



**SPRINGFIELD PUBLIC SCHOOLS**  
**ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21<sup>ST</sup> CENTURY GLOBAL SKILLS**

**Springfield Public Schools**  
**Springfield, New Jersey 07081**

## **Grade 2 Computer Science**

### **Curriculum Guide**

**2022**

This curriculum may be modified through varying materials, techniques, and strategies as per an individual student's IEP.

*Springfield Board of Education*  
*Approved July 25, 2022*



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Springfield, New Jersey**

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*Springfield Board of Education*  
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*"Cultivating compassionate and extraordinary learners"*

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Resolution: School Government  
Introduced By: Mr. Miller  
Seconded By: Mrs. Gamarekian  
Adopted: July 25, 2022

### **Curriculum Adoption**

To adopt the following curriculum and courses for the 2022-2023 school year:

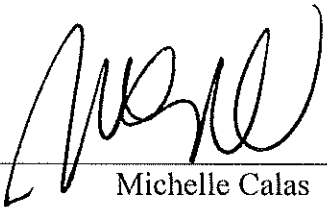
- Revised Elementary Curriculum due to revised state standards.
  - K-5 Social Studies
- Revised Middle School Curriculum due to revised state standards.
  - Grades 6-8 Social Studies
- Revised High School Curriculum due to revised state standards.
  - AP Macroeconomics
  - AP European History
  - AP US Government & Politics
  - AP US History
  - Contemporary Global Studies
  - Diversity Studies
  - Holocaust & Genocide
  - Sociology
  - US History to 1900
  - World History
  - World History Honors
  - 20th Century & Beyond
- Revised Middle School Courses due to new standards in Computer Science
  - PLTW Gateway: Computer Science for Innovators and Makers
  - PLTW Gateway: App Creators
- Revised High School Courses due to new standards in Computer Science
  - Introduction to Java
  - AP Computer Science Principles
  - Advanced Computer Science - Data Structures: Java
- New Elementary Courses
  - Kindergarten Computer Science
  - Grade 1 Computer Science
  - Grade 2 Computer Science
  - Anticipated - moving PLTW Launch down to Grade 3
  - PLTW Launch Grade 4
  - PLTW Launch Grade 5
- New Middle School Elective Course
  - Forensics

- New Elective Courses at FMG
  - Creative Writing
  - Drama/Theater/Playwriting
  - Journalism
  - Mock Trial
  - Model UN
  - Mysteries in History
  - Project Citizen
- New ELA Courses at FMG
  - Accelerated Communication Arts Grade 7
  - Accelerated Communication Arts Grade 8
- New Elective Courses at JDHS:
  - African American Studies

I, Michelle Calas, School Business Administrator/Board Secretary of the Springfield Board of Education, hereby certify that the extract from the minutes of a meeting of the Board of Education duly called and held on July 25, 2022 has been compared by me with the original minute book of said Board of Education, and is a true, complete and exact copy therefor, as far as the same relates to the subject matter referred to said contract.

IN WITNESS THEREOF, I have hereunto set my hand and seal of the Springfield Board of Education, this 26<sup>th</sup> of July 2022.

SEAL

  
\_\_\_\_\_  
Michelle Calas  
School Business Administrator/Board Secretary



### Unit Overview Template

**Content Area:** Computer Science      **Grade Level:** 2      **Unit Title:** Unplugged CS

**Unit Summary:** Students will explore concepts of computer science using unplugged activities. These unplugged activities include active movement or crafts. These activities support hands-on learning while students learn computer science concepts such as algorithms, loops, and sequences.

**Primary Interdisciplinary Connections:** *Mathematics*

**21<sup>st</sup> Century Themes**   **X** Creativity and Innovation   **X** Critical Thinking and Problem Solving   **X** ICT Literacy

☐ Information Literacy   **X** Life and Career Skills   ☐ Communication and Collaboration   ☐ Media Literacy

**Unit Rationale:** This unit will enhance student knowledge of computer science through readings and hands-on activities.

**Career Readiness (Standard 9):**

- 9.2.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job.
- 9.4.2.CI.2: Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
- 9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
- 9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
- 9.4.2.DC.1: Explain differences between ownership and sharing of information.
- 9.4.2.DC.5: Explain what a digital footprint is and how it is created.
- 9.4.2.IML.2: Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10).
- 9.4.2.TL.1: Identify the basic features of a digital tool and explain the purpose of the tool (e.g., 8.2.2.ED.1).
- 9.4.2.TL.2: Create a document using a word processing application.
- 9.4.2.TL.5: Describe the difference between real and virtual experiences.
- 9.4.2.TL.6: Illustrate and communicate ideas and stories using multiple digital tools (e.g., SL.2.5.).

### Learning Targets

**Standards:** 8.1.2; 2.MD; RI.2

**Content Statements:** Computing Systems; Networks and the Internet; Impacts of Computing; Data & Analysis; Algorithms & Programming; Represent and Interpret Data; Reading Informational Text

**CPI#:**      **Cumulative Progress Indicator (CPI):**

8.1.2.CS.2      Explain the functions of common software and hardware components of computing systems.

8.1.2.NI.1      Model and describe how individuals use computers to connect to other individuals, places, information, and ideas through a network.



|                   |                                                                                                                                                                                                                           |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8.1.2.NI.2        | Describe how the Internet enables individuals to connect with others worldwide.                                                                                                                                           |
| 8.1.2.NI.3        | Create a password that secures access to a device. Explain why it is important to create unique passwords that are not shared with others.                                                                                |
| 8.1.2.NI.4        | Explain why access to devices need to be secured.                                                                                                                                                                         |
| 8.1.2.IC.1        | Compare how individuals live and work before and after the implementation of new computing technology.                                                                                                                    |
| 8.1.2.DA.1        | Collect and present data, including climate change data, in various visual formats                                                                                                                                        |
| 8.1.2.DA.3        | Identify and describe patterns in data visualizations.                                                                                                                                                                    |
| 8.1.2.DA.4        | Make predictions based on data using charts or graphs.                                                                                                                                                                    |
| 8.1.2.AP.1        | Model daily processes by creating and following algorithms to complete tasks.                                                                                                                                             |
| 8.1.2.AP.4        | Break down a task into a sequence of steps.                                                                                                                                                                               |
| 8.1.2.AP.5        | Describe a program's sequence of events, goals, and expected outcomes.                                                                                                                                                    |
| 8.1.2.AP.6        | Debug errors in an algorithm or program that includes sequences and simple loops.                                                                                                                                         |
| RI.2.3            | Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.                                                                                  |
| 2.MD.D.10         | Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put together, take-apart, and compare problems using information presented in a bar graph. |
| SEL.PK-12.<br>2.2 | Recognize the skills needed to establish and achieve personal and educational goals.                                                                                                                                      |
| SEL.PK-12.<br>4.1 | Develop, implement and model effective problem-solving, and critical thinking skills.                                                                                                                                     |
| SEL.PK-12.<br>5.2 | Utilize positive communication and social skills to interact effectively with others.                                                                                                                                     |

**Unit Essential Questions:**

- What is a computer?
- How do we design our own computers?
- What do computers do?

**Unit Enduring Understandings:**

- Computers take inputs, give outputs, store data, and process data.
- Computers are made of different parts that have different purposes.
- Computers connect to each other through networks.
- Computers complete tasks through sequences and algorithms.
- Passwords help protect computers by adding a layer of security.
- New computing technology constantly changes the way we live and work.

**Unit Learning Targets:**

Students will....enhance their knowledge of computer science through readings and hands-on activities.



### **Evidence of Learning**

**Summative Assessment:** 6 days

**Equipment Needed:** Hello Ruby, Computer Safari activity sheet, arts and craft supplies

**Teacher Resources:** Laptop

**Formative Assessments:**

- Computer Safari
- Paper Computer
- Rosie's Runtime
- Unplugged Activities



### Lesson Plans

| Lesson                                      | Time Frame            |
|---------------------------------------------|-----------------------|
| Lesson 1 <b>Journey Inside the Computer</b> | <b>1 hour/1 day</b>   |
| Lesson 2 <b>Crazy Character Algorithms</b>  | <b>2 hours/2 days</b> |
| Lesson 3 <b>Rosie's Runtime</b>             | <b>2 hours/2 days</b> |

#### Teacher Notes:

In the first unit, students will be introduced to computer science first through a story about a little girl who goes on an adventure and encounters many computer science concepts along the way, and then by playing a game to navigate a robotic dog. All of the activities in this unit are unplugged, and many involve active movement or arts and crafts.

