

4.4 Variables: Build (2-day Lesson) (Use->Modify->Create)

Students will be able to:

1. Complete a debugging challenge related to variables.
2. Program with a partner, assuming the role of both driver and navigator part of the time, a game with variables project.

Learning Activity Summary (2 day lesson - 100 minutes)

1. [Debugging Challenge](#) (5 minutes)
2. [Optional: Review and complete the planning documents](#) (if needed) (15 min)
3. [Review Pair Programming and how it works. MODEL!](#) (10 minutes)
4. [Student time to build Game with Variables project in pairs](#) (30-70 minutes)



[Optional: Turn and Talk](#): Use this Turn & Talk to start the 2nd day of building.

Student Materials

- [A2:U4 Student Workbook](#)
- Computer with Internet

Teacher Preparation

- [A2:U4.4 Teacher Slide Deck](#) projected - **Speakers turned on! Animation in some slides**
 - Link to the U4 Debugging exercise bit.ly/variabledebug
 - Link to the U4 Debugging FIX bit.ly/A2U4DebugSolution
 - Pair Partner Video Link for bit.ly/drivernavi
 - Link to Starter Project with Arrow Key Scripts bit.ly/ArrowKeysStarterProject

4.4 Lesson Presentation

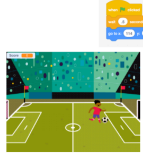


EXPLORE ELABORATE
(Use->Modify->Create)

Debugging Challenge

in Student Workbook

Debugging with VARIABLES



DEBUGGING

Each time the game starts the score should reset to 0, but it continues to increase.

What can we change on the soccer ball sprite's code to reset the score to 0 each time the green flag is clicked?

Debugging Challenge: bit.ly/variabledebug

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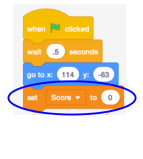


Let's see how you do with a Debugging Challenge! Let's read through the problem together as a class. Ask students if they have any ideas of how they can reset the score at the beginning of every game.

You can go to bit.ly/variabledebug, click See inside and click on the soccer ball sprite to show them the problem of the score not resetting.

in Student Workbook

Debugging SOLUTION



Solution: Add a "set Score to 0" to the "when green flag clicked" script to reset the score when the green flag is clicked

Debugging Solution: bit.ly/A2U4DebugSolution

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Once students have had time to discuss the debugging challenge, go over the solution.

SOLUTION: Add a set block.

The link at the bottom of the slide provides the solution code for the problem.

Got to bit.ly/A2U4DebugSolution, click See inside and click on the soccer ball sprite to show the solution.

Review and Complete the Plan

in Student Workbook

GAME with VARIABLES PLANNING GUIDE

Synchronization:
Write the conversation that the sprites will have to introduce the game and to give instructions when the green flag is clicked

Main Sprite 1: _____
Main Sprite 2: _____
Main Sprite 1: _____
Main Sprite 2: _____
Main Sprite 1: _____
Main Sprite 2: _____
(continue on a separate sheet of paper if there are more directions)

Scripting:
The game play will start by pressing the (circle one): a letter key a number key the space key

Our main sprites will move by pressing the (circle one): (only if your sprites will move in your game)

arrow keys letter keys number keys space key

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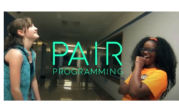
Explain to students that they will review the Game plans from the last session and finish them.

The two sprites will explain the instructions for the game and what the user has to do. Plan out with your partner what each of the sprites will say to explain the theme, rules, and how the game ends.

Decide what event will start your game and how your sprites will move in your game.

Pair Programming

Pair Programming



Driver
Controls the actions of the computer.



Navigator
Helps the driver by thinking about the BIG picture and offering suggestions.

bit.ly/drivernavi

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Introduce/Review the concept of Pair Programming. You can show the Pair Programming video at bit.ly/drivernavi

Key takeaways:

- Driver- types on the computer
- Navigator - offers suggestions

You may want to let students know that programmers often program together in the real world and in all areas of life, we need to be able to work with others and to communicate clearly in order to get things done.

Pair Programming

DO:	DON'T:
Be respectful.	Ignore the navigator. (driver)
Talk about the work.	Hesitate to ask the navigator to repeat what you don't understand. (driver)
Explain what you are doing.	Be a bossy navigator. (navigator)
Switch roles often.	Grab the driver's mouse or keyboard. (navigator)
Think ahead and make suggestions.	

bit.ly/drivernavi

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Reinforce the roles of the driver and navigator by explicitly discussing these do's and don'ts on page 80.

in Student Workbook

Phrases to use while Pair Programming

Driver
Controls the actions of the computer.

What do we want to happen?

Could you repeat that please?

It's my turn to type. What should I add?

