Pre-Express Course

Pre-readers and early readers can learn the basics of computer science and internet safety.

Teacher Links: Teacher Videos Playlist

Lesson 1: Debugging: Unspotted Bugs
Unplugged | Bug | Debugging | Persistence

Lesson 2: Persistence & Frustration: Stevie and the Big Project
Unplugged | Fail | Frustrated | Persistence

Lesson 3: Real-Life Algorithms: Plant a Seed
Unplugged | Algorithms

Lesson 4: Learn to Drag and Drop
Click | Double-Click | Drag | Drop | Pair Programming

Lesson 5: Common Sense Education: Your Digital Footprint
Common Sense Education | Unplugged

Lesson 6: Programming Unplugged: My Robotic Friends
Algorithms | Debugging | Unplugged

Lesson 7: Programming in Maze
Algorithms | Debugging | Program | Programming

Lesson 8: Programming in Star Wars
Programming | Maze

Lesson 9: Loops Unplugged: My Loopy Robotic Friends
Unplugged | Loop | Repeat

Lesson 10: Loops in Collector
Loop | Collector

Lesson 11: Loops in Artist
Loop | Artist

Lesson 12: Events Unplugged: The Big Event
Event | Unplugged

Lesson 13: Events in Play Lab
Event | Play Lab
Lesson 14: Spelling Bee
If you are interested in licensing Code.org materials for commercial purposes, contact us.
Lesson 1: Debugging: Unspotted Bugs

Overview

This lesson will guide students through the steps of debugging. Students will learn the mantra: “What happened? What was supposed to happen? What does that tell you?”

Purpose

Research shows that some students have less trouble debugging a program than writing one when they first learn to code. In this lesson, we introduce the idea of debugging in a real world sense.

The goal in this lesson is to teach students steps to spot a bug and to increase persistence by showing them that it’s normal to find mistakes. In later lessons, students will debug actual programs on Code.org.

Agenda

- Warm Up (12 min)
  - Unspotted Bugs
  - Vocabulary
- Marble Run Breakdown (10 - 20 min)
  - Debug the Run
- Wrap Up (10 - 20 min)
  - Journaling
- Extended Learning
  - Real Life Bug Hunting

Objectives

Students will be able to:
- Express that they have noticed when something goes differently than what is expected.
- Identify what the expected result was before an error occurs.
- Determine and describe the difference between what was expected and what actually happened in the event of an error.

Preparation

- Watch the Unspotted Bugs - Teacher Video.
- Review the Unspotted Bugs Story (Unspotted Bugs - Storybook (PDF)).
- Pre-read Unspotted Bugs to identify appropriate questions for your classroom.
- Follow instructions in the Marble Run - Teacher Prep Guide to make a Marble Run (which will be arranged incorrectly at the start).
- Give a Think Spot Journal - Reflection Journal to each student.

Links

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

For the Teacher
- Unspotted Bugs - Teacher Video
- Marble Run - Teacher Prep Guide
- Unspotted Bugs - Storybook (PDF)
- Think Spot Journal - Reflection Journal

For the Students
- First Computer Bug - Student Video

Vocabulary

- Bug - Part of a program that does not work
correctly.

- **Debugging** - Finding and fixing problems in an algorithm or program.
  - **Persistence** - Trying again and again, even when something is very hard.
Teaching Guide

Warm Up (12 min)

Goal: Help students understand the steps involved in debugging.

Unspotted Bugs

This story can be presented in several ways, including:

- Circled up story time
- Projected with document camera / smartboard
- Pair shared with students at their computers

The story of Unspotted Bugs presents many of the ideas that students will need to understand the debugging process of coding. This warm-up is meant to tie a memorable story together with a concept that young kids often find to be difficult.

Read the book and discuss the techniques that JD used to discover and take care of bugs. Make sure those questions and tactics get repeated often enough that students can recall (if not recite) them without the story in hand.

Potential Questions for Storytime:

- Page 3: What do you notice in the picture? What’s wrong with the flower? (It’s upside down!) What’s wrong with the clock? (The hands aren’t in the center) Why do you think there is something wrong with these items? (Because there are bugs on them!)
- Page 7: What’s wrong with the picture? (The lamp is upside down) Why is that? (There’s a bug)
- Page 11: What’s wrong in this scene? (The car doesn’t have wheels!) Why? (Because there are bugs on it!) What did JD find when he went looking for the bug? What was wrong? What does this mean? (JD found an upside down tree. This is wrong because the tree trunk should be touching the ground! This means there is a bug on the tree!)

Vocabulary

This lesson has three new and important vocabulary words:

- **Bug** - Say it with me - Buhh-g. Something that is going wrong. An error.
- **Debugging** - Say it with me: Dee-bug-ing. To find and fix errors.
- **Persistence** - Say it with me: Purr-siss-tense. Not giving up. Persistence works best when you try things many different ways, many different times.

Marble Run Breakdown (10 - 20 min)

Goal: Help students think critically about the difference between what is happening and what is expected.

Debug the Run
Now that students have been introduced to the idea of looking for problems, they can try to apply it to more places in the real world. This next activity gives them practice looking for bugs in Marble Runs (a project that they will be working with next week.)

Grab your sample marble run (built from our plans, or something similar.) Show the students how each piece works, then demonstrate putting them together (but put them together incorrectly, to prevent the ball from flowing properly from A to B.

The goal of this exercise is to help the students identify when something goes wrong, so if they don’t catch it the first time, run it again, and again. It can help to make exaggerated frustration faces when the ball doesn’t do what you would like it to do.

Let the students share hypotheses about what is going wrong, and how to fix it. Students should feel free to try things that you know will be incorrect. If students misidentify solutions, use the bug finding formula on their configurations. Repeat until you get a working run.

Encouragement is key here. If things don’t work right away, praise the class for being so persistent and choosing not to give up. If they start to get frustrated, encourage them to persist a bit longer, promising them that they will get it soon if they just hang in there.

Wrap Up (10 - 20 min)

Journaling

Goal: Students will start to understand the importance of the activity they just completed by reflecting on it verbally, then through drawing in their journals.

Clear your mind:

It can be distracting to a learner when they have unanswered questions or doubts. To end this lesson, we’ll give everyone the chance to get those out so that they can reflect on what they’ve been taught.

Encourage students to share their thoughts and questions either with the whole class or with an elbow partner.

Journal Prompts:

Once they’ve had time to ponder their own thoughts, get the students thinking about the purpose of the lesson that they just learned. Why did you do this activity? How will it help them later? Can they think of buggy things that they’ve seen in the real world?

Students should finish by drawing or writing in their journal. Possible topics include:

- How do you feel when something that you are working on acts buggy?
- How many times do you think you should try to fix a bug before you give up?
- What would you do if you notice that something is buggy, but you don’t know how to fix it?

Extended Learning
Real Life Bug Hunting

Take your students outside. Do you see any signs of bugs? What are they? Now look closer... can you find the actual bug?

Lesson Tip:
The signs of real-live bugs won't be as dramatic as upside down trees, but it might be dead leaves, spots on flowers, or slime on the sidewalk. Have the students brainstorm these before going outside to look for them.

Standards Alignment

CSTA K-12 Computer Science Standards

- AP - Algorithms & Programming

If you are interested in licensing Code.org materials for commercial purposes, contact us.
Lesson 2: Persistence & Frustration: Stevie and the Big Project

Unplugged | Fail | Frustrated | Persistence

Overview

When students run into a barrier while answering a question or working on a project, it’s so easy for them to get frustrated and give up. This lesson will introduce students to the idea that frustration can be an important part of learning. Here, frustration is presented as a step in the creative process, rather than a sign of failure.

This lesson can be done over one or two class sessions. If you have more time, feel free to draw out the building and revising phase of the Marble Run activity.

Purpose

The goal of this lesson is to help students realize that failure and frustration are common when working on projects, but that doesn’t mean that they should give up.

In this lesson, students will develop an understanding of what it means to be frustrated while working on a large project. It’s possible that not every student will experience frustration with this activity, but there are many opportunities to open a discussion about moments in the past where students have felt frustrated but nevertheless persisted.

