

Course A

Course A offers computer science curriculum for beginning readers around the kindergarten age range. Students will learn to program using commands like loops and events. The lessons featured in this course also teach students to collaborate with others meaningfully, investigate different problem-solving techniques, persist in the face of difficult tasks, and learn about internet safety. By the end of this course, students create their very own custom game or story from Play Lab that they can share.

Teacher Links: [Teacher Videos](#) [Playlist](#)

Lesson 1: Debugging: Unspotted Bugs

Bug | Debugging | Persistence | Unplugged

Lesson 2: Persistence & Frustration: Stevie and the Big Project

Fail | Frustrated | Persistence | Unplugged

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: Programming Unplugged: Happy Maps

Algorithms | Sequencing | Unplugged

Lesson 6: Programming in Maze

Algorithms | Debugging | Program | Programming

Lesson 7: Common Sense Education: Going Places Safely

Common Sense Education | Unplugged

Lesson 8: Loops Unplugged: Happy Loops

Unplugged | Loop | Repeat

Lesson 9: Loops in Collector

Loop | Collector

Lesson 10: Loops in Artist

Loop | Artist

Lesson 11: Events Unplugged: The Big Event

Unplugged | Event

Lesson 12: Events in Play Lab

Play Lab | Event



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Lesson 1: Debugging: Unspotted Bugs

Bug | Debugging | Persistence | Unplugged

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 - Online Story**)

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)

For the Students

- **Unspotted Bugs** - Online Story
- **Think Spot Journal** - Reflection Journal

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.

💡 Lesson Tip

Important ideas from the story:

- What happened?
- What was supposed to happen?
- What does that tell you?
- Did it work at the first step?
- Did it work at the second step?
- Where did it go wrong?

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.

Reflect:

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?

Lesson Tip

Say:

Great! You all are so good at this, maybe you can help me with my own problem!

See, I have this marble run that I made. It comes in two pieces. When I put the ball in here (input A) it's supposed to come out here (output A). When I put the ball in here (input B) it's supposed to come out here (output B). Now, when I slide them together, I should be able to put the ball in here (input A) and have it come out here (output B). But it doesn't work, watch.

[Slide the pieces together with output B facing output A.]

Watch what happens. [Drop ball at input A and notice that it does not come out output B.]

- BUG!

What happened?

- The ball fell on the table.

What was supposed to happen?

- The ball was supposed to drop from A into B.

What does that tell you?

- You should turn B around so that the ball goes into the right place!

Lesson Tip

Say:

What do you think we learned in this lesson?

- Debugging
- How to solve a problem
- How to make a marble go
- How do you think that can help us in other places?

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



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Lesson 2: Persistence & Frustration: Stevie and the Big Project

Fail | Frustrated | Persistence | Unplugged

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:

- Identify and point out symptoms of frustration.
- Illustrate 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.

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](#))

For the Students

- **Stevie and the Big Project** - Online Story
- **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

This lesson is meant to introduce students to the idea that they should not give up just because they are frustrated.

Read: Begin by reading **Stevie and the Big Project - Storybook (PDF)**. Students will be introduced to the ideas of persistence and frustration through the relatable challenges of Stevie the Squirrel and her crew. Chief among these are the concept that struggle leads to learning and that persistence can lead to success.

This book should be read as a classroom story, any other format exists only for students without access to a teacher.

Discuss: When sharing this story with your class, feel free to 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

Review: The vocabulary in this lesson is among the most important of the year. You may need to do a little extra work with your students at the end of the story to make sure that they understood that frustration is the feeling of being annoyed or angry at something and that persistence is choosing not to give up, and attempting something over and over again.

- **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.

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.

Lesson Tip

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?

Set-Up: How you conduct this lesson depends heavily on your confidence in your own classroom. If you don't feel that your students are ready to be taping rolled paper into tubes, then you might want to modify the lesson and its materials to be something that students can be more successful with. Some alternatives are:

- Newspapers taped to the wall/chair/floor
- Cardboard tubes and paper cups
- Wooden building blocks with train/car tracks

The options are really endless. Just make sure that the point of the activity remains the same. Students need to struggle with a hard task long enough to be able to identify the feeling of frustration in themselves, then they must be intentionally persistent.



Building the Marble Run

Remarks

Now, we're going to do something very fun, and very challenging! I am going to let you all try to make a Marble Run of your own!

This is **supposed** to be challenging. That's part of the fun! Your Marble Run probably won't work right the first time, and that's alright. The goal for this game is to practice being persistent.

Remember, Stevie showed us that this might be difficult, and sometimes difficult things are frustrating. It is okay if you get frustrated during this activity. Most of us probably will at some point. How should we handle those feelings?

- Count to 10
- Take deep breaths
- Journal about them
- Talk to a partner about them
- Ask for help

Time to be an engineer!

Group: 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.



It can be a good idea to 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.

Circulate: 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.

Teaching Tip

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.

