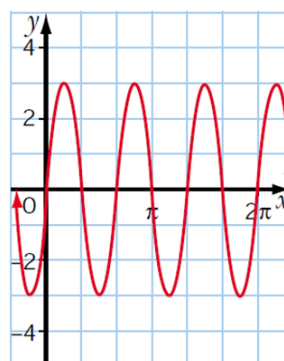
Minimum of -1 occurs at 90° .



Example 2: $f(x) = \cos \frac{1}{2}x$



Example 3: Determine the equation of the sine function.



$$k = \frac{360}{\text{period}}$$

UNIT 6: Trigonometric Functions

Stretches and Compressions of Periodic Functions

Learning Goal:

I will learn how to graph the stretches and compressions of a sine and cosine function.

Success Criteria:

To be successful, I must be able to...

- graph the stretches and compressions of a sine and cosine function by identifying 5 key points (zeros and max & min values)
- identify the transformations from a sine and cosine graph and state its equation

