

Spheros

Introduction, Output & Parameters

MTH1W - Day 1, Part A



MTH1W Curriculum Covered in This Lesson:

- C2.1a [Coding] Use coding to demonstrate understanding of **variables**
- C2.1b [Coding] Use coding to demonstrate understanding of parameters**
- C2.1c [Coding] Use coding to demonstrate understanding of **equations**
- C2.1d [Coding] Use coding to demonstrate understanding of **inequalities**

- C2.2a [Coding] Create code by decomposing situations into computational steps in order to **represent mathematical concepts and relationships**
- C2.2b [Coding] Create code by decomposing situations into computational steps in order to solve problems**

- C2.3a [Coding] **Read code to predict** its outcome
- C2.3b [Coding] **Alter code** to adjust **constraints, parameters** to represent a similar or new mathematical situation
- C2.3c [Coding] **Alter code** to adjust **outcomes** to represent a similar or new mathematical situation

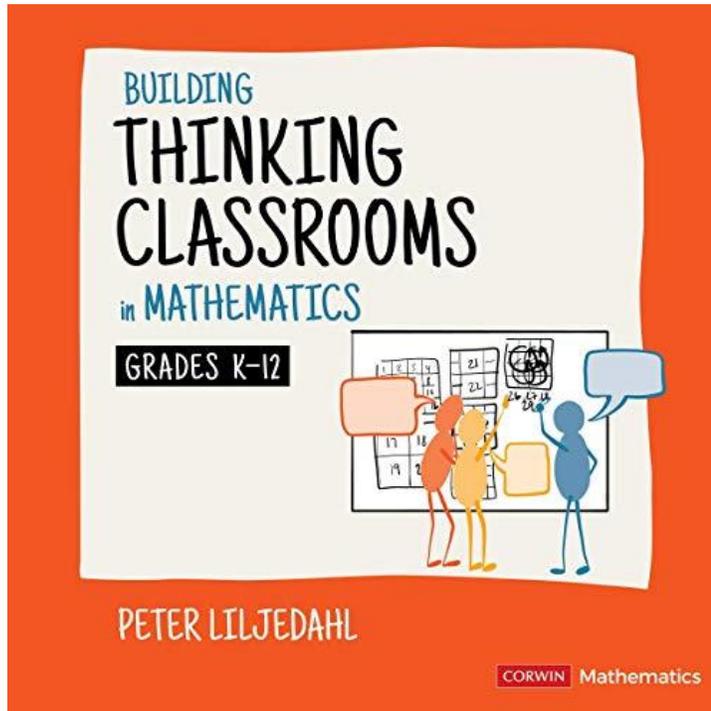
Sequencing and Timing:

- On Day 1, students will cover part A (this lesson), Part B and some of Part C.
- On Day 2, students finish Part C and cover Part D.

Original Curriculum Language:

C2.1 [Coding] use coding to demonstrate an understanding of algebraic concepts including variables, parameters, equations, and inequalities
C2.2 [Coding] create code by decomposing situations into computational steps in order to represent mathematical concepts and relationships, and to solve problems
C2.3 [Coding] read code to predict its outcome, and alter code to adjust constraints, parameters, and outcomes to represent a similar or new mathematical situation

This lesson is set up to follow the format of Building Thinking Classrooms by Peter Liljedahl.



BUILDING THINKING CLASSROOMS

Research: @pgliljedahl
 SKETCHNOTE: @wheeler_laura

- ① Begin w/ a Problem**
 Give a problem-solving task
 To start: Problems should be
 - engaging
 - non-curricular
 - collaborative
 - ↳ promote talking
 Later: Problems can be curricular
 - eg textbook problems
- ② Visibly Random Groups**
 - Randomly assigned eg playing cards
 - Daily & in front of students
 - 2 or 3 students / group
 - Sit & stand together
- ③ Vertical NonPermanent Surfaces**
 - Vertical
 - Erasable
 - WHITEBOARD CHALKBOARD WINDOW
 - 1 marker or chalk per group
 - ↳ promotes discussion
- ④ Oral Instructions**
 give instructions orally
 Project: data, long expressions, diagrams
 ↳ groups will discuss (instead of decoding text)
- ⑤ Defront the room**
 Desks: orient in various directions, pull away from wall (room to stand @ VNPS)
 Teacher addresses the class from a variety of locations.
- ⑥ Answering Questions**
 Acknowledge, but don't answer:
 - ✗ Proximity questions (b/c teacher is close by)
 - ✗ Stop thinking questions
 Answer:
 - ✓ Keep thinking questions
 - ↳ give HINTS not answers
- ⑦ Build Autonomy**
 - Model how groups can visit other groups when they are stuck or done.
 - Hints & extensions come from peers (not just the teacher).
 - ↳ Helps manage flow
- ⑧ Hints & Extensions**
 Manage flow
 Frustration, Persistence, Tolerance, Boredom
 Challenge vs Ability graph
- ⑨ Level to the Bottom**
 debrief class discussion, direct teaching the "lesson"
 Once all groups pass & minimum threshold.
 Debrief 1 or more groups' solutions!
 Work through a new problem w/ whole group
- ⑩ Student Notes**
 Student created: select, synthesize, reorganize → ideas
 Provide time for this after levelling.
- ⑪ Assessment**
 Process > Product
 Group work + Individual work
 Student learning: Where are they? Where are they going?

