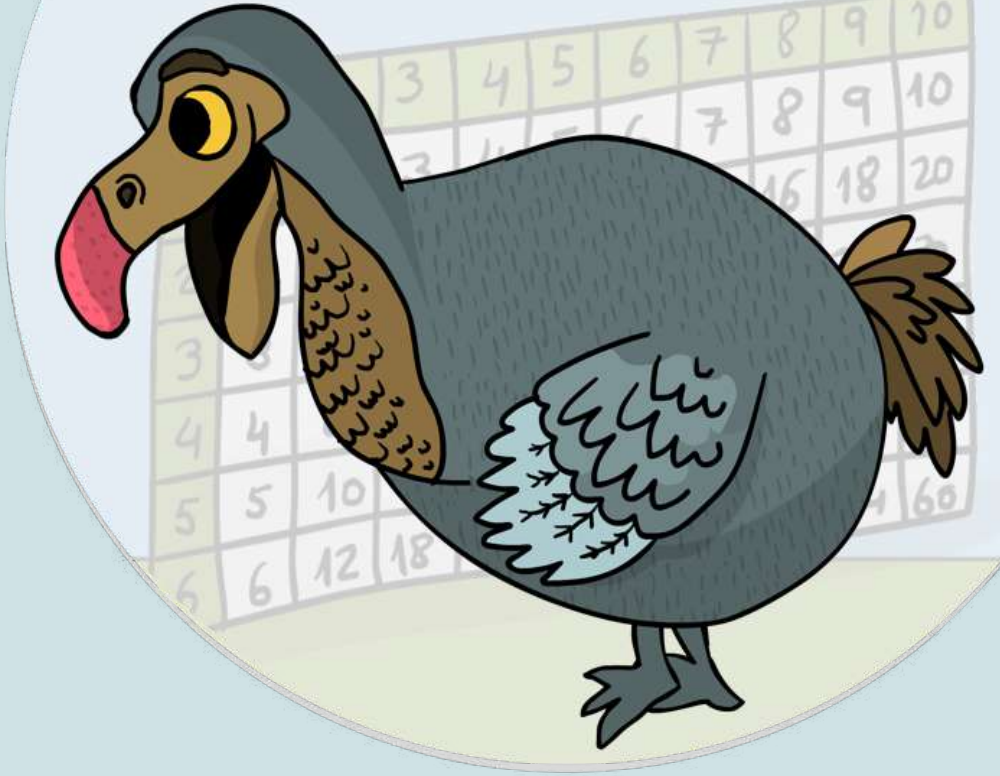
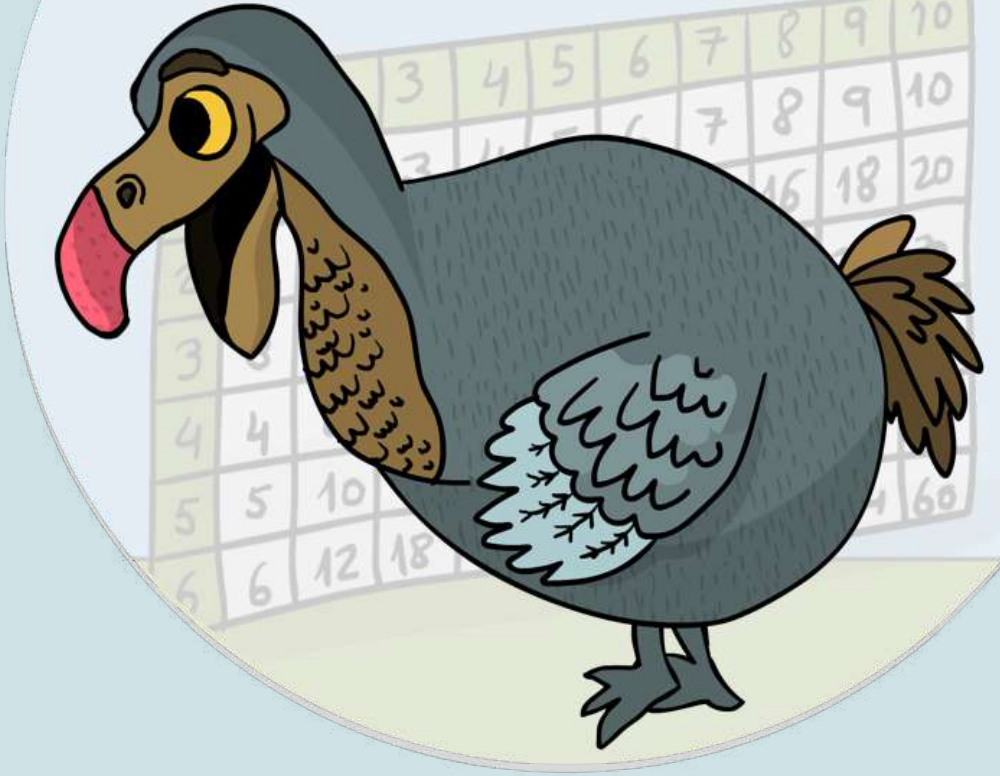
CODEMONKEY
LESSON PLANS



DODO DOES MATH

MULTIPLICATION

LESSON PLANS



2345 Yale St., 1st floor

Palo Alto, CA 94306

info@codemonkey.com

www.codemonkey.com

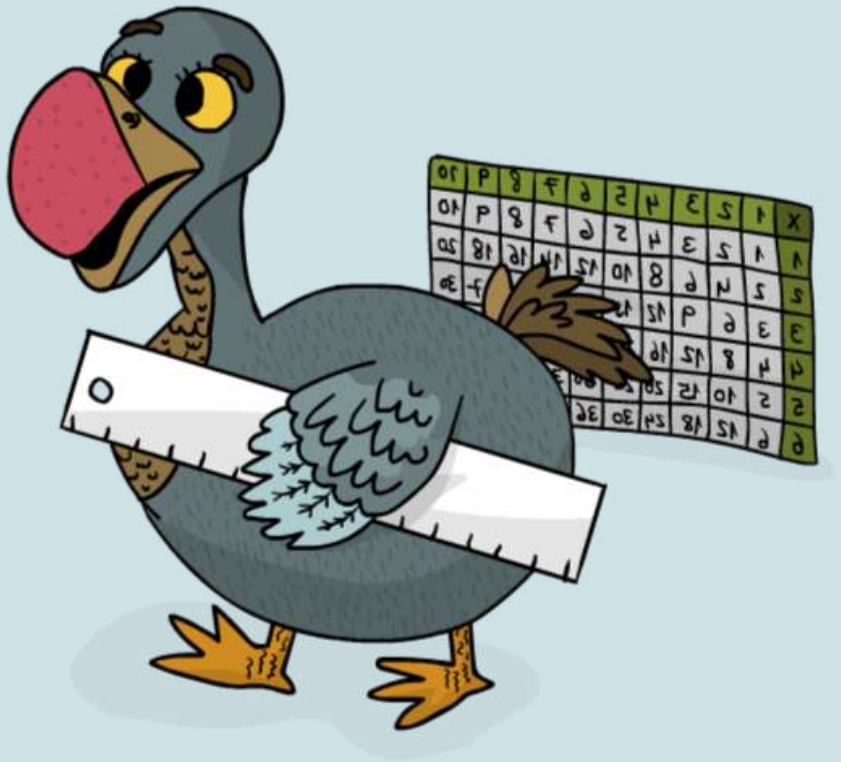
Table of Contents

Introduction

Thank you for choosing Dodo Does Math to provide your students with a fun and innovative way to practice math with code.

Dodo Does Math: Multiplication enables students to practice their multiplication skills. In the upcoming challenges, students will be required to help a dodo find all of her missing eggs by using 2nd - 4th grade math concepts.

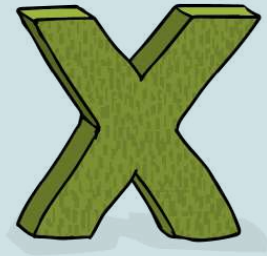
The following lesson plans will guide you on how to successfully integrate Dodo Does Math into your class.



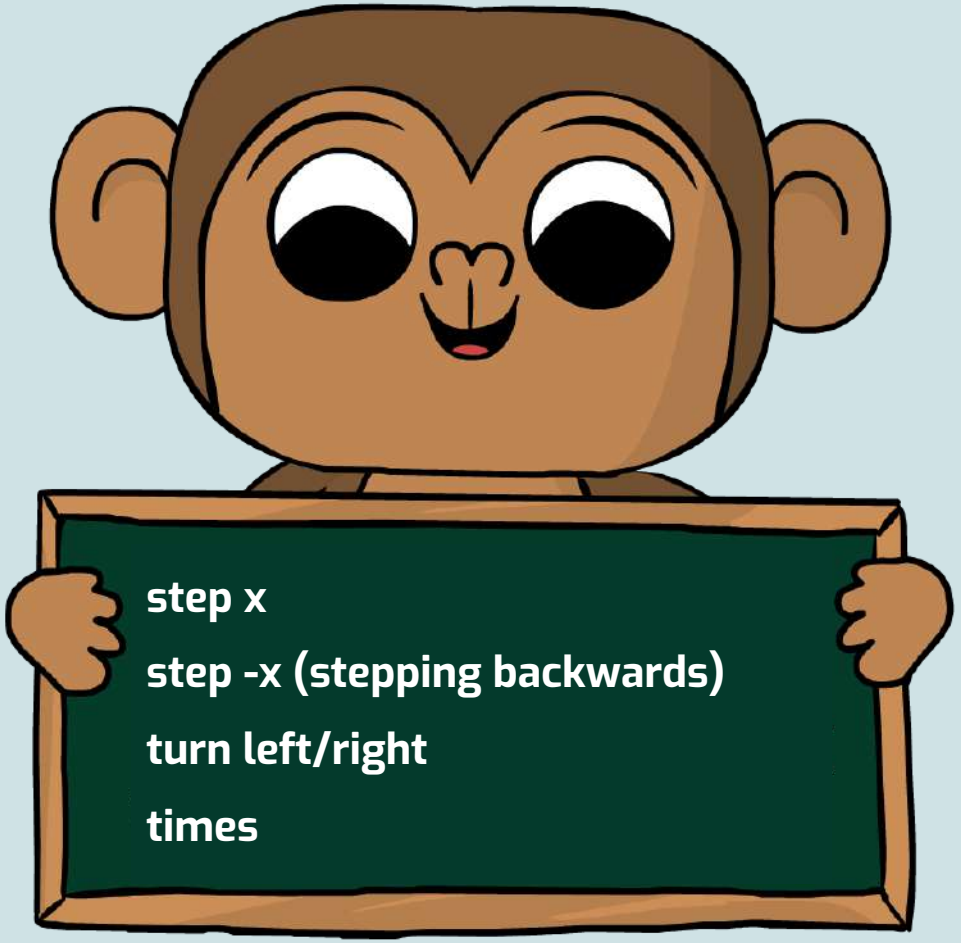
Ready? Let's Begin!

