Lesson 7: Happy Loops

33 minutes

Overview

This **context-setting** lesson revisits Happy Maps. This time, students will use loops to solve bigger, longer puzzles with their code.

Purpose

This lesson serves as an introduction to loops. Loops allow for students to simplify their code by grouping commands that need to be repeated. Students will develop critical thinking skills by noticing repetition in movements of their classmates and determining how many times to repeat commands. By seeing "Happy Maps" again, students will get the chance to relate old concepts such as sequencing to the new concept of repeat loops.

Standards

Full Course Alignment

CSTA K-12 Computer Science Standards (2017)

▶ **AP** - Algorithms & Programming

Agenda

Warm-Up (5 minutes)

Main Activity (20 minutes)
- **Happy Loops**

Wrap Up (8 minutes)
- **Reflection**

Extended Learning

Objectives

Students will be able to:

- Identify repeating code and use numbers to shorten multiple actions into a single loop.
- Interpret a program with loops as a series of multiple actions.

Preparation

- Print out a ***Worksheet** to display for the class
- Per each group of 2-3, print one of each: ***Game pieces, *XL Worksheet, and *Bonus Pack Manipulatives**.
- Make sure each student has a Reflection Journal.

Links

Heads Up! Please make a copy of any documents you plan to share with students.

For the teachers

- **CSF Course A Lesson Slides** - Slides (**Download**) ▾ Make a Copy

For the students

- **Feeling Faces Emotion Image** - Resource ▾ Make a Copy
- **Happy Map Cards** - Worksheet ▾ Make a Copy
- **Happy Map Cards XL** - Worksheet ▾ Make a Copy
- **Happy Map Game Pieces** - Manipulatives ▾ Make a Copy
- **Happy Map Game Pieces Bonus Pack** - Manipulatives ▾ Make a Copy

Vocabulary

- **Algorithm** - A list of steps to finish a task.
- **Loop** - The action of doing something over and over again.
- **Repeat** - To do something again.

Teaching Guide

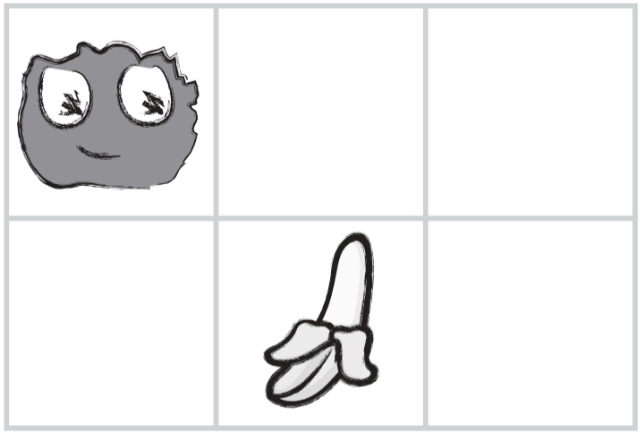
Warm-Up (5 minutes)

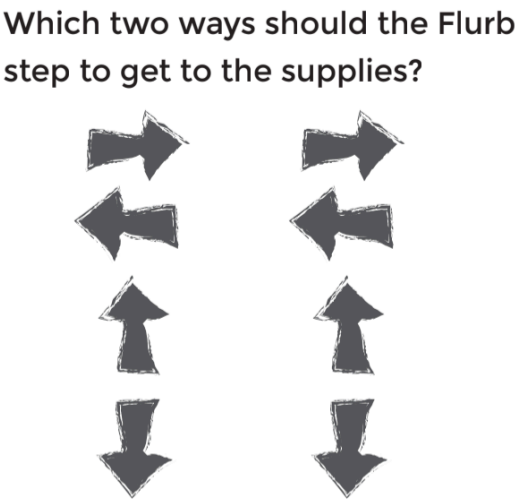
Happy Maps Review

Display: Show "Happy Maps Review" slide

This lesson builds off of the Happy Maps activity from earlier in the year. Students might benefit from a quick refresher before you hop into the difficult stuff.

Display:





Model: Select one of the maps that your class covered together in the last lesson.

Have students look at the puzzle, then think-pair-share their solution for how they would get the flurb to the fruit (using the symbols from last time).

Think: *Do you remember writing programs to get the flurbs to the fruit? What would this program look like coded with arrows?*

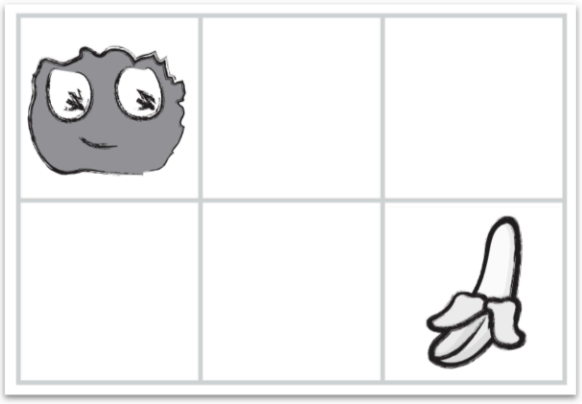
Pair: Have students discuss for about 90 seconds.