THINKING LEARNING

← → ↻ edu.sphero.com/gettingstarted 🔍 ☆

Apps U 1 Output on Scratch

sphero edu

Home Activities Programs Classes Drive Gorski ▾

Welcome to Sphero Edu

All Programs I don't need to see this page on login

My Programs

JavaScript Wiki

+ Create

The Sphero edu website

Sphero Edu Basics



- The Sphero Edu app helps bring your robot to life. Drive your robot or create a unique program. Find out which devices you can use with Sphero Edu [here](#).
- Create a Sphero Edu account to save all of your work.
- Complete Activities to learn how to program your Sphero robot, dive deep into STEM topics, and lots more.
- Learn to program your robot by drawing a path, using a sequence of code blocks, or writing your own JavaScript code.
- Educators can create and manage classes and assign activities to learners.
- Parents have the ability to change sharing permissions and assign activities to their children.

Getting Started Tips ▾

Getting Started as an Educator ▾

My Programs

AlarmLights
3m | Private

Square
5m | Private

Square Variable
1h | Private

- All Programs
- My Programs
- JavaScript Wiki
- + Create

To make a new program

Create a Program

1 Name your program

LightExperiment

2 Choose Program Type



3 Choose Compatible Robots

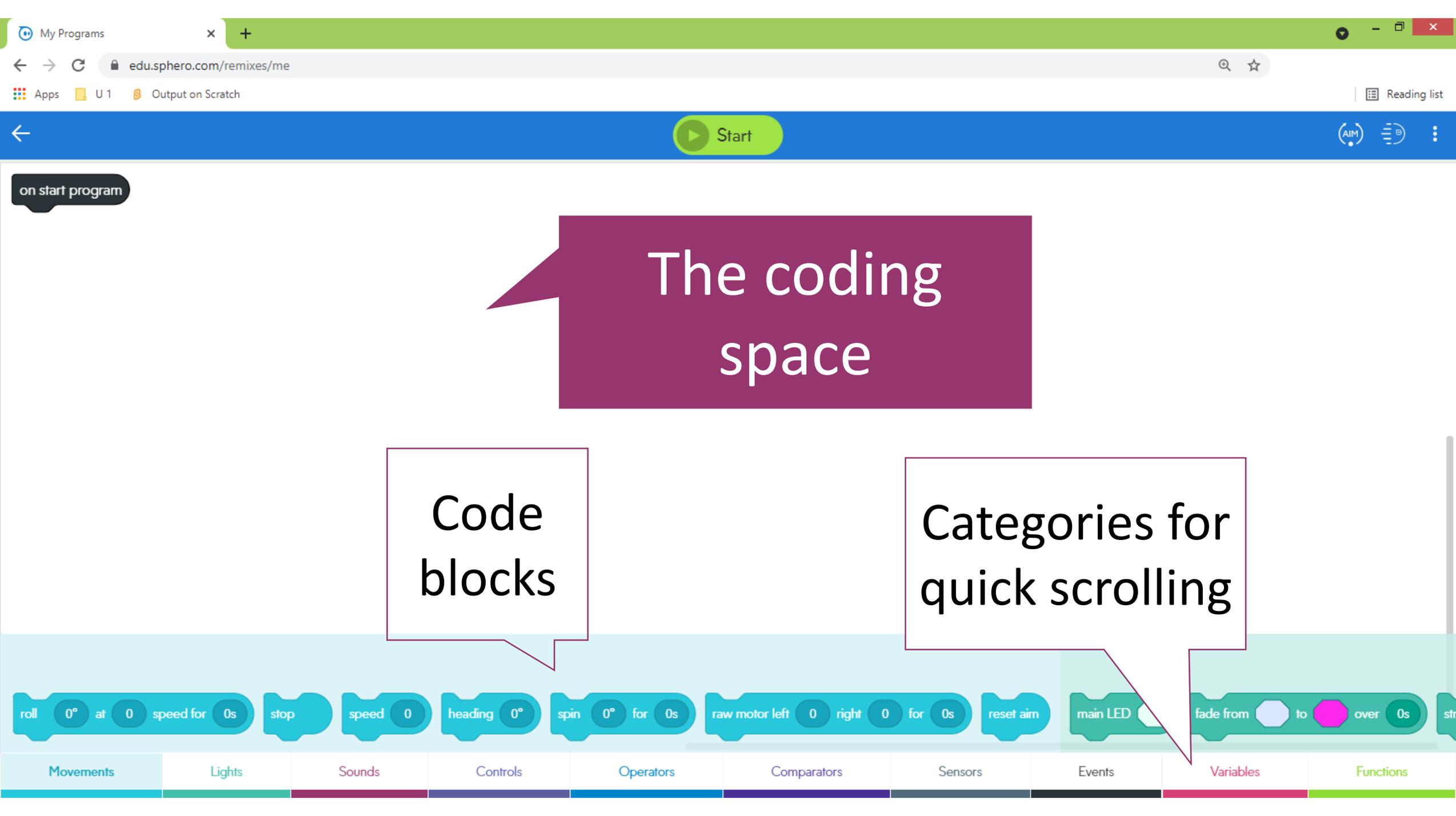


Cancel

Create

Programs must be named

Our robots are mini's



The coding space

Code blocks

Categories for quick scrolling

Movements

Lights

Sounds

Controls

Operators

Comparators

Sensors

Events

Variables

Functions

on start program



Connected.
Will run.



