FORTNITE

BUILDING A TREASURE HUNT RACE:

CREATING A SCORING SYSTEM USING VARIABLES IN FORTNITE CREATIVE

Content/Grade: Computer Science/Hour of Code: Grades 8–12
Lesson Timeframe: One hour

LESSON/AUTHOR/CLASS INFORMATION

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Teacher Guide

Student Guide

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DESCRIPTION OF CLASS / LEARNING ENVIRONMENT

This lesson is designed for Hour of Code during Computer Science Education Week. It can be used in any curricular area interested in participating in Hour of Code. It can also be used outside of Hour of Code in a game design or computer science course. This can serve as a stand alone-lesson, or used in conjunction with the other activities to complete a larger project.

Author Steve Isaacs teaches Game Design and Development as a quest- or choice-based learning environment that provides students with opportunities to take different approaches to meeting the learning outcomes based on their own interests, in terms of content as well as project options.

Author Brian Dickman studied computer science, and operates a full-time game development studio that produces entertaining and educational content inside popular video games.

LESSON OVERVIEW

Have you ever thought about how score is handled in video games? If you've ever played Pac-Man, you have certainly tried to get a high score. As you collect dots you get points and bonus points for fruit. When the monsters turn blue, you try to get as many as you can as the score for each one increases and you eat your way through them. Many games have a scoring mechanism that is an integral part of the game.

Scores in games are handled with variables. A variable is set at the beginning of the game and changes throughout the game, based on actions that impact the score.

In this activity, you will set up a scoring system using variables. This is just one of many ways variables are used in programming.

DESIRED RESULTS

WHAT ARE THE LEARNING OUTCOMES FOR STUDENTS?

ESSENTIAL QUESTIONS/BIG IDEAS

Can students learn computer science concepts as part of a meaningful activity rather than simply learning syntax as an isolated skill?

Will learning computer science concepts like variables through an activity in Fortnite Creative generalize to understanding the concept in a coding environment?

Can students learn computer science concepts through game mechanics?

Will students show more motivation to learn computer science when the concepts are introduced in a game environment?

LEARNING OUTCOMES/OBJECTIVES

The student will be able to:

- Demonstrate an understanding of variables as a concept
- Apply the understanding of variables in the context of a game
- Create a puzzle in a game environment that incorporates the use of variables

LESSON PLAN

LEARNING ACTIVITIES

HOW TO USE THE FORTNITE CREATIVE HOUR OF CODE LESSONS

This series of lessons has been designed to provide flexibility. Each lesson is set up as a stand-alone lesson to teach a coding concept in isolation in the span of about an hour as part of the Hour of Code initiative. The teacher can choose which lesson students complete, or students can choose one (or more) that appeal to them.

The lessons also work together so that a student could complete all five lessons and create a game experience with five different puzzles, demonstrating the different concepts. Likewise, students can work in groups where each student or small group completes one of the activities as part of a larger project.

Each lesson is accompanied by a student guide with notes to guide the educator in delivering the lesson and supporting your students in the process.

INTRODUCTION: VARIABLES

VARIABLES: In programming, a variable is a value that can change, depending on conditions or on information passed to the program. Typically, a program consists of instructions that tell the computer what to do and data that the program uses when it is running. The data consists of **constants (fixed values)** that never change, and **variable values** (which are usually initialized to 0 or some default value because the actual values will be supplied by a program's user). Usually, both constants and variables are defined as certain data types. Each data type prescribes and limits the form of the data. Examples of data types include an integer expressed as a decimal number, or a string of text characters, usually limited in length.

– from WhatIs.com

For example, in terms of a scoring system, you could set the value at the start for the score to equal 0. Each time a coin is collected, the score could increase by 10. If the player has 100 points or more, they win and the game ends. If not, the game continues until the player has at least 100 points.

Pseudocode is the act of simulating writing code to illustrate the idea that the code would represent. Pseudocode would show the general structure but does not necessarily follow proper syntax. In these lessons we will periodically use pseudocode to demonstrate the concepts.

In terms of pseudocode, this could look like:

Declare / set variable

```
var score=0
```

Award 10 Points for a Gold Coin

```
Begin Loop
       Check Player for Coin
       Does player have a gold coin?
       If YES, score = score +10
Loop Again
```

Loop Until the Player has 100 points

```
Begin Loop
       Check Player for Coin
              Does player have a gold coin?
                     If YES, add 10 points to player score and remove the coin
                            Does player have at least 100 points
                                   If YES, indicate that the player wins
                                   End Game
Loop Again IF the Score is less than 100
Continue running the rest of the program until the player has at least 100 points
```

Here are several videos that explains variables in the context of coding:

CS Principles: Intro to Variables Part 1: https://youtu.be/G4IG_PEWFjE
CS Principles: Intro to Variables Part 2: https://youtu.be/ijjVDBPwAIo

Variables can be used in any coding language, and also environments like Fortnite Creative where you can set up a scenario where a value can change throughout the game.