Important Information

- Pre-requisite: First 30 Coding Adventure challenges
- 20 total Multiplication challenges
- The first few challenges practice skip-counting by two, three, five, etc.
- The last few challenges practice the Commutative and Distributive Properties.



Preliminary Coding Knowledge



Coding in CoffeeScript

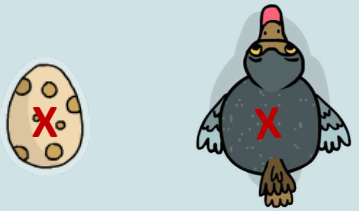
CoffeeScript is the programming language taught in CodeMonkey's Coding Adventure. Dodo Does Math requires basic knowledge of CoffeeScript in every challenge. The language compiles to JavaScript. Similarly to JavaScript, it is used in the industry primarily for web applications. The language was chosen mainly because of its friendly syntax, which resembles written English.

Star-based Grading

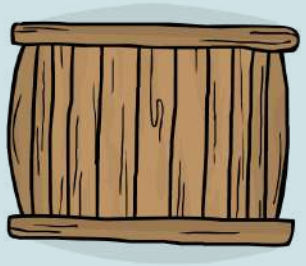
- 1-Star = Incomplete solution (math problem left unsolved)
- 2-Stars = Solution completed, but not the most concise code
- 3-Stars = Solution completed, wrote concise code.
- Remind students to read the win message
- The win message formalizes the equation solved
- In order to practice math, all students are expected to write answers that will credit them with at least two stars (encourage 3-stars).
- In most challenges, using the correct calculation will yield code with the least number of lines needed. This will result in a three-star solutions.

Helpful Tips

- In order to pick an egg up, the center of the dodo needs to be exactly on the center of the egg.

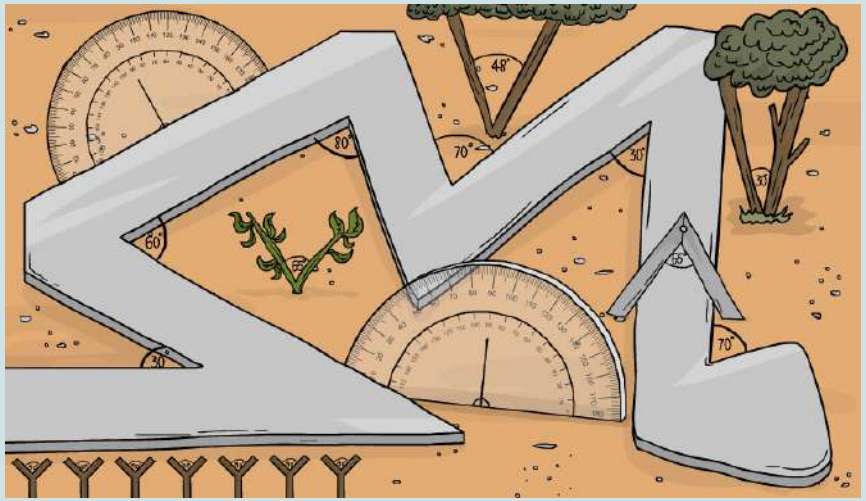


- The dodo needs to step the correct distance and direction in order to pickUp() the egg.
- In the first six challenges, the dodo needs to throw lobsters to form a bridge so that she can get to the egg on the other side.



Common Core State Standards Addressed

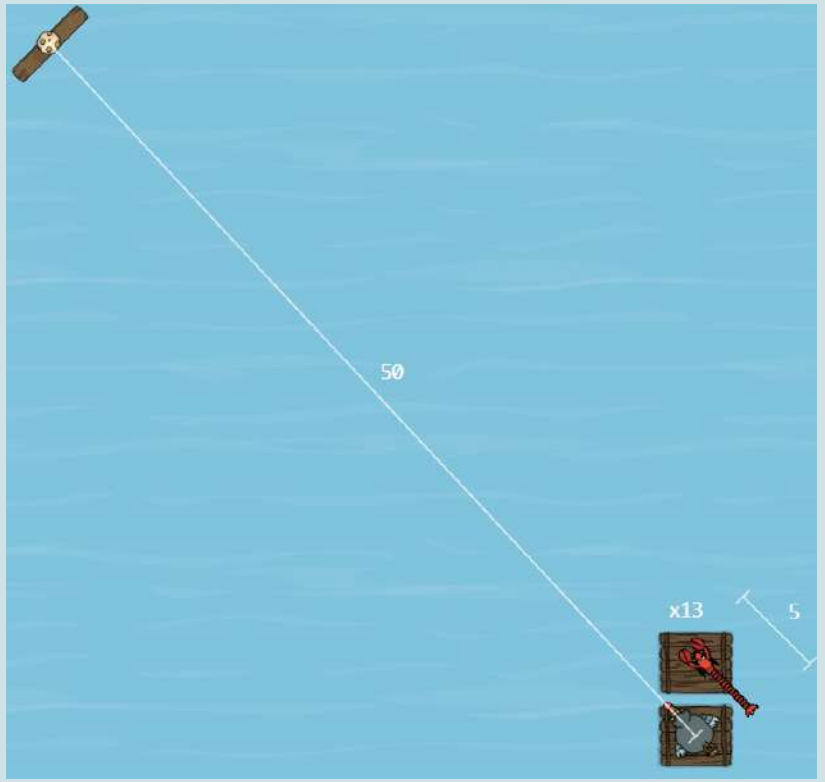
- CCSS.MATH.CONTENT.2.OA.B.2
- CCSS.MATH.CONTENT.2.NBT.A.2/.B.5 /.B.7
- CCSS.MATH.CONTENT.2.MD.A. 1
- CCSS.MATH.CONTENT.3.OA.B.5/C.7
- CCSS.MATH.CONTENT. 3.NBT.A.2
- CCSS.MATH.CONTENT.4.MD./C.7



Skip-Counting Using Lobsters

The lobsters help students practice skip-counting

- The lobsters have lengths
- All the lobsters in a challenge have the same length
- The lobsters' length can vary between challenges

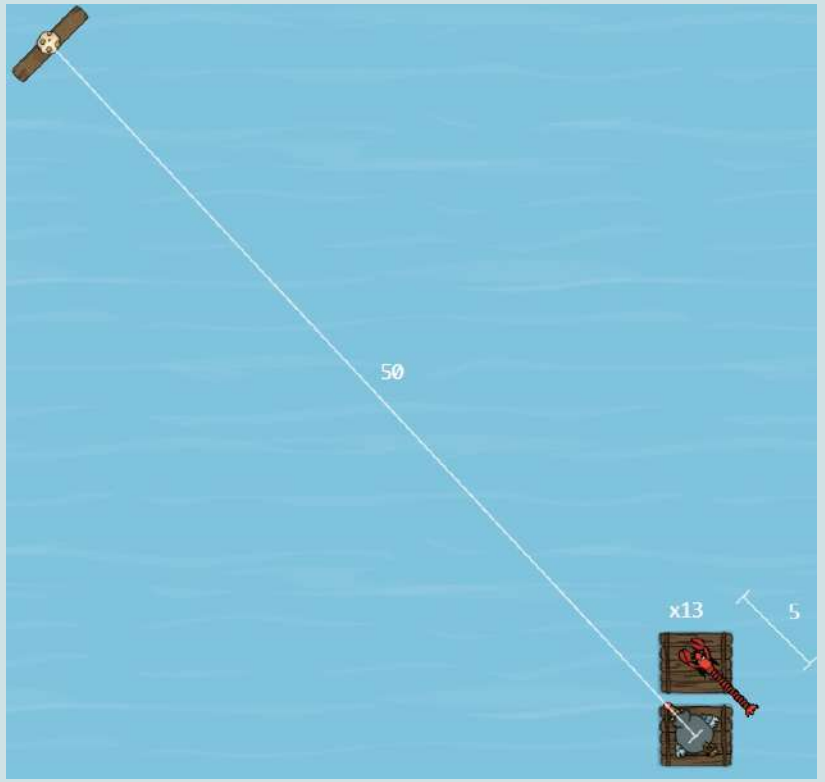


Skip-Counting Using Lobsters

The lobsters need to be thrown to form a bridge between the dodo and egg.

The number of lobsters and their length are displayed.

- There are more lobsters than needed in every challenge
- While the game is running, each time a lobster is thrown, the number of lobsters decreases by one.
- The distance a lobster is thrown needs to be specified
- Students wills skip count the distance that the lobsters need to be thrown

