Click, Clack, Cool

An Introduction to Computer Science

Emma Hunt

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BELLEVUE SCHOOL DISTRICT

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Overview

Click, Clack, Cool was written by Emma Hunt as part of her Senior Project. The Senior Project is a graduation requirement of the International School in Bellevue Washington. Seniors design and complete a yearlong comprehensive project in a field of their choice. Emma's project was focused on increasing the interest of young student, in particular girls, in the field of computer science. Lessons and activities were written for students in grades 3 through 8.

This curriculum was originally written for International School's Focus Week, a week long camp to provide students with vocational credit. Feel free to move the lessons around as you wish to fit your schedule. If you are teaching an after school class, you will most likely want to do one activity every class period, or across multiple classes. For reference, the arrow symbol indicates a discussion question for the class.

Monday

Introductions

Lesson Time: 15 minutes

Overview:

In this lesson students will help to set up rules for the class room.

Objectives:

- Establish class rules

Skills Used:

- Reasoning
- Self-motivated thinking

Preparation:

- Come up with rules specific to your group and set up that you will help students to come up with.

Materials:

- White Board and pens

Script:

Hello everyone, and welcome to our first day of class. I am super excited to have you all finally here for an entire week. Before we get down to work, I think we should come up with some class rules.

- What rules do we need in our class?

  Suggested rules:

  - Treat computers respectfully
  - Try to figure out a problem for yourself before asking for help
  - Help other students, but don't give them the answer
  - Only touch your own computer
  - 3-2-1 means quit

  Additional rules:

  - Treat guest speakers with respect
  - On field trips, no questions that voice your unhappiness
  - Use "Listening Behavior"- eye contact, nod, say thank you

Warm-Up 1: The Human Computer

Lesson Time: 45 minutes

Overview:

In this warm-up, students will be given an overview of what computer science is, and what it means to be a computer scientist today. The Human Computer is a game intended to help students internalize that a computer is just a tool to help you do a task, not way to get out of thinking all together.

Objectives:

- Define computer science
- Define coding
- Show how literally a computer thinks

Skills used:

- Problem solving

Preparation:

- Read through the game, feel free to modify the task given to the "computer" to fit your class
- Remember to take everything the students tell you to do very literally. If they don't tell you to pick up the pen between letters, don't. If they forget to tell you to uncap the pen, or turn it to face the board, don't do so on your own. Letting students figure these things out for themselves not only improves their problem solving skills, but it also provides some humor to get the kids excited about the activity.

Materials:

- White board and markers

Script:

Now that we have got the boring stuff out of the way, let's jump into learning about computer science. Before we can start learning how to do things on computer, let's define what computer science is.

➢ What is Computer Science?

Those are all really good definitions. For the sake of consistency, in our class we are going to define Computer

science as the art of blending human ideas and digital tools to increase problem solving power

So that makes a Computer Scientist a person who is skilled at modifying problems for digital solutions. A lot of people think that all computer scientist is, is someone who sits at a computer by themselves and writes code all day. Code is one important piece of computer science, but saying that is all a computer scientist does is a lot like saying all a French person does is speak French. They do speak French, but they speak it in order to communicate with other people and to solve problems they encounter.

- What is a problem a computer scientist could solve?

Computers can do a lot of really cool things, and make it so humans can solve a lot of big, complex, or boring problems that we couldn't before. Thanks to computers, we can count out more digits of pi than we could before. They let us break complex codes, decode the human genome, or communicate over long distances.

- What is something that we can do today thanks to computers that we couldn't do in the past?

Computers are not an excuse to stop thinking though. Computers are a tool, and like any other tool, you have to know how they work in order to use them well. We are going to be playing a game to see how computers think. As a warning, computers think very literally. You are going to have to break things down into very small steps. Where you could say "walk to the board" and a human would understand, computers would find that too complicated. Instead you are going to have to say things like "take one step forwards" or "turn clockwise 90°".

The first time we play, I am going to be the computer. You guys are trying to "code" me, by giving me very simple instructions in order to complete a task. The first thing you are going to try and have me do is go to the board, pick up a pen, and write "Hello World" on the board. We are going to snake around the room and let each person say a line of code. If something is too complicated or the computer to understand, I will tell you that I am "unable to compute" and you can try again. Don't be discouraged, this will probably take some trial and error in order to get right.

PLAY HUMAN COMPUTER

Good job everyone. That was really good.

Now you guys are going to get a chance to play. I want you to work in groups of two. One of you will play the role of the computer, and the other will be the programmer. After you complete one task, you can switch. This task can be similar to the one we did as a group, such as writing down a message or drawing a picture. As the computer, don't be afraid to tell your partner that the computer is "unable to compute" and to break down the task into smaller problems.

LET KIDS PLAY HUMAN COMPUTER IN PAIRS

Good job everyone, it looked like everyone had a lot of fun.

- What are some of the activities that you were able to program your "computer" to do?

- Did anyone run into any problems while trying to break down a task? Was there anything that you couldn't come up with a way to simplify?

- How might this relate to real computers?

Code.org, part 1

Lesson Time: 3 hours

This lesson is flexible dependent on how quickly students are able to work through the activities. Most students in my class took 3 hours to do the first 10 activities. Be sure to break this up into shorter sections by adding a break or two in the middle, or spreading the work across multiple days.

Overview:

This is the first of two Code.org lessons. In this lesson, you will have to help kids set up their code.org accounts

Objectives:

- Introduce students to the basic ideas of coding

Skills used:

- Repeat blocks/ loops
- If/else statements
- Nested loops
- While loops

Preparation:

- Make a teacher account on Code.org for yourself. This is very important because you can use your teacher account to start a class for your students. This will enable you to keep track of their progress. Instructions on how to set up a class can be found from the teacher homepage. Click Student Accounts and Progress, and then follow the instructions from there. The script bellow is set up for an email based class.
- This part is for Stages 1 – 10. Depending on your age group, you may want to decrease the number of stages per sitting.

Materials:

- Code.org
- Computers for all students

Script:

Ok guys, we are going to actually start learning to code now. We are going to be using Code.org's 20 Hour Course. This may seem a bit daunting, but I have full confidence that all of you will finish within the week. On the board is the URL for our class. Please type this into your web browser and create a new

account from there. If you have any questions I am more than willing to help. Once you get your account made, go ahead and get started. Level 10 is today's goal, but don't be discouraged if you don't make it that far today.

LET STUDENTS WORK ON CODE.ORG

Movie: *The Computer Wore Tennis Shoes*

Lesson Time: 2 hours

Overview:

Students will have the opportunity to take a break from coding and learn a bit about the history of computers and early computer science while watching the film, *The Computer Wore Tennis Shoes*, from 1969.

Objectives:

- Teach about the history of Computers
- Let the students take a break from coding

Preparation:

- Rent or buy the movie *The Computer Wore Tennis Shoes.* Make sure it plays on whatever device you are using to show the film.

Materials:

- *The Computer Wore Tennis Shoes*
- way to show movie

Script:

Ok everyone, we are going to switch activities and take a break from coding.

SHOW PICTURE OF THE ENIAC ON THE BOARD

- Who here knows what is on the board?

This is the ENAIC, the first general use electronic computer. As you have probably noticed, this computer is really big. It was so big in fact, it took up the entire room, and it was a big room. This computer was coded by five women during World War Two. It was very different that computers today.

SHOW PICTURE OF 1960's COMPUTER

This is a computer from the 1960's. It is significantly smaller than the ENIAC, but still a lot bigger than computers today. Not only did computers look very different, but people thought they could do very different things.

We are going to be watching *The Computer Wore Tennis Shoes*, a movie from 1969 about the first computers. It is about some college students in 1969 who got a computer at their school.

Computers were only owned by universities because they were so large and expensive.

