

Top 10 Ways to Teach Your Kids to Code



Kris Boedigheimer

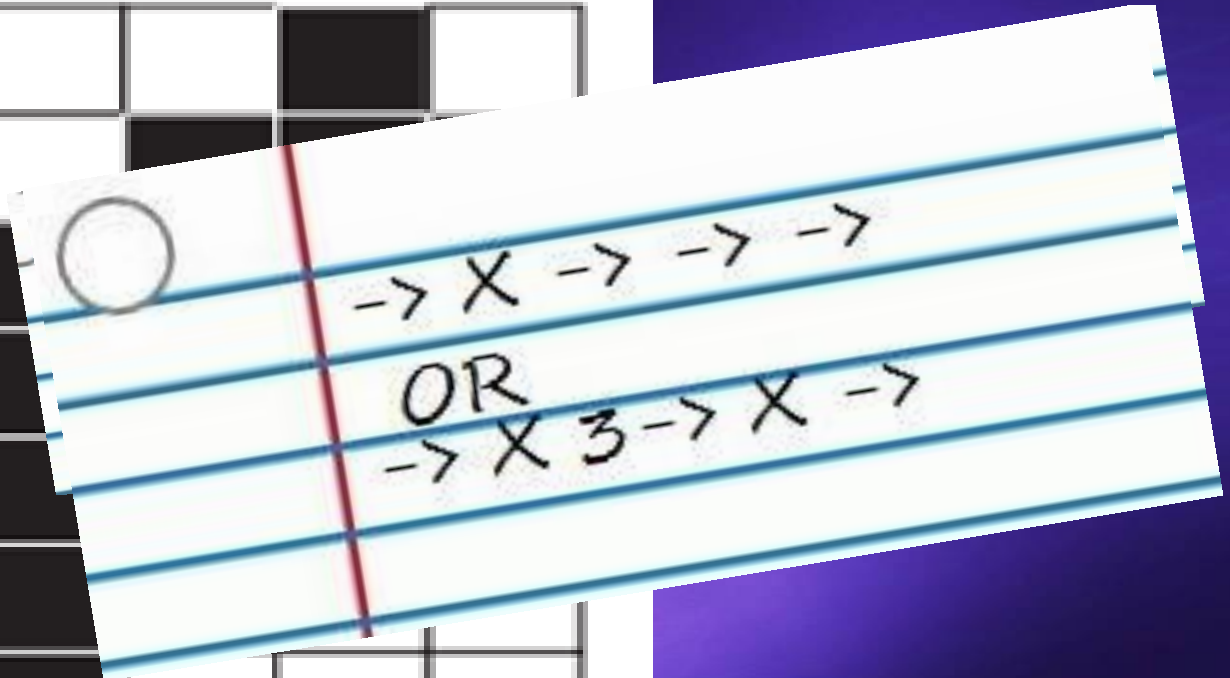
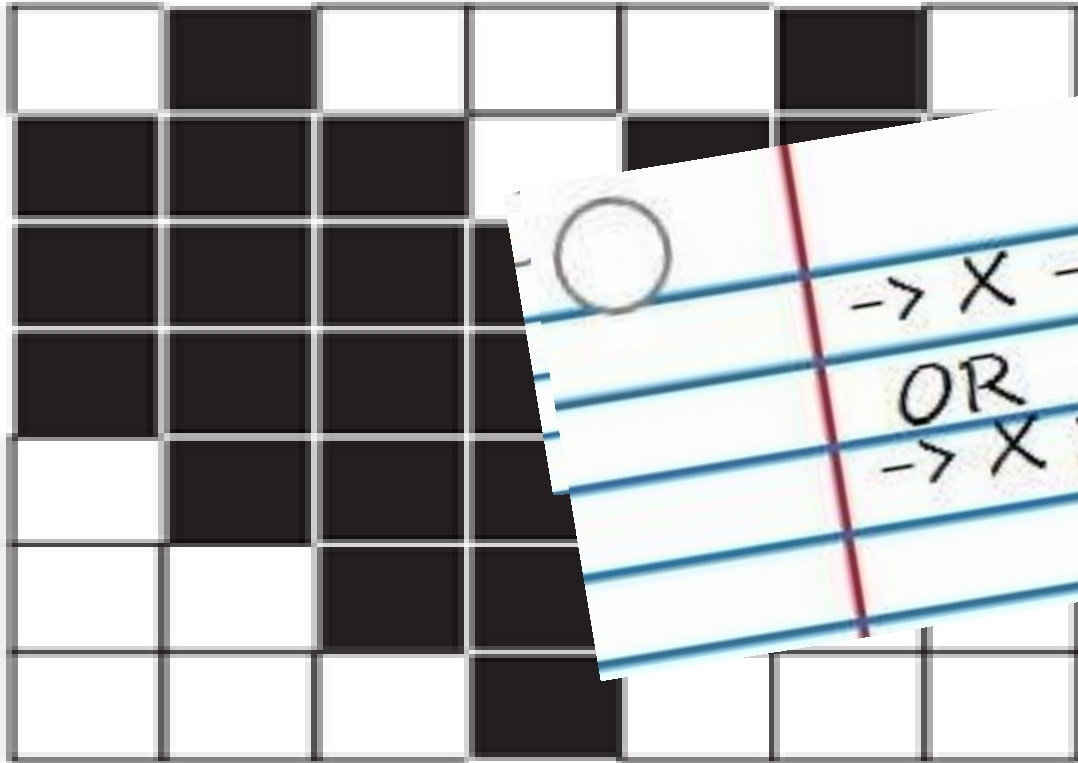
Top 10 Ways to Teach Your Kids to Code