#### Curriculum Development Resources/Technology Resources:

*Click the links below to access additional resources used to design this unit:*

<https://sites.google.com/sfusd.edu/k-2cs/yellow/unit-1-unplugged-cs>

<https://www.csunplugged.org/en/topics/>

<https://www.pattan.net/Supports/STEM/computer-science/CS-Teacher-Toolkit/Lesson-Resources>



### Lesson Plan 1 Template

Content Area: Computer Science      Lesson Title: Journey Inside the Computer      Time Frame: 1 hour/1 day

### Lesson Components

#### 21<sup>st</sup> Century Themes

- ☐ Global Awareness    ☒ Financial, Economic, Business and Entrepreneurial Literacy  
☐ Civic Literacy      ☐ Health Literacy

#### 21<sup>st</sup> Century Skills

- ☒ Creativity and Innovation    ☒ Critical Thinking and Problem Solving    ☐ Information Literacy  
☐ Life and Career Skills    ☐ Communication and Collaboration    ☒ Media Literacy    ☒ ICT Literacy

#### **Interdisciplinary Connections:**

ELA, Mathematics

#### **Integration of Technology:**

Computer Programming

#### **Equipment Needed:**

Is This A Computer slidedeck, Computer Safari activity sheet, What's Inside a Computer activity sheet, Hello Ruby Journey Inside the Computer book, projector, crayons, markers, and other art supplies

| Goals/Objectives                                                                                                                                                                                                                                                                                                          | Learning Activities/<br>Instructional Strategies                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Formative Assessment Tasks                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Students will:</p> <ul style="list-style-type: none"> <li>identify and describe objects that are and are not computers.</li> <li>name the four things that all computers do: input, output, process, and store.</li> <li>find different types of computers in their classroom, school, or home environment.</li> </ul> | <p>Lesson Sequence</p> <ol style="list-style-type: none"> <li>Engage students by asking them to think about the question “What does a computer look like?”. Invite students to respond with a class share out, think/pair/share, equity sticks, or whichever classroom protocol you like to use to allow students to equitably share their thinking.</li> <li>Using the <a href="#">Is This A Computer slidedeck</a>, invite students to identify the objects that are computers. Consider pointing to one object at</li> </ol> | <p>Review student work through the following questions:</p> <ul style="list-style-type: none"> <li>Are students able to identify objects that are computers, giving reasons for why something may or may not be a computer?</li> <li>Are students able to identify computers in the classroom environment successfully, using the list of suggestions at the top of the activity page?</li> <li>Are students using the input/output/process/store model when identifying a computer?</li> </ul> |



- a time and having students give a sign (like a thumbs up, hands in the air, or standing up) if they believe that object is a computer. Encourage them to back-up their answers with facts and observations, whether the answer is expected (like “phone”) or unexpected (like “food” or “plant”).
3. Explain to students that all computers do 4 basic things: input, output, process (memory), and store. Connect this to a sequence of movements to help students physically and visually experience these 4 elements of computers: input (point both thumbs towards body); output (point index finger away from body); process (move arms in circular motion in front of you); store (both hands on head [brain]).
  4. Try this call and response after students know the 4 actions: T: What do computers do? S: They input, they output, they process and they store! *Repeat multiple times!*
  5. Additionally, use the analogy of baking cupcakes on [slide #5](#) to



help students see this process, and let them know they'll learn more about this in future lessons.

6. Reintroduce students to Ruby, the little girl from *Hello Ruby* who likes to go on adventures and use computational thinking to solve the problems she encounters along the way. Read Chapters 1-2 (p. 9-19) of *Hello Ruby: Journey Inside the Computer* to students to introduce the premise of this new story: Ruby is about to take an adventure *inside* of a computer.
7. (Extension or supplemental activity: optional) In small groups or with partners, allow students to go on a Computer Safari to find objects in the classroom/school that are computers. Use the [Computer Safari activity sheet](#) for students to record at least 5 different computers, as well as where they found it and how they know it is a computer. Invite students to compare their lists at the end; consider



creating a whole class list on a large sheet of paper/anchor chart.

8. Close out the lesson with a review of what students experienced today, and provide space for student reflection. Use any or all of these questions as a guide: What are the four things that all computers do? What surprised you about the computers you found today? What do you think Ruby will see when she goes inside the computer?

**Differentiation:**

Teachers can scaffold the level of support for small group and/or partner activities.

Written questions can be provided to students to give more structure and organization to group discussions.

Students can extend their learning through a hands-on Computer Safari activity. They will use a range of materials (pencils, crayons, markers, clay, pipe cleaners, found objects) to create a depiction of what is inside a computer. Encourage students to focus less on what's "outside" of the computer (keyboard, mouse, screen) and more on what's inside, whether it is abstract or concrete (i.e. files, games, music, or possibly wires, electricity, different components).

**Resources Provided:**

- [Is This A Computer slidedeck](#)
- [Computer Safari activity sheet](#)
- [What's Inside a Computer activity sheet.](#)
- *Hello Ruby: Journey Inside the Computer* book



### Lesson Plan 2 Template

|                                |                                          |                            |
|--------------------------------|------------------------------------------|----------------------------|
| Content Area: Computer Science | Lesson Title: Crazy Character Algorithms | Time Frame: 2 hours/2 days |
|--------------------------------|------------------------------------------|----------------------------|

### Lesson Components

#### 21<sup>st</sup> Century Themes

☐ Global Awareness    ☒ Financial, Economic, Business and Entrepreneurial Literacy  
☐ Civic Literacy        ☐ Health Literacy

#### 21<sup>st</sup> Century Skills

☒ Creativity and Innovation    ☒ Critical Thinking and Problem Solving        ☐ Information Literacy  
☒ Life and Career Skills    ☐ Communication and Collaboration    ☒ Media Literacy        ☒ ICT Literacy

#### **Interdisciplinary Connections:**

ELA, Mathematics

#### **Integration of Technology:**

Computer Programming

#### **Equipment Needed:**

blank paper  
pencils / crayons / markers  
Crazy Character Algorithm design sheet

| Goals/Objectives                                                                                                                                                                                                                                 | Learning Activities/<br>Instructional Strategies                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Formative Assessment Tasks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Students will:</p> <ul style="list-style-type: none"> <li>deepen their understanding of algorithms and the need for precise, sequenced instructions.</li> <li>create, test, and refine an algorithm for drawing a crazy character.</li> </ul> | <p>Lesson Sequence</p> <ol style="list-style-type: none"> <li>Ask students to recall an example or definition of the word algorithm from previous lessons. Construct a list of student responses, which might include: programming the teacher, Bossy Little Ruby (when Ruby put her clothes on over her pajamas), Rosie's Runtime, Bee Bot activities, command cards, ScratchJr activities</li> <li>Afterwards, review the definition with students: steps to complete a task and add any items to the</li> </ol> | <p>Check student understanding using the following discussion questions:</p> <ul style="list-style-type: none"> <li>How did you plan your algorithm when you first wrote it down?</li> <li>How did your algorithm change after your first friend followed it?</li> <li>What types of words did you have to add to your algorithm to make it more precise?</li> </ul> <p>Review student work to determine:</p> <ul style="list-style-type: none"> <li>Are students able to break down their crazy</li> </ul> |



|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                 |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>list that students may have forgotten about.</p> <ol style="list-style-type: none"><li>3. Show students the video What is an Algorithm? starting at the beginning, up through 1:33 to see an example of giving steps for a robot to make food (students will watch the rest in the following class). The video is available in both English and Spanish.</li><li>4. Tell students that you have created an algorithm to draw a crazy character. Distribute blank paper and something for students to write with, then instruct them to draw exactly what they hear in your algorithm. Read each step one by one, giving students time to draw, but don't add in any extra details at this stage! (See the algorithm on the next page.)</li><li>5. After students have drawn their crazy characters from your algorithm, invite them to share their drawings with their neighbors and discuss what is the same and what is different about each drawing. Guide students to see that the drawings are all different, so the algorithm needs to be more precise. Discuss what words could be added to the algorithm to</li></ol> | <p>character into a multi-step algorithm?</p> <ul style="list-style-type: none"><li>• Are students able to test and refine their algorithm so that it is more precise, and results in a picture that is more closely connected to what they imagined?</li></ul> |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



- be more specific about location, size, etc.
6. Model how students will use the Crazy Character design sheet to create their own algorithm:
  7. Demonstrate how to imagine a simple crazy character then create the step by step directions - the algorithm - for someone else to follow in the 5 boxes on the left side of the sheet.
  8. Ask a volunteer to follow the algorithm to draw the crazy character in the top box on the right side of the sheet.
  9. Model how to compare the steps of the algorithm to the drawing, asking “is this what I expected?” for each step, then adding more details to the algorithm to make it more precise.
  10. Ask a different volunteer to follow the revised algorithm to draw the crazy character in the bottom box on the right side of the sheet.
  11. Distribute one Crazy Character Algorithm design sheet and something to write with to each student. Encourage students to follow the steps modeled above, and give them specific guidelines around how to find the 2 friends to follow their algorithms. This could be



|  |                                                                                                                                                                       |  |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  | tablemates, elbow partners, free choice, etc.<br>12. Close out the lesson with a review of what students experienced today, and provide space for student reflection. |  |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

**Differentiation:**

Teachers can complete this activity in guided groups to provide more structure and support. Teachers can provide story starters and other prompts to assist struggling students. To extend the activity and for AL students, partners or groups can create stories using their created characters or can compare their characters with others that were created by their peers.

**Resources Provided:**

- What is an Algorithm? video (begin video at 1:33)
- [Crazy Character design sheet](#)
- [Crazy Character Algorithm design sheet](#)
- [Monster Moves](#) (optional brain break-dance)
- *Hello Ruby: Journey Inside the Computer* book



### Lesson Plan 3 Template

Content Area: Computer Science      Lesson Title: Rosie's Runtime      Time Frame: 2 hours/2 days

### Lesson Components

#### 21<sup>st</sup> Century Themes

☐ Global Awareness    ☒ Financial, Economic, Business and Entrepreneurial Literacy  
☐ Civic Literacy      ☐ Health Literacy

#### 21<sup>st</sup> Century Skills

☒ Creativity and Innovation    ☒ Critical Thinking and Problem Solving    ☐ Information Literacy  
☐ Life and Career Skills    ☐ Communication and Collaboration    ☒ Media Literacy    ☒ ICT Literacy