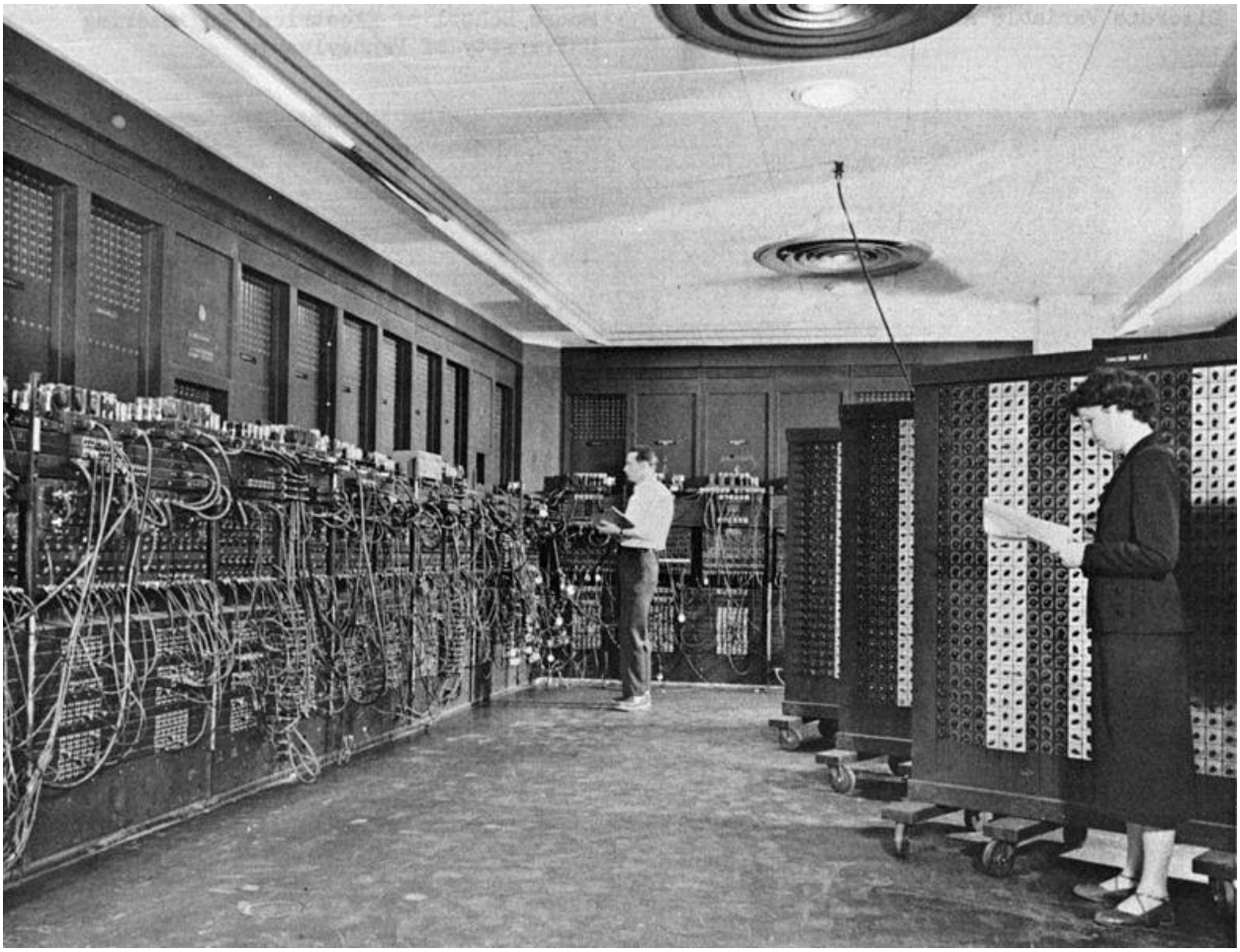
WATCH MOVIE

Ok, who enjoyed the movie?

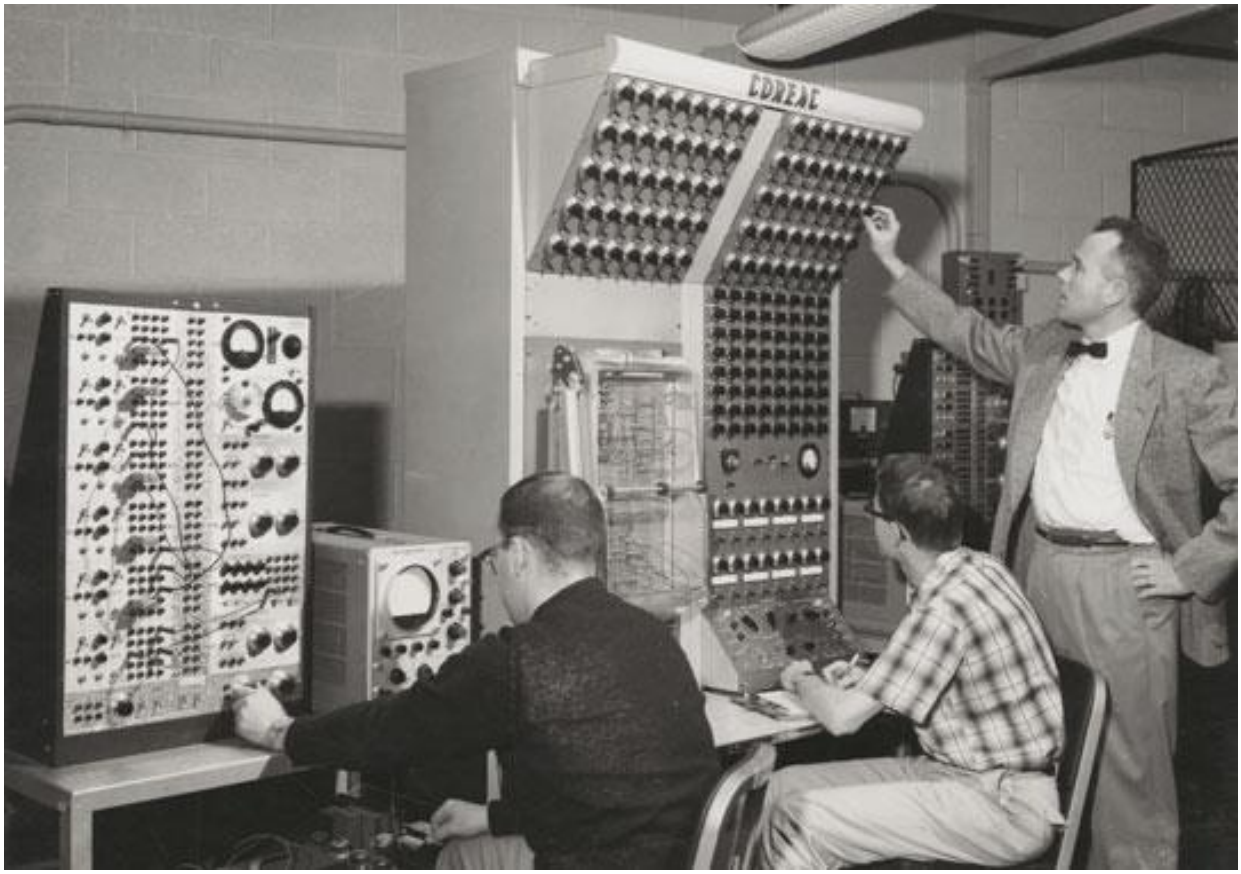
- Turn to your partner and talk about your favorite part of the movie.
- What was something interesting that you noticed about the computers in the movie?
- What could the computer in the movie do?
- How are computers today different than the computer in the movie?

Pictures:

The ENIAC



1960's Computer



Project 1: The Drawing Challenge

Lesson Time: 1 hour 30 minutes

Overview:

In this project, students are asked to imitate images provided for them by coding on Scratch.

