Course 2

OVERVIEW

Students create programs with loops, events, and conditionals and write algorithms for everyday tasks. They will translate their names into binary, investigate different problem-solving techniques, and discuss societal impacts of computing. By the end of the curriculum, students create interactive games or stories they can share. While the description of some lessons may look similar to lessons in the Course 1, this review is important for those who have taken Course 1 as most will be at the lower elementary level. The complexity and depth of topics discussed are scaffolded appropriately to provide all students a rich and novel experience. Students starting in Course 2 will be students who can read in the lower and middle elementary grades.

Lesson Sequence

Online lessons are in regular text and unplugged activities are in **bolded** text.

#	Lesson Name	Description
1	**Graph Paper Programming**	Students write an algorithm (a set of instructions) using a set of predefined commands to direct their classmates to reproduce a drawing.
2	**Real-Life Algorithms**	This lesson calls out ways we use algorithms in our daily lives. This lesson also focuses on the bigger picture of computer science and how algorithms play an essential part.
3	Maze: Sequence	Students write programs (algorithms for the computer) that get a character through a maze. They'll understand the importance of sequence in the programs they write.
4	Artist: Sequence	Students write programs to draw different lines and shapes.
5	**Getting Loopy**	This lesson introduces the programming concept of loops (repeated instructions) through a dance activity. Students will learn simple choreography and then be instructed to repeat it.
6	Maze: Loops	Student write programs in the Maze environment using loops.
7	Artist: Loops	Students write programs to draw different shapes while identifying patterns in their code. They learn about the programming concept of loops (repeated statements), which can be used to make their programs more efficient.
8	Bee: Loops	Students write programs using loops in the Bee environment.

#	Lesson Name	Description
9	**Relay programming**	Students run a relay race, where they dash across the yard to write an algorithm based on a "Graph Paper Programming" image. They can only write one instruction at a time and if there's an error, they have to erase everything back to the error.
10	Bee: Debugging	Students are presented with a pre-written program that fails to complete the puzzle. Students will have to “debug” or fix the pre-written program.
11	Artist: Debugging	Students are presented with a drawing and a pre-written program that fails to create that drawing. Students will have to “debug” or fix the pre-written program.
12	**Conditionals**	To learn about conditional statements, students play a card game and create rules like “If I draw a red card, I get a point” and “If I draw a black card, you get a point.”
13	Bee: Conditionals	Students write programs using conditional statements using the Bee environment.
14	**Binary Bracelets**	Students create bracelets from a paper template that is a binary representations of the first letter of their name. Students learn that the same set of data can be represented in more than one way.
15	**The Big Event**	Students are introduced to the programming concept of “events,” which are actions that a computer constantly monitors for. The teacher will press buttons on a fake remote, and student have to shout specific phases depending on which button is pressed.
16	Flappy	Using the concept of “Events,” students will create their own game with events like “When the mouse is clicked, make the bird flap” and “When the bird hits the ground, end the game.”
17	Play Lab: Create a Story	Students employ all the different programming concepts they have learned in the curriculum this far to make a customized, interactive story or game of their own.
18	**Your Digital Footprint**	Teachers introduce to students the idea that putting information about themselves online creates a digital footprint or “trail” that has consequences.
19	Artist: Nested Loops	Students write programs that draw interesting and beautiful patterns using nested loops.

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UNPLUGGED

Graph Paper Programming

Lesson time: 20 Minutes Basic lesson time includes activity only. Introductory and Wrap-Up suggestions can be used to delve deeper when time allows.

LESSON OVERVIEW

By "programming" one another to draw pictures, students will begin to understand what programming is really about. The class will begin by having students instruct each other to color squares in on graph paper in an effort to reproduce an existing picture. If there's time, the lesson can conclude with images that the students create themselves.

TEACHING SUMMARY

Getting Started - 15 minutes

1) Vocabulary
2) Introduce Graph Paper Programming
3) Practice Together

Activity: Graph Paper Programming - 20 minutes

4) Four-by-Fours

Wrap-up - 5 minutes

5) Flash Chat: What did we learn?
6) Vocab Shmocab

Assessment - 10 minutes

7) Graph Paper Programming Assessment

LESSON OBJECTIVES

Students will:

- Understand the difficulty of translating real problems into programs
- Learn that ideas may feel clear and yet still be misinterpreted by a computer
- Practice communicating ideas through codes and symbols

TEACHING GUIDE

MATERIALS, RESOURCES AND PREP

For the Student

- Four-by-Fours Activity Worksheet
- Graph Paper Programming Assessment
- Sheets of 4x4 paper grids for the students to use as practice (These are provided as part of the Four-by-Fours

Activity Worksheet, but if you have the students create their own, you can include Common Core Math standard 2.G.2.)
- Blank paper or index cards for programs
- Markers, pens, or pencils

For the Teacher

- Lesson Video
- Print out one Four-by-Fours Activity Worksheet for each group
- Print one Graph Paper Programming Assessment for each student
- Supply each group with several drawing grids, paper, and pens/pencils

GETTING STARTED (15 MIN)

1) Vocabulary

This lesson has two new and important words:

Algorithm - Say it with me: Al-go-ri-thm
A list of steps that you can follow to finish a task

Program - Say it with me: Pro-gram
An algorithm that has been coded into something that can be run by a machine

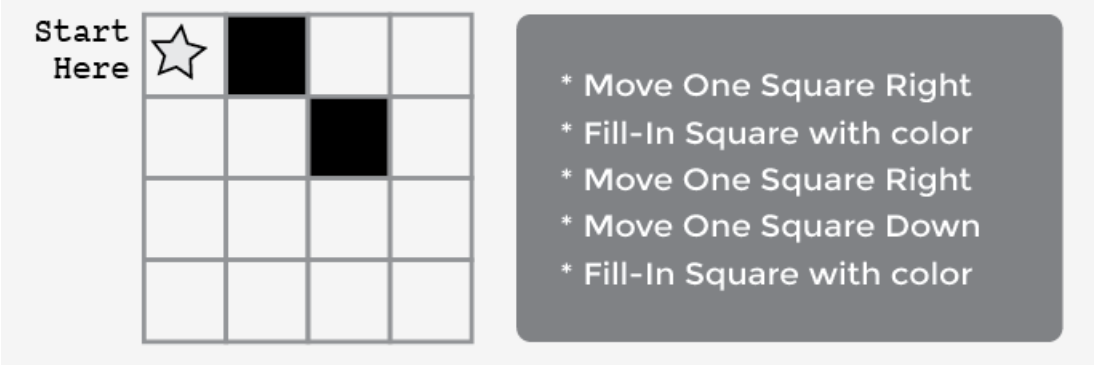
2) Introduce Graph Paper Programming

In this activity, we are going to guide each other toward making drawings, without letting the other people in our group see the original image.

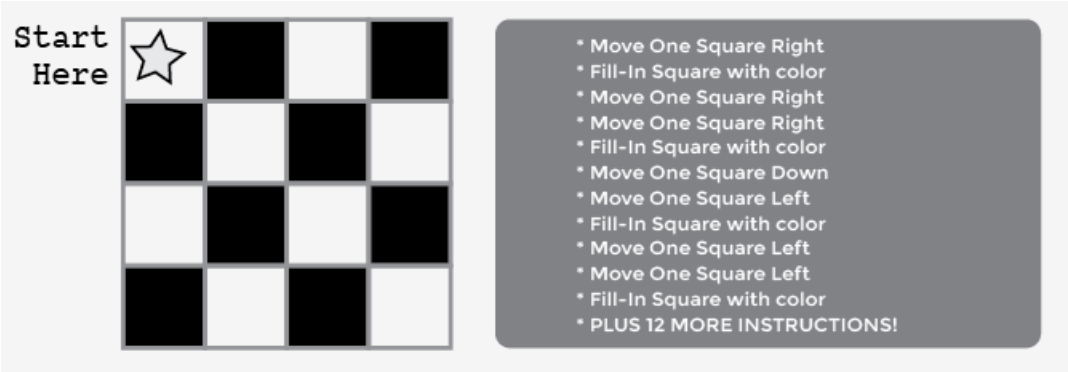
For this exercise, we will use sheets of 4x4 graph paper. Starting at the upper left-hand corner, we'll guide our teammates' Automatic Realization Machine (ARM) with simple instructions. Those instructions include:

- Move One Square Right
- Move One Square Left
- Move One Square Up
- Move One Square Down
- Fill-In Square with color

For example, here's how we would write an algorithm to instruct a friend (who is pretending to be a drawing machine) to color their blank grid so that it looks like the image below:



That's simple enough, but it would take a lot of writing to provide instructions for a square like this:

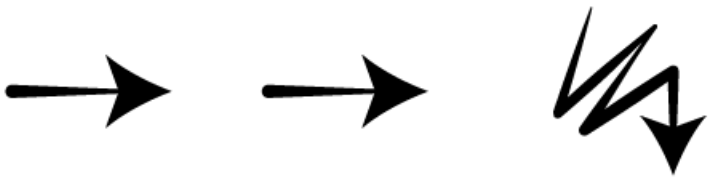


With one little substitution, we can do this much more easily! Instead of having to write out an entire phrase for each instruction, we can use arrows.

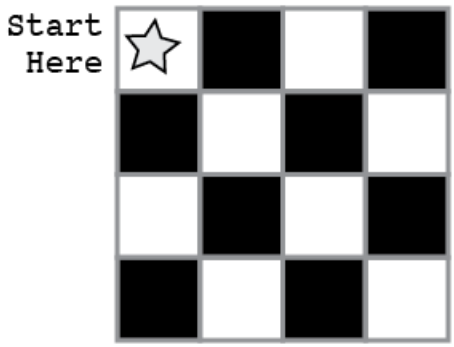
In this instance, the arrow symbols are the "program" code and the words are the "algorithm" piece. This means that we could write the algorithm:

> "Move one square right, Move one square right, Fill-in square with color"

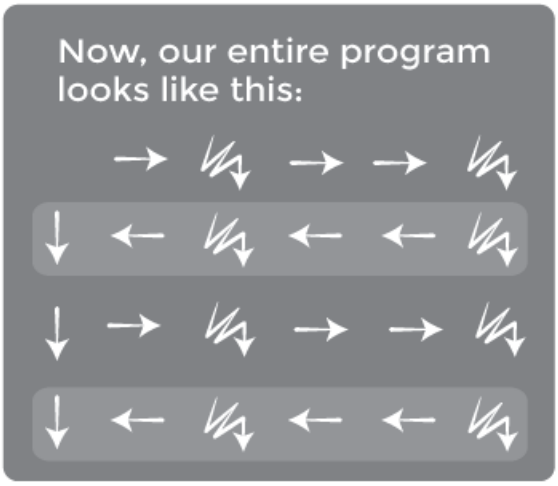
and that would correspond to the program:



Using arrows, we can redo the code from the previous image much more easily!



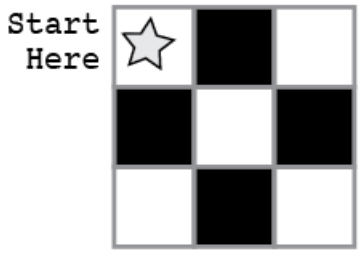
Follow along with your finger and see if you can figure out how to get this image from the program to the right.



3) Practice Together

Start your class off in the world of programming by drawing or projecting the provided key onto the board.

Select a simple drawing, such as this one to use as an example.



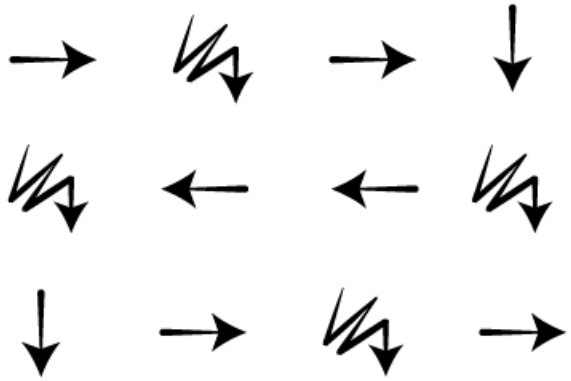
This is a good way to introduce all of the symbols in the key. To begin, fill in the graph for the class -- square by square -- then ask them to help describe what you've just done. First, you can speak the algorithm out loud, then you can turn your verbal instructions into a program.

A sample algorithm:

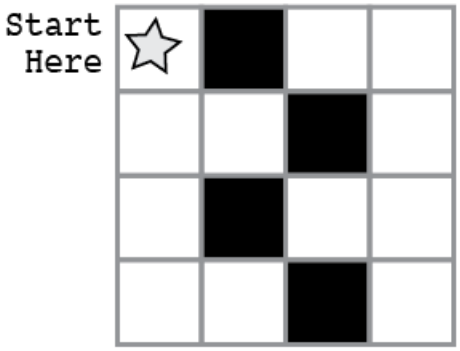
> "Move Right, Fill-In Square, Move Right, Move Down
> Fill-In Square, Move Left, Move Left, Fill-In Square
> Move Down, Move Right, Fill-In Square, Move Right"

Some of your class may notice that there is an unnecessary step, but hold them off until after the programming stage.

Walk the class through translating the algorithm into the program:



The classroom may be buzzing with suggestions by this point. If the class gets the gist of the exercise, this is a good place to discuss alternate ways of filling out the same grid. If there is still confusion, save that piece for another day and work with another example.



If the class can shout out the algorithm and define the correct symbols to use for each step, they're ready to move on. Depending on your class and their age, you can either try doing a more complicated grid together or skip straight to having them work in groups on their Four-by-Fours Activity Worksheet.

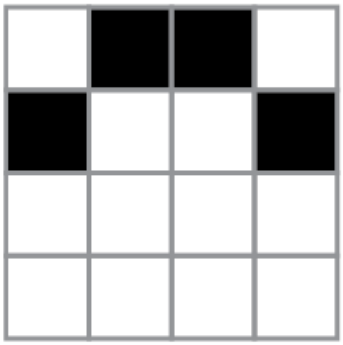
LESSON TIP

Have the class imagine that your arm is an Automatic Realization Machine (ARM). The idea of "algorithms" and "programs" will be brought to life even further if students feel like they're actually in control of your movements.

ACTIVITY: GRAPH PAPER PROGRAMMING (20 MIN)

4) Four-by-Fours Activity Worksheet

1. Divide students into pairs.
2. Have each pair choose an image from the worksheet.
3. Discuss the algorithm to draw that image with partner.
4. Convert algorithm into a program using symbols.
5. Trade programs with another pair and draw one another's image.
6. Choose another image and go again!



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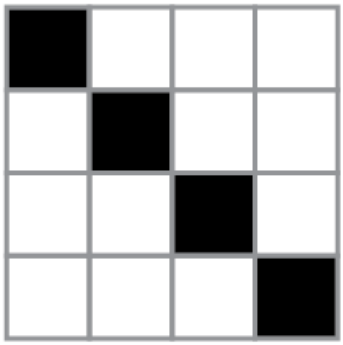

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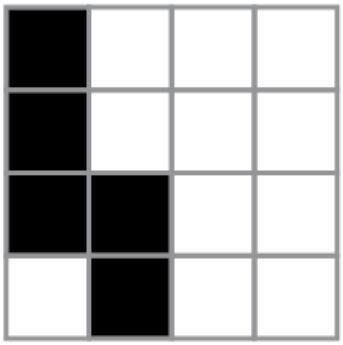

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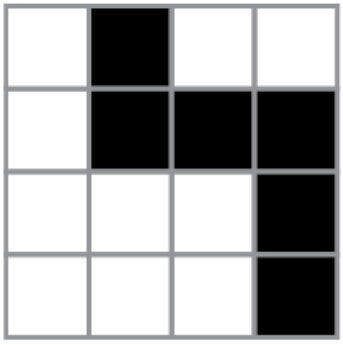
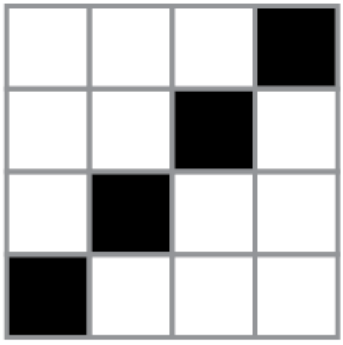


Image 4



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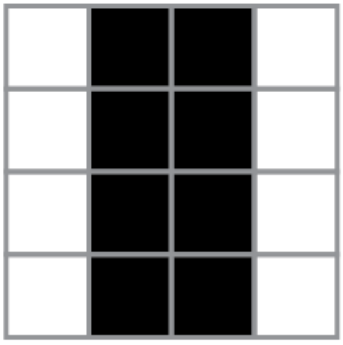

Image 6

WRAP-UP (5 MIN)

5) Flash Chat: What did we learn?

- What did we learn today?
- What if we used the same arrows, but replaced "Fill-In Square" with "Lay Brick"? What might we be able to do?
- What else could we program if we just changed what the arrows meant?

6) Vocab Shmocab

- Which one of these definitions did we learn a word for today?

    "A large tropical parrot with a very long tail and beautiful feathers"
    "A list of steps that you can follow to finish a task"
    "An incredibly stinky flower that blooms only once a year"

    ...and what is the word that we learned?

- Which one of these is the *most* like a "program"?

    *A shoebox full of pretty rocks
    *Twelve pink flowers in a vase
    *Sheet music for your favorite song

    Explain why you chose your answer.