#### **Interdisciplinary Connections:**

ELA, Mathematics

#### **Integration of Technology:**

Computer Programming

#### **Equipment Needed:**

- 2 Twister mats
  - 2 sets of Rosie's Runtime floor tiles (start, end, 4 mud puddles in each set)
  - 2 sets of plastic bones (2 in each set)
  - Yellow and green command cards:
    - Yellow (from Bee-Bot card sets): forward, left, right
- Green (Rosie's Runtime extension cards): pick up bone (2 per set), jump over mud puddle (4 per set)
- Dog ears and tails (*optional*)

| Goals/Objectives                                                                                                                                                                                      | Learning Activities/<br>Instructional Strategies                                                                                                                                                                                                                                                                             | Formative Assessment Tasks                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Students will: <ul style="list-style-type: none"> <li>• explore additional examples of real-life algorithms</li> <li>• create algorithms to guide a robotic dog through a complicated task</li> </ul> | Lesson Sequence <ol style="list-style-type: none"> <li>1. Engage students by asking them what they used an algorithm to make in the previous class (answer: crazy characters/monsters). Invite students to share the algorithms they created, and then review the definition with them: steps to complete a task.</li> </ol> | Check student understanding using these guiding questions: <ul style="list-style-type: none"> <li>• What was one challenge you had when writing an algorithm for Rosie?</li> <li>• How did you work together with others to write an algorithm for Rosie?</li> <li>• Are students able to work cooperatively to write algorithms to help Rosie</li> </ul> |



|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                             |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ol style="list-style-type: none"><li>2. Show students the second part of the video What is An Algorithm starting at 1:34 (<a href="#">English</a> / <a href="#">Spanish</a>) to continue exploring this concept.</li><li>3. Ask students to recall which algorithms were discussed in the video (making food and doing a dance), then ask them to recall some of the challenges the children had with programming the robot to do exactly what they wanted. Encourage students to make connections to the crazy character algorithms they created last week and how specific they had to be with their written instructions.</li><li>4. Introduce students to Rosie the robot dog, who they will be programming to collect bones and jump over mud puddles as she makes her way home. Invite students to gather around one of the Twister mats that has a simple version of the activity set up (see examples at the end of the lesson), and have them identify the starting point, ending point, mud puddles, and</li></ol> | <p>navigate home while staying on the colored spots, avoiding mud puddles, and picking up both bones?</p> <p>Review student work to determine:</p> <ul style="list-style-type: none"><li>• Are students able to debug their programs, replacing incorrect command cards with accurate ones?</li><li>• Did you fix any bugs in your program? How did you fix them?</li></ul> |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



bones. Point out the different colored spots of the mat, letting students know that Rosie must only move from one spot to the next.

5. If students have not played Rosie's Runtime before: Select one student to be Rosie for the demonstration. Ask that student to stand at the starting point, facing in the direction of the arrow on the start card, and instruct them to only follow the exact directions given by the class.
6. Invite a student to give the first command to Rosie, selecting one of the command cards from the 5 options and placing it in a location where all students can see (pocket chart, chalkboard ledge, floor surface near the mat). Rosie should move based on the card selected: **forward**: move one spot forward; if there is no spot, Rosie falls off the path! **left**: stand in place and turn 90 degrees left (do not move to a different spot) **right**: stand in place and turn 90 degrees right (do not



move to a different spot)  
**jump over:** jump over the spot in front of you, landing on the spot after the puddle; if there is no spot, Rosie falls off the path!  
**pick up bone:** pick up a bone on the spot on which Rosie is standing

7. If an incorrect command is given, allow Rosie to follow the command so students see the error, but then celebrate the error by announcing **“There’s a bug in the program!”**.

Acknowledge which command card caused the bug, and invite the next student to remove that card and replace it with one that does not cause an error. Examples of bugs include: stepping off the game board, stepping in mud, does not pick up a bone while on the same spot, or arrives home without 2 bones.

8. Repeat the above sequence with as many students as needed (consider going around the circle or using equity sticks to select students)



until Rosie makes it to her home.

9. If students HAVE played Rosie's Runtime before: Prompt students to create the algorithm for Rosie before the student acting as Rosie begins moving (instead of moving *while* students select command cards, as demonstrated above). Assign a student as the "debugger" who tracks the command cards in order as Rosie moves, which will make it easier to spot any bugs in the program.
10. Review the game rules to check for understanding before dividing students into two separate groups to play multiple rounds of Rosie's Runtime. Use the example board setups below or create your own. After a few rounds, you may decide to allow students to create their own board setups, too!
11. Find a system that encourages students to share roles and responsibilities when playing, but also be sure to prepare students for the reality that not every student will likely get to



be Rosie during the class period.

12. Close out the lesson with a review of what students experienced today, and provide space for student reflection.

**Differentiation:**

The teacher can simplify board setups to enable quick rounds of play or make it more difficult to extend the activity for more of a challenge. Twister mat can be folded in half so that there are less spots for students to move amongst. Consider using less bones and mud puddles as well.

Students can also be invited to come up with different algorithms to solve the same problem; have students find the “longest” and “shortest” path to pick up both bones and make it home, and then have them count the number of command cards used for each one. Use that comparison to determine which algorithm is the most *efficient*.

**Resources Provided:**

- What is an Algorithm? video
- Rosie’s Runtime floor tiles and Bee-Bot command cards
- [Doggie High Five](#) by Awesome Sauce (optional brain break)



### Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson *Strongly*, *Moderately* or *Weakly* meets the criteria below.

| Lesson Activities                                                                                                    | Strongly | Moderately | Weakly |
|----------------------------------------------------------------------------------------------------------------------|----------|------------|--------|
| Are challenging <b>Strongly</b> and require higher order thinking and problem solving skills                         | <b>X</b> |            |        |
| Allow for student choice                                                                                             | <b>X</b> |            |        |
| Provide scaffolding for acquiring targeted knowledge/skills                                                          |          | <b>X</b>   |        |
| Integrate global perspectives                                                                                        | <b>X</b> |            |        |
| Integrate 21st century skills                                                                                        | <b>X</b> |            |        |
| Provide opportunities for interdisciplinary connection and transfer of knowledge and skills                          | <b>X</b> |            |        |
| Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills            | <b>X</b> |            |        |
| Are varied to address different student learning styles and preferences                                              | <b>X</b> |            |        |
| Are differentiated based on student needs                                                                            | <b>X</b> |            |        |
| Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process    | <b>X</b> |            |        |
| Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives | <b>X</b> |            |        |
| Provide opportunities for student reflection and self- assessment                                                    | <b>X</b> |            |        |
| Provide data to inform and adjust instruction to better meet the varying needs of learners                           | <b>X</b> |            |        |

### Curriculum Design Template

|                                       |                           |                                 |
|---------------------------------------|---------------------------|---------------------------------|
| <b>Content Area:</b> Computer Science | <b>Grade Level:</b> 2     | <b>Unit Title:</b> Unplugged CS |
| <b>Created:</b> June 2022             | <b>Board Approved on:</b> |                                 |



### Unit Overview Template

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                  |                     |   |                    |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------------|---|--------------------|----------|
| <b>Content Area:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Computer Science | <b>Grade Level:</b> | 2 | <b>Unit Title:</b> | Bee-Bots |
| <b>Unit Summary:</b> Students will work with Bee-Bots by programming them to complete simple tasks. This bee-shaped robot is used as a tool for teaching sequencing, estimation, problem-solving, and students created activities.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                  |                     |   |                    |          |
| <b>Primary Interdisciplinary Connections:</b> <i>Mathematics</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                  |                     |   |                    |          |
| <b>21<sup>st</sup> Century Themes</b> <input checked="" type="checkbox"/> Creativity and Innovation <input checked="" type="checkbox"/> Critical Thinking and Problem Solving <input checked="" type="checkbox"/> ICT Literacy<br><input type="checkbox"/> Information Literacy <input checked="" type="checkbox"/> Life and Career Skills <input type="checkbox"/> Communication and Collaboration <input type="checkbox"/> Media Literacy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                  |                     |   |                    |          |
| <b>Unit Rationale:</b> In this unit, students will learn to program Bee-Bots using sequences of simple commands. By doing so, they will gain fluency with planning, testing, and debugging programs of increasing complexity.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                  |                     |   |                    |          |
| <b>Career Readiness (Standard 9):</b><br>9.2.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job.<br>9.4.2.CI.2: Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).<br>9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).<br>9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).<br>9.4.2.DC.1: Explain differences between ownership and sharing of information.<br>9.4.2.DC.5: Explain what a digital footprint is and how it is created.<br>9.4.2.IML.2: Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10).<br>9.4.2.TL.1: Identify the basic features of a digital tool and explain the purpose of the tool (e.g., 8.2.2.ED.1).<br>9.4.2.TL.2: Create a document using a word processing application.<br>9.4.2.TL.5: Describe the difference between real and virtual experiences.<br>9.4.2.TL.6: Illustrate and communicate ideas and stories using multiple digital tools (e.g., SL.2.5.). |                  |                     |   |                    |          |

### Learning Targets

|                                                                                                                        |                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>Standards:</b> 8.1.2; 2.MD; L.2                                                                                     |                                                                                                                                  |
| <b>Content Statements:</b> Computer Systems; Data & Analysis; Algorithms & Programming; Measurement and Data; Language |                                                                                                                                  |
| <b>CPI#:</b>                                                                                                           | <b>Cumulative Progress Indicator (CPI):</b>                                                                                      |
| 8.1.2.CS.1                                                                                                             | Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences. |
| 8.1.2.CS.2                                                                                                             | Explain the functions of common software and hardware components of computing systems.                                           |



|               |                                                                                                                                                                                                                           |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8.1.2.CS.3    | Describe basic hardware and software problems using accurate terminology.                                                                                                                                                 |
| 8.1.2.DA.2    | Store, copy, search, retrieve, modify, and delete data using a computing device.                                                                                                                                          |
| 8.1.2.AP.1    | Model daily processes by creating and following algorithms to complete tasks.                                                                                                                                             |
| 8.1.2.AP.2    | Model the way programs store and manipulate data by using numbers or other symbols to represent information                                                                                                               |
| 8.1.2.AP.3    | Create programs with sequences and simple loops to accomplish tasks.                                                                                                                                                      |
| 8.1.2.AP.4    | Break down a task into a sequence of steps                                                                                                                                                                                |
| 8.1.2.AP.5    | Describe a program's sequence of events, goals, and expected outcomes                                                                                                                                                     |
| 8.1.2.AP.6    | Debug errors in an algorithm or program that includes sequences and simple loops.                                                                                                                                         |
| L.2.2.D       | Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. D. Generalize learned spelling patterns when writing words (e.g., cage → badge; boy → boil).           |
| 2.MD.D.10     | Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put together, take-apart, and compare problems using information presented in a bar graph. |
| SEL.PK-12.2.2 | Recognize the skills needed to establish and achieve personal and educational goals.                                                                                                                                      |
| SEL.PK-12.4.1 | Develop, implement and model effective problem-solving, and critical thinking skills.                                                                                                                                     |
| SEL.PK-12.5.2 | Utilize positive communication and social skills to interact effectively with others.                                                                                                                                     |

**Unit Essential Questions:**

- How do we program Bee-Bots using sequences?
- How do we use Bee-Bots to tell a story?
- How do we debug a Bee-Bot's program?
- How do we delete data on a Bee-Bot?

