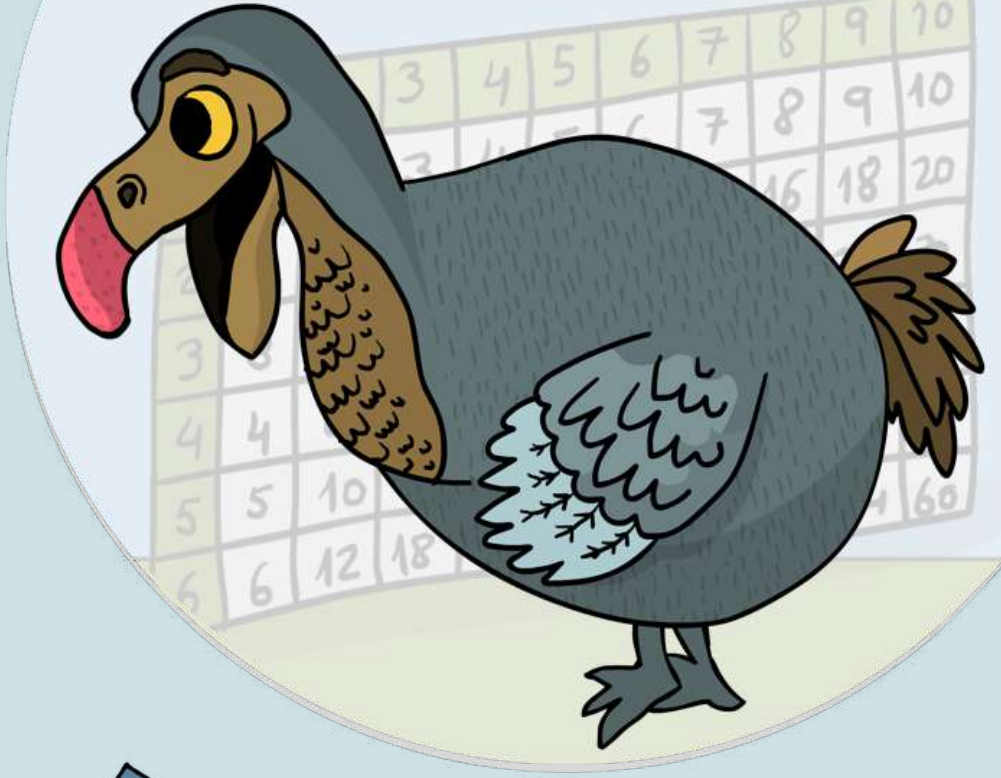
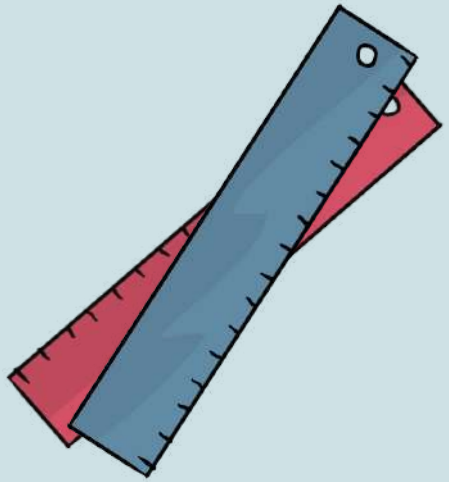
CodeMonkey
LESSON PLANS

DODO DOES MATH

DISTANCES





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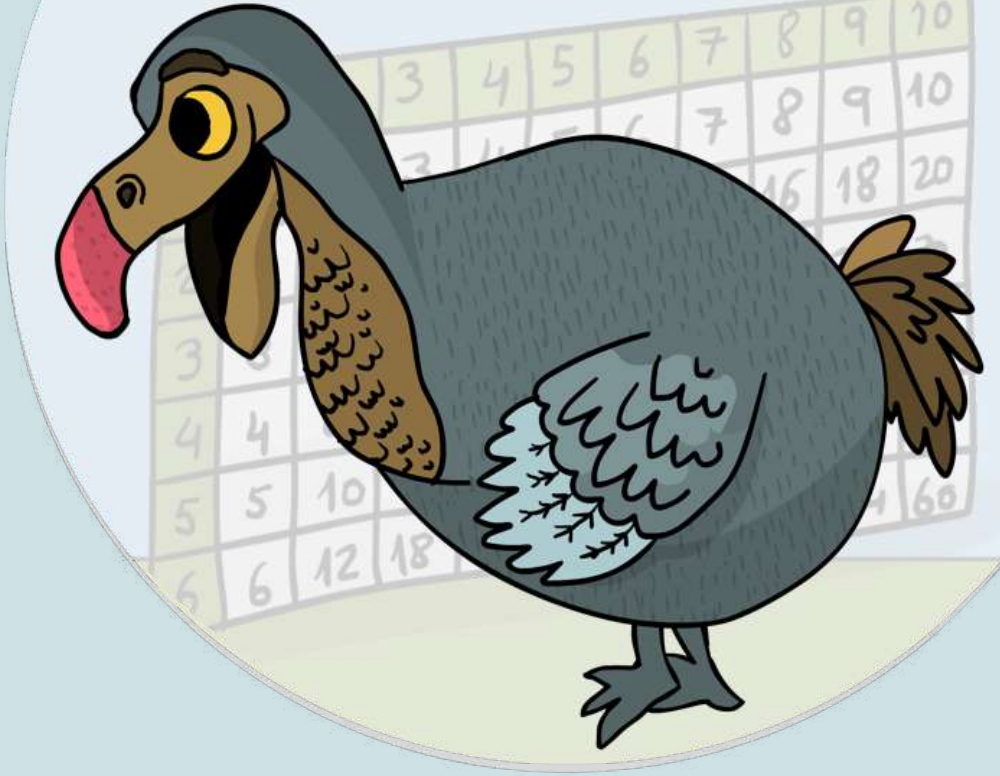

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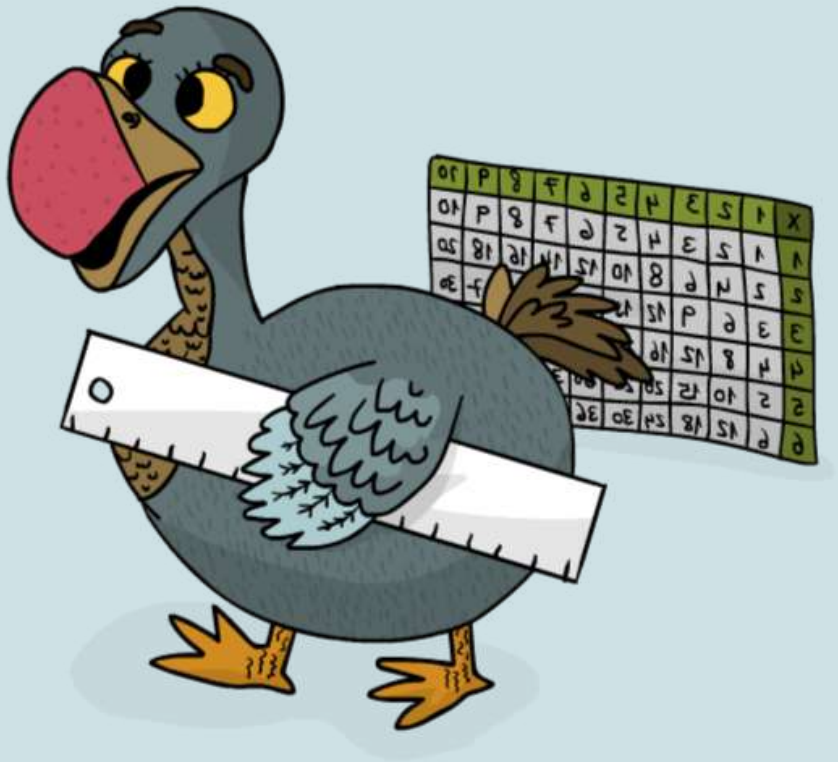
Table of Contents

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: Distances enables students to practice their measuring skills alongside their addition and subtraction skills, The course consists of challenges where students are required to help the dodo pick up all of the eggs that went missing by using 2nd-4th grade math concepts.

