

4.3 Variables: Quest & Plan

(Use->**Modify**->**Create**)

Students will be able to:

1. Modify, delete, and add coding blocks in an existing project.
2. Use, set, and change a variable in Scratch.
3. Collaboratively work in pairs to plan their project.
4. Discuss and decide on the theme, rules, and how their game will end.

Learning Activity Summary

1. [Review how variables are used in a script](#) (5 minutes)
2. [Quest Activity](#) (15 minutes)
-  [Optional: Turn and Talk](#) (on slide) (4 minutes)
3. [Introduce the Games with Variables Project](#) (6 minutes)
4. [Plan the Game with Variables with a partner](#) (20 minutes + additional time allocated in the next lesson if necessary)

Student Materials

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

Teacher Preparation

- [A2:U4.3 Teacher Slide Deck](#) projected
- [Turn and Talk: Script example in Scratch](#)
- Links to example projects:
 - bit.ly/A2U4game1
 - bit.ly/A2U4game2
 - bit.ly/A2U4game3



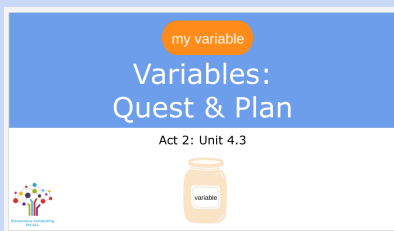
[A2:U4.3 Variables: Quest Google Form](#)



[A2:U4.3 Planning Pages Fillable Slide](#)

- Build your Scratch skills
 - bit.ly/dragSprite
 - bit.ly/Scratchvariables
 - bit.ly/changebackdrop

4.3 Lesson Presentation



ENGAGE

Variables Review

in Student Workbook

Exploring Variables

Fill in the blank spaces in the scripts below so that the value of the **Score** variable is **set** to 0 when the green flag is clicked, and **changes** by 2 every time the sprite touches the edge.



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Let's look at some scripts to review how the set and change variable blocks are used in Scratch. How would you change the first script so the score is set to 0 each time the user clicks on the green flag?

Answer: Put a <press space> **0** in the white argument circle

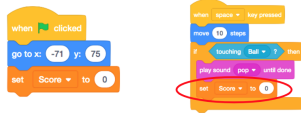
How would you change the second script to make the score increase by 2 each time the sprite touches the edge?

Answer: Put a <press space> **2** in the white argument circle

in Student Workbook

Exploring Variables

I want the **Score** to increase by 1 every time the sprite touches the ball, but the **Score** always stays at 0. Circle the block that needs to be changed in the scripts below.



WB Page 72

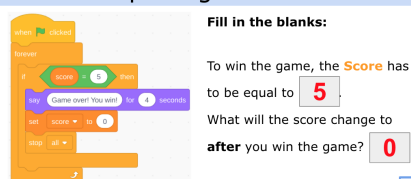


In these scripts, the score should increase by 1 every time the sprite touches the ball, but it doesn't. The score always stays at 0. Can you figure out what needs to be changed?

Answer: <press space> *the "set" block in the second script needs to be a "change" block, and there needs to be a 1 in the white argument circle.*

in Student Workbook

Exploring Variables



Fill in the blanks:

To win the game, the **Score** has to be equal to **5**

What will the score change to **0** after you win the game?

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According to this script, when does a user win the game?

Answer: <press space> *when the score equals 5*



What will the score change to 4 seconds after the game is won?

Answer: <press space> **0**

QUEST

Before you begin your Quest:



WB Page 2



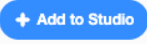
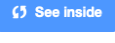
Remind students that the "Quest" is where they get to modify the Scratch project they used in the TIPP&SEE.



Remind students that before they begin the Quest they need to follow this procedure to save their project in their Scratch accounts:



[Roar & hiSS: Reload. Remix. Share. and add to Studio](#)

Show or have students click on the **Reload**  icon on the browser and then the  button to create a copy of the project to their account. **Have them rename the project to your liking.** Then have students click on the  button and add their project to the class studio with  . Then click the  button to start the Quest.

in Student Workbook

Present the Quest. Read through the requirements and brainstorm ideas of how to complete the tasks. Ask students to check off the completed tasks as they code and check their code when they are finished.

Remember, the Quest is designed to be challenging. Encourage the students' productive struggle!

You can choose to use the workbook page or provide a link to the virtual version of this form.