Objectives:

- Teach students how to code to an objective

Skills used:

- X, Y coordinates
- Repeat blocks/loops
- Nested loops
- Wait blocks

Preparation:

- Print out/prepare hand outs
- Make teacher Scratch account, or feel free to use mine. The username is Admin-E, and the password is gocode.
- Familiarize yourself with Scratch in order to build the demo

Materials:

- Drawing Challenge Worksheet
- Scratch accounts
- Smart Board
- Computers for Students

Script:

Today we are going to be working on our first project, The Drawing Challenge. We are going to be moving over to another website, this one called Scratch. On Scratch, you are going to be coding a cat to make a variety of shapes using different blocks.

To start with you will all need to make an account on Scratch. Go ahead and search Scratch MIT online, or type in the URL on the board. After you make your account, go ahead and wait for the rest of the class to catch up. I will be passing out worksheets as you work. We will work through the first problem as a group.

LET KIDS MAKE THEIR ACCOUNTS

Has everyone made an account? OK, I want you all to close your computers for a moment and look up here. I am going to walk you through the first problem on the page.

DO FIRST PROBLEM ON SMART BOARD

You guys can now get started on your own. Try to work through as many problems as you can. If you get stuck, try asking your neighbors for help, but remember the class rules, you can help each other, but no telling people what blocks to drag where or coding the project for you. As you complete each checkpoint, raise your hand and I will come over and check off your work.

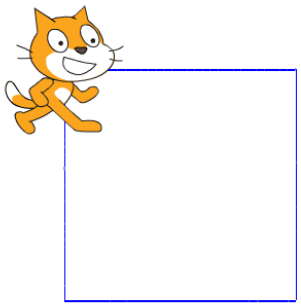
Name:

The Drawing Challenge

Make a new project titled Drawing Challenge.

Note: Scratch is in XY Coordinates. Move your mouse around on the screen to see where on the grid you are.

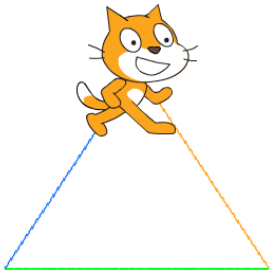
Checkpoint 1: Square



- Sprite draws a square using go to/ glide to blocks

Sign Off: _____

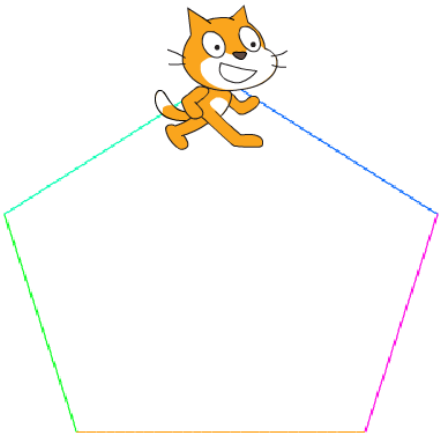
Checkpoint 2: Triangle



- Sprite draws an equilateral triangle
- Each side is a different color

Sign Off: _____

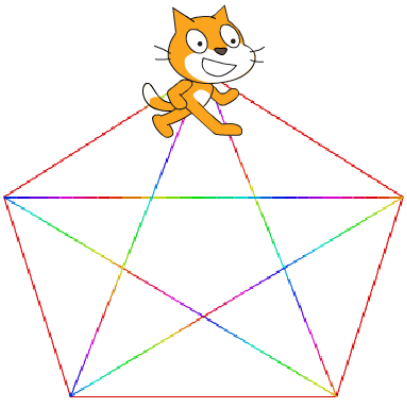
Checkpoint 3: Pentagon



- Sprite draws a Pentagon
- Each side is a different color
- Hint: good coordinates to use would be (0, 125), (150, 30), (100, -120), (-100, -120) and (-150, 30)

Sign Off: _____

Checkpoint 4: Star inside Pentagon



- Sprite draws a star inside the pentagon
- Pentagon is all one color
- Each side of the star is rainbow (this will take some extra code)

Sign Off: _____

Extra Credit:

_____ Change pen size

_____ Change background

_____ Change the sprite being used

_____ Draw a Star of David

_____ Draw a window

_____ Draw a 3D looking Pyramid

_____ Draw a 12 sided shape

_____ Challenge: Draw a Circle

_____ Super Challenge: draw a smiley face

Tuesday

Warm-Up 2: Binary

Lesson Time: 45 minutes

Overview:

In this warm up, students will learn about the primary language of computer, binary. They will have the opportunity to pictorially represent letters in binary and make a sticker with a binary representation of their initials.

Objectives:

- Learn how computers represent things internally
- Learn how binary works

Skills used:

- Problem solving
- Drawing
- Computational thinking

Preparation:

- Get binary stickers or magnets printed using the practice binary worksheet
- Print/upload binary decoder key

Materials:

- Binary decoder key
- Binary worksheet
- Practice binary squares
- Binary stickers/magnets
- Permanent markers (sharpies)

Script:

Hello everyone, we are now onto our second warm-up activity.

- Does anyone know how computers talk to themselves?
- What is binary?

Binary is the language that computers use to convey information within their own systems. Any time you write a program, no matter what language it is in, the computer has to translate that in to binary, much like you may have to translate your French homework into English in order to understand the instructions. Binary looks like a string of ones and zeros.

- Can anyone tell me what the ones and zeros in binary represent?

We are going to be writing our own binary representations of letters using colors. The white spaces will represent the zeros, or the off slots, and the colored sections will represent the ones, or the on slots. You will be receiving two handouts. One is the Binary Decoder Key and the other is a Binary Worksheet. Take the next 10 or so minutes to complete the worksheet. There should be markers in the center of your tables.

LET KIDS WORK THROUGH BINARY WORK SHEET

- Does anyone need any more time?

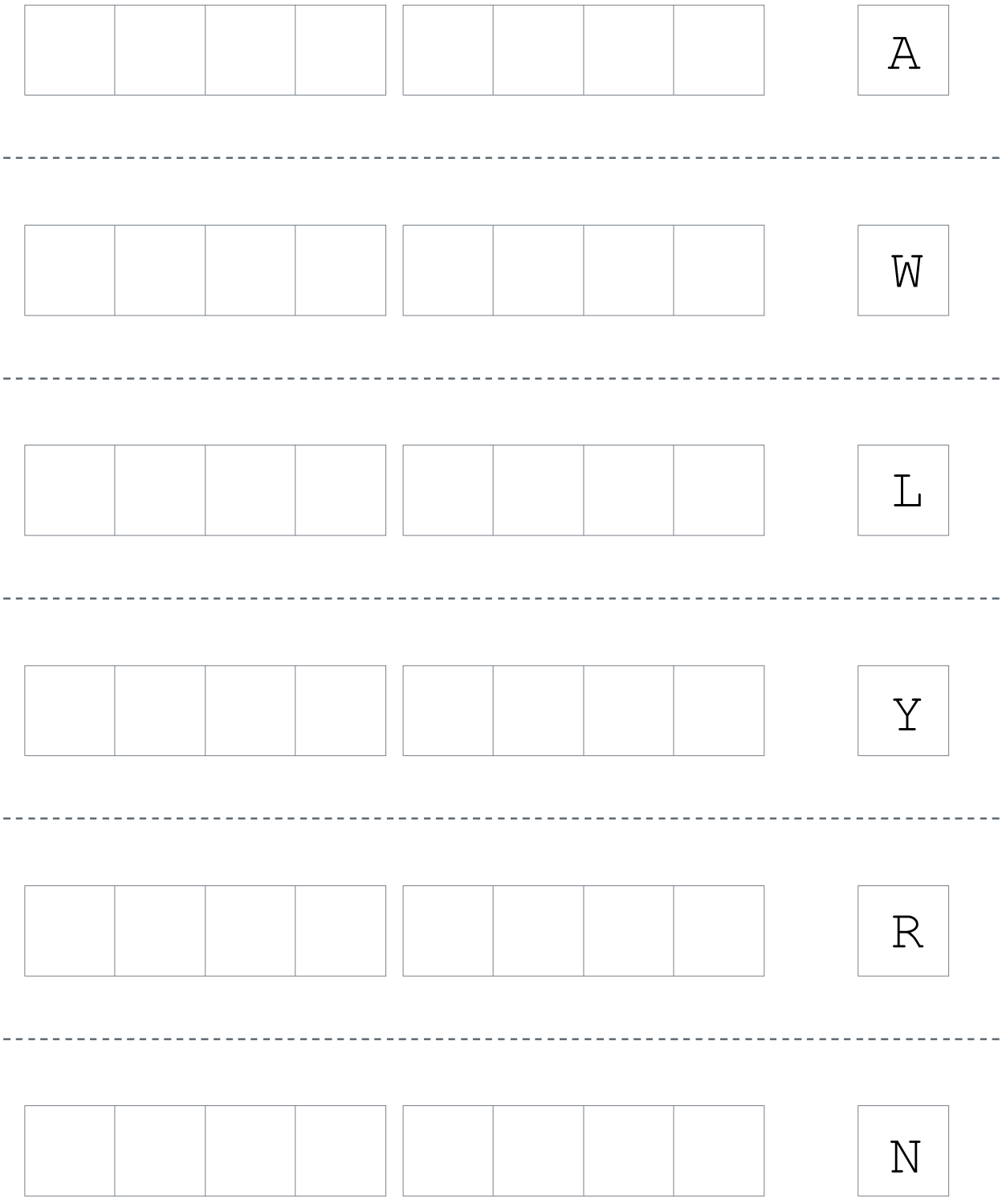
Awesome, now that you all have had the opportunity to practice writing and identifying individual binary letters, you all are going to have the opportunity to write your initials in a binary square. These squares are made of a 4 by 4 grid. The first two lines will be for your first initial, while the second two will be your last initial. It will probably work best if your do your fist and last initials each in a different color, but feel free to branch out. I will be passing out squares for you to practice on. When you feel confident with what your square looks like, raise your hand and we will give you a sticker/magnet to fill in to match your finalized binary square