Agenda

Warm Up (15 min)
  - Stevie and the Big Project Vocabulary
Marble Run (20 - 45 min)
  - Before the Project: Building the Marble Run:
  - After the Marble Run:
Wrap Up (5 min)
  - Journaling
Extended Learning

Objectives

Students will be able to:
- Recognize and point out symptoms of frustration.
- Describe at least one reason why they will choose to be persistent in the face of frustration, rather than giving up.

Preparation

- Watch the Stevie and the Big Project - Teacher Video.
- Pre-read "Stevie and the Big Project" to identify appropriate questions for your class (Stevie and the Big Project - Storybook (PDF)).
- Follow instructions in the Marble Run - Teacher Prep Guide to make a Marble Run.
- Print copies of the Marble Run Ruler (page 2 of teacher guide) for each student or pair of students
- Prepare a resource station with cardstock, safety scissors, tape, and anything else you think might be fun for students to build with. Include a stack of the “Marble Run Hints” pages from the Teacher Prep Guide, but do not advertise their existence.
- (Optional) Allow students to bring cardboard, popsicle sticks, string, or other tidbits from home to add to the resource station.
- Make sure each student has a Think Spot Journal - Reflection Journal.

Links

Heads Up! Please make a copy of any documents you plan to share with students.
For the Teacher
- Stevie and the Big Project - Teacher Video
- Marble Run - Teacher Prep Guide
- Stevie and the Big Project - Storybook (PDF) (download)
- Think Spot Journal - Reflection Journal

Vocabulary
- F.A.I.L. - First Attempt In Learning
- Frustrated - Feeling annoyed or angry because something is not the way you want it.
- Persistence - Trying again and again, even when something is very hard.
Teaching Guide

Warm Up (15 min)

Stevie and the Big Project

Goal: Introduce students to the idea that they don’t have to give up just because they are frustrated.

This lesson begins with a story. Students will be introduced to several ideas on persistence and frustration through relatable struggles by fictional characters, including the idea that frustration is not a sign that someone should instantly give up.

This book can be presented in several ways, including:

- Circled up story time
- Projected with document camera / smartboard
- Pair share with students at their computers

Use the reading techniques that work in your classroom:

If your students like to discuss things that happen as they appear in the book, be sure to stop your class after large plot areas like when Stevie breaks her structure, or when Laurel explains frustration.

If your students like to sit through a whole story and discuss at the end, read through the book, then prompt their memory with some “Remember when…” type questions.

Vocabulary

- **Persistence** - Say it with me: Purr-siss-tense. Not giving up. Persistence works best when you try things many different ways, many different times.
- **Frustrated** - Say it with me: Frus - straight - ted. Feeling annoyed or angry because something is not the way you want it.
- **F.A.I.L.** - First Attempt in learning. When you try to do something, but you don't do it quite right.

Sample Questions:

- How would you feel if you were given a project that feels much harder than what you are used to?
- Do you think it’s okay to try something new, even if it doesn’t work out the first time?
- Why do you think Stevie smashed her project?
  - Do you think that helped her or hurt her when it comes to reaching her goal?
  - What do you think Stevie should have done instead of breaking her project?
- Can somebody explain what frustration is?
- How do you think you can know when you are frustrated?
  - What face do you make when you are frustrated?
  - How can you make yourself feel better when you start to get frustrated?
  - We all get frustrated sometimes. Does that mean that we should give up?
- Can someone tell me what persistence is?
  - Why is it hard to learn if you’re not persistent?
  - Can you tell me why you might be tempted not to be persistent?
  - What happened when Stevie decided to be persistent?
  - Do you think you can be persistent?

Marble Run (20 - 45 min)

This activity is meant to highlight and normalize the feeling of frustration, while giving students a chance to be persistent.

Before the Project:

It is vitally important that students understand that this activity is meant to help them learn about frustration and persistence. This is not one of those times when we allow students to experience something, then give it a name afterward. Students need to know that they will be feeling some emotions, and that those emotions are okay.
Take a moment to relate the next activity back to the book that you just read. The class might be excited that they get to try the same project that Stevie did, but they might also be apprehensive at the thought of tackling something difficult.

Encourage your students to have their Think Spot Journals around during the activity so they can use them to plan, solve, and voice concerns.

**Building the Marble Run:**

Time to be an engineer!

Break students up into pairs and have them quickly come up with a team name. This should help to unify them in their work.

Next, point out the resource station that you have set up with all of the supplies and goodies that students will have access to. Make sure you are very clear about whether they are limited only to the items in the resource station or whether they are allowed to ask for other items for their creation.

Give students checkpoints for this activity. Make sure that they know that there is no penalty for not finishing on time.

Preplanning is optional, since prediction is not often a kindergartener’s strong suit.

The first attempt at building will likely be hectic and a bit sloppy, but it should give students access to the feelings and opportunities for persistence that are being studied in this lesson.

Try to end the Marble Run build with an opportunity for groups to collaborate. This will improve the chances of success for students who have been struggling, without the need for teacher intervention.

**After the Marble Run:**

Time to do some damage control if any is needed.

Remind students that this activity was planned to teach students how to identify feelings of frustration and work past them to be persistent.

Discuss the difference between being successful for the purpose of this activity, and being successful at building their contraption. Is it possible to have done the first without the second?

**Wrap Up (5 min)**

**Journaling**

Allow students to reflect on the emotions and processes experienced during the lesson.
Finish out this lesson by asking students to spend some time in their **Think Spot Journal - Reflection Journal**.

### Journal Prompts:
- Draw a picture of what you look like when you’re frustrated.
- Draw a picture that shows things you can do to feel better when you’re frustrated.
- What does persistence look like?

### Extended Learning
- Add a third piece to the beginning of the Marble Run. Can students start a marble up even higher and get it to flow through the rest of their contraption?
- Talking through frustration. Can students think of things that they can say to classmates to help them be persistent when they are frustrated?

### Standards Alignment

**CSTA K-12 Computer Science Standards**

- **AP - Algorithms & Programming**

---

If you are interested in licensing Code.org materials for commercial purposes, [contact us](mailto:contact@code.org).
Lesson 3: Real-Life Algorithms: Plant a Seed

Unplugged | Algorithms

Overview

In this lesson, students will relate the concept of algorithms back to everyday, real-life activities by planting an actual seed. The goal here is to start building the skills to translate real-world situations to online scenarios and vice versa.

Purpose

In this lesson, students will learn that algorithms are everywhere in our daily lives. For example, it is possible to write an algorithm to plant a seed. Instead of giving vague or over-generalized instructions, students will break down a large activity into smaller and more specific commands. From these commands, students must determine a special sequence of instructions that will allow their classmate to plant a seed.

Agenda

- Warm Up (10 min)
  - Vocabulary
  - What We Do Daily
- Main Activity (20 min)
  - Real-Life Algorithms: Plant a Seed - Worksheet
- Wrap Up (10 - 20 min)
  - Flash Chat: What did we learn?
  - Journaling
- Assessment (15 min)
  - Real-Life Algorithms: Plant a Seed - Assessment

Objectives

Students will be able to:
- Decompose large activities into a series of smaller events.
- Arrange sequential events into their logical order.

Preparation

- Watch the Plant a Seed - Teacher Video.
- Prepare supplies for planting seeds. You'll need seeds, dirt, and paper cups for each student or group.
- Print one Real-Life Algorithms: Plant a Seed - Worksheet for each student.
- Print one Real-Life Algorithms: Plant a Seed - Assessment for each student.
- Make sure each student has a Think Spot Journal - Reflection Journal.