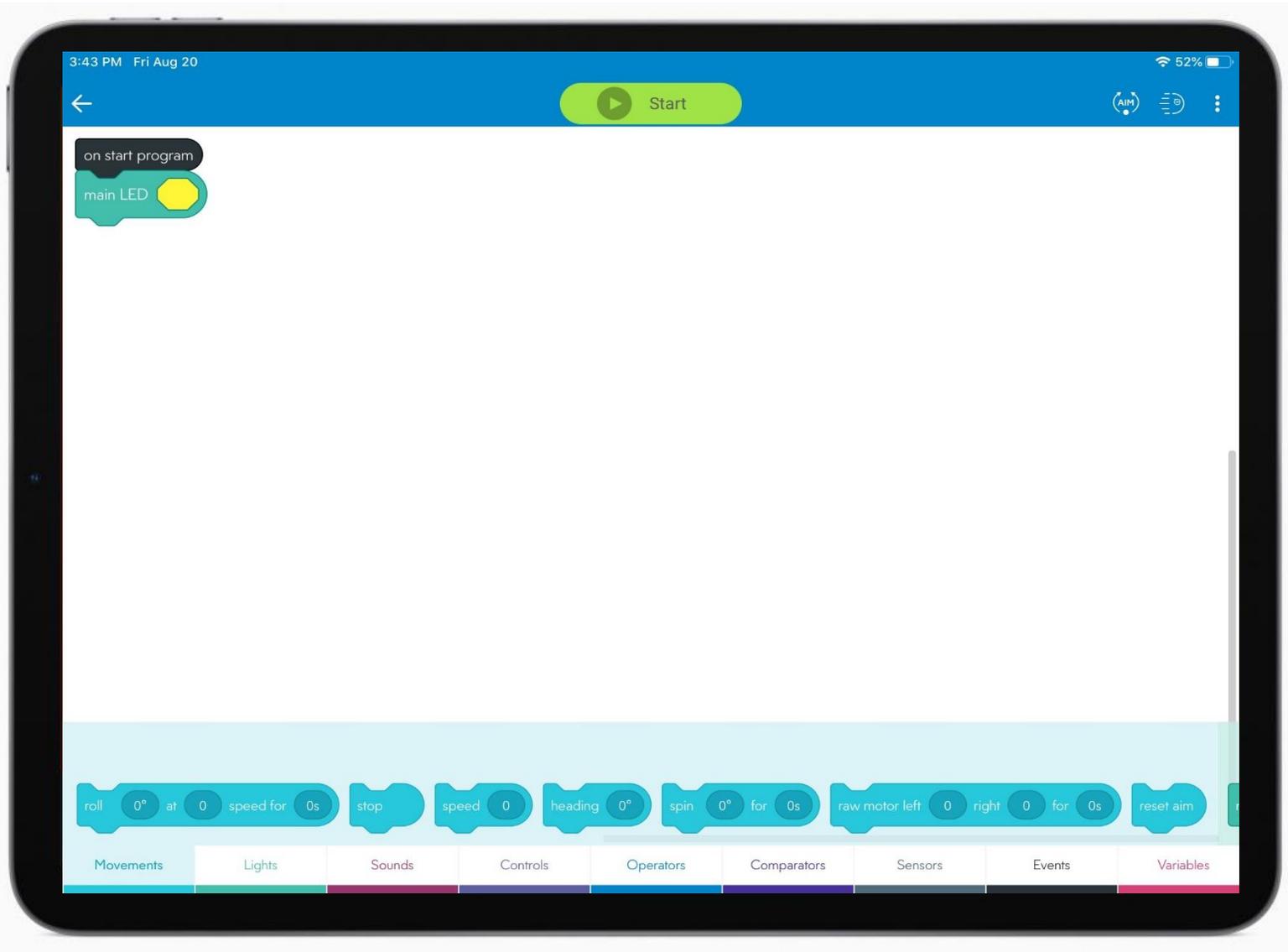
Not
connected.
Won't run.

You can add as
many blocks as
you like to
your program.

Drag and
drop from
the bottom.

motor left 0 right 0 for 0s reset aim main LED fade from pink to blue over 0s strobe yellow for 0s 0 times back LED 0 play random sound and wait speak and

Movements Lights Sounds Controls Operators Comparators Sensors Events Variables Functions

