Animation and Games

Content Area: **Math**
Course(s): **Introduction to Computer Science**
Time Period: **Marking Period 3**
Length: **5 Weeks**
Status: **Published**

Unit Overview

How do you program animation of an object, either automatically, using key strokes, or mouse actions?

Enduring Understandings

Objectives / Topics Covered

- Timers
- Randomizing Games
- Mouse Events
- Keyboard Events
- Solving large and more complex problems using animation

Essential Questions

- How can you program animation of different geometric figures?
- In what different ways can you control the programmed animation (start/ stop/ delay/ change direction)?

New Jersey Student Learning Standards (No CCS)

8.1.8.CS.1: Recommend improvements to computing devices in order to improve the ways users interact with the devices.

8.1.8.AP.1: Design and illustrate algorithms that solve complex problems using flowcharts and/or pseudocode.

8.1.8.AP.3: Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.

8.1.8.AP.4: Decompose problems and sub-problems into parts to facilitate the design, implementation, and review of programs.

8.1.8.AP.6: Refine a solution that meets users' needs by incorporating feedback from team members and users.

8.1.8.AP.7: Design programs, incorporating existing code, media, and libraries, and give attribution.

8.1.8.AP.8: Systematically test and refine programs using a range of test cases and users.

8.1.8.AP.9: Document programs in order to make them easier to follow, test, and debug.

Technology Standards

TECH.8.1.12	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.B.2	Apply previous content knowledge by creating and piloting a digital learning game or tutorial.
TECH.8.1.12.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
TECH.8.1.12.B.CS2	Create original works as a means of personal or group expression.
TECH.8.1.12.C.CS4	Contribute to project teams to produce original works or solve problems.
TECH.8.2.12.C.CS1	The attributes of design.
TECH.8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in our world.
TECH.8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
TECH.8.2.12.E.CS1	Computational thinking and computer programming as tools used in design and engineering.

21st Century Themes/Careers

CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.
CAEP.9.2.12.C.5	Research career opportunities in the United States and abroad that require knowledge of world languages and diverse cultures.

Instructional Strategies & Learning Activities

● 15 animations programming exercises in total

● Using timers to add randomizations to graphical programs

○ Example Exercise: Paint Splatter Write a program that splatters paint on the screen every DELAY milliseconds. To splatter paint, pick a random color and draw CIRCLES_PER_SPLATTER circles of that color at random places on the screen. The radius of each circle should be a random value between MIN_RADIUS and MAX_RADIUS. Remember to use helper functions.

● Using mouse events for interactive programs

○ Example Exercise: Target Draw a target on the screen that moves to aim at where your mouse is located. A target consists of a horizontal line that goes from 0 to the window width and a vertical line that goes from 0 to the window height. The lines should cross paths where the mouse is. If you're feeling adventurous, you can extend this to draw a small red circle whenever you click. If you're feeling really adventurous, you can have a bouncing ball on the screen and see if you can remove it when it gets clicked. You can use remove(obj) to remove something from the screen and getElementAt(x, y) to get an object at the given position. It will return the object or will return null if there is no object there.

● Using keyboard events for interactive programs

○ Example Exercise: Basic Snake Write a basic version of the snake game. The way our game works is by first creating a green square at the center of the screen. The snake should be moving to the right. If you hit an arrow key, you should change the snake's direction.

● 2 challenges using animation to tie everything learned in the Animation & Games module together

○ Example Exercise: Blinking Rectangles You should divide the canvas into an imaginary grid with `NUM_RECTANGLES_ACROSS` rectangles across, and `NUM_RECTANGLES_DOWN` rectangles down. Each time the user moves the mouse, a rectangle aligned with this grid should be drawn so that the mouse's location is within the rectangle. The rectangle should change color each time the mouse passes over it.

Formative Assessments

Quick Friday Quizzes - (2- 3 MC / Short answer questions as well as a programming task).

Summative Assessment

End of Unit Code HS MC Test

Programming Task

Alternate Assessments

Extension exercies and Challenges