CODEMONKEY JR.

A PRE-CODING GAME FOR 4-6 YEAR OLDS

Conditional Loops

Lesson plans
1-6

CodeMonkey Jr.
LESSON PLANS

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Introduction

Let's continue the adventure with CodeMonkey Jr.. The following 6 lessons will cover 2 chapters (conditional loops and advanced conditional loops), which include a total of 30 challenges. These challenges will help students practice more the fundamental concepts and terms from the world of computers and programming.

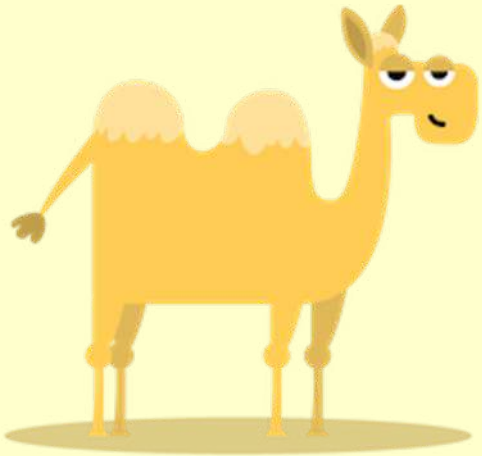
Each lesson is set to be 35 minutes long and is made up of 3 parts: an Introduction, Playtime and Debriefing. If you think you need more time to complete a lesson, feel free to split it into 2 sessions. The lessons are based upon playing the game itself, the first lesson is more theoretical and teaches the new concepts. All the lessons are playful and designed for younger students.

Before you get into the lesson plans, we recommend reading CodeMonkey Jr.'s Teacher Guide. At the end of this file, you will find a Glossary that summarizes each coding concept. Please refer to it throughout the course. Feel free to email us with any questions or comments.

Good Luck!
The CodeMonkey Team

SOME NOTES ON TEACHING CODEMONKEY JR.

- **ALL Beginners are welcome!**
  - We will provide you with everything you need in order to learn the basics of coding and enjoy teaching the game. You do not need *any* background in Computer Science!
- **A love of learning is a plus**
  - A love of learning is key for learning new topics like programming, which may seem intimidating at first. Don't worry though, we will provide you all the information you need to successfully teach your students coding.
- **A love for playing is also a plus!**
  - We believe learning through playing is a joyful and engaging way to introduce concepts to your students. CodeMonkey Jr. will open up a new world for your students so give them time to replay the game if they want. Afterall, we want students to have fun.
- **Mistakes are OK!**
  - Mistakes are the best way to learn so use them to challenge and engage your class. You can even encourage students to play with wrong solutions to see where the monkey will go.



Guidelines

- We recommend going over the Teacher Guide and the entire lesson plans before starting the course
- The following lesson plans are only suggestions so feel free to change, edit and adjust them to your class. At the end of the day, only you know what is best for your students!

Technical Requirements

- You will need tablets or desktops for students. You can use 1 device per 2 students.
- It is best if your computer is connected to a projector or screen so that you can present challenges
- An Internet connection is required

LESSON PLANS

Table of Contents

Lesson 1 – Back to Business

In this lesson, students will start a new chapter of CodeMonkey Jr., which focuses on conditional loops. In the scope of this game, conditional loops are loops that repeat based on a certain condition.
By end of this lesson, students will complete challenges 1-6.

In previous chapters your students learned how to write their first programs - using sequenced instructions and simple conditional loops that repeat instructions until the monkey reaches the treasure chest.

Note: If long time has passed since the students played in previous chapters, we recommend refreshing their memory by running several challenges from previous chapters before you start the course.