Teaching Tip

Checkpoint Suggestions:

- Pre-planning time (3-5 minutes)
- First attempt at building (10-15 minutes) -- For a longer (or two day) time period --
- Discuss with another group (3-5 minutes)
- Revision of structure (10-15 minutes) -- Wrap Up Work --
- Collaborative work time (5-15 minutes)

After the Marble Run

Discuss: 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 at building their contraption and being successful for the purpose of this activity. Allow students the opportunity to celebrate their hard work and persevering through frustration.

Wrap Up (5 min)

Journaling

Goal: Allow students to reflect on the emotions and processes experienced during the lesson.

Journal Prompts:

Finish out this lesson by asking students to spend some time in their Think Spot Journal.

- 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

Teacher Tip

As you know, tears are a very common byproduct when students have to identify feelings of frustration and work past them to be persistent. You don't want to have a pre-packaged prescription for students who become emotionally raw.

- Can you put into words what you are feeling right now?
- Stevie would be so proud of you. What do you think Laurel and Jorge would say if you told them how you feel?
- What would it be called if you said out loud that you are frustrated, but decided to keep working anyway?
 - Do you feel like you can be persistent with me today?



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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

Extended Learning

Go Figure

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**

For the Students

- **Think Spot Journal - Reflection Journal**

Vocabulary

- **Algorithm** - A precise sequence of instructions for processes that can be executed by a computer

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 **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!

💡 Lesson Tip

You know your classroom best. As the teacher, decide if you should all do this together, or if students should work in pairs or small groups.

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?

💡 Lesson Tip

If deciding on the correct steps seems too difficult for your students, do that piece together as a class before you break up into teams.

Journaling

Ask the students to go back to their desks to reflect individually on what they learned. Write a couple of the questions up above on a whiteboard. Ask the students to discuss these in their journal. Sample prompts include:

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 **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



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Lesson 4: Learn to Drag and Drop

Click | Double-Click | Drag | Drop | Pair Programming

Overview

This lesson will give students an idea of what to expect when they head to the computer lab. It begins with a brief discussion introducing them to computer lab manners, then they will progress into using a computer to complete online puzzles.

Purpose

The main goal of this lesson is to build students' 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 proper 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)

Course A Online Puzzles - Website

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 your own class section on Code.org 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

- **How to Make a Class Section on Code.org** - Teacher Video
- **Course A Online Puzzles** - Website
- **CS Fundamentals Main Activity Tips** - Lesson Recommendations

For the Students

- **Pair Programming** - Student Video
- **Think Spot Journal** - Reflection Journal

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

location

- **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 walk 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.

Discussion Goals:

- Use calm bodies in the lab
- Remember not to chew gum or candy
- Sanitize your hands
- Sit with your partner at one computer
- Make sure that the first "driver" can reach the mouse
- When you get frustrated, don't hit or shake the computer or monitor
- Follow the **20/20/20 - Website** rule
- How to deal with the **Wiggles** every 20-30 minutes (requires a free login on GoNoodle)
- Ask your partner before you ask the teacher
- Keep volume down so everyone else can hear their partners
- Use your journal for keeping track of feelings and solutions

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 **Course A Online Puzzles - Website** corresponding to this lesson. 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)

Main Activity (20 - 30 min)

Course A Online Puzzles - Website

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** 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.

Teacher Tip

Show the students the right way to help classmates:

- 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

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 could include:

- 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 Stage 4 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

► AP - Algorithms & Programming



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Lesson 5: Programming Unplugged: Happy Maps

Algorithms | Sequencing | Unplugged

Overview

This unplugged lesson brings together teams with a simple task: get the "flurb" to the fruit. Students will practice writing precise instructions as they work to translate instructions into the symbols provided. If problems arise in the code, students should also work together to recognize bugs and build solutions.

Purpose

The bridge from algorithms to programming can be a short one if students understand the difference between planning out a sequence and encoding that sequence into the appropriate language. This activity will help students gain experience reading and writing in shorthand code.

Agenda

Warm Up (5 min)

Step-by-Step

Activity (40 min)

**Happy Maps Programming
Students' Turn**

Wrap Up (8 min)

**Flash Chat
Journaling**

Extended Learning

Objectives

Students will be able to:

- Translate an algorithm into a program
- Decode and run a program created by someone else
- Identify and address bugs or errors in sequenced instructions

Preparation

Watch the **Happy Maps - Teacher Video**.

Print out **Happy Map Cards - Worksheet** for each group.

Print out **Happy Map Game Pieces - Manipulatives** for each 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

- **Happy Maps** - Teacher Video
- **Happy Map Cards** - Worksheet Answer Key

For the Students

- **Happy Map Cards** - Worksheet
- **Happy Map Game Pieces** - Manipulatives
- **Think Spot Journal** - Reflection Journal

Vocabulary

- **Algorithm** - A list of steps to finish a task.
- **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)

Step-by-Step

This warm-up is meant to get the class thinking about how to break a big problem down into a list of individual steps.