ASSESSMENT (10 MIN)

7) Graph Paper Programming Assessment

EXTENDED LEARNING

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

Better and Better

- Have your class try making up their own images.
- Can they figure out how to program the images that they create?

Class Challenge

- As the teacher, draw an image on a 5x5 grid.
- Can the class code that up along with you?

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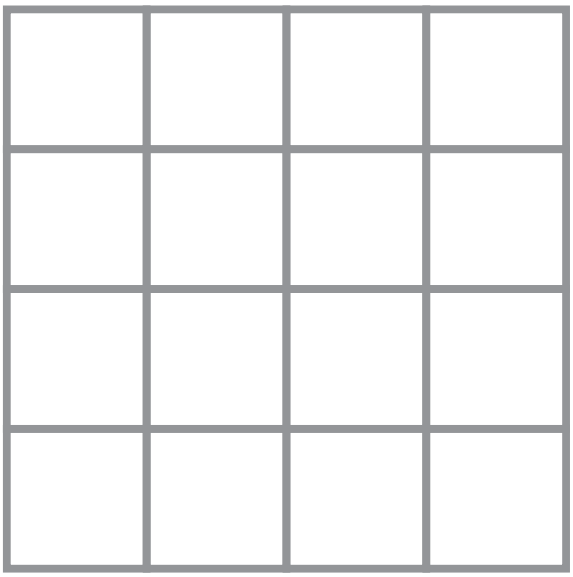

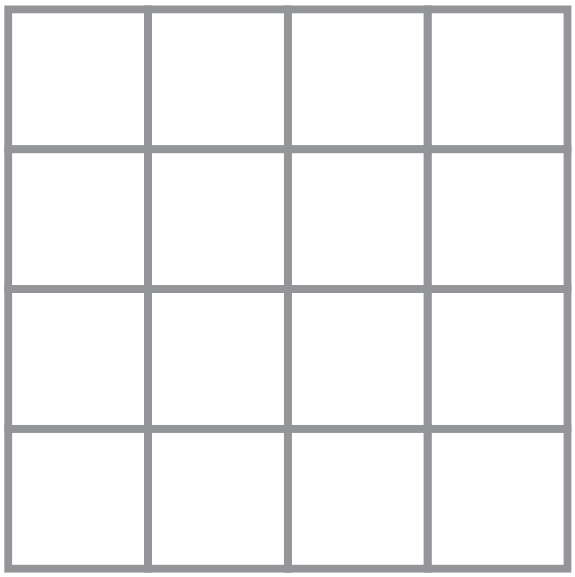

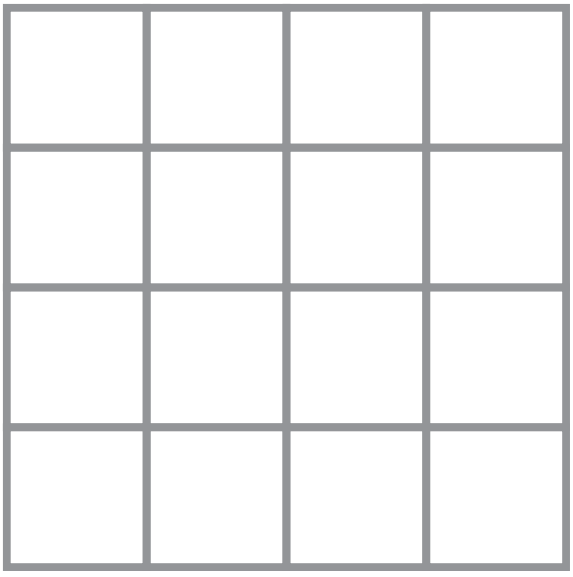

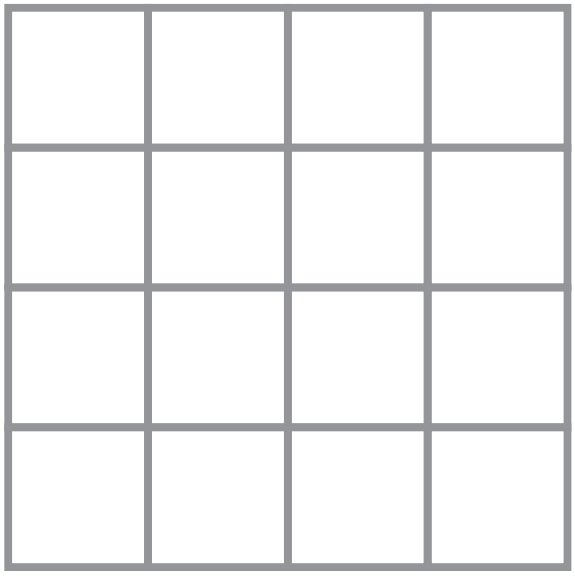

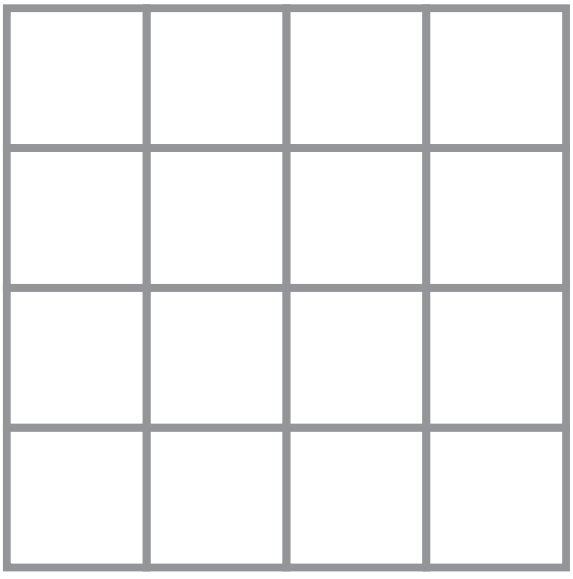

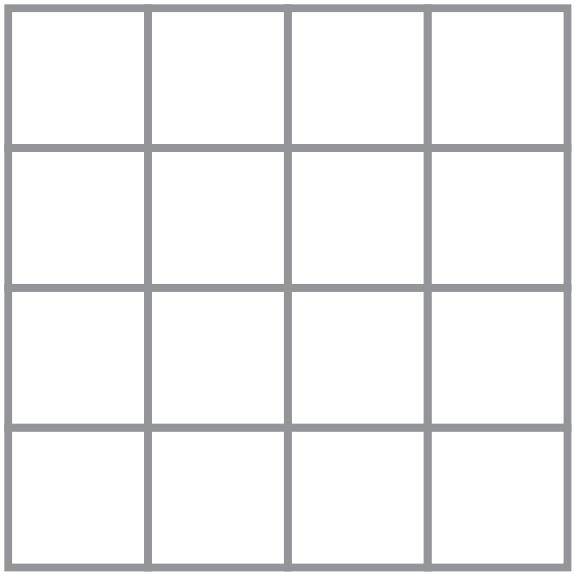

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Graph Paper Programming

Four-by-Fours Activity Worksheet

C O
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Choose one of the drawings below to program for a friend. Don't let them see which one you choose!

Write the program on a piece of paper using arrows. Can they recreate your picture?

Use these symbols to write a program that would draw each image.

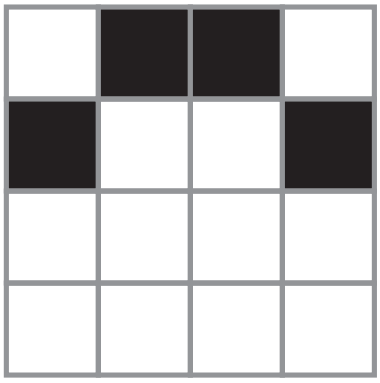

Move One Square Right

Move One Square Left


Move One Square Up


Move One Square Down


Fill-In Square with Color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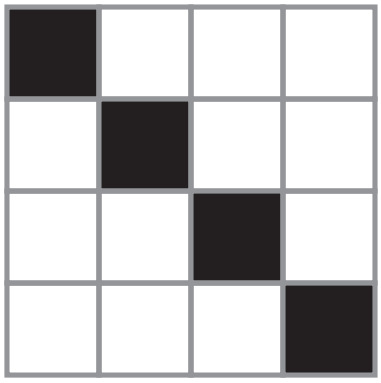
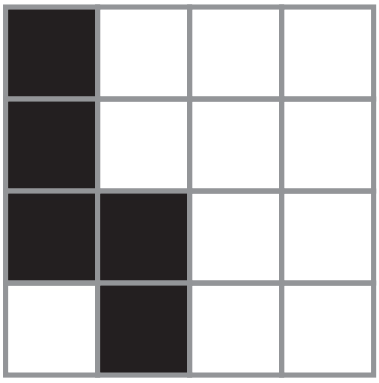


Image 2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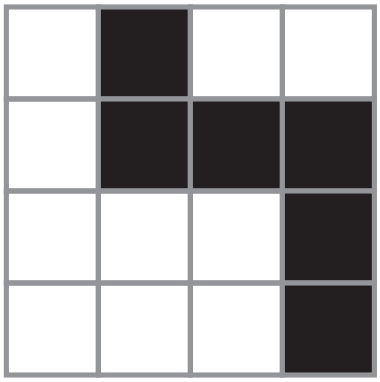
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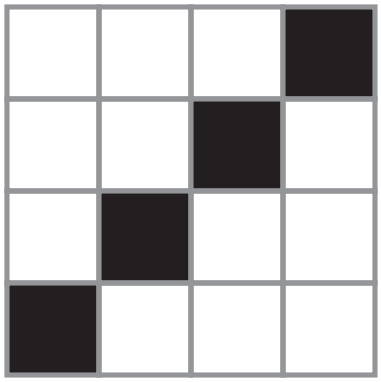
Image 5

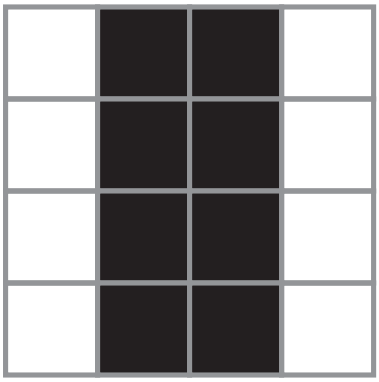
Image 6

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Name: ____________________ Date: ______________

Graph Paper Programming

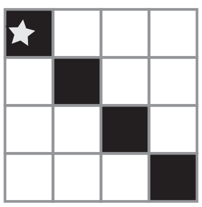
Assessment Worksheet

You have just learned how to create algorithms and programs from drawings, and how to draw an image from a program that someone gives to you. During the lesson, you worked with other people to complete your activities. Now you can use the drawings and programs below to practice by yourself.

Use the symbols below to write a program that would draw each image.

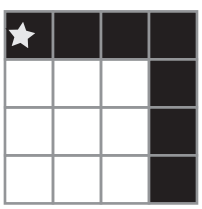
→	←	↑	↓	Fill
Move One Square Forward	Move One Square Backward	Move One Square Up	Move One Square Down	Fill-In Square with Color

Start Here



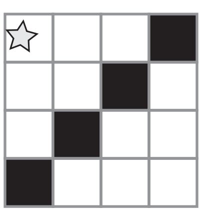
Step 1	2	3	4	5	6	7	8	9	10
Step 11	12	13	14	15	16	17	18	19	20

Start Here



Step 1	2	3	4	5	6	7	8	9	10
Step 11	12	13	14	15	16	17	18	19	20

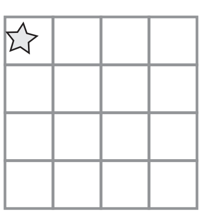
Start Here



Step 1	2	3	4	5	6	7	8	9	10
Step 11	12	13	14	15	16	17	18	19	20

Now, read the program below and draw the image that it describes.

Start Here



→ Step 1	Fill 2	→ 3	↓ 4	Fill 5	← 6	↓ 7	Fill 8	→ 9	↓ 10
Fill Step 11									

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Real-Life Algorithms: Paper Airplanes

Lesson time: 20 Minutes Basic lesson time includes activity only. Introductory and Wrap-Up suggestions can be used to delve deeper when time allows.

LESSON OVERVIEW

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

TEACHING SUMMARY

Getting Started - 15 minutes

1) Review
2) Vocabulary
3) What We Do Daily

Activity: Real-Life Algorithms - 20 minutes

4) Real-Life Algorithms: Paper Airplanes

Wrap-up - 5 minutes

5) Flash Chat - What did we learn?

Assessment - 10 minutes

6) Daily Algorithms

LESSON OBJECTIVES

Students will:

- Name various activities that make up their day
- Decompose large activities into a series of smaller events
- Arrange sequential events into their logical order

TEACHING GUIDE

MATERIALS, RESOURCES AND PREP

For the Student

- Paper for folding into airplane
- Real-Life Algorithms Worksheet: Paper Airplanes

- Assessment Worksheet: Daily Algorithms
- Scissors
- Glue

For the Teacher

- Lesson Video
- Teacher Lesson Guide
- Real-Life Algorithms Worksheet: Paper Airplanes
- Print Assessment Worksheet: Daily Algorithms for each student

GETTING STARTED (15 MIN)

1) Review

This is a great time to review the last lesson that you went through with your class. We suggest you alternate between asking questions of the whole class and having students talk about their answers in small groups.

Here are some questions that you can ask in review:

- What did we do last time?
- What do you wish we had had a chance to do?
- Did you think of any questions after the lesson that you want to ask?
- What was your favorite part of the last lesson?

LESSON TIP *Finishing the review by asking about the students' favorite things helps to leave a positive impression of the previous exercise, increasing excitement for the activity that you are about to introduce.*

2) 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

3) 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, brushing teeth, and planting a flower.

- Let's try doing this with a new and fun activity, like making paper airplanes!

ACTIVITY: (20 MIN)

4) Real-Life Algorithm Worksheet: Paper Airplanes

LESSON TIP *You know your classroom best. As the teacher, decide if students should do this individually or if students should work in pairs or small groups.*

- 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 fold a paper airplane.

    Directions:

    1. Cut out the steps for making a paper airplane provided worksheet.
    2. Work together to choose the six correct steps from the nine total options.
    3. Glue the six correct steps, in order, onto a separate piece of paper.
    4. Trade the finished algorithm with another person or group and let them use it to make their plane!
    5. If you are concerned about injury when your students begin flying their paper airplanes, we recommend having them blunt the tip of the plane by either folding it inward or ripping it off and covering the ripped edges with tape.

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.*

WRAP-UP (5 MIN)

5) Flash Chat: What did we learn?

- How many of you were able to follow your classmates' algorithms to make your airplanes?
- 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: "Fold a Paper Airplane"?
        - Would it have been easier or harder?
        - What if it were forty steps?
- What was your favorite part about that activity?

ASSESSMENT (15 MIN)

6) Assessment Worksheet: Daily Algorithms

- Hand out the worksheet titled "Daily Algorithms" 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.

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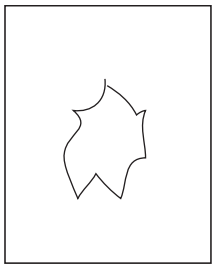
Real-Life Algorithms

Paper Airplane Worksheet

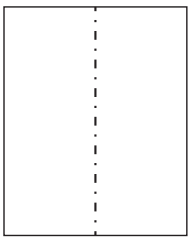
C O
D E

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 make paper airplanes.

Cut out the steps of making an airplane below. Glue the six the correct steps, in order, onto a separate piece of paper. Trade your finished algorithm with another person or group and let them use it to make an actual flying model paper plane!