Top 10 Ways to Teach Your Kids to Code



1 – Mazes



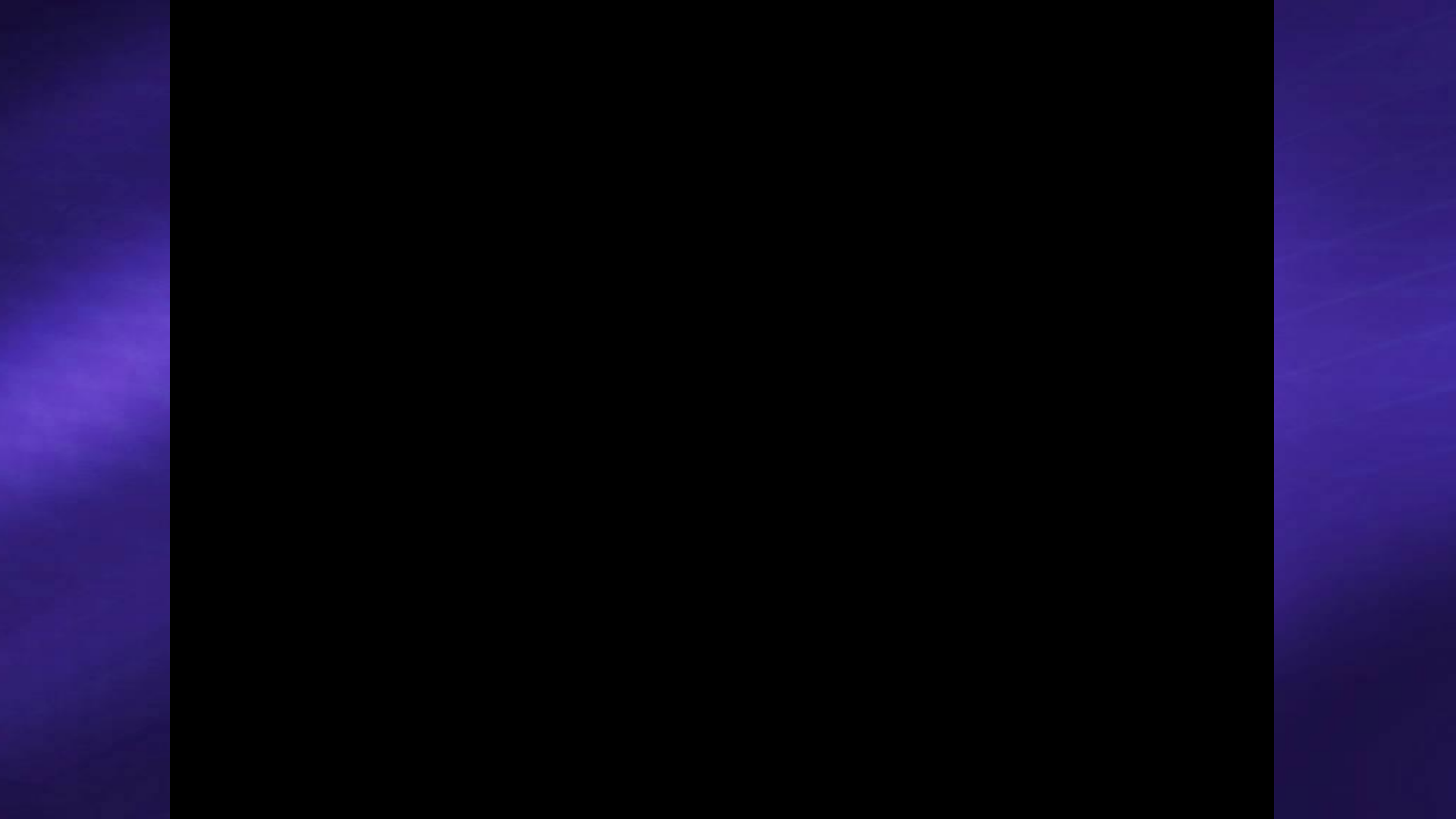
- Solve a Puzzle/Maze -



STRAIGHT-RIGHT-LEFT

Little Codr game – littlecodr.com





2 – Board Games

- Robot Turtles- thinkfun.com



● Robot Turtles



•The Galapagos and mazes for older kids/adults- <http://www.robotturtles.com/>

● Code Master – thinkfun.com

The image shows the Code Master game interface. On the left, a scroll titled "GUIDE SCROLL" shows a sequence of instructions: a character moving right, then down, then down, then down, and finally reaching a goal. Below the scroll are three icons with the number "1" and a "clear all" button. On the right, a 3D map shows a character at the start, a goal (a blue gem) at the top right, and a path of five white circles. Colored arrows (red, blue, green) connect the circles and the character to the goal, representing the sequence of instructions. At the bottom, a dark bar says "Start program, Advance instruction pointer". On the bottom right, "MAP CONTROLS" includes "RESET", "STEP", and "RUN" buttons.

DRAG ALL TOKENS ONTO THE SCROLL TO CREATE DIRECTIONS FOR YOUR MAP SOLUTION:

1

1

1

clear all

skip

GUIDE SCROLL

CODE MASTER™

Start program, Advance instruction pointer

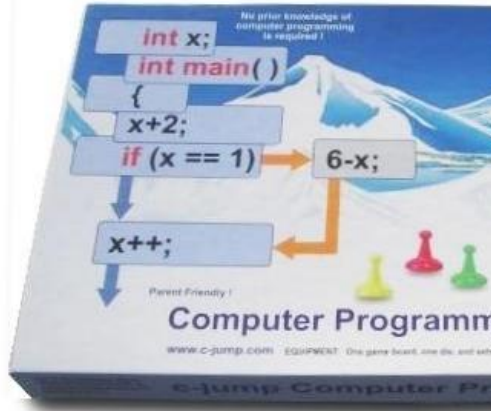
MAP CONTROLS:

RESET STEP RUN

Code Monkey Island – codemonkeyplanet.com



C-JUMP— <http://c-jump.com/>



3 – Block Coding Puzzles

- Hour of Code - Code.org



Minecraft Hour of Code

Use blocks of code to take Steve or Alex on an adventure through this Minecraft world. (Ages 6-106)

