**Lesson 3** Practice with Conditionals

**How can we use mouse position to make a sketch interactive?**

| **Overview** | |
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| In this lesson, students will practice using “if” statements in their sketches. They will work in pairs to try to recreate their partner’s sketches using conditionals that test for the position of mouseX and mouseY. | |
| **Lesson Objectives** | |
| Students will be able to   * Write an “if” statement that contains multiple actions within the code block * Use “if” statements to update the background, fill, and parameters of shapes * Make a sketch interactive by creating thresholds for mouseX and mouseY | |
| **Suggested Duration** | |
| One period (45 minutes) | |
| **Blueprint Foundations Student Outcomes (**https://blueprint.cs4all.nyc/outcomes/) | |
| Abstraction  Analyze | **Describe** how I might use patterns to express an idea. |
| Abstraction  Prototype | **Describe** different things I tried in order to achieve a goal. |
| Algorithms  Analyze | **Describe how** instructions can have different outputs depending on inputs. |
| Programming  Analyze | **Experiment** with the commands of a programming language. |
| **Vocabulary** | |
| There is no new vocabulary in this lesson. | |
| **Planning Notes** | |
| * For the **Do Now**, students should continue on yesterday’s Sunset Lab. The starter code and prompts are [here](https://editor.p5js.org/mparker/sketches/fFHwiRs-O). * Print out copies of the Guess My Conditional [worksheet](https://drive.google.com/open?id=1g6MPJ-GtbWF2kAdw_DUZFsFNFOKnem0YHMQxNkte67Q).   + Note that the two pages are very similar, but the first page asks for the **mouseX** conditional, and the second asks for the **mouseY** conditional   + Completed [worksheet](https://drive.google.com/open?id=1n786MzeSSh9cqp7DTD4odwDw2-Qrep-7) for reference | |
| **Resources** | |
| * N/A | |
| **Assessments** | |
| * During the **Sunset Lab Review**, circulate to see how far students progressed in the code. Check for the ability to:   + Reassign a new value to an existing variable (yPosition = 350)   + Use proper syntax when writing if statements * After the **Sunset Lab Review**, assess students’ answers in their design journals. Check for the ability to:   + Identify the condition being tested   + Explain what happens to the sketch when the condition is true. * Assess the **Wrap Up**. Check for the ability to:   + Explain how different inputs can lead to the same output | |

| **Do Now: Sunset Lab Continued** |
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| Students should review the Sunset Lab from Lesson 2 and write down any questions they have. For students who were absent or forgot to save, the starter code and prompts are [here](https://editor.p5js.org/mparker/sketches/fFHwiRs-O).  Note: If students didn’t get at least 15 minutes to work on the lab, you may want to allot some time for students to continue independent work on their labs before reviewing as a class. |
| **Discussion** |
| There is no new material being introduced in this lesson. |
| **Teacher Demo** |
| * Sunset Lab Review   + Circulate the room and check in on how far students progressed in the lab. Find a student to get up in front of class and do a walkthrough of their code. It is not necessary for this student to have fully completed the lab.   + After their code is up on the projector, ask the student to explain what they did to follow the prompts and how this affected their code. Encourage the student to talk about any struggles they encountered or lingering questions. If the student didn’t finish the lab, finish it together as a class. The completed code is below, but you can also view the sketch [here](https://editor.p5js.org/mparker/sketches/bN91HQkRL).      * + If students have any unanswered questions from the **Do Now**, they should ask them now.   + For students who are confused by how the crescent moon is being drawn, change the fill in the second conditional to a different color, like red. This will help them understand that the sketch uses an overlapping ellipse to create the illusion of a crescent shape.   + Students may point out that the two if statements test for the same condition, and ask if there is a way to combine them. If any students completed the extension, ask one of them to explain their solution to the class. Otherwise, validate the observation and let students know that they will learn more about conditionals in the upcoming days, and discover new ways to eliminate this kind of repetition. * Check For Understanding - Have students answer the following questions in their **Design Journals**:   + What condition is being tested?   *Answer: The condition tests whether the y position of the mouse is greater than 200 pixels, on the lower half of the canvas.*   * + What happens when the first condition is true?   *Answer: The background becomes dark blue, and the ellipse becomes white and changes its y position from 100 to 350.*   * + What happens when the second condition is true? How is the crescent moon drawn?   *Answer: A new dark blue ellipse is drawn over the white ellipse, making it look like a crescent.*   * Guess My Conditional Demo   + In the next activity, students will get to make up their own conditionals. First, share [this example](https://editor.p5js.org/mparker/sketches/EwKs-a1e7). When the mouse crosses certain thresholds, it looks like this:      * + Ask students to identify what is changing about the shapes. There may be some discussion about whether the position, height, or both position and height of the rectangle are changing in the conditional.   + Turn and Talk: Ask students to work with a partner to look for clues in the code to figure out which parameters are being changed. If they need a nudge, encourage them to think about the variables that have been declared.   You may expand on student responses using the following language: “Remember that we use variables to manage changes in our code. If you look at the top of this sketch, you can see variables named circleX, circleSize, and rectY. Since there’s no variable for rectHeight, it’s pretty likely that the height stays the same. This is confirmed when we scroll down and see that there is only one rectangle drawn on line 32, and the parameter for height is hard-coded at 400 pixels. The canvas is too small to show the rest of the rectangle, making it look like the height has changed.” |
| **Student Activity: Guess My Conditional** |
| In the first part of this activity, students will be designing their own two-shape sketches. One shape should change based on the mouseX position, and one shape should change based on the mouseY position. Have students begin by filling out [this worksheet](https://docs.google.com/document/d/1g6MPJ-GtbWF2kAdw_DUZFsFNFOKnem0YHMQxNkte67Q/edit?usp=sharing) and following the prompts below. An example of a completed worksheet is [here](https://drive.google.com/open?id=1n786MzeSSh9cqp7DTD4odwDw2-Qrep-7).   1. Pick any 2D shape 2. Choose a **condition** to test for mouseX (like, mouseX > 50, or mouseX < 333) 3. Shade in where the mouse can be on the canvas when the condition is false or true. 4. Pick **one** shape attribute to change: fill, stroke, or strokeWeight.    1. Write the value of that attribute when the condition is false or true. 5. Pick **one** shape parameter to change.    1. Choose a **variable** name for that parameter (like xPos, or width);    2. Write the value for the variable when the condition is false or true. 6. Draw what the shape looks like when the condition is false or true. 7. Repeat steps 1 - 4 with a different shape and condition for mouseY   When students are finished with their designs, share the [starter code](https://editor.p5js.org/mparker/sketches/qHdne_Jm_) with students, as well as the [previous example](https://editor.p5js.org/mparker/sketches/EwKs-a1e7) for their reference. Explain that their code should follow the structure of the in-class example. It is fine if some students only have time to create a conditional for one shape—those students can choose to have that conditional test for mouseX or mouseY.  In the second part of this activity, students will work in pairs to try to recreate each other’s sketches. They should open up a new sketch called “Guess [Partner’s Name’s] Conditional.” Students should share their sketches by going to File -> Share and copying the “Present” link so their code stays hidden.  Before the Wrap Up, allow students to reveal their code so they can compare their recreation to the original and discuss similarities and differences with their partners. |
| **Wrap Up** |
| * In their **Design Journals**, students should answer the following questions:   + Were you able to recreate your partner’s sketch?   + What did you enjoy about this exercise? What did you struggle with?   + Is it possible for two sketches to look the same but have different conditionals? Explain how that might happen. |