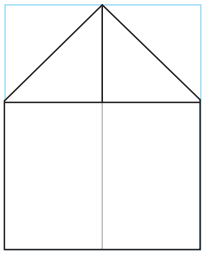


CUT CENTER OUT OF PAPER

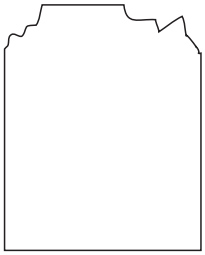


CREASE PAPER DOWN THE CENTER

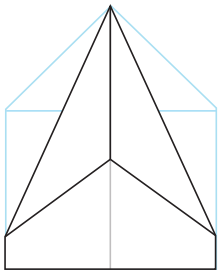
CRUMBLE PAPER



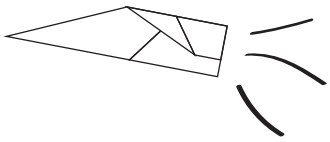
FOLD TOP CORNERS TO CENTER



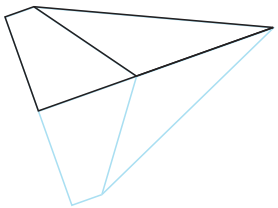
RIP CORNER OFF PAPER



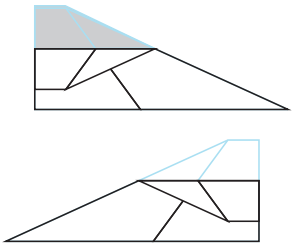
FOLD CORNER SIDES TO CENTER



TOSS FINISHED PLANE



FOLD PAPER IN HALF AGAIN



PULL SIDES DOWN

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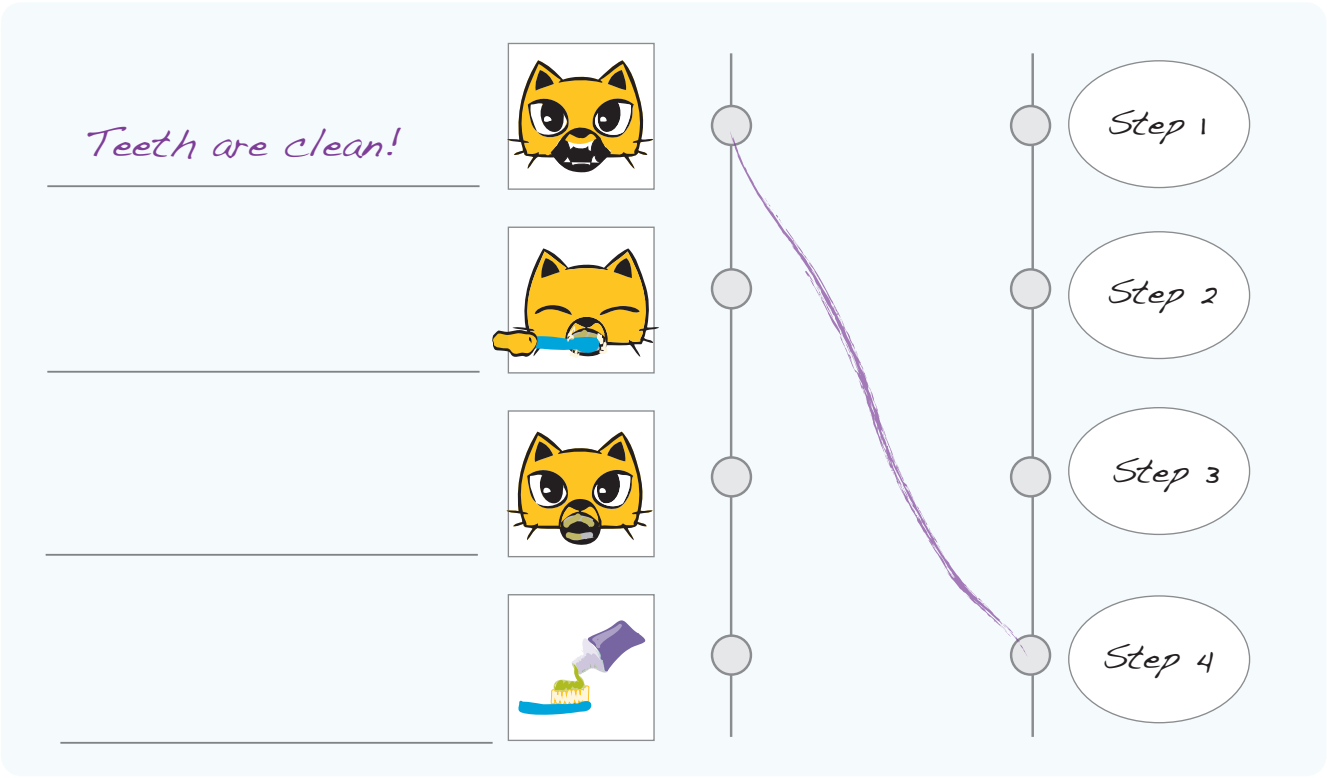
Daily Algorithms

Assessment Worksheet

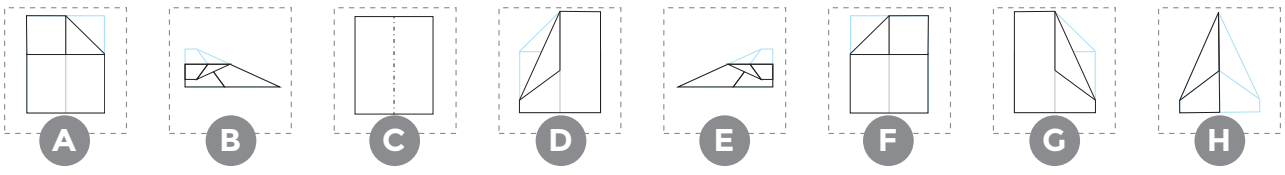
C O D E

An algorithm is a list of instructions for acomplishing a task. We follow algorithms everyday when it comes to activities like making the bed, making breakfast, or even getting dressed in the morning.

These images are not in order. First, describe what is happening in each picture on the line to its left, then match the action to it's order in the algorithm. The first one has been done for you as an example.



Sometimes you can have more than one algorithm for the same activity. The order of some of these steps can be changed without changing the final product. Use the letters on the images below to create two algorithms for making a paper airplane.



ALGORITHM 1: _____ _____ _____ _____ _____ _____ _____ _____

ALGORITHM 2: _____ _____ _____ _____ _____ _____ _____ _____

3

Course 2 | Lesson 3

Maze: Sequence

Lesson time: 30 Minutes

LESSON OVERVIEW

In this series of puzzles students will build on the understanding of algorithms learned in the Graph Paper Programming and Real-Life Algorithms Unplugged activities. Featuring characters from the game Angry Birds, students will develop sequential algorithms to move a bird from one side of the maze to the pig at the other side. To do this they will stack blocks together in a linear sequence to move straight or turn left and right.

TEACHING SUMMARY

Getting Started

Introduction

Activity: Maze: Sequence

Maze: Sequence

Extended Learning

Extension Activities

LESSON OBJECTIVES

Students will:

- Express movement as a series of commands
- Order movement commands as sequential steps in a program
- Represent an algorithm as a computer program
- Count the number of times an action should be executed and represent it as instructions in a program
- Recall and apply the rules of pair programming
- Use pair programming to complete collaborative tasks with or without a computer
- Identify situations when the rules of pair programming are not followed

GETTING STARTED

Introduction

Ask your students if they are familiar with the game Angry Birds. Explain that they will be writing programs to help an Angry Bird locate a Pig.

- Getting the bird to the pig will require putting your directions in a very specific order or sequence.
- Can you solve the puzzles using the fewest blocks possible?

LESSON TIP

Some students may struggle with turning their bird in the correct direction, particularly when the bird isn't facing up. Remind students that when we say turn left or right, we're talking about it from the bird's point of view.

ACTIVITY

Maze: Sequence

As your students work through the puzzles, observe how they plan the path for the bird. Identify different strategies used and ask students to share with the whole class. This helps students to recognize that there are many ways to approach these problems. You may want to go through a few puzzles on the projector. While doing this you can ask one student to trace the path on the screen while another writes the directions on a whiteboard.

EXTENDED LEARNING

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

Create Your Own

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

4

Course 2 | Lesson 4

Artist: Sequence

Lesson time: 30 Minutes

LESSON OVERVIEW

In this lesson students will take control of the Artist to complete simple drawings on the screen.

TEACHING SUMMARY

Getting Started

Introduction

Activity: Artist: Sequence

Artist: Sequence

Extended Learning

Extension Activities

LESSON OBJECTIVES

Students will:

- Create a program to complete an image using sequential steps
- Select an argument for a given command
- Differentiate between defining and non-defining attributes of triangles, squares, and rectangles
- Draw triangles, squares, and rectangles to reflect defining attributes
- Explain the difference between squares and rectangles and support it with evidence consisting of the commands used to draw the different shapes
- Compare and contrast squares and rectangles by their number of sides and side lengths
- Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles) to create a composite shape, such as two squares to compose a rectangle and two rectangles to compose a square
- Compose new shapes from composite shapes
- Draw partitions into a rectangle and describe the partitions using the words halves, fourths, quarters, half of, fourth of, and quarter of
- Describe a whole rectangle as two halves or four quarters
- Explain that decomposing into more equal shares creates smaller shares

GETTING STARTED

Introduction

Brainstorm with students ways to tell someone else how to draw a picture:

- How would you do that with a computer?
- In these puzzles you will be moving a character who leaves a line everywhere it goes.

ACTIVITY

Artist: Sequence

In the Artist levels students will no longer be constrained to 90 degree angles. Having protractors available can be help students better visualize the angles they need.

EXTENDED LEARNING

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

The Copy Machine

- Give students two pieces of paper
- On one sheet draw a simple image, using straight lines only.
- On the second sheet draw instructions for recreating that image commands to move straight and turn at various angles.
- Trade instruction sheets and attempt to recreate the image using only the provided instructions.

U

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Getting Loopy

Lesson time: 15 Minutes Basic lesson time includes activity only. Introductory and Wrap-Up suggestions can be used to delve deeper when time allows.

K-1 LESSON OVERVIEW

Loops are a handy way of describing actions that repeat a certain number of times. In this lesson, students will practice converting sets of actions into a single loop.

TEACHING SUMMARY

Getting Started - 15 minutes

1) Review
2) Vocabulary
3) Repeat After Me

Activity: Loops - 15 minutes

4) Getting Loopy

Wrap-up - 10 minutes

5) Flash Chat - What did we learn?

Assessment - 10 minutes

6) Getting Loopy Assessment

LESSON OBJECTIVES

Students will:

- Repeat actions initiated by the instructor
- Translate a picture program into a live-action dance
- Convert a series of multiple actions into a single loop

TEACHING GUIDE

MATERIALS, RESOURCES AND PREP

For the Student

- Open Space for Dancing/Moving
- Assessment Worksheet: Getting Loopy Assessment
- Pens/Pencils/Markers

For the Teacher

- Lesson Video

- Teacher Lesson Guide
- Print one Getting Loopy Activity Worksheet for the class
- Print Assessment Worksheet: Getting Loopy Assessment for each student

GETTING STARTED (15 MIN)

1) Review

This is a great time to review the last lesson that you went through with your class. We suggest you alternate between asking questions of the whole class and having students talk about their answers in small groups.

Here are some questions that you can ask in review:

- What did we do last time?
- What do you wish we had had a chance to do?
- Did you think of any questions after the lesson that you want to ask?
- What was your favorite part of the last lesson?

LESSON TIP *Finishing the review by asking about the students' favorite things helps to leave a positive impression of the previous exercise, increasing excitement for the activity that you are about to introduce.*

2) Vocabulary

This lesson has one new and important vocabulary word:

Loop - Say it with me: Loop
The action of doing something over and over again

3) Repeat After Me

- Ask for a volunteer and have them stand.
  - Instruct your volunteer to walk around the table (or their chair, or a friend).
  - When they finish, instruct them to do it again, using the exact same words you did before.
  - When they finish, instruct again.
  - Then again.
- Would it have been easier for me to just ask you to go around the table four times?
  - What if I wanted you to do it ten times?

- If I want you to repeat an action 10 times, that's called "looping."
- When I know in advance that I want you to do something a certain number of times, it's easier for both of us if I just ask you to "Repeat it that many times."
- Can you think of some other things that we could loop?

ACTIVITY: (15 MIN)

4) Getting Loopy

Today, we're going to have a dance party!

Sometimes, when you know that you will be doing something over and over, it is helpful to know how many times it needs to be done before you begin. That way, you can keep track of how many actions you have left as you go.

Example:

If your mom wanted you to play her favorite song over and over, she wouldn't say:

"Please play my song, play my song, play my song, play my song."

She would most likely say:

"Please play my song four times."

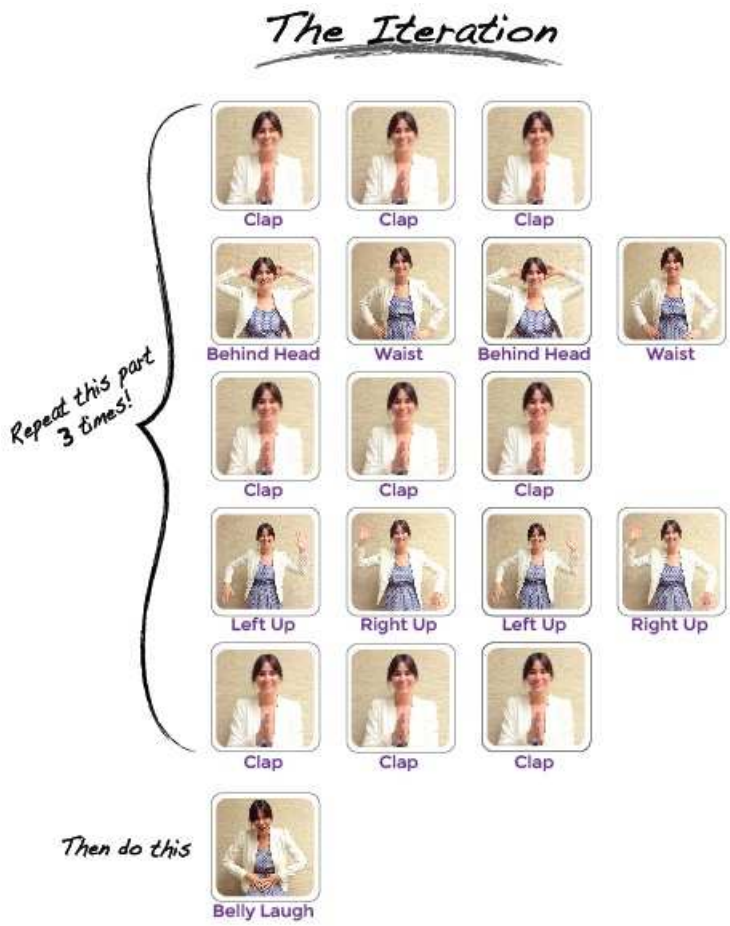
LESSON TIP

Looking for some good music?
Here are some great places to find some:

- Radio Disney
- Kidz Bop Radio

Directions:

1. Look at the dance moves provided on the Getting Loopy Worksheet.



2. Show the class what the entire dance looks like done at full-speed.
3. Run through the dance slowly, one instruction at a time, with the class.
4. Can you find the loop in the instructions?
    - What would the dance look like if we only repeated the main part 2 times?
    - What if we repeated the main part 4 times?
5. Can you find anything else in the dance that we could use a loop for?

WRAP-UP (10 MIN)

5) Flash Chat: What did we learn?

- Do you think it is easier to add more pictures to the screen or change the number of times we loop?
    - Would your answer be the same if we wanted to loop 100 times?
- Could we use these same loops with different dance moves?
- Do you know any dances that are done inside a loop?
- What was your favorite part about that activity?

ASSESSMENT (10 MIN)

6) Assessment Worksheet: Getting Loopy Assessment

- Hand out the worksheet titled "Getting Loopy" 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.

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!

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Getting Loopy

Unplugged Loops Activity

C O
D E

Sometimes, when you know that you will be doing something over and over, it is helpful to know how many times it needs to be done before you begin. That way, you can keep track of how many actions you have left as you go.

Example:

If your mom wanted you to play her favorite song over and over, she wouldn't say:

"Please play my song, play my song, play my song, play my song."

She would most likely say:

"Please play my song four times."

We are going to practice using loops to explain how many times we should perform an action while we learn a new dance!

Come on everybody, let's do **The Iteration!**

New Word!

Loop

Say it with me: Loop

The action of doing something over and over again.

When you repeat something multiple times, like clapping your hands, you are perfoming a **loop** of that action.

Getting Loopy

Unplugged Loops Activity

The Iteration

Repeat this part 3 times!


Clap


Clap


Clap


Behind Head


Waist


Behind Head


Waist


Clap


Clap


Clap


Left Up


Right Up


Left Up


Right Up


Clap


Clap


Clap

Then do this


Belly Laugh

U

Unplugged

Name: _____ Date: _____

Getting Loopy

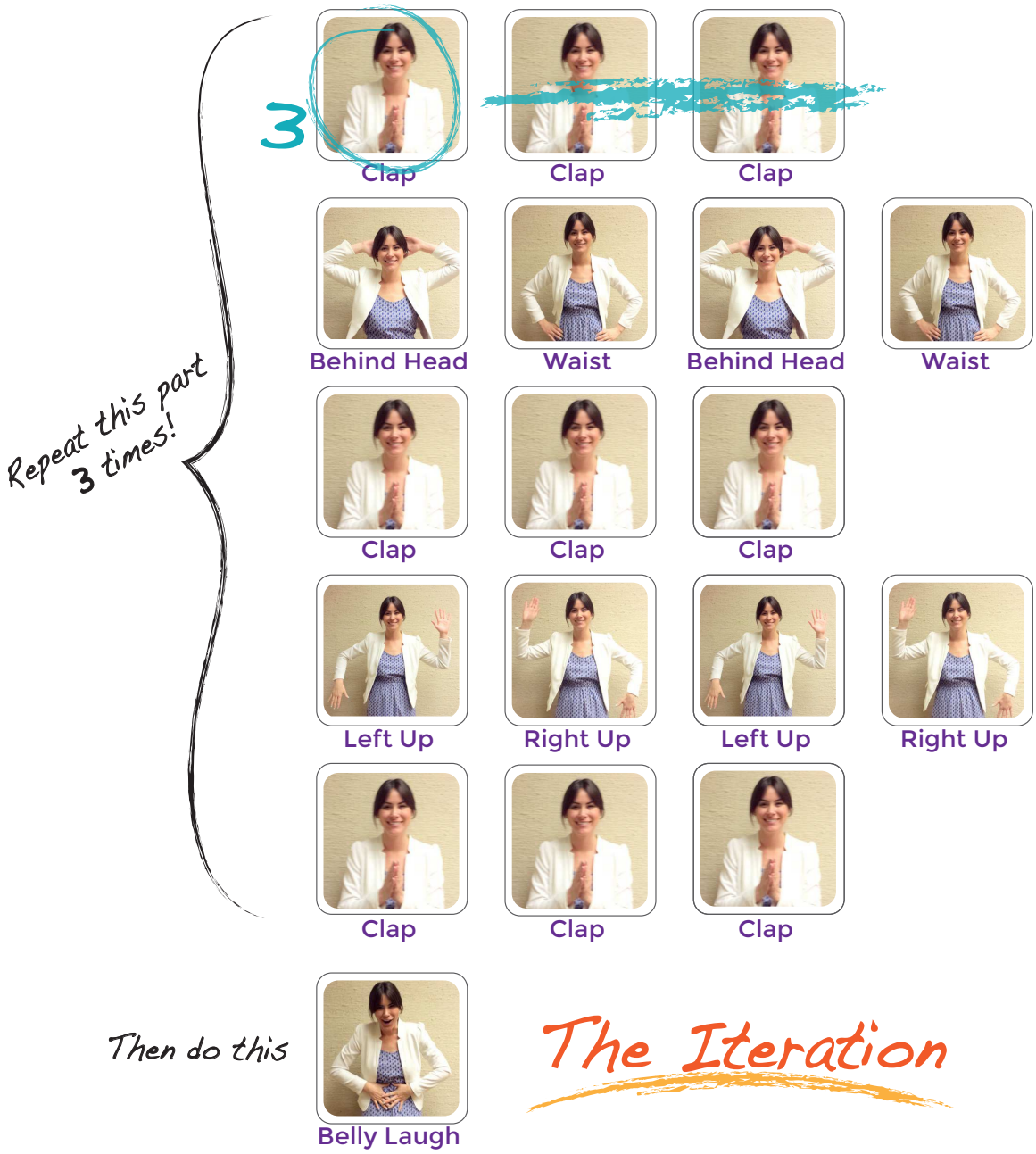
Unplugged Loops Activity

C O D E

Looping can save space!