Share: Ask a student to use their fingers to point in the direction of the arrows that they chose to solve this puzzle.

Debugging Review

Display: Show "Debugging Review" slide

This activity is designed to help students review how to debug.





There's a bug with this code. Can you figure out how to fix the error?

Display:

Model: Ask students if they can spot the error with the code. Ask them where the Flurb ends up with the current algorithm.

Think: *What should we change in the algorithm to get the Flurb to the banana?*

Pair: Have students discuss for about 30 seconds.

Share: Ask a student to use their fingers to point in the direction of the arrows that they chose to solve this puzzle.

Display: Show "Vocabulary" slide

Say:

- **Loop** - The action of doing something over and over again.
- **Repeat** - To do something again.

Main Activity (20 minutes)

Happy Loops

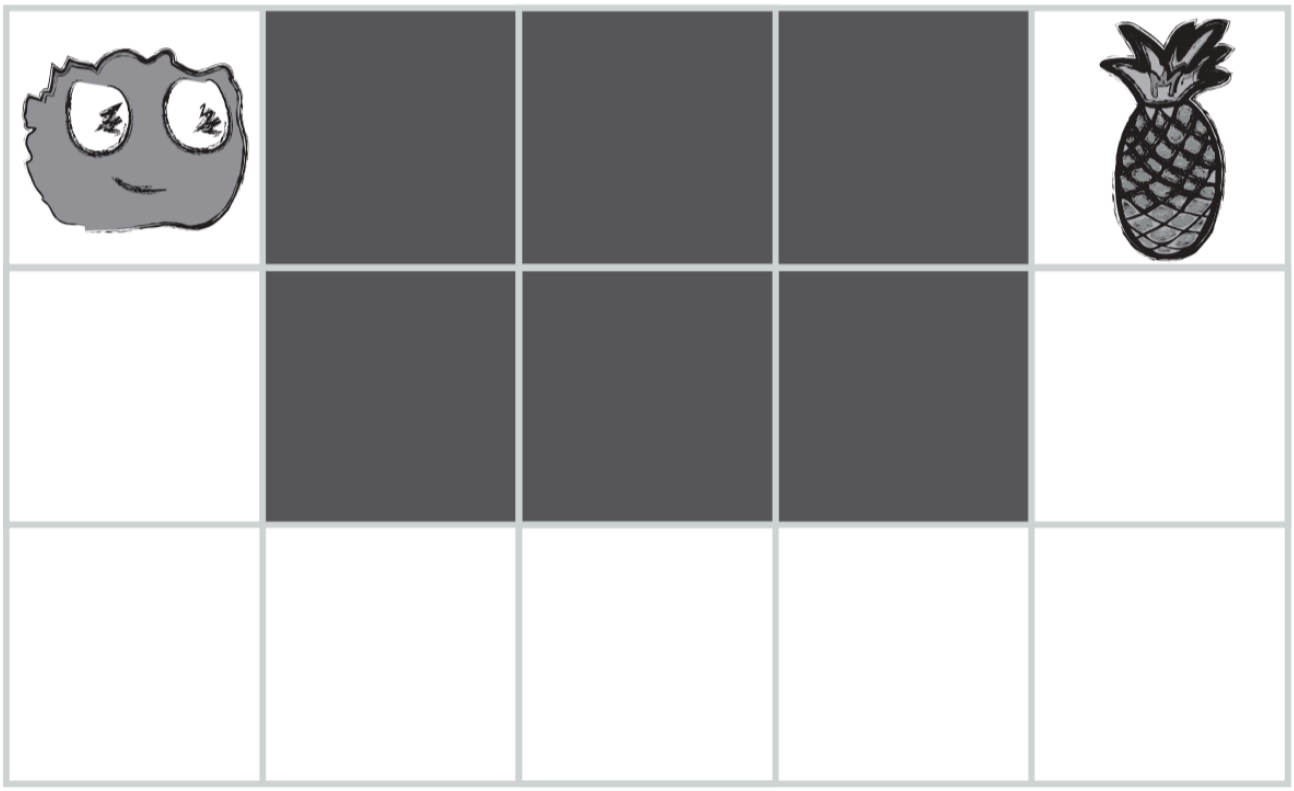
Display: Show "Happy Maps XL" slides

1 **Happy Loops - Unplugged Activity**

2 **Happy Loops - Student Resources**

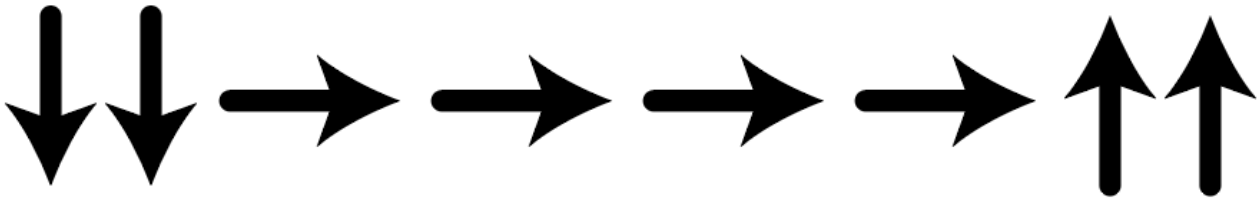
This portion of the lesson should help students see that there is an easier way to handle repetitive code than to brute force a solution with dozens of the same symbols.

