Loops & Variables

v3.0

Unit Overview:

In this unit, students will build upon previous Kid Spark robotics and coding experiences as they explore how to use different types of loops and variables in a program.

Recommended Grade Level:
6 - 8

Kid Spark STEM Lab:
STEM Pathways **or**
Engineering Pathways (w/Spark:bit)

Prerequisite Kid Spark Units:
1. Robotics & Coding 101
2. Exploring Sensors

Alignment to STEM Standards:

The table below highlights how this unit is aligned to the Computer Science Teachers Association (CSTA) K-12 Computer Science Standards and the Next Generation Science Standards (NGSS).

- CSTA K-12 CS standards introduce the fundamental concepts of computer science to all students, beginning at the elementary level. **Click here** to view the standards.
- NGSS Disciplinary Core Ideas (DCI) are standards related to content knowledge.

Lessons & Assessment	CSTA	NGSS-DCI
Lesson 1: Repeat Loops (120 Min.) In this lesson, students will learn how **repeat loops** can be used to repeat a set of commands in a program. Then, students will build and program a custom design that utilizes a **repeat loop**.	**1B-AP-10** Create programs that include sequences, events, loops, and conditionals. **Concept:** Algorithms & Programming | **Subconcept:** Control	Engineering Design
Lesson 2: While Loops (120 Min.) In this lesson, students will learn how to use **while loops** to control a simple mechanism. Then, students will build and program a custom design that utilizes a **while loop**.	**1B-AP-10** Create programs that include sequences, events, loops, and conditionals. **Concept:** Algorithms & Programming | **Subconcept:** Control	Engineering Design
Lesson 3: Integer Variables (120 Min.) In this lesson, students will learn how integer variables can be used in a program as they create a simple counting device. Then, students will build and program a custom design that includes an integer variable.	**2-AP-11** Create clearly named variables that represent different data types and perform operations on their values. **Concept:** Algorithms & Programming | **Subconcept:** Variables	Engineering Design
Lesson 4: Boolean Variables (120 Min.) In this lesson, students will learn how to use boolean variables in a program to create a toggle switch. Then, students will build and program a custom design that includes a boolean variable and a toggle switch.	**2-AP-12** Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals. **Concept:** Algorithms & Programming | **Subconcept:** Control	Engineering Design
Lesson 5: Free Build Challenge (60 - 120 Min.) In this lesson, students will apply the knowledge and skills they have acquired throughout the Loops & Variables unit to develop a custom design or invention.	**1B-AP-13** Use an iterative process to plan the development of a program by including others' perspectives and considering user preferences. **Concept:** Algorithms & Programming | **Subconcept:** Program Dev.	Engineering Design
Unit Assessment: Loops & Variables In this performance-based assessment, students will complete a series of tasks as they demonstrate their understanding of the core ideas and concepts that were covered throughout this unit.		

Target Vocabulary

The following key terms will be used throughout this unit. It may be helpful to explain these terms as they show up in lessons and challenges.

Repeat Loop - Repeats a set of commands a specified amount of times.

While Loop - Executes (or loops) a set of commands until the condition of the test is false.

Variable - Used to store data that may change during the course of a program. Variables include a name, data type, and a value.

Integer Variable - A variable that includes an integer data type (whole numbers which may or may not include negative numbers).

Boolean Variable - A variable that includes a boolean data type (true or false).

Prerequisite Kid Spark Units

We highly recommend students complete the following Kid Spark units prior to starting this unit.

Elementary Program Units

- Robotics & Coding 101
- Exploring Sensors