What if we wanted to take The Iteration dance below and make more loops inside? Can you circle the actions that we can group into a loop and cross out the ones that we don't need anymore? Write a number next to each circle to let us know how many times to repeat the action.

The first line has been done for you.



6

Course 2 | Lesson 6

Maze: Loops

Lesson time: 30 Minutes

LESSON OVERVIEW

Building on the concept of repeating instructions from Getting Loopy, this stage will have students using loops to more effeciently traverse the maze.

TEACHING SUMMARY

Getting Started

Introduction

Activity: Maze: Loops

Maze: Loops

Extended Learning

Extension Activities

LESSON OBJECTIVES

Students will:

- Identify the benefits of using a loop structure instead of manual repetition
- Create a program for a given task which loops a single command
- 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

GETTING STARTED

Introduction

Review with students the Getting Loopy activity:

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

ACTIVITY

Maze: Loops

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.

EXTENDED LEARNING

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

enrichment.

So Moving

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

Connect It Back

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

7

Course 2 | Lesson 7

Artist: Loops

Lesson time: 30 Minutes

LESSON OVERVIEW

Returning to the artist, students learn to draw more complex images by looping simple sequences of instructions.

TEACHING SUMMARY

Getting Started

Introduction

Activity: Artist: Loops

Artist: Loops

Extended Learning

Extension Activities

LESSON OBJECTIVES

Students will:

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

GETTING STARTED

Introduction

- Ask students to name as many simple shapes as possible, focus on shapes with equal sides and angles.
- For each shape:
  - How would you explain to someone how to draw that shape?
  - How could you draw this using a loop?

ACTIVITY

Artist: Loops

In the Artist levels students will no longer be constrained to 90 degree angles. Having protractors available can be help students better visualize the angles they need.

EXTENDED LEARNING

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

The Copy Machine

- Give students two pieces of paper.
- On one sheet have the students draw a shape with equal sides and angles.
- On the second sheet draw instructions for recreating that shape using loops.
- Trade instruction sheets and attempt to recreate the shape using only the provided instructions.
  - Can you predict what shape will be drawn just by reading the instructions?

8

Course 2 | Lesson 8

Bee: Loops

Lesson time: 30 Minutes

LESSON OVERVIEW

In the last stage students used loops to repeat simple movements. Now they're going to add to that the looping of actions in order to help the bee collect more nectar and make more honey.

TEACHING SUMMARY

Getting Started

Introduction

Activity: Bee: Loops

Bee: Loops

Extended Learning

Extension Activities

LESSON OBJECTIVES

Students will:

- Write a program for a given task which loops a single command
- Identify when a loop can be used to simplify a repetitive action
- Employ a combination of sequential and looped commands to move and perform actions

GETTING STARTED

Introduction

At this point, students have used loops in context of both the Maze and the Artist levels. Both of those stages focused on looping movement instructions.

- What are some other elements of our programs that could benefit from loops?
- How do you think we could use loops to make the Bee programs more efficient?

ACTIVITY

Bee: Loops

When students are using loops to repeat an action (such as getting nectar), encourage them to think about the movements before and after that action. Could those be brought into the loop as well?

EXTENDED LEARNING

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

So Moving

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

Connect It Back

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

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Relay Programming

Lesson time: 20 Minutes Basic lesson time includes activity only. Introductory and Wrap-Up suggestions can be used to delve deeper when time allows.

LESSON OVERVIEW

This activity will begin with a short review of Graph Paper Programming, then will quickly move to a race against the clock, as students break into teams and work together to create a program, one instruction at a time.

TEACHING SUMMARY

Getting Started - 15 minutes

1) Review
2) Vocabulary
3) Refresh Graph Paper Programming

Activity: Relay Programming - 20 minutes

4) Relay Programming

Wrap-up - 10 minutes

5) Flash Chat: What did we learn?
6) Vocab Shmocab

Assessment - 10 minutes

7) Relay Programming Assessment:Debugging

LESSON OBJECTIVES

Students will:

- Practice communicating ideas through codes and symbols
- Use teamwork to complete a task
- Verify the work of their teammates to ensure a successful outcome

TEACHING GUIDE

MATERIALS, RESOURCES AND PREP

For the Student

- Blank Paper or Index Cards for programs
- Sheets of 4x4 paper grids for the students to use as practice (These are provided as part of the Relay Programming Activity Packet, but if you have the students create their own, you can include Common Core Math standard 2.G.2.)
- Markers, pens, or pencils

- Relay Programming Assessment

For the Teacher

- Lesson Video
- Locate a wide open space for this activity, such as the gym or outdoor field
- Print out one Relay Programming Activity Packet for each group
- Print one Relay Programming Assessment for each student
- Supply each group with plenty of paper and pens/pencils

GETTING STARTED (15 MIN)

1) Review

This is a great time to review the last lesson that you went through with your class. You can do this as one large group or have students discuss with an elbow partner.

Here are some questions that you can ask in review:

- What did we do last time?
- What do you wish we had had a chance to do?
- Did you think of any questions after the lesson that you want to ask?
- What was your favorite part of the last lesson?

LESSON TIP *Finishing the review by asking about the students' favorite things helps to leave a positive impression of the previous exercise, increasing excitement for the activity that you are about to introduce.*

2) Vocabulary

This lesson has one new and important word:

Debugging - Say it with me: De-bugg-ing
Finding and fixing problems in your algorithm or program

3) Refresh Graph Paper Programming

Recall that in "Graph Paper Programming" we guided our teammates' Automatic Realization Machine (ARM) using arrows. Take a moment to do a refresher Graph Paper Programming image -- either one that you have already covered or an entirely new one.

We are going to do the same kind of thing today, but instead of controlling each other, we are going to work together to create a program one symbol at a time.

ACTIVITY: RELAY PROGRAMMING (20 MIN)

4) Relay Programming

The practice lesson was easy enough; let's add some action! We're going to do the same type of thing (create a program describing an image) but now we're going to do it in relay teams, one symbol at a time.

The rules of this game are simple:

1. Divide students into groups of 3-5.
2. Have each group queue up relay-style.
3. Place an identical image at the other side of the room/gym/field from each team.
4. Have the first student in line dash over to the image, review it, and write down the first symbol in the program to reproduce that image.
5. The first student then runs back and tags the next person in line, then goes to the back of the queue.
6. The next person in line dashes to the image, reviews the image, reviews the program that has already been written, then either debugs the program by crossing out an incorrect symbol, or adds a new one.
7. That student then dashes back to tag the next person, and the process continues until one group has finished their program.
8. First group to finish is the winner!

Play through this several times, with images of increasing difficulty.

CLARIFICATIONS *Here are some clarifications that need to be shared from time to time:*

- Only one person from each group can be at the image at one time.
- It *is* okay to discuss algorithms with the rest of the group in line, even up to the point of planning who is going to write what when they get to the image.
- When a student debugs a program by crossing out an incorrect instruction, they must also cross out the rest of the program after that. This counts as their entire turn. The next player is allowed to continue from the last *correct* instruction.

WRAP-UP (10 MIN)

5) Flash Chat: What did we learn?

- What did we learn today?
- What if we were each able to do five arrows at a time?
  - How important would it be to debug our own work and the work of the programmer before us?
  - How about with 10 arrows?
  - 10,000? Would it be more or less important?
- Is it easier or harder to have multiple people working on the same program?
- Do you think people make more or fewer mistakes when they're in a hurry?
- If you find a mistake, do you have to throw out the entire program and start over?

6) Vocab Shmocab

You can choose to do these as a class, or have the students discuss with an elbow partner and share.

- Which one of these definitions did we learn a word for today?

    "To rub or scrape out letters or characters"
    "Doing something repeatedly in a similar way"
    "Finding and fixing problems in your algorithm or program"

        ...and what is the word that we learned?

- Which of these things could you debug?

    *The wrong answer to a math problem
    *A tunafish sandwich
    *Two baskets of pine cones

        Explain why you chose your answer.

ASSESSMENT (10 MIN)

7) Relay Programming Assessment: Debugging

EXTENDED LEARNING

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

Pass the paper

- If you don't have the time or room for a relay, you can have students pass the paper around their desk grouping, each writing one arrow before they move the paper along.

Fill It, Move It

- As the teacher, draw an image with as many filled squares as children in each group.
- Have the students write as many arrows in the program as it takes to get to a filled-in square (including actually filling that square in) before passing to the next person.

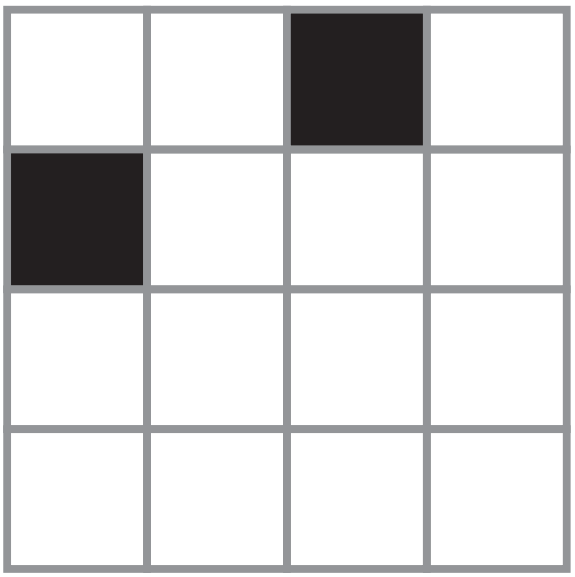
Debugging Together

- As the teacher, draw an image on the board.
- Have each student create a program for the image.
- Ask students to trade with their elbow partner and debug each other's code.
    - Circle the first incorrect step, then pass it back.
    - Give the students another chance to review and debug their own work.
    - Ask for a volunteer to share their program.
        - How many students had the same program?
        - Anyone have something different?