ACTIVITY

Students will build a treasure hunt in Fortnite Creative. The players will search the island for treasure (coins). The game will end when the player collects a certain number of coins, or when the time runs out. The treasure hunt should incorporate **variables**, and **score** to track the value/score based on the number of coins collected.

Refer to the Teacher Guide for the step-by-step directions for the activity.

Students should access and work from the Student Guide.

EXTENSION ACTIVITIES

If you time permits, students should attempt the following challenges:

- Add new items that have a different score value.
- Increase the player sprint speed using a Teams & Inventory Device.
- Adjust the game so a single player can complete the goal before time runs out.
- Use a Score Manager device to reset the player score to 0 when collecting a special item.

Please refer to the Teacher Guide for the step-by-step directions for the activity.

EXTERNAL RESOURCES

Code.org: http://www.code.org

Hour of Code: https://hourofcode.com/us

CS Principles: Intro to Variables Part 1: https://youtu.be/G4lG_PEWFjE
CS Principles: Intro to Variables Part 2: https://youtu.be/ijjVDBPwAlo

Definition of variables: https://whatis.techtarget.com/definition/variable

ASSESSMENT

RUBRIC

BUILDING A TREASURE HUNT RACE IN FORTNITE CREATIVE:

Creating a Scoring System using Variables

	Developing	Competent	Proficient	Distinguished
Project Content / Learning Objectives	Project does not convey the required information or understanding as it pertains to the learning objectives.	Project shows a basic understanding of variables and learning objectives.	Project reflects understanding of variables and coding, and how that can be accomplished through a scoring system in a game.	Project reflects exemplary understanding and application of variables through the gameplay. Mastery of the learning objectives are met or exceeded.
Project Development/ Functionality	Project does not work, or has major flaws that prevent its intended use.	Project demonstrates basic functionality, and has only minor flaws.	Project functions in the way the student intended and provides general guidance for the end user.	Project is functional and refined, with extra features that exceed the requirements.
Project Aesthetics/ Design	Project requires more attention to the look and feel of the experience, as well as the general design.	Project shows some attention to aesthetics and thoughtful design, but is incomplete or lacking in some aspects of layout and design.	Project is well organized and pleasing to the eye; the design makes sense in the context of the activity and creates a well designed experience for the player.	Beautiful design. The environment is inviting, and provides the user with an engaging world to explore in order to experience the puzzle activities.
Reflection	Student demonstrates difficulty describing variables, and the connection between code and this activity.	Student can mostly describe reflect on the basics of variables, and has a general understanding of how that translates to this activity.	Students provides a thoughtful reflection/ explanation of the variables and scoring and how the functionality works in Fortnite Creative.	Student can eloquently explain the concept of variables and scoring, and describe how to create and manage variables in Fortnite Creative.

STANDARDS MAPPING

CSTA Standards for Students: https://csteachers.org/Page/standards

1A-AP-09
Model the way programs store and manipulate data by using numbers or other symbols to represent information.

1B-AP-09
Create programs that use variables to store and modify data.

1B-AP-10
Create programs that include sequences, events, loops, and conditionals.

1B-AP-12
Modify, remix, or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features.

1B-AP-15
Test and debug (identify and fix errors) a program or algorithm to ensure it runs as intended.

2-AP-1
Create clearly named variables that represent different data types and perform operations on their values.

2-AP-10
Use flowcharts and/or pseudocode to address complex problems as algorithms.

2-AP-13
Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.

2-AP-17
Systematically test and refine programs using a range of test cases.

3A-AP-13
Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests.

3A-AP-16
Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue by using events to initiate instructions.

3A-AP-17
Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.

3A-AP-22
Design and develop computational artifacts working in team roles using collaborative tools

INTERDISCIPLINARY AND 21ST CENTURY CONNECTIONS

This lesson covers areas related to coding/Computer Science.

21st Century Connections:

- Critical thinking
- Creativity
- Collaboration
- Communication
- Technology literacy
- Flexibility
- Leadership
- Initiative
- Social skills

MODIFICATIONS AND ACCOMMODATIONS

Provide modifications and accommodations as appropriate based on student needs, IEP, 504, etc.

Students can work in teams to integrate a paired programming approach

Sample map can be provided for students to deconstruct / modify

Provide adaptive controller / game controller if necessary.

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