

Grasping Gravity through Mathematical Modeling

Project Goal:

To see the math behind gravity and be able to accurately model it using algebraic variables in Scratch. Students should be able to explain the connection between quadratics and the rate of change in a falling object.

Math Standard:

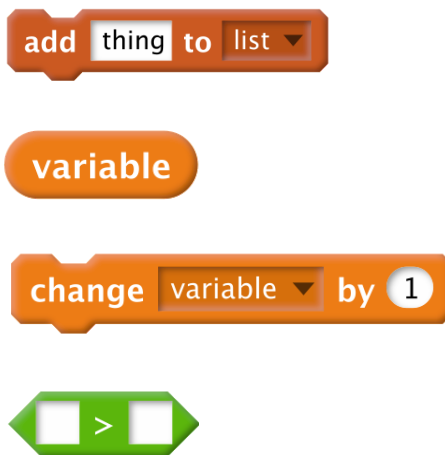
[CCSS.MATH.CONTENT.HSF.IF.B.6](#)

Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

CSTA Standard:

1B-AP-10 Create programs that include sequences, events, loops, and conditionals.

Blocks:



Student Guide



#CSANDMATH

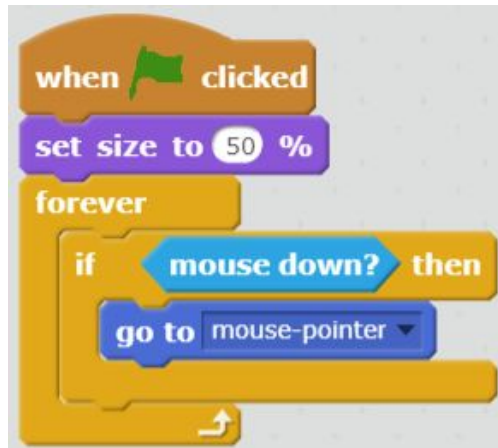
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Teacher Guide:

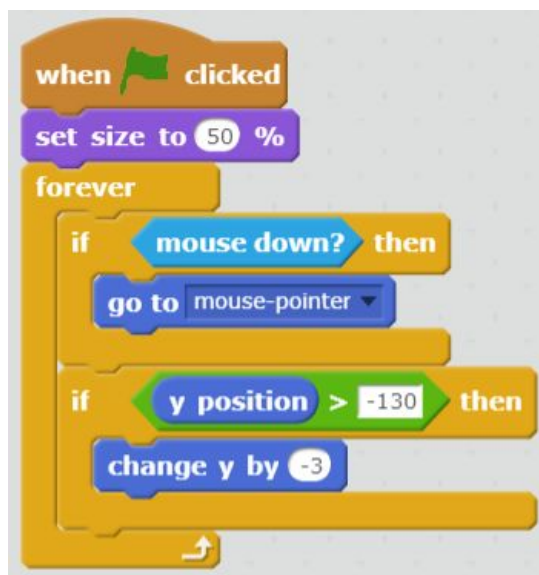
This lesson will work best in groups of 2. There are a lot of gif animations in the directions, so have one student with the directions open and the other writing the Scratch program. As always, it's best practice to complete the student guide yourself and cross reference with the solutions on the next page. Good Luck!!

Solutions:

Task 1:



Task 2:



Task 3:

```
when green flag clicked
  set size to 50 %
  go to x: -100 y: -130
  set speed to 3
  forever loop
    if mouse down? then
      go to mouse-pointer
      set speed to 3
      delete all of Rate of change
    if y position > -130 then
      change y by -1 * speed
      change speed by 3
      add speed to Rate of change
```