Links

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

For the Teacher

- Real-Life Algorithms: Planting a Seed - Unplugged Video (download)
- Plant a Seed - Teacher Video
- Real-Life Algorithms: Plant a Seed - Worksheet
- Real-Life Algorithms: Plant a Seed - Worksheet Answer Key
- Real-Life Algorithms: Plant a Seed - Assessment
- Real-Life Algorithms: Plant a Seed - Assessment Answer Key
- Think Spot Journal - Reflection Journal
Teaching Guide

Warm Up (10 min)

Vocabulary
This lesson has one vocabulary word that is important to review:
Algorithm - Say it with me: Al-go-ri-thm
A list of steps that you can follow to finish a task

What We Do Daily
- Ask your students what they did to get ready for school this morning.
  - Write their answers on the board
  - If possible, put numbers next to their responses to indicate the order that they happen
    - If students give responses out of order, have them help you put them in some kind of logical order
    - Point out places where order matters and places where it doesn't
- Introduce students to the idea that it is possible to create algorithms for the things that we do everyday.
  - Give them a couple of examples, such as making breakfast, tying shoes, and brushing teeth.
  - Let's try doing this with a new and fun activity, like planting a seed!

Main Activity (20 min)

Real-Life Algorithms: Plant a Seed - Worksheet
You can use algorithms to help describe things that people do every day. In this activity, we will create an algorithm to help each other plant a seed. Directions:
- Cut out the steps for planting a seed from the Real-Life Algorithms: Plant a Seed - Worksheet.
- Work together to choose the six correct steps from the nine total options.
- Glue the six correct steps, in order, onto a separate piece of paper.
- Trade the finished algorithm with another person or group and let them use it to plant their seed!

Wrap Up (10 - 20 min)

Flash Chat: What did we learn?
- How many of you were able to follow your classmates' algorithms to plant your seeds?
- Did the exercise leave anything out?
  - What would you have added to make the algorithm even better?
  - What if the algorithm had been only one step: "Plant the seed"?
    - Would it have been easier or harder?
    - What if it were forty steps?
- What was your favorite part about that activity?

Journaling
Having students write about what they learned, why it’s useful, and how they feel about it can help solidify any knowledge they obtained today and build a review sheet for them to look to in the future.

Journal Prompts:
- Draw the seed you planted today.
- Write the algorithm you used to plant the seed.

Assessment (15 min)

Real-Life Algorithms: Plant a Seed - Assessment
- Hand out the worksheet titled Real-Life Algorithms: Plant a Seed - Assessment and allow students to complete the activity independently after the instructions have been well explained.
- This should feel familiar, thanks to the previous activities.

Extended Learning

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

Go Figure
- Break the class up into teams.
- Have each team come up with several steps that they can think of to complete a task.
- Gather teams back together into one big group and have one team share their steps, without letting anyone know what the activity was that they had chosen.
- Allow the rest of the class to try to guess what activity the algorithm is for.

Standards Alignment

CSTA K-12 Computer Science Standards
  - AP - Algorithms & Programming

This curriculum is available under a Creative Commons License (CC BY-NC-SA 4.0).

If you are interested in licensing Code.org materials for commercial purposes, contact us.
Lesson 4: Learn to Drag and Drop

Overview
In this lesson, students will relate the concept of algorithms back to everyday, real-life activities by planting an actual seed. The goal here is to start building the skills to translate real-world situations to online scenarios and vice versa.

Purpose
The main goal of this lesson is to build experience with computers. By covering the most basic computer functions such as clicking, dragging, and dropping, we are creating a more equal playing field in the class for future puzzles. This lesson also provides a great opportunity to introduce appropriate computer lab behavior.

Agenda
- Warm Up (10 min)
  - Behaving in the Computer Lab
  - Discuss
  - Vocabulary
- Bridging Activity - Drag and Drop (10 - 15 min)
  - Dragging and Dropping Algorithms
  - Previewing Online Puzzles as a Class
- Main Activity (20 - 30 min)
  - CSF Pre-Express Course
- Wrap Up (5 - 10 min)
  - Journaling
- Extension Activities

Objectives
Students will be able to:
- Recognize what is expected of them when they transition into the computer lab.
- Drag, drop, and click to complete Code.org puzzles.

Preparation
- Watch the How to Make a Class Section on Code.org - Teacher Video.
- Create a class section and make sure every student has a card with their passcode on it.
- Have the school IT person add a quick link for your class section to the computer desktop.
- Make sure each student has a Think Spot Journal - Reflection Journal.

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

For the Teacher
- CSF Pre-Express Course
- Unplugged Blockly Blocks (Grades 1 - 2) - Manipulatives
- CS Fundamentals Main Activity Tips - Lesson Recommendations
- Think Spot Journal - Reflection Journal

For the Students
- Pair Programming - Student Video

Vocabulary
- **Click** - Press the mouse button
- **Double-Click** - Press the mouse button very quickly
- **Drag** - Click your mouse button and hold as you move the mouse pointer to a new
- **Drop** - Release your mouse button to "let go" of an item that you are dragging
Teaching Guide

Warm Up (10 min)

Behaving in the Computer Lab
Goal: This discussion will teach students what to expect and how to behave when they enter the computer lab.

Discuss
Have a good discussion around the computer lab expectations to make sure that students understand the rules. Some topics of discussion might include:
- Is running in the computer lab okay?
- How loudly should we talk when we are in the computer lab?
- What should you do if you get stuck on a puzzle?
- If you get frustrated, will it help to hit the computer?
- When we’re about to go to the computer lab, how should we get ready?

Vocabulary
- Click: Pressing the mouse button
- Double-Click: Pressing the mouse button twice very quickly.
- Drag: Click your mouse button and hold as you move the mouse pointer to another location
- Drop: Releasing your mouse button to “let go” of the item that you are dragging.

Bridging Activity - Drag and Drop (10 - 15 min)

Choose one of the following to do with your class:

Dragging and Dropping Algorithms
Print out a copy of Real-Life Algorithms: Plant a Seed - Worksheet. Cut out each of the squares representing tasks. On a projector or in front of the class practice "dragging and dropping" by pressing your finger on one of the paper squares and moving it across a table. Explain that you can "click" on this square by tapping your finger to the square, or you can "drag" the square by pressing your finger on the square and moving it. To “drop” the square, release your finger from the square.

After showing this to the class, ask for volunteers to put the algorithm in correct order by "dragging and dropping" the squares.

Previewing Online Puzzles as a Class
Project a puzzle from the online stage. Show the class how to click on the picture and place it in the correct spot by dragging and dropping. Purposely make mistakes such as clicking the background or dropping the image before it's at the right spot. Ask for help from volunteers in the class when you run into these problems.

Main Activity (20 - 30 min)
CSF Pre-Express Course

Goal: This will teach students how to use Code.org to complete online puzzles.

This stage was designed to give students the opportunity to practice hand-eye coordination, clicking, and drag & drop skills. Students will also play with sequence.

The vocabulary introduced in this lesson becomes relevant during this activity. Take some time to explicitly teach how to click, double-click, drag, and drop. It might work better for you to cover these words in the classroom environment where you can lead by example -- or it might make more sense to teach the words individually as students work on their puzzles in the lab. You will need to decide what you believe is best for your class.

Place kids in pairs and have them watch the Pair Programming - Student Video video at their stations. This should help students start off in the right direction.

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 during the activity.
- 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 - 10 min)

Journaling

Goal: Help students reflect on the things they learned in this lesson

Give the students a journal prompt to help them process some of the things that they encountered during the day.

Journal Prompts:

- Can you draw a sequence for getting ready to go to the computer lab?
- Draw a computer lab “Do” and a “Don’t”
- Use your journal to let me know how you felt about today's lesson plan

Extension Activities

If students complete the puzzles from this stage early, have them spend some time trying to come up with their own puzzles in their Think Spot Journal - Reflection Journal.

Standards Alignment

CSTA K-12 Computer Science Standards
If you are interested in licensing Code.org materials for commercial purposes, contact us.
Lesson 5: Common Sense Education: Your Digital Footprint

Common Sense Education | Unplugged

Overview
In collaboration with Common Sense Education - Website, this lesson helps students learn about the similarities of staying safe in the real world and when visiting websites. Students will also learn that the information they put online leaves a digital footprint or “trail.” This trail can be big or small, helpful or hurtful, depending on how they manage it.