Teacher's Notes

<https://hourofcode.com/mc>

Go



Star Wars: Building a Galaxy with Code

Learn to program droids, and create your own Star Wars game in a galaxy far, far away. (Ages 6-106)

Teacher's Notes

<https://hourofcode.com/star>

Go



Code with Anna and Elsa

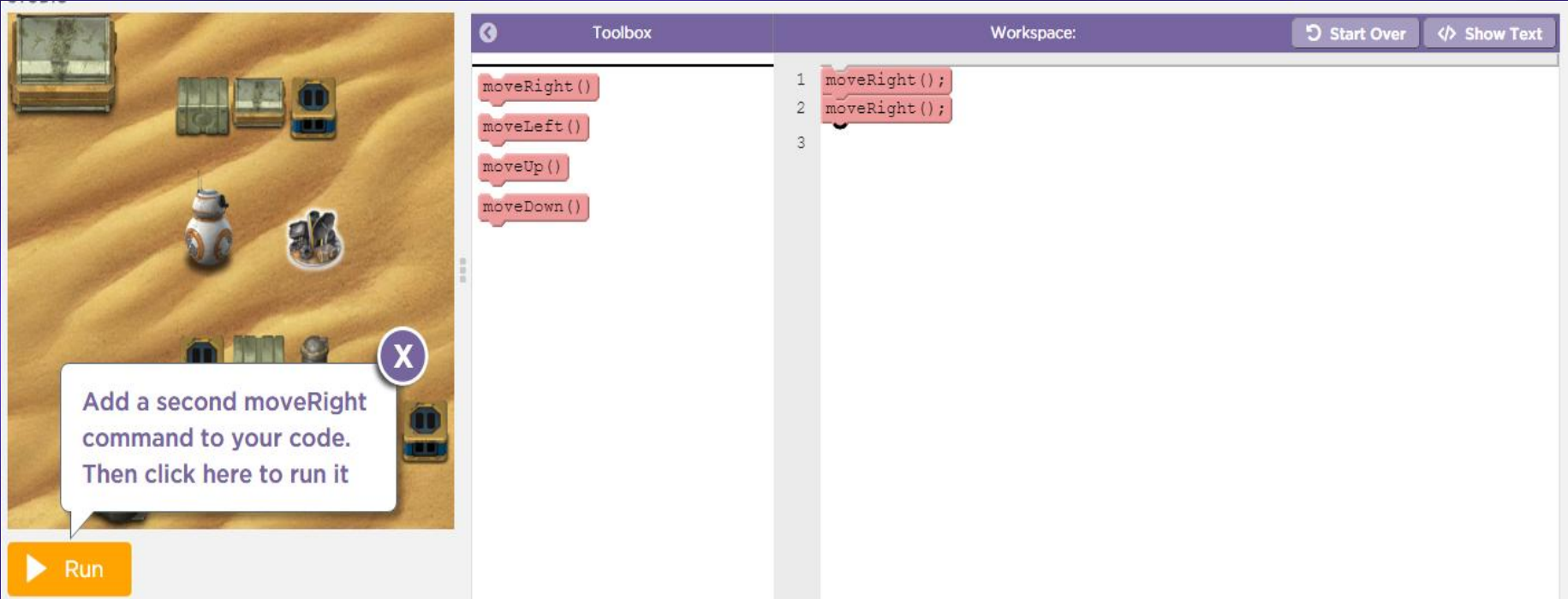
Let's use code to join Anna and Elsa as they explore the magic and beauty of ice. (Ages 8-108)

Teacher's Notes

<https://hourofcode.com/frzn>

Go

3 – Star Wars Hour of Code



The screenshot displays the Star Wars Hour of Code interface. On the left, a BB-8 droid is on a desert planet. A toolbox contains several movement commands: `moveRight()`, `moveLeft()`, `moveUp()`, and `moveDown()`. A speech bubble with a close button (X) says: "Add a second `moveRight()` command to your code. Then click here to run it". Below the speech bubble is a yellow "Run" button with a play icon.

The workspace on the right shows the following code:

```
1 moveRight();  
2 moveRight();  
3
```

```
moveRight();  
moveRight();
```

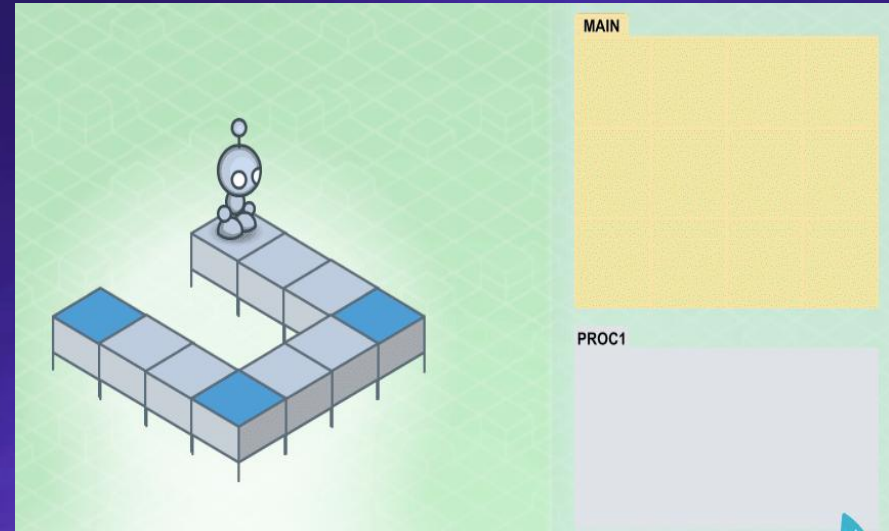
3 –Block Code - Younger Kids

- The Foos –great for younger kids (4+)
- Tynker – block coding (7+)