**Unit Enduring Understandings:**

- Bee-Bots can be programmed to complete a sequence of moves.
- Tasks can be broken down into a sequence of steps.
- Bee-Bots' hardware and software allow students to complete a series of tasks.

**Unit Learning Targets:**

Students will....learn to program Bee-Bots using sequences of simple commands.



### **Evidence of Learning**

**Summative Assessment:** 6 days

**Equipment Needed:** Bee-Bots, mats, activity cards

**Teacher Resources:** Laptops

**Formative Assessments:**

- Applying sequences to Bee-Bots
- Debugging Bee-Bots
- Using Bee-Bots to represent words or numbers



### Lesson Plans

| Lesson                                   | Time Frame          |
|------------------------------------------|---------------------|
| Lesson 1 <b>Spelling Words</b>           | <b>1 hour/1 day</b> |
| Lesson 2 <b>Coin Counting Algorithms</b> | <b>1 hour/1 day</b> |
| Lesson 3 <b>Debugging Challenges</b>     | <b>1 hour/1 day</b> |

**Teacher Notes:**

Remind students to clear the program on the Bee-Bot after each program.

**Curriculum Development Resources/Technology Resources:**

*Click the links below to access additional resources used to design this unit:*

<https://sites.google.com/sfusd.edu/k-2cs/yellow/unit-1-unplugged-cs>

<https://www.csunplugged.org/en/topics/>

<https://www.pattan.net/Supports/STEM/computer-science/CS-Teacher-Toolkit/Lesson-Resources>



### Lesson Plan 1 Template

Content Area: Computer Science      Lesson Title: Spelling Words      Time Frame: 1 hour/1 day

### Lesson Components

#### 21<sup>st</sup> Century Themes

- ☐ Global Awareness    ☒ Financial, Economic, Business and Entrepreneurial Literacy  
☐ Civic Literacy      ☐ Health Literacy

#### 21<sup>st</sup> Century Skills

- ☒ Creativity and Innovation    ☒ Critical Thinking and Problem Solving    ☐ Information Literacy  
☐ Life and Career Skills    ☐ Communication and Collaboration    ☐ Media Literacy    ☒ ICT Literacy

#### **Interdisciplinary Connections:**

ELA, Mathematics

#### **Integration of Technology:**

Computer Programming

#### **Equipment Needed:**

Bee-Bots, 1 for each group of 4 students, Bee-Bot mats, 1 per robot used, Letters A-Z mat cards (26 cards per set), Planning worksheet, Spicy challenge planning worksheet (optional), Bee-Bot team roles lanyards

| Goals/Objectives                                                                                                                                                                                                                                                                                                     | Learning Activities/<br>Instructional Strategies                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Formative Assessment Tasks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Students will:</p> <ul style="list-style-type: none"> <li>review classroom spelling/vocabulary words using the Bee-Bot to spell them out.</li> <li>use a planning worksheet to plan out an algorithm before programming their Bee-Bot.</li> <li>practice strategies to find and fix bugs in a program.</li> </ul> | <p>Lesson Sequence</p> <ol style="list-style-type: none"> <li>Engage students by asking them to think about what was helpful when using the yellow Bee-Bot command cards while planning their programs to visit parts of the computer. You may wish to invite students to share their answer with an elbow partner, then invite a few students to share their answer with the class.</li> <li>Tell students that they are going to use their Bee-Bots to practice spelling words from their classroom today!</li> </ol> | <p>Check student understanding using these guiding questions:</p> <ul style="list-style-type: none"> <li>How did your team use the planning worksheet today?</li> <li>Did you create any new symbols to help write down the Bee-Bot's program?</li> </ul> <p>Review student work to determine:</p> <ul style="list-style-type: none"> <li>Are students able to cooperatively and collaboratively navigate a Bee-Bot successfully through challenges using the 4 different job roles?</li> <li>Are students able to use the planning worksheet to plan out a program for</li> </ul> |



3. Set up a Bee-Bot mat with the lowercase side of the A-Z letter cards, either in alphabetical order (easier), or scattered randomly (more challenging). Select a 3- or 4- letter word to demonstrate this activity. Model the use of this planning worksheet, as a substitution for the yellow command cards, which will help students decompose the word into smaller pieces to make the program much easier to figure out. Show students how to place one letter of the word at the start of each line, then drawing arrows (from the vantage point of the Bee-Bot, similar to how students used the yellow command cards) to navigate the Bee-Bot from one letter to the next (see the example of this on the next page). Students should run and debug the program in between 2 letters before moving on to the creation of a program between the next 2 letters.
4. If students are ready for a more advanced challenge, use the spicy challenge planning worksheet, showing students how to use the blue pause button to program the Bee-Bot to stop for 1 second and blink/beep when it

the Bee-Bot before actually programming the Bee-Bot to move across the mat?



reaches one of the letters from the spelling word. You may wish to encourage students to test each line of the program first (using the protocol from the standard planning worksheet) before creating the longer program for the entire word. As needed, review of the 4 job roles with students, highlighting the revised role of the Navigator. Encourage students to rotate roles after each letter of the spelling word.

5. Show students a red Designer lanyard and ask if they remember what the Designer did in previous lessons (they selected the challenge). Explain that today the Designer will be deciding which word the Bee-Bot will spell. Since multiple rotations will take place during the spelling of one word, other Designers can help with the navigation by deciding on the path the Bee-Bot should go, which will then be plotted out by the Navigator. After the complete word has been spelled, the next Designer will select a new word.
6. Show students a yellow Navigator lanyard and ask if they remember what the Navigator did in



previous lessons (used the yellow command cards to create Bee-Bot's path, read the cards aloud to the Driver). Explain that today the Navigator is going to use the planning worksheet to draw arrows/symbols to show the Bee-Bot's path before the Driver presses any of the buttons on the Bee-Bot. The Navigator will also read the directions out loud to the Driver as s/he presses the programming buttons.

7. Show students a green Driver lanyard and ask if they remember what the Driver did in previous lessons (pushed the buttons on the Bee-Bot to program it). Explain that today the Driver is going to wait until the Navigator writes the program on the planning sheet, and then press only the buttons that go with each arrow/symbol written down by the Navigator.
8. Show students a blue Debugger lanyard and ask if they remember what the Debugger did in previous lessons (found and fixed any bugs in the program). Remind students that a bug is when the Bee-Bot didn't move the way students expected, and that they



- are simply mistakes in a program to find and fix. Explain that it will again be someone's job to find and fix bugs in the Bee-Bot's program.
9. Divide students into 6 groups, giving each group 1 Bee-Bot, 1 mat with one set of cards preset underneath the clear plastic, at least one planning worksheet (and a clipboard and pencil), and 1 set of 4 job role lanyards. Invite students to decide on their first role and determine how they will rotate roles, explaining that not everyone will get to perform every role in that class period. Ensure students have access to the list of words from which they should select for their programs.
  10. Close out the lesson with a review of what students experienced today, and provide space for student reflection.

**Differentiation:**

The teacher can use more simple sight words, vocabulary, or spelling lists to make tasks simpler. Job roles can also be selected to provide more or less challenge and responsibility to students or groups.

**Resources Provided:**

- [Planning worksheet](#)
- [Spicy challenge planning](#)
- Doche sight word [list](#)



| Lesson Plan 2 Template                                                                                                                                                                                                                                                                                                                                                                     |                                        |                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|--------------------------|
| Content Area: Computer Science                                                                                                                                                                                                                                                                                                                                                             | Lesson Title: Coin Counting Algorithms | Time Frame: 1 hour/1 day |
| Lesson Components                                                                                                                                                                                                                                                                                                                                                                          |                                        |                          |
| <b><u>21<sup>st</sup> Century Themes</u></b>                                                                                                                                                                                                                                                                                                                                               |                                        |                          |
| <input type="checkbox"/> Global Awareness <input checked="" type="checkbox"/> Financial, Economic, Business and Entrepreneurial Literacy<br><input type="checkbox"/> Civic Literacy <input type="checkbox"/> Health Literacy                                                                                                                                                               |                                        |                          |
| <b><u>21<sup>st</sup> Century Skills</u></b>                                                                                                                                                                                                                                                                                                                                               |                                        |                          |
| <input checked="" type="checkbox"/> Creativity and Innovation <input checked="" type="checkbox"/> Critical Thinking and Problem Solving <input type="checkbox"/> Information Literacy<br><input type="checkbox"/> Life and Career Skills <input type="checkbox"/> Communication and Collaboration <input type="checkbox"/> Media Literacy <input checked="" type="checkbox"/> ICT Literacy |                                        |                          |
| <b>Interdisciplinary Connections:</b><br>ELA, Mathematics                                                                                                                                                                                                                                                                                                                                  |                                        |                          |
| <b>Integration of Technology:</b><br>Computer Programming                                                                                                                                                                                                                                                                                                                                  |                                        |                          |
| <b>Equipment Needed:</b> Bee-Bots, 1 for each group of 4 students, Bee-Bot mats, 1 per robot used, US Coins mat cards (18 cards per set), Planning worksheet, Spicy challenge planning worksheet (optional), Bee-Bot team roles lanyards                                                                                                                                                   |                                        |                          |