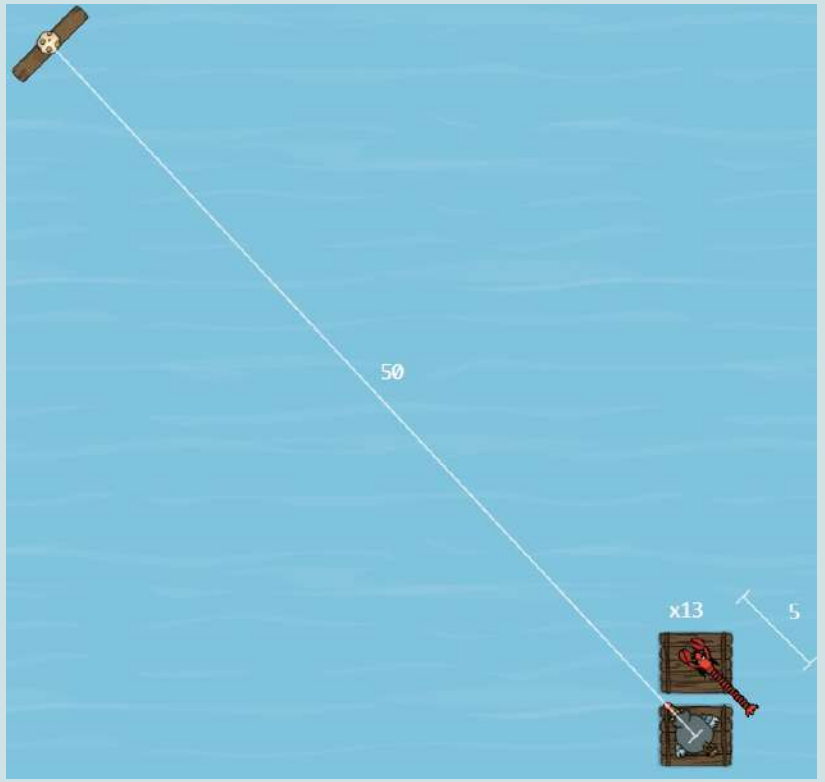


Watch on YouTube

Skip-Counting Using Lobsters

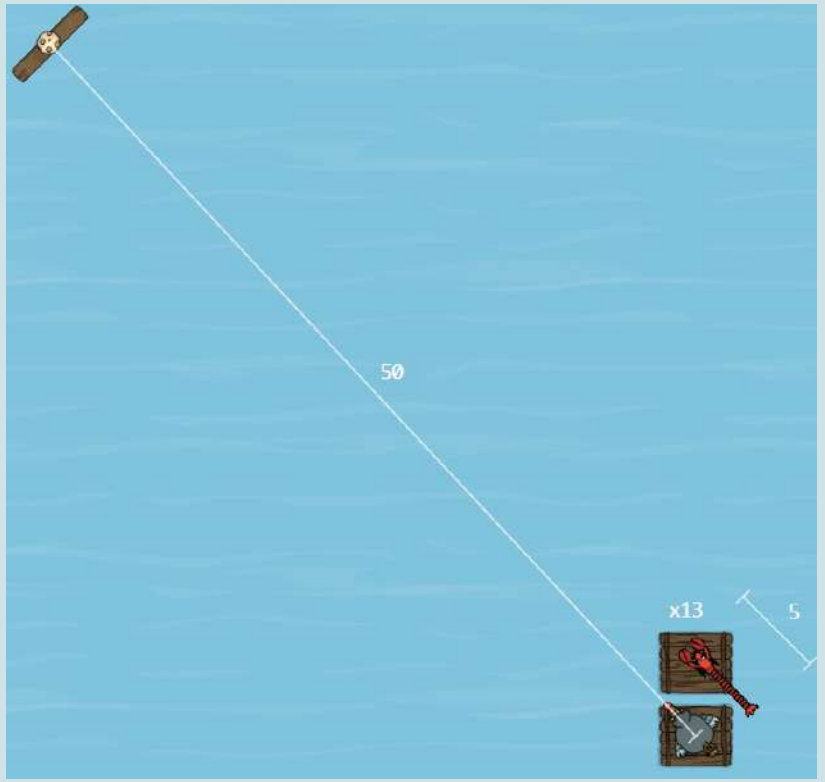
The function “throwLobster” is used to throw the lobsters. The argument of this function is the distance.

- For example:
  - “throwLobster 5” means that the lobster is thrown at a distance of five steps
  - “throwLobster 7” means that the lobster is thrown at a distance of seven steps.
- This distance is calculated from the dodo to the lobster’s claws



Skip-Counting Using Lobsters

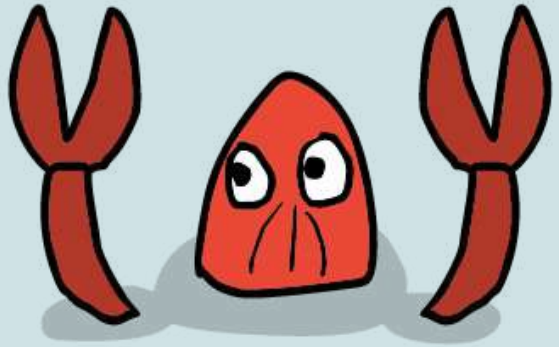
- In order to form a bridge, each lobster needs to hold onto another lobster
- The dodo always holds onto the first lobster.
- If a lobster is thrown at a distance where it cannot hold onto another lobster, it will float away.



Skip-Counting Using Lobsters

- The length of each lobster should be taken into account whenever calculating the distance that the next lobster needs to be thrown at
- For example, if the length of a lobster is nine and the distance between the egg and dodo is 45, then five lobsters need to be thrown

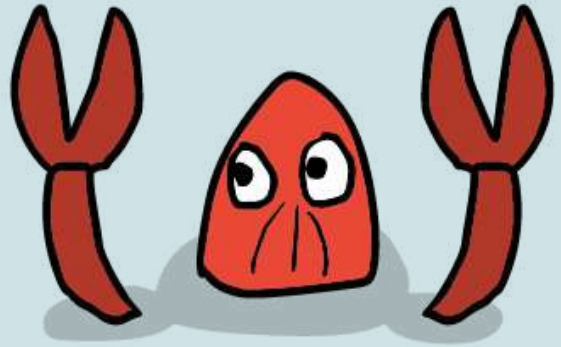
- The code should be:
  - throwLobster 9
  - throwLobster 18
  - throwLobster 27
  - throwLobster 36
  - throwLobster 45



Skip-Counting Using Lobsters

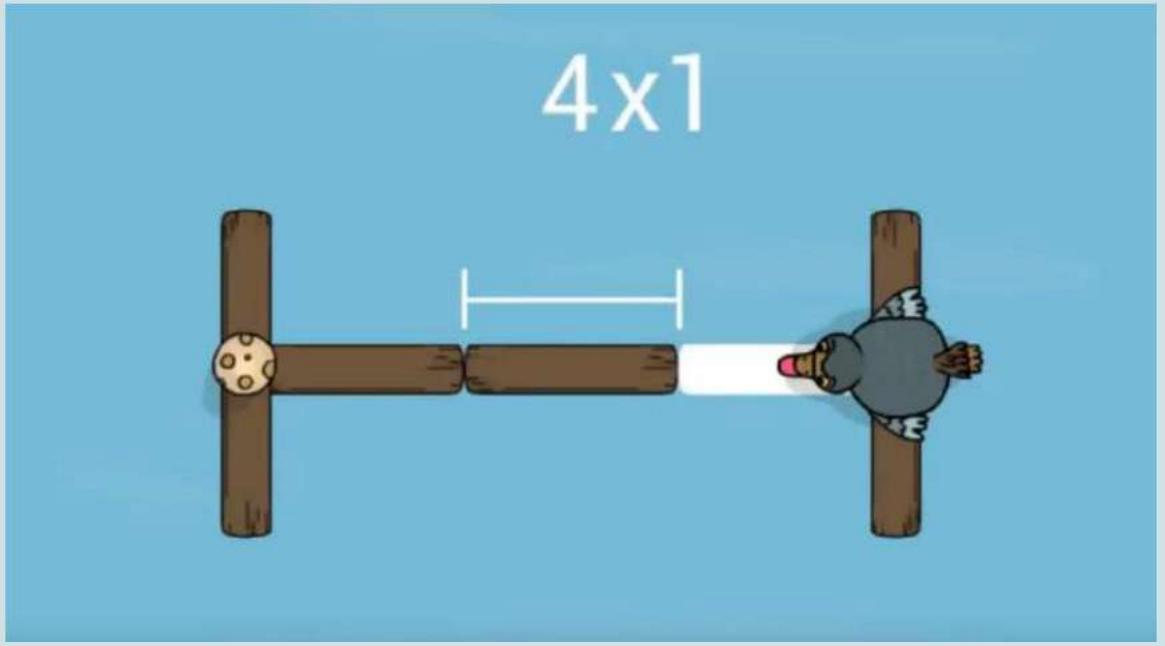
- Throwing the lobsters in an incorrect order will result in lobsters floating away.
- The code on the right will cause the second lobster to float away since it does not have a lobster to hold onto
- To achieve three stars in the skip-counting challenges, the dodo needs to step only one time and throw the correct number of lobsters.

- Wrong code:
  - throwLobster 9
  - throwLobster 36
  - throwLobster 27
  - throwLobster 18
  - throwLobster 45



Multiplying Using Logs

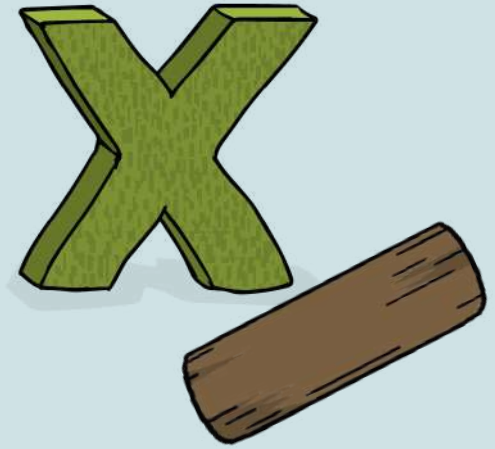
- The logs are used to help practice multiplication.
- Each log has its own length that is displayed.
- The length for a bunch of logs that are the same is only displayed once.



Watch on YouTube

Multiplying Using Logs

- Students will count the number of logs with the same length and multiply the number of logs by their length
- The dodo needs to step the product
- For example:
  - There are four logs, with the length of each equaling five
  - Since 4 X 5 = 20, the dodo needs to take 20 steps.
- In a few of the challenges all logs are the same length. In others, there are two or more sets of logs with different lengths



Before We Begin...

In some of the challenges the students have to demonstrate what they have learned by writing the entire code from scratch.

These are referred to as assessment challenges.