Purpose
Common Sense Education has created this lesson to teach kids the importance of understanding the permanence of something posted on the internet. By relating footprints on a map to what a student might post online, students will make important connections between being tracked by a physical footprint on a path and being tracked based on information posted online.

Agenda
- Warm Up (20 min)
  - Vocabulary
  - Pause and Think
- Main Activity (20 min)
  - Follow the Digital Trail - Worksheet
- Wrap Up (15 min)
  - Flash Chat: What did we learn?
  - Journaling
- Assessment (5 min)
  - Digital Footprint - Assessment
  - Extended Learning

Objectives
Students will be able to:
- Understand that being safe when they visit websites is similar to staying safe in real life.
- Learn to recognize websites that are safe for them to visit.
- Recognize if they should ask an adult they trust before they visit a particular website.
- Explore what information is appropriate to be put online.

Preparation
- Watch this Your Digital Footprint - Teacher Video.
- Prepare to show Your Digital Footprint - Lesson Video.
- (Optional) Prepare to show Pause and Think Online - Video.
- Common Sense Education’s Follow the Digital Trail - Worksheet game.
- Print one Animal Tracks chart (page 7) for each student.
- Print one Digital Footprint - Assessment for each student.

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

For the Teacher
- Your Digital Footprint - Teacher Video
- Your Digital Footprint - Lesson Video
- Follow the Digital Trail - Worksheet
- Common Sense Education - Website
- Digital Footprint - Assessment
- Digital Footprint - Assessment Answer Key
- Think Spot Journal - Reflection Journal
Vocabulary

- **Digital Footprint** - The collected information about an individual across multiple websites on the Internet.
Lesson Tip

If you have access to a computer, feel free to navigate to sites that might showcase each of these types (using extreme caution with your RED selection).

---

**Teaching Guide**

**Warm Up (20 min)**

**Vocabulary**

This lesson has one new and important phrase:

- **Digital Footprint** - Say it with me: Dih-jih-tal Foot-print

The information about someone on the internet.

**Pause and Think**

- Ask What does it mean to be safe?
- When you walk down the street or play in your neighborhood without a trusted adult there, how do you stay safe?
- Tell students that just as they should stay safe in the real world, they should stay safe when they go into the online world (visiting websites). Make parallels between the answers students gave you about their neighborhood and the online world.

Play the **Your Digital Footprint - Lesson Video**.

- Introduce the idea that there are three different kinds of websites that students may have the opportunity to visit.
  - **Green**: A “green” website is:
    - A good site for kids your age to visit
    - Fun, with things for you to do and see
    - Has appropriate words
    - Doesn’t let you talk to people you don’t know
  - **Yellow**: A “yellow” website is:
    - A site you are not sure is right for you
    - One that asks for information such as who you are, where you live, your phone number or email address, etc.
    - A place where you are allowed to communicate freely with others
  - **Red**: A “red” website is:
    - A site that is not right for you
    - A place you might have gone to by accident
    - Filled with things that are for older kids or adults

- Discuss examples of each of these kinds of sites.

Now, let’s see what we can do to keep ourselves safe.

**Main Activity (20 min)**

**Follow the Digital Trail - Worksheet**

- Peruse the **Follow the Digital Trail - Worksheet** lesson on the Common Sense Education webpage.
- Give each student an **Animal Tracks Chart** (page 7).
Lesson Tip
If your students have trouble writing, feel free to do this activity as a group and have students raise their hand when they find clues. This will allow you (or a teacher aide) to help communicate and record the information being shared.

For more in-depth modules, you can find additions to this curriculum at the Common Sense Education - Website page on Scope and Sequence.

| Whose full name do you know? |  |
| Whose house could you find? |  |
| Whose birth date do you know? |  |
| Whose user name and password do you know? |  |
| Who let out a secret on the internet? |  |
| Which animal can you describe better from his or her photo? |  |

Directions:
- Place the Digital Trail Squares on the ground, face down, in two different trails, keeping Mizzle the Mouse and Electra the Elephant’s trails separate from one another.
- Share the stories of Mizzle and Electra. These animals decided it would be fun to put some information about themselves online. They went onto www.wildkingdom.com and posted information. The only problem is that they forgot to ask their parents if it was okay first.
- Explain to students that they are from the “Things Big and Small” Detective Agency. A hunter has hired them to find out as much as possible about Mizzle the Mouse and Electra the Elephant. The more the detectives learn, the better for their plan to take over the animal kingdom.
- Divide students into groups of four. Tell them that each group should have a detective that will keep detailed notes.
- Invite students to go on a hunt for information. Let them know that the information that Mizzle and Electra post can be seen by anyone, including the detectives. Each group should follow the digital trail of both animals, starting with the mouse and then the elephant. Stagger the groups so they are on the trail at slightly different times. Students should fill out their handout as they go.

Wrap Up (15 min)

Flash Chat: What did we learn?
- Who can the detectives find out more about, and why?
- Which animal has a bigger digital footprint?
- Mizzle says some interesting things about himself on the Internet. What are they?
- Is there anything that Electra posted on the Internet that could become a problem for her? If so, what and why?
Lesson Tip

Flash Chat questions are intended to spark big-picture thinking about how the lesson relates to the greater world and the students' greater future. Use your knowledge of your classroom to decide if you want to discuss these as a class, in groups, or with an elbow-partner.

<table>
<thead>
<tr>
<th>Appropriate</th>
<th>Not Appropriate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interests</td>
<td>Address</td>
</tr>
<tr>
<td>Hobbies</td>
<td>Full Name</td>
</tr>
<tr>
<td>First Name</td>
<td>Information that would hurt others</td>
</tr>
</tbody>
</table>

**Journaling**

Having students write about what they learned, why it’s useful, and how they feel about it can help solidify any knowledge they obtained today and build a review sheet for them to look to in the future.

**Journal Prompts:**
- What was today’s lesson about?
- How did you feel during today’s lesson?
- Draw some things that you should never talk to a stranger about on the internet. For example, draw your house to represent your address, draw your school, or draw your family.

**Assessment (5 min)**

**Digital Footprint - Assessment**

Hand out the assessment worksheet and allow students to complete the activity independently after the instructions have been well explained. This should feel familiar, thanks to the previous activities.

**Extended Learning**

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

**Common Sense Education**

- Visit [Common Sense Education - Website](http://common-sense-education.org) to learn more about how you can keep your students safe in this digital age.

---

This curriculum is available under a Creative Commons License (CC BY-NC-SA 4.0).

If you are interested in licensing Code.org materials for commercial purposes, [contact us](mailto:contact@code.org).
Lesson 6: Programming Unplugged: My Robotic Friends

Overview

Using a predefined symbol key, your students will figure out how to guide one another to accomplish specific tasks without using any verbal commands. This segment teaches students the connection between symbols and actions, the difference between an algorithm and a program, and the valuable skill of debugging.

Purpose

This unplugged lesson brings the class together as a team with a simple task to complete: get a "robot" to stack cups in a specific design. Students will work to recognize real world actions as potential instructions in code. The designing of precise instructions will also be practiced, as students work to translate worded instructions into the symbols provided. If problems arise in the code, students should work together to recognize bugs and build solutions.

Agenda

- Warm Up (5 min)
  - Introduction
- Main Activity (45 min)
  - My Robotic Friends
- Wrap Up (10 min)
  - Journaling

Objectives

Students will be able to:
- Gain understanding of the need for precision in coding.
- Learn how to recognize a bug and how to debug the malfunctioning code.

Preparation

- Watch the My Robotic Friends - Teacher Video.
- Read My Robotic Friends - Teacher Prep Guide.
- Print out one My Robotic Friends - Symbol Key per group. This is "code" to be used.
- Paper Trapezoid Template - Manipulatives are provided if your class is not going to use cups.
- Print out one set of Stacking Cup Ideas - Manipulatives per group.
- Make sure each student has a Think Spot Journal - Reflection Journal.