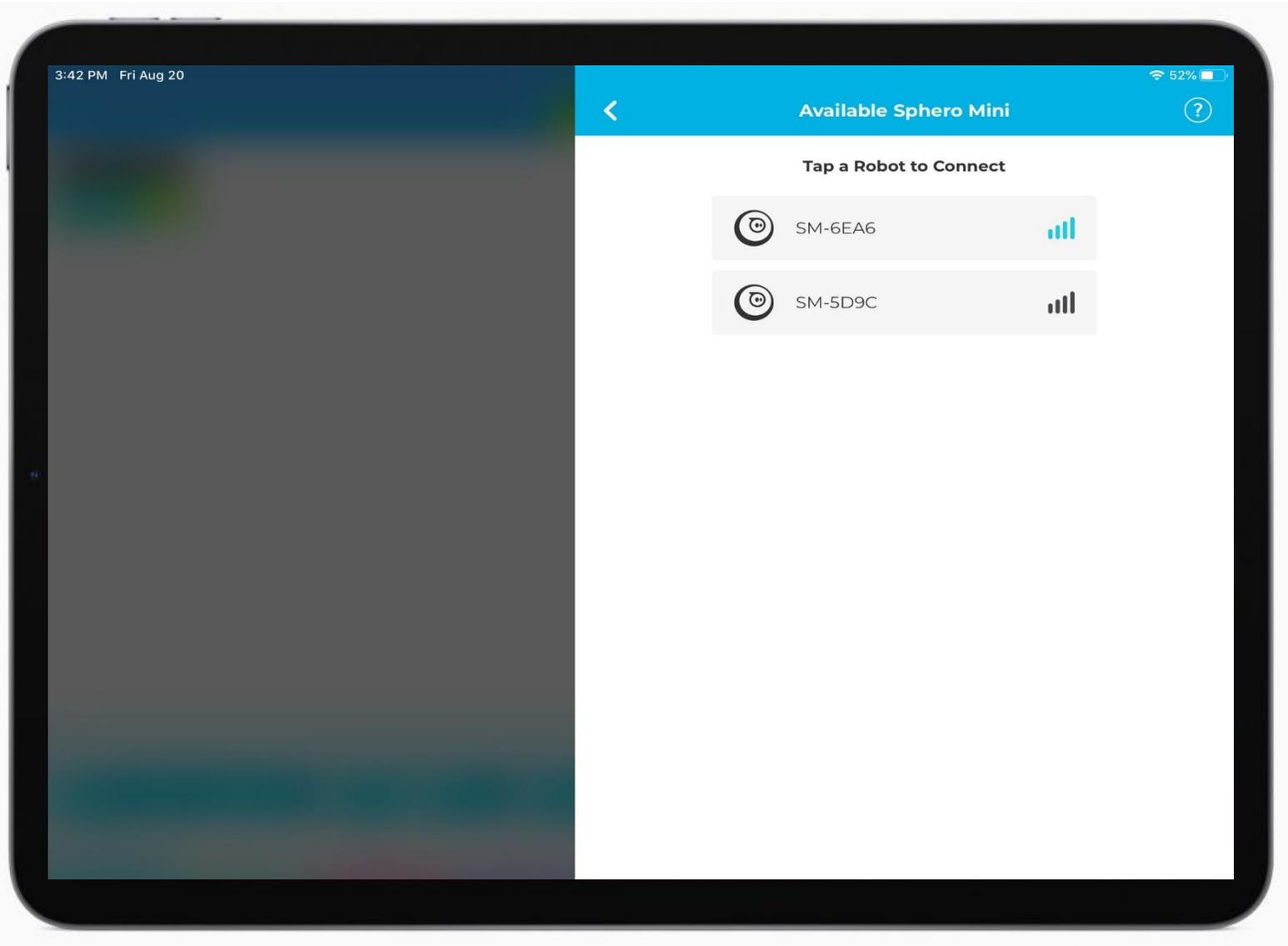


While you can code a Sphero using <https://edu.sphero.com/>, you can only run the code using an app on an iPad, tablet or Chromebook.



The app runs the code on your Sphero robot ball.