Lesson 1 – Red Lobster

In this lesson, students will:

- Solve challenges 1-6
- Practice skip-counting in challenges 1-6

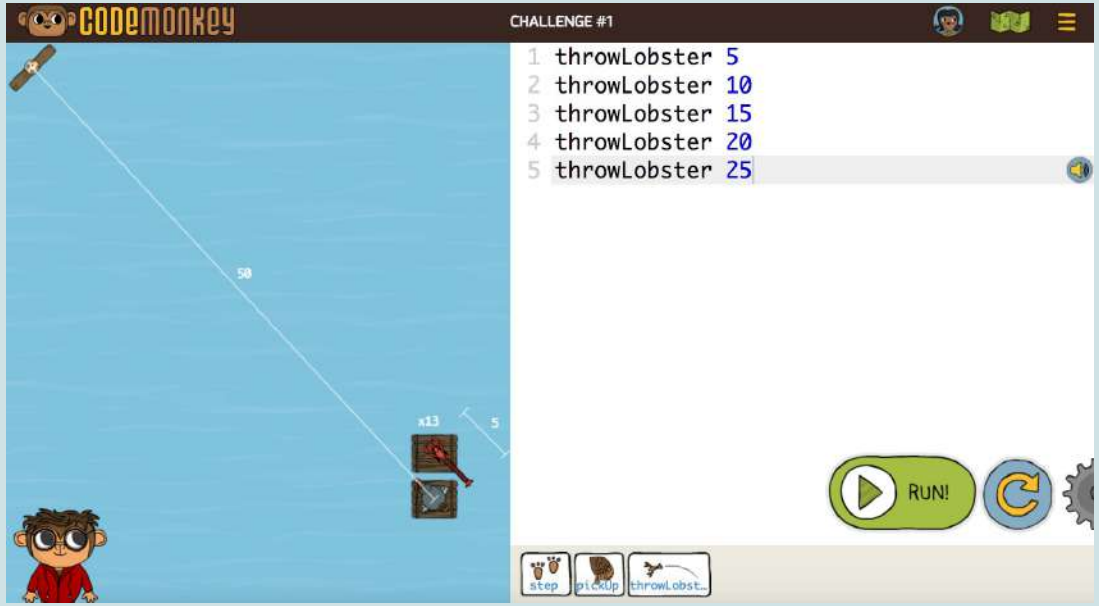
Red Lobster

U.S. Standards Addressed

CCSS-Math Standards	
MP.1	4.NBT.4
MP.4	4.NBT.5
MP.5	4.MD.7
MP.6	5.NBT.5
MP.7	7.G.5
CSTA-K12 Computer Science Standards	
1B-AP-12	2-AP-14
1B-AP-15	2-AP-16
	2-AP-17

Red Lobster
Challenge 1

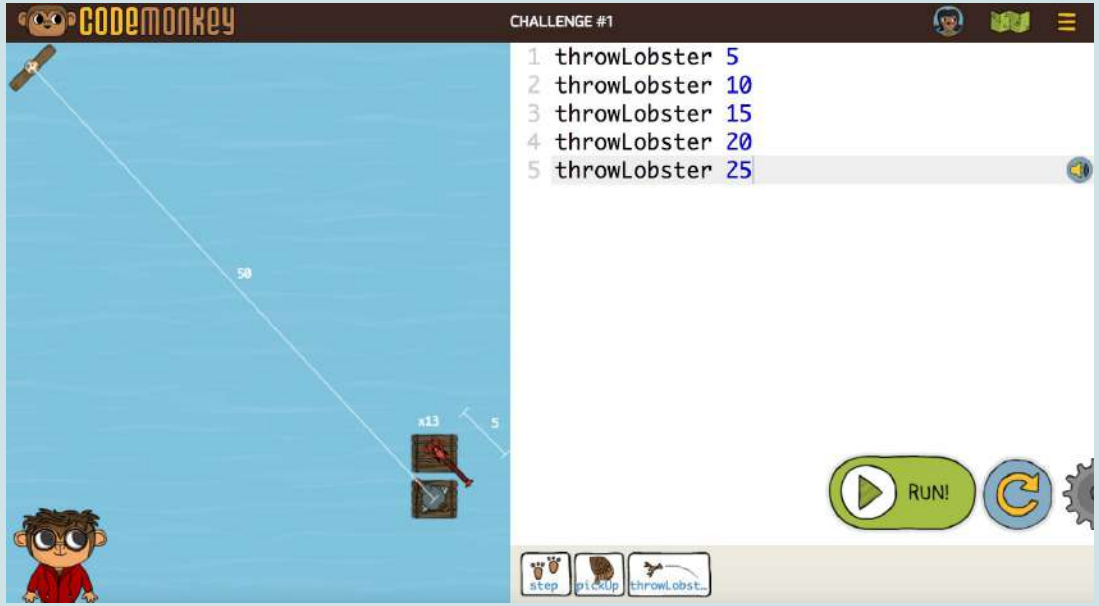
- The students will start this chapter with skip counting.
- In this challenge, students will practice skip counting by fives.
- Students need to throw the lobster to create a bridge for Dodo.
- The length of the lobster is five.
- Open the challenge and show your students where the length of the lobster is displayed.



Red Lobster

Challenge 1 Continued

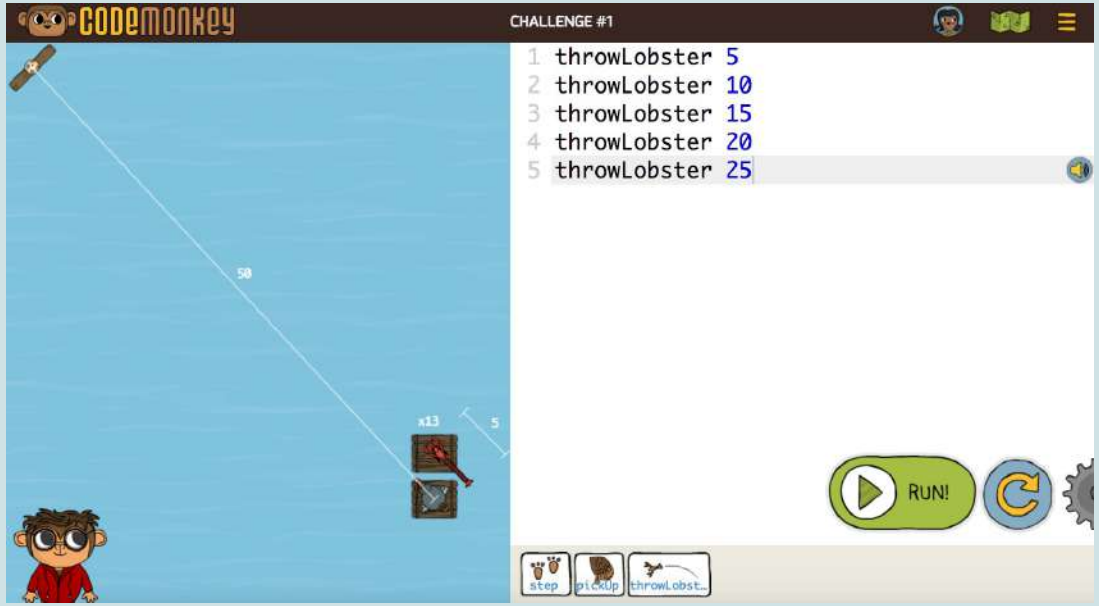
- The students are shown an example of how to use the throwLobster function
- The pre-existing code only throws five lobsters. Since the length of each lobster is five, the distance a lobster is thrown increases each time by five.
- The distance between the dodo and the egg is 50 (as displayed)



Red Lobster

Challenge 1 Continued

- Show your students what happens when the lobster is thrown the wrong distance
- For example, if you add “throwLobster 32”, the lobster floats away.
- Your students need to throw more lobsters (five more). The last lobster needs to be thrown a distance of 50.
- Once all lobsters are thrown, Dodo can step across them and pick up the egg.



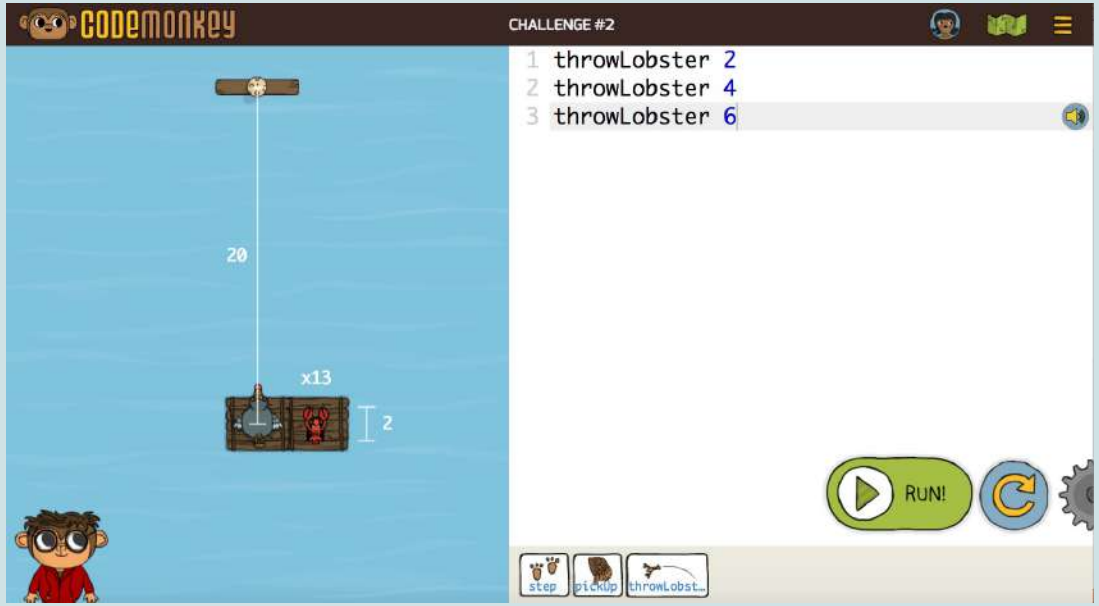
Red Lobster

Challenge 2

In this challenge, students will practice skip-counting by 2's.

Ask the students the following:

- What is the length of each lobster? (2)
- What is the distance between Dodo and the egg? (20)
- How many lobsters are needed in this challenge? (10)
- How many available lobsters are there? (13)



- Students will practice what they have learned in the previous challenge.

Red Lobster

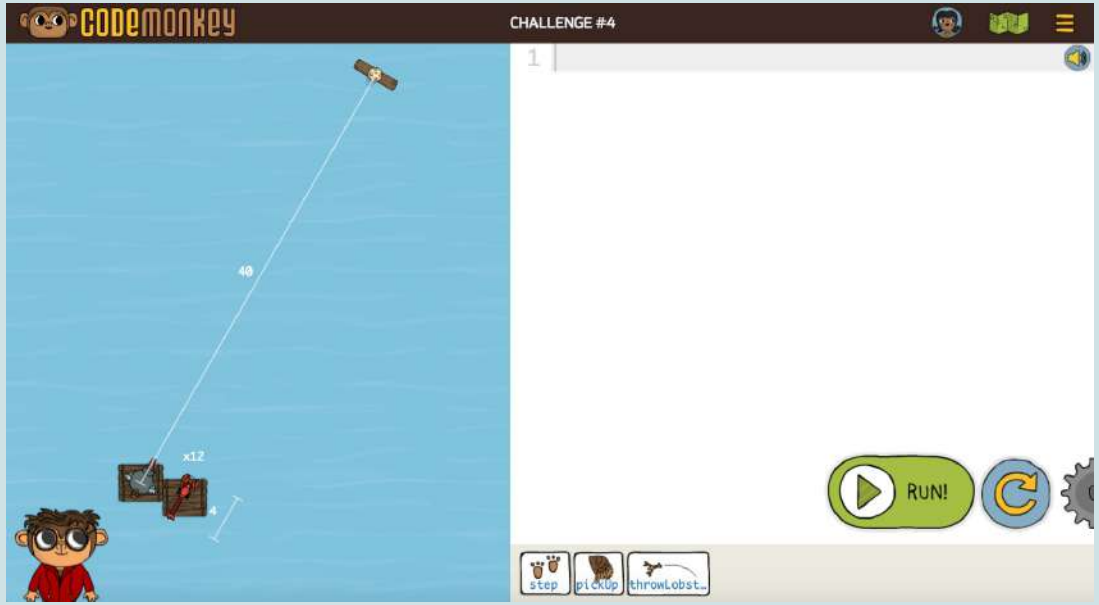
Challenge 3

- Students will practice skip-counting by 3's.
- In order for Dodo to get to the egg, 10 lobsters need to be thrown.