U.S. STANDARDS ADDRESSED

CSTA-K12 Computer Science Standards	
• 1A-AP-10 • 1A-AP-12	• 1A-AP-14 • 1A-AP-15

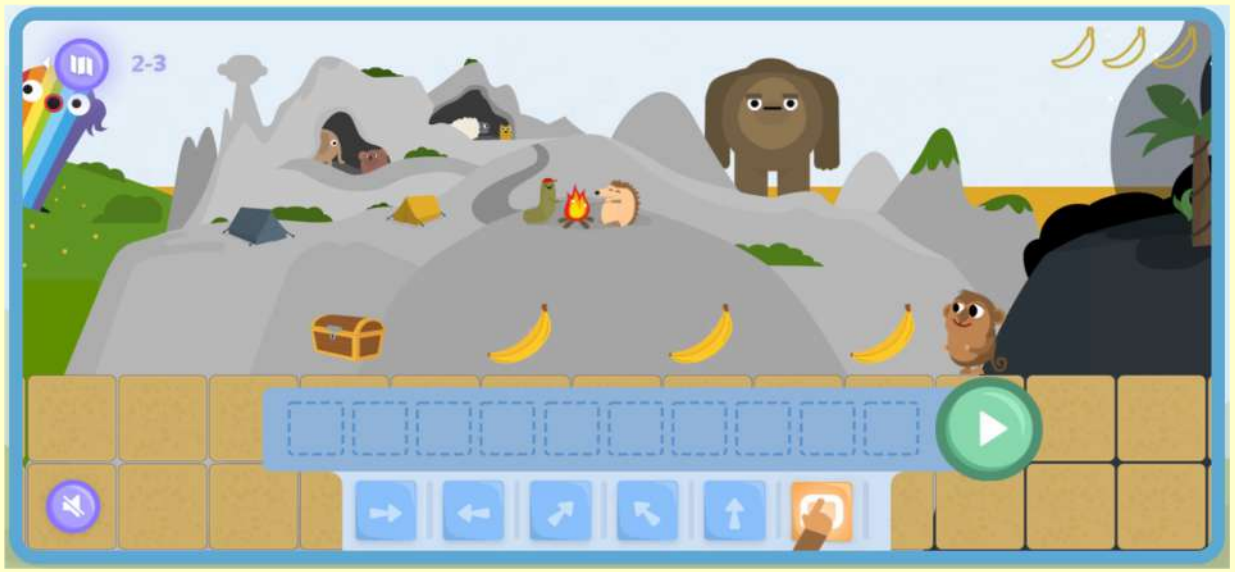
PART 1: 5 MINUTES
PRESENT

Discussion	**5 mins.**
Present Challenge #3 - Loops chapter – ask the students to describe the loop condition – i.e. when does the loop stops? It was simple – when the monkey reach the treasure chest. Now present Challenge #1 Conditional Loops chapter – is there a way we can use a loop that runs until the monkey reach the treasure chest? Challenge #1 is a guided challenge – Ask the student if they can define a new loop condition that will help us solve this challenge. The solution for this challenge requires a simple conditional loop, but it's a bit different from the loop we used in the previous chapter. All we need is a loop that will take the monkey to the red flower, only then monkey can jump up to the treasure chest. The solution will be - Loop[Move Left], Jump Up	

PREPARE IN ADVANCE:

- Use this slide to present the two challenges together

PART 1: 5 MINUTES
PRESENT



Challenge #3 - Loops chapter

Challenge #1 - Conditional Loops chapter

PART 2: 25 MINUTES
PLAYTIME

Instructions	**TIME: 25 min**
Remember to plan the solution based on subsections – 1. Identify the repeated process 2. Check if additional steps are needed to get to the treasure chest	

Challenge	**Scope**
2	Move right until the monkey reaches the blue flower, and then jump-right to the treasure chest (Loop[MR], JR)
3	Jump right until the monkey reaches the blue flower, and then walk right (Loop[JR], MR)
4	Move right until the monkey reaches the purple flower, and then jump-right and move right to the treasure chest (Loop[MR], JR, MR)
5	Move right until the monkey reaches the red flower, and then jump-right twice(Loop[MR], JR, JR)
6	Move left until the monkey reaches the blue flower, and then jump-left twice(Loop[ML], JL, JL)

PART 3: 5 MINUTES
DEBRIEFING

Discussion	**5 mins.**
Discuss the following with your class: ● In the previous chapter we used a loop that ends when the monkey reaches the treasure chest. ● The disadvantage was that a code after the loop will not run. ● In this chapter the programming flexibility increases, and we can solve more complex programs that involve code before and after the loop.	

Lesson 2 – PLAN PLAN PLAN

In this lesson, students will continue practicing solving challenges by planning their journey. They will need to decide which instructions are before and after the loop and which instructions are included within the loop.
By end of this lesson, students will complete challenges 7-12.