LET KIDS WORK ON BINARY SQUARES

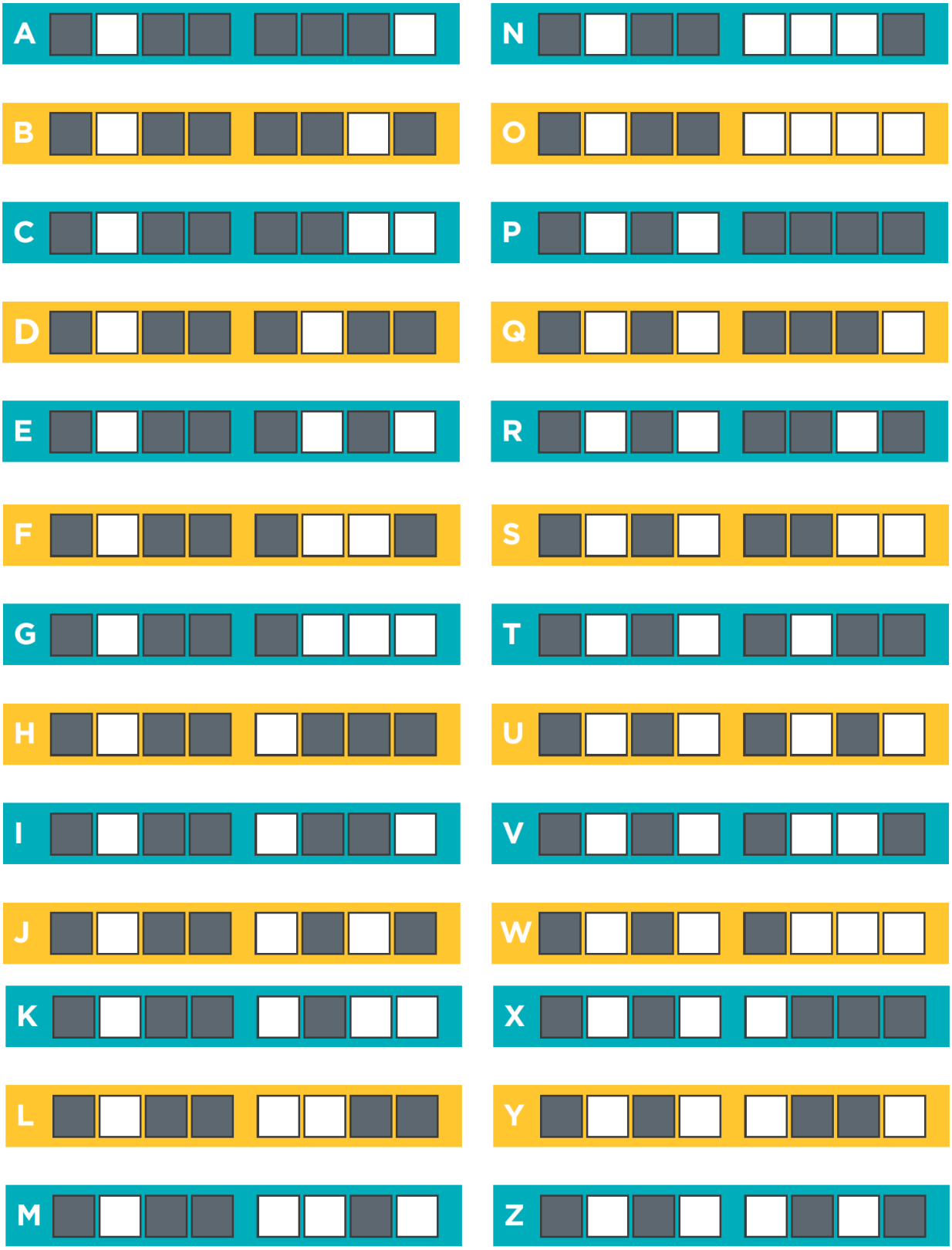
Name: _____

Binary Worksheet

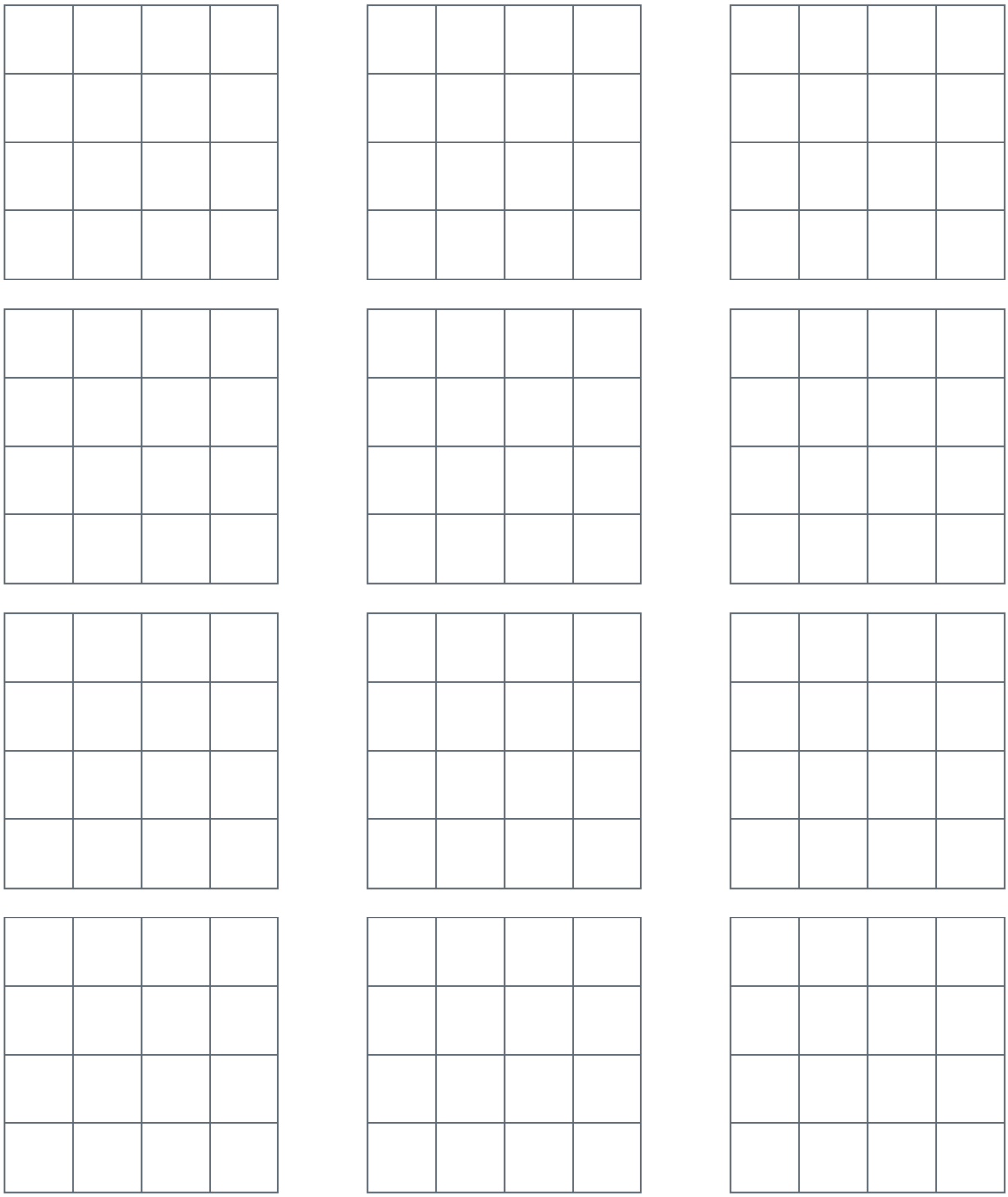
Identify or draw each letter in binary. Use your binary decoding sheet if you need hints.