1

Relay Programming

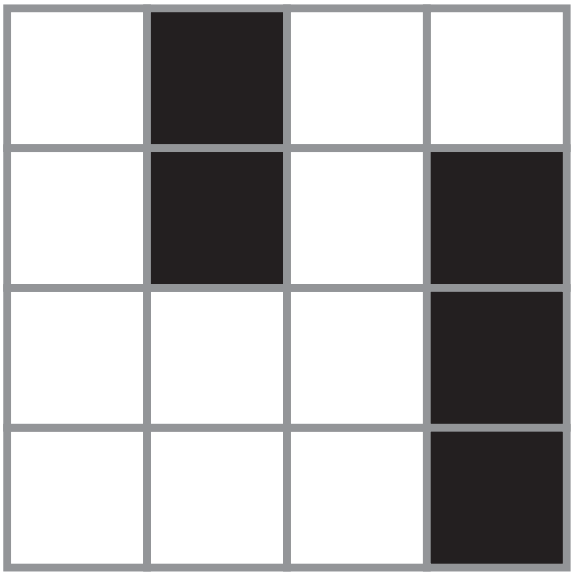
Relay Image 1



2

Relay Programming

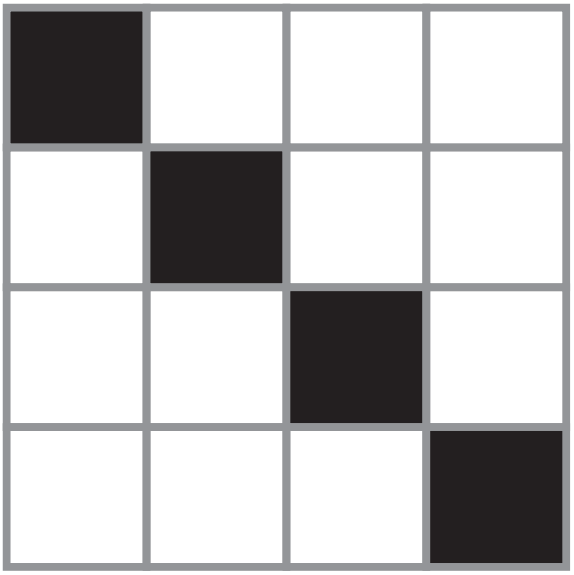
Relay Image 2



3

Relay Programming

Relay Image 3

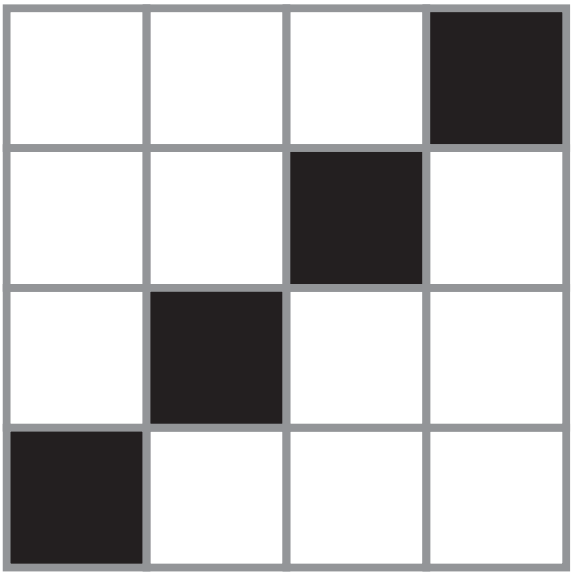


Revision 140710.1a

4

Relay Programming

Relay Image 4

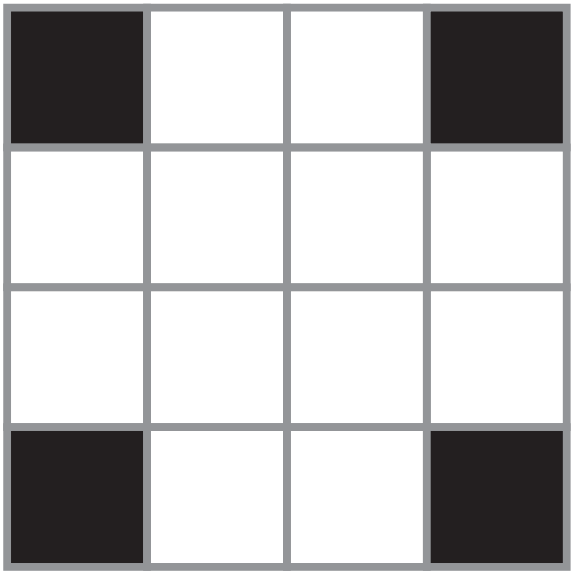


Revision 140710.1a

5

Relay Programming

Relay Image 5

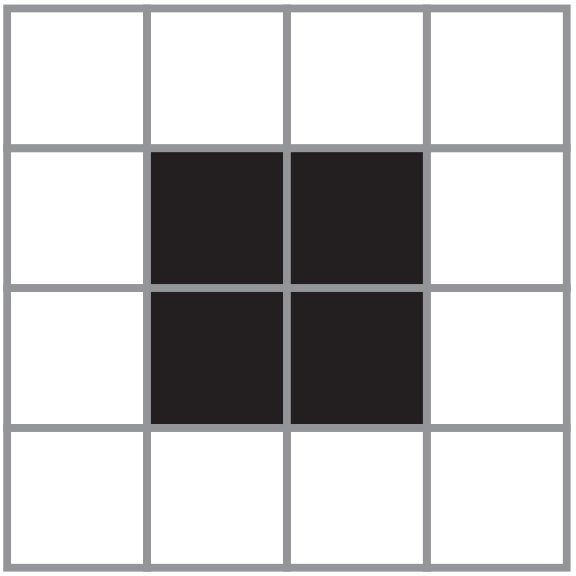


Revision 140710.1a

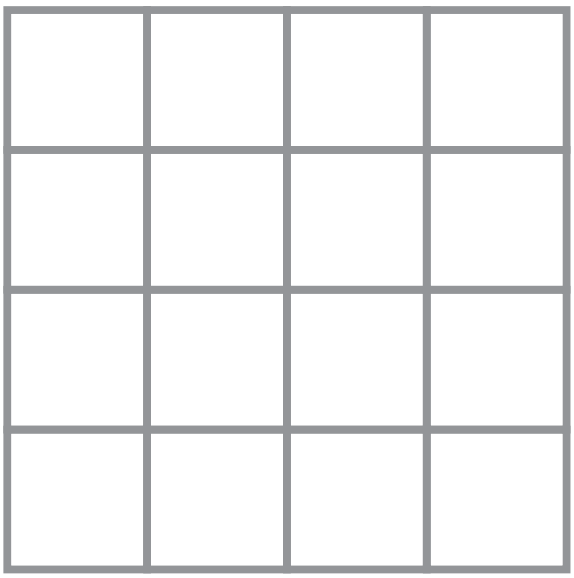
6

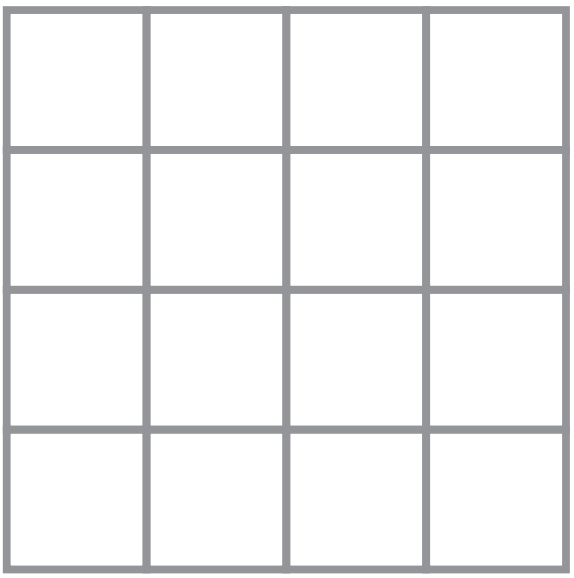
Relay Programming

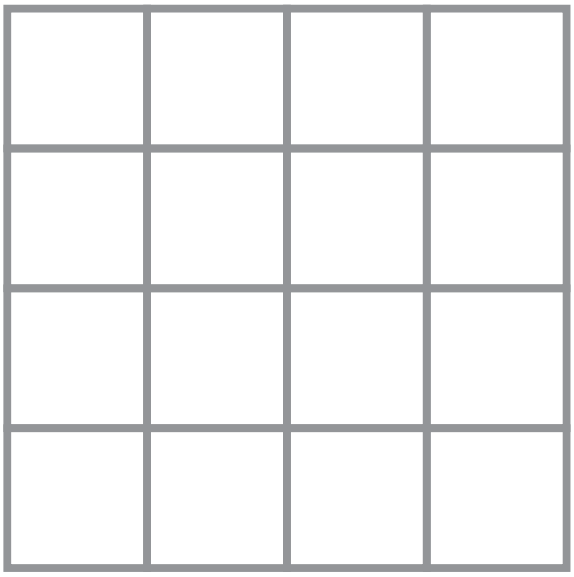
Relay Image 6

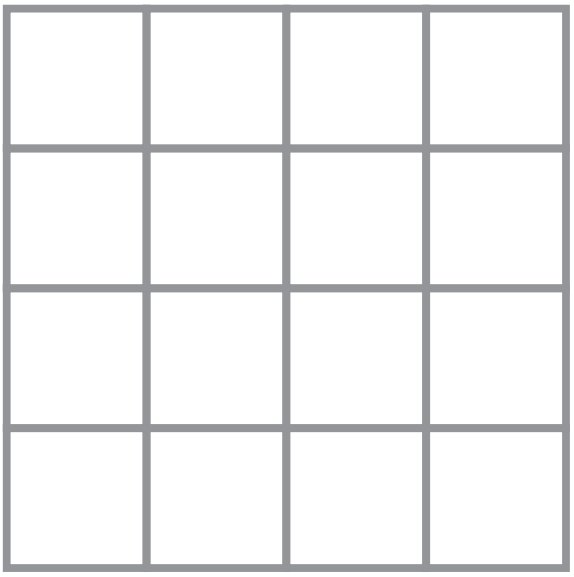


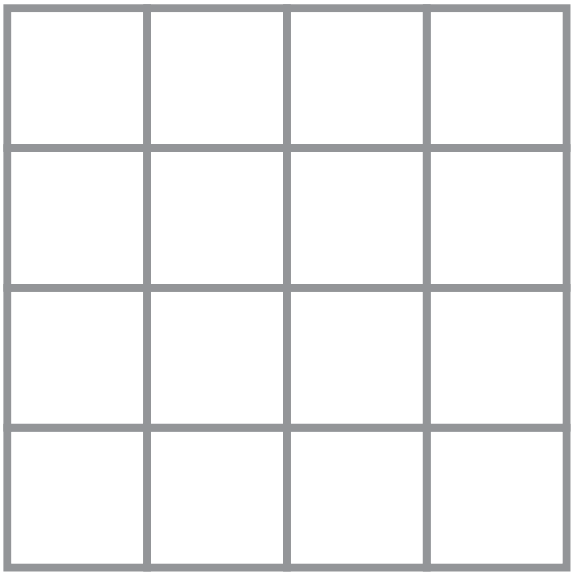
Revision 140710.1a

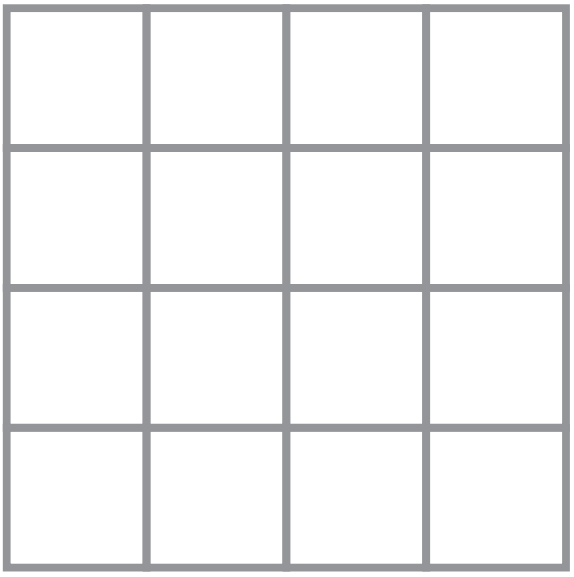












Name: _____ Date: _____

U

Unplugged

Debugging

Assessment Worksheet

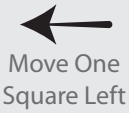
C O D E

Sometimes when you are coding in groups, someone will make an error that will affect everyone.

Somebody has already written programs for the images below, but each one has a mistake! Figure out what the programs are *supposed* to look like, and circle the error in each one. Then, draw the correct symbol in the box beneath.

Each program should use the symbols below to draw the image to its left.


Move One Square Right

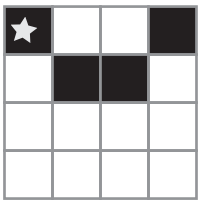

Move One Square Left

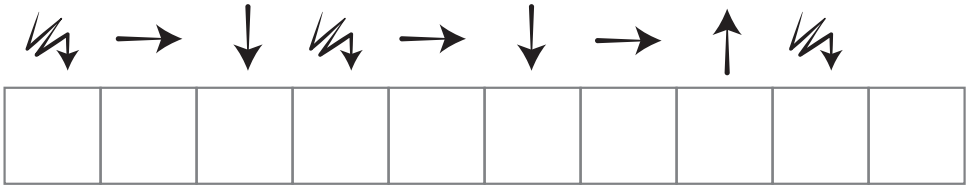

Move One Square Up


Move One Square Down

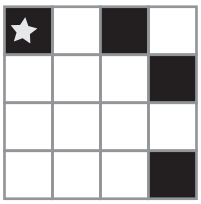

Fill-In Square with Color

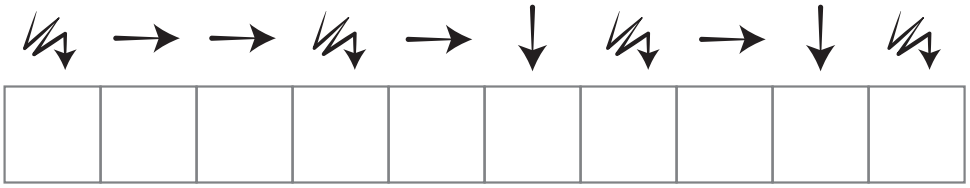
Start Here



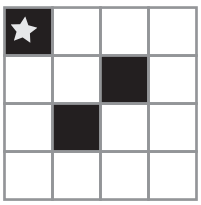


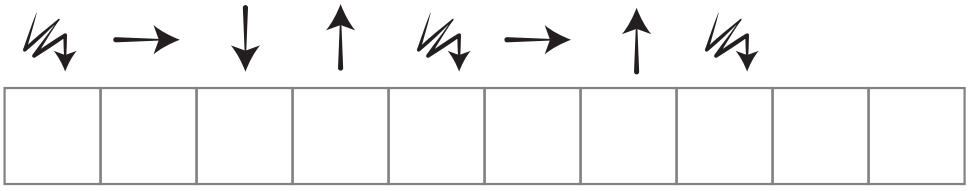
Start Here



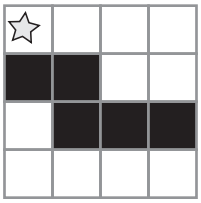


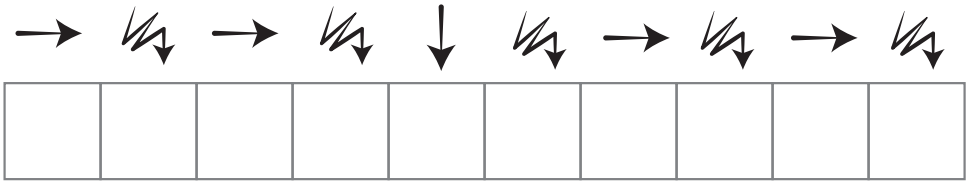
Start Here





Start Here





10

Course 2 | Lesson 10

Bee: Debugging

Lesson time: 30 Minutes

LESSON OVERVIEW

Debugging is an essential element of learning to program. In this lesson, students will encounter puzzles that have been solved incorrectly. They will need to step through the existing code to identify errors, including incorrect loops, missing blocks, extra blocks, and misordered blocks.

TEACHING SUMMARY

Getting Started

Introduction

Activity: Bee: Debugging

Bee: Debugging

Extended Learning

Extension Activities

LESSON OBJECTIVES

Students will:

- Predict where a program will fail
- Modify an existing program to solve errors
- Identify an algorithm that is unsuccessful when the steps are out of order
- Reflect on the debugging process in an age-appropriate way

GETTING STARTED

Introduction

Ask students to think about problems they have to solve in everyday life.

- How do you fix something that isn't working?
- Do you follow a specific series of steps?
- The puzzles in this unit have already been solved for you (yay!), but they don't seem to be working (boo!)
- We call the problems in these programs "bugs," and it will be your job to "debug" them.

ACTIVITY

Bee: Debugging

As your students work through the puzzles, observe how they search for bugs. Identify different strategies used and ask students to share with the whole class. This helps students to recognize that there are many ways to approach these problems. Have students follow the path described by the code with their fingers to find potential bugs.

EXTENDED LEARNING

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

Planting bugs

Have students go back through previous levels, purposefully adding bugs to their solutions. They can then ask other students to debug their work. This can also be done with paper puzzles.

11

Course 2 | Lesson 11

Artist: Debugging

Lesson time: 30 Minutes

LESSON OVERVIEW

In this stage, students will continue practicing their debugging skills by helping the Artist to fix pictures that aren't coming out quite right.

TEACHING SUMMARY

Getting Started

Introduction

Activity: Artist: Debugging

Artist: Debugging

Extended Learning

Extension Activities

LESSON OBJECTIVES

Students will:

- Predict where a program will fail
- Modify an existing program to solve errors
- Identify an algorithm that is unsuccessful when the steps are out of order
- Reflect on the debugging process in an age-appropriate way

GETTING STARTED

Introduction

By now students should be pretty comfortable digging in and finding bugs. This is a great time to bring the class together to share debugging tactics and difficulties.

- What kinds of bugs are easiest for you to see? Why?
- Which bugs were the hardest to find? How did you eventually fix them?
- What's the first thing you look for in a buggy program?

ACTIVITY

Artist: Debugging

Some students are averse to running a program until they've fixed it. Sometimes the easiest way to figure out what's wrong with a program is to watch it fail, so there's nothing wrong with running a program before we've finished fixing it. The only time we care if they got it right the first time is on the assessment levels.

EXTENDED LEARNING

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

Planting bugs

Have students go back through previous levels, purposefully adding bugs to their solutions. They can then ask other students to debug their work. This can also be done with paper puzzles.

U

UNPLUGGED

Conditionals with Cards

Lesson time: 30 Minutes Basic lesson time includes activity only. Introductory and Wrap-Up suggestions can be used to delve deeper when time allows.

LESSON OVERVIEW

We don't always know ahead of time what things will be like when we run our computer programs. Different users have different needs, and sometimes you will want to do something based off of one user's need that you don't want to do with someone else. That is where conditionals come in. This lesson demonstrates how conditionals can be used to tailor a program to specific information.

TEACHING SUMMARY

Getting Started - 15 minutes

1) Review
2) Vocabulary
3) On One Condition

Activity: Conditionals with Cards - 30 minutes

4) Conditionals with Cards

Wrap-up - 10 minutes

5) Flash Chat - What did we learn?
6) Vocab Shmocab

Assessment - 5 minutes

7) Conditionals with Cards Assessment

LESSON OBJECTIVES

Students will:

- Define circumstances when certain parts of programs should run and when they shouldn't
- Determine whether a conditional is met based on criteria
- Traverse a program and predict the outcome, given a set of input

TEACHING GUIDE

MATERIALS, RESOURCES AND PREP

For the Student

- Playing Cards
- Paper for keeping track of how a program reacts to a card
- Pens & Pencils

- Conditionals with Cards Assessment

For the Teacher

- Lesson Video
- This Teacher Lesson Guide
- One Sample Program for the class to look at
- Print one Conditionals with Cards Assessment for each student

GETTING STARTED (20 MIN)

1) Review

This is a great time to review the last lesson that you went through with your class. You can do this as one large group or have students discuss with an elbow partner.

Here are some questions that you can ask in review:

- What did we do last time?
- What do you wish we had had a chance to do?
- Did you think of any questions after the lesson that you want to ask?
- What was your favorite part of the last lesson?

LESSON TIP *Finishing the review by asking about the students' favorite things helps to leave a positive impression of the previous exercise, increasing excitement for the activity that you are about to introduce.*

2) Vocabulary

This lesson has one new and important word:

Conditionals - Say it with me: Con-di-shun-uls
Statements that only run under certain conditions

3) On One Condition

- We can start this lesson off right away
  - Let the class know that if they can be completely quiet for thirty seconds, you will do something like:
    - Sing an opera song

        - Give five more minutes of recess
        - or Do a handstand
    - Start counting right away.
    - If the students succeed, point out right away that they succeeded, so they *do* get the reward.
    - Otherwise, point out that they were not completely quiet for a full thirty seconds, so they *do not* get the reward.
- Ask the class "What was the *condition* of the reward?"
    - The condition was *IF* you were quiet for 30 seconds
        - If you were, the condition would be true, and you would get the reward.
        - If you weren't, the condition would be false, so the reward woud not apply.
    - Can we come up with another conditional?
        - If you can guess my age correctly, the class can give you applause.
        - If I know an answer, I can raise my hand.
        - What examples can you come up with?
- Sometimes, we want to have an extra condition, in case the "IF" statement is not true.
    - This extra condition is called an "ELSE" statement
    - When the "IF" condition isn't met, we can look at the "ELSE" for what to do
        - Example: IF I draw a 7, everybody claps. Or ELSE, everyone says "Awwwwwwe."
        - Let's try it. (Draw a card and see if your class reacts appropriately.)
    - Ask the class to analyze what just happened.
        - What was the IF?
        - What was the ELSE?
        - Which condition was met?
    - Believe it or not, we have even one more option.
        - What if I wanted you to clap if I draw a 7, or else if I draw something less than seven you say "YAY," or else you say "Awwwwwwwe"?
            - This is why we have the terms If, Else If, and Else.
            - If is the first condition
            - Else-if gets looked at only if the "If" isn't true.
            - Else gets looked at only if nothing before it is true.

Now let's play a game.