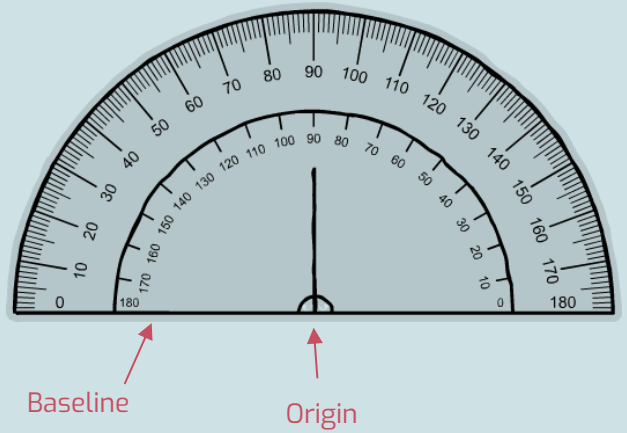
The following lesson plans will guide you on how to successfully Integrate Dodo Does Math into your class.

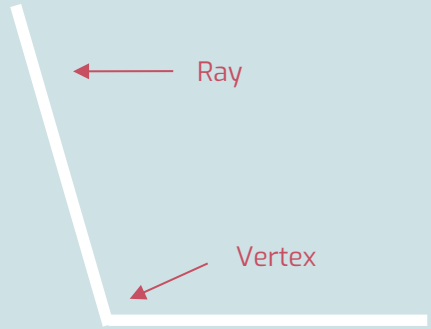


Ready? Let's Begin!

Math Terms

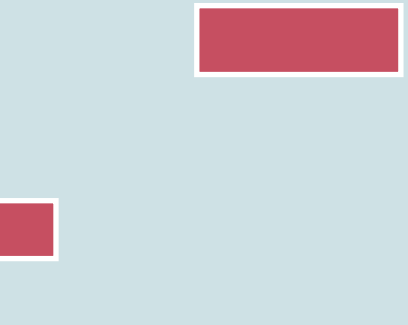
- Baseline: the line along the bottom of the protractor
- Origin: the middle of the baseline
- Vertex: the point where two rays meet
- Ray: a line that has one endpoint and goes on forever in the other direction
- Degrees: the unit of measurement in angles

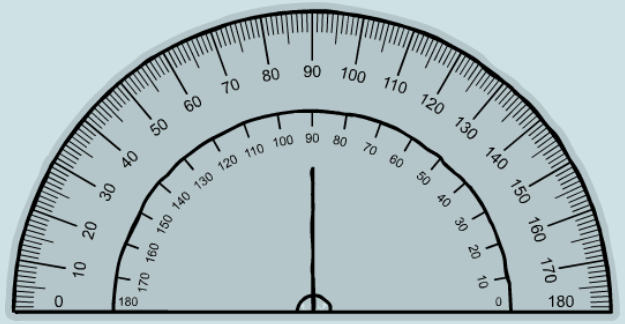


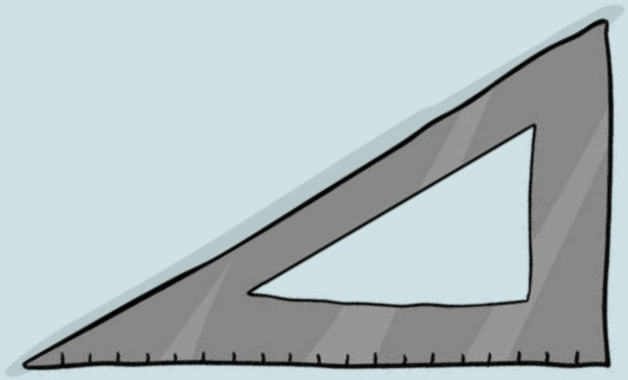


Important Information

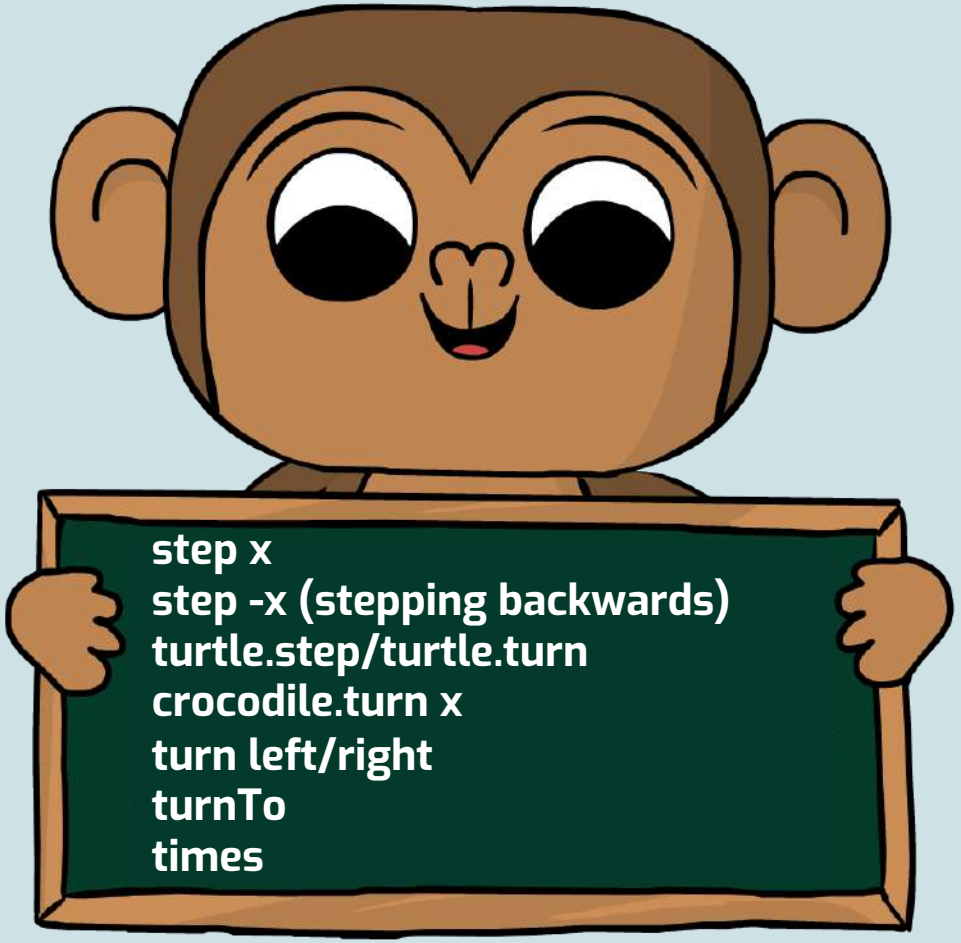
- Pre-requisite: First 30 Coding Adventure challenges
- 20 total Distance challenges
- Some challenges include adding or subtracting two distances while others consist of adding or subtracting more than two distances
- Challenges that do not include a ruler are meant to be solved using the displayed measurements only