A
W
L
Y
R
N

Binary Decoder Key



Practice Binary Squares



Project 2: The Maze Game

Lesson Time: 2 hours

Overview:

Students will use Scratch to build an interactive maze game that is playable by students.

Objectives:

- Teach students how to create an interactive game

Skills used:

- Repeat blocks/loops
- Nested loops
- Wait blocks
- If/else blocks
- Counters (Variables)

Preparation:

- Print out/prepare hand outs
- Build a version of the maze to show students as a demo
- You will need to figure out how to create variables to count the amount of time and lives players have. You can create these under the Data tab on the left. To get an idea of how to do this, you may want to look at my maze example on my Scratch account (username: Admin-E, password: gocode)

Materials:

- Maze Game Worksheet
- Scratch accounts
- Computers for students
- Smart board or other way to show demo

Script:

We are going to be starting our second project today. This project is very different than the Drawing Challenge, but it will help you to get ready for when you start designing your own game later on. You are all going to be building a maze game from scratch. This game will use a lot things you have used before like loops and if else statements, but it will also be adding some new material. Here is a version of the game that I made.

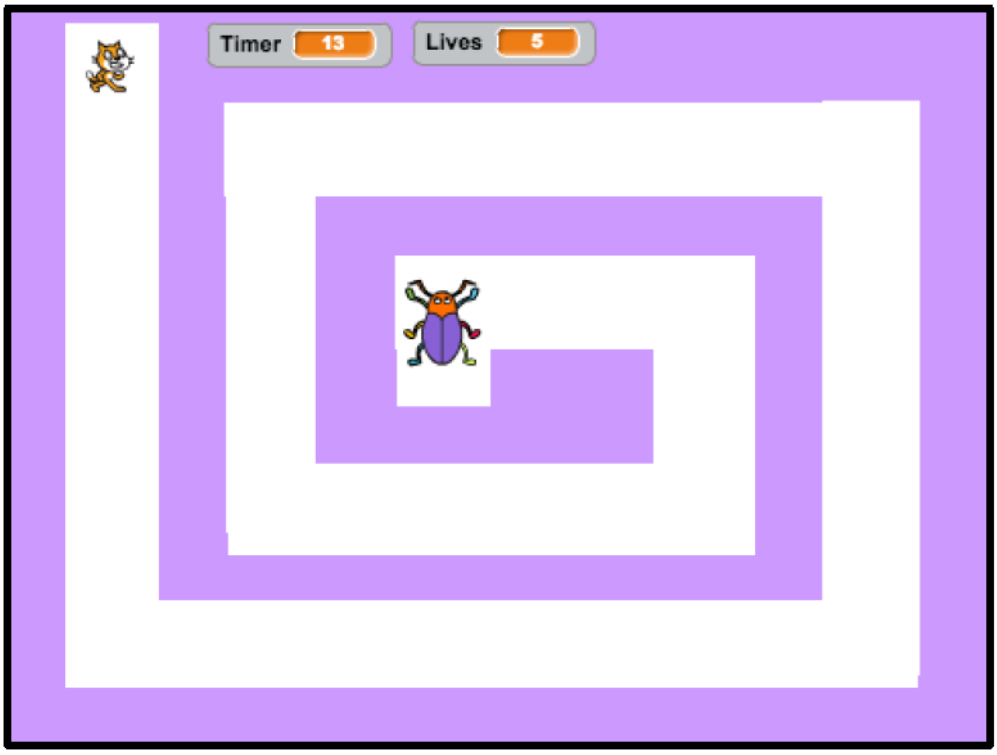
SHOW DEMO

You are going to be making your own versions of this game. Feel free to change some features, make a different maze, or add

more challenges. I will be passing out worksheets to help guide the creation of your games. Feel free to ask questions, and go ahead and get started by logging in to Scratch and opening a new project.

Name: _____

The Maze Game



Check list to a fantastic maze

- Maze drawn in the background out of one solid color
- The explorer is appropriately sized to navigate the maze
- Explorer controlled by key pad
- Something happens when you reach the friend at the end of the maze, you pick what!
- Something happens when you hit the wall, you decide what!
- There is a timer that counts down at a reasonable rate
- Game stops when the timer reaches 0

Done? Try adding more features

- Add more levels to your game
- Add obstacles
- Are there multiple things you have to collect to win?
- Add a lives counter
- Add power ups
- Come up with something new to add.

Field Trip Expectations

Lesson Time: 15 minutes

Overview:

In this lesson students will help to set up rules for field trips. If you do not have any field trips, go ahead and cut this lesson out.

Objectives:

- Establish field trip rules

Skills Used:

- Reasoning
- Self-motivated thinking

Preparation:

- Come up with rules specific to your group and set up that you will help students to come up with.

Materials:

- White Board and pens

Script:

➢ What rules should we have on field trips?

Suggested rules:

- No questions that voice your unhappiness
- Use "Listening Behavior"- eye contact, nod, say thank you
- Stay with the group and stick with a buddy
- Keep in mind that we are going into someone else's workspace

Those sound like great rules. We will be leaving all our computers here in the class room while we are gone. Feel free to eat a snack on the bus, but be sure to take all the trash off with you.

Wednesday

Warm-Up 3: Conditionals Card Game

Lesson Time: 45 minutes

Overview:

In this warm up, students will have a hands on experience with conditionals and how they work in a functional, problem solving way. They will be using a deck of card to play a game based on conditionals.

Objectives:

- Practice conditionals in a hands on scenario

Skills used:

- Conditionals (if/else statements)
- Forever loops

Preparation:

- Collect enough decks of cards for each group of 2 to 4 students.
- Print out worksheet

Materials:

- Decks of cards
- Card Conditionals Hints Worksheet

Script:

- Can anyone define what a conditional is for me?

A conditional is a statement that is either true or false depending on the situation.

- What is an example of conditional that you have seen in real life?
- What is an example of a conditional

Let's try an example as a class. **If** you raise your hands, I will tough my nose. **Else** I will put my hands on my hips.

- So what just happened there?
- Would anyone like to come up and make another class conditional?

