

Solar SPRK+

Lesson 1: Introduction to Drag and Drop Coding Using Scratch

AUTHOR

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DESCRIPTION

Students go through a series of exercises and projects/challenges to gain familiarity with coding, specifically with drag-and-drop coding. Students will look at Scratch, a free introductory computer programming language, which focuses on creative computing. After working on a few Scratch drag and drop programs, participants will transition to Sphero Edu (formerly Lightning Lab), a comparable drag and drop program for Lesson 2 to prepare to program a Sphero SPRK+ ball to navigate through a maze.

GRADE LEVEL(S)

6, 7, 8

SUBJECT AREA(S)

Computer programming

ACTIVITY LENGTH

10 hours

LEARNING GOAL(S)

1. Students will understand how to properly order basic blocks of code to program simple functions.
2. Students will determine the steps needed to debug issues in block programming.
3. Students will devise methods to achieve basic animation-focused block programming tasks.
4. Students will combine music and animation to create music videos and simple games using block coding.



LESSON PLAN

STANDARDS REMINDERS

- Use the array of challenges presented by Scratch as a way to continue having students practice using language such as “criteria for success” and “constraints.” This will help them to identify these much more easily in open ended-engineering challenges.
- Additionally, have a discussion with students about how lines of code used to solve previous problems may come in handy later, determining what types of situations this may occur in. This highlights the importance of noting different methods for reaching success to build background knowledge in problem solving.

CONTENT BACKGROUND

STUDENT BACKGROUND

It is extremely helpful, though not necessary, that students participating in this lesson are familiar with drag and drop programming languages such as Scratch.

EDUCATOR BACKGROUND

Educators leading this lesson should be familiar with Scratch and Sphero Edu and should have worked through the challenges in this lesson.

MATERIALS NEEDED

HANDOUTS/PAPER MATERIALS

- Scratch Learner Workbook (print or electronically at <http://scratched.gse.harvard.edu/guide/curriculum.html>)

CLASSROOM SUPPLIES

- N/A

ACTIVITY SUPPLIES (PER STUDENT)

- Computer or tablet that runs Scratch (<https://scratch.mit.edu/>) and Sphero Edu

LESSON PROGRESSION

PLANNING AND PREP

Read through the Scratch Educator Guide at:
<http://scratched.gse.harvard.edu/guide/curriculum.html>

LESSON SEQUENCE

Have students work through the following activities individually or in small groups.

SCRATCH PART 1: ABOUT ME

- Refer to your Learner Workbook and Educator Guidebook for these activities.
 - Create Account
 - Scratch Surprise
 - Scratch Studio
 - Step-by-Step
 - 10 Blocks
 - About Me
 - Share: About Me

SCRATCH PART 2: MUSIC VIDEO

- Refer to your Learner Workbook and Educator Guidebook for these activities.
 - Build a Band
 - Orange Square, Purple Circle
 - It's Alive
 - Music Video
 - Share: Music Video

SCRATCH PART 3: VIDEO GAMES

- Refer to your Learner Workbook and Educator Guidebook for these activities.
 - Maze
 - Pong
 - Scrolling
 - Score
 - Extensions
 - Video Game
 - Share: Video Game

ASSESSMENT AND EXTENSIONS

FORMATIVE ASSESSMENT

LESSON PLAN

Teacher should be making observations and notes throughout the student investigations. A basic understanding of algorithmic thinking and problem-solving will be important to integrate the coding into modeling and simulating a rover environment. In order to determine how students are contextualizing coding within a broader context, teachers may want to end this section with a journaling activity asking students questions about career pathways that use coding. This could be made more specific and targeted by asking them how they think space exploration and other careers use software engineering and programmers to solve problems.

LESSON EXTENSIONS

There are many opportunities to research how coding is used in space exploration.