Links

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

For the Teacher

- My Robotic Friends - Unplugged Video (download)
- My Robotic Friends - Teacher Video
- My Robotic Friends - Teacher Prep Guide
- My Robotic Friends - Symbol Key
- Paper Trapezoid Template - Manipulatives
- Stacking Cup Ideas - Manipulatives
- Think Spot Journal - Reflection Journal
Vocabulary

- **Algorithm** - A precise sequence of instructions for processes that can be executed by a computer.
- **Bug** - Part of a program that does not work correctly.
- **Debugging** - Finding and fixing problems in an algorithm or program.
- **Program** - An algorithm that has been coded into something that can be run by a machine.
Teaching Guide

Warm Up (5 min)

Introduction
Start by asking the class if anyone has heard of robotics. Has anyone seen a robot or touched one? Does a robot really “hear” you speak? Does it really “understand” what you say? The answer to the last question is: “Not the same way that a person does.”

Robots operate off of instructions, specific sets of things that they have been preprogrammed to do. In order to accomplish a task, a robot needs to have a series of instructions (sometimes called an algorithm) that it can read. Today, we are going to learn what it takes to make that happen.

If you feel that there is time, it might be helpful to do a quick example. Page 6 and 7 of My Robotic Friends - Teacher Prep Guide describe how to do a simple example before the main activity. This example could be up to 10 minutes in length.

Main Activity (45 min)

My Robotic Friends
Display a copy of the My Robotic Friends - Symbol Key (or write the symbols on the board). Step to the side and tell the class that these will be the only six symbols that they will be using for this exercise. For this task, they will instruct their “robot” friend to build a specific cup stack using only the arrows listed on the My Robotic Friends - Symbol Key.

1. Pick a "robot" for the class (try to choose a student that feels confident after the warm-up.) Ask this "robot" to leave the classroom until they are called back in.

2. Display Stacking Cup Ideas - Manipulatives to the rest of the class. Have the class vote and choose which idea they would like the robot to do. Try to push for an easier idea for the first time, then choose a more complex design later on.

3. Let the class discuss how the stack should be built, then ask the class to translate the algorithm into the symbols. Write down the symbol algorithm somewhere for the robot to use later.

4. When the class has decided on the algorithm, ask the robot to come back in. We recommend continuing to display the My Robotic Friends - Symbol Key while the robot is building the stack so the student robot remembers what each command means.

If a student sees a bug and raises their hand, have the robot finish the instructions to the best of their ability. Afterward, have the students discuss the potential bug and come up with a solution. Continue repeating until the stack is built properly.

Lesson Tip:
While the robot is working on the stack make sure that the class knows:
- Programmers are not allowed to talk when the robot is working. This includes blurtling out answers or pointing out when the robot has done something wrong.
- Programmers should raise their hand if they see a bug.

Once the stack is built, you can choose to repeat the activity again with another student robot.

Wrap Up (10 min)
Journaling

Having students write about what they learned, why it’s useful, and how they feel about it can help solidify any knowledge they obtained today and build a review sheet for them to look to in the future.

Journal Prompts:
- What was today’s lesson about?
- How did you feel during today’s lesson?
- Draw a stack of cups that the robot made today.
- Draw a stack of cups that you would like a robot to make someday!

Standards Alignment

CSTA K-12 Computer Science Standards
- AP - Algorithms & Programming

This curriculum is available under a Creative Commons License (CC BY-NC-SA 4.0).

If you are interested in licensing Code.org materials for commercial purposes, contact us.
Lesson 7: Programming in Maze

Overview

In this series of online puzzles, students will build on the understanding of algorithms, debugging, and general computer literacy. Featuring characters from the game Angry Birds, students will develop sequential algorithms to get the bird to the pig without crashing into walls or TNT. Debugging puzzles have also been mixed into this stage for added practice with problem solving and critical thinking.

Purpose

In this lesson, students will be practicing their debugging and programming skills on a computer platform. When someone starts programming they piece together instructions in a specific order using something that a machine can read. Through the use of programming, students will develop an understanding of how a computer navigates instructions and order. Debugging is a concept that is very important to computer programming. Computer scientists have to get really good at facing all of the bugs in their own programs. Debugging forces the students to recognize problems and overcome them while building critical thinking and problem solving skills.

Agenda

- Warm Up (10 min)
  - Introduction
- Bridging Activity - Programming (10 min)
  - Unplugged Activity Using Paper Blocks
  - Previewing Online Puzzles as a Class
- Main Activity (30 min)
  - CSF Pre-Express Course
- Wrap Up (5 - 10 min)
  - Journaling
  - Extended Learning

Objectives

Students will be able to:

- Order movement commands as sequential steps in a program.
- Represent an algorithm as a computer program.
- Develop problem solving and critical thinking skills by reviewing debugging practices.

Preparation

- Play through the CSF Pre-Express Course in stage 7 to find any potential problem areas for your class.
- (Optional) Pick a couple of puzzles to do as a group with your class.
- Make sure each student has a Think Spot Journal - Reflection Journal.

Links

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

For the Teacher

- CSF Pre-Express Course
- Unplugged Blockly Blocks (Grades 1 - 2) - Manipulatives
- CS Fundamentals Main Activity Tips - Lesson Recommendations
- Think Spot Journal - Reflection Journal

Vocabulary

- Algorithm - A list of steps to finish a task.
- Bug - Part of a program that does not work correctly.
- Debugging - Finding and fixing problems in an algorithm or program.
- Program - An algorithm that has been coded into something that can be run by a machine.
- Programming - The art of creating a program.
Teaching Guide

Warm Up (10 min)

Introduction
Ask your students if they are familiar with the game or the movie "Angry Birds". Explain that they will be writing programs to help Red, from Angry Birds locate a pig.

Teacher Tip:
Review cardinal directions with your class. Let students know that they will see those letters in their programs next to the direction arrows. We recommend drawing the directions somewhere that the students can look back up to review.

Bridging Activity - Programming (10 min)
This activity will help bring the unplugged concepts from My Robotic Friends into the online world that the students are moving into. Choose one of the following to do with your class:

Unplugged Activity Using Paper Blocks
Select a pattern from Stacking Cup Ideas - Manipulatives from the My Robotic Friends unplugged activity. Using arrows from the [course-ab-blockly-blocks], have the students program a "robot" from their desks to get the correct stacking of the cups. Make sure that they understand that the blocks need to go from top to bottom and they all need to touch! Have the students pair share to check answers and resolve any questions or bugs that may come up.

Previewing Online Puzzles as a Class
Pull a puzzle from the corresponding online puzzles. We recommend puzzle 8. Give students small note cards to draw out the various commands from the My Robotic Friend My Robotic Friends - Symbol Key. Have students lay out a pattern with the arrows they created that will get the bird to the pig. Ask the students to share. See how many other students had the same answer!

Main Activity (30 min)

Teacher Demonstration
We've included some multiple choice prediction levels that are difficult for non-readers. Like the puzzles in the bridging activity, these levels are optional for you to review with your class to help prepare for the puzzles to come. Alternatively, these could be used after finishing the stage as a review for the class.

Prediction Levels:
- Pre-Express Course, Programming in Maze #1
- Pre-Express Course, Programming in Maze #2

CSF Pre-Express Course
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
Teacher 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

Wrap Up (5 - 10 min)

Journaling
Having students write about what they learned, why it’s useful, and how they feel about it can help solidify any knowledge they obtained today and build a review sheet for them to look to in the future.

Journal Prompts:
- What was today’s lesson about?
- How did you feel during today’s lesson?
- Write a program that gets you from your desk to the front of the classroom.
- What is a bug? What does a bug do to your program?

Extended Learning

In small groups, let students design their own mazes on paper and challenge other students or groups to write programs to solve them. For added fun, make life-size mazes with students as the pig and bird.

Standards Alignment

CSTA K-12 Computer Science Standards
- AP - Algorithms & Programming

This curriculum is available under a Creative Commons License (CC BY-NC-SA 4.0).

If you are interested in licensing Code.org materials for commercial purposes, contact us.
Lesson 8: Programming in Star Wars

Overview
In this lesson, students will use their newfound programming skills in more complicated ways to navigate a tricky course with BB-8.