We want to ___ by using the ___ block.

Will that script make the sprite ___?

Let's start by ___. Could you ___?

What else can we do to improve this project?

Navigator
Helps the driver by thinking about the BIG picture and offering suggestions.

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These are helpful phrases to have students read through and use as they program the game with their partner.

Build Project (students will start in this class period and then continue during a 2nd class period)

GAME with VARIABLES

DESIGN	IMPLEMENTATION	TESTING
1. I created a variable to keep track of the score.	1. I created a variable to keep track of the score.	1. I tested the variable to make sure it worked.
2. I used a loop to repeat the same action over and over again.	2. I used a loop to repeat the same action over and over again.	2. I tested the loop to make sure it worked.
3. I used a condition to make sure the game ended when the score reached a certain point.	3. I used a condition to make sure the game ended when the score reached a certain point.	3. I tested the condition to make sure it worked.
4. I used a condition to make sure the game ended when the score reached a certain point.	4. I used a condition to make sure the game ended when the score reached a certain point.	4. I tested the condition to make sure it worked.
5. I used a condition to make sure the game ended when the score reached a certain point.	5. I used a condition to make sure the game ended when the score reached a certain point.	5. I tested the condition to make sure it worked.
6. I used a condition to make sure the game ended when the score reached a certain point.	6. I used a condition to make sure the game ended when the score reached a certain point.	6. I tested the condition to make sure it worked.

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Remind the pairs of students of the criteria of the project: design, variables, repeat and conditional loops, synchronization, and events. Mention that the first column contains the project requirements and the next columns provide them with challenge tasks that are above and beyond the requirements. This is the final project! There is a lot that students can show that they know!

If students don't finish their projects today in class, mention that they will be sharing their projects in the next lesson, so encourage them to finish them at home!

in Student Workbook

GAME with VARIABLES Building Guide

Sign in to your Scratch account and click **Create**

hSS your project (Share & Add to Studio (Dance Party Studio))

Add the sprites from your planning sheet.

- Select a backdrop and sprites
- Create and use a Variable
- Animate your sprite
- Use Loops with Conditions
- Coordinate the actions of your sprite

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 Tell students that you are going to walk them through the Building Guide before they start their project. They can refer to page 79 in their workbooks.

Encourage students to turn to their planning guides that they completed in the last lesson to guide them as they build.

in Student Workbook

GAME with VARIABLES Building Guide

Switch backdrop to backdrop

set drag mode: draggable

repeat until

show

hide

THINGS TO TRY

- Use the arrow keys to move your sprite in your game. Use this project that has arrow key scripts: bit.ly/4owwysShareProject
- Add a "time" variable and have it count down from 20 seconds, then stop all and say "Game Over"
- Switch to a different backdrop when the game is over.
- Use "go to" and "wait" blocks in a loop to program sprites to move to different locations on the stage.
- Make your sprite "draggable" and use your mouse to move it.

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Challenge students to stretch themselves and to do the "Things to Try" section.

in Student Workbook

CREATE your VARIABLE

In **Scratch**, you **create** the variables that are used in your project.

Variables: Make a Variable, Make a List, My Blocks, Make a Block

bit.ly/Scratchvariables

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Students will be creating their own variables for this project. Model this process again. They can also refer to page 63 or watch the video:



A2:U4.2 How to create variables Video:

bit.ly/Scratchvariables (Optional - present or assign to class).

Turn and Talk

TURN AND TALK (optional)

Share projects so far with the partner pair next to you. Ask them:

- What they **like most** about their project.
- If they have had any **bugs** in their project.
- If they have any **suggestions** for your project.

If you are able to give your students an extra day to build their projects, perhaps you can use this “Turn and Talk” activity to start the second day of building. The projects, of course, will not be completed but will help students remember where they are in the project and what they are doing.

Game with Variables Rubric

LESSON	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
LESSON 1	Created 1 variable.	Created 2 variables.	Created 3 variables.	Created 4 variables.
LESSON 2	Used 1 variable in a script.	Used 2 variables in a script.	Used 3 variables in a script.	Used 4 variables in a script.
LESSON 3	Used 1 variable in a loop.	Used 2 variables in a loop.	Used 3 variables in a loop.	Used 4 variables in a loop.
LESSON 4	Used 1 variable in a conditional.	Used 2 variables in a conditional.	Used 3 variables in a conditional.	Used 4 variables in a conditional.
LESSON 5	Used 1 variable in a function.	Used 2 variables in a function.	Used 3 variables in a function.	Used 4 variables in a function.

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WHEN STUDENTS COMPLETE THEIR PROJECTS: Have them refer to the project rubric on page 78 and have them put a check next to the descriptions that describe the process. It is a good idea to model this process for your students.