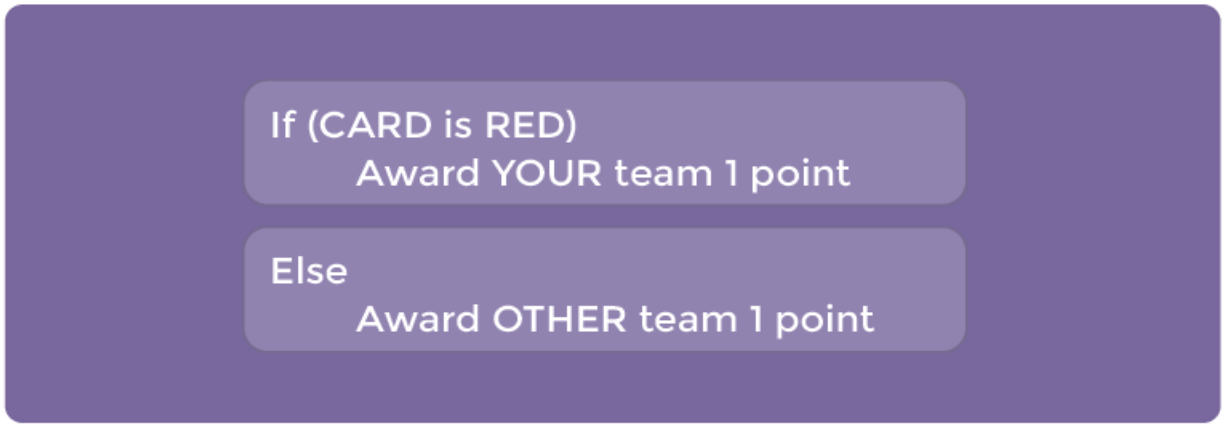
ACTIVITIES: (20 MIN)

4) Conditionals with Cards

Directions:

1) Create a few programs with your class that depend on things like a card's suit, color, or value to award or subtract points. You can write the program as an algorithm, pseudocode, or actual code.

Here is a sample algorithm:



ere is a sample of the same program in pseudocode:

```
If (card.color == RED) {
        points.yours = points.yours + 1;
}

Else {
        points.other = points.other + 1;
}
```

2) Decide how you want to split your class into teams.

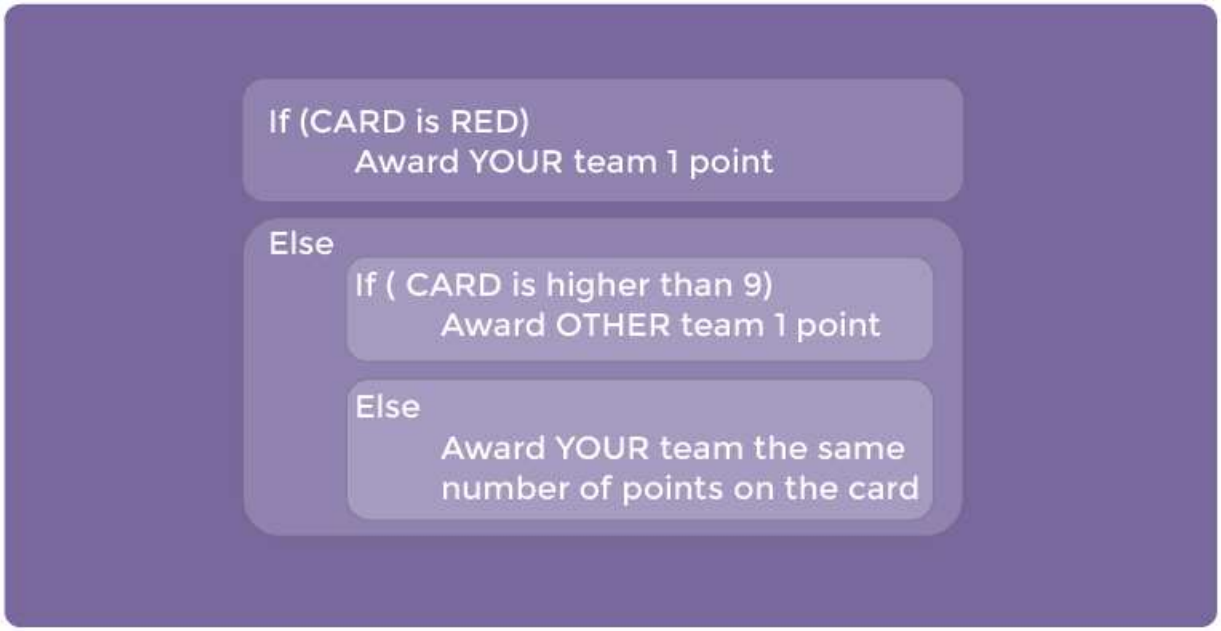
3) Each team should have a pile of cards (at least as many cards as team members) nearby.

4) Put one of your “Programs” up on the board for all to see.

5) Have the teams take turns drawing cards and following the program to see how many points they score in each round.

6) Play several times with several different programs to help the students really understand conditionals.

Once the class has had some practice, you can encourage students to **nest** conditionals inside one another:



Here is the same program in pseudocode:

```
If (card.color == RED) {
        points.yours = points.yours + 1;
}

Else {
        If ( card.value > 9) {
                points.other = points.other + 1;
        }

        Else {
                points.yours = points.yours + card.value;
        }
}
```

WRAP-UP (5 MIN)

5) Flash Chat: What did we learn?

- If you were going to code this up in Blocky, what would you need to add around your conditionals to let the code run more than one time?
- What other things do you do during the day under certain conditions?
- If you are supposed to do something when the value of a card is more than 5, and you draw a 5, do you meet that condition?
- Notice that conditions are either "True" or "False." There is no assessment of a condition that evaluates to "Banana."
- When you need to meet several combinations of conditions, we can use something called "nested conditionals."
  - What do you think that means?
  - Can you give an example of where we saw that during the game?
- What part of that game did you like the best?

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.

6) Vocab Shmocab

- Which one of these definitions did we learn a word for today?

  "Adding additional space to the beginning of a line of text"
  "A combination of yellow and green"
  "Statements that only run under certain conditions"

  ...and what is the word that we learned?

ASSESSMENT (5 MIN)

7) Conditionals with Cards Assessment

- and 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.

True/False Tag

- Line students up as if to play Red Light / Green Light.
- Select one person to stand in front as the Caller.
- The Caller chooses a condition and asks everyone who meets that condition to take a step forward.
  - If you have a red belt, step forward.
  - If you are wearing sandals, take a step forward.
- Try switching it up by saying things like "If you are *not* blonde, step forward."

Nesting

- Break students up into pairs or small groups.
- Have them write if statements for playing cards on strips of paper, such as:
  - If the suit is clubs
  - If the color is red
- Have students create similar strips for outcomes.
  - Add one point
  - Subtract one point
- Once that's done, have students choose three of each type of strip and three playing cards, paying attention to the order selected.
- Using three pieces of paper, have students write three different programs using only the sets of strips that they selected, in any order.
  - Encourage students to put some if statements inside other if statements.
- Now, students should run through all three programs using the cards that they drew, in the same order for each program.
  - Did any two programs return the same answer?
  - Did any return something different?

Conditionals with Cards

Sample Program 1

Sample program as algorithm

If (CARD is RED)
    Award YOUR team 1 point

Else
    Award OTHER team 1 point

This program has you choose a card. If the card is red, your team gets a point. Else, the other team gets a point.

Sample program from above as pseudocode (like code, but in no particular language)

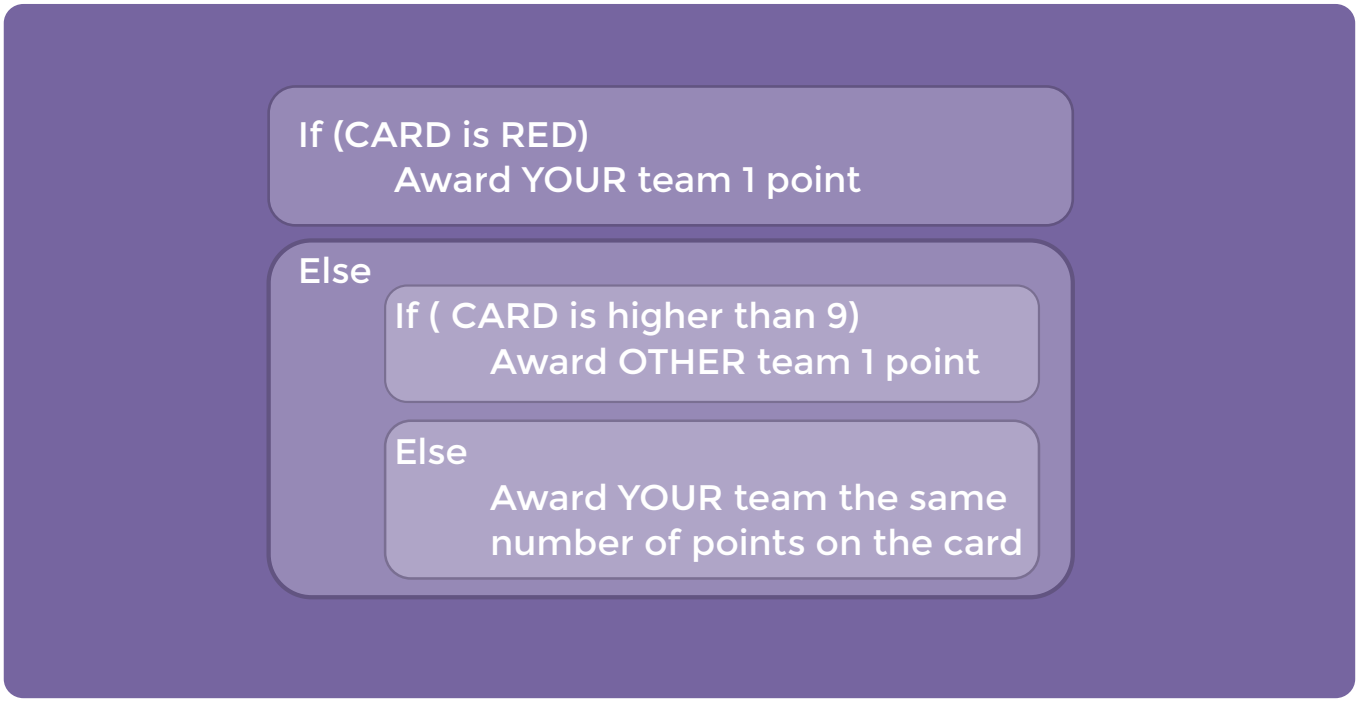
```
If (card.color == RED) {
    points.yours = points.yours + 1;
}

Else {
    points.other = points.other + 1;
}
```

Conditionals with Cards

Sample Program 2

Sample program as algorithm



This program has you choose a card. If the card is red, your team gets a point. Else, the card must be black. If your black card is higher than 9, then the other team gets a point, else your card must be black and lower than or equal to 9, and you get as many points as are on your card.

Sample program from above as pseudocode (like code, but in no particular language)

```
If (card.color == RED) {
        points.yours = points.yours + 1;
}

Else {
        If ( card.value > 9) {
                points.other = points.other + 1;
        }

        Else {
                points.yours = points.yours + card.value;
        }
}
```

U

Unplugged

Name: _____ Date: _____

Conditionals with Cards

Assessment Activity

C O D E

Look at the program below.

The steps below show each team taking turns to play the Conditionals Game. See if you can figure out what happens for each draw. Write down the score during each round along the way. After three rounds, circle the winner.

```
If (CARD is lower than 5)
        If ( CARD is BLACK)
                Award YOUR team the same
                number of points on the card.

        Else
                Award OTHER team 1 point.

Else
        If ( CARD is HEARTS)
                Award YOUR team 1 point
```

Here's how the game went:

	TEAM #1	END OF ROUND SCORE	TEAM #2	END OF ROUND SCORE
		0		0
ROUND #1	3♠	____	7♥	____
ROUND #2	4♥	____	4♣	____
ROUND #3	9♣	____	5♦	____

13

Course 2 | Lesson 13

Bee: Conditionals

Lesson time: 30 Minutes

LESSON OVERVIEW

Up until this point all the programs your students have written should run exactly the same way every time - reliable, but not very flexible. In this stage we introduce the conditional statement, code that functions differently depending on the conditions it encounters.

TEACHING SUMMARY

Getting Started

Introduction

Activity: Bee: Conditionals

Bee: Conditionals

Extended Learning

Extension Activities

LESSON OBJECTIVES

Students will:

- Compare values using the = operator
- Translate spoken language conditional statements into a program
- Identify when a conditional can be used to deal with unknown values
- Execute an algorithm with a conditional statement
- Solve puzzles using a combination of looped sequences and conditionals

GETTING STARTED

Introduction

Review the Conditionals with Cards activity with your students.

- What is a conditional statement?
- When is it useful?
- What are some of the conditions you used in the Unplugged activity?

Now we're going to use conditionals with our bee to help us deal with some mysterious purple flowers. We don't know if those flowers have nectar or not, so we'll need to use conditionals to make sure that we collect nectar if it's there, but that we don't try to collect nectar from a flower that doesn't have any.

ACTIVITY

Bee: Conditionals

EXTENDED LEARNING

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

True/False Tag

- Line students up as if to play Red Light / Green Light.
- Select one person to stand in front as the Caller.
- The Caller chooses a condition and asks everyone who meets that condition to take a step forward.
  - If you have a red belt, step forward.
  - If you are wearing sandals, take a step forward.
- Try switching it up by saying things like "If you are *not* blonde, step forward."

Nesting

- Break students up into pairs or small groups.
- Have them write if statements for playing cards on strips of paper, such as:
  - If the suit is clubs
  - If the color is red
- Have students create similar strips for outcomes.
  - Add one point
  - Subtract one point
- Once that's done, have students choose three of each type of strip and three playing cards, paying attention to the order selected.
- Using three pieces of paper, have students write three different programs using only the sets of strips that they selected, in any order.
  - Encourage students to put some if statements inside other if statements.
- Now, students should run through all three programs using the cards that they drew, in the same order for each program.
  - Did any two programs return the same answer?
  - Did any return something different?

U

UNPLUGGED

Binary Bracelets

Lesson time: 15 Minutes Basic lesson time includes activity only. Introductory and Wrap-Up suggestions can be used to delve deeper when time allows.

LESSON OVERVIEW

Binary is extremely important to the computer world. The majority of computers today store all sorts of information in binary form. This lesson helps to demonstrate how it is possible to take something that we know and translate it into a series of ons and offs.

TEACHING SUMMARY

Getting Started - 15 minutes

1) Review
2) Vocabulary
3) Off and On

Activity: Binary Bracelets - 15 minutes

4) Binary Bracelets

Wrap-up - 5 minutes

5) Flash Chat - What did we learn?

Assessment - 10 minutes

6) Binary Assessments

LESSON OBJECTIVES

Students will:

- Encode letters into binary
- Decode binary back to letters
- Relate the idea of storing initials on a bracelet to the idea of storing information in a computer

TEACHING GUIDE

MATERIALS, RESOURCES AND PREP

For the Student

- Binary Bracelet Worksheet
- Binary Assessment
- Pens and Pencils
- Scissors

For the Teacher

- Lesson Video
- This Teacher Lesson Guide
- Binary Bracelet Worksheet
- Binary Assessment
- Computer for opening or images of an open computer
- Optional: Write a short message on the board in binary

GETTING STARTED (15 MIN)

1) Review

This is a great time to review the last lesson that you went through with your class. We suggest you alternate between asking questions of the whole class and having students talk about their answers in small groups.

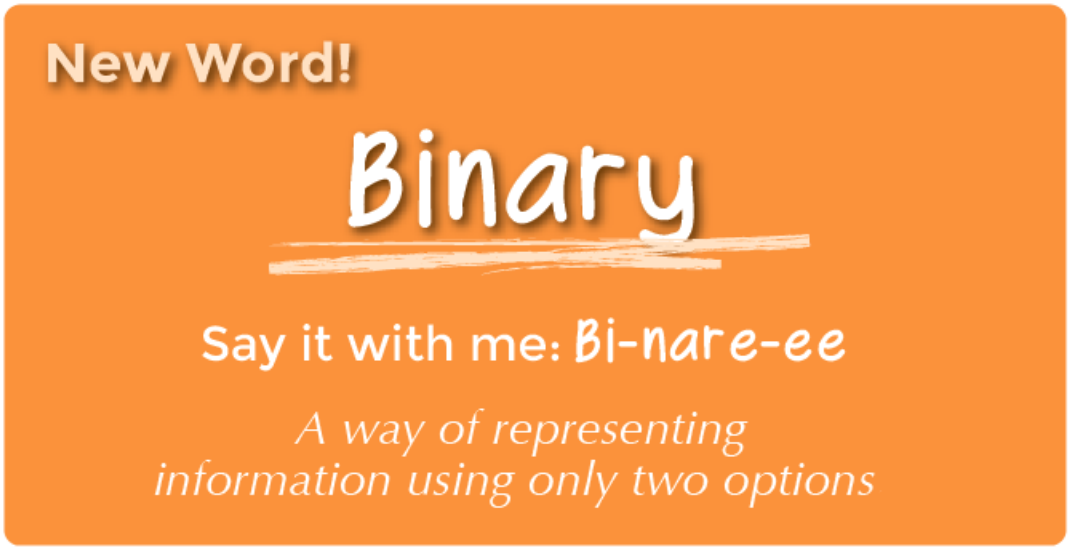
Here are some questions that you can ask in review:

- What did we do last time?
- What do you wish we had had a chance to do?
- Did you think of any questions after the lesson that you want to ask?
- What was your favorite part of the last lesson?