Model: Start by asking the class for step-by-step directions on how to get to the chalkboard. Make sure that you ask students to break apart any large instructions, like "Walk to the chalkboard," into smaller instructions like "Step forward."

When you reach the board, ask for instructions to draw a smiley face and try to get them to keep their instructions equally small.

🔗 **Say:** Well done! You just gave me a list of steps to finish a task. In computer science, that's called an Algorithm! [Follow up with your typical method of introducing vocabulary: word wall, repeat-after-me, etc.]

🔗 Teaching Tip

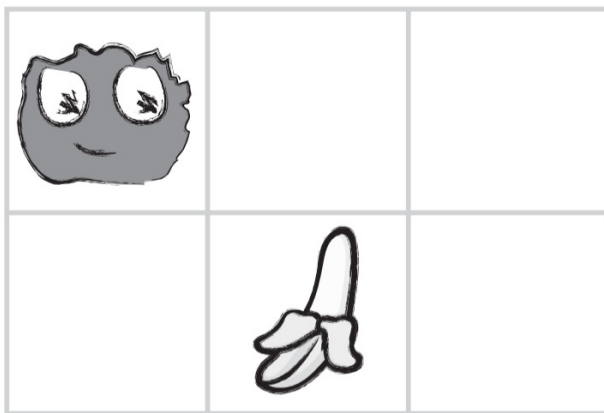
If the class starts shouting simultaneously, explain that you can only hear one instruction at a time. Call on students individually if that helps.

Activity (40 min)

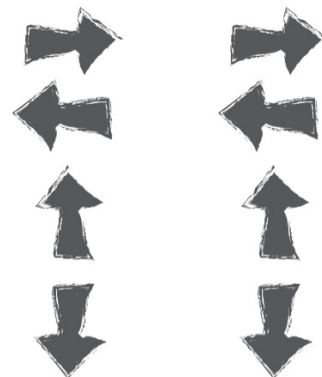
Happy Maps Programming

In this exercise, the class will get map cards that have a pre-defined start space (Flurb) and end space (fruit). Students will need to get the Flurbs to the fruit on each card, using the arrows provided.

Display:



Which two ways should the Flurb step to get to the supplies?



Model: Select one of the intermediate maps, like the one shown above. Display it for the class and work through the puzzle together.

Have students look at the puzzle, then think-pair-share their solution for how they would get the Flurb to the fruit.

Think: This Flurb needs to take two steps to get to the fruit. Work with your elbow partner to decide what you think those two steps are.

Pair: Have students discuss with neighbors for about 90 seconds.

Share: Ask a few students to describe their algorithm to the class. Move your finger along the displayed map as the students read their steps. Once you have a solution, ask if anyone else came up with a different idea that also works.

Now, share with the students that the magic step of changing an algorithm into a "program" happens when the code is written down using symbols. Do the students see any symbols on the display?

Think: Challenge students to encode the algorithm that they came up with before into symbols, and to write those symbols down in their journals (or on a piece of paper.)

Pair: Once students have written down their symbols, ask them to swap with a partner to see if they can follow each others' instructions.

Share: Ask for volunteers to come draw their arrows on the board. If the original code doesn't work, spend some time debugging as a class. Students should be familiar with the idea of "debugging" from previous lessons, so be sure to use the vocabulary to get them comfortable with it.

Once the code has been successfully written on the board, congratulate the class on writing their first program together!

Students' Turn

Group: If your class is comfortable, place students into small groups of 2-3. Otherwise, you can continue solving these problems as a class and having them think-pair-share to write programs.

Distribute: Pass out one of the images from the **Happy Map Cards - Worksheet** to each group as needed. **(Optional)** If you start noticing that students are ready for more, use the provided **Happy Map Game Pieces - Manipulatives** and let students choose their own start and finish destinations on the blank map.

Encourage the students to follow these steps:

- Discuss an algorithm to get the Flurb to the fruit.
- Encode the algorithm into arrows in their journals.
- Try their code to see if everything works as expected.
- Debug any issues and fix their code until it works correctly.

Share: When the lesson is done, offer to let groups share out the most difficult maps that they solved. If you had time, ask them to share their solutions as well.

Wrap Up (8 min)

Flash Chat

Discuss: When it's time to wind down, ask students if they can tell the difference between an algorithm and a program. Both are a list of steps, but a program (code) has been encoded in a way that can be run by a machine (or a kindergartener!)

- Do you think that someone who speaks another language would be able to run your program?
- Why or why not?

Journaling

Students should be encouraged to capture their thoughts in their journal after each activity (with text or images.) Choose a journal prompt that will help students remember the purpose of this exercise.

Journal Prompts:

- What was today's lesson about?
- Draw a feeling face to show how you felt about today's lesson in your journal
- Can you draw your own Flurb map?
- What would the code be to solve your map?