LET TWO OR THREE KIDS DO THEIR OWN EXAMPLES AT THE FROUNT OF THE CLASS

Now we are going to play similar game but with cards. Each group of four will be given a pack of cards to share. Working

with a partner, I want you to come up with a set of rules with conditionals. An example of this would be **if you draw a red card, then you get a point; else your turn is over.** Make up the instructions for the game with your partner. Be sure to add conditionals saying when a person's turn is over and when the game ends. When both teams at your table group are done, play the two games as a table. I will be handing out worksheet with hints on it. Go ahead and get started and have fun.

LET KIDS MAKE THEIR GAMES

If your group is done playing both games, try to make a master game for the table with all the best rules of each game.

If your group has made a master game, go challenge another group to a game.

OK, it looks like everyone is done.

- What conditionals worked well?
- What conditionals didn't?

Name:

Card Conditionals Hints

Basic format:

If _____, then _____;

Else_____.

Ideas for conditions:

- draw a red card
- draw a black card
- draw a certain suit
- draw a face card
- draw an ace/ other certain card

Ideas for consequences:

- gain a point
- lose a point
- lose a turn
- automatically win

Write your code bellow:

Code.org, part 2

Lesson Time: 3 hours

Overview:

In the second Code.org lesson, kids will finish their code.org curriculum. Once again, you may want to break up this lesson into smaller chunks or multiple days.

Objectives:

- Expose students to all the basic components of major coding languages
- Give students the opportunity to practice what they have learned

Skills used:

- Repeat blocks/ loops
- If/else statements
- Nested loops
- While loops
- Functions/methods
- Tracing
- debugging

Preparation:

- This part is for Stages 11 – 20. Depending on your age group, you may want to split up or increase the number of stages per sitting.
- Be sure to put in a break

Materials:

- Code.org
- Computers for students

Script:

Today we are working on code.org again. The goal today is to finish all 20 stages. Go ahead and start wherever you left off last time and work forwards from there.

LET KIDS WORK ON CODE.ORG

Movie: *Wreck-It Ralph*

Lesson Time: 2 hours

Overview:

Students will have the opportunity to take a break from coding and learn a bit about the applications of computer science in the entertainment industry. They will also get to look a bit at the concepts of glitches and bugs.

Objectives:

- Teach about the history of Computers
- Let the students take a break from coding

Skills used:

- Linking concepts represented in a movie to those found in the real world.

Preparation:

- Rent or buy the movie *Wreck-It Ralph.* Make sure it plays on whatever device you are using to show the film.

Materials:

- *Wreck-It Ralph*

Script:

Welcome back everyone. To reward you from all your hard work coding, we are going to do something a little different today.

➢ What jobs are there in the field of computer science?

Computer animation is a huge area in the field of computer science. *Toy Story* was the first full length animated movie, released by Pixar in 1995. Today, computer animation has advanced leaps and boards. Today, to honor the world of computer animation, we are going to be watching *Wreck-It Ralph*. While you are watching the movie, keep your eyes out for other computer science ideas.

WATCH MOVIE

➢ There were a lot of computer science terms in that movie. What were a few that you noticed?

A few of you pointed out the bug in the movie. This bug was actually a virus.

➢ What is the definition of a virus?

A virus is program that finds the bugs in an existing computer program, and uses this weakness to get into that computer. It then inserts code and self-spreads.

Some of you also pointed out the glitch. A glitch is another name for a bug in programming.

- Can anyone tell me what a bug is?

A bug is an error in written code. A few of you had problems with bugs in your maze game. These bugs are hard to catch, but usually are easily fixed.

Students may come up with other terms such as code, data or HD. Address these positively as they come up and agree that they are also important computer science terms.

Thursday

Warm-Up 4: The Internet

Lesson Time: 45 minutes

Overview:

In this warm-up activity, students will get to learn more about how the internet actually works. Students will learn through class discussion and an interactive class activity to help students visualize how the internet is connected.

Objectives:

- Learn how the internet works
- Translate IP addresses

Skills used:

- Problem solving

Preparation:

- Print out the materials
- Find videos
- Look over the instructions and group sizes for the activity. Depending on the size of your class, you will may want to add or remove URL's. If you have drastically fewer students, you may want to take out the third parties altogether. I originally made this activity for 24 students, with 6 students on each job, for groups of 4 students per URL.

Materials:

- DNS Translation Table
- Server Address Name Tags
- Message Packets
- Scissors
- VIDIO: The World Science Festival, How the Internet Works https://youtu.be/7XoaoFjKqYM
- VIDIO: Ted Talks, Andrew Blum: What is the Internet, really? https://youtu.be/w42EsCDAhB4

Script:

This morning we are going to be learning a bit more about the internet.

➢ Who knows what the internet is?

Now can anyone give me a definition of the internet?

- Turn to your table partner and try to come up with a working definition of the internet.
- Would anyone like to share what they came up with?

Giving a definition of the internet is hard because it is really big and has no physical form. The internet is a group of computers and servers that are networked, or connected, together. Servers are computers that exist only to provide or pass along information to other computers.

We are going to watch a short video that gives a pretty good summery of how the internet actually works.

WATCH VIDEO BY THE WORLD SCINCE FESTIVAL (https://youtu.be/w42EsCDAhB4)

- Who wants to summarize what we just learned?
- Turn to your neighbor and talk about what is different about the neighbor than you first expected.

Now that you all have an idea of how the internet works, we are going to put what you have learned into practice.

To start the game, I am going to need 6 volunteers to be servers. Each of you will receive a URL, then please go stand quietly at the back of the room. I need 6 student to come up and be internet users. Each of you will be handed a message. I need another 6 students to come up to the front and stand next to an internet user. You will be carriers. The last 6 of you are going to third parties. Each of you pair up with a server.

The rules of the game are as follows:

1. Internet users will look at their message and see how many pieces it needs to be broken up into. They will then cut their message into the appropriate number of pieces and label them 1/6, 2/6, 3/6 and so on.
2. Internet users will then use the URL table on the front board to translate their URL's into IP addresses which they will write on the back of each piece, along with its means of transportation (Wi-Fi, Fiber or DSL). They will then hand one message at a time to their carrier.
3. Carriers must look at the IP address to find their destination. Then, according to the mode of transportation being used, you must take your messages to the correct server.
    a. If you are Fiber, you must carry your messages using one hand.
    b. If you are DSL, you must carry your message on the back of your hand.

    c. If you are Wi-Fi, you have to carry your message on your head.
4. If a carrier drops a message on the way to the server, they must ignore it. You can only go back and retrieve the dropped packet after you have delivered all other pieces to the server.
5. Servers must collect the messages and reassemble them in order. After all pieces of a message are collected, they will then be passed to a third party.
6. When a third party receives a full message, they must run to the front of the room and wait until everyone finishes to read their message out load. Messages will be read in the order they reached the front of the room in.

- Does anyone have any questions?

  Ok, let's get started.

  LET STUDENTS PLAY GAME

  Awesome job everyone.

- What was something that someone noticed during that activity?

Some students will probably point out that the process of receiving a message was really slow. Point out that in real life these exchanges are occurring at the speed of light. Others may be frustrated by how often their message was dropped during transportation. Acknowledge this frustration, and ask them to consider which means of transportation was most reliable, and which means of transportation would be fastest in real life.

You may want to take this opportunity to insert an internet safety lesson.

IF TIME SHOW TED TALK BY ANDREW BLUM (https://youtu.be/7XoaoFjKqYM)

Warm-Up 4 Materials

DNS Translation Table

URL	IP Address
Code.org	23.23.160.123
Thinkersmith.org	64.14.68.10
CSEDweek.org	174.129.210.209
CSisFun.org	198.58.93.24
Khanacademy.org	107.20.223.238
Scratch.mit.edu	76.32.108.76

Server Address Name Tags

23.23.160.123

64.14.68.10

174.129.210.209

198.58.93.24

107.20.223.238

76.32.108.76

Message Packets

This is a message for you, from me.

To: Code.org
Number of pieces: 4
Using: DSL

My message is shorter than yours.