U.S. Standards Addressed

CSTA-K12 Computer Science Standards	
• 1A-AP-10 • 1A-AP-12	• 1A-AP-14 • 1A-AP-15

Part 1: 5 Minutes
Present

Discussion	**5 mins.**

What happens when you need to perform an action before you can start the loop?

Sometimes, the loop does not start from the beginning of the monkey's path, and you need to move the monkey to the starting position of the repeated pattern.

How can you solve this problem? Analyze the various parts of the route to the treasure chest:

- What happens before the loop?
- What is the repeated action within the loop?
- What happens after the loop?

Part 2: 25 Minutes
PLAYTIME

Instructions	TIME: 25 min
Encourage the students to get all the bananas and get 3 stars in each challenge.	

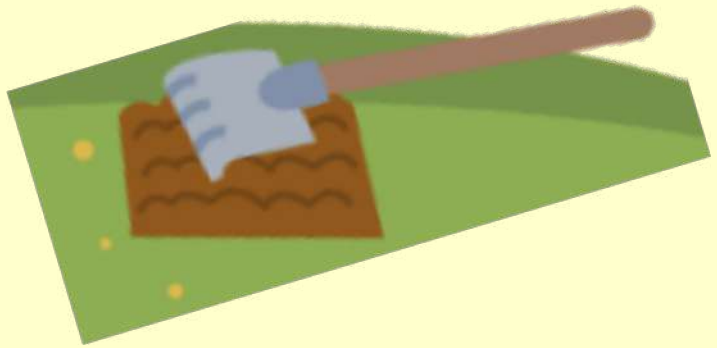
Challenge	Scope
7	Jump up to catch the banana, then, move left until the monkey reaches the red flower, and then jump left (JU, Loop[ML], JL)
8	Move right to catch the banana, then, move left until the monkey reaches the blue flower, and then jump left (MR, Loop[ML], JL)
9	Move right twice, then jump left until the monkey reaches the purple flower, and then move left to the treasure chest (MR, MR, Loop[JL], ML)
10	Jump right and then move right until the monkey reaches the purple flower, and then jump up to the treasure chest (JR, Loop[MR], JU)
11	Jump left and catch the banana, then move left until the monkey reaches the red flower, and then jump left (JL, Loop[ML], JL)
12	Move right to get to the stairs and then jump right until the monkey reaches the purple flower and then move right twice (MR, Loop[JR], MR,MR)

Part 3: 5 Minutes
Debriefing

Discussion	**5 mins.**
In this lesson, we saw that while the loop is fundamental part of the solution, there should be careful planning to identify what should happen before and after the loop. Try to figure out what makes the difference between 3-star to 2-star solution? You can code different paths to the treasure chest, but they might not collect all the bananas. This indicates that you can complete a challenge successfully, however you will not receive the highest score. Attaining the highest score requires planning and composing a solution that is built based on the right building blocks.	

Lesson 3 – It is COMPLICATED

In this lesson, the loop is getting complicated – the basic step within the loop is composed by two instructions.

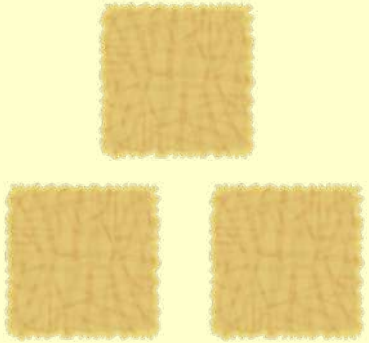


U.S. Standards Addressed

CSTA-K12 Computer Science Standards	
• 1A-AP-10 • 1A-AP-12	• 1A-AP-14 • 1A-AP-15

Part 1: 5 Minutes
Present

Discussion	**5 mins.**
Open Challenge #13 ask the students if they see a difference between this challenge and previous one? In the last 3 challenges in this chapter the students will face a new challenge – the loop requires combination of more then one block.	



Part 2: 25 Minutes
PLAYTIME

Instructions	**TIME: 25 min**
Make sure you understand the basic step within the loop.	

Challenge	**Scope**
13	The loop is getting complicated – there are two instructions – a step and a jump (Loop[MR,JR], JU)
14	Going to the other side (Loop[JL, ML], ML)
15	And now to the right - (Loop[JR, MR], JR, JU)

Part 3: 5 Minutes
Debriefing

Discussion	**5 mins.**
In this lesson, the students had to plan the blocks within the loop in order to get to the treasure chest. They needed to see the pattern in order to use a loop.	

