AlbertaSat

Scratch Coding

Grade Level	7	Workable grades	5, 6, 7, 8
Recommended Time	1 hour		
Curriculum Alignment	**SHAPE AND SPACE (Transformations)** **General Outcome:** Describe and analyze position and motion of objects and shapes. **Specific Outcomes:** 4. Identify and plot points in the four quadrants of a Cartesian plane, using integral ordered pairs. [C, CN, V] 5. Perform and describe transformations (translations, rotations or reflections) of a 2-D shape in all four quadrants of a Cartesian plane (limited to integral number vertices). [C, CN, PS, T, V]		

Background Information (Science required for the lesson) :

- Coding = using digital languages and commands to solve problems (giving instructions in the computer's language)
- Teaches problem solving, critical-thinking skills, resiliency (lots of trial and error) and has also become a valuable/relevant skill in nearly every occupational field
- Coding is used in various aspects of our everyday life: TVs, phones, video games, websites, operating systems (Google, Safari, Mozilla Firefox, etc.), cars, and more
- Math required is basic knowledge of the four quadrant Cartesian Plane
- You will be making a game where you will be playing as a CubeSat known as the AuroraSat (made by Yukon University and supported by AlbertaSat) and will be dodging asteroids which are randomly initialized on the y axis.
 	
Functions of Scratch Coding you should be familiar with:
 	
Main Screen:
   a. Programming Window: the main center screen where you drag and combine the blocks
   b. Sprite Window: the window on the bottom right where you can select different sprites
   c. Game Preview Window: window on the top right where you can test out game
      i. Green flag starts the game, red sign stops game
 	
Sprites:

   a. "Objects" of the game (asteroids and satellite)
   b. Each has its own code segment; clicking on the different sprites will switch between the different coding screens

Coding Blocks:
   a. Motion blocks: dark blue; control how objects move
   b. Looks blocks: purple; changes appearance of the sprites (appearances called costumes)
   c. Control blocks: orange; uses logic to perform tasks (control the running of the program)
   d. Sensing blocks: light blue; detect things (eg. location of mouse)
   e. Operator blocks: green; perform mathematical and logical tasks (comparing values/variables, calculations, etc.)

Basic Controls:
   a. Panning across the programming window: click and drag on any empty space
   b. Moving blocks: click and drag the blocks to where you want them
   c. Separating blocks: click and drag the block from the bottom; dragging from top will move the entire "block combination"

Explanation of Activity:	Notes:

A step-by-step guide for your activity:
1. Copy-and-paste the link to the Scratch tutorial in the chat.
2. Have students click on a blue button that says "See inside" near the top right.
3. Go over different coding blocks and make sure students understand what each one does.
4. Go over basic controls and different game windows:
    a. Give some demonstrations
5. Now walk the students through the tutorial.
6. Click on the AuroraSat sprite; in the programming window, drag and combine the required blocks for its movement according to the solution image. Do the same requirements for when the AuroraSat crashes into an asteroid.
	- A Scratch Coding account isn't required to play or create projects, only for saving
	- There are 8 types of coding blocks used in Scratch, however, we will only be using/talking about the 5 mentioned in the background information
	- During each step of the activity, explain the logic behind the certain combinations of blocks we make
	    - Emphasize the relation to x-and y-coordinates, the Cartesian Plane, and transformations when appropriate.
	- Watch your pace; students will be constantly switching between their game tab and watching you

7. Click on the asteroid-1 sprite; drag and combine the required blocks for its movement according to the solution image. 8. Click on the asteroid-2 sprite; drag and combine the required blocks (most of this step will already be done for you). 9. The game should be finished and students can try it out in their preview window.	

Materials Required (INCLUDE ALL MATERIALS NEEDED EVEN PEN AND PAPER)

- Access to the internet (Chromebook or laptop preferred, can be completed on a tablet)
- Version for students: https://scratch.mit.edu/projects/605478607
- Solutions: https://scratch.mit.edu/projects/605516110

Changes to the activity for COVID-19

- Can be done easily by following along through Google Meet or Zoom
- Presenter will share their screen so that students can still watch and participate
- Questions can be asked through the hand-raising feature or the chat