Lesson 8: Loops with Scrat

55 minutes

Overview

In this **skill-building** lesson, students will practice loops in programming puzzles where the goal is to help the squirrel reach the acorn.

Purpose

In this lesson, students will be learning more about loops and how to implement them in Blockly code. Using loops is an important skill in programming because manually repeating commands is tedious and inefficient. With these Code.org puzzles, students will learn to add instructions to existing loops, gather repeated code into loops, and recognize patterns that need to be repeated.

Standards

Full Course Alignment

CSTA K-12 Computer Science Standards (2017)

- ▶ **AP** - Algorithms & Programming

Agenda

Warm Up (10 minutes)
- **Unplugged Review**

Bridging Activity - Choose One (10 minutes)
- **Unplugged Activity Using Paper Blocks**
- **Previewing Online Puzzles as a Class**

Main Activity (30 minutes)
- **Loops with Scrat**

Wrap Up (5 minutes)
- **Reflection**

Extended Learning

Cross-Curricular Opportunity

Objectives

Students will be able to:

- Construct a program using loops to solve puzzles with repeated sections of code.
- Improve existing code by finding areas of repetition and replacing them with a loop.

Preparation

- Review the previous unplugged lesson and develop questions to remind students why loops are used.
- (Optional) Pick a couple of puzzles to do as a group with your class.
- Gather supplies from previous Happy Loops to reuse for warm up
- 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 Images ▾ Make a Copy
- **Happy Map Cards** - Worksheet ▾ Make a Copy
- **Happy Map Game Pieces** - Manipulatives ▾ Make a Copy
- **Happy Map Game Pieces Bonus Pack** - Manipulatives ▾ Make a Copy

- **Pair-Programming** - Video (**Download**)
- **Unplugged Blockly Blocks (Grades K-1)** - Manipulatives Make a Copy

Vocabulary

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

Teaching Guide

Warm Up (10 minutes)

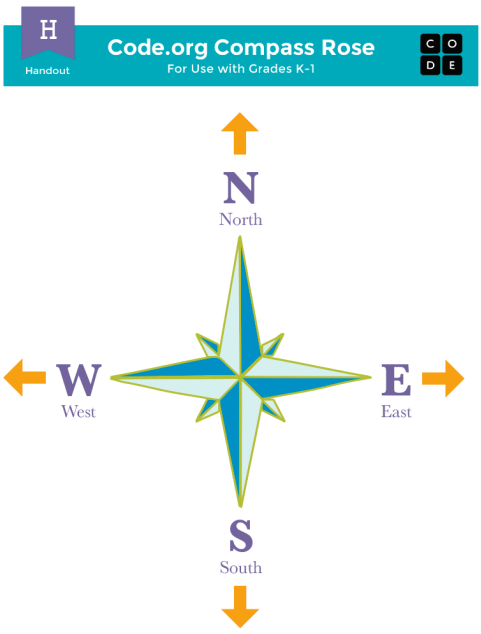
Unplugged Review

Display: Show "Review" slide

This lesson relies on the concept of `repeat` loops that students learned in the previous unplugged activity, Happy Loops. It is important to bring this idea from the real world into digital form so that students understand how to use Blockly blocks to repeat a task multiple times.

Teaching Tip

If your class has already learned cardinal directions, then changing "Up" and "Down" to "North" and "South" shouldn't be a problem. If they have not, we have provided a handy worksheet with the Code.org Compass Rose that you can use to get students onboard. This conversion will come in handy for nearly all of the online puzzles aimed at kindergarten and first grade.



Let students know that they will see those letters in their online programs next to the direction arrows.

Display: Show students map from the "Happy Loops" exercise that they completed in the lessons prior to this one.

Discuss: Ask students to recall the symbols used in "Happy Loops."

- *What happens when "East" arrow is circled with the number 3? (It moves E 3 times)*
- *What is it called when we circle an arrow and add a number?* `repeat`

Transition: Once you are satisfied that your students remember "Happy Loops", you can move into the Bridging Activity.

Bridging Activity - Choose One (10 minutes)

Teaching Tip

If you predict that your students will have trouble with the idea of using `repeat` loops to not only move, but also pick corn, you can introduce this idea in the Bridging Activity. This will help students understand that loops can have many different uses.

Unplugged Activity Using Paper Blocks

Display: Show "Option 1: Paper Blocks" slide

Select an empty flurb map from the ***Worksheet** and give students ***Blockly Blocks** prefilled with the `collect` command, a `repeat` loop, and the cardinal commands like `E →` (East) and `W ←` (West). Now, have the students program the flurb from their desks using the paper Blockly blocks to get the flurbs to collect the fruit. Make sure that they understand that the blocks need to go from top to bottom and they all need to touch!