| Goals/Objectives                                                                                                                                                                                                                                                                                                               | Learning Activities/<br>Instructional Strategies                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Formative Assessment Tasks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Students will: <ul style="list-style-type: none"> <li>plan multiple different ways to count coins that add to the same sum of money using the Bee-Bot.</li> <li>use a planning worksheet to plan out an algorithm before programming their Bee-Bot.</li> <li>practice strategies to find and fix bugs in a program.</li> </ul> | Lesson Sequence <ol style="list-style-type: none"> <li>Engage students by asking them to think about how they used decomposition to write Bee-Bot programs that spelled out words (see lesson 1). You may wish to invite students to share their answer with an elbow partner, then invite a few students to share their answer with the class.</li> <li>Tell students that they are going to use their Bee-Bots to count out sums of money today! Show students the 4 different US coin cards</li> </ol> | Check student understanding using these guiding questions: <ul style="list-style-type: none"> <li>When you wrote 2 programs for the same amount of money, did one program work better? Why?</li> <li>What is important to do to write a good program for your Bee-Bot? What makes it a good program?</li> </ul> Review student work to determine: <ul style="list-style-type: none"> <li>Are students able to cooperatively and collaboratively navigate a Bee-Bot successfully through challenges using the 4 different job roles?</li> </ul> |



(penny, nickel, dime, quarter), asking them to identify each coin by name and denomination. If students seem to require more exposure, consider using the mat cards to show different sums of coins that students have to practice counting out before moving on to the Bee-Bot activity. Use this video to review counting coins, too!

3. Set up a Bee-Bot mat with some or all of the 18 US coin cards, either organized by coin or randomly scattered. Select a relatively simple amount for the Bee-Bot to count out (i.e. no more than 3 coins, such as 31¢ - 1 quarter, 1 nickel, 1 penny). Model the use of the front side of this planning worksheet, as a substitution for the yellow command cards, which will help students decompose the amount into individual coins to make the program easier to figure out. Show students how to circle one coin at the start of each line, then to draw arrows (from the vantage point of the Bee-Bot, similar to how students used the yellow command cards) to navigate the Bee-Bot from one coin to the next

- Are students able to use the planning worksheet to plan out a program for the Bee-Bot before actually programming the Bee-Bot to move across the mat?



(see the example of this on the next page).

4. Show students how each line ends with a blue pause button and not a blue clear button; tell students they should program the Bee-Bot with one long sequence that has the Bee-Bot pause at each coin it wishes to count. Encourage students who may need additional support that they can still test their program in between each coin, but that at the end of their planning, they should be sure to test out the entire program that navigates to all of the coins.
5. Once you have modeled one way to solve the problem, invite students to think of other coin combinations that result in the same sum (ex. 31¢ could also be 3 dimes and 1 penny, or 2 dimes, 2 nickels, and 1 penny). Show students how they will then complete the back side of the planning worksheet with this second option (it is not necessary to model this process again). Reinforce the idea that it is important to always search for multiple ways to solve the same problem, as there is not one right answer when



counting coins to create a sum.

6. If students are ready for a more advanced challenge, use the spicy challenge planning worksheet to allow students the autonomy to write out the entire program, both arrows and the pauses where the Bee-Bot should stop momentarily to signify the counting of a coin.
7. Review the 4 job roles with students (see lesson 1).
8. Divide students into 6 groups, giving each group 1 Bee-Bot, 1 mat with one set of cards preset underneath the clear plastic, at least one planning worksheet (and a clipboard and pencil), and 1 set of 4 job role lanyards. Invite students to decide on their first role and determine how they will rotate roles, explaining that not everyone will get to perform every role in that class period. Ensure students are aware of the “coin bank” at the bottom of the worksheet; consider making scratch paper available to work out equations, too.
9. Close out the lesson with a review of what students experienced today, and provide space for student reflection.



**Differentiation:**

It is not necessary to use all 18 coins on the mat; consider using a smaller number as a scaffold for some students. You may wish to only use one of each coin, too, and have students pause on coins multiple times if they wish to count out more than one. Job roles can also be selected to provide more or less challenge and responsibility to students or groups.

**Resources Provided:**

- [Video](#) to review coin counting
- [US coin cards](#)
- [Planning worksheet](#)
- [Spicy challenge planning worksheet](#)



| <b>Lesson Plan 3 Template</b>                                                                                                                                                                                                                                                                                                                                                              |                                    |                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|--------------------------|
| Content Area: Computer Science                                                                                                                                                                                                                                                                                                                                                             | Lesson Title: Debugging Challenges | Time Frame: 1 hour/1 day |
| <b>Lesson Components</b>                                                                                                                                                                                                                                                                                                                                                                   |                                    |                          |
| <b><u>21<sup>st</sup> Century Themes</u></b>                                                                                                                                                                                                                                                                                                                                               |                                    |                          |
| <input type="checkbox"/> Global Awareness <input checked="" type="checkbox"/> Financial, Economic, Business and Entrepreneurial Literacy<br><input type="checkbox"/> Civic Literacy <input type="checkbox"/> Health Literacy                                                                                                                                                               |                                    |                          |
| <b><u>21<sup>st</sup> Century Skills</u></b>                                                                                                                                                                                                                                                                                                                                               |                                    |                          |
| <input checked="" type="checkbox"/> Creativity and Innovation <input checked="" type="checkbox"/> Critical Thinking and Problem Solving <input type="checkbox"/> Information Literacy<br><input type="checkbox"/> Life and Career Skills <input type="checkbox"/> Communication and Collaboration <input type="checkbox"/> Media Literacy <input checked="" type="checkbox"/> ICT Literacy |                                    |                          |
| <b>Interdisciplinary Connections:</b><br>ELA, Mathematics                                                                                                                                                                                                                                                                                                                                  |                                    |                          |
| <b>Integration of Technology:</b><br>Computer Programming                                                                                                                                                                                                                                                                                                                                  |                                    |                          |
| <b>Equipment Needed:</b> Bee-Bots                                                                                                                                                                                                                                                                                                                                                          |                                    |                          |

| <b>Goals/Objectives</b>                                                                                                                                                                                                                                                                                                               | <b>Learning Activities/<br/>Instructional Strategies</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>Formative Assessment Tasks</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Students will: <ul style="list-style-type: none"> <li>plan out programs for a Bee-Bot to complete a challenge, then add bugs to the program by adding, removing, or changing commands within their program.</li> <li>practice strategies to find and fix bugs intentionally placed in a program by a group of their peers.</li> </ul> | Lesson Sequence <ol style="list-style-type: none"> <li>Engage students to think about how they used debugging in previous activities by asking them to describe a bug they found then to describe how they found it and fixed it. You may wish to invite students to share their answer with an elbow partner, then invite a few students to share their answer with the class.</li> <li>Tell students that they are going to use their Bee-Bots to create and solve debugging challenges today! They</li> </ol> | Check student understanding using these guiding questions: <ul style="list-style-type: none"> <li>What bugs did you find today? How did you fix them?</li> <li>How did you work together as a team to find the bugs?</li> </ul> Review student work to determine: <ul style="list-style-type: none"> <li>Are students able to add bugs into their team's program, showing their understanding of what a bug in a program looks like?</li> <li>Are students able to find the intentional bugs in a fellow team's program?</li> </ul> |



are going to first work with their team to design and solve a Bee-Bot challenge, and then they are going to rewrite their program to add bugs into it. Next, they will switch programs (and possibly mats) with another team to see if they can each debug the other team's buggy program.

3. Set up a Bee-Bot mat with mat cards of your choosing. You may choose this time to review a favorite mat activity, utilize the number or CVC rhyming word cards, or create your own cards. Model and/or explain the use of this planning worksheet to first plan out the Bee-Bot's challenge (completed by the Designer), then to create the correct version of the program in the box in the top half of the page (completed by the Navigator). Point out that students will have to write their own arrows and pause symbols to create their program. Once the program is complete and has been tested (and all unintentional bugs have been removed), the Debugger will rewrite the program in the box on the lower half of the page, creating 1-3 intentional bugs in the new buggy

Did they also discover other unintentional bugs, too?



program. The Debugger will now fold the paper in half so that the correct program is underneath and the buggy program is on top.