Advanced conditional loops

- Congratulations! Your students completed the first chapter – Conditional Loops.
- At this point they know how to analyze and implement a loop within a program. The Loop can include single or multiple instructions and may be at the beginning or middle of the code.
- Moving into the second chapter - Advanced Conditional Loops, your students will face challenges with multiple consecutive loops.

Lesson 4 – Two is a Company

In this lesson, students will start the Advanced Conditional Loops chapter.
By end of this lesson, students will complete challenges 1-5.

Up until now, the students solved the challenges using a single loop and blocks inside the loop. In this lesson, students will learn how to implement two separate loops one after the other.

In this lesson, when two loops are required, we can differentiate between the loops by the conditional check – the color of the flower.

U.S. Standards Addressed

CSTA-K12 Computer Science Standards	
• 1A-AP-10 • 1A-AP-12	• 1A-AP-14 • 1A-AP-15

Part 1: 5 Minutes
Present - 1

Discussion	**5 mins.**

Open Challenge #1.
This challenge summarize the previous chapter.
Let's go over how to build the solution for this challenge.

There is a clear pattern here with straw-block and bananas above.
However, it can be challenging to define where does the loops starts and ends.

Let's try to run a reverse engineering process:
If we take a look at the blue flower – that's where the loop ends.

- What is the last step to the flower? Move right
- What is the step before that? Jump up to get the banana
- What is the step before that? Jump right to get on the straw-block
- What is the step before that? Move right – is this part of the current loop iteration or the previous loop?

Once we identify the loop pattern – JR-JU-MR we can add the steps before and after the loop.
What happens if we decide not to collect the bananas – how many stars will we get?
Collecting the bananas can make the difference between 1 to 3 stars.

Part 1: 5 Minutes
Present - 2

Discussion	**5 mins.**
Open Challenge #2. There are two flowers, ask the students what does it mean? The first flower (purple) defines the first part of the path – Loop[Jump Left]. The second flower (red) defines the second part of the path – Loop[Move Left]. These are two separate parts that will be composed together one after the other.	

Part 2: 25 Minutes
PLAYTIME

Instructions	**TIME: 25 min**
Remember to count the steps to and from the bananas and not from the point the monkey is at in the beginning. Encourage the students to get all the bananas and get 3 stars in each challenge.	

Challenge	**Scope**
1	Two steps to the right, then use a loop to take the monkey to the flower (MR, MR, Loop[JR, JU, MR], MR, JU)
2	Loop twice – (Loop(purple)[JL], Loop(red)[ML], JU)
3	Going down and up – (Loop(red)[MR], Loop(blue)[JR], MR, MR)
4	Going up and down – (Loop(blue)[JR], Loop(purple)[MR], MR, MR)
5	Go right to collect bananas and then go left all the way (Loop(purple)[MR], Loop(red)[ML], JU)

Part 3: 5 Minutes
Debriefing

Discussion	**5 mins.**
In this lesson, the students had to detect the two different loop parts and decide how to compose them together. Challenges 2-4 the two loops moved the monkey in the same directions. In challenge #5 – we are facing a conflict – to collect all the bananas we need to go all the way right and only then we can start the walk to the left. Remind the students how we did it in the previous chapter (advanced sequencing, before we learned how to use loops) – we had to carefully count the steps to both side and make the right calculations, for example - Challenge #10. This is the strength and the power of loops. In the next lesson we will see how it comes in handy.	

Lesson 5 – Look Around

Upon completing this lesson, the students will complete challenges 6-10 and will use multiple loops as required for moving back and forth.

As the students can code a solution that will move the monkey to the treasure chest without collecting all the bananas it is important to use the teacher dashboard to make sure the students completed the challenges with 3 stars. If not, encourage them to solve again and earn 3 stars for each challenge.

U.S. Standards Addressed

CSTA-K12 Computer Science Standards	
• 1A-AP-10 • 1A-AP-12	• 1A-AP-14 • 1A-AP-15

Part 1: 5 Minutes
Present

Game	**5 mins.**

The purpose of the lesson is to practice the use of multiple separate loops, each loop with a different condition.
We have 3 flowers that are used as conditional statements within the loop – red, purple and blue.

The student will have to define and build the loop for each part and then build the entire program to take the monkey to the treasure chest.