Preliminary Coding Knowledge



Coding in CoffeeScript

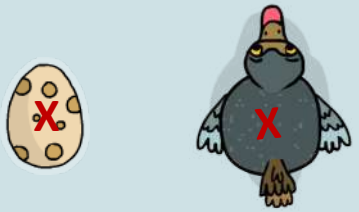
CoffeeScript is the programming language taught in CodeMonkey's Coding Adventure. Dodo Does Math requires basic knowledge of CoffeeScript in every challenge. The language compiles to JavaScript. Similarly to JavaScript, it is used in the industry primarily for web applications. The language was chosen 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 guessed instead of measured
- 3-Stars = Solution completed, used tools to measure and 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

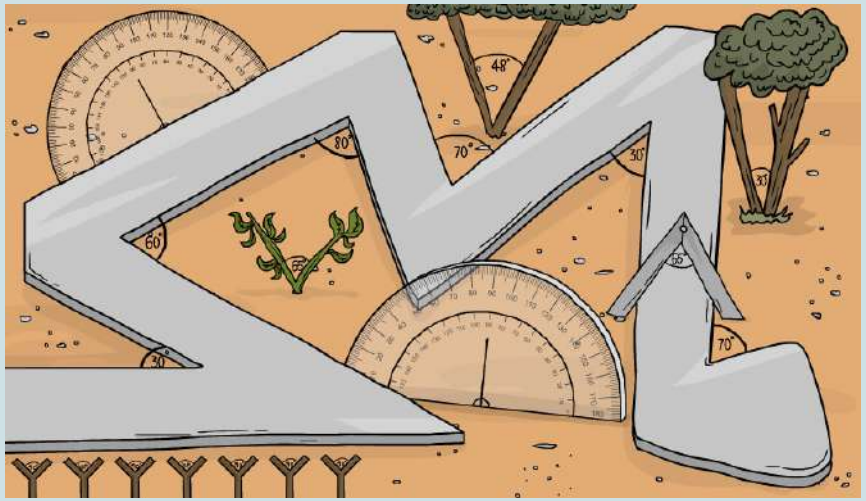
- In order to pick an egg up, the center of the dodo needs to be exactly on the center of the egg.



- The dodo needs to step the correct distance and direction in order to pickUp() the egg.
- Precise instructions on how to get to each egg and pick it up are needed in order for the dodo to successfully catch all of the eggs.
- To write the correct instructions, the number of steps and degrees that the dodo needs to move should be measured and/or calculated.

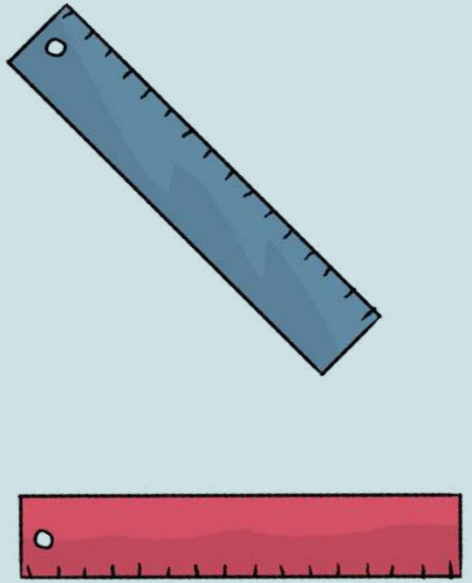
Common Core State Standards Addressed

- 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



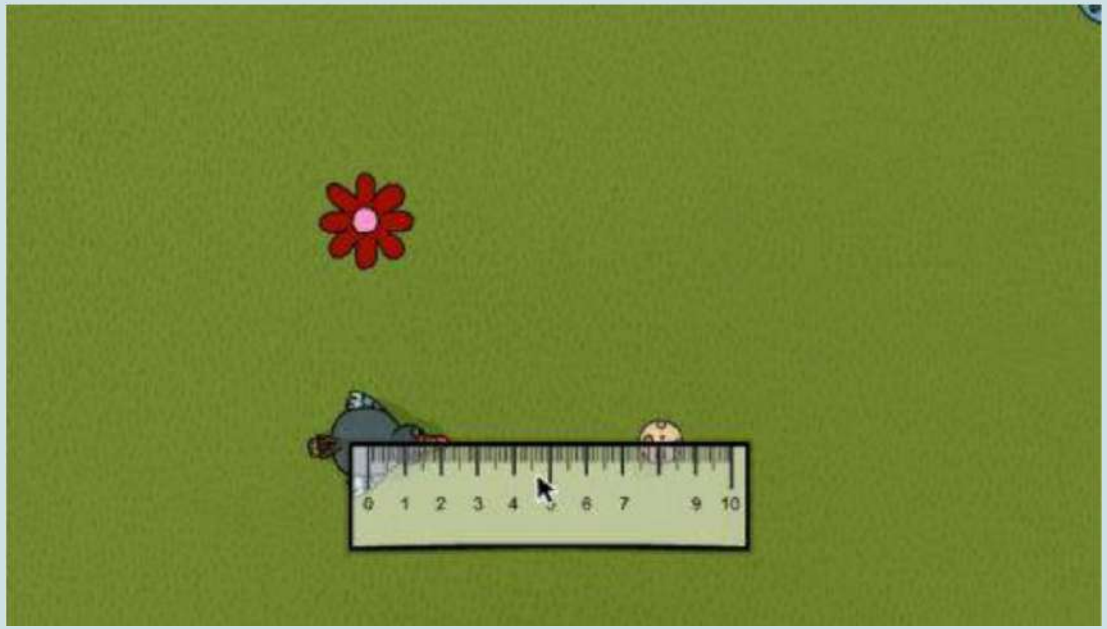
Measuring Distance with a Life-like Ruler

- Students will use a new type of ruler that simulates a real-life one.
- The ruler has a fixed length of 10 steps.
- In some challenges, students will use the ruler more than once to measure the full distance.
- Students will discover the need to use a reference point for measuring distances to and from objects.



Measuring Distance with a Life-like Ruler

- For distance measuring, students will need to:
  - Place the ruler on the center of an object
  - Rotate the ruler (using the icon)
  - Read the distance on the ruler