[A2:U4.3 Variables: Quest Google Form](#)

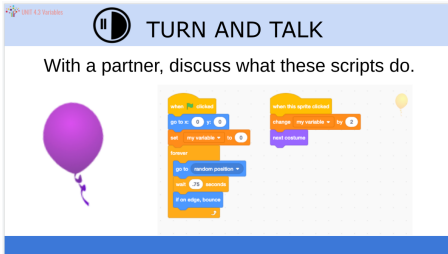
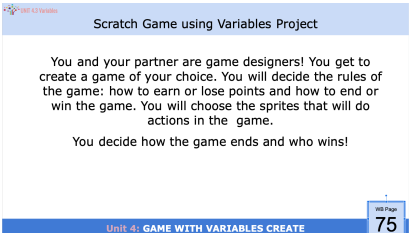
Have students turn to the second page of the Quest on page 74 in their workbooks.



Remember that a bug is something that happens that you did not want or expect to happen in your project. A helpful bug is one where you learn something about coding.

Ask students to list their helpful bug(s) or to state that they did not experience a bug.

If students finish the Quest required activities and reflection early, then can optionally work on the "If You Finish Early" tasks.

Turn and Talk	
	 There are some new blocks in these scripts. Let's do a little exploring. What do you think the new blocks do? Point out the new blocks and have students discuss this question for about 2 minutes. Have one student share what the pair talked about. Discussion points: - What does the “go to random position” block do? - <i>Answer: makes the sprite move to a different/random position on the stage</i> - What does the “if on edge, bounce” block do? - <i>Answer: makes the sprite change directions when it touches the edge of the stage</i> - The coder can give a variable any name they want to. What is the name of the variable in this script? - <i>Answer: “my variable”.</i> Variables should be given a name that represents the value it stores. What would be a good name for the variable in this script? <i>Possible answer: “Score”</i> You can show the script in action by going to this link: bit.ly/A2U4talk
Introduce Games with Variables	
	 Let students know that they will experiment with variables in Scratch by planning and building a unique game of their own design!
<i>in Student Workbook</i> 	 Tell students that for this project, they are game designers! In partners, they get to create a game of their choice. You and your partner will decide the rules of the game: how to earn or lose points. You and your partner will choose the sprites that will do actions in the game, how the game ends and who wins!

Examples of Scratch Games using Variables

DESIGN

- 1. Create 2 main sprites and a background scene.
- 2. Create 1 variable.

VARIABLES

- 1. Create the variable.
- 2. Set the score when the game begins.
- 3. Set the game to end when the score is 10.

SCRIPT AND CONCEPTUAL LOGIC

- 1. When the green flag is clicked, set the score to 0.
- 2. When the score is 10, stop the game.

EVENTS

- 1. When the green flag is clicked, set the score to 0.
- 2. When the score is 10, stop the game.

bit.ly/A2U4game1

Examples of Scratch Games using Variables

DESIGN

- 1. Create 2 main sprites and a background scene.
- 2. Create 1 variable.

VARIABLES

- 1. Create the variable.
- 2. Set the score when the game begins.
- 3. Set the game to end when the score is 10.

SCRIPT AND CONCEPTUAL LOGIC

- 1. When the green flag is clicked, set the score to 0.
- 2. When the score is 10, stop the game.

EVENTS

- 1. When the green flag is clicked, set the score to 0.
- 2. When the score is 10, stop the game.

bit.ly/A2U4game2

Examples of Scratch Games using Variables

DESIGN

- 1. Create 2 main sprites and a background scene.
- 2. Create 1 variable.

VARIABLES

- 1. Create the variable.
- 2. Set the score when the game begins.
- 3. Set the game to end when the score is 10.

SCRIPT AND CONCEPTUAL LOGIC

- 1. When the green flag is clicked, set the score to 0.
- 2. When the score is 10, stop the game.

EVENTS

- 1. When the green flag is clicked, set the score to 0.
- 2. When the score is 10, stop the game.

bit.ly/A2U4game3

Teachers, feel free to share your own game that you created at this time! In the next three slides, you will provide examples of what they can do and how they correspond with the expectations on the rubric.

- Links to example projects:
 - bit.ly/A2U4game1
 - bit.ly/A2U4game2
 - bit.ly/A2U4game3

Be sure to let the class know that they will develop this project in *PARTNERS*.

Also, as you review the games, make students aware of the increasingly challenging requirements of the rubric on page 78.

Note: Each partner can fill out the planning pages in their own workbook, or partners can work together to fill out the planning pages in one workbook.

PLAN

in Student Workbook

GAME with VARIABLES PLANNING GUIDE

GAME THEME

Our game theme is:

The backdrop will be (either describe or draw it here):

GAME RULES how your main sprites will play the game and earn or lose points:

The sprites in our game will do the following actions:

Points will be earned or lost when:

Other rules in our game:

END OR WIN choose the condition that ends and/or wins the game:

1) Our game will end when:

2) The total points needed to win our game is:



The first three things you and your partner need to decide for your game are the **theme**, the **rules**, and **how the game ends**.