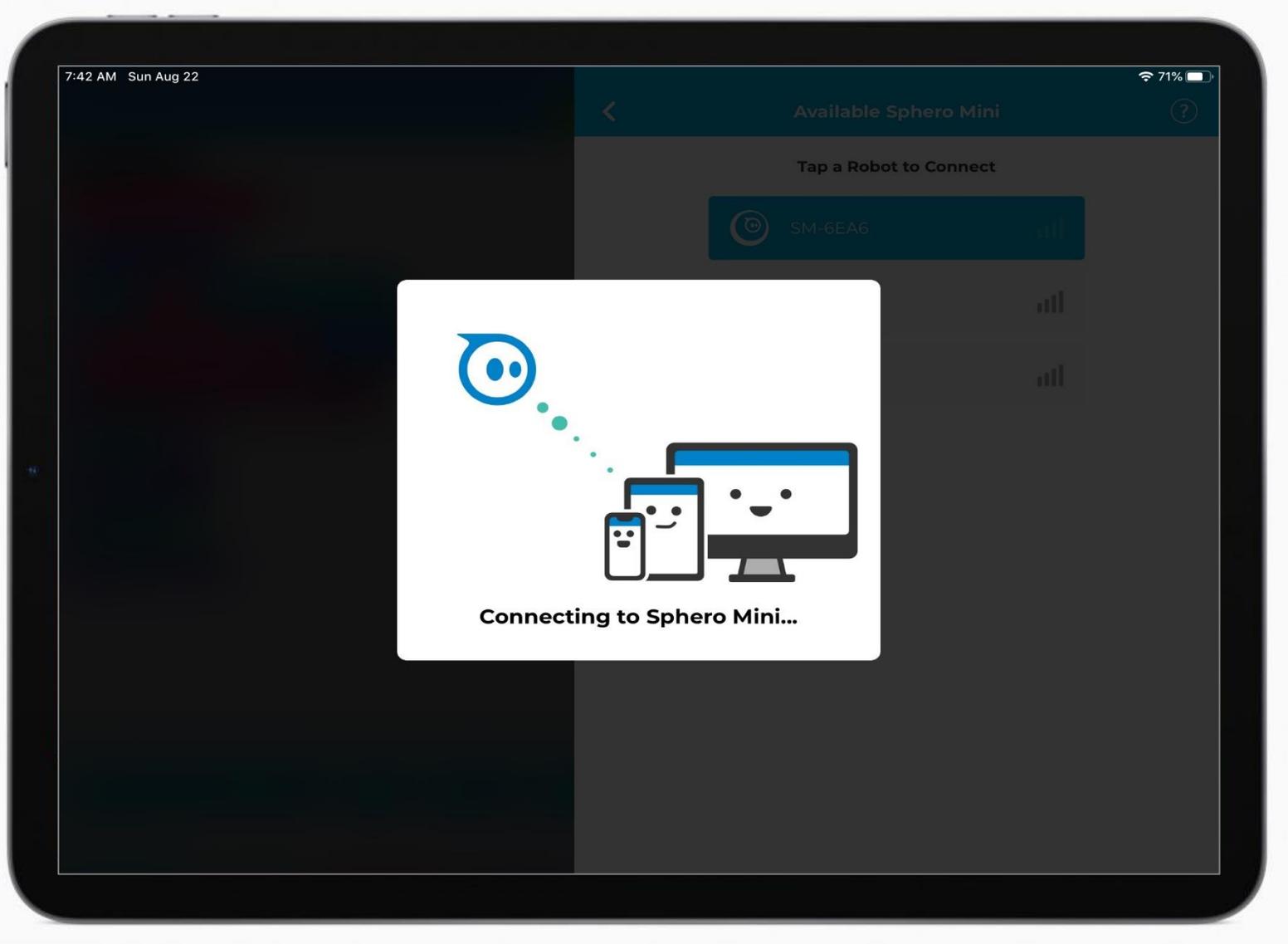




When you first run a program, your computer asks which Sphero Mini it should connect to.

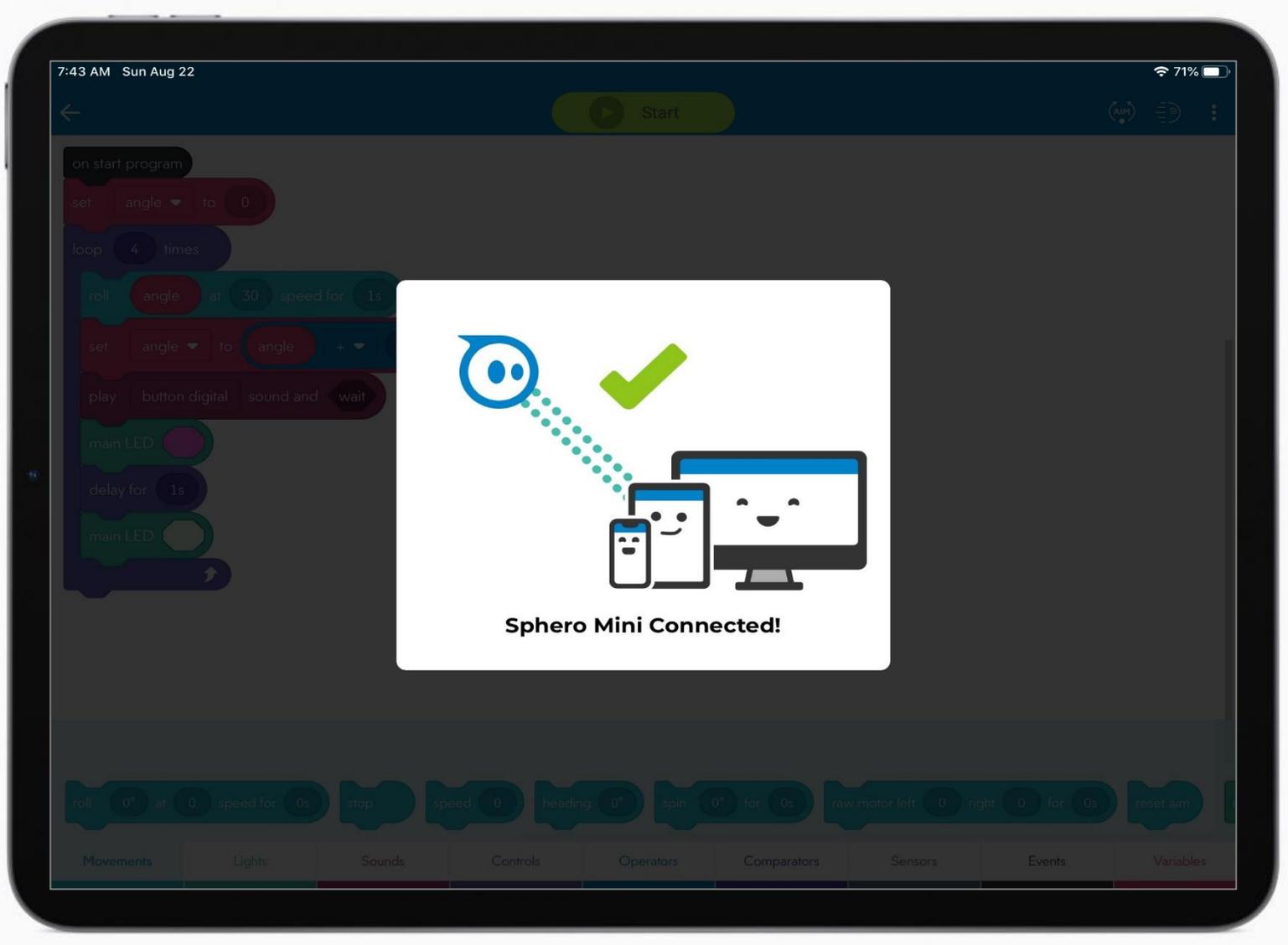
Bring your Sphero close to the computer so it has the strongest symbol.





