### **Javascript: Variables and Animation**

### **Duration: 1 Week**

### **Summary**

This lesson introduces the programming notion of variables and expressions, animation, and interaction with the user's mouse movement. It uses Khan video lectures and exercises.

The assignment has the student use javascript to draw animals and make them "dance" using random x,y coordinates, and "race" by animating the animals with various increments to their x position.

### **Learning Objectives**

* Explain what a Javascript *variable* is.
* State the syntax for declaring a variable in Javascript.
* Explain what a *variable's value* is.
* Explain how values can be determined by *expressions*.
* Explain how variables can be used to abstract values making for easy program change.
* Explain the meaning of x = x + 1 (and statements like it) where x is a Javascript variable.
* Explain how to animate using a Javascript *draw* loop including:
  + Declaring the background properly.
  + Using variables for the X and Y position coordinates of shapes.
  + Changing the variables in a draw loop.
* Program an animation in Javascript.
* Explain how to use variables mouseX and mouseY to have your program interact with the user's mouse movements.
* Program Javascript to interact with the user's mouse movements.
* Develop a correct program to solve problems [AP CSP P2, LO 5.1.2]
* Employ appropriate mathematical and logical concepts in programming, such as forming math expressions. [AP CSP P1, LO 5.5.1]

### **Course Material**

Sign in to Khan Academy before completing the following tutorials.

Complete the following Videos and Exercises, in order. You will earn points for completing the exercises labeled "Do". You must be signed in to Khan Academy to have it show that you completed these modules. The assignment requires that you show this.

**Variables**

* Watch: [Intro to Variables](https://www.khanacademy.org/computing/cs/programming/variables/p/intro-to-variables) [3:45]
* Do: [Variables Exercise](https://www.khanacademy.org/computing/cs/programming/variables/e/exercise--intro-to-variables)
* Do: [Challenge: Bucktooth Bunny](https://www.khanacademy.org/computing/cs/programming/variables/p/challenge-bucktooth-bunny)
* Watch: [More on Variables](https://www.khanacademy.org/computing/cs/programming/variables/p/more-on-variables) [3:33]
* Do: [Challenge: Funky Frog](https://www.khanacademy.org/computing/cs/programming/variables/p/challenge-funky-frog)

**Animation Basics**

* Read: [What are Animations?](https://www.khanacademy.org/computing/computer-programming/programming/animation-basics/a/what-are-animations)
* Watch: [Making Animations](https://www.khanacademy.org/computing/computer-programming/programming/animation-basics/p/making-animations) [6:02]
* Do: [Challenge: Exploding Sun](https://www.khanacademy.org/computing/cs/programming/animation-basics/p/challenge-exploding-sun)
* Watch: [Incrementing Shortcuts](https://www.khanacademy.org/computing/computer-programming/programming/animation-basics/p/incrementing-shortcuts) [3:49]
* Watch: [A Shorter Shortcut](https://www.khanacademy.org/computing/computer-programming/programming/animation-basics/p/a-shorter-shortcut) [1:59]
* Do: [Challenge: Parting Clouds](https://www.khanacademy.org/computing/computer-programming/programming/animation-basics/p/challenge-parting-clouds)

**Interactive Programs**

* Watch: [Mouse Interaction](https://www.khanacademy.org/computing/computer-programming/programming/interactive-programs/p/mouse-interaction) [2:59]
* Do: [Challenge: Tasty Tomato](https://www.khanacademy.org/computing/computer-programming/programming/interactive-programs/p/challenge-tasty-tomato)
* Do: [Challenge: Mouse Movement Mania](https://www.khanacademy.org/computing/computer-programming/programming/interactive-programs/p/challenge-mouse-movement-mania)

**Math Expressions**

* Read: [Using Math Expressions in JS](https://www.khanacademy.org/computing/computer-programming/programming/resizing-with-variables/a/using-math-expressions-in-js)
* Watch: [Resizing Shapes With Expressions](https://www.khanacademy.org/computing/computer-programming/programming/resizing-with-variables/p/resizing-shapes-with-variable-expressions) [7:36]
* Do: [Variable Expression Review](https://www.khanacademy.org/computing/computer-programming/programming/resizing-with-variables/p/resizing-shapes-with-variable-expressions)
* Do: [Brown Bear Eyes](https://www.khanacademy.org/computing/computer-programming/programming/resizing-with-variables/p/challenge-brown-bear-eyes)

### **Assessments**

* Conceptual Quiz:
  + [Variables and Animation](https://docs.google.com/document/d/1lNJ9dHAHLN2n26BDWuvLcHzE1QCLF514UFGE_1tajzk/edit?usp=sharing) (requires access)
* Practical Assignment:
  + [Javascript: Animation](https://drive.google.com/open?id=1UaVrHUoRg3Q7qks2JLg6gMJC5DBbOc1f0YnFxjFNLog) | [Grading Rubric](https://drive.google.com/open?id=1Xufkk5seQDSh0FLDF4FoCKxvi_FRvQ27-i1sXtzOslY) | [Answer Key](https://docs.google.com/a/my.uri.edu/document/d/16hCm-X01AV3Ete6wYB9M7MpeSw9-qq7WXUS_hwYz14M/edit?usp=sharing)