Purpose
With transfer of knowledge in mind, this lesson gives students a new environment to practice the skills that they have been cultivating. Star Wars fans will jump for joy when they see these puzzles. Each puzzle in this series has been added to provide a deeper understanding of the basic concepts that they will be using throughout the rest of this course.

Agenda
- Warm Up (15 min)
  - Introduction
- Main Activity (30 min)
  - CSF Pre-Express Course
- Wrap Up (15 min)
  - Journaling

Objectives
Students will be able to:
- Sequence commands in a logical order.
- Recognize problems or “bugs” in a program and develop a plan to resolve the issues.

Preparation
- Play through the CSF Pre-Express Course corresponding with this lesson to find any potential problem areas for your class.
- Review CS Fundamentals Main Activity Tips - Lesson Recommendations.
- Make sure every student has a Think Spot Journal - Reflection Journal.

Links

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

For the Teacher
- CSF Pre-Express Course
- CS Fundamentals Main Activity Tips - Lesson Recommendations
- Think Spot Journal - Reflection Journal

Vocabulary
- Algorithm - A list of steps to finish a task.
- Bug - Part of a program that does not work correctly.
- Debugging - Finding and fixing problems in an algorithm or program.
- Program - An algorithm that has been coded into something that can be run by a machine.
- Programming - The art of creating a program.
Teaching Guide

Warm Up (15 min)

Introduction
Ask the students how they felt about the last lesson.

- Which puzzles were too hard or too easy?
- Which puzzles were frustrating or a lot of fun?
- If they were to teach the lesson to a friend, which part of the lesson would they want to review?

Use these questions to form a brief review of programming and debugging. If you think the class could benefit from it, you can go over the vocabulary words and definitions from the last lesson.

If you feel comfortable, also give a brief introduction to BB-8 from Star Wars. Many students may already be familiar with the lovable robot, but the introduction will surely build excitement.

Main Activity (30 min)

CSF Pre-Express Course
As we mentioned in the last lesson, we highly recommend viewing and using Pair Programming - Student Video as a class. Pair programming stimulates a discussion that can answer questions, review basic concepts, and build confidence with the subject.

Wrap Up (15 min)

Journaling
Having students write about what they learned, why it’s useful, and how they feel about it can help solidify any knowledge they obtained today and build a review sheet for them to look to in the future.

Journal Prompts:
- What was today’s lesson about?
- How did you feel during today’s lesson?
- Draw a picture of BB-8 you guided through the maze today and add a list of the commands that you used.

Standards Alignment

CSTA K-12 Computer Science Standards
- AP - Algorithms & Programming

This curriculum is available under a Creative Commons License (CC BY-NC-SA 4.0).

If you are interested in licensing Code.org materials for commercial purposes, contact us.
Lesson 9: Loops Unplugged: My Loopy Robotic Friends

Unplugged | Loop | Repeat

Overview
Here, students learn the simplicity and utility of loops by “programming” their friends using the language from “My Robotic Friends.” Once loops are introduced, students will find that they can build bigger structures faster.

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 the movements of classmates and determining how many times their code needs to be looped. By seeing “My Robotic Friends” again, students will be able to relate old concepts (such as sequencing) to the new concept of loops.

Agenda
Warm Up (10 - 15 min)
  - My Robotic Friends Review
  - Loops to the Rescue
Main Activity (15 - 20 min)
  - Looping with My Robotic Friends
Wrap Up (8 min)
  - Journaling
Extension Activities

Objectives
Students will be able to:
- Identify repetitive code and convert a series of multiple actions into a single loop.
- Decode loops into a series of multiple actions.

Preparation
- Watch the My Robotic Friends - Teacher Video.
- Print one My Robotic Friends Loops - Teacher Prep Guide for each group.
- Acquire up to 20 paper cups for each group.
- Review My Robotic Friends - Teacher Video.
- Make sure each student has a Think Spot Journal - Reflection Journal.

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

For the Teacher
- My Loopy Robotic Friends - Teacher Video
- My Robotic Friends - Teacher Prep Guide
- My Robotic Friends Loops - Teacher Prep Guide
- My Robotic Friends - Teacher Video
- Think Spot Journal - Reflection Journal

Vocabulary
- Loop - The action of doing something over and over again.
- Repeat - Do something again
Teaching Guide

Warm Up (10 - 15 min)

My Robotic Friends Review

Goal: This review will refresh the students’ minds about how quickly programs for the My Robotic Friends activity can get intense.

Revisit the rules of My Robotic Friends.

With the class together as a group, pull an easy puzzle from the My Robotic Friends Cup Stack Pack and program with each other as a reminder of rules and terminology.

Next, pull a puzzle that’s slightly harder, but also requires a lot of steps like the one below.

Ask a volunteer (or a group of volunteers) to come forward to help program this one on the board. If you make them stick strictly to the “no symbols other than those on the key” rule, it will probably take a while!

Now, bring up this image:
Loops to the Rescue

Give students the opportunity to brainstorm shorter ways to relay the code that they’re about to create. (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.)

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 on Code.Org.

Main Activity (15 - 20 min)

Looping with My Robotic Friends

Goal: This activity will allow students to gain practice spotting areas that repeat loops can be used, as well as places where they need to expand programs that utilize loops.

Practice Makes Perfect

Take the program from one of your previous cup stacks and display it for the class. Have them help you find places that the same arrows repeat, uninterrupted, multiple times. Have students count the number of times those arrows repeat and give you the final tally.

Circle the first arrow in that line, write the number of loops near that circle, then cross out the rest of the arrows.

Repeat this until the entire program has been shortened, then re-write the program in a way where students can see how much more simple the resulting instructions are.

Looping with My Robotic Friends

Now that students have a new tool in their toolbox, they should be able to start finding success on new (and more difficult) cup stacks.
Teaching Tips:

Be sure to keep your eyes open for students using loops. Try to avoid correcting their overall algorithms, but feel free to point out instructions that could be shortened by using a repeat circle.

Watch students as they run through the code. 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 min)

Journaling
Goal: Allow students to reflect on the activity that they just experienced.

Flash Chat:
Here are some possible topics:
- Do you feel like loops make programming easier or harder?
- What other kinds of things in life do we repeat?
  - Eating - put food in mouth, chew 20 times
  - Brushing hair - brush through hair 35 times
  - Routines - Wake up, go to school, come home, go to bed

Journal Prompts:
- Journal time! Ask students to draw a feeling face in the corner of their journal page to remind them how they felt about this lesson.
- Have the students write or draw something in their journal that will remind them later what loops are. This can come from a prompt like:
  - What does "repeat" mean to you?
  - Draw a picture of you repeating something.

Extension Activities

- Have students draw their own cup stacking creations for someone else to code.
- Provide students with algorithms that utilize repeats, then have them expand the program back out to a full step-by-step version.

Standards Alignment

CSTA K-12 Computer Science Standards

- AP - Algorithms & Programming

If you are interested in licensing Code.org materials for commercial purposes, contact us.
Lesson 10: Loops in Collector

Overview

Building on the concept of repeating instructions from "My Loopy Robotic Friends," this stage will have students using loops to collect treasure more efficiently on Code.org.

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 the Code.org puzzles, students will learn to add instructions to existing loops, gather repeated code into loops, and recognize patterns that need to be looped.

Agenda

- Warm Up (10 min)
  - Introduction
- Bridging Activity - Loops (10 min)
  - Unplugged Activity Using Paper Blocks
  - Previewing Online Puzzles as a Class
- Main Activity (30 min)
  - CSF Pre-Express Course
  - Warm Up (5 - 10 min)
  - Journaling
- Extended Learning

Objectives

Students will be able to:

- Identify the benefits of using a loop structure instead of manual repetition.
- Breakdown a long sequence of instructions into the largest repeatable sequence possible.
- Create a program for a given task which loops a sequence of commands.
- Employ a combination of sequential and looped commands to reach the end of a maze.

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.
- Review CS Fundamentals Main Activity Tips - Lesson Recommendations.
- Make sure each student has a Think Spot Journal - Reflection Journal.