Extended Learning

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

Stuffie Maps

- Create a life-size grid on the rug with tape and have student bring stuffed animals to school.
- Now students can program friends to move their actual stuffies as directed in the programs.

Create Your Own

- Have students create their own maps.
- Have other students solve them using programs.

Standards Alignment

CSTA K-12 Computer Science Standards

- ▶ **AP** - Algorithms & Programming



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Lesson 6: Programming in Maze

Algorithms | Debugging | Program | Programming

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 (5 min)

Introduction

Bridging Activity - Programming (10 min)

Unplugged Activity Using Paper Blocks Previewing Online Puzzles as a Class

Main Activity (30 min)

Course A Online Puzzles - Website

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 **Course A Online Puzzles - Website** in stage 6 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

- **Course A Online Puzzles - Website**
- **CS Fundamentals Main Activity Tips - Lesson Recommendations**

For the Students

- **Unplugged Blockly Blocks (Grades 1 - 2) - Manipulatives**
- **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 (5 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.

Bridging Activity - Programming (10 min)

This activity will help bring the unplugged concepts from Happy Maps 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 an empty Flurb map from the **Happy Map**

Cards - Worksheet and give students **Unplugged Blockly Blocks (Grades 1 - 2) - Manipulatives** prefilled with cardinal commands like $E \rightarrow$ (East) and $W \leftarrow$ (West). Now, have the students program the Flurb from their desks using the paper Blockly blocks to get the Flurbs to the fruit. Make sure that they understand that the blocks need to go from top to bottom and they all need to touch!

Previewing Online Puzzles as a Class

Pull a lesson from the puzzles corresponding to this lesson. We recommend puzzle 7. Using arrows from the **Happy Map Game Pieces - Manipulatives**, have students lay out a pattern that they think 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:

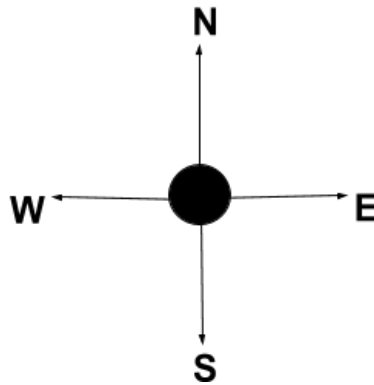
- **Course A, Programming in Maze #1**
- **Course A, Programming in Maze #2**

Course A Online Puzzles - Website

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:

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.

- Utilize **Pair Programming - Student Video** 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.

💡 Teacher Tip:

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

- Don't sit in their chair
- Don't use their keyboard
- Don't touch their mouse
- Make sure the classmate can describe the solution 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?
- What's something you shouldn't do while helping a friend with a puzzle?
- Why do you think debugging is important?

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



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Lesson 7: Common Sense Education: Going Places Safely

Common Sense Education | Unplugged

Overview

In collaboration with **Common Sense Education - Website**, this lesson helps students learn that many websites ask for information that is private and discusses how to responsibly handle such requests. Students also find out that they can go to exciting places online, but they need to follow certain rules to remain safe.

Purpose

Common Sense Education has created this lesson to teach kids the importance of being safe online. By relating places in the real world to websites on the internet, students will make important connections between safe websites and safe places in their own neighborhood.

Agenda

Warm Up (20 min)

Vocabulary
Where We Go

Main Activity (20 min)

Keep It Private

Wrap Up (15 min)

Flash Chat: What did we learn?
Journaling

Assessment (5 min)

Going Places Safely - 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 the kind of information that is private and understand that it should never be shared online.

Preparation

Watch the **Going Places Safely - Teacher Video**.

Prepare to show the **Going Places Safely - Lesson Video**.

Live access or print-off of **SecretBuilders** sign-up page (Click “New Player,” select an age, and then select “I’m a Girl” or “I’m a Boy.”).

Print one **Going Places Safely - Assessment** for each student.

Make sure each student has a **Think Spot Journal - Reflection Journal**.

Review **CSF Digital Citizenship - Resource List** for more online safety content.

Links

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

For the Teacher

- **Going Places Safely** - Teacher Video
- **Going Places Safely** - Lesson Video
- **Going Places Safely** - Assessment
- **Going Places Safely** - Assessment Answer Key
- **Common Sense Education** - Website
- **CSF Digital Citizenship** - Resource List

For the Students

- **Think Spot Journal** - Reflection Journal

Teaching Guide

Warm Up (20 min)

Vocabulary

This lesson has one new and important word:

Username - Say it with me: Yews-er-naym

A name you make up so that you can see or do things on a website, sometimes called a “screen name”

Where We Go

- Invite students to talk about places they have visited on a class field trip.
 - If students have limited experience with field trips, provide some examples of the types of places they could visit as a class, such as museums, science centers, or zoos.
 - Have students choose a place they would like to go on a class field trip.
- Have students take an imaginary field trip to their chosen place.
 - Narrate the preparations while having students pantomime what’s happening – For example: put on your jacket; climb on/off the bus; get your ticket checked; go inside.
 - Have students describe what they think they might see and do once they arrive.
- Let the students sit back down, then ask: "What do you need to do to stay safe when you visit new places?"