To: CSEDweek.org
Number of Pieces: 4
Using: Wi-Fi

This is a note just for you! (shush, don’t tell anyone)

To: Thinkersmith.org

Number of Pieces: 5

Using: Fiber

We really like to code. Always keep coding.

To: CSisfun.org

Number of Pieces: 6

Using: Wi-Fi

The internet is a network of networks that I use to watch cat videos.

To: khanacademy.com

Number of Pieces: 7

Using: DSL

Focus Week is really fun.

To: scratch.mit.edu

Number of Pieces: 3

Using: Fiber

Project 3: Design Your Own Game, Part 1

Lesson Time: 1 hour

Overview:

Students will design and build their own game using Scratch. Games can be designed and built in pairs or individually depending on the size of the group.

Objectives:

- Have students design their own game

Skills used:

- Creative thinking
- Problem solving
- Team work
- Computational thinking

Preparation:

- Print out/ upload game design worksheets
- Build demos of different games or use mine (Username: Admin-E, password: gocode)

Materials:

- Game Design Worksheet
- Butcher paper
- Markers

Script:

Today is the day that you all get to start working on the much anticipated Design Your Own Game Project. For the next two days, you will get to work individually or in groups of two to design and build your own game on Scratch. These games can be anything you would like, as long as they keep your attention for the remainder class and are completed by lunch on Friday. On Friday you will have the opportunity to share your games with the class and play other student's finished games. We will be voting on awards of who has the best game.

Before you can start building your game, you are going to need to do some brainstorming. I will be passing out a planning worksheet that I want each group to complete. After you complete

the planning sheet, every group will make a poster describing your game.

These posters should include:

- Name of Game
- Creators (your name)
- Game screenshot (a picture of what your game will look like while you are playing)

Later every group will be asked to pitch their game to the class. During these pitches you will give an overview of your game using your poster as an aid. In addition to the three things in your poster, be sure to mention:

- One line of code that will be included in your game
- The goal of your game
- Obstacles that will come between you and your goal

Before you start on your own projects, I have a couple of demos to show you to give you a few ideas.

SHOW DEMOS

Go ahead and get into your groups and start working.

LET STUDENTS WORK ON GAME DESIGN WORKSHEET AND POSTER

Name:

Design Your Own Game

Planning and Pitch Worksheet

Name of Game: _____

Username of the account game is on:

_____

Objective:

Obstacles:

Screenshot:

How is the game won or lost?

What variables does your game include?

What sprites are involved?

Sprite	Behavior	How it interacts with other sprites	How it interacts with the player

Project 3: Design Your Own Game, Part 2

Lesson Time: 30 minutes

Overview:

Students will pitch their game designs and start building their games.

Objectives:

- Have students pitch their own game
- Allow students to start work time

Skills used:

- Creative thinking
- Presentation skills
- Team work

Materials:

- Game Design Worksheet
- Butcher paper and Markers (if posters are not completed)
- Scratch accounts
- Computers

Script:

Today we will be working on our games. We are going to start with our game pitches. The sooner we start those, the sooner you can get to working on your games.

- Does anyone need more time to complete their planning worksheet and poster?

(If students need time, give them 10 to 15 additional minutes to finish their planning)

Ok, we are going to start our pitches now. When you come up to pitch, show everyone your poster and explain the objective of the game and the obstacles involved in it. You will also need to give an example of one line of code you will use.

STUDENT PITCHES

Awesome job everyone, I am very excited to see the finished projects. You have the rest of class to start working.

Friday

Warm-Up 5: Team Oriented Computer Science

Lesson Time: 45 minutes (allows time for 2 rounds)

Overview:

In this warm-up activity, students will work in teams in a relay style coding game to code and image.

Objectives:

- Learn to code as team
- Practice tracing other peoples code
- Practice debugging

Skills used:

- Problem solving
- Tracing
- Debugging
- Coding

Preparation:

- Print out Warm-Up 5 images for all the groups
- Find an open area where your students can run or quickly walk during the game. (My open location was our school's commons. You will want to replace this with your chosen location in the script.)

Materials:

- Warm-Up 5 Images: you may cut up the images and pass out each individually, or you may give students the full sheet and make them figure out which image is being worked on themselves.
- Computers (1 per group)
- Code.org's Drawing Studio

Script:

Hello everyone, and welcome to class today. For the majority of this class you have been working on projects individually. In the real world of computer science projects are usually done in groups, with a deadline that needs to be met. When working under these timed conditions, people often start to leave things out and miss important steps. To get you ready to finish your games today, we are going to be having a coding relay.

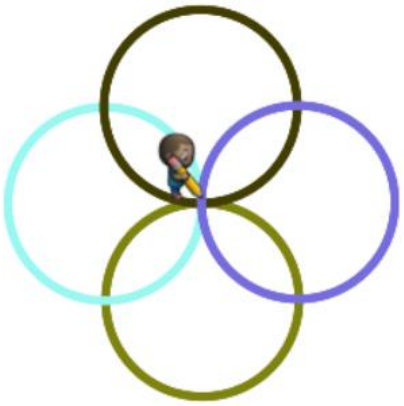
We are going to go down to the commons to play this game. In table groups, you will have to code an image on Code.org's Drawing Studio. You will need one computer per group, with a fresh Drawing Studio up.

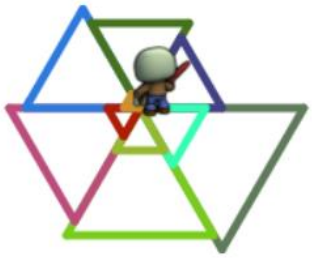
This computer will be placed at one end of the commons. Your team will then line up across from the computer on the other side of the gym. One at a time you will walk over to the computer. When it is your turn you, you will have three options. 1. You may drag and drop a new line of code, 2. You may correct one bug in the existing code, or 3. You may fun the code to test what has been coded so far. After taking your turn, walk back to your team and tag off to the next person in line. You are not allowed to help any of your team mates or tell them what you changed in the code. The first team to correctly recreate the image wins.

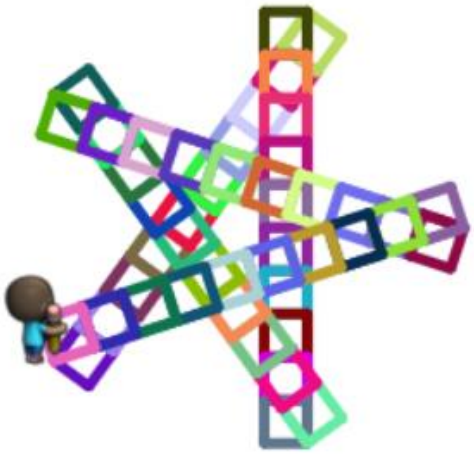
Let's walk down to the commons. Go ahead and get set up and then I will pass around the images.

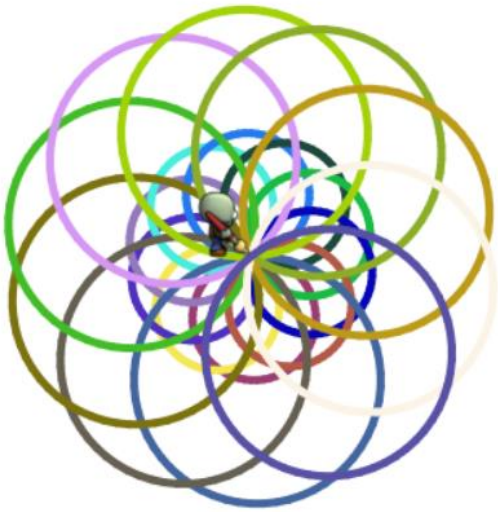
PLAY CODING RELAY

Warm-Up 5 Images









Project 3: Design Your Own Game, Part 3

Lesson Time: 2 hours

Overview:

Students will finish building their games before publishing.