-Or-

Previewing Online Puzzles as a Class

Display: Show "Option 2: Preview Puzzles as a Class" slide

Pull a puzzle from the corresponding online puzzles. We recommend puzzle 4. Using arrows, have students lay out a pattern that they think will get *Scrat* to the acorn. Ask the students to share. See how many other students had the same answer!

Main Activity (30 minutes)

Loops with Scrat

Online Foundation - Preview Loops in Ice Age

To finish the connection, preview an online puzzle (or two) as a class.

Model: Reveal an entire online puzzle from the progression to come. We recommend Lesson 8, Puzzle 5. Point out the "Play Area" with *Scrat* and the acorn, as well as the "Work Space" with the Blockly code. Explain that this Blockly code is now the language that the class will be using to help *Scrat* get to the acorn. Do students see any similarities to the exercise that they just did? What are the big differences?

Work with your class to drag code into the workspace in such a way that *Scrat* (eventually) gets to the acorn.

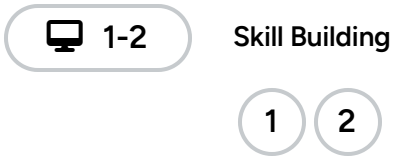
Transition: Students should now be ready to transition to computers to complete online puzzles on their own.

As students work through the puzzles, see if they can figure out how many blocks they use with a loop vs. without a loop.

Display: Show “Decompose it!” slide

Remind students to break each puzzle down into smaller steps.

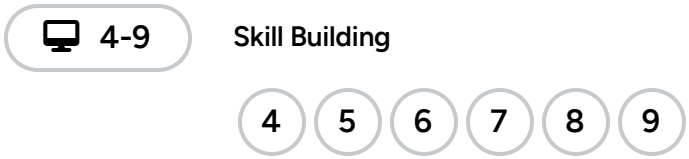
Display: Show "Level 1-2: Skill Building” slide



Display: Show "Video: Ice Age Loops” slide



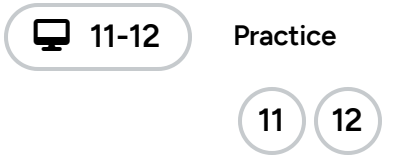
Display: Show "Level 4-9: Skill Building” slide



Display: Show "Level 10: Challenge” slide



Display: Show "Level 11-12: Practice” slide



Teaching Tip

Show the students the *right* way to help classmates by:

- Don’t sit in the classmate’s chair
- Don’t use the classmate’s keyboard
- Don’t touch the classmate’s mouse
- Make sure the classmate can describe the solution to you out loud before you walk away

Circulate: Teachers play a vital role in computer science education and supporting a collaborative and vibrant classroom environment. During online activities, the role of the teacher is primarily one of encouragement and support. Online lessons are meant to be student-centered, so teachers should avoid stepping in when students get stuck. Some ideas on how to do this are:

- Utilize ***Pair Programming** whenever possible
- Encourage students with questions/challenges to start by asking their partner
- Unanswered questions can be escalated to a nearby group, who might already know the solution

- Remind students to use the debugging process before you approach
- Have students describe the problem that they're seeing. What is it supposed to do? What does it do? What does that tell you?
- Remind frustrated students that frustration is a step on the path to learning, and that persistence will pay off.
- If a student is still stuck after all of this, ask leading questions to get the student to spot an error on their own.

Wrap Up (5 minutes)

Reflection

Display: Show "Reflection" slide

Prompts:

- What was today's lesson about?
- Draw a face that shows how you felt about today's lesson in the corner of your journal page.
- Draw *Scrat* and an acorn.
- Draw yourself using a loop to do an everyday activity, like brushing your teeth.

Extended Learning

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

So Moving

- Give the students pictures of actions or dance moves that they can do.
  - Have students arrange moves and add loops to choreograph their own dance.
- Share the dances with the rest of the class.

Connect It Back

- Find some YouTube videos of popular dances that repeat themselves.
- Can your class find the loops?
- Try the same thing with songs!

Cross-Curricular Opportunity

Help Your Sunflower Grow (90-120 minutes)

Computer Science + English Language Arts + Math + Science

Help Your Sunflower Grow is an optional activity aligned to Common Core ELA, Common Core Math and Next Generation Science Standards, written by our teacher community. Students will practice sequencing using tangible cards.

Standards Addressed:

- **NGSS K.LS.1** Use observations to describe patterns of what plants and animals (including humans) need to survive.
- **CCSS.MATH.CONTENT.K.CC.B.4.A** When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.

- **CCSS.MATH.CONTENT.K.G.A.1** Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.
- **CCSS.ELA-LITERACY.L.K.4.A** Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on kindergarten reading and content.



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