Play **Going Places Safely - Lesson Video** .

What three rules does Jeremiah follow when he goes places online?

- 1) Always ask your parent (or teacher) first
- 2) Only talk to people you know
- 3) Stick to places that are just right for you

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

Main Activity (20 min)



Keep It Private

Access **SecretBuilders** sign-up page live, or project a print-out on the board for the class to see.

- Invite students to give examples of information that they should keep private.
 - Write down their responses on the board or chart paper so that you can return to them later in the lesson.
- Make sure they understand that private information includes the following:
 - full name
 - age
 - address
 - telephone number
 - email address (or parents’ email addresses)
 - where they go to school or after school
 - where their parents work
- Encourage students to discuss why it is important to keep this information private.
 - Stress that it is never safe to give out private information to people they don’t know.

- Students should always ask a parent or caregiver before they give out private information to anyone.
- Refer back to the sign-up page.
 - Ask "Do you think you should use your real name, or something that includes your real name, when you make up a username?"

Guide students through the following rules and tips for creating usernames:

Rules:

- Ask a parent or other trusted adult before you create a username.
- Never include any private information in your username, such as your real name, age, birthday, the name of your school or hometown, parts of your address or phone number, or email address.
- Avoid using symbols or spaces, as they are usually not allowed in usernames.

Tips

- Include the name of something that will help you remember your username, like your favorite animal, character, or toy. You might have to combine this with other words or numbers.
- If the username you create is already taken, you will have to come up with another one.
- Write down your username and password and, with the help of a parent, find a safe place to keep it in case you forget them.

Distribute paper and place students in pairs.

Directions:

1. Have students interview their partner using the following questions, and write down their responses:
2. What is your favorite pet or animal?
3. What is your favorite TV show, book, or movie character?
4. What are your favorite numbers?
5. Instruct students to make up three safe usernames for their partner using information from their interview responses.
6. They should not include their partner's name, age, school, email address, birthday, or any other private information.
7. Invite students to share one or more of their usernames with the class.
8. Encourage students to respond to one another's usernames, confirming that each name follows the rules they have learned.

Lesson Tip

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

Wrap Up (15 min)

Flash Chat: What did we learn?

- What information should you always keep private when you are using the computer?
- What rules should you follow when you make up a username?
- What can the Internet be used for?
- What rules do we have for visiting places online?

Take the time to discuss again what is appropriate information to share on the Internet, and what is not:

Appropriate	Not Appropriate
Interests	Address

Appropriate	Not Appropriate
Hobbies	Full Name
First Name	Information that would hurt others

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.

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)

Going Places Safely - 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** to learn more about how you can keep your students safe in this digital age.



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Lesson 8: Loops Unplugged: Happy Loops

Unplugged | Loop | Repeat

Overview

This activity revisits Happy Maps. This time, student will be solving bigger, longer puzzles with their code, leading them to see utility in structures that let them write longer code in an easier way.

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.

Agenda

Warm-Up (5 min)

Happy Maps Review

Main Activity (20 min)

Happy Loops

Wrap Up (8 min)

Journaling

Extension Activities

Objectives

Students will be able to:

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

Preparation

Watch the **Happy Loops - Teacher Video**

Print out a **Happy Map Cards - Worksheet** to display for the class

Print out **Happy Map Game Pieces - Manipulatives** for each group

Print out **Happy Map Cards XL - Worksheet** for each group

Print out **Happy Map Game Pieces Bonus Pack - Manipulatives** for each 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

- **Happy Loops - Teacher Video**

For the Students

- **Happy Map Cards - Worksheet**
- **Happy Map Cards XL - Worksheet**
- **Happy Map Game Pieces - Manipulatives**
- **Happy Map Game Pieces Bonus Pack - Manipulatives**
- **Think Spot Journal - Reflection Journal**

Vocabulary

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

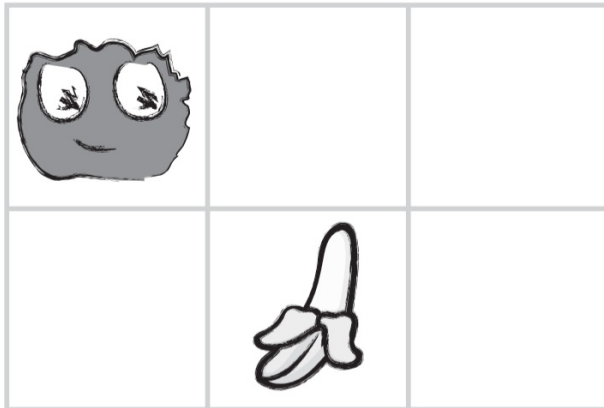
Teaching Guide

Warm-Up (5 min)

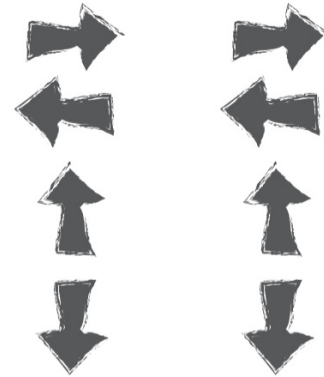
Happy Maps Review

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:



Which two ways should the Flurb step to get to the supplies?