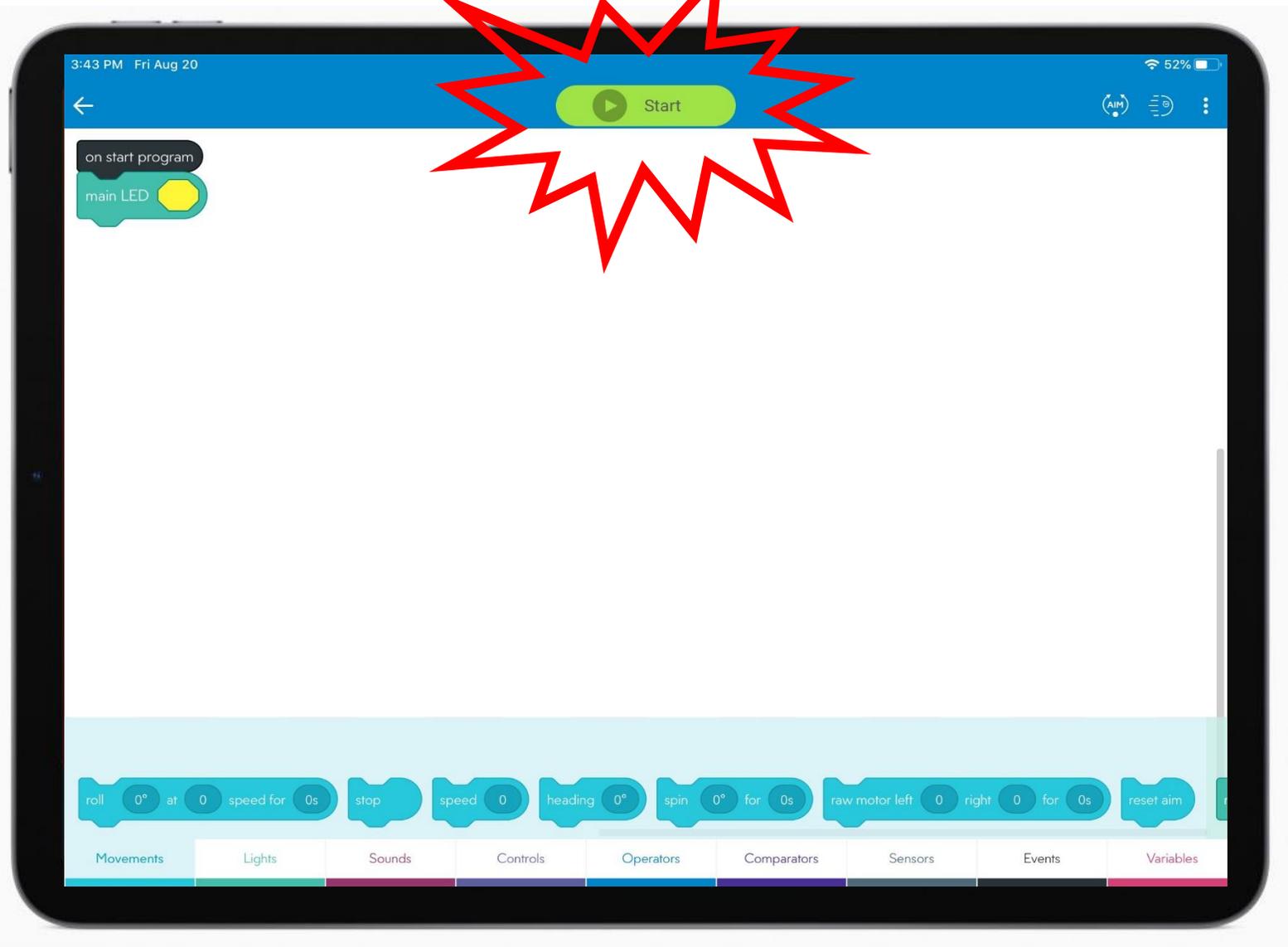
It takes a second for your tablet to connect to the Sphero Mini via Bluetooth



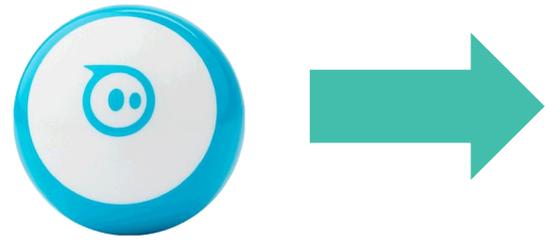


Then you
are ready
to go!



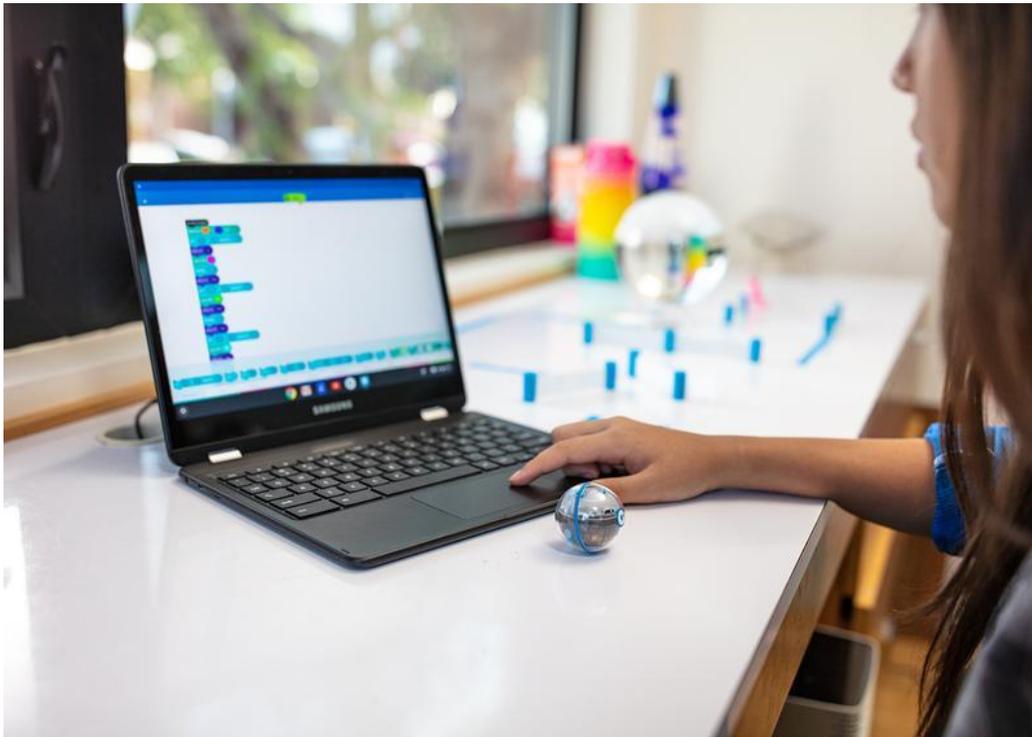


After it is connected, as soon as you hit start, the Sphero will start running your program.