3 – Block Code– More for Older Kids

- MadeWithCode = block – (9+)
- Lightbot – blocks/arrows– (9+)



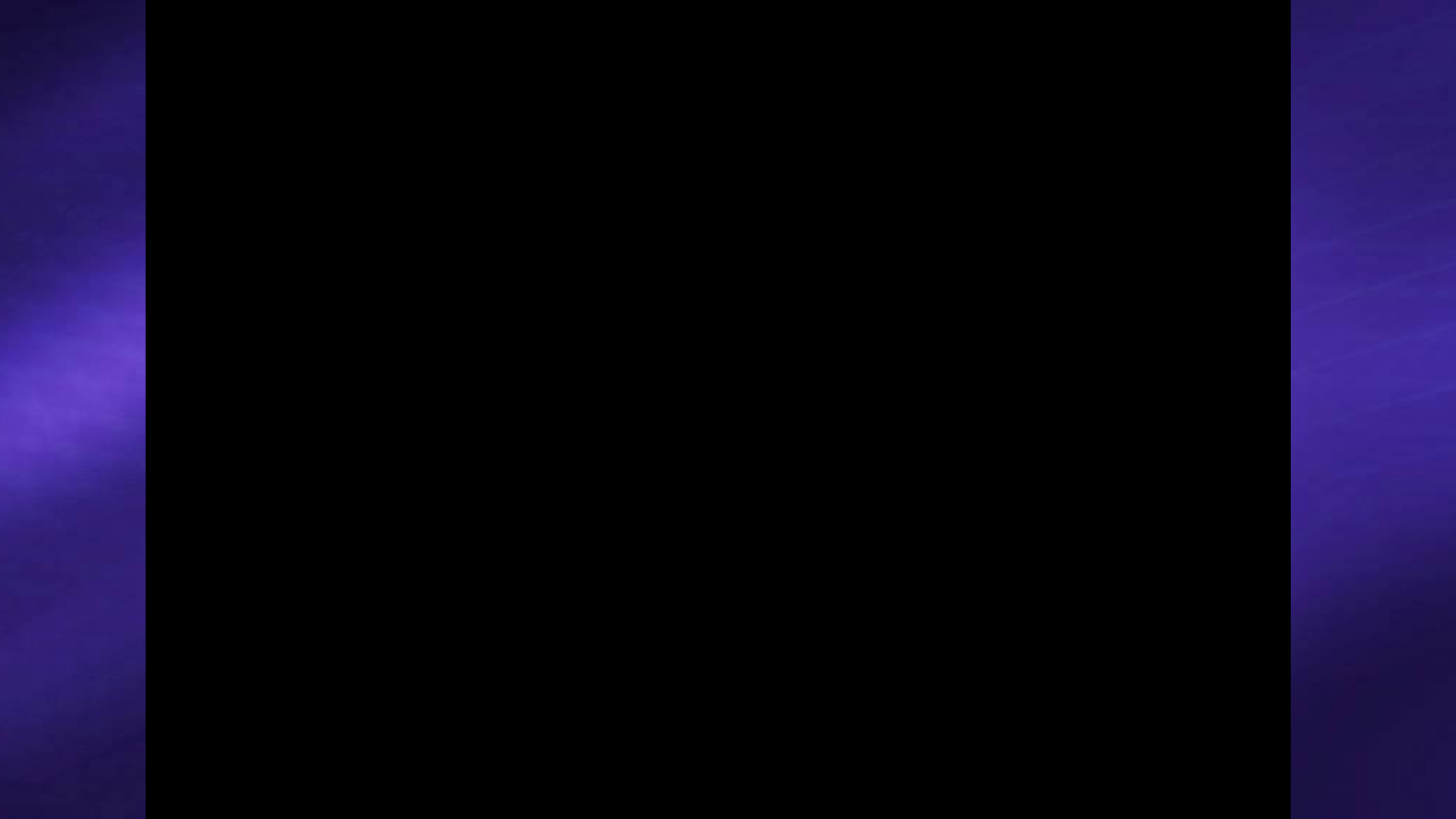
3 – Puzzlets from digitaldreamlabs.com



*tablet not included

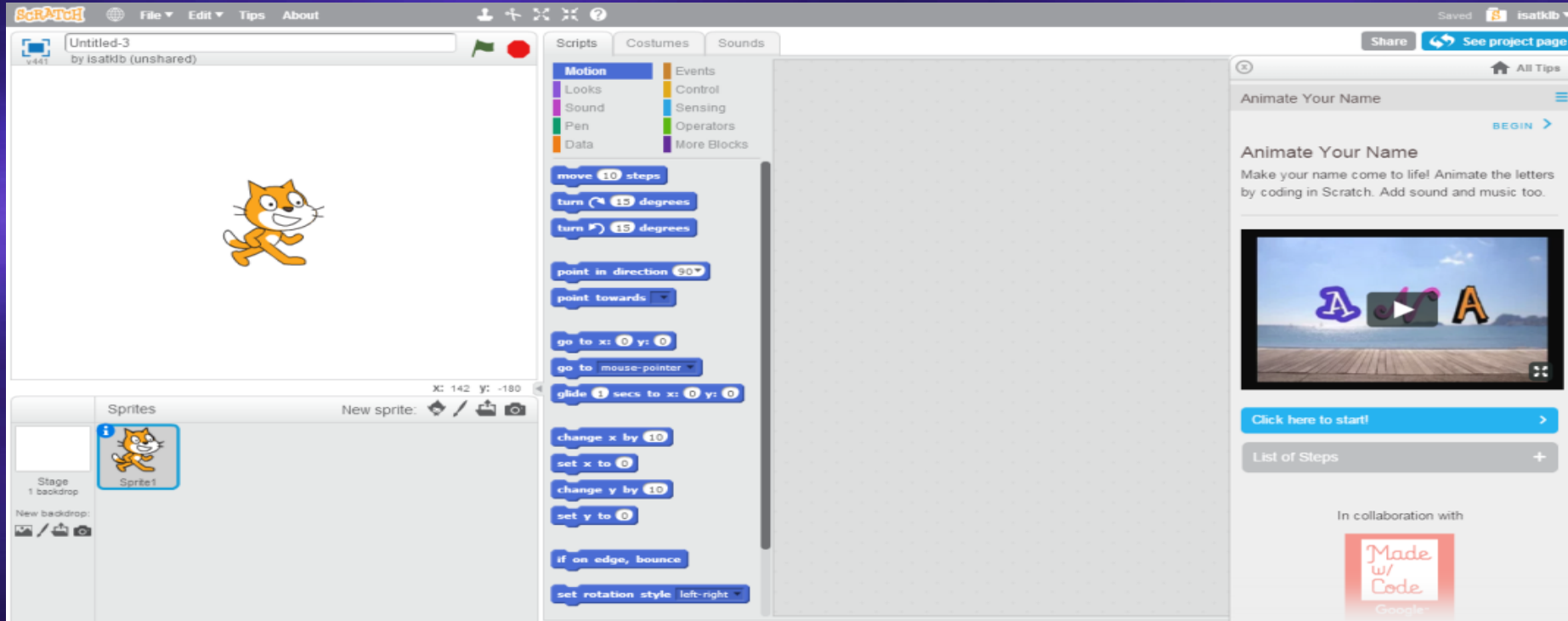


- Cork the Volcano
- Similar to Mario Brothers game...
- No joystick



4 – Create Animation and Games

- *Scratch – scratch.mit.edu - a favorite programming tool, mainly because it offers so much control




The image shows a screenshot of the Scratch programming environment. The main stage displays a cat sprite (Scratch Cat) with a script of blocks: `move 10 steps`, `turn 15 degrees`, `turn 15 degrees`, `point in direction 90`, `point towards`, `go to x: 0 y: 0`, `go to mouse-pointer`, `glide 1 secs to x: 0 y: 0`, `change x by 10`, `set x to 0`, `change