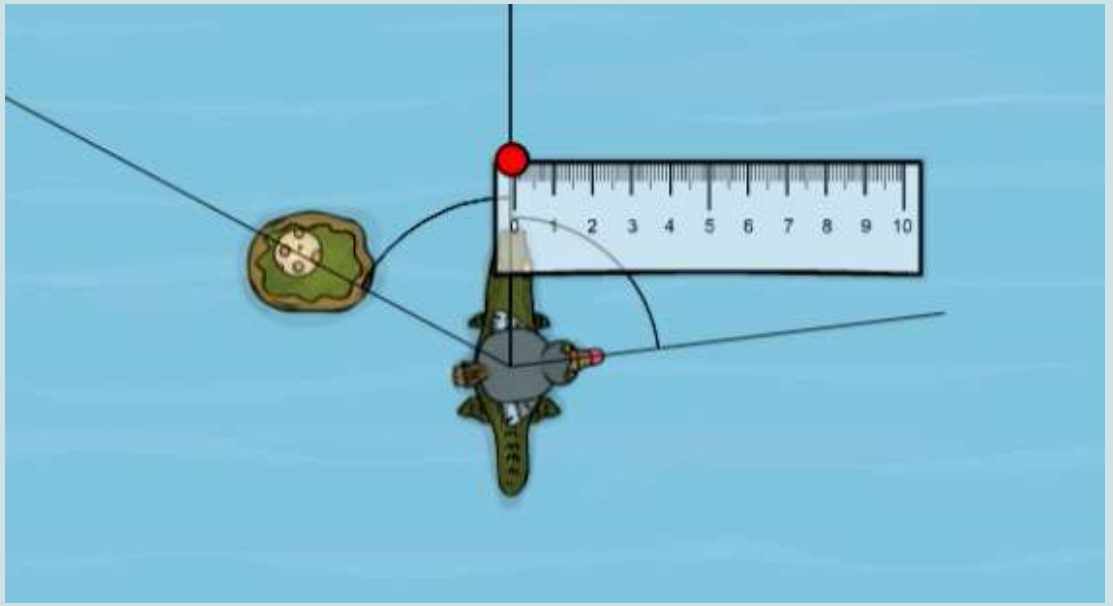


Watch on YouTube

Measuring Distance with a Life-like Ruler

Meaning of Colored Dots:

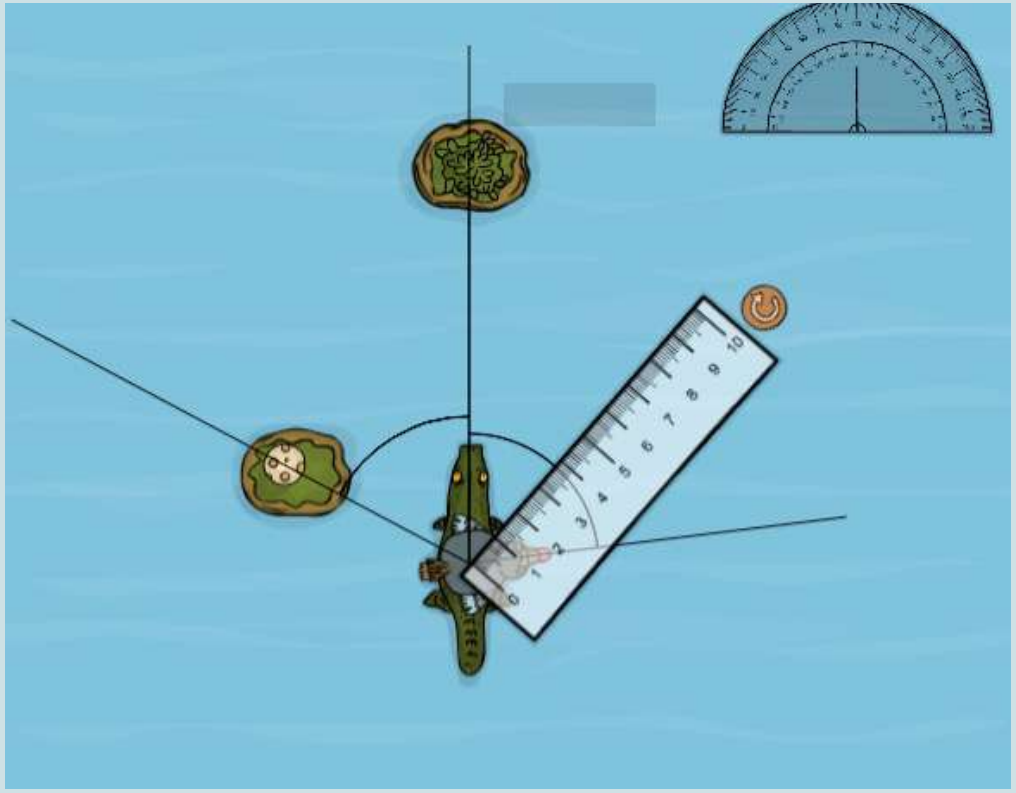
- When the ruler is moved, a flashing red dot will appear above the zero.
- The dot will change to green when the ruler is placed correctly on an object.
- If the ruler is placed anywhere else, the dot will either not appear or remain red.



Measuring Distance with a Life-like Ruler

Rotating the ruler:

- To rotate the ruler, move the mouse over the rotate icon and click on it.
- Drag with the mouse and rotate the ruler until it is placed onto the second object that you want to measure the distance to.



One more thing...

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.

Before We Begin...

Click here to access a beginner's guide that will help you get started with creating accounts for students and managing your classroom.
Should you have any questions, you can contact us anytime at: **info@codemonkey.com.**

Good luck!

The CodeMonkey Team

Lesson 1 – You Rule

In this lesson, students will:

- Complete challenges 1-8
- Measure distance using a ruler in challenges 1-5
- Measure using a ruler and add two or more distances in challenges 6-8

You Rule

U.S. Standards Addressed

CCSS-Math Standards	
MP.1	4.NBT.4
MP.4	4.NBT.5
MP.5	4.MD.7
MP.6	6.NS.4
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

You Rule

Challenge 1

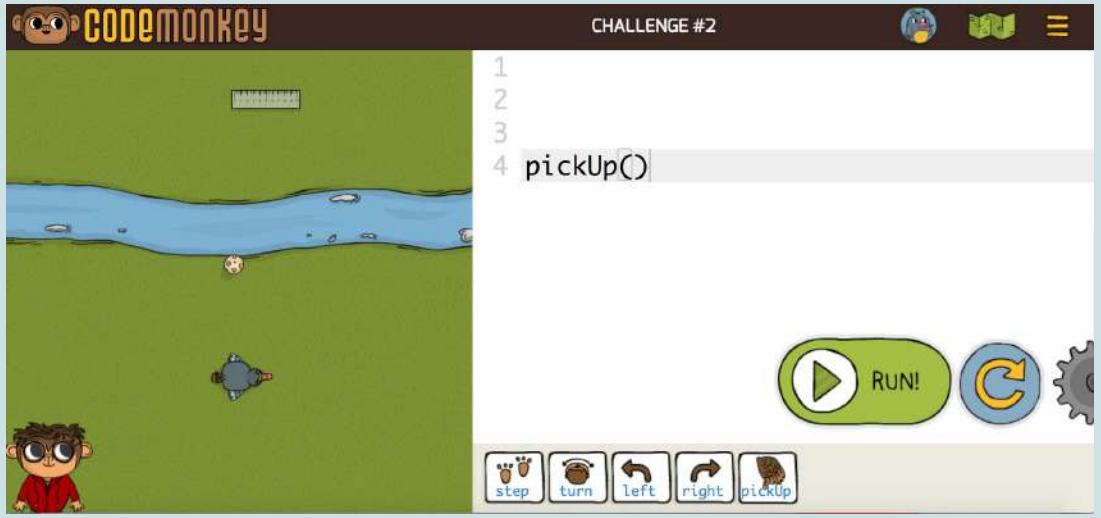
- A short clip at the beginning of the challenge explains how to use the ruler.
- Your students will move the ruler to the center of Dodo and measure the distance to the center of the egg.
- Once the distance between Dodo and egg has been measured, the code should be changed to contain the measured distance.
- Instead of “step 0”, the distance should be “step 8”.
- Not moving the ruler (i.e. guessing the number), will only earn the student one star.

You Rule

Challenge 2

This challenge will demonstrate how distance is not influenced by the direction the dodo is facing.