Be ready.

I tend not to run my code on a table. Dropping the Sphero on the ground isn't good for it.



Put the Sphero on the floor. It will protect the hardware.



Basic Coding Components

Output

Changes the robot: Moves. Spins. Re-directs to a new angle. Makes sound. Speeds up. Lights up.



Math

*Calculation that results in a number: +, -, *, /, square root*

Boolean Expressions

*Calculation that results in **true or false**: >, <, =, >=, <=, and, or, not*

Control

ifs ***Decides** which piece of code to run: Uses a Boolean expression and output or math.*

Loops ***Repeats** code: Uses a Boolean expression and output or math.*

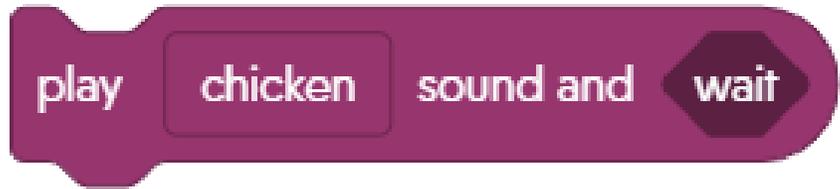
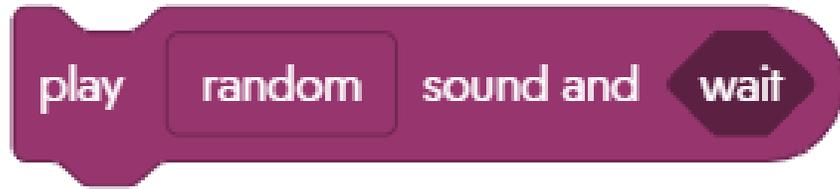
Variables

Named pieces of memory where you can store things to use later OR to store calculation results.

Functions

Named pieces of code where you can group code together to use it later.

We've started here.



The blocks actually represent sections of code that have been written by Sphero to allow you to change the robot's behaviour.

The **function name** of these blocks is "play sound"

The parts in the squares or hexagons are called parameters. These are specific instructions you send into the function to choose which output you want.

The **parameters** of these blocks are (1) which sound, (2) wait or continue

1 fade from  to  over 

2 main LED 

3 speak  and 

4 delay for 

What are the function names?

How many parameters for each?

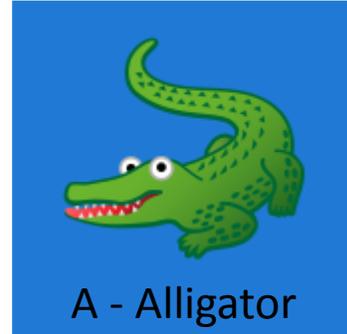
Group Activities

We won't complete all of the following problems.

Your group will only complete one or two.

Start with Alligator. After you are done, we will discuss which one you should do next.

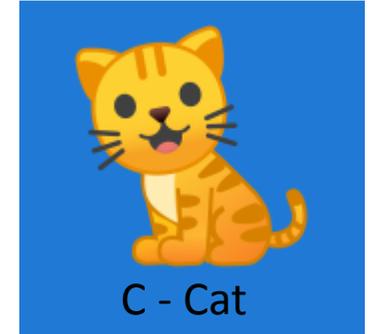
Problem
1



Practice



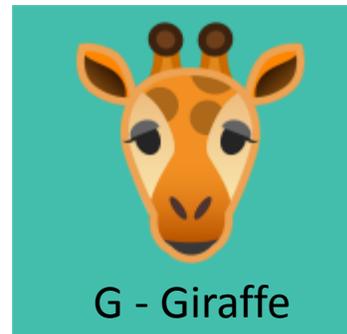
More
Practice



Problem
2



Problem
3



TIPS



J - Jaguar

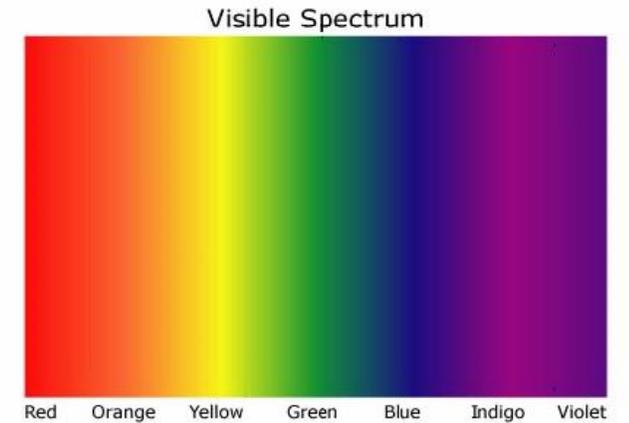


A - Alligator



Write a program that makes the light gradually change in a rainbow pattern: ROY B GIV.

Test it on your Sphero.