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?

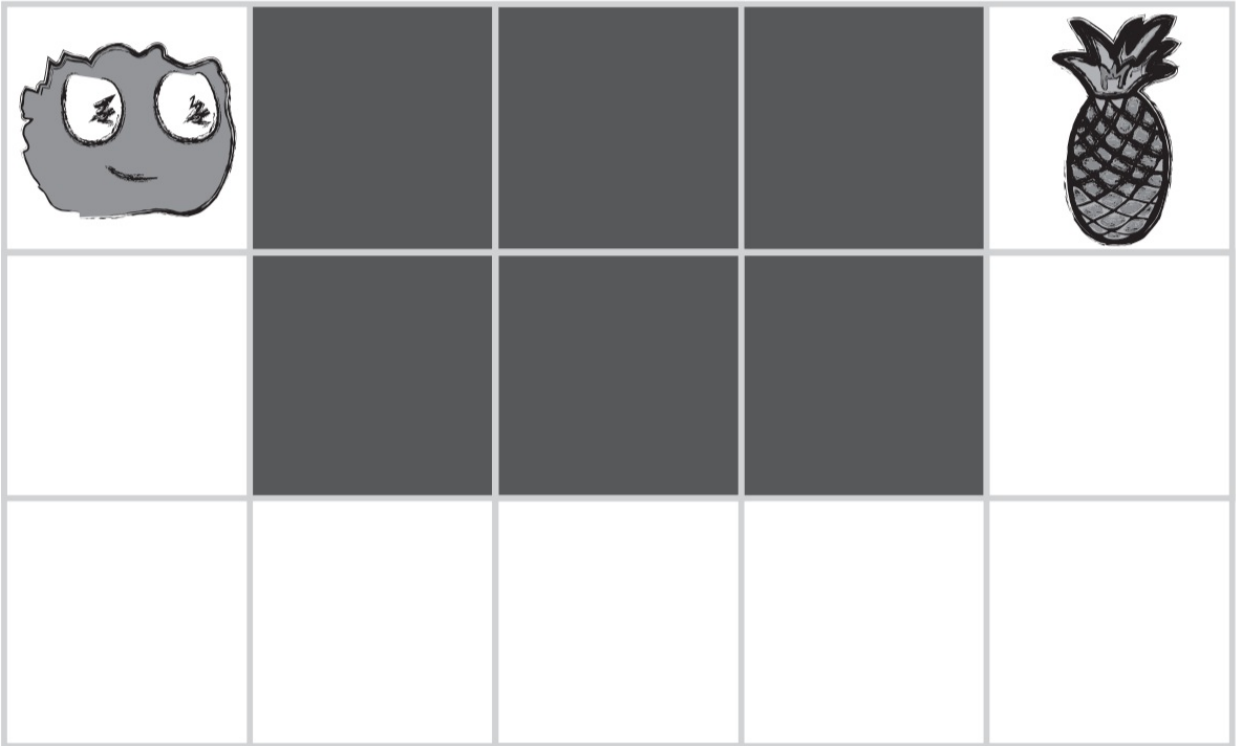
Pair: Have students discuss for about 90 seconds.

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

Main Activity (20 min)

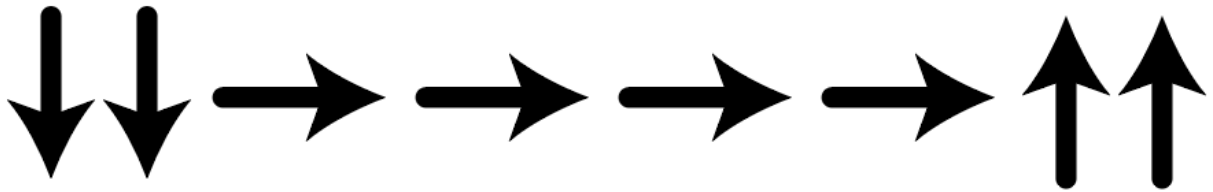
This portion of the lesson should help students see that there is an easier way to handle repetitive code than to brute force a solution with dozens of the same symbols.

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?