Red Lobster

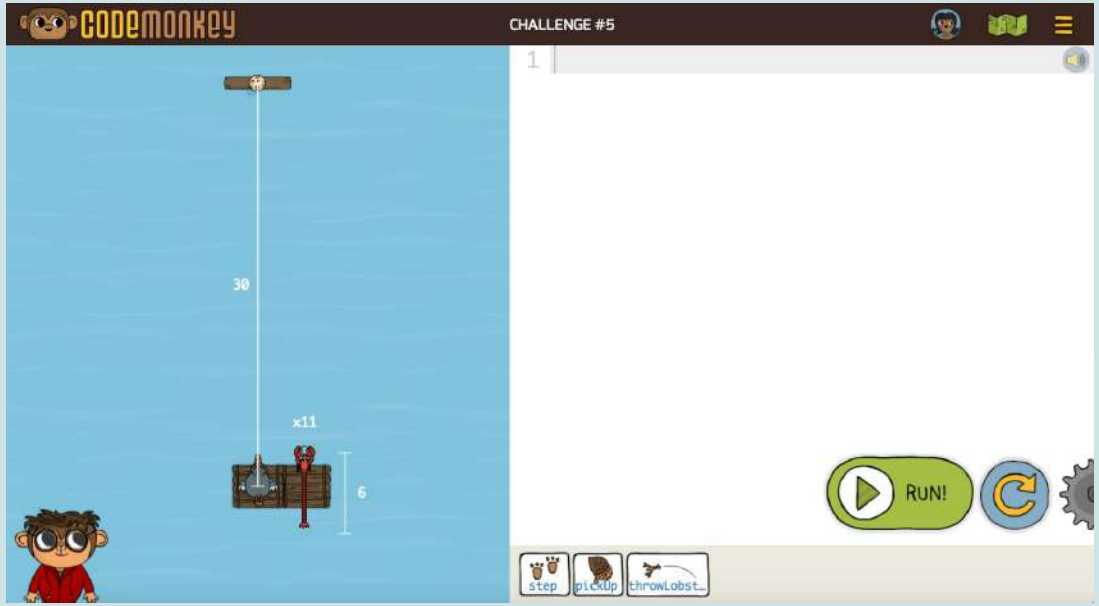
Challenge 4

- Students will practice skip-counting by 4's
- In order for Dodo to get to the egg, ten lobsters need to be thrown



Red Lobster
Challenge 5

- Students will practice skip-counting by 6's
- In order for Dodo to get to the egg, five lobsters need to be thrown
- Open the challenge and read Gordo's instructions out loud to your class. Before pressing OK, discuss Gordo's question:
  - The lobster's length is 6 steps, the egg is 30 steps away. How many lobsters are needed?
  - The answer is five



Red Lobster
Challenge 6

- Your students will practice skip-counting by 7's
- Five lobsters need to be thrown
- The distance between Dodo and egg is not displayed
- Open the challenge and read Gordo's instructions
  - Throw five lobsters. Step the distance.
- Discuss the distance between Dodo and egg with your students
  - What is the length of each lobster?

Lesson 2 – Deep in the Ocean

In this lesson, students will:

- Complete challenges 7-15
- Practice multiplication in challenges 7-14
- Find the sum of two products in challenge 15

Deep in the Ocean

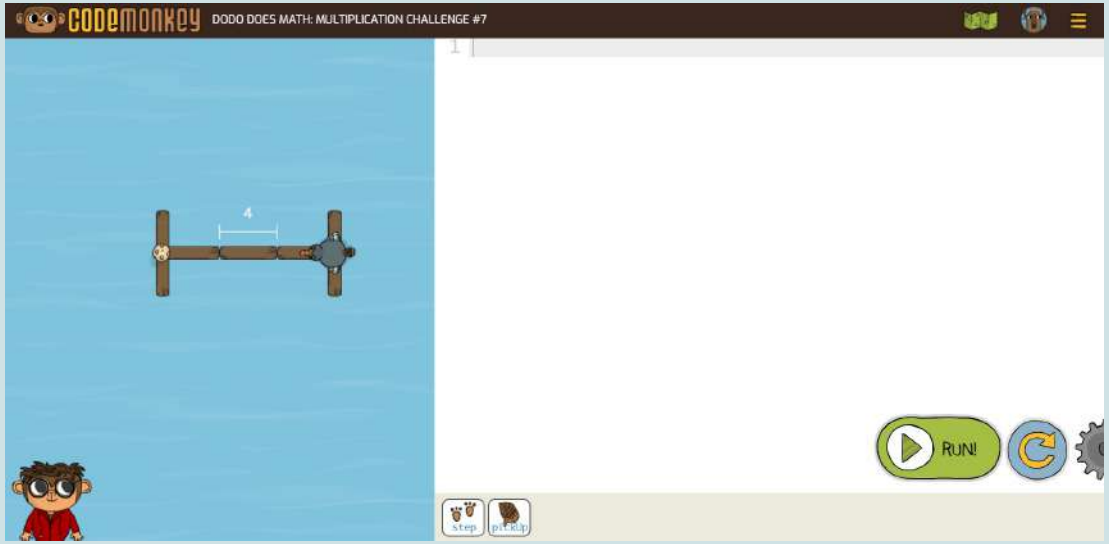
U.S. Standards Addressed

CCSS-Math Standards	
MP.1	4.NBT.4
MP.4	4.NBT.5
MP.5	4.MD.7
MP.6	5.NBT.5
MP.7	7.G.5
CSTA-K12 Computer Science Standards	
1B-AP-12	2-AP-14
1B-AP-15	2-AP-16
	2-AP-17

Deep in the Ocean

Challenge 7

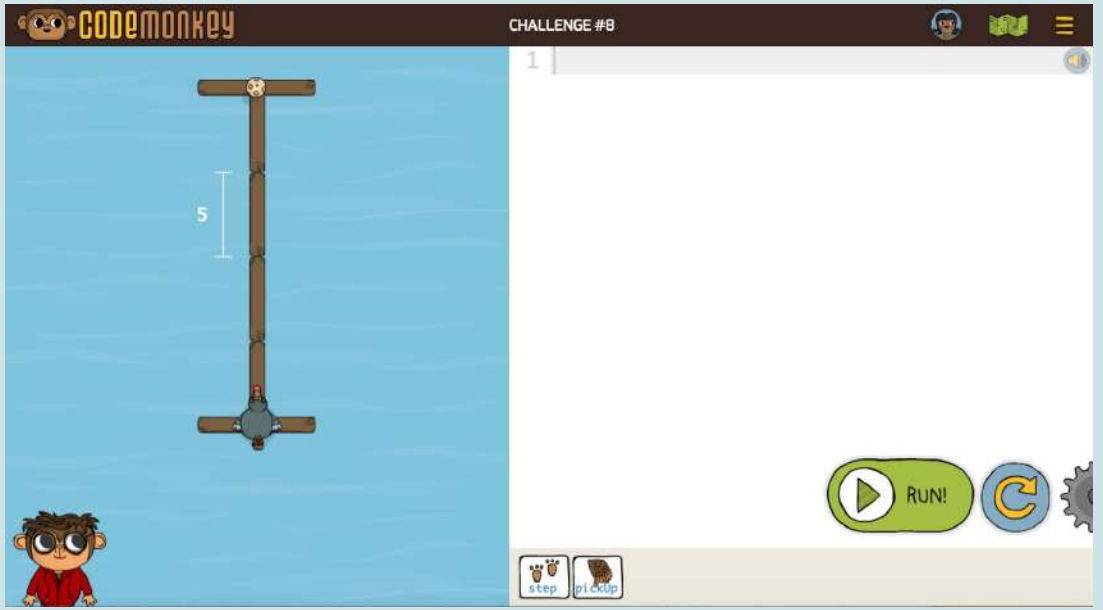
- This challenge features the clip on how to multiply using logs.
- The length of each log is four and there are three logs in this challenge.
- Use multiplication (3 X 4) to step 12
- Point out that although Dodo covers part of the first one, there are three logs that are the same length.



Deep in the Ocean

Challenge 8

- Students will multiply the length of the logs by the number of logs and then step one time.
  - The length of the logs is five
  - There are four logs

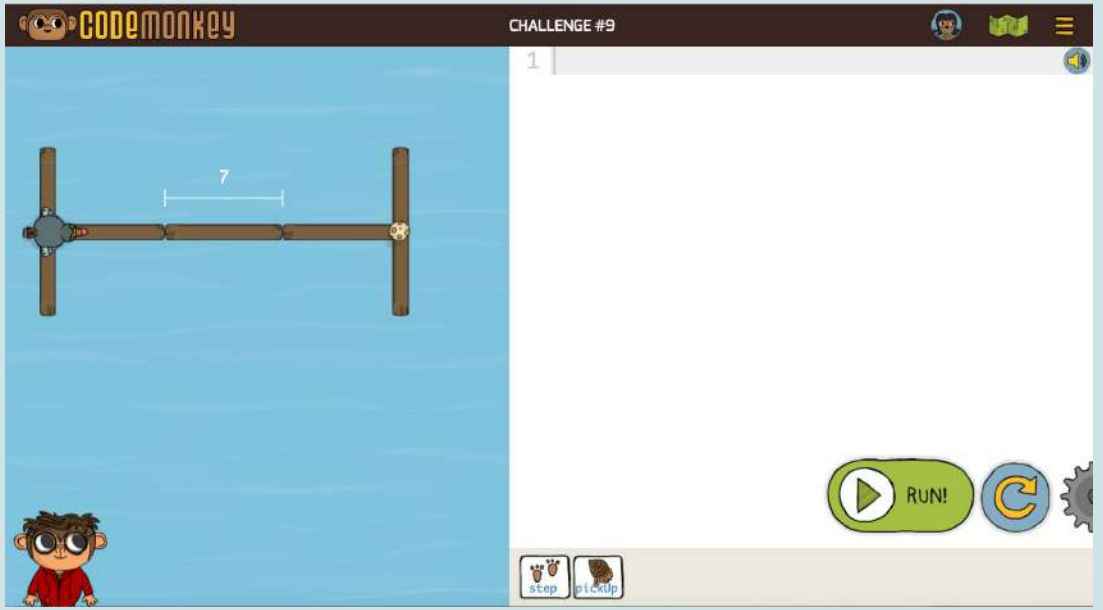


Deep in the Ocean

Challenge 9

Students will multiply the length of the logs by the number of logs and step once