4. Teams should now switch programs (and possibly mats, depending on mat set up) to begin debugging. First, they should read the challenge to ensure they understand the program's goal. Then, they should work together to identify the 1-3 bugs by testing out the program and finding and fixing the spots where the program does not do what was expected. Bugs should be circled in a different color ink, and any additions or corrections to the program should also be done in a different color ink. Once students have completely debugged and tested the buggy program, they should compare it to the correct program to see if they found all of the bugs!
5. Divide students into 6 groups, giving each group 1 Bee-Bot, 1 mat with one set of cards preset underneath the clear plastic, at least one planning worksheet (and a clipboard and pencil), and 1 set of 4 job role lanyards. Invite students



|                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                     |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                                                                                                                                                                                                                                 | <p>to decide on their first role and determine how they will rotate roles, explaining that not everyone will get to perform every role in that class period. Allow students to repeat this creation/debugging process multiple times if time allows.</p> <p>6. Close out the lesson with a review of what students experienced today, and provide space for student reflection.</p> |  |
| <p><b>Differentiation:</b><br/>Consider setting mats up with different types of cards, and allowing teams to rotate throughout the different mats during the activity, as time permits, as they create then solve each debugging challenge.</p> |                                                                                                                                                                                                                                                                                                                                                                                     |  |
| <p><b>Resources Provided:</b></p> <ul style="list-style-type: none"><li>• <a href="#">Planning worksheet</a></li></ul>                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                     |  |



### Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson *Strongly*, *Moderately* or *Weakly* meets the criteria below.

| Lesson Activities                                                                                                    | Strongly | Moderately | Weakly |
|----------------------------------------------------------------------------------------------------------------------|----------|------------|--------|
| Are challenging <b>Strongly</b> and require higher order thinking and problem solving skills                         | <b>X</b> |            |        |
| Allow for student choice                                                                                             | <b>X</b> |            |        |
| Provide scaffolding for acquiring targeted knowledge/skills                                                          | <b>X</b> |            |        |
| Integrate global perspectives                                                                                        | <b>X</b> |            |        |
| Integrate 21st century skills                                                                                        | <b>X</b> |            |        |
| Provide opportunities for interdisciplinary connection and transfer of knowledge and skills                          | <b>X</b> |            |        |
| Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills            | <b>X</b> |            |        |
| Are varied to address different student learning styles and preferences                                              | <b>X</b> |            |        |
| Are differentiated based on student needs                                                                            | <b>X</b> |            |        |
| Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process    | <b>X</b> |            |        |
| Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives | <b>X</b> |            |        |
| Provide opportunities for student reflection and self- assessment                                                    | <b>X</b> |            |        |
| Provide data to inform and adjust instruction to better meet the varying needs of learners                           | <b>X</b> |            |        |

### Curriculum Design Template

|                                       |                           |                             |
|---------------------------------------|---------------------------|-----------------------------|
| <b>Content Area:</b> Computer Science | <b>Grade Level:</b> 2     | <b>Unit Title:</b> Bee-Bots |
| <b>Created:</b> June 2022             | <b>Board Approved on:</b> |                             |



### Unit Overview Template

**Content Area:** Computer Science      **Grade Level:** 2      **Unit Title:** ScratchJr

**Unit Summary:** Students will use the block coding programming application ScratchJr to create real computer algorithms and programs. Students will apply all their previous knowledge to create algorithms and programs, model processes, use numbers and symbols to represent information, create programs with sequences and loops, and debug algorithms and programs.

**Primary Interdisciplinary Connections:**

[21<sup>st</sup> Century Themes](#)   **x** Creativity and Innovation   **x** Critical Thinking and Problem Solving   **x** ICT Literacy  
☐ Information Literacy   **x** Life and Career Skills   ☐ Communication and Collaboration   ☐ Media Literacy

**Unit Rationale:** In this unit, students will learn a series of concepts and skills that are applied in the creation of games that students will be familiar with. Through these lessons, students will learn how to express their own ideas in a way that a computer can understand. Using the ScratchJr app, children can create their own interactive collages, animated stories, games, and other programs. ScratchJr is a developmentally appropriate programming language designed specifically for children aged five through seven by teams at Tufts University and MIT.

**Career Readiness (Standard 9):**

- 9.2.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job.
- 9.4.2.CI.2: Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
- 9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
- 9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
- 9.4.2.DC.1: Explain differences between ownership and sharing of information.
- 9.4.2.DC.5: Explain what a digital footprint is and how it is created.
- 9.4.2.IML.2: Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10).
- 9.4.2.TL.1: Identify the basic features of a digital tool and explain the purpose of the tool (e.g., 8.2.2.ED.1).
- 9.4.2.TL.2: Create a document using a word processing application.
- 9.4.2.TL.5: Describe the difference between real and virtual experiences.
- 9.4.2.TL.6: Illustrate and communicate ideas and stories using multiple digital tools (e.g., SL.2.5.).

### Learning Targets

**Standards:** 8.1.2; 2.MD

**Content Statements:** Computer Systems; Data & Analysis; Algorithms & Programming; Measurement and Data; Reading Informational Text

**CPI#:**      **Cumulative Progress Indicator (CPI):**



|               |                                                                                                                                                                                                                           |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8.1.2.CS.1    | Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.                                                                                          |
| 8.1.2.CS.2    | Explain the functions of common software and hardware components of computing systems.                                                                                                                                    |
| 8.1.2.CS.3    | Describe basic hardware and software problems using accurate terminology.                                                                                                                                                 |
| 8.1.2.DA.2    | Store, copy, search, retrieve, modify, and delete data using a computing device.                                                                                                                                          |
| 8.1.2.AP.1    | Model daily processes by creating and following algorithms to complete tasks.                                                                                                                                             |
| 8.1.2.AP.2    | Model the way programs store and manipulate data by using numbers or other symbols to represent information                                                                                                               |
| 8.1.2.AP.3    | Create programs with sequences and simple loops to accomplish tasks.                                                                                                                                                      |
| 8.1.2.AP.4    | Break down a task into a sequence of steps                                                                                                                                                                                |
| 8.1.2.AP.5    | Describe a program's sequence of events, goals, and expected outcomes                                                                                                                                                     |
| 8.1.2.AP.6    | Debug errors in an algorithm or program that includes sequences and simple loops.                                                                                                                                         |
| RI.2.3        | Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.                                                                                  |
| 2.MD.D.10     | Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put together, take-apart, and compare problems using information presented in a bar graph. |
| SEL.PK-12.2.2 | Recognize the skills needed to establish and achieve personal and educational goals.                                                                                                                                      |
| SEL.PK-12.4.1 | Develop, implement and model effective problem-solving, and critical thinking skills.                                                                                                                                     |
| SEL.PK-12.5.2 | Utilize positive communication and social skills to interact effectively with others.                                                                                                                                     |

**Unit Essential Questions:**

- How do you use each block on the ScratchJr app?
- How do you model processes using ScratchJr?
- How do you store and manipulate data on ScratchJr?
- How do you create programs with sequences and simple loops on ScratchJr?
- How do you debug errors on ScratchJr?

**Unit Enduring Understandings:**

- Block coding languages have students apply all major computer science concepts.
- Simple loops and sequences can be programmed into ScratchJr.
- ScratchJr can be used to tell stories and communicate ideas.

**Unit Learning Targets:**

Students will....express their own ideas in a way that a computer can understand by using a block coding language.



### **Evidence of Learning**

**Summative Assessment:** 6 days

**Equipment Needed:** iPads, ScratchJr app

**Teacher Resources:** iPad, ScratchJr app, laptop

**Formative Assessments:**

- Student created block coding programs using ScratchJr
- Debugging activities



### Lesson Plans

| Lesson                          | Time Frame          |
|---------------------------------|---------------------|
| Lesson 1 <b>Motion</b>          | <b>2 hours/days</b> |
| Lesson 2 <b>Collage Project</b> | <b>2 hours/days</b> |
| Lesson 3 <b>Story Project</b>   | <b>2 hours/days</b> |

**Teacher Notes:**

These lessons were designed to support students working individually and in pairs, with 1-2 tablets per pair.

**Curriculum Development Resources/Technology Resources:**

*Click the links below to access additional resources used to design this unit:*

<https://sites.google.com/sfusd.edu/k-2cs/orange/>

<https://www.csunplugged.org/en/topics/>

<https://www.pattan.net/Supports/STEM/computer-science/CS-Teacher-Toolkit/Lesson-Resources>

<https://www.scratchjr.org/curricula/animatedgenres/full.pdf>



### Lesson Plan 1 Template

Content Area: Computer Science      Lesson Title: Motion      Time Frame: 2 hours/days

### Lesson Components

#### 21<sup>st</sup> Century Themes

- ☐ Global Awareness    ☒ Financial, Economic, Business and Entrepreneurial Literacy  
☐ Civic Literacy      ☐ Health Literacy

#### 21<sup>st</sup> Century Skills

- ☒ Creativity and Innovation    ☒ Critical Thinking and Problem Solving    ☐ Information Literacy  
☐ Life and Career Skills    ☐ Communication and Collaboration    ☐ Media Literacy    ☒ ICT Literacy

#### **Interdisciplinary Connections:**

ELA, Mathematics

#### **Integration of Technology:**

Computer Programming

**Equipment Needed:** Tablets: 1-2 per pair of students

| Goals/Objectives                                                                                                                                                                                                                                                                                                                                                                    | Learning Activities/<br>Instructional Strategies                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Formative Assessment Tasks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Students will:</p> <ul style="list-style-type: none"> <li>Number of motion blocks in a programmed sequence corresponds to the number of actions performed by a character</li> <li>Order of commands in a programmed sequence directly corresponds to the order of actions performed by a character</li> <li>Combine different motion blocks into programmed sequences</li> </ul> | <p>Lesson Sequence</p> <ol style="list-style-type: none"> <li>During our last lesson, we played Simon Says. What did you learn from that activity? <ul style="list-style-type: none"> <li>When you programmed your teacher, you had him/her go to a certain spot in the classroom. How did you get your teacher from one spot in the classroom to another?</li> <li>What did you find hard about this activity?</li> <li>What is a program?</li> <li>We also worked with ScratchJr on the iPad. What was something you liked? What was something hard?</li> </ul> </li> </ol> | <p>Check student understanding using these guiding questions:</p> <ul style="list-style-type: none"> <li>Can someone tell me what we learned during our lesson?</li> <li>What was your favorite activity that we played? What did you learn from it?</li> <li>Can you tell me what a program is?</li> <li>What were some of the ScratchJr blocks you learned about?</li> </ul> <p>Review student work to determine:</p> <ul style="list-style-type: none"> <li>Ability to combine different motion blocks into programmed sequences</li> </ul> |



2. Guess the Program (5 minutes): The teacher should act out several short programs. Students should then be given the opportunity to guess what the program acted out is (e.g. step forward, step back, jump).
3. Program the Teacher (15 minutes): Students will be responsible for directing their teacher to a specific location in the classroom. However, during this lesson, students will only be able to use a specific set of possible instructions instead of simply using plain English. Examples of these specific instructions are: Step forward, Step backward, Turn right, Turn left, Turn until you see something.
4. This activity will work the same way as it did in the prior lesson. However, this time students are encouraged to use this exact instruction set.
5. Introduction to New ScratchJr Blocks (10 minutes): The teacher should demonstrate to children how to use the following blocks: Hop, Go Home, Reset Size, Turn clockwise, Turn counterclockwise  
Materials: iPad for teacher only.