LESSON TIP *Finishing the review by asking about the students' favorite things helps to leave a positive impression of the previous exercise, increasing excitement for the activity that you are about to introduce.*

2) Vocabulary

This lesson has one new and important word:



Binary - Say it with me: Bi-nare-ee
A way of representing information using only two options

3) Off and On

- If you've written a short message on the board in binary, call the students' attention to it and ask if anyone knows what it is or what it means.

    - Put the message aside and move on to prepping for the activity.
- You can start by asking the class if they have ever seen inside a computer.
    - What's in there?
    - This is a good place to actually show them the inside of a computer (or pictures of the inside of a computer).
- Wires carry information through the machine in the form of electricity.
    - The two options that a computer uses with respect to this electrical information are "off" and "on."
        - When computers represent information using only two options, it's called "Binary."
    - That theme of two options doesn't stop when the information gets to its destination.
- Computers also *store* information using binary.
    - Binary isn't always off and on.
        - Hard Disk Drives store information using magnetic positive and magnetic negative.
        - DVDs store information as either reflective or non-reflective.
    - How do you suppose we can convert the things we store in a computer into binary?
        - Let's start with letters.
        - Use the Binary Decoder Key to show how a computer might represent capital letters.
            - **This is a good time to mention that each spot where you have a binary option is called a "binary digit" or "bit" for short.**
            - **Ask if anyone knows what a grouping of eight bits is called** (it's a byte.)
            - **Fun fact: A grouping of four bits is called a nibble.**
        - Go over a few examples of converting letters into binary, then back.
        - Afterward, write an encoded letter and give the class a few seconds to figure out what it is.
        - When the class can figure out your encoded letters on their own, you can move on to the activity.

ACTIVITY: (20 MIN)

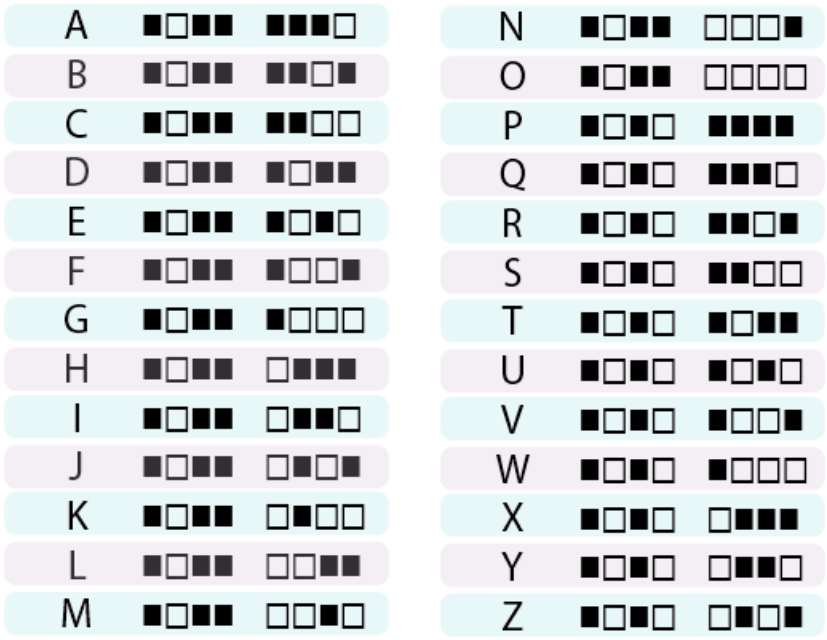
4) Binary Bracelet Worksheet

LESSON TIP *You know your classroom best. As the teacher, decide if students should do this individually or if students should work in pairs or small groups.*

*You **do not** need to cover the whole of binary, including counting and converting numbers back and forth from decimal. i n is intended to be a fun introduction to how computers store information, not a frustrating lesson in bases.*

Directions:

1. Find the first letter of your first name in the Binary Decoder Key.
2. Fill in the squares of the provided bracelet to match the pattern of the squares next to the letter that you selected.
3. Cut the bracelet out.
4. Tape the bracelet around your wrist to wear it!
5. Share your bracelet with your classmates to see if they can figure out your letter.



LESSON TIP

ing this exercise using thread i ners an beads to create the binary bracelets instead of pen and paper. You can provide any combination of two colors in beads to the students, but black and white tend to be easiest, given the way that the key is done.

fter the activity, revisit the message that was on the board and see if your class can decypher it using what they've learned.

WRAP-UP (5 MIN)

5) Flash Chat: What did we learn?

- What else do you think is represented as binary inside of a computer?
- How else might you represent binary instead of boxes that are filled or not filled?
- What was your favorite part about that activity?

ASSESSMENT (15 MIN)

7) Binary 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.

Binary Images

- There are several great resources on the web for taking this activity to the next level.
- If your students are interested in how images (or even music) can be represented as binary, you can find more

details in Thinkersmith's Binary Baubles.

Created in partnership with
THINKERSMITH®

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Unplugged

Name: _____ Date: _____

Binary Bracelets

Binary Decoder Key

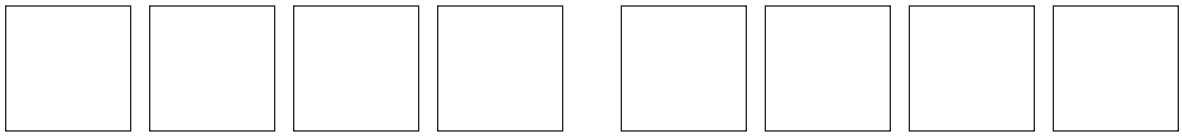
C O D E

A	■□■■	■■■□
B	■□■■	■■□■
C	■□■■	■■□□
D	■□■■	■□■■
E	■□■■	■□■□
F	■□■■	■□□■
G	■□■■	■□□□
H	■□■■	□■■■
I	■□■■	□■■□
J	■□■■	□■□■
K	■□■■	□■□□
L	■□■■	□□■■
M	■□■■	□□■□
N	■□■■	□□□■
O	■□■■	□□□□
P	■□■□	■■■■
Q	■□■□	■■■□
R	■□■□	■■□■
S	■□■□	■■□□
T	■□■□	■□■■
U	■□■□	■□■□
V	■□■□	■□□■
W	■□■□	■□□□
X	■□■□	□■■■
Y	■□■□	□■■□
Z	■□■□	□■□■

Find the first letter of your first name.

Fill in the squares of the bracelet below to match the pattern of the squares next to the letter that you found.

Cut the bracelet out and tape it around your wrist to wear it!



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Unplugged

Name: _____ Date: _____

Binary Bracelets

Assessment for Binary Bracelets Lesson

C O D E

Use the Binary Decoder Key below to decode the message at the bottom of the sheet.

A	■□■■	■■■□	N	■□■■	□□□■
B	■□■■	■■□■	O	■□■■	□□□□
C	■□■■	■■□□	P	■□■□	■■■■
D	■□■■	■□■■	Q	■□■□	■■■□
E	■□■■	■□■□	R	■□■□	■■□■
F	■□■■	■□□■	S	■□■□	■■□□
G	■□■■	■□□□	T	■□■□	■□■■
H	■□■■	□■■■	U	■□■□	■□■□
I	■□■■	□■■□	V	■□■□	■□□■
J	■□■■	□■□■	W	■□■□	■□□□
K	■□■■	□■□□	X	■□■□	□■■■
L	■□■■	□□■■	Y	■□■□	□■■□
M	■□■■	□□■□	Z	■□■□	□■□■

Can you figure out what the message says?

■□■■ ■■□□ _____

■□■■ □□□□ _____

■□■■ ■□■■ _____

■□■■ ■□■□ _____

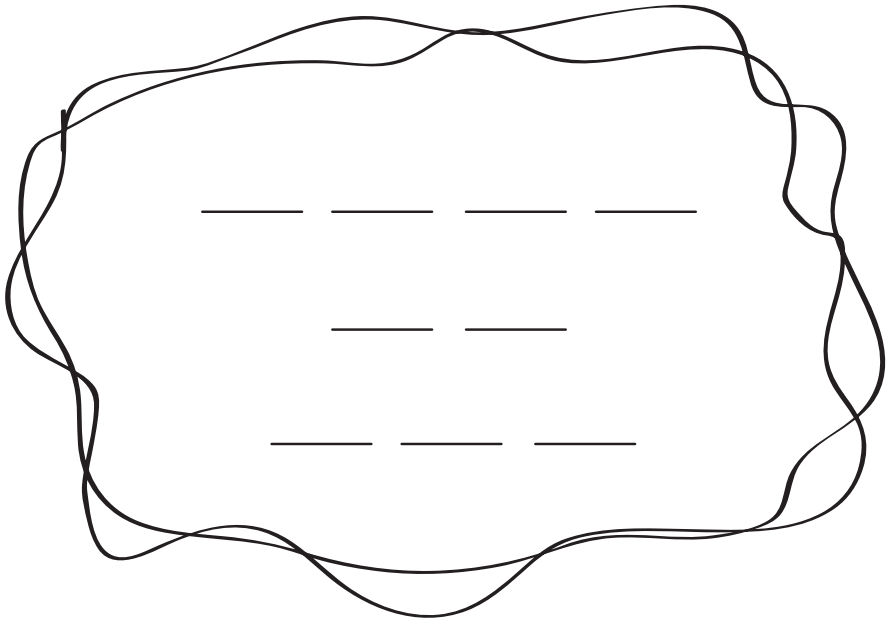
■□■■ □■■□ _____

■□■□ ■■□□ _____

■□■■ ■□□■ _____

■□■□ ■□■□ _____

■□■■ □□□■ _____



_____ _____ _____ _____

_____ _____

_____ _____ _____

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UNPLUGGED

The Big Event

Lesson time: 15 Minutes Basic lesson time includes activity only. Introductory and Wrap-Up suggestions can be used to delve deeper when time allows.

K-1 LESSON 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.

TEACHING SUMMARY

Getting Started - 15 minutes

1) Review
2) Vocabulary
3) A Series of Events

Activity: Events - 15 minutes

4) The Big Event

Wrap-up - 5 minutes

5) Flash Chat - What did we learn?

Assessment - 10 minutes

6) The Big Event Assessment

LESSON OBJECTIVES

Students will:

- 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

TEACHING GUIDE

MATERIALS, RESOURCES AND PREP

For the Student

- Assessment Worksheet: The Big Event Assessment
- Pens/Pencils/Markers

For the Teacher

- Lesson Video
- Teacher Lesson Guide

- Print one The Big Event Activity Worksheet and Event Controller
- Print Assessment Worksheet: The Big Event Assessment for each student

GETTING STARTED (15 MIN)

1) Review

This is a great time to review the last lesson that you went through with your class. We suggest you alternate between asking questions of the whole class and having students talk about their answers in small groups.

Here are some questions that you can ask in review:

- What did we do last time?
- What do you wish we had had a chance to do?
- Did you think of any questions after the lesson that you want to ask?
- What was your favorite part of the last lesson?

LESSON TIP *Finishing the review by asking about the students' favorite things helps to leave a positive impression of the previous exercise, increasing excitement for the activity that you are about to introduce.*

2) Vocabulary

This lesson has one new and important vocabulary word:

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

3) 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 practice changing programs by introducing events.

ACTIVITY: (15 MIN)

4) The Big Event

- Do you remember guiding your friends to fill in an image of squares in Graph Paper Programming?
    - In that exercise, you knew in advance exactly what you wanted your friends to draw, 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.

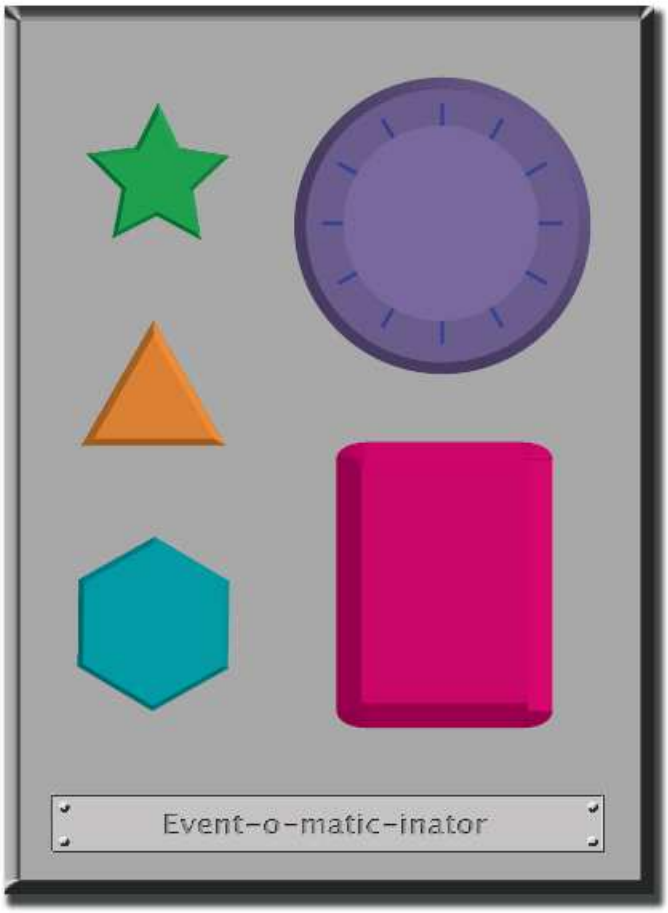
In earlier lessons, we created algorithms that allowed us to control a friend or Flurb for several steps at a time. It was fun and useful, but what happens when you don't know everything that you want your friend to do in advance? This is where events come in!

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.

Directions:

1. Project the Event Controller onto your classroom screen.



1. Decide with your class what each button does. We suggest:
   - Pink Button -> Say “Wooooo!”
   - Teal Button -> “Yeah!”
   - Purple Dial -> “Boom!”
   - Green Button -> Clap
   - Orange Dial -> Stomp
2. Practice tapping the buttons on the overhead and having your class react.
3. Add some button sequences into the mix and have the students try to keep up with their sounds.
4. 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.
5. Get the class started on a planned task before interrupting them again with the buttons. We suggest:
   - Counting to 10
   - Singing “Old MacDonald”
6. Once their plan is underway, interject button presses sporadically.
7. 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)

5) 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?

ASSESSMENT (10 MIN)

7) Assessment Worksheet: Controlling by Events 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.

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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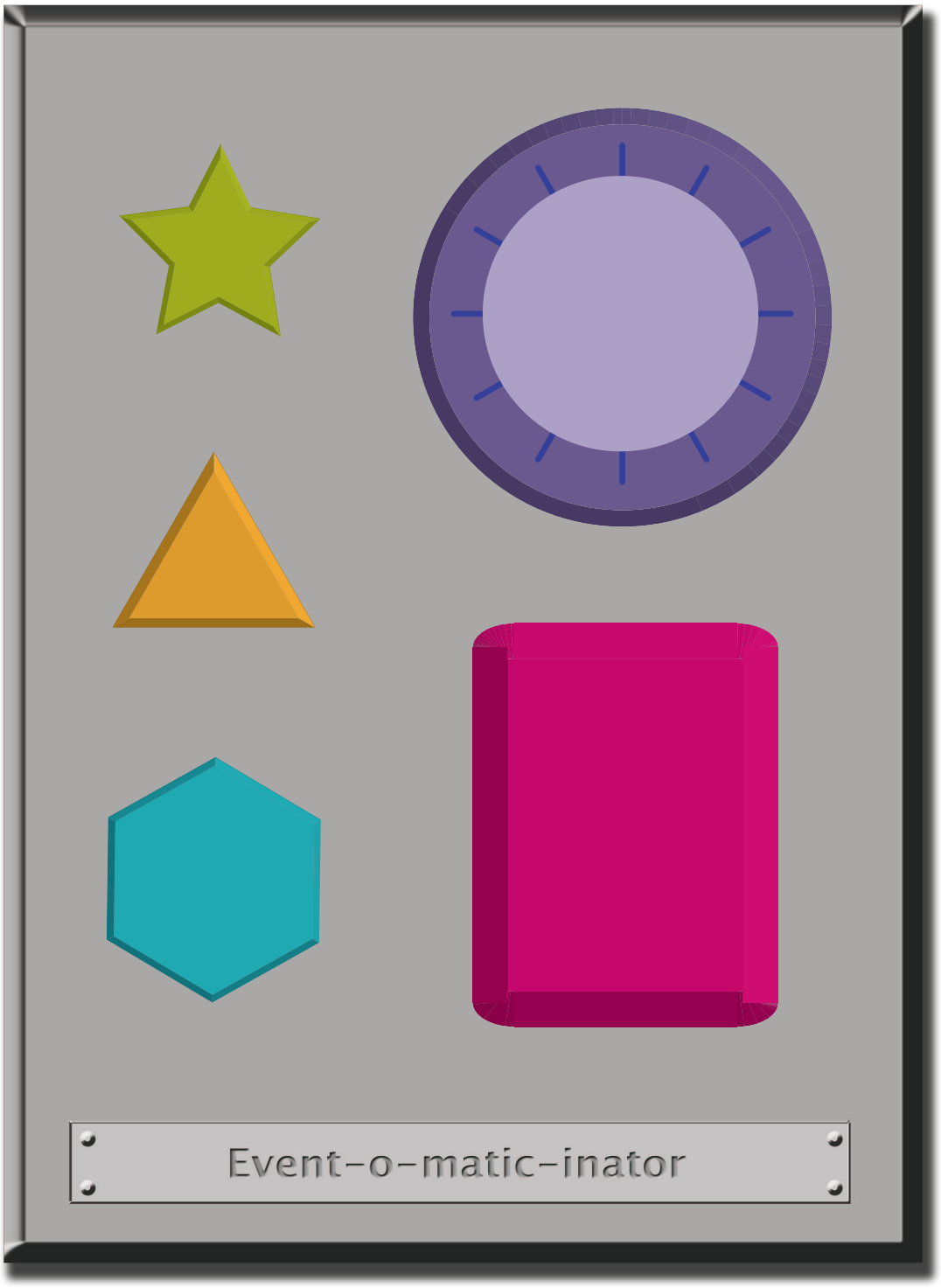
Event-o-matic-inator