The focus here will be on analyzing the separate solution parts that build up the full path.
Let the students start playing, if you see that they are facing difficulties, you can walk-through Challenge #8 together (see slide 35)

Part 2: 25 Minutes
PLAYTIME

Instructions	**TIME: 25 min**
Encourage the students to get all the bananas and get 3 stars in each challenge.	

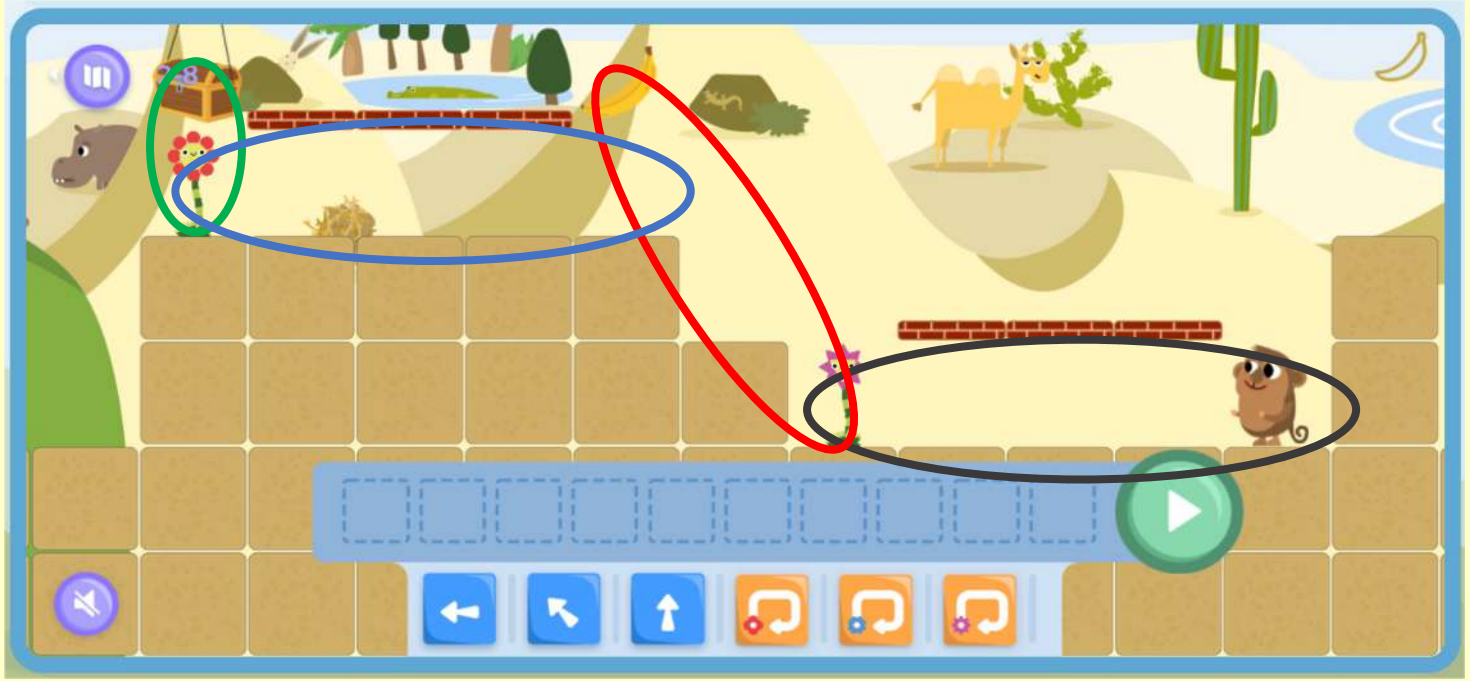
Challenge	**Scope**
6	Go all the way to the blue flower and only then go back to the treasure chest(Loop(blue)[MR], Loop(red)[ML], JU)
7	Jump between loops – (Loop(blue)[JR], JU, Loop(purple)[MR], JR)
8	Jump between loops – (Loop(purple)[ML], JL, JL, JU, Loop(red)[ML], JU)
9	Same color, different loop – (JU, Loop(red)[MR], Loop(red)[JR], MR)
10	Same color, different loop – (Loop(purple)[ML], JU, Loop(purple)[ML], JL)

Part 2: 25 Minutes
PLAYTIME

Game	5 mins.