6. Sequencing in ScratchJr (10 minutes): The teacher should begin a new project in ScratchJr. S/he should place the Scratch cat and the treasure chest characters on the same line on the screen (on a horizontal or vertical line). S/he should then ask students which blocks need to be placed next to each other in order for the cat to successfully move toward the treasure chest.
7. Three different scenarios should be set up (e.g. cat in the upper left corner and treasure chest in lower left corner; cat in the lower left corner and the treasure chest in the bottom right corner) for the students to solve together as a class.  
Materials: iPad for teacher only.
8. ScratchJr Exploration (10 minutes): The teacher should then hand out the iPads and allow students to explore the ScratchJr iPad application.  
Encourage them to experiment with recently learned blocks, as well as with blocks that have not yet been taught. Have them practice putting different programming blocks next to each other to make the cat move in different directions.



- |  |                                                                                                                                                                 |  |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  | <p>9. Wrap Up (5 minutes):<br/>Make sure that students save their projects.<br/>Provide a preview of what will be taught in the next lesson. Collect iPads.</p> |  |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

**Differentiation:**

Teachers can use the simplified “Programmer Says” activity instead of “Guess the Program”:  
Programmer Says (5 minutes): The directions for this game are the same as those for “Simon Says,” except sequences of three instructions are given (e.g. step forward, step back, jump). The teacher should emphasize the importance of following directions and the order of instructions.

**Resources Provided:**

- [Lesson Video](#)
- [Assessment](#) (*optional*)

Additional Support Resources for Scratch Jr. lessons

- [Loopy Rockets](#)
- [Make Your Characters Dance](#)
- [Make a Spooky Forest](#)
- [Make Your Character Dribble a Basketball](#)



### Lesson Plan 2 Template

Content Area: Computer Science      Lesson Title: Collage Project      Time Frame: 2 hours/days

### Lesson Components

#### 21<sup>st</sup> Century Themes

- ☐ Global Awareness    ☒ Financial, Economic, Business and Entrepreneurial Literacy  
☐ Civic Literacy      ☐ Health Literacy

#### 21<sup>st</sup> Century Skills

- ☒ Creativity and Innovation      ☒ Critical Thinking and Problem Solving    ☐ Information Literacy  
☐ Life and Career Skills    ☐ Communication and Collaboration    ☐ Media Literacy      ☒ ICT Literacy

#### **Interdisciplinary Connections:**

ELA, Mathematics

#### **Integration of Technology:**

Computer Programming

**Equipment Needed:** Tablets: 1-2 per pair of students

Scene Planning Worksheet (optional)

| Goals/Objectives                                                                                                                                                                                   | Learning Activities/<br>Instructional Strategies                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Formative Assessment Tasks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Students will:</p> <ul style="list-style-type: none"> <li>learn what elements should be a part of their collages.</li> <li>apply concepts from prior lessons when creating collages.</li> </ul> | <p>Lesson Sequence</p> <ol style="list-style-type: none"> <li>Introduction (2 minutes): What is a Collage on ScratchJr? The teacher should explain to students that during this lesson, they will design their own collages. A collage on ScratchJr is a free-form project that has various characters moving on the screen. The characters in a ScratchJr collage have no clear course of action, and are simply moving or transforming.</li> <li>Review (5 minutes): The teacher should briefly review the programming blocks learned in prior</li> </ol> | <p>Check student understanding using these guiding questions:</p> <ul style="list-style-type: none"> <li>Last time we worked on ScratchJr, we created collages. Can you tell me what a collage is?</li> <li>What are two blocks you used in your collage?</li> </ul> <p>Review student work to determine:</p> <ul style="list-style-type: none"> <li>Did the student include a background?</li> <li>Did the student include multiple characters?</li> <li>Did the student use programming blocks taught in prior lessons?</li> </ul> |



lessons. S/he should show the blocks on the screen, and ask the students to verbally describe what each block does. These blocks are:

- Right
- Left
- Up
- Down
- Turn clockwise
- Turn counterclockwise
- Jump
- Go Home
- Bigger
- Smaller
- Reset Size
- Visible
- Invisible
- Start on Green Flag
- End

Materials: iPad for teacher only.

3. Collage Design and Creation (40 minutes):  
Hand out ipads. Students should spend about 40 minutes designing and creating their own collages. They should be encouraged to choose or create their own backgrounds, and to program multiple characters. Students should only use programming blocks taught in prior lessons when designing these collages. Note: The collage can be tailored to fit into the current curriculum being taught in the classroom. For example, if the class is



|                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                           |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                                                                                                                                                                                                                           | <p>currently learning about outer space, the collage can be made using only items associated with space.</p> <p>4. Sharing (10-15 minutes): Students should be encouraged to share their collages with the rest of the class. They should explain which blocks they used to create their collage, and what is occurring on the screen. Collect iPads.</p> |  |
| <p><b>Differentiation:</b><br/>The collage topics and requirements can be teacher or student selected to provide different levels of difficulty for students.</p>                                                                         |                                                                                                                                                                                                                                                                                                                                                           |  |
| <p><b>Resources Provided:</b></p> <ul style="list-style-type: none"><li>• iPads</li><li>• <a href="https://www.scratchjr.org/curricula/animatedgenres/full.pdf">https://www.scratchjr.org/curricula/animatedgenres/full.pdf</a></li></ul> |                                                                                                                                                                                                                                                                                                                                                           |  |



### Lesson Plan 3 Template

Content Area: Computer Science      Lesson Title: Story Project      Time Frame: 2 hours/days

### Lesson Components

#### 21<sup>st</sup> Century Themes

- ☐ Global Awareness    ☒ Financial, Economic, Business and Entrepreneurial Literacy  
☐ Civic Literacy      ☐ Health Literacy

#### 21<sup>st</sup> Century Skills

- ☒ Creativity and Innovation    ☒ Critical Thinking and Problem Solving    ☐ Information Literacy  
☐ Life and Career Skills    ☐ Communication and Collaboration    ☒ Media Literacy    ☒ ICT Literacy

#### **Interdisciplinary Connections:**

ELA, Mathematics

#### **Integration of Technology:**

Computer Programming

#### **Equipment Needed:**

Tablets: 1-2 per pair of students, Scene Planning Worksheet (optional), Project Planning Worksheet (optional)

| Goals/Objectives                                                                                                                                                                       | Learning Activities/<br>Instructional Strategies                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Formative Assessment Tasks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Students will: <ul style="list-style-type: none"> <li>review what elements are part of a story.</li> <li>apply concepts from prior lessons when creating their own stories.</li> </ul> | Lesson Sequence <ol style="list-style-type: none"> <li>Introduction (10 minutes): What is a story? The teacher should choose a story that the class has recently read together (s/he should not read it to them). S/he should ask students to describe the characters in the story and the setting of the story. The teacher should explain that a story has a beginning, middle, and end. S/he should then ask students to briefly describe the beginning, middle, and end of the story they are discussing.</li> </ol> | Check student understanding using these guiding questions: <ul style="list-style-type: none"> <li>What are the story elements from the chosen story that will help us build our stories?</li> <li>What programming blocks can we use to create this story?</li> </ul> Review student work to determine: <ul style="list-style-type: none"> <li>Did the student use three pages in their stories – one each for the beginning, middle, and end?</li> <li>Did the student create their own backgrounds, program multiple characters, and use the</li> </ul> |



|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                  |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
|  | <p>2. Review (5 minutes): The teacher should briefly review the programming blocks learned in the second module's lessons. S/he should show the blocks on the screen, and ask the students to verbally describe what each block does. These blocks are:</p> <ul style="list-style-type: none"><li>• Speed</li><li>• Repeat</li><li>• Repeat forever</li><li>• Voice recorder</li><li>• Speech bubble</li><li>• Change page</li><li>• Wait for</li></ul> <p>Materials: iPad for teacher only.</p> <p>3. Story Design and Creation (35 minutes): Students should spend about 35 minutes designing and creating their own stories. Hand out the iPads individually after a student shows a reasonably detailed design. Students should be encouraged to use three pages in their stories – one each for the beginning, middle, and end. They should also be encouraged to choose or create their own backgrounds, program multiple characters, and use the record and speech blocks. Note: The story can be tailored to fit into the current curriculum being taught in the classroom.</p> | <p>record and speech blocks?</p> |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|



4. Sharing (10 minutes):  
Students should be encouraged to share their stories with the rest of the class. They should explain which blocks they used to create their stories, and what is occurring on the screen. Collect iPads. Schedule (Story Project Day 2)
5. Story Design and Creation (45 minutes):  
Hand out the iPads. On the second Story Project Day, students can either continue the story they started during the last lesson, or they can start a new story.
6. Sharing (15 minutes):  
Students should be encouraged to share their stories. They should explain what is occurring in their story, and where the idea for their story came from. Collect iPads.

**Differentiation:**

The teachers can provide scaffolded support by assisting students with story retelling, using graphic organizers, scribing for students and/or giving sentence starters to help structure writing for the project.