y by 10`, `set y to 0`, `if on edge, bounce`, and `set rotation style left-right`. The Sprites panel shows the cat sprite selected. The right sidebar displays a project titled "Animate Your Name" with a "BEGIN" button and a video player showing the letters "A" and "a" being animated.

4 – Create Animation and Games


- Scratch – scratch.mit.edu/help/

Get Started with Scratch




Step-by-Step Intro

★ 1 Start Moving




Explore these starter projects




Watch the Getting Started video

Scratch Guides


Here are some guides to help you learn Scratch:



Getting Started Guide
This step-by-step guide (PDF) provides an easy introduction to Scratch.
Download the **English version**.



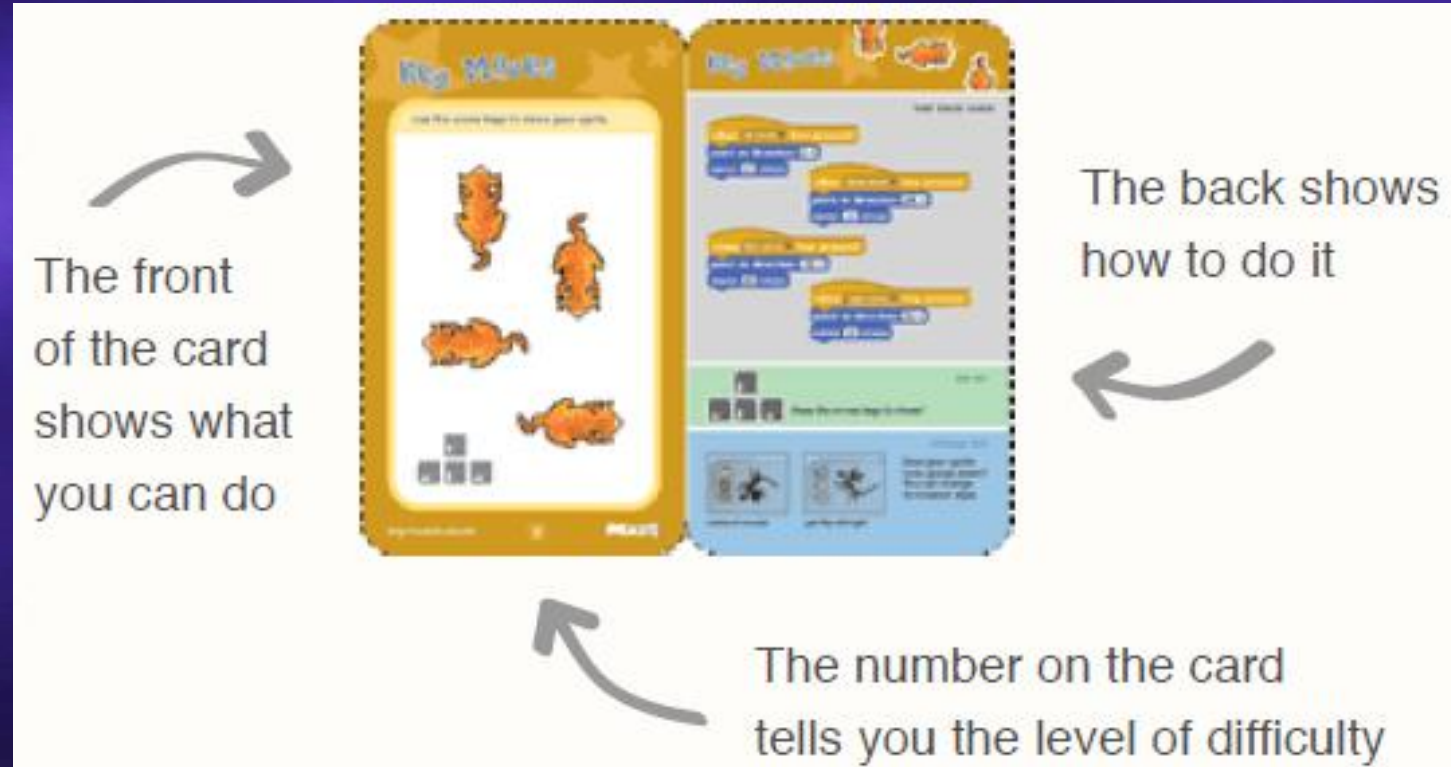
Scratch Cards
Each of these cards shows something you can do in Scratch.