Objectives:

- Have students build in a team
- Give students the opportunity to share their work

Skills used:

- Creative thinking
- Problem solving
- Team work
- Computational thinking

Preparation:

- Practice publishing a game on Scratch
- Be prepared to come up with a potential award for each game

Materials:

- Computers
- Scratch accounts
- Smart Board or Projector

Script:

Today is your last day to work on building your games. I know many of you have started already. All the games need to be completed in an hour and a half, at which point I will be cutting you all off to teach you how to publish your games. Try to switch off on who has the computer at least every 15 minutes. We want everyone to get the opportunity to both code and dictate. Please do your best work, remember to debug, and have fun.

GIVE STUDENTS AN HOUR AND A HALF TO WORK. STUDENTS MAY NEED A BREAK HALF WAY THROUGN IN ORDER TO MAINTAIN CONCENTRATION.

Ok everyone, we are now going to be publishing our games. This means I need everyone to stop coding and look up here. In order to publish a game on Scratch, you first need to make sure you have saved your game and the name of your game for the

title. Next press the share button in the upper right hand corner.

At this point you will see a share screen. Be sure to fill in the instructions so that other people will know how to play your game.

SHOW A TUTORIAL ON THE PROJECTOR

Project 3: Design Your Own Game, Part 4

Lesson Time: 45 minutes

Overview:

Students will play each other's games and vote on whose is the best. After voting, you may hold an awards ceremony if you so wish.

Objectives:

- Give students the opportunity to share their work
- Recognize student's achievement

Skills used:

- Analysis
- Constructive feedback.

Preparation:

- Make an award for each group
- Set up a way to vote on best game

Materials:

- Computers
- Ballets
- Certificates

Script:

Hello everyone and welcome back. Today we are going to be sharing our games, voting and having an awards ceremony. To start with, everyone is going to need to open up their published games from their shared section of My Files. Leave this page up on your screen for other people to play.

GIVE STUDENTS TIME TO SET UP THEIR GAMES

Now that that is done, you will all have 30 minutes to go around and play other student's games. After you have played every game, come up and get a ballot from me. When you vote, please do not vote for your own game.

LET STUDENTS PLAY GAMES AND VOTE FOR 30 MINUTES

COLLECT BALLOTS AND COUNT UP

CONDUCT AN AWARDS CEREMONY

Extra Materials

Warm-Up 6: Multi-Tasking Computers

Lesson Time: 45 minutes

This lesson was originally used during a pre Focus Week camp meeting. It is one of my favorite Games, and I would highly encourage using it. This warm-up is especially good for younger kids, or students who may be a bit squirrely.

Overview:

Students will learn about how computers pass information internally through a hands on, interactive activity.

Objectives:

- Teach students about how computers pass information
- To help students understand why their computers start to lag

Skills used:

- Problem solving
- Team work

Preparation:

- Decide how many groups you want, and how big those groups will be. I would suggest starting with groups of 5. The larger the groups, the more difficult the activity will be.

Materials:

- Smart Board/ projector
- Student's shoes
- VIDIO: The Orange Game by CS Unplugged (https://www.youtube.com/watch?v=WforXEBMm5k&feature=player_embedded)

Script:

➢ Have any of you ever had a problem with your computer having too many things open at a time, and it starts to slow everything down?

STUDENT ANSWERS

➢ What do you think is going on when your computer starts to slow down?

STUDENT ANSWERS

So think about this: You're playing music on Spotify, chatting on Facebook, posting a picture on Instagram, loading a

new mod on Minecraft, and suddenly everything starts to slow down. Your webpages load slower, your songs start to glitch, and the percentage bar on Minecraft looks to be moving in reverse. This is because your computer can only do so many things at once. Just like you can't do all your homework at one time, your computer has to jump between things and pass information around in order to get everything done. And the more applications you have going at one time, the longer it takes to load each of them. We are going to play a game to see how computers sometimes have to slow down and even work backwards to get all the information to where it needs to be.

SHOW COMPUTER VIDEO

- So can anyone summarize what they were talking about in the video?

STUDENT ANSWERS

- What are the rules of the game?

1. You can only pass to the person next to you.
2. You can pass with either hand
3. One person only has one shoe

We are going to play with shoes instead of fruit. Get in a group of five and take off your shoes. One person will need to get rid of one of their shoes so that there is one free hand in the circle. Put your shoes in a pile in the center of the circle and pick out two non-matching shoes that are not your own. One person will only have one shoe. Pass the shoes around so everyone ends up with their own shoes.

- Start in a circle, then try in a line.
- Try in a group of 10
- Let's try it as a whole class.

- What did you notice about the different groups?
- Why do you think that is?
- How might that relate to computers?

Stickers

During my camp, I handed out stickers to students to help recognize their achievements. For each major milestone activity, students were able to earn a sticker to show their accomplishment. I designed and printed these stickers on stickeryou.com. You can design your own stickers, or use mine bellow.

Start of camp sticker (awarded pre-camp)

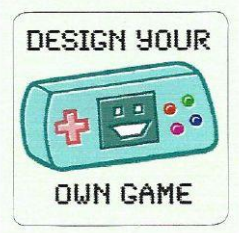
Completion of Code.org Stage 10

Completion of Code.org Stage 20

Completion of Project 1: Drawing Challenge

Completion of Project 2: The Maze Game

Game Pitch Project 3: Design Your Own Game



Given out at awards ceremony in Project 3: Design Your Own Game

Extra Credit

End of Camp

Sample Camp Schedule

This is the schedule from my week long camp I taught during International School's Focus Week 2015. My class was made up of 24 middle school students.

On Tuesday, we took a trip to Microsoft for the majority of the day. On Thursday, we toured the University of Washington's Computer Science Department. I would highly encourage you to include field trips if you are teaching a long class or camp like I was.

On Wednesday, we had early release, so class was about two hours shorter.

Additionally, I invited professionals from the field of computer science to come and speak to us on Monday, Wednesday and Friday to add some verity.

Sample Schedule

Monday: 8:00 am – 2:30 pm

08:00 – 08:15 Introductions

08:45 – 09:00 Warm-Up 1: The Human Computer

09:00 – 09:30 Code.org, Part 1

09:30 – 09:45 Break

09:45 – 10:15 Guest Speaker

10:15 – 11:00 Code.org, Part 1 cont.

11:00 – 12:00 Movie: *The Computer Wore Tennis Shoes*

12:00 – 12:30 Lunch

12:30 – 01:30 Movie cont.

01:30 – 02:30 Project 1: The Drawing Challenge

Tuesday: 8:00 am – 2:30 pm

08:00 – 08:45 Warm-Up 2: Binary

08:45 – 09:15 Project 2: The Maze Game

09:15 – 09:30 Field Trip Expectations

09:30 – 13:30 Field Trip

13:30 – 14:30 Project 2: The Maze Game cont.

Wednesday: 8:00 am – 12:30 pm

08:00 – 08:45 Warm-Up 3: Conditionals
08:45 – 09:30 Code.org, Part 2
09:30 – 09:45 Break
09:45 – 10:15 Guest Speaker
10:15 – 10:45 Code.org, Part 2 cont.
10:45 – 12:30 Movie: *Wreck-It Ralph*

Thursday: 8:00 am – 2:30 pm

08:00 – 08:45 Warm-Up 4: The Internet
08:45 – 09:30 Project 3: Design Your Own Game, Part 1
09:30 – 01:30 Field Trip
13:30 – 14:30 Project 3: Design Your Own Game, Part 2

Friday: 8:00 am – 2:30 pm

08:00 – 08:45 Warm-Up 5: Team Oriented Computer Science
08:45 – 09:30 Project 3: Design Your Own Game, Part 3
09:30 – 09:45 Break
09:45 – 10:15 Guest Speaker
10:15 – 11:45 Project 3: Design Your Own Game, Part 3 cont.
11:45 – 12:00 Project 3: Design Your Own Game, Part 4
12:00 – 12:30 Lunch
12:30 – 13:00 Project 3: Design Your Own Game, part 4 cont.
13:00 – 13:30 Ice-Cream Party
13:30 – 14:00 Awards Ceremony
14:00 – 14:30 Free Time