**Resources Provided:**

- [Scene Planning Worksheet](#)
- [Project Planning Worksheet](#)
- Video: [How to Make an Animation](#) (5 minutes)
- [ScratchJr Detectives 1](#)
- [ScratchJr Detectives 2](#)



### Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson *Strongly*, *Moderately* or *Weakly* meets the criteria below.

| Lesson Activities                                                                                                    | Strongly | Moderately | Weakly |
|----------------------------------------------------------------------------------------------------------------------|----------|------------|--------|
| Are challenging <b>Strongly</b> and require higher order thinking and problem solving skills                         | <b>X</b> |            |        |
| Allow for student choice                                                                                             | <b>X</b> |            |        |
| Provide scaffolding for acquiring targeted knowledge/skills                                                          | <b>X</b> |            |        |
| Integrate global perspectives                                                                                        | <b>X</b> |            |        |
| Integrate 21st century skills                                                                                        | <b>X</b> |            |        |
| Provide opportunities for interdisciplinary connection and transfer of knowledge and skills                          | <b>X</b> |            |        |
| Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills            | <b>X</b> |            |        |
| Are varied to address different student learning styles and preferences                                              | <b>X</b> |            |        |
| Are differentiated based on student needs                                                                            | <b>X</b> |            |        |
| Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process    | <b>X</b> |            |        |
| Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives | <b>X</b> |            |        |
| Provide opportunities for student reflection and self- assessment                                                    | <b>X</b> |            |        |
| Provide data to inform and adjust instruction to better meet the varying needs of learners                           | <b>X</b> |            |        |

### Curriculum Design Template

|                                       |                           |                              |
|---------------------------------------|---------------------------|------------------------------|
| <b>Content Area:</b> Computer Science | <b>Grade Level:</b> 2     | <b>Unit Title:</b> ScratchJr |
| <b>Created:</b> June 2022             | <b>Board Approved on:</b> |                              |



## **SPRINGFIELD PUBLIC SCHOOLS**

**ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21<sup>ST</sup> CENTURY  
GLOBAL SKILLS**

### **IEP AND 504 ACCOMMODATIONS AND MODIFICATIONS FOR EARLY CHILDHOOD AND ELEMENTARY SCHOOL STUDENTS:**

Large print textbooks  
Textbooks for at-home use  
Additional time for assignments  
Review of directions  
Use of mnemonics  
Have student restate information  
Concrete examples  
Adaptive writing utensils  
Support auditory presentations with visuals  
Use of a study carrel  
Assistance in maintaining uncluttered space  
Weekly home-school communication tools (notebook, daily log, phone calls or email messages)  
Space for movement or breaks  
Study sheets and teacher outlines  
Extra visual and verbal cues and prompts  
Math sheets with highlighted instructions  
Graph paper to assist in organizing or lining up math problems  
Use of computers and calculators  
Books on tape  
Graphic organizers  
Quiet corner or room to calm down and relax when anxious  
Preferential seating  
Alteration of the classroom arrangement  
Reduction of distractions  
Answers to be dictated  
Hands-on activities  
Use of manipulatives  
No penalty for spelling errors or sloppy handwriting  
Follow a routine/schedule  
Alternate quiet and active time  
Teach time management skills  
Rest breaks  
Verbal and visual cues regarding directions and staying on task  
Agenda book and checklists  
Adjusted assignment timelines  
Visual daily schedule



## **SPRINGFIELD PUBLIC SCHOOLS**

**ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21<sup>ST</sup> CENTURY  
GLOBAL SKILLS**

Varied reinforcement procedures  
Immediate feedback  
Work-in-progress check  
Personalized examples

### **TESTING AND ASSESSMENT ACCOMMODATIONS AND MODIFICATIONS:**

Answers to be dictated  
Frequent rest breaks  
Additional time  
Oral testing  
Untimed tests  
Choice of test format (multiple-choice, essay, true-false)  
Alternate ways to evaluate (projects or oral presentations instead of written tests)  
Accept short answers  
Open-book tests  
Read test and directions to student  
Provide study outline prior to tests  
Highlight key directions  
Test in alternative site  
Use of calculator  
Extra credit option  
Preview test procedures  
Simplified test wording; rephrased test questions and/or directions

### **GENERAL ACCOMMODATIONS AND MODIFICATIONS:**

Use of alternative books or materials on the topic being studied  
Computerized spell-check support  
Word bank of choices for answers to test questions  
Provision of calculator and/or number line for math tests  
Reworded questions in simpler language  
Projects instead of written reports  
Highlighting important words or phrases in reading assignments  
Modified workload or length of assignments/tests  
Modified time demands  
Modified grades based on IEP

### **BEHAVIOR ACCOMMODATIONS MODIFICATIONS:**



## **SPRINGFIELD PUBLIC SCHOOLS**

**ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21<sup>ST</sup> CENTURY  
GLOBAL SKILLS**

Breaks between tasks  
Cue expected behavior  
Daily feedback to student  
Have contingency plans  
Use de-escalating strategies  
Use positive reinforcement  
Use proximity/touch control  
Use peer supports and mentoring  
Model expected behavior by adults  
Have parent sign homework  
Have parent sign behavior chart  
Set and post class rules  
Chart progress and maintain data



## SPRINGFIELD PUBLIC SCHOOLS

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21<sup>ST</sup> CENTURY  
GLOBAL SKILLS

### **IEP AND 504 ACCOMODATIONS AND MODIFICATIONS FOR MIDDLE AND HIGH SCHOOL STUDENTS:**

Large print textbooks  
Textbooks for at-home use  
Additional time for assignments  
A locker with adapted lock  
Review of directions  
Review sessions  
Use of mnemonics  
Have student restate information  
Provision of notes or outlines  
Concrete examples  
Adaptive writing utensils  
Support auditory presentations with visuals  
Weekly or bi-weekly home-school communication  
Space for movement or breaks  
Study sheets and teacher outlines  
Extra visual and verbal cues and prompts  
Lab and math sheets with highlighted instructions  
Graph paper to assist in organizing or lining up math problems  
Use of tape recorder for lectures  
Use of Interactive notebook  
Use of a scribe  
Use of computers and calculators  
Books on tape  
Graphic organizers  
Quiet corner or room to calm down and relax when anxious  
Preferential seating  
Alteration of the classroom arrangement  
Reduction of distractions  
Answers to be dictated  
Hands-on activities  
Ability to type all assignments  
Follow a routine/schedule  
Teach time management and organizational skills  
Rest breaks  
Verbal and visual cues regarding directions and staying on task  
Agenda book and checklists  
Daily check-in with case manager or special education teacher  
Adjusted assignment timelines  
Visual daily schedule



## **SPRINGFIELD PUBLIC SCHOOLS**

**ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21<sup>ST</sup> CENTURY  
GLOBAL SKILLS**

Varied reinforcement procedures  
Immediate feedback  
Work-in-progress check  
Personalized examples

### **TESTING AND ASSESSMENT ACCOMMODATIONS AND MODIFICATIONS:**

Answers to be dictated  
Frequent rest breaks  
Additional time  
Oral testing  
Choice of test format (multiple-choice, essay, true-false)  
Alternate ways to evaluate (projects or oral presentations instead of written tests)  
Accept short answers  
Open-book or open-note tests  
Read test and directions to student  
Provide study guides prior to tests  
Highlight key directions  
Test in alternative site  
Use of calculator  
Extra credit option  
Pace long-term projects  
Preview test procedures  
Simplified test wording; rephrased test questions and/or directions

### **GENERAL ACCOMMODATIONS AND MODIFICATIONS:**

Allow outlining, instead of writing for an essay or major project  
Use of alternative books or materials on the topic being studied  
Computerized spell-check support  
Word bank of choices for answers to test questions  
Provision of calculator for math tests  
Film or video supplements in place of reading text  
Reworded questions in simpler language  
Projects instead of written reports  
Highlighting important words or phrases in reading assignments  
Modified workload or length of assignments/tests  
Modified time demands



## **SPRINGFIELD PUBLIC SCHOOLS**

**ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21<sup>ST</sup> CENTURY  
GLOBAL SKILLS**

Pass/no pass option  
Modified grades based on IEP

### **BEHAVIOR ACCOMMODATIONS FOR STUDENTS:**

- Breaks between tasks
- Cue expected behavior
- Daily feedback to student
- Have contingency plans
- Use de-escalating strategies
- Use positive reinforcement
- Use proximity/touch control
- Use peer supports and mentoring
- Model expected behavior by adults
- Have parent sign homework
- Set and post class rules
- Chart progress and maintain data



## SPRINGFIELD PUBLIC SCHOOLS

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21<sup>ST</sup> CENTURY  
GLOBAL SKILLS

### Accommodations and Modifications for ESL Students

- Give tests orally
- Give instructions/directions in writing and orally
- Assign a peer tutor, same language or English speaking
- Allow use of bilingual/translation dictionary
- Provide summaries of text or study guides of particular chapters
- Allow errors in speaking
- Allow errors in writing
- Accept writing in first language
- Highlight key vocabulary
- Reduce amount of work required
- Assess comprehension through demonstration or other alternative means (gestures, drawings)
- Rephrase questions, directions, and explanations
- Reduce multiple choices on assessments
- Provide study guides and/ or outlines
- Shorten reading assignments
- Allow extended time for test/project completion
- Use of audio books
- Use of graphic organizers
- Use reduced text, so that print is not dense
- Use visuals/pictures throughout lesson/unit/assignment
- Adapt homework to reflect language proficiency/home support
- Adapt homework to reflect home support
- Provide hands-on activities and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Use of translation dictionaries to locate words in the native language
- Use anecdotal records and portfolio of work as forms of assessment
- Use story retellings to assess comprehension