Video Tutorials
These videos include tips on using the paint editor, and introduce how to program games and animations in Scratch.

4 – Create Animation and Games

- Scratch – Cards, scratch.mit.edu/help/



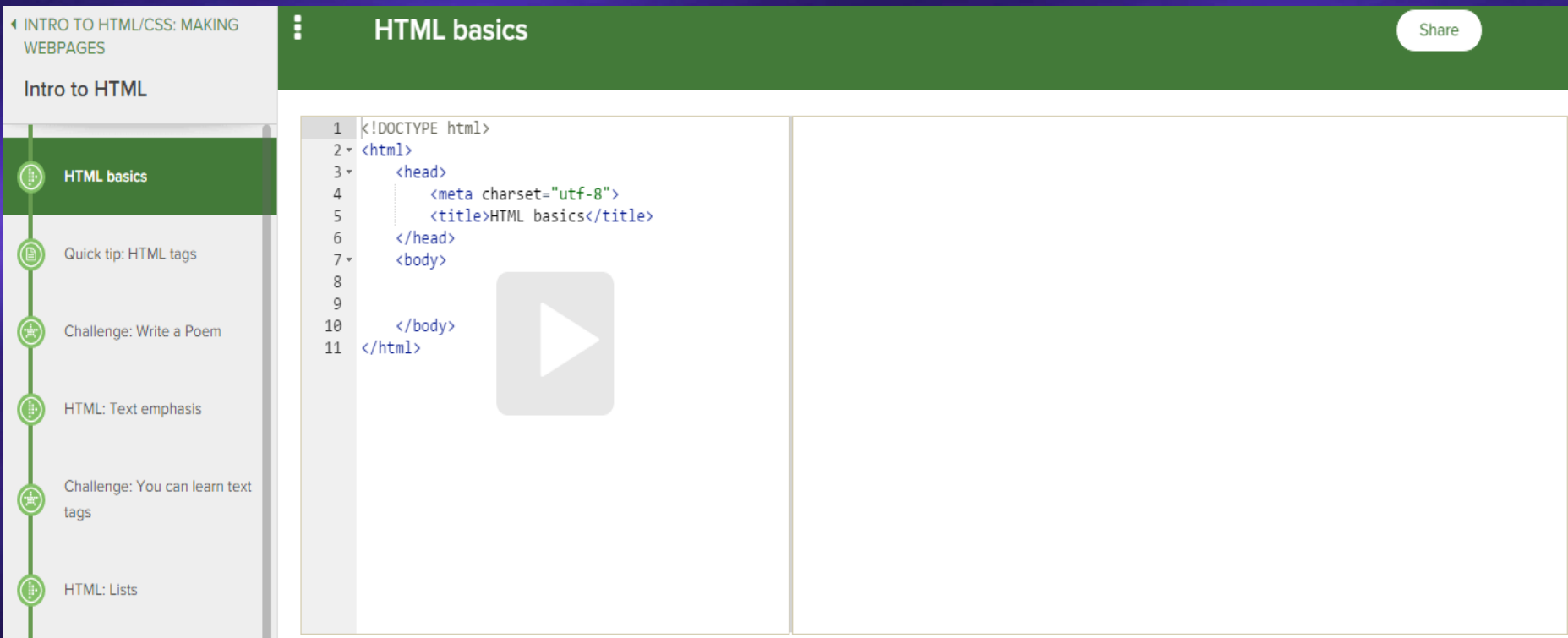
4- Create Animation and Games

- Hopscotch – block coding to create games on an ipad.

The screenshot displays the Hopscotch block coding environment. On the left, a sidebar contains a list of actions: Turn, Set Position, Change X by, Change Y by, Set Speed, and Set Angle. Below these are expandable categories: Drawing, Looks & Sounds, and Values. The main workspace shows a script triggered by the event "When the play button is tapped". The script consists of six blocks: a green "Set Invisibility Percent" block set to 100, a red "Set Position to X" block with X=1000 and Y=300, a green "Set Invisibility Percent" block set to 0, a red "Change X by" block set to -1000, and a final green "Set Invisibility Percent" block set to 100. A "Play" button is visible in the top right corner.