Links

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

For the Teacher

- CSF Pre-Express Course
- Unplugged Blockly Blocks (Grades 1 - 2) - Manipulatives
- CS Fundamentals Main Activity Tips - Lesson Recommendations
- Think Spot Journal - Reflection Journal

Vocabulary

- Loop - The action of doing something over and over again.
- Repeat - Do something again
Teaching Guide

Warm Up (10 min)

Introduction
Review with students the My Loopy Robotic Friends activity:

- What are loops?
- Why do we use them?

Bridging Activity - Loops (10 min)

This activity will help bring the unplugged concepts from "My Loopy Robotic Friends" into the online world that the students are moving into. Choose one of the following to do with your class:

Unplugged Activity Using Paper Blocks
Select a pattern from Stacking Cup Ideas - Manipulatives from the My Robotic Friends unplugged activity and give students Unplugged Blockly Blocks (Grades 1 - 2) - Manipulatives prefilled with the collect command, a repeat loop, and the cardinal commands like E → (East) and W ← (West). Remember to choose a cup pattern that doesn't use any upside down cups, because there is no turn command online for K-1 students. Next, have the students program a "robot" (a partner or the teacher) from their desks to get the correct stacking of the cups. Make sure that they understand that the blocks need to go from top to bottom and they all need to touch! Have the students pair share to check answers and resolve any questions or bugs that may come up.

Previewing Online Puzzles as a Class
Pull a puzzle from the corresponding online puzzles. We recommend puzzle 8. Using the My Robotic Friends - Symbol Key from the My Loopy Robotic Friends Unplugged Activity, have students draw out a pattern that they think will get Laurel the Adventurer to collect all the treasure. Ask the students to share. See how many other students had the same answer!

Main Activity (30 min)

Teacher Demonstration
We've included some multiple choice prediction levels that are difficult for non-readers. These levels are optional for you to review with your class to help prepare for the puzzles to come. Alternatively, these could be used after finishing the stage as a review for the class.

Prediction Levels:

- Pre-Express Course, Loops in Collector

CSF Pre-Express Course
As students work through the puzzles, see if they can figure out how many fewer blocks they use with a loop vs. not using a loop.

Warm Up (5 - 10 min)

Journaling
Having students write about what they learned, why it’s useful, and how they feel about it can help solidify any knowledge they obtained today and build a review sheet for them to look to in the future.

**Journal Prompts:**
- What was today’s lesson about?
- How did you feel during today’s lesson?
- Draw a maze that you can solve using loops.
- Draw yourself using a loop to do an everyday activity, like brushing your teeth.

**Extended Learning**

**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!

**Standards Alignment**

**CSTA K-12 Computer Science Standards**
- AP - Algorithms & Programming

If you are interested in licensing Code.org materials for commercial purposes, contact us.
Lesson 11: Loops in Artist

Overview

Returning to loops, students learn to draw images by looping simple sequences of instructions. In the previous online lesson, loops were used to traverse a maze and collect treasure. Here, students use loops to create patterns. At the end of this stage, students will be given the opportunity to create their own images using loops.

Purpose

This lesson gives a different perspective on how loops can create things in programming. Students will test their critical thinking skills by evaluating given code and determining what needs to be added in order to solve the puzzle. Students can also reflect on the inefficiency of programming without loops here because of how many blocks the program would require without the help of repeat loops.

Agenda

- Warm Up (10 min)
  - Introduction
- Main Activity (30 min)
  - CSF Pre-Express Course
- Warm Up (5 - 10 min)
  - Journaling

Objectives

Students will be able to:
- Count the number of times an action should be repeated and represent it as a loop.
- Decompose a shape into its largest repeatable sequence.
- Create a program that draws complex shapes by repeating simple sequences.

Preparation

- Play through the CSF Pre-Express Course before the lesson to find any potential problem areas for your class.
- Review CS Fundamentals Main Activity Tips - Lesson Recommendations.
- Make sure each student has a Think Spot Journal - Reflection Journal.

Links

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

For the Teacher
- CSF Pre-Express Course
- CS Fundamentals Main Activity Tips - Lesson Recommendations
- Think Spot Journal - Reflection Journal

Vocabulary

- Loop - The action of doing something over and over again.
Teacher Tip

Remind the students to only share their work with their close friends or family. For more information watch or show the class Pause and Think Online - Video.

Teaching Guide

Warm Up (10 min)

Introduction

- Quickly review the definition of a loop, the action of doing something over and over again.
- Discuss different patterns like zigzags and stairsteps.
  - How would you explain to someone how to draw that pattern?
  - How could you draw this using a loop?

In the artist levels, students will be using 45 degree angles described as northwest, northeast, southwest, southeast. We recommend briefly discussing these directions with the class and drawing an image for students to refer back to.

Main Activity (30 min)

Teacher Demonstration

We’ve included some multiple choice prediction levels that are difficult for non-readers. These levels are optional for you to review with your class to help prepare for the puzzles to come. Alternatively, these could be used after finishing the stage as a review for the class.

Prediction Levels:

- Pre-Express Course, Loops in Artist

CSF Pre-Express Course

Warm Up (5 - 10 min)

Journaling
Having students write about what they learned, why it's useful, and how they feel about it can help solidify any knowledge they obtained today and build a review sheet for them to look to in the future.

**Journal Prompts:**

- What was today’s lesson about?
- How did you feel during today’s lesson?
- Draw the patterns you made with a loop.
- Draw a pattern that you would like to make with a loop.

**Standards Alignment**

**CSTA K-12 Computer Science Standards**

- AP - Algorithms & Programming

---

This curriculum is available under a Creative Commons License (CC BY-NC-SA 4.0).

If you are interested in licensing Code.org materials for commercial purposes, contact us.
Lesson 12: Events Unplugged: The Big Event

Overview

Events are a great way to add variety to a pre-written algorithm. Sometimes you want your program to be able to respond to the user exactly when the user wants it to. That is what events are for.

Purpose

Today, students will learn to distinguish events from actions. The students will see activities interrupted by having a “button” pressed on a paper remote. When seeing this event, the class will react with a unique action. Events are widely used in programming and should be easily recognizable after this lesson.

Agenda

Warm Up (15 min)
- Vocabulary
- A Series of Events
Main Activity (15 min)
- The Big Event
Wrap Up (10 min)
- Flash Chat: What did we learn?
- Journaling
Assessment (10 min)
- The Big Event - Assessment
Extended Learning

Objectives

Students will be able to:
- Repeat commands given by an instructor.
- Recognize actions of the teacher as signals to initiate commands.
- Practice differentiating pre-defined actions and event-driven ones.

Preparation

- Watch the The Big Event - Teacher Video.
- Print one The Big Event - Worksheet.
- Print one The Big Event - Assessment for each student.
- Make sure each student has a Think Spot Journal - Reflection Journal.

Links

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

For the Teacher
- The Big Event - Unplugged Video (download)
- The Big Event - Teacher Video
- The Big Event - Worksheet
- The Big Event - Assessment
- The Big Event - Assessment Answer Key
- Think Spot Journal - Reflection Journal

Vocabulary

- Event - An action that causes something to happen.
Teaching Guide

Warm Up (15 min)

Vocabulary
This lesson has one new and important vocabulary word:

Event - Say it with me: E-vent
An action that causes something to happen

A Series of Events

- Prep your class to answer a question:
  - "I'm going to ask you a question. I want you to raise your hand if you want me to call on you for the answer."
  - Ask a simple question that most of your students should be able to answer, such as:
    - How many thumbs do I have?
    - What is bigger, a bird or a horse?
- Call on a student who has their hand raised and let them give their answer.
- Upon finishing that display, ask the class how you knew that the student wanted you to call on them.
  - Your class will likely mention the raising of the hand.
- Explain to everyone that when students raise their hand, it is an "event" that causes you to know that they want to be called on.
- Ask the class if they can think of any other events that give signals.
  - You may need to remind them that you're not talking about an event like a birthday party or a field trip.
  - If they have trouble, you can remind them that an event is an action that causes something to happen.
    - What about an alarm clock going off? What does that make happen?
    - What about pressing "Start" on the microwave? What does that do?
    - What about pressing the power button on your tv remote?
- Today, we're going to create programs with events.