- Draw students' attention to the fact that the distance between Dodo and egg is the same no matter which way Dodo is facing.
- Your students will rotate the ruler after placing it on Dodo (or egg).
- Dodo needs to turn before it steps the correct distance.



You Rule

Challenge 3

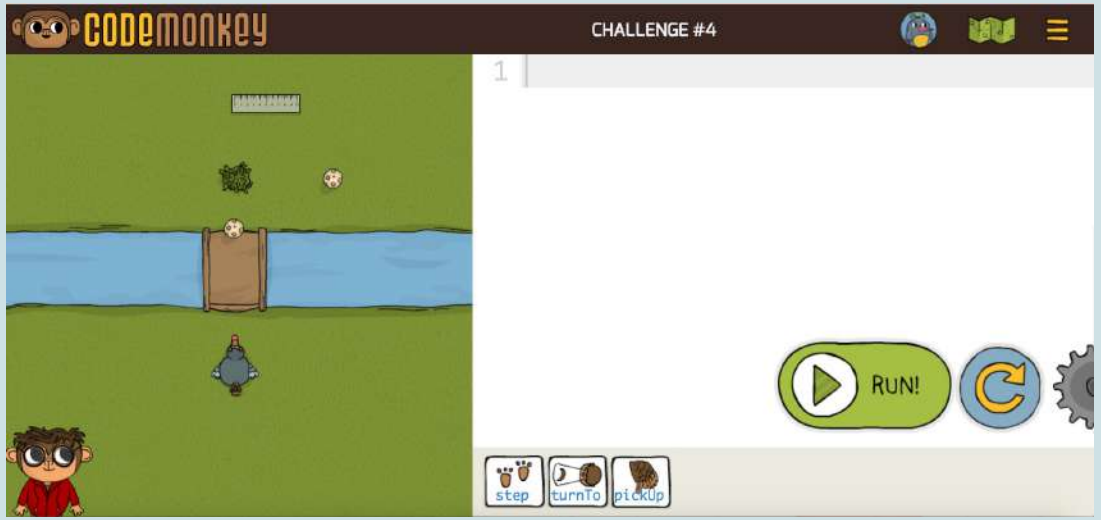
Measuring distances between objects:

- Students will measure the distance between Dodo and first egg (eggs[0]), and between the first egg and second egg (eggs[1]).
- The two pickup() statements are given in the initial code to remind students they need to pick up both eggs and to allow them to focus on navigating Dodo.
- In between picking up the first and second eggs, Dodo will need to turn to the second egg. By doing this, students will utilize the concepts that they have practiced in the previous challenge.

You Rule

Challenge 4

- This is as assessment challenge so students will write all the code by themselves.
- They will integrate their measuring skills, including how to measure from one object to the next using the coding skills they acquired.
- Remind your students to pick up the egg when Dodo gets to it.
- The command buttons at the bottom of the screen can be used to remind students of the functions they have learned and to save typing.



You Rule

Challenge 5

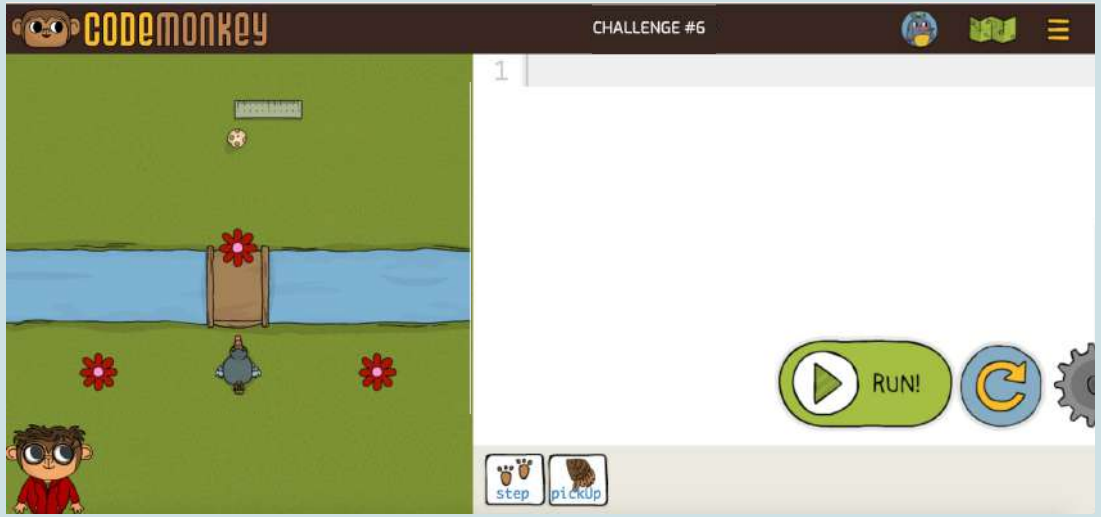
- In the previous challenge, students used the egg as a turning point. In this challenge, they will use the flower as a turning point.
- Both Dodo and the turtle can step over the flower (unlike the bush that blocks the way).
- Students will use the flower to help measure the first distance that Dodo needs to step.
- When Dodo reaches the flower, she will need to turn.
- After turning, students will need to measure the distance from the flower to the egg.

You Rule

Challenge 6

Measuring distances longer than the ruler:

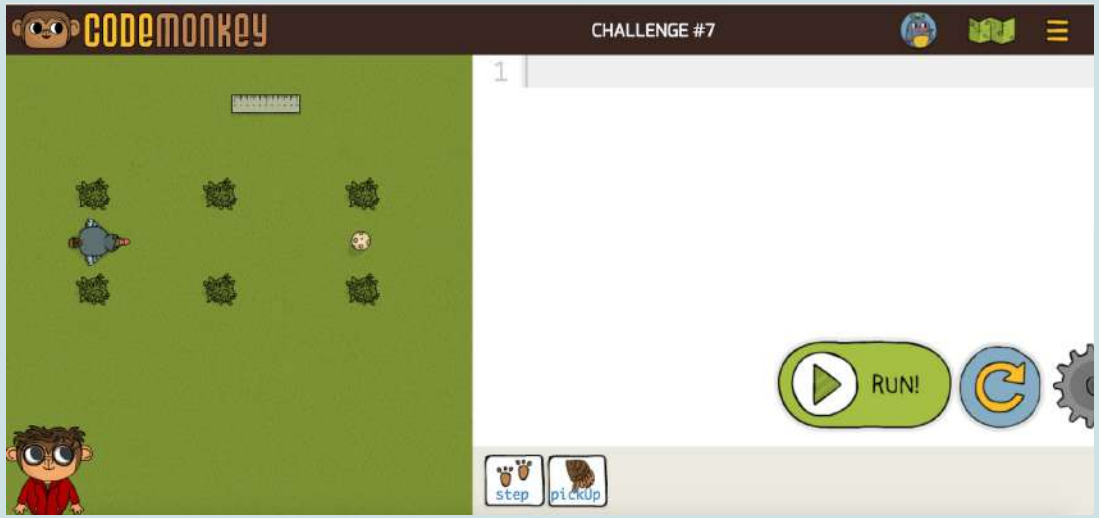
- A short clip displays the addition problem at hand and how to measure the two distances.
- The distance between Dodo and egg is longer than the ruler's length.
- Students will need to measure two distances and find their sum. 'step' should be used only once.
- The flower should be used to measure two distances:
  - Dodo to flower
  - flower to egg



You Rule

Challenge 7

- Students will face the obstacle of measuring two consecutive distances without a reference point.
- Draw your students' attention to other objects (i.e. the bushes) that as the same distance apart as Dodo and egg.
- Ask how these objects can help.
- The bushes should be used to measure the two distances using the middle bush as a reference point
- Your students will add up the distances and step once (as learned in the previous challenges).