5 – Write a Web Page – Start a Blog

● HTML & CSS – Khan Academy

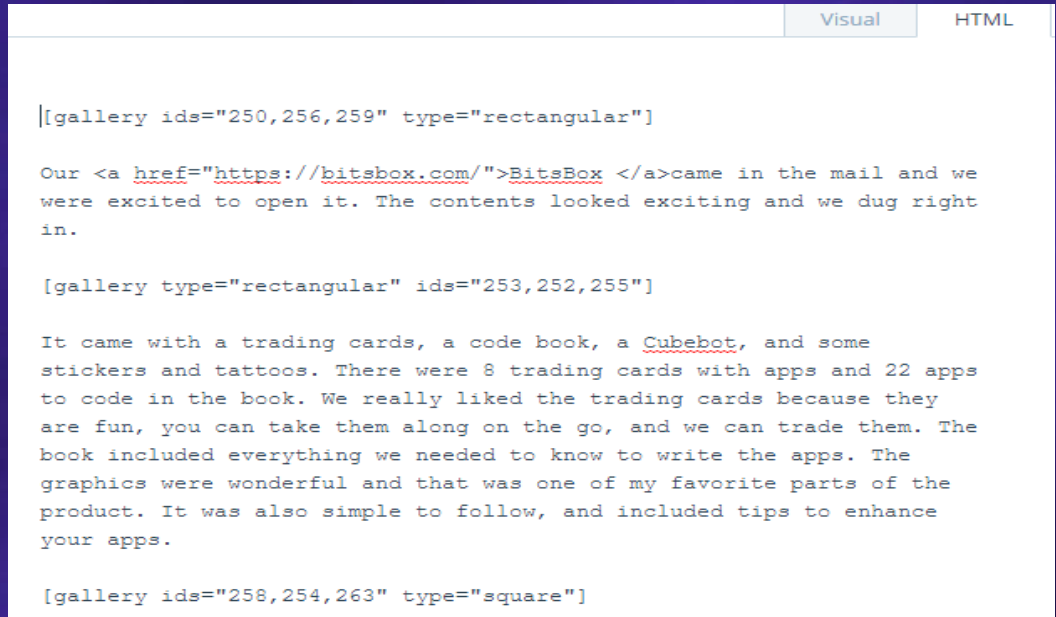
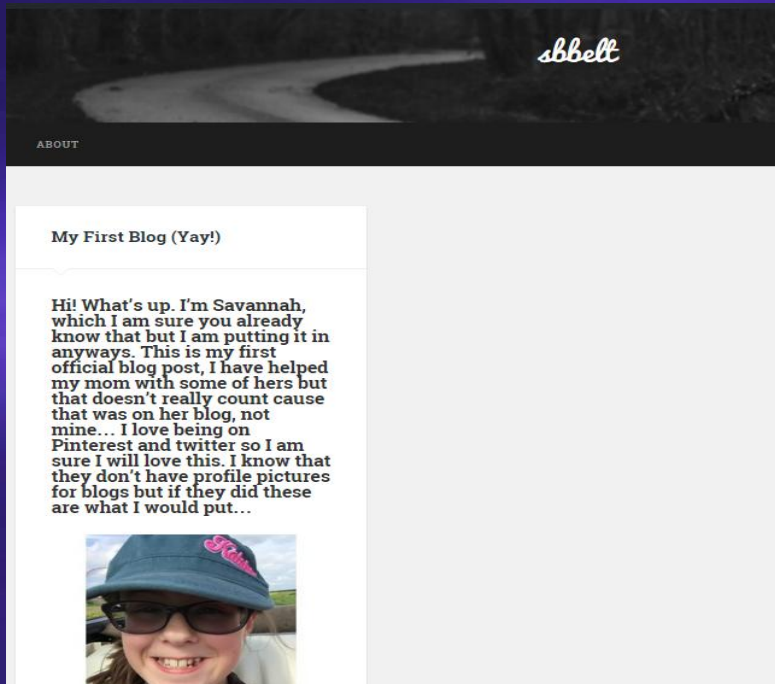


The screenshot shows the Khan Academy interface for the 'HTML basics' lesson. The top navigation bar is green with the text 'HTML basics' and a 'Share' button. The left sidebar is grey and contains a list of lesson topics: 'Intro to HTML', 'HTML basics' (highlighted in green), 'Quick tip: HTML tags', 'Challenge: Write a Poem', 'HTML: Text emphasis', 'Challenge: You can learn text tags', and 'HTML: Lists'. The main content area is white and displays the following HTML code in a monospaced font:

```
1 <!DOCTYPE html>
2 <html>
3   <head>
4     <meta charset="utf-8">
5     <title>HTML basics</title>
6   </head>
7   <body>
8
9
10  </body>
11 </html>
```

A large, semi-transparent play button icon is centered over the code editor area.

5 – Write a Web Page – Start a Blog



6- Learn a Language



JavaScript for Cats – jsforcats.com

Bitsbox



● Bitsbox



Moon Blaster

By Isatklb

```
1 target=stamp('moon')
2 target.tap = explode
3 fill('stars')
4
5
```