- The log's length is seven
- There are three logs



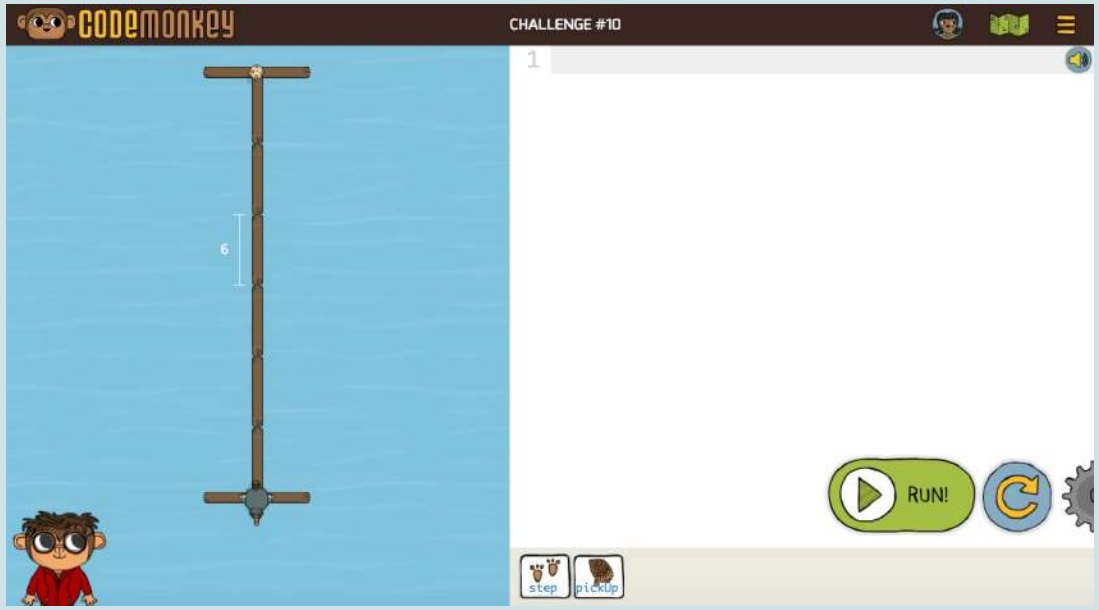
Deep in the Ocean

Challenge 10

Students will multiply the length of the logs by the number of logs and step one time

- The log's length is six
- There are six logs

The egg is behind Dodo! Remind your students that using a negative number causes Dodo to step backwards.



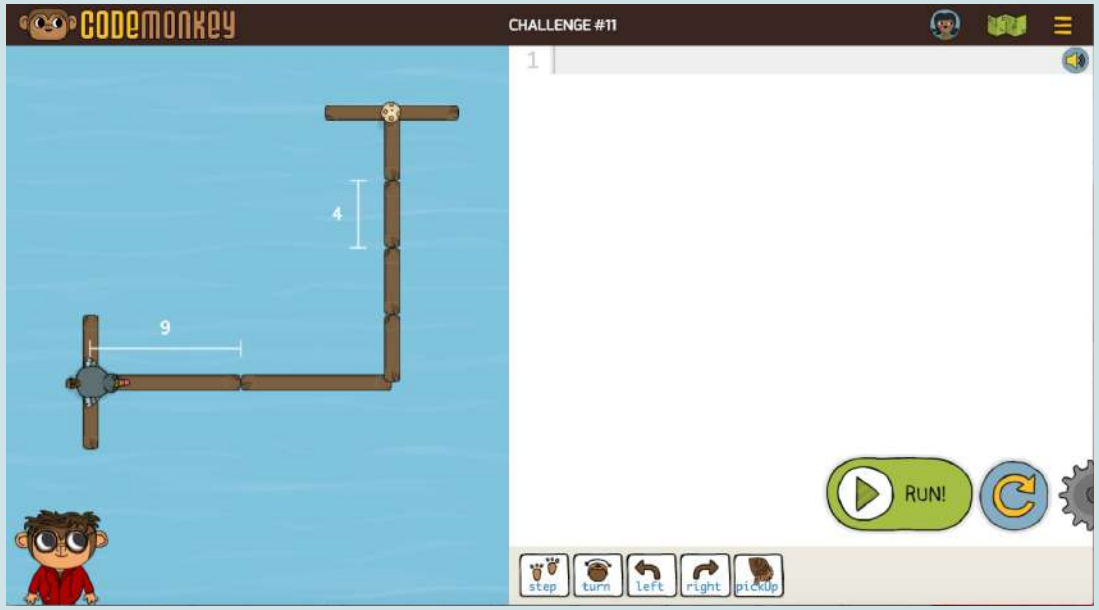
Deep in the Ocean

Challenge 11

Students will solve two problems:

- Two logs with a length of nine steps each
- Four logs with a length of four steps each

Dodo needs to step the product of the first problem, turn and then step the product of the second problem.



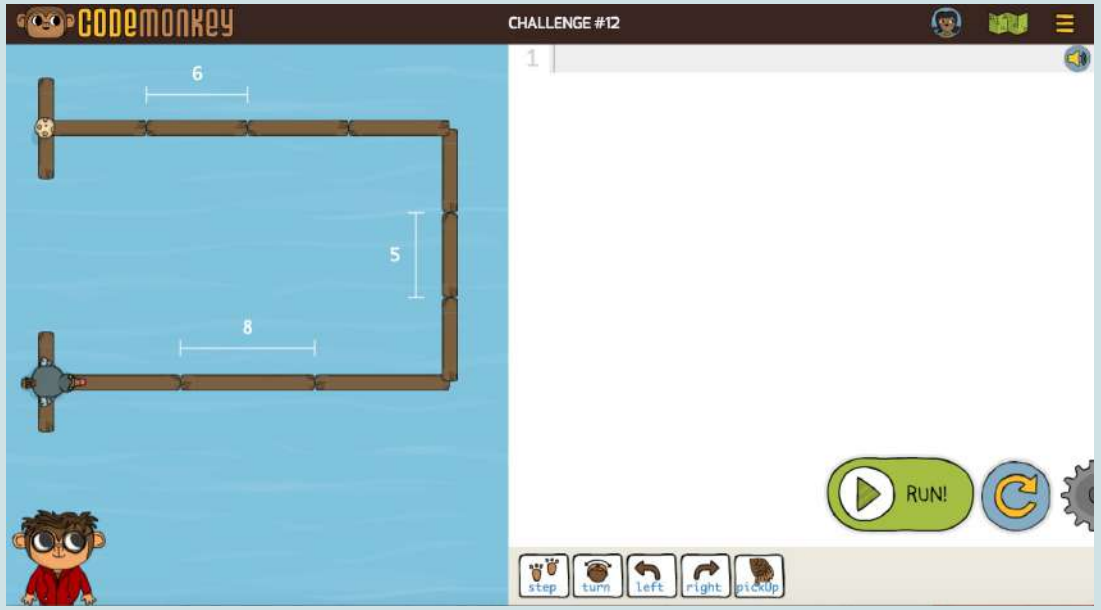
Deep in the Ocean

Challenge 12

Students will solve three problems:

- Three logs with a length of eight each
- Three logs with a length of five each
- Four logs with a length of six each

- Ask your students to state a fact regarding the first and last problems
  - Their product is the same



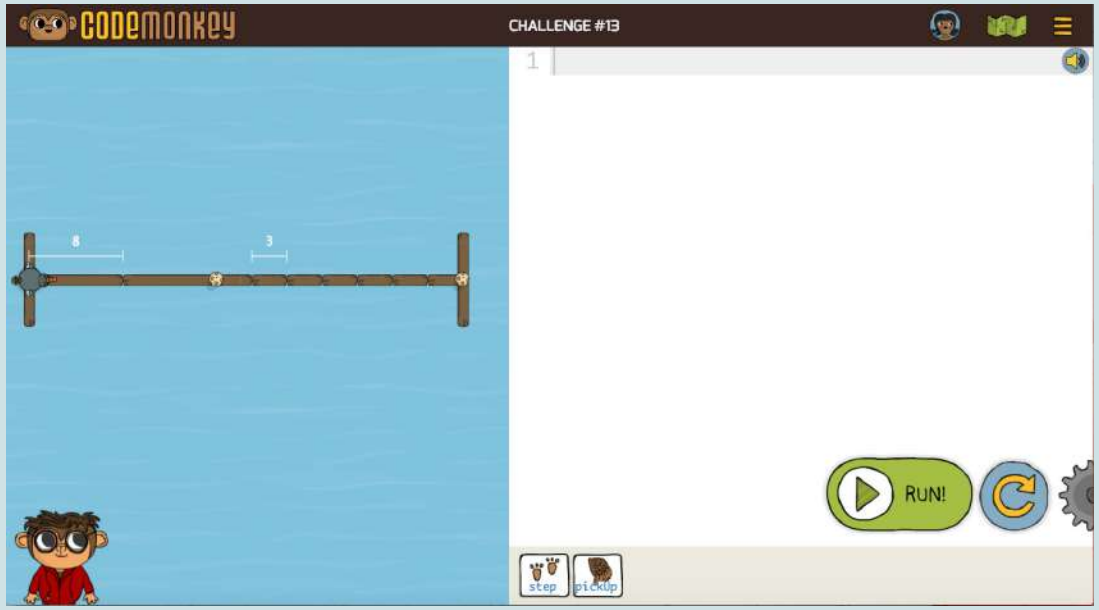
Deep in the Ocean

Challenge 13

Students will solve two problems here:

- Two logs with a length of eight each
- Seven logs with a length of three each

- There are two eggs in this challenge
- Both eggs are on the same line
- Dodo needs to step the product of the first problem, pick up the egg and then step the product of the second egg.



Deep in the Ocean

Challenge 14

- Students will solve one problem:
  - Four logs with a length of seven each
- Dodo needs to step, pick up an egg and turn three times
- The length of all the logs in this challenge is seven
- There are four logs on each side
- Emphasize that Dodo needs to step the same distance each time.