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Unplugged

Name: _____ Date: _____

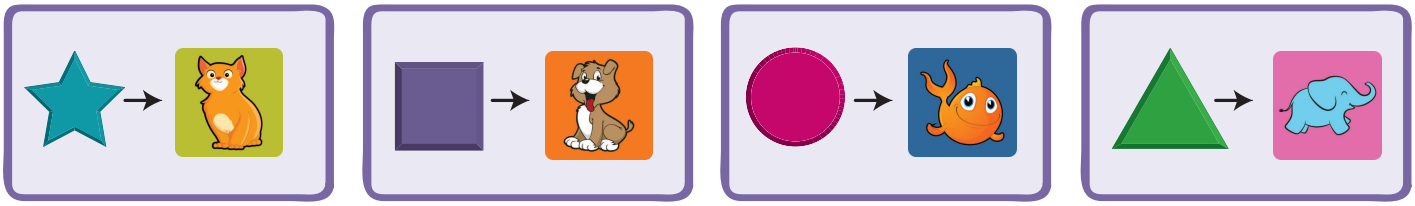
The Big Event

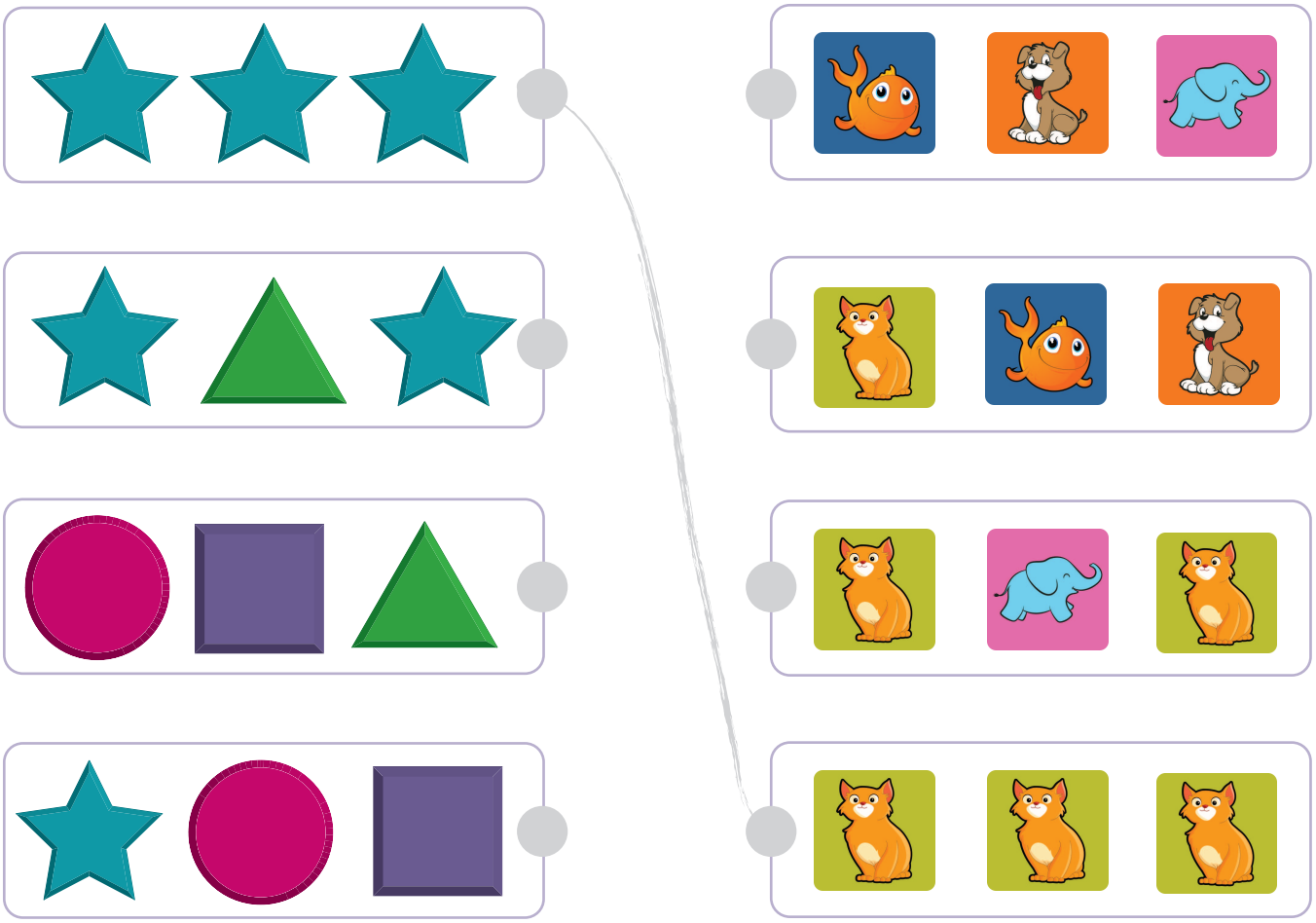
Controlling by Events Assessment

C O D E

You've been given a magical controller that changes the picture on the frame on your desk.

Take a look below to see what each button does. Can you figure out which series of button events will cause your frame to show the pictures on the right? Draw a line from each set of pictures to the button combination that causes it. The first one has been done for you.





16

Course 2 | Lesson 16

Flappy

Lesson time: 30 Minutes

LESSON OVERVIEW

In this special level students get to build their own Flappy game by using event handlers to detect mouse clicks and object collisions.

TEACHING SUMMARY

Getting Started

Introduction

Activity: Flappy

Flappy

Extended Learning

Extension Activities

LESSON OBJECTIVES

Students will:

- Match blocks with the appropriate event handler
- Create a game using event handlers
- Share a creative artifact with other students

GETTING STARTED

Introduction

- Review The Big Event activity with students:
  - What did we "program" the button click events to do?
- Now we're going to add events to our coding. Specifically, we're going to create an event for clicking the mouse and the bird hitting an object.
  - In video game programming we call this kind of event collision detection; it lets us decide what to do when one thing collides with, or touches, another.
  - What kinds of collision events have you seen in games?

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!

ACTIVITY

Flappy

In the final stage of this lesson students are able to tweak their game to make it unique - encourage them to see how different they can make each game within the constraints provided.

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 game, 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 games online or on the board.
  - Make a game 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 game.
- Discuss as a group the different ways your classmates coded their games.
  - What suprised you?
  - What would you like to try?
- Choose someone else's game and build on it. (Don't worry; the original game will be safe.)

17

Course 2 | Lesson 17

Play Lab: Create a Story

Lesson time: 30 Minutes

LESSON OVERVIEW

In this culminating plugged activity, students will have the opportunity to apply all of the coding skills they've learned to create an animated story. It's time to get creative and create a story in the Play Lab!

TEACHING SUMMARY

Getting Started

Introduction

Activity: Play Lab: Create a Story

Play Lab: Create a Story

Extended Learning

Extension Activities

LESSON OBJECTIVES

Students will:

- Identify actions that correlate to input events
- Create an animated, interactive story using sequence, loops, and event-handlers
- Share a creative artifact with other students

GETTING STARTED

Introduction

Review the event handling students did in Flappy:

- What did events did you use in coding Flappy?
- Now you're going to animate multiple characters using events triggered by the arrow keys to tell a story.
- This is your chance to get really creative!

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!

ACTIVITY

Play Lab: Create a Story

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, partiularly for students who are overwhelmed by too many options.

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 or on the board.
  - 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 suprised you?
  - What would you like to try?
- Choose someone else's story and build on it. (Don't worry; the original story will be safe.)

U

UNPLUGGED

Your Digital Footprint

Lesson time: 30 Minutes Basic lesson time includes activity only. Introductory and Wrap-Up suggestions can be used to delve deeper when time allows.

LESSON OVERVIEW

In collaboration with Common Sense Media, 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.

TEACHING SUMMARY

Getting Started - 20 minutes

1) Review
2) Vocabulary
3) Pause and Think

Activity: Follow the Digital Trail - 30 minutes

4) Follow the Digital Trail

Wrap-up - 10 minutes

5) Flash Chat - What did we learn?
6) Vocab Shmocab

Assessment - 5 minutes

7) Digital Footprint Assessment

LESSON OBJECTIVES

Students will:

- Understand that being safe when they visit websites is similar to staying safe in real life
- Learn to recognize websites that are alright 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

TEACHING GUIDE

MATERIALS, RESOURCES AND PREP

For the Student

- One Animal Tracks Chart (page 7)
- Pens & Pencils
- Digital Footprint Assessment

For the Teacher

- Lesson Video
- This Teacher Lesson Guide
- Download or prepare the Pause and Think" video
- Common Sense Media's Follow the Digital Trail game
- Print one set of Animal Tracks from this PDF
- Print one Animal Tracks chart (page 7) for each student
- Print one Digital Footprint Assessment for each student

GETTING STARTED (20 MIN)

1) Review

This is a great time to review the last lesson that you went through with your class. You can do this as one large group or have students discuss with an elbow partner.

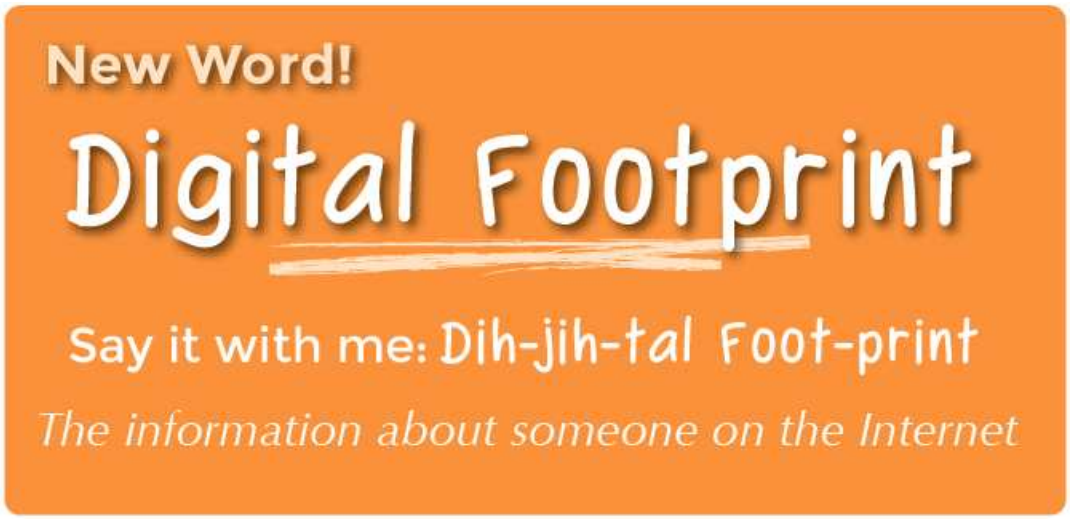
Here are some questions that you can ask in review:

- What did we do last time?
- What do you wish we had had a chance to do?
- Did you think of any questions after the lesson that you want to ask?
- What was your favorite part of the last lesson?

LESSON TIP *Finishing the review by asking about the students' favorite things helps to leave a positive impression of the previous exercise, increasing excitement for the activity that you are about to introduce.*

2) Vocabulary

This lesson has one new and important word:



Digital Footprint - Say it with me: Dih-jih-tal Foot-print
The information about someone on the Internet

3) 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 ust 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 Pause and Think Online 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.

LESSON TIP *If you have access to a computer, feel free to navigate to sites that might showcase each of these types nig extreme caution with your n i*

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

ACTIVITIES: (20 MIN)

4) Follow the Digital Trail

- Peruse the Follow the Digital Trail lesson on the Common Sense Media webpage.
- Give each student an Animal Tracks Chart (page 7).

	Mizzle the Mouse	Electra the Elephant
1. Whose full name do you know?		
2. Whose house could you find?		
3. Whose birth date do you know?		
4. Whose user name and password do you know?		
5. Who let out a secret on the Internet?		
6. Which animal can you describe better from his or her photo?		

Directions:

1) 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.

2) 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.

3) Explain to students that they are from the "Things Big and Small" Detective Agency. An evil 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.

4) Divide students into groups of four. Tell them that each group should have a detective that will keep detailed notes.

5) 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.

LESSON TIP

For more in depth modules, you can find additions to this curriculum at the ommon ense edia page on cope and e uence.

WRAP-UP (5 MIN)

5) 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?

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

Appropriate	Inappropriate
Interests	Address
Hobbies	Full name
First name	Information that would hurt others

LESSON TIP

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

6) Vocab Shmocab

- Which one of these definitions did we learn a word for today?

"The information about someone on the Internet"
"Changing the sun's light to energy"
"A person who is under the age of 21"

...and what is the word that we learned

ASSESSMENT (5 MIN)

7) Digital Footprint Assessment

- and 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 Media

- Visit Common Sense Media to learn more about how you can keep your students safe in this digital age.

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U

Unplugged

Name: _____ Date: _____

Your Digital Footprint

Staying Safe and Responsible Assessment

C O D E

Just because you **can** share something online doesn't mean that you **should**!

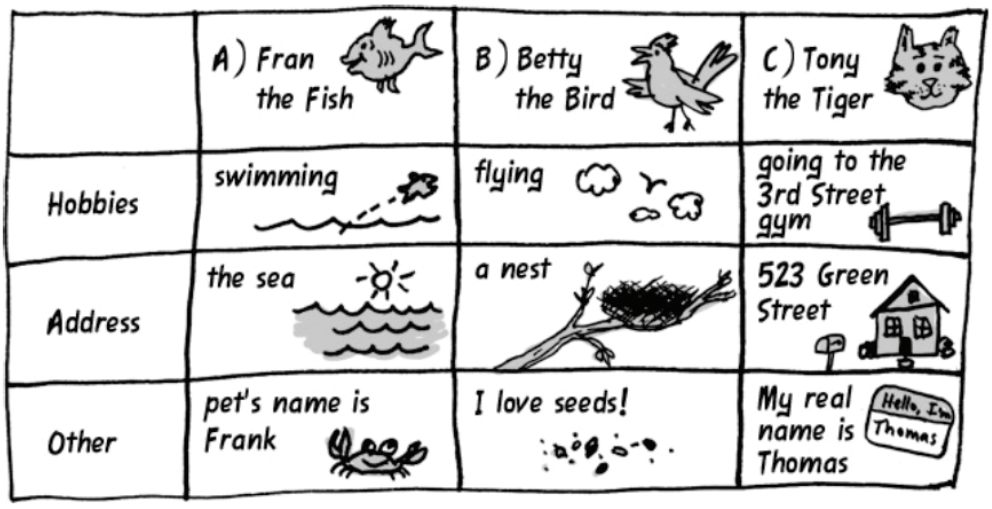
Cross out the information that you should not share online. Use the words that are leftover as the key to what you should find in the word search.

WORDS

1) Your Real Name (NAME)
2) Your Online Name (NICKNAME)
3) Your Address (ADDRESS)
4) Your Email (EMAIL)
5) Your Favorite Color (COLOR)
6) The Last Book you Read (BOOK)
7) Your Credit Card Info (CARD)
8) Your Favorite Band (BAND)
9) Your Phone Number (PHONE)
10) What You Ate Today (FOOD)
11) Your Birthday (BIRTHDAY)

O	H	D	T	X	V	X	N	G	Y
L	X	Q	G	J	U	D	E	M	S
T	B	I	H	T	F	N	B	N	W
H	I	M	D	I	O	I	A	M	G
A	K	S	C	J	O	C	N	O	C
P	E	B	O	M	D	K	A	N	C
P	K	O	L	M	B	N	N	K	O
Y	Y	O	O	G	A	A	A	E	D
V	U	K	R	V	N	M	G	Y	E
R	Z	O	I	F	D	E	C	C	T

Which animal below has the digital footprint that leaves him or her most unsafe?
HINT: Think about which animal shares the most private information online.



Circle One:

A) Fran the Fish

B) Betty the Bird

C) Tony the Tiger

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Course 2 | Lesson 19

Artist: Nested Loops

Lesson time: 30 Minutes

LESSON OVERVIEW

Students use the Artist environment to write programs that have looped statements inside another loop, which is called a nested loop.

TEACHING SUMMARY

Getting Started

Introduction

Activity: Artist: Nested Loops

Artist: Nested Loops

Extended Learning

Extension Activities

LESSON OBJECTIVES

Students will:

- Count the number of times an action should be repeated and represent it as a loop
- Divide the number of degrees in a circle into even segments
- Given a number of segments, calculate the degrees need to complete a circle
- Break complex tasks into smaller repeatable sections
- Combine simple shapes into complex designs with nested loops

GETTING STARTED

Introduction

ACTIVITY

Artist: Nested Loops

EXTENDED LEARNING

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