



Surfing Waves of Trigonometric Functions

Project Goal:

To learn how to program graphs of sine and cosine functions

Standard:

CCSS.MATH.CONTENT.HSF.TF.B.5

Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.*

Student Guide

Solutions:

Challenge 1: Amplitude

A Scratch block representing the equation $100 * \sin \text{ of } x$. The block is green and contains a white circle with "100", a multiplication sign "*", a dropdown menu with "sin", the word "of", and a white circle with "x".

Challenge 2: Frequency

A Scratch block representing the equation $100 * \sin \text{ of } 2 * x$. The block is green and contains a white circle with "100", a multiplication sign "*", a dropdown menu with "sin", the word "of", a white circle with "2", a multiplication sign "*", and a white circle with "x".

A Scratch block representing the equation $100 * \sin \text{ of } 3 * x$. The block is green and contains a white circle with "100", a multiplication sign "*", a dropdown menu with "sin", the word "of", a white circle with "3", a multiplication sign "*", and a white circle with "x".

```
define Sin
repeat 400
  set y to 100 * sin of 20 * x
  go to x: x y: y
  pen down
  change x by 1
pen up
```

A Scratch script for graphing a sine wave. It starts with a pink "define Sin" block. Inside the definition, there is an orange "repeat 400" block. Inside the repeat loop, there are four blocks: an orange "set y to 100 * sin of 20 * x" block, a blue "go to x: x y: y" block, a green "pen down" block, and an orange "change x by 1" block. After the repeat loop, there is a green "pen up" block.

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Challenge 3: Midline

```
define Sin
repeat 40
  set y to 50 * sin of 2 * x + 50
  go to x: x y: y
  pen down
  change x by 10
pen up
```

```
define Sin
repeat 40
  set y to 100 * sin of 2 * x + -100
  go to x: x y: y
  pen down
  change x by 10
pen up
```

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