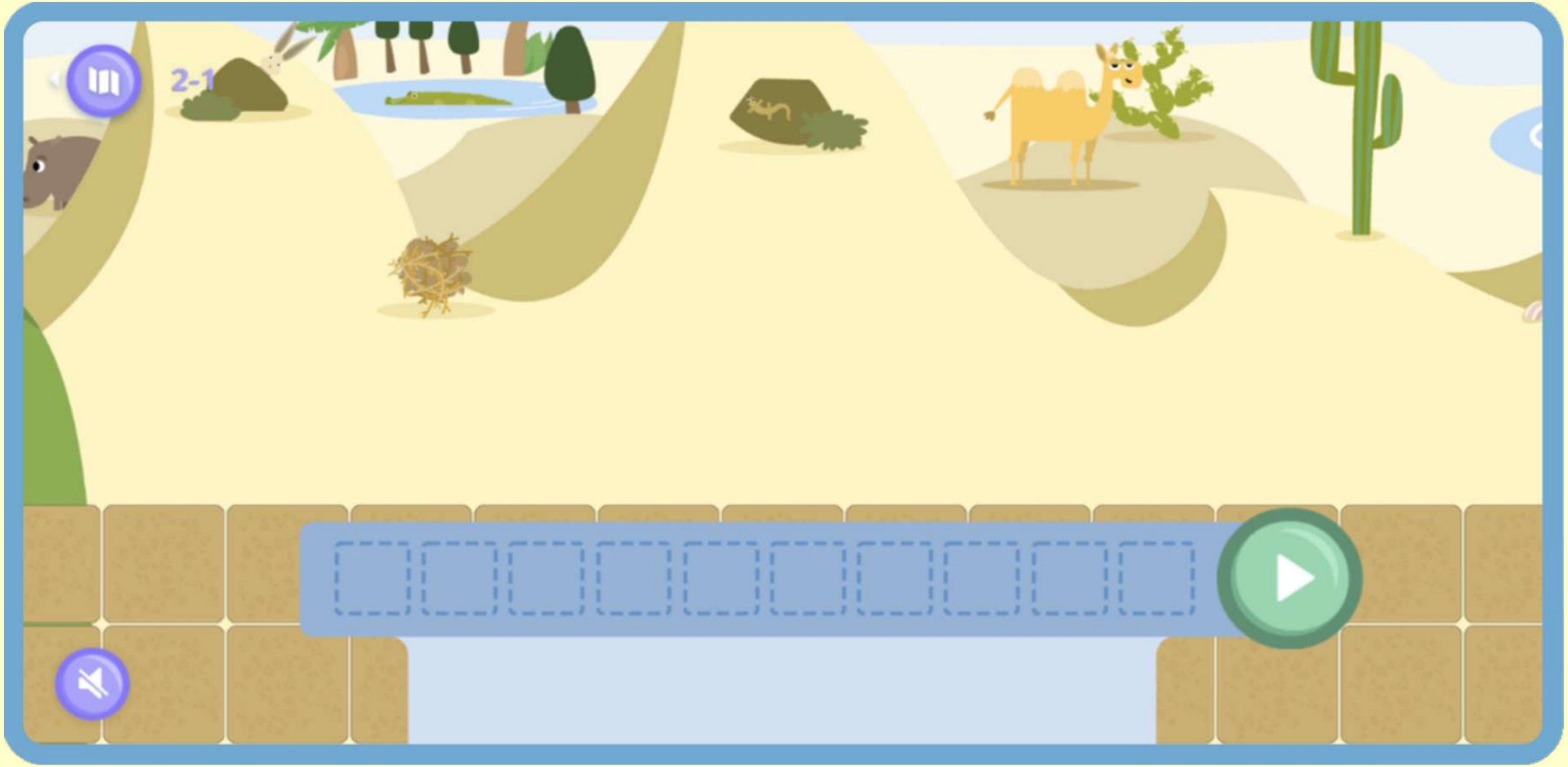
Challenge #8

1. Grey circle – Loop to move left until reaches the purple flower
2. Red circle – Sequence or order to take the monkey to collect the banana
3. Blue circle – Loop to move left to the red flower
4. Green circle – Jump up to the treasure chest



Part 3: 5 Minutes
Debriefing

Unplugged activity - Challenge design	**5 mins.**
Just before going into the last lesson, it's a good time to conduct an unplugged activity of challenge design. Challenge design can improve planning and analysis capabilities - by looking at the different building blocks students will think about the loop pattern they wish to include, the directions, if they plan to add steps before and after the loop. The next slide include an image of a blank (empty) challenge with a variety of game images. Work together with the class or ask the students to design their own challenge – guide them to have at least 2 loops and 2 bananas. You can use the slides to present in class and build the challenge or share a PowerPoint or Google slides with your students and let them build the challenge by dragging, cutting and pasting the images on the slide. Students can work in pairs while each student gives her/his challenge to the other student to solve.	




