You Rule

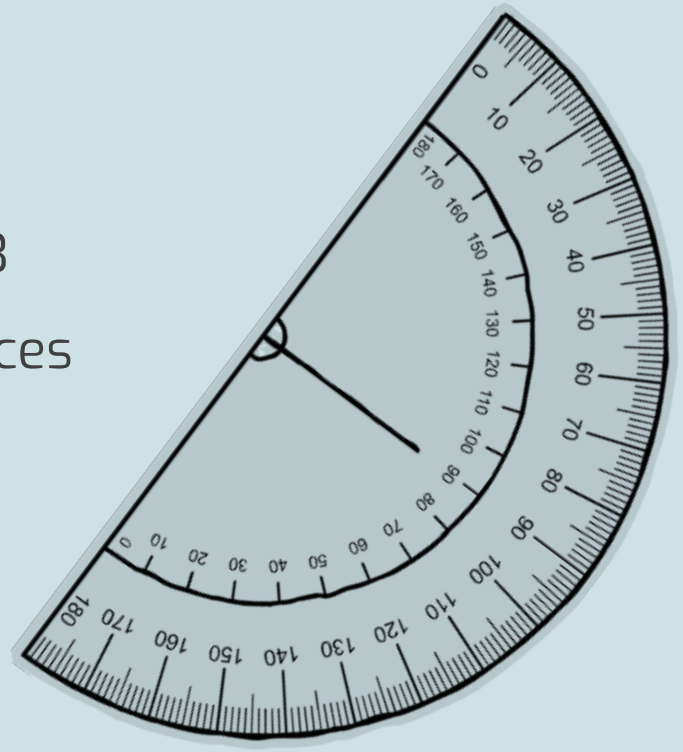
Challenge 8

- Your students will measure three distances and add them up. The code will use ‘step’ only once.
- The flowers should be used as reference points to measure from.

Lesson 2 – Between the Bushes

Within this lesson, students will:

- Complete challenges 9-16
- Add two or more distances in challenges 9-13
- Measure using a ruler and subtracting distances in challenges 14-16



Between the Bushes

U.S. Standards Addressed

CCSS-Math Standards	
MP.1	4.NBT.4
MP.4	4.NBT.5
MP.5	4.MD.5
MP.6	4.MD.6
MP.7	4.MD.7
	4.G.1
	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

Between the Bushes

Challenge 9

- The ruler will not appear in the next five challenges since the distances are shown.
- A short clip will demonstrate the task at hand.
- Your students will need to add up the distances.
- Like before, the sum of the numbers should be used to ‘step’ once.

Between the Bushes

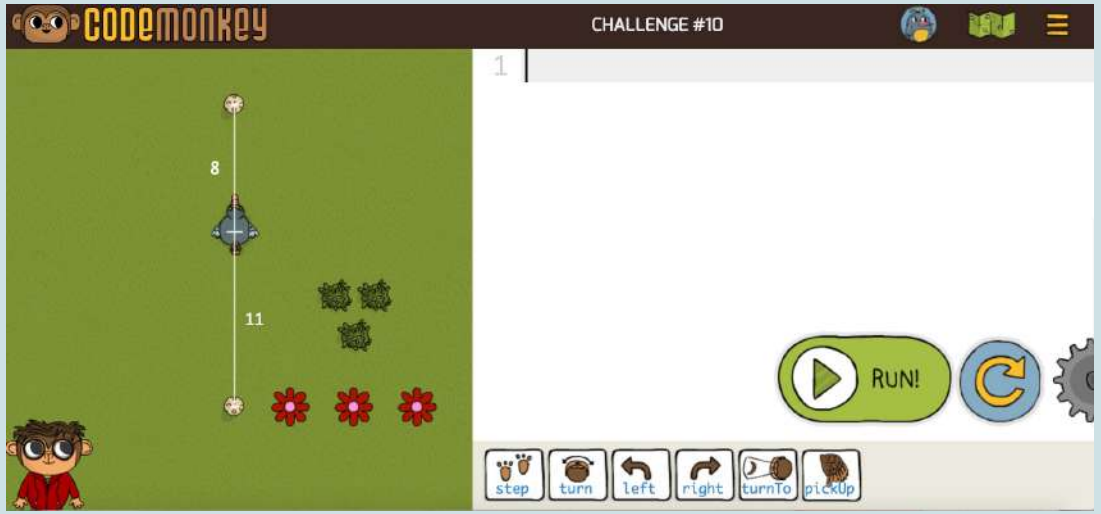
Challenge 9 Continued

- Students should notice that the first distance displayed (5) is equal to the distance from Dodo to the flower.
- The second distance they need (17) is the distance from the flower to the egg.
- Students will add up the distances and use their sum in their code to get to the egg.

Between the Bushes

Challenge 10

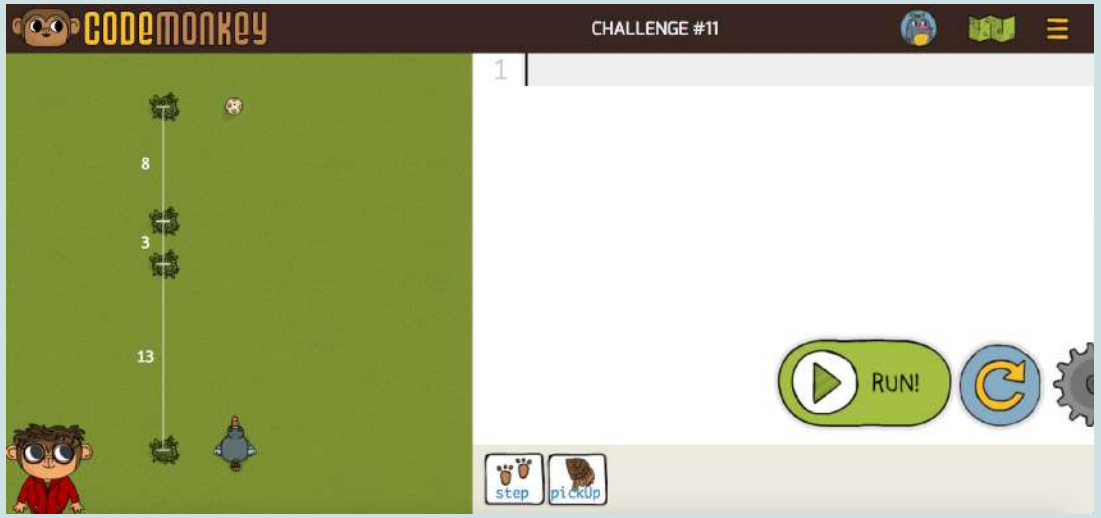
- This is an assessment challenge.
- To get three stars, students will use the negative symbol to step backwards.
- For example: in 'step -5' , Dodo will walk back five steps.



Between the Bushes

Challenge 11

- In this challenge, three different distances are displayed as one line.
- Students will add up distances and use the sum to step.
- Students should only step once



Between the Bushes

Challenge 12

There are two ways to solve this challenge. Both involve Dodo stepping backwards, which can be accomplished by using a negative argument for step, e.g. step -10

1. Step to the top egg first

- Add two distances to get to the top egg.
- Add all three distances to get to the bottom egg by stepping backwards.