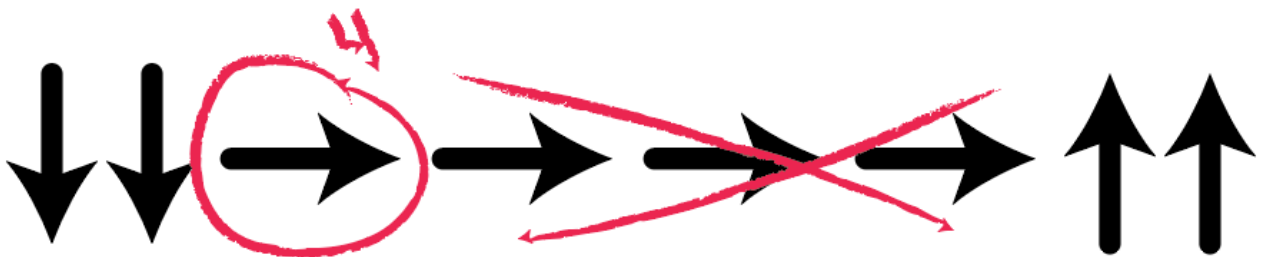
Discuss:

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.)

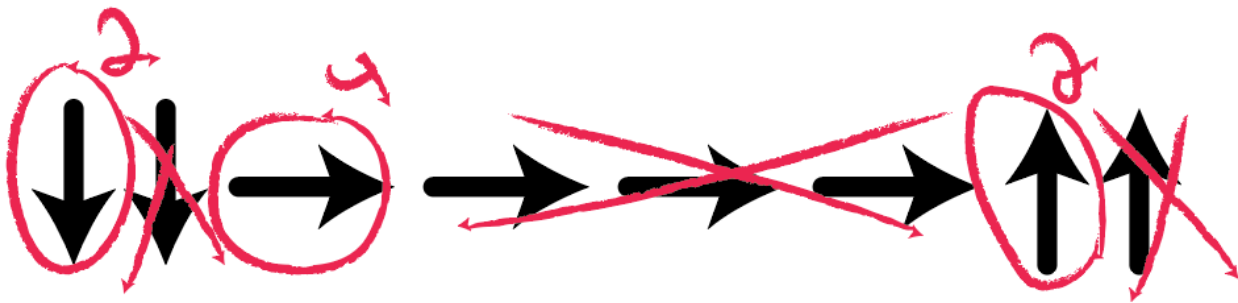
Discussion

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.

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

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 **Happy Map Game Pieces Bonus Pack - Manipulatives** 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 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:

- 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. Prompts include:
 - What does "repeat" mean to you?
 - Draw a picture of you repeating something.

Extension Activities

- 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.

Standards Alignment

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Lesson 9: Loops in Collector

Loop | Collector

Overview

Building on the concept of repeating instructions from "Happy Loops," 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)

Course A Online Puzzles - Website

Wrap 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.
- Break down a long sequence of instructions into the smallest 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

Play through the **Course A Online Puzzles - Website** in stage 9 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 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

- **Course A Online Puzzles - Website**
- **CS Fundamentals Main Activity Tips - Lesson Recommendations**

For the Students

- **Unplugged Blockly Blocks (Grades 1 - 2) - Manipulatives**
- **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 the Happy Loops activity with your students:

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

Bridging Activity - Loops (10 min)

Choose **one** of the following to do with your class:

Unplugged Activity Using Paper Blocks

Select an empty Flurb map from the **Happy Map Cards - Worksheet** 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). 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!

💡 Teacher Tip:

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

Previewing Online Puzzles as a Class

Pull a puzzle from the corresponding online puzzles. We recommend puzzle 7. Using arrows from the **Happy Map Game Pieces - Manipulatives** and **Happy Map Game Pieces Bonus Pack - Manipulatives**, have students lay 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:

- **Course A, Loops in Collector #1**
- **Course A, Loops in Collector #2**

Course A Online Puzzles - Website

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

💡 Lesson Tip:

Some students may be curious about what happens when you add more blocks inside a repeat loop. Make sure to explain that the repeat loop goes through every block inside it once, then starts back over from the top and repeats that. It does not just repeat each block inside that many times and move to the next one.

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?
- How did loops make your program easier to write?
- Draw something that uses loops.

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

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Lesson 10: Loops in Artist

Loop | Artist

Overview

Returning to loops, students learn to draw images by looping simple sequences of instructions. In the previous plugged lesson, loops were used to traverse a maze and collect treasure. Here, loops are creating 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 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)

Course A Online Puzzles - Website

Wrap 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 **Course A Online Puzzles - Website** in stage 10 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

- **Course A Online Puzzles - Website**
- **CS Fundamentals Main Activity Tips - Lesson Recommendations**
- **Pause and Think Online - Video**