Lesson 6 – Three is More Fun

Upon completing this lesson, the students will complete challenges 11-15 and complete the chapter for Advanced Conditional Loops. Use the teacher dashboard to make sure the students completed the challenges with 3 stars. If not, encourage them to solve again and earn 3 stars for each challenge.

In this lesson, they will learn how to add more then two loops and how to use the same conditional loop for different parts of the solution.

U.S. Standards Addressed

CSTA-K12 Computer Science Standards	
• 1A-AP-10 • 1A-AP-12	• 1A-AP-14 • 1A-AP-15

Part 1: 5 Minutes
Present

Discussion	**5 mins.**
Let's discuss the following instruction: Go straight ahead until you see a right turn, then turn right and – Go straight ahead until you see a right turn, then turn right and – Go straight ahead until you see a right turn, then stop and park ☺ you've reached your destination. While along the route we only drove straight ahead, there were several point where we had to stop, make a turn and then continue. The path is composed of 3 parts, and the conditional check is similar in each.	

Part 2: 25 Minutes
PLAYTIME

Instructions	25 mins.
Ask the students to solve challenges 11-14. encourage the students to get all the bananas and get 3 stars in each challenge. Solve challenge #15 together with the class to summarize the course and discuss the different solutions as described in the next slide.	

Challenge	Scope
11	Jump between loops – (Loop(red)[ML], JU, Loop(purple)[ML], JU, Loop(blue)[ML], JU)
12	Back and forth – (Loop(blue)[MR], MR, Loop(red)[ML], Loop(red)[JL], ML)
13	Pause after each loop – (Loop(blue)[MR], JR, Loop(blue)[MR], JU, Loop(blue)[MR], JU)
14	Back and forth – (Loop(purple)[ML], JU, Loop(blue)[JR, MR], MR)
15	Back and forth – (Loop(red)[JL,ML], Loop(purple)[MR], Loop(red)[JR], MR)

Part 3: 5 Minutes
Debriefing

Discussion	**5 mins.**

Open Challenge #15 and solve it with

- 1-stars solution
- 2-stars solution
- 3-stars solution

- 1-stars solution - the monkey doesn't go to the left-red flower and skip the bananas collection
- 2-stars solution - moving down towards the purple flower will have two move right steps in the loop (Loop(purple)[MR,MR])
- 3-stars solution - Loop(red)[JL,ML], Loop(purple)[MR], Loop(red)[JR], MR

To summarize, discuss with your students the difference between the solutions - Getting to the treasure chest is the final goal - but we need to make sure we collect all the bananas on the route and get there in the most efficient way.

Glossary

Term	Definition
Computer	A **computer** is a machine that is able to take information (input), do some work on or make changes to the information, to make new information (output). Modern computers are very different from early computers. They are now very powerful machines that are able to do billions of calculations every second. Most people have used a personal computer in their home or at work. Computers are useful for many different jobs where automatic tasks are useful. Some examples are controlling traffic lights, vehicle computers, security systems, Washing machines and Digital Televisions. (source: https://wiki.kidzsearch.com/wiki/Computer)
Software	Computer software (often called just software) is made of one or more computer programs. Sometimes it means one specific program, or it can mean all the software on a computer, including the applications and the operating system. Applications are programs that do a specific thing, such as a game or a word processor. (source: https://wiki.kidzsearch.com/wiki/Computer_software)
Hardware	Hardware (computer hardware) includes the physical parts of a computer, such as the cabinet, motherboard, central processing unit, storage, and more. Peripheral hardware include - monitor, keyboard, speakers, mouse and more. In some computers the peripheral devices are built-in (like laptop or tablet)
Until loop	Until loops are a way to repeat a set of actions until a certain condition is satisfied.

Great Job!

You have Completed