2. Step to the bottom egg first

- Stepped backwards to the bottom egg.
- Add the three distances to step to the top egg.

Between the Bushes

Challenge 13

- Here students will use previous Coding Adventure skills to turn the crocodiles.
- The length of the crocodiles is displayed
- Crocodiles can only turn. Use the following code to turn the crocodiles:
  - crocodiles[0].turn left
  - crocodiles[1].turn right

Between the Bushes

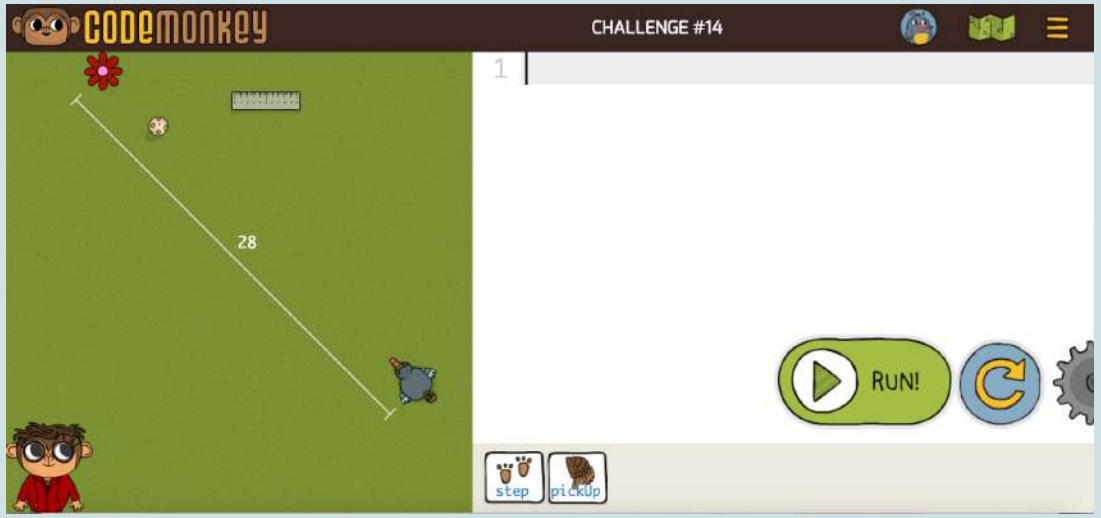
Challenge 13 Continued

- The crocodiles can be turned so their orientation is vertical rather than horizontal.
- Once the crocodiles turn, they create a bridge for Dodo to walk across the lake.
- Your students will add two distances to step once to the egg.

Between the Bushes

Challenge 14

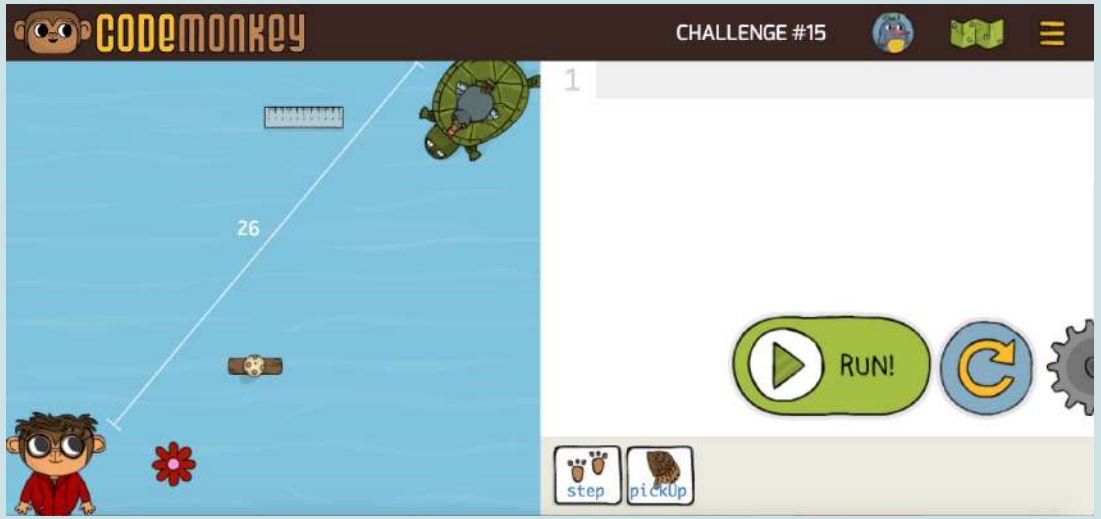
- The distance from Dodo to the egg that need to be measured is longer than the ruler.
- Discuss the difficulty of measuring a distances that is longer than the size of the ruler without a reference point
- Ask the following questions:
  - Which distance **can** be measured using a ruler?
    - The distance between the flower and egg
  - How can this distance help?
    - We can subtract it from the total distance



Between the Bushes

Challenge 15

- In this challenge the egg is located on a log to keep it out of the water.
- Students will measure the distance from the flower to the egg and subtract it from the total distance displayed.
- Because of the water, this time the turtle must be the one to step this distance.
- The syntax to tell the turtle to step instead of Dodo is turtle.step



Between the Bushes

Challenge 16

- Students will have to measure two distances:
  - Dodo to the bottom flower
  - The egg to the top flower
- Make sure that they measure the distance to the correct flower (straight above or below), otherwise they will get the wrong answer.
- Your students will subtract both distances from the total.
- Show students that they can solve this by:
  - 23 – 4 -3 = 16

    or
  - 4 + 3 = 7; 23 – 7 = 16

Lesson 3 – Egg-cellent

Within this lesson, students will:

- Solve Challenges 17-20
- Subtract two or more distances in challenges 17-19
- Implement all previous distance and coding concepts in challenge 20

Egg-cellent

U.S. Standards Addressed

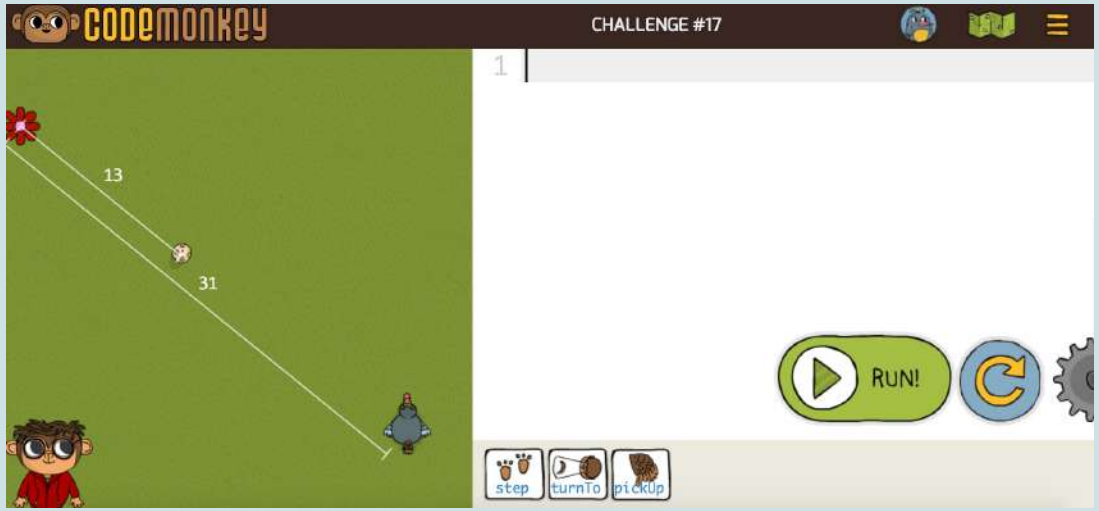
CCSS-Math Standards	
MP.1	4.NBT.4
MP.4	4.NBT.5
MP.5	4.MD.5
MP.6	4.MD.6
MP.7	4.MD.7
	4.G.1
	6.NS.4
	7.G.5
CSTA-K12 Computer Science Standards	
1B-AP-12	2-AP-14
1B-AP-15	2-AP-16
	2-AP-17

Egg-cellent

Challenge 17

The ruler will not be available in the next three challenges since distances are already displayed.