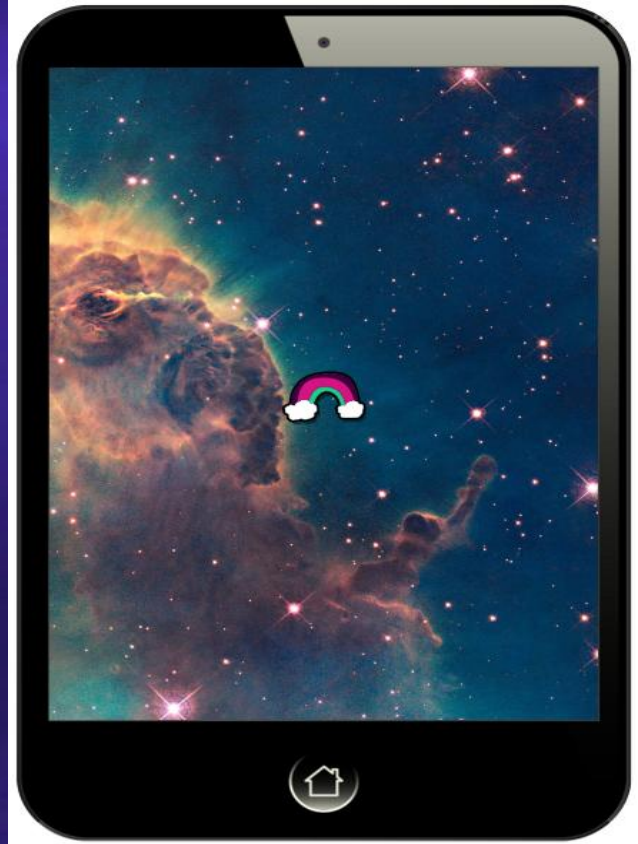
Bitsbox



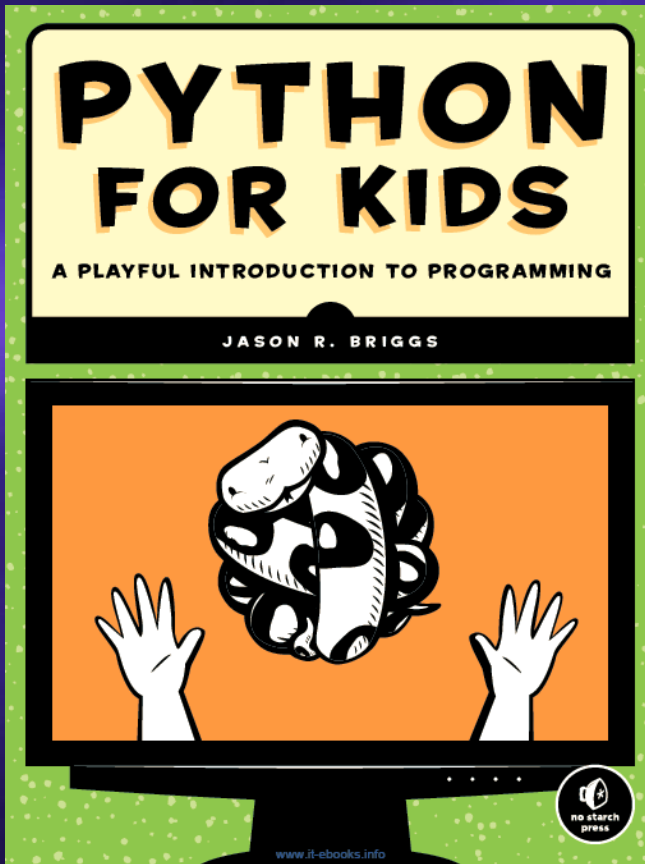
Moon Blaster

By Isatklb

```
1 target=stamp('rainbow')
2 target.tap = explode
3 fill('stars')
4
5
6
7
```



6 – Learn a Language



Hello world

Python

```
1 print('Hello World!')
2 print(2+2)
3 tax=12.5/100
4 price=100.5
5 totalprice=price + tax * price
6 print(totalprice)
```

Run code

```
Hello World!
4
113.0625
```

Powered by [HackerRank.com](https://www.hackerrank.com)

6 – Elm

-- SYNTAX PROBLEM -----

I ran into something unexpected when parsing your code!

```
5|   text Hello, World!"
```

^

I am looking for one of the following things:

```
"\""
```

```
"\\\""
```

```
"\n\""
```

```
"\r\""
```

7- Find Something that Interests Them

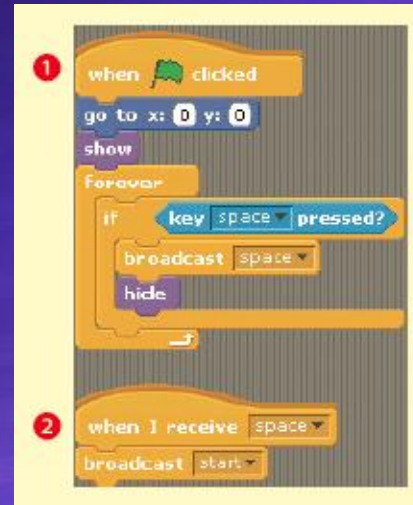
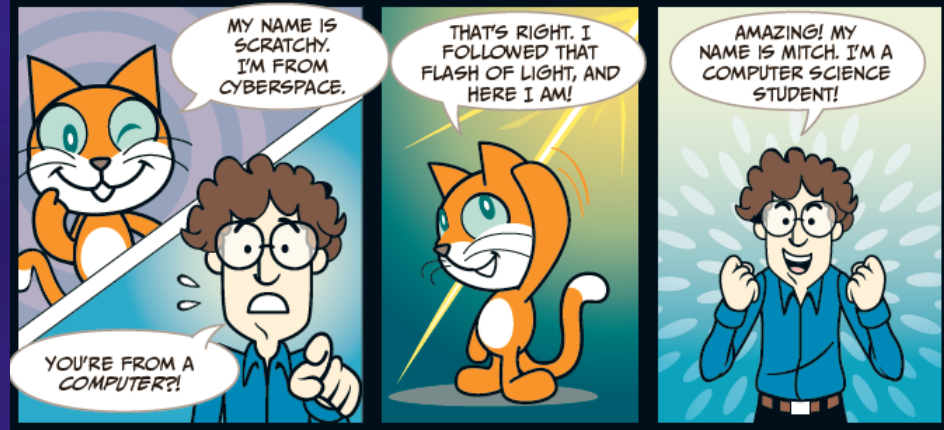
- Contests



<http://www.kidscodingcontest.com/>
<https://www.imaginecup.com/>
<http://www.us.lego.com/en-us/mindstorms/community/r>
<https://twitter.com/Hopscotch>

7- Find Something that Interests Them...

- Books and Magazines-

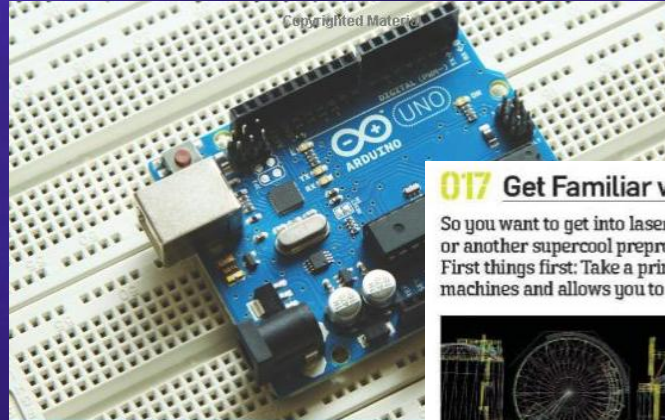