This can be done in at least two ways, so once you have coded it one way, consider doing it again using different blocks.

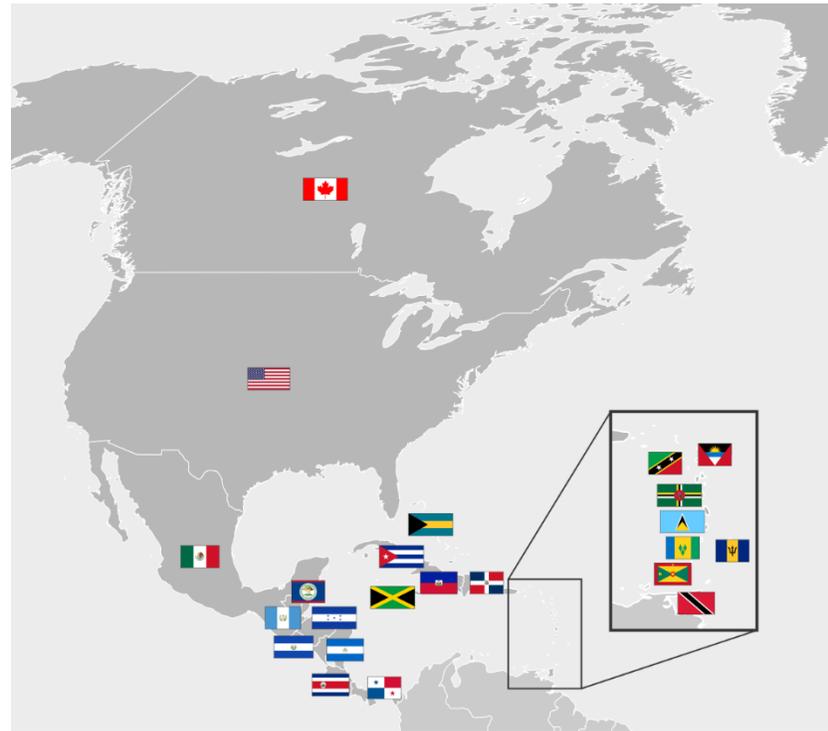


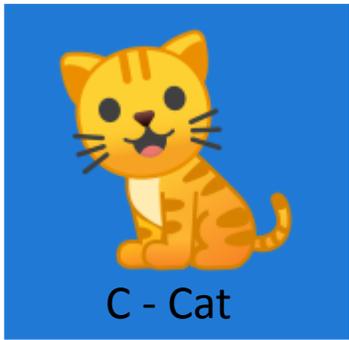
B - Bat



Choose a flag for each of your team members.
Write a program cycles through the colours of
each country's flag.

Test it on your Sphero.





Write a program that says
“Hello world!”, then makes
an applause sound, then
says “How are you?”

Test it on your Sphero.

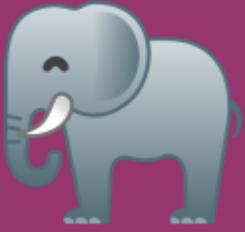


D - Dog



Write a program plays 4 different sounds. Each sound should have a different light to go with it. You should be able to hear each sound distinctly.

Test it on your Sphero.



E - Elephant



Write a program that uses Morse code to signal SOS either both lights and sounds.

Test it on your Sphero.

... — — — ...

S O S

MORSE CODE

A ··-	J ·- - -	S ...
B -···	K -·-	T -
C -·-·	L ·-··	U ··-
D -··	M - -	V ···-
E ·	N -·	W ·- -
F ····	O - - -	X -·-·
G - - ·	P ·- ··	Y - - - ·
H ····	Q - - · -	Z - - ··
I ··	R ·- ·	



F - Fish



Write a program that makes a makes noises to simulate the chaos of a farmyard. Many sounds and lights should play at once.

Test it on your Sphero.



G - Giraffe



Write a program that allows the Sphero Mini to travel in an “L” shape.

Test it on your Sphero.



H - Horse



Write a program that makes the light change back and forth between red and yellow repeatedly.

Test it on your Sphero.

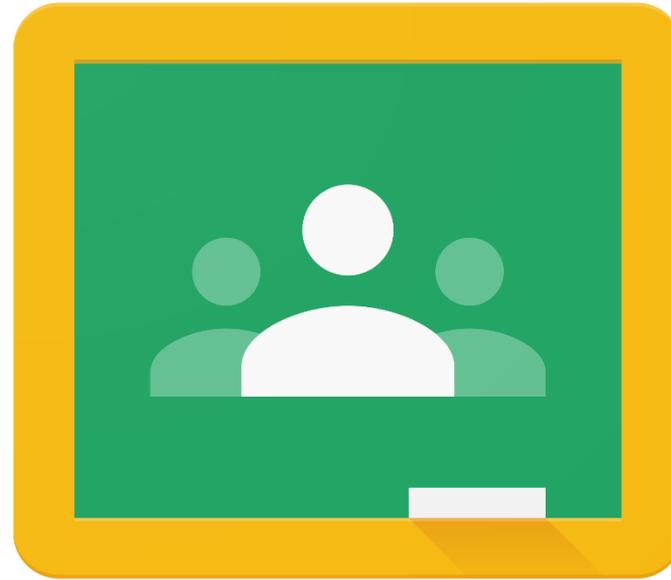
If you do this in a clever way, you can repeat the steps forever – or until you stop the program!



Write a program that allows the Sphero to travel in a square shape. Make each side of the square light up in a different colour.



When you are done,
there are check-your-
understanding
questions on Google
Classroom.



Google Classroom