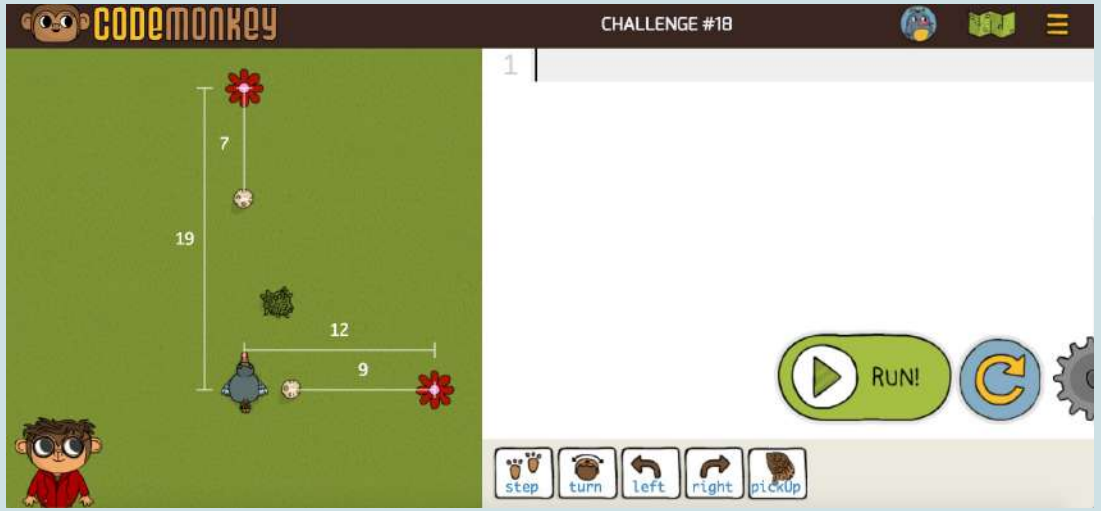
- The distance between the flower and egg is shown
- The distance between Dodo and flower is shown.
- Students will subtract one distance from the other to get the difference between Dodo and egg
- Students will us ‘turnTo’ to turn the dodo towards the egg.



Egg-cellent

Challenge 18

- Students need to help the Dodo get to one egg, return to the starting point, and then step to the second egg.
- No matter which egg the students pick up first, they will not be able to move Dodo directly from one egg to the other because the bush is in the way and they don't know the distance between the two eggs.

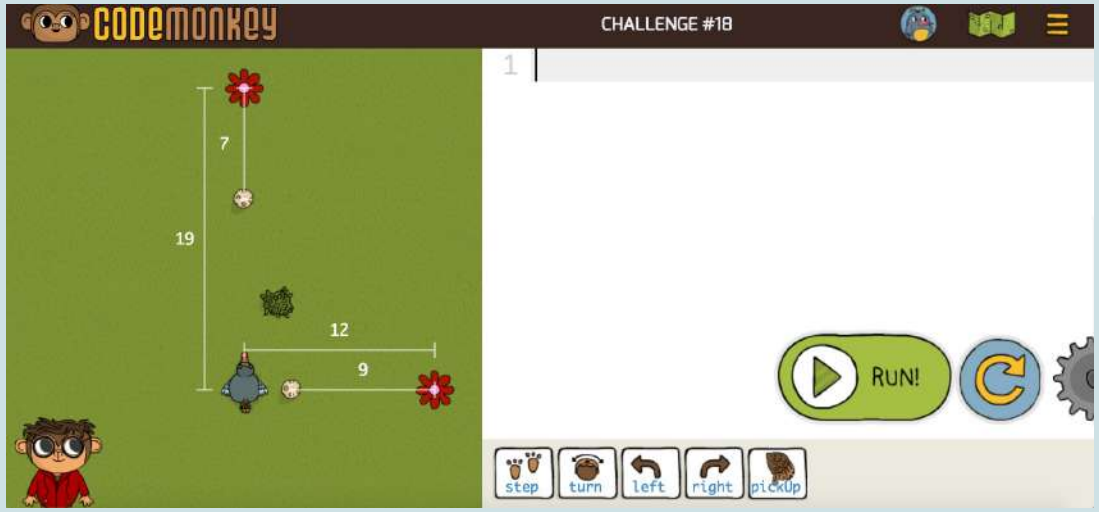


Egg-cellent

Challenge 18 Continued

Students will:

- Calculate the distance to one egg and help the dodo get to it.
- Step backwards by using a negative sign with the same number calculated above.
- Turn to the second egg.
- Calculate the distance to the second egg and help the dodo get to it.



Egg-cellent

Challenge 19

- This challenge ask students to remember another skill from Coding Adventure: the times loop.
- The times loop is used to repeat the same commands over and over a specific number of times.
- All eggs are the same distance from Dodo
- The distance to an egg can be calculated by subtracting the flower-to-egg distance from the Dodo-to-flower distance.

Egg-cellent

Challenge 20

In this challenge, students will incorporate all previously learned skills.

Students will:

- Measure a distance and subtract it from the total displayed
- Make Dodo step the distance measured
- Add two distances and step the sum

After picking up the first egg, students need to calculate the distance from one egg to the next. They need to pick up each egg and turn left in between.

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 him 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.
	"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.
	'turnTo' is another way of turning. Rather than using direction or degrees, turnTo instructs the object, or dodo, to turn to a specific object. For example, 'turnTo egg'. Pressing the turnTo button will write the command in your code.

Reference Card Continued

Keyword/Button	Description

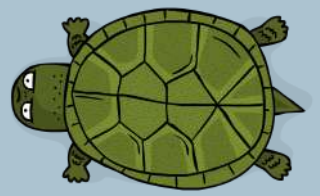
	A simple loop is a sequence of instructions that repeats a specific number of times.
	For example,
	`3.times ->`
	`....step 5`
	`....turn left`
	
	This code will make the dodo 'step 5, turn left' three times. The instructions written inside a loop are written underneath with an indentation (.....). You can do that by pressing the Tab key on your keyboard. Pressing the times button will write the beginning of a simple loop in your code. '3.times ->'.

	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.
	A life-like ruler to measure the distances between the different objects. Remember, exact measure is needed.
	The dodo and the turtle can step over the flower. The flower usually used as a reference point to measure the distance when two objects are too far apart (for example, the dodo and the egg).

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.
	This is the trusty turtle. The turtle will help the dodo cross the lake or the river. In order to instruct the turtle to 'turn' or 'step', you need to first click on it. This will write its name in the code and then separate it from the action we want it to take using a period (.). Example: turtle.step 10
	Crocodiles are used to form a bridge on the water, to help the Dodo get to her eggs. They can only "turn" or "turnTo".