Deep in the Ocean
Challenge 15

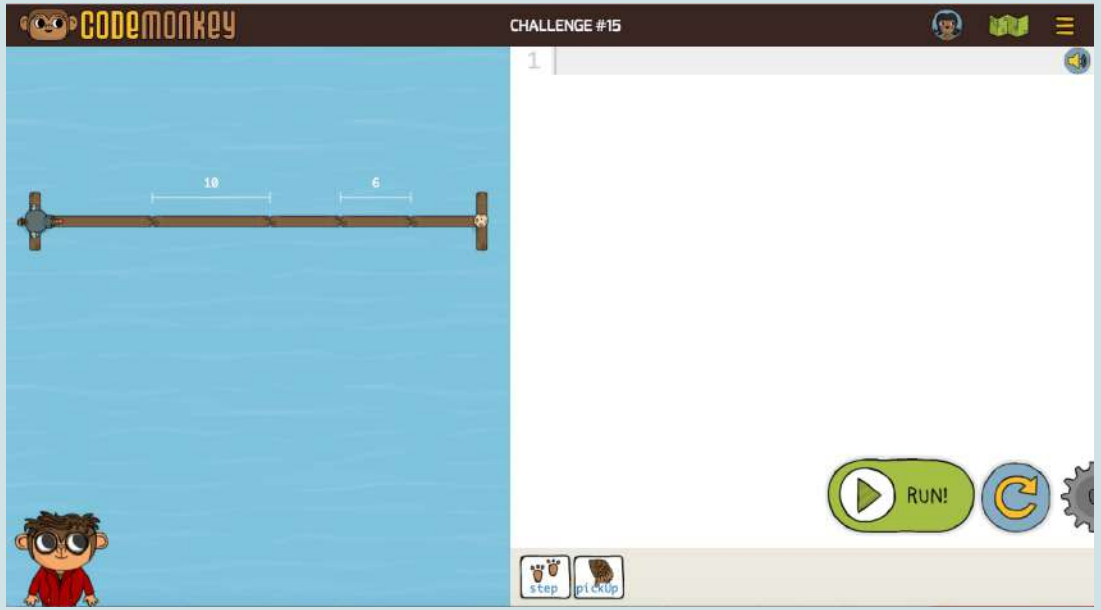
Your students will solve two multiplication problems:

- Two logs with a length of ten each
- Three logs with a length of six each

In order to achieve two or three stars in this challenge, students need to solve it using “step” only one time. Your students will add the two products and step that number.

Emphasize the order of operations:

- Multiplication first
- Addition after multiplication



Lesson 3 – Log Central

Within this lesson, students will:

- Solve Challenges 16-20
- Practice the Commutative and Distributive Properties

Log Central

U.S. Standards Addressed

CCSS-Math Standards	
MP.1	4.NBT.4
MP.4	4.NBT.5
MP.5	4.MD.7
MP.6	5.NBT.5
MP.7	6.NS.4
	7.G.5
CSTA-K12 Computer Science Standards	
1B-AP-12	2-AP-14
1B-AP-15	2-AP-16
	2-AP-17

Log Central

Challenge 16

The Commutative Property:

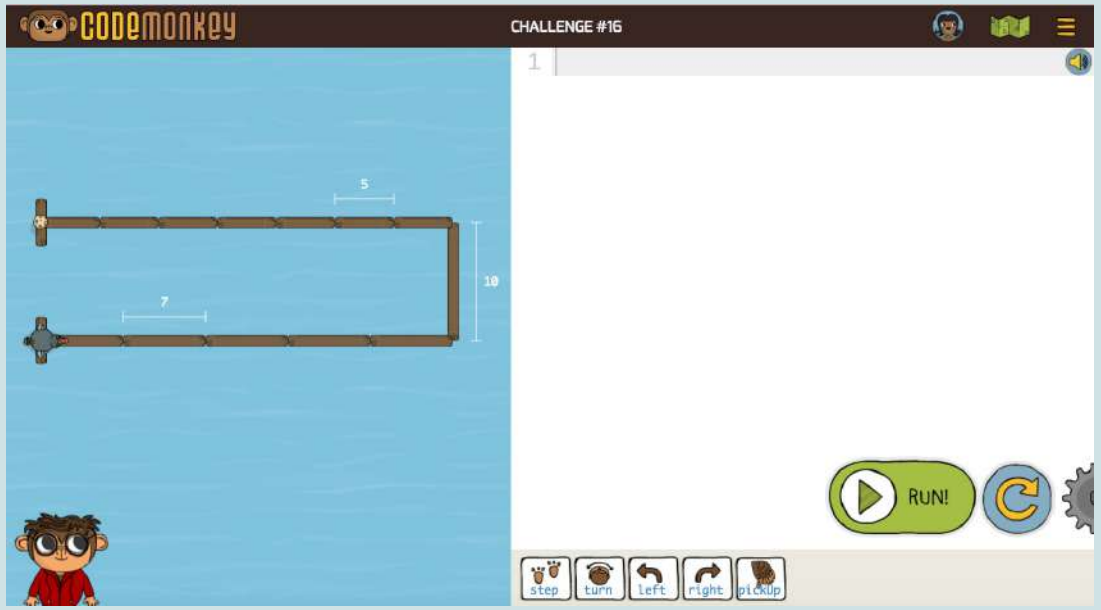
Students will instruct Dodo to step right, then up and then step left the same distance that she stepped right.

Emphasize that the distances are equal:

- Five logs with a length of seven steps
- Seven logs with a length of five steps

Your class will solve the following problems:

- 5 X 7 = 35
- 7 X 5 = 35



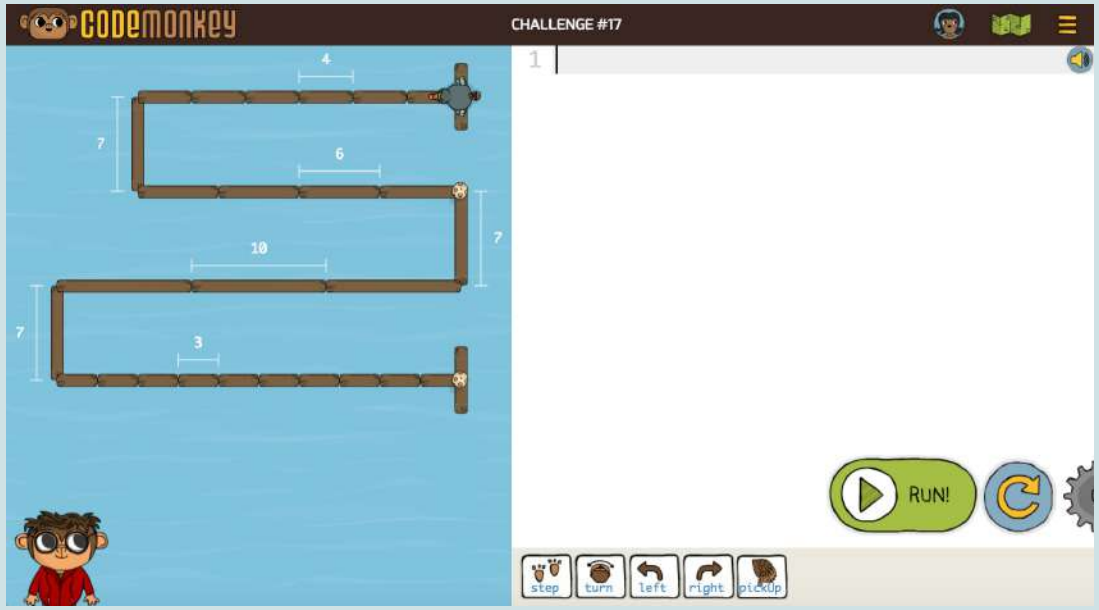
Log Central

Challenge 17

The Commutative Property:

- To get to the first egg:
  - Six logs with a length of four steps
  - Four logs with a length of six steps
- To get to the second egg:
  - Three logs with a length of ten steps
  - Ten logs with a length of three steps

Note that in order to get to the first egg, Dodo needs to cross from one side of the logs to the other side and back. These two distances are equal. The same goes for the second egg.



Log Central

Challenge 18

The Distributive Property:

On both sides, there are the following:

- Four logs with a length of four steps
- Four logs with a length of two steps

Discuss with your class the difference between the logs on the top and bottom (the difference is the order in which the logs are placed)

Log Central

Challenge 18 Continued

- The pattern of the tops logs is 2-2-2-2-4-4-4-4
- The pattern of the bottom logs is 4-2-4-2-4-2-4-2

Note that the distance across both logs is the same even though the logs are placed in different patterns

Ask your students to write the number sentence for the following two sets of logs:

- The top logs: 4X4 + 2X4
- The bottom logs: (4+2)X4

Log Central

Challenge 19

The Distributive Property:

Ask your students what the first thing they notice is when looking at the challenge. (answer: all the sides are equal)

Ask your students to list the length and number of logs on each side:

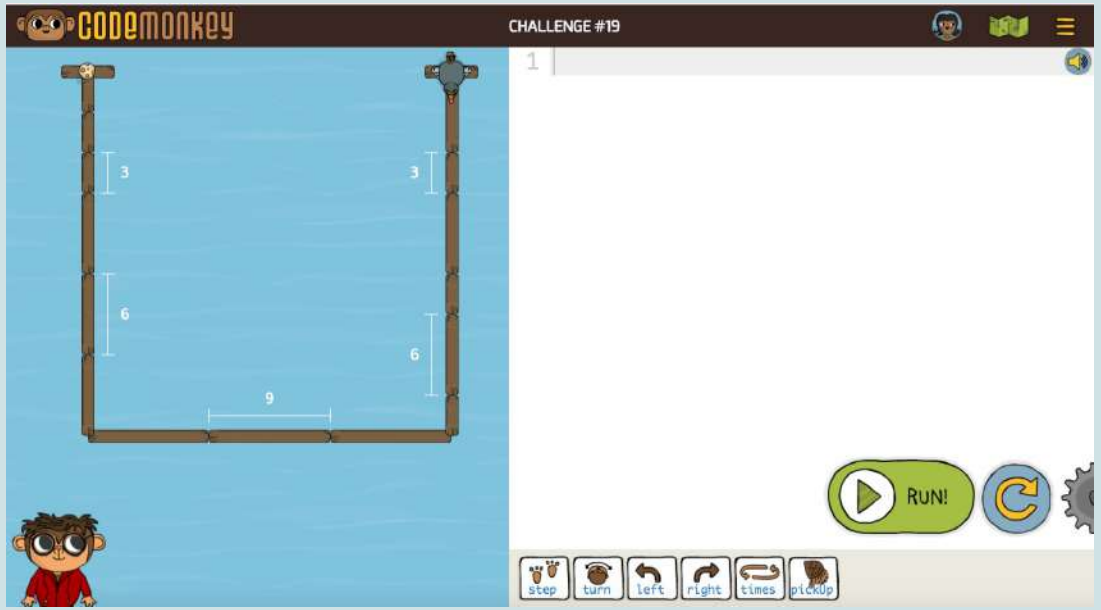
- Three times: one log with a length of three and one log with a length of six
- Three logs with a length of nine
- Three logs with a length of three and three logs with a length of six