For the Students

- **Think Spot Journal - Reflection Journal**

Vocabulary

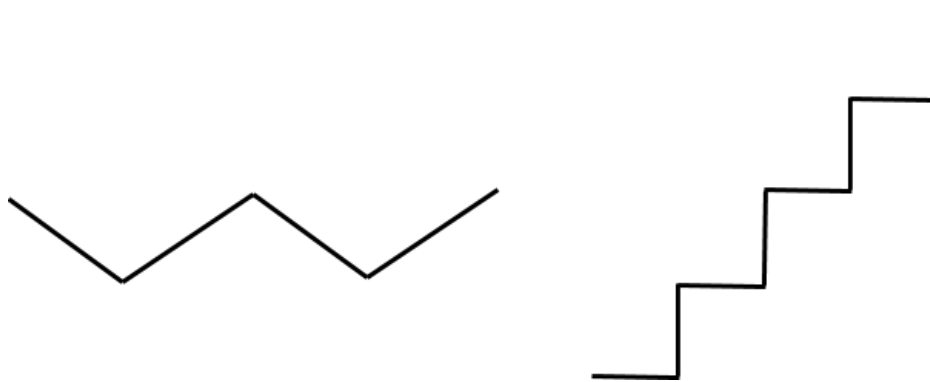
- **Loop** - The action of doing something over and over again.
- **Repeat** - Do something again

Teaching Guide

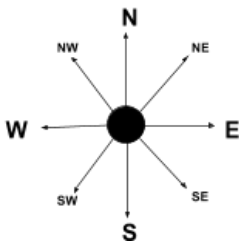
Warm Up (10 min)

Introduction

- 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:

- **Course A, Loops in Artist**

Course A Online Puzzles - Website

Wrap Up (5 - 10 min)

Journaling

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**.

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 stairs. Imagine the loop needed to draw this.
- Draw something else in your life that uses loops.

Standards Alignment

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Lesson 11: Events Unplugged: The Big Event

Unplugged | 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 (15 min)

Flash Chat: What did we learn? Journaling

Assessment (10 min)

The Big Event - Assessment

Extended Learning

Objectives

Students will be able to:

- 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 **The Big Event - Assessment** for each student.

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

- **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

For the Students

- **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 Flurbs find fruit?
 - In that exercise, you knew in advance exactly where you wanted your Flurb to end up, so you could make a program that took them 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.

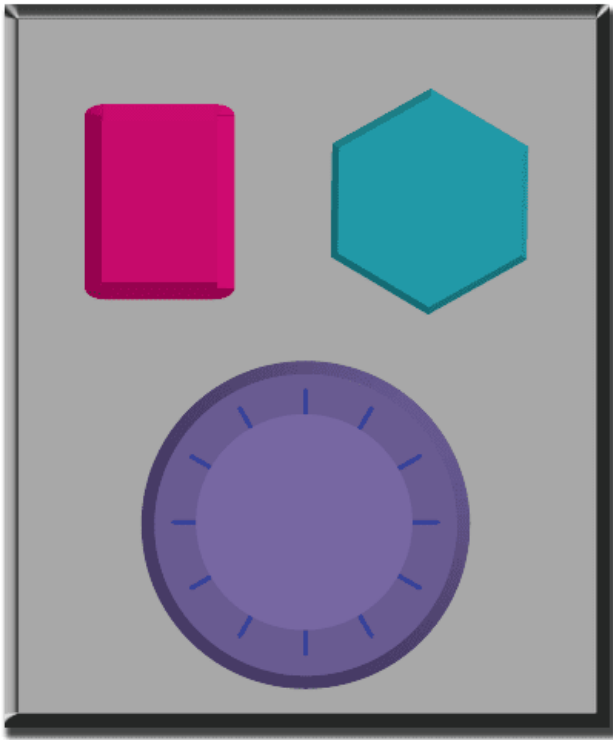
Lesson Tip

If your students seem confused, talk about their favorite games and all of the ways that they let the characters know what they're supposed to do. Point out how the game would be really boring if it ran from start to finish without any events required.

In earlier lessons, we created algorithms that allowed us to control a friend or Flurb 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 "Wooooo!"
 - 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 (15 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!

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Lesson 12: Events in Play Lab

Play Lab | Event

Overview

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

Purpose

Students will further develop their understanding of events using Play Lab today. Events are very common in most computer programs. In this activity, students will use events to make a character move around the screen, make noises, and change backgrounds based on user-initiated events.

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)

Course A Online Puzzles - Website

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 sequence and event-handlers.
- Share a creative artifact with other students.

Preparation

Play through the **Course A Online Puzzles - Website** 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

- **Course A Online Puzzles - Website**
- **CS Fundamentals Main Activity Tips - Lesson Recommendations**

For the Students

- **Unplugged Blockly Blocks (Grades 1 - 2) - Manipulatives**
- **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.

💡 Lesson Tip

Students will have the opportunity to share their final product with a link. This is a great opportunity to show your school community the great things your students are doing. Collect all of the links and keep them on your class website for all to see!

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**.

Previewing Online Puzzles as a Class

Pull a puzzle from the corresponding puzzles online. We recommend puzzle 7. Call on different students to make a funny noise when you click on Jorge. Explain this is an event that they are reacting to and Jorge can be coded to make noise when you click on him.

Main Activity (30 min)

Course A Online Puzzles - Website

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

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