The **theme** can be the setting where your game takes place, such as on a basketball court or in space. Another possibility for a theme is to base it on a story, such as using characters from a movie or cartoon, or video game. There are many other possibilities. During this time, sketch out possible backdrops for your game. Next, you will decide **how points will be earned or lost**. These are the rules of the game: what actions will happen in your game to earn or lose points. Lastly, decide **what condition will end the game**. Will it be a certain number of points? Or when a certain task is completed?

Give students about 10 minutes to decide on these three things and write them on their planning pages: the theme, rules, and how the game ends.

in Student Workbook

GAME with VARIABLES PLANNING GUIDE

DRAW OR WRITE about the TWO main sprites that you will use in your project (each sprite should have at least 3 different costumes)

Variables: We will create a **variable** named: _____
 Our **variable** will be set to _____ each time the game starts.
 The game will end when _____ points are scored. (if **END OR WIN** condition 2 is chosen)

Loops with Conditions: (using **lose** _____ points* is optional)
 Our 1st main sprite will **earn** _____ points each time _____ (action)
 Our 2nd main sprite will **earn** _____ points each time _____ (action)
 Our 2nd main sprite will **lose** _____ points each time _____ (action)

Loops / Animations:
 Our 1st / 2nd main sprite will do the following **animation** (using a repeat loop):
 Our sprite's **animation** will start when the user presses or clicks the:
 green flag on the sprite space key arrow key letter/number key

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Next, based on the theme you and your partner chose, think of at least two appropriate sprites that fit your theme. Sketch out what you imagine them to look like.

Then decide what type of variable you will use in your game. Select a name that represents what the variable is.

- Decide what the variable will be initially set at. If you have chosen a certain number of points as the way to win the game, include the number of points required to win the game.
- Add in the details of how points will be earned or lost.

Lastly, for this section, decide on how you will animate your sprites in your game and decide which event block will start the animation.

Give students about 10 minutes to decide on these three things and write them on their planning pages: the sprites, the variable, and the animation.

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)

Events:
 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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The two sprites will explain the instructions for the game and what the user has to do. You will 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.

Note: Students will work on this in the following lesson. Just review this with them so they are aware that it is part of the planning pages for the project.

GAME with VARIABLES RUBRIC

	1st Column	2nd Column	3rd Column
DESIGN	Created 2 main sprites (each with at least 3 different costumes)	Created 2 main sprites (each with at least 3 different costumes)	Created 2 main sprites (each with at least 3 different costumes)
VARIABLES	Used a variable to track points earned/lost	Used a variable to track points earned/lost	Used a variable to track points earned/lost
ANIMATION	Used a loop to animate the sprites	Used a loop to animate the sprites	Used a loop to animate the sprites
EVENTS	Used an event block to start the game	Used an event block to start the game	Used an event block to start the game
MOVEMENT	Used a movement block to move the sprites	Used a movement block to move the sprites	Used a movement block to move the sprites

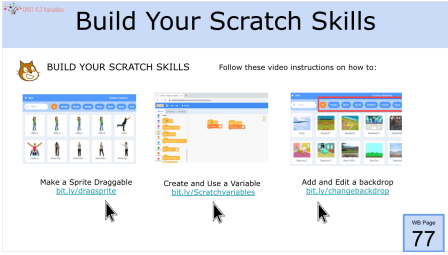
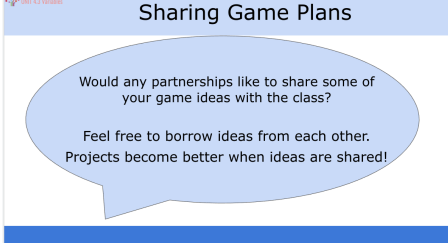
WB Page 78



Direct students to page 78 in their workbook. This is a review of the criteria rubric for the project. Your main goal is to complete all the tasks in the first column. If you would like to challenge yourselves, you can also complete tasks from the 2nd and 3rd columns. Use this rubric as you plan your project.

Emphasize that the skills in the 2nd and 3rd columns are additional skills that they should try once they have completed all the requirements in the 1st column.

This rubric is in the planning section in order to give students a chance to decide in what areas they will challenge themselves.

	The rubric will be discussed again in the next “building” lesson.
<i>in Student Workbook</i> 	If students finish early, encourage them to review how to make sprites draggable, review how to create and use a variable, and how to change the backdrop.
	(<i>Optional</i>) If time allows at the end of the lesson, ask a few partnerships to share some ideas from their game plan.