Log Central

Challenge 19 Continued

Instruct your class to write the following number sentences:

- (6+3) X 3
- 9 X 3
- 6 X 3 + 3 X 3

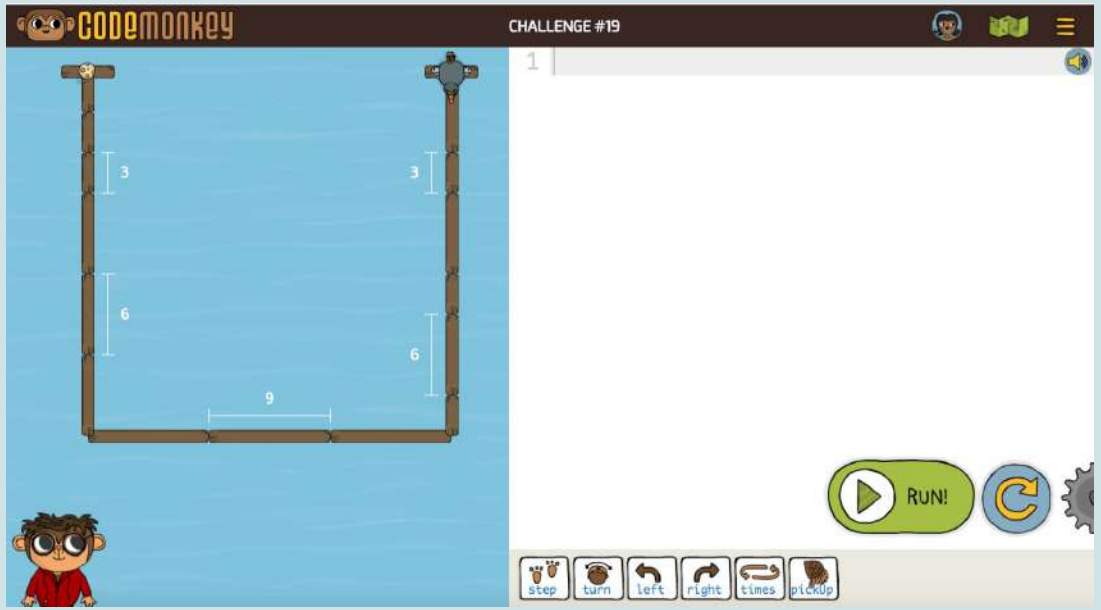


Log Central

Challenge 19 Continued

Emphasize the following:

- The first expression can be simplified by first adding six and three, which is the same as the second expression.
  - (6 + 3) X 3 = 9 X 3
- Or, multiply three by each of the terms inside the parentheses, which is the same as the third expression.
  - (6 + 3) X 3 = 6 X 3 + 3 X 3



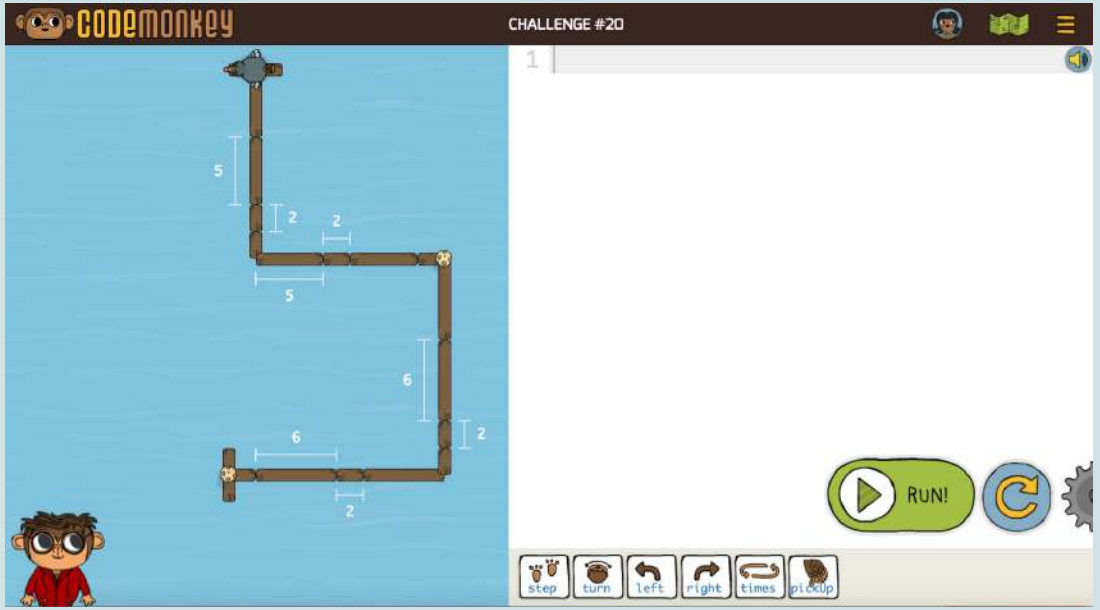
Log Central

Challenge 20

The Distributive Property:

Ask your students to list the length and number of logs on each side

- To get to the first egg:
  - Two logs with a length of five and two logs with a length of two steps
  - Two times: one log with a length of five and another log with a length of two steps

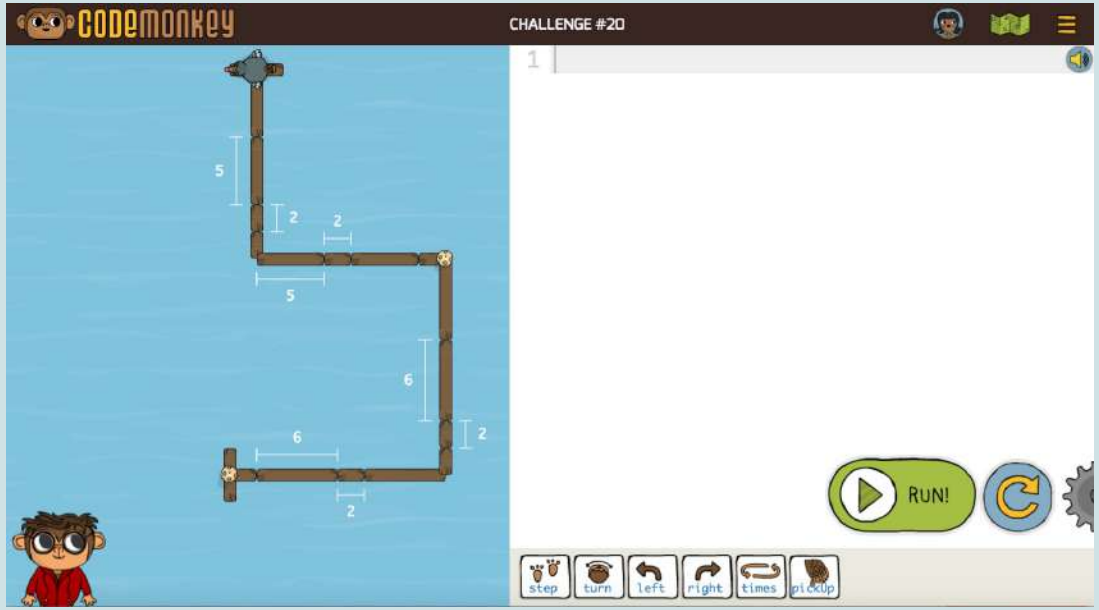


Log Central

Challenge 20

- To get to the second egg:
  - Two logs with a length of six and two logs with a length of two steps
  - Two times: one log with a length of six and one log with a length of two

Your students need to use “step” twice in order to achieve two stars in this challenge. Instruct your students to read Gordo’s instructions since he offers a hint for the solution (i.e. using two loops)



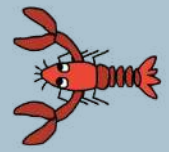
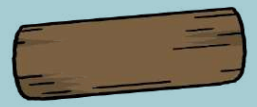
Reference Card

Keyword/Button	Description
	To make the dodo "step" a certain distance, we have to write "step X" using the number of steps we want her to take, for example, "step 10". Pressing the step button will write the word "step" in your code.
	"Turn" should be accompanied by a direction (left/right) or degrees (45, 90, 180). Examples: "turn right", "turn 90" Pressing the turn button will write the word "turn" in your code.
	Pressing the run button will make the code on the right run. You can see the outcome by looking at the scene on the left.
	The reset button will erase everything you wrote in the code on the right and will reset the code to how it was at the beginning of the challenge.

Reference Card Continued

Keyword/Button	Description
	"pickUp()" is a function without an argument that is used to pick up the eggs. Pressing the pickUp button will write the words "pickUp()" in your code.
	"Left" and "right" are used after the statement "turn" to make the dodo turn in the desired direction. Pressing the **left** or **right** buttons will write the word "left" or "right" in your code accordingly.
	A simple loop is a sequence of instructions that repeats a specified number of times. **Example**: the dodo will repeat "step 5, turn left" three times. The instructions in the loop should be written underneath the code with an indentation (....). Press the **Tab** key on the keyboard. Pressing the **times** button will write the beginning of a simple loop in your code: "3.times - >".
	"throwLobster()" is a function that is used to throw a lobster. The argument of this function is the distance to throw the lobster. Pressing the throwLobster button will write the word "throwLobster" in your code.

Character Review

Character	Description
	Gordo, named after the first ape in space, is the guide who will help you and give you instructions along the way. His remarks are both funny and helpful. You can always click him to re-read the instructions.
	The dodo is the main character. You need to help the dodo pick up all the eggs in each challenge. The dodo needs to be exactly where the egg is in order to pick it up.
	The lobsters are thrown in order to form a bridge for the dodo. Each lobster needs to hold onto another lobster, or it will float away. They are used to practice skip counting. Each lobster has a length. When throwing the lobster, the distance to throw it needs to be specified. The number of available lobsters is also displayed.
	The logs are used as a bridge for the dodo. It is used to practice multiplication. The logs have length. The students need to count the number of logs and multiply the length of the logs by the number of logs. The dodo needs to step the product and pick up the egg.