Main Activity (15 min)

The Big Event

- Do you remember helping the Red, the Angry Bird find the pig?
- In that exercise, you knew in advance exactly where you wanted Red to end up, so you could make a program that took the bird from start to finish without any interruptions.
- In most real programs, we can't do that because we want to have options, depending on what the user needs.
  - Say that I only want my character to move when my finger is on the screen of my phone. I would need to program the character to only move when I put my finger on the screen of my phone.
  - Putting my finger on the screen would then become an "event" that tells my character to move.

In earlier lessons, we created algorithms that allowed us to control a friend or bird for several steps at a time. It was fun and useful, but what happens when you don't know everything that you want your friend to do in advance? This is where events come in!

Directions:
• Project the Event Controller onto your classroom screen.

• Decide with your class what each button does. We suggest:
  - Pink Button -> Say “Wooowow!”
  - Teal Button -> “Yeah!”
  - Purple Dial -> “Boom!”

• Practice tapping the buttons on the overhead and having your class react.

• Add some button sequences into the mix and have the students try to keep up with their sounds.

• Let your class know that every time you push a button, it is an “event” that lets them know what they are expected to do next.

• Get the class started on a planned task before interrupting them again with the buttons. We suggest:
  - Counting to 10
  - Singing “Old MacDonald”

• Once their plan is underway, interject button presses sporadically.

• Continue the blend until they understand the difference between actions that are guided by a plan and those that are event driven.

Wrap Up (10 min)

Flash Chat: What did we learn?
• Why do we need to be able to handle events in a program?
• What are some other kinds of events that you can think of?

Journaling

Journal Prompts:
• What was today’s lesson about?
• How did you feel during today’s lesson?
• Draw an event that caused an action today.
• Draw an action that was caused by an event that happened today.

Assessment (10 min)
The Big Event - Assessment

- Hand out the assessment activity and allow students to complete the activity independently after the instructions have been well explained.
- This should feel familiar, thanks to the previous activities.

Extended Learning

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

One Person's Event is Another One's Reaction

Assign each student an event to watch out for, and an appropriate reaction to that event. Chain the actions so that each child's reaction becomes an event that triggers the reaction of another student. Keep assigning until everyone has something to do and everyone makes someone react.

Eventopalooza

Break the class up into groups. Using the Events Controller, assign each group a different reaction to the same button. Do this for all three buttons, then watch the chaos!

Standards Alignment

CSTA K-12 Computer Science Standards

- AP - Algorithms & Programming

This curriculum is available under a Creative Commons License (CC BY-NC-SA 4.0).

If you are interested in licensing Code.org materials for commercial purposes, contact us.
Lesson 13: Events in Play Lab

Overview
In this online activity, students will have the opportunity to learn how to use events in Play Lab and apply all of the coding skills that they've learned to create an animated game. It's time to get creative and make a game in Play Lab!

Purpose
In this online activity, students will learn how to use events in Play Lab. They will start by training the knight to move when an arrow key is pressed, then end with the opportunity to showcase the rest of the skills that they learned throughout this course, including sequence and looping, as part of the final freeplay puzzle.

Agenda
- Warm Up (10 min)
  - Introduction
- Bridging Activity - Events (10 min)
  - Unplugged Activity Using Paper Blocks
  - Previewing Online Puzzles as a Class
- Main Activity (30 min)
  - CSF Pre-Express Course
- Wrap Up (5 - 10 min)
  - Journaling
- Extended Learning

Objectives

Students will be able to:
- Identify actions that correlate to input events.
- Create an animated, interactive story using sequences and event-handlers.
- Share a creative artifact with other students.

Preparation
- Play through the CSF Pre-Express Course in stage 12 to find any potential problem areas for your class.
- (Optional) Pick a couple of puzzles to do as a group with your class.
- Review CS Fundamentals Main Activity Tips - Lesson Recommendations.
- Make sure every student has a Think Spot Journal - Reflection Journal.

Links

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

For the Teacher
- CSF Pre-Express Course
- Unplugged Blockly Blocks (Grades 1 - 2) - Manipulatives
- CS Fundamentals Main Activity Tips - Lesson Recommendations
- Think Spot Journal - Reflection Journal

Vocabulary
- Event - An action that causes something to happen.
Teaching Guide

Warm Up (10 min)

Introduction
Review “The Big Event” activity with students:

♦ What did we “program” the button events to do?

Now we’re going to add events to our code. Specifically, we’re going to have an event for when two characters touch each other.

♦ When have you seen two characters touch each other as an event in games?

Bridging Activity - Events (10 min)

This activity will help bring the unplugged concepts from “The Big Event” into the online world that the students are moving into. Choose one of the following to do with your class:

Unplugged Activity Using Paper Blocks
Using the remote from the The Big Event - Worksheet and Unplugged Blockly Blocks (Grades 1 - 2) - Manipulatives, gather your class to reprise the activity from the previous lesson. Ask the class “when the teal button is pushed, what do we do?” then fill in one of the when event blocks and one of the blue action blocks accordingly. Make sure that the students understand that the when blocks need to be on top of the blue block and they need to touch in order for the program to run.

Previewing Online Puzzles as a Class
Pull a puzzle from the corresponding online puzzles. We recommend puzzle 4 of this stage. Call on different students to make a funny face representing a mood when you click on Daisy. Explain this is an event that they are reacting to and Daisy can be coded to change moods when you click on her.

Main Activity (30 min)

CSF Pre-Express Course
This is the most free-form plugged activity of the course. At the final stage students have the freedom to create a story of their own. You may want to provide structured guidelines around what kind of story to write, particularly for students who are overwhelmed by too many options.

Wrap Up (5 - 10 min)

Journaling
Having students write about what they learned, why it’s useful, and how they feel about it can help solidify any knowledge they obtained today and build a review sheet for them to look to in the future.

**Journal Prompts:**
- What was today’s lesson about?
- How did you feel during today’s lesson?
- Draw an event you used in your program today.
- Imagine that you have a remote controlled robot. What would the remote look like? Draw a picture of what you think you could make the robot do.

**Extended Learning**

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

**Look Under the Hood**

When you share a link to your story, you also share all of the code that goes behind it. This is a great way for students to learn from each other.

- Post links to completed stories online
  - Make a story of your own to share as well!
- When students load up a link, have them click the “How it Works” button to see the code behind the story.
- Discuss as a group the different ways your classmates coded their stories.
  - What surprised you?
  - What would you like to try?
- Choose someone else’s story and click Remix to build on it. (Don't worry, the original story will be safe.)

**Standards Alignment**

**CSTA K-12 Computer Science Standards**

- AP - Algorithms & Programming

This curriculum is available under a Creative Commons License (CC BY-NC-SA 4.0).

If you are interested in licensing Code.org materials for commercial purposes, contact us.
Lesson 14: Spelling Bee

Overview
Part puzzle, part word search, the Spelling Bee asks students to program a bee to find common words in a grid.

Agenda
- Getting Started
  - Introduction
- Activity
- Extended Learning

Objectives
Students will be able to:
- Arrange sequential movement commands to search for and identify target words within a grid of letters.
- Practice spelling age-appropriate words
Teaching Guide

Getting Started

Introduction

- Students should be able to read and identify the following words for this activity:
  - North
  - South
  - East
  - West
  - Jump
  - Code
  - Debug
  - Above
  - Below
  - Story
  - Move
  - Square

Activity

Spelling Bee

Very young students or struggling readers may need additional support finding the words - using manipulatives (like Scrabble tiles) can help students see what words look like in different directions.

Extended Learning

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

Vocab Hop Scotch

Using class vocab words, create a floor-sized word search. The whole class can then "program" a student, or teacher, to spell out words by creating sequences of cardinal directions.

Standards Alignment

CSTA K-12 Computer Science Standards

- AP - Algorithms & Programming

This curriculum is available under a Creative Commons License (CC BY-NC-SA 4.0).

If you are interested in licensing Code.org materials for commercial purposes, contact us.