Display:



Model: Once you are confident that your students remember Happy Maps, pull up one of the new -- and much longer -- *Happy Maps XL*.

Can your students help you program these maps? The resulting code might look something like this:

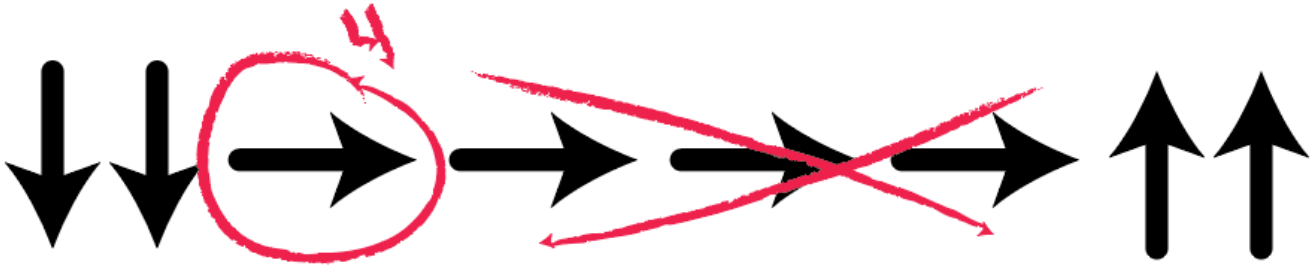


It's a bit longer, isn't it?

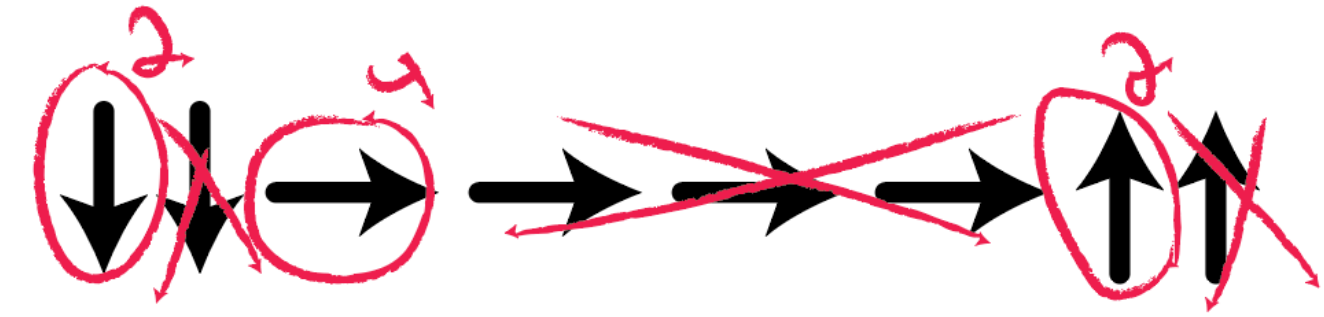
Discuss The point of this discussion is to get students to see that, sometimes, many symbols are repeated and they can lump all of those movements into a single icon.

Give students the opportunity to brainstorm shorter ways to relay the code that they're creating. (This bit can be skipped over if your students start saying things like: "Move forward 6 times." Since that will open the discussion about how to show "six times" with symbols.)

Ideally, students will land on a method that looks like this one:



Which can be reduced even further to this:



Eventually, students can write programs like this on the fly:



Define: Once students have put together the idea of repeating code, give them the vocabulary around it. Make sure to share with them that often the terms “repeat something” and “loop something” will be used interchangeably in Code Studio.

Happy Loops

Display: Show "Let’s do one more together!" slide

Now that students are familiar with the ability to repeat lots of code using a single loop, select an XL map and let them help you write code for the situation. Do this as many times together as a class as you need, then set students off in groups to solve some problems on their own. You may also need to add the ***Game Pieces Bonus Pack** to adapt this activity for loops.

Circulate: Make sure to walk around and have students run through their code with you watching. Are there any bugs? Use the debugging questions to help them find a solution.

- *What does it do?*
- *What is it supposed to do?*
- *What does that tell you?*
- *Does it work at the first step?*
- *Does it work at the second step?*
- *Where does it stop working?*

Wrap Up (8 minutes)

Reflection

Display: Show "Reflection" slide

Prompts:

- Draw a face that shows how you felt about today's lesson in the corner of your journal page.
- Have the students write or draw something in their journal that will remind them later what loops are. Prompts include:
  - What does "repeat" mean to you?
  - Draw a picture of you repeating something.

Extended Learning

Use these activities to enhance student learning. They can be used as outside of class activities or other enrichment.

- Create a life-size grid on the rug with tape and have student bring stuffies to school. Now students can program friends to move their actual stuffies as directed in the programs.
- Have students create their own maps for other students to solve using loops.
- Draw a program on the board that uses several sets of repeated commands and have students take turns coming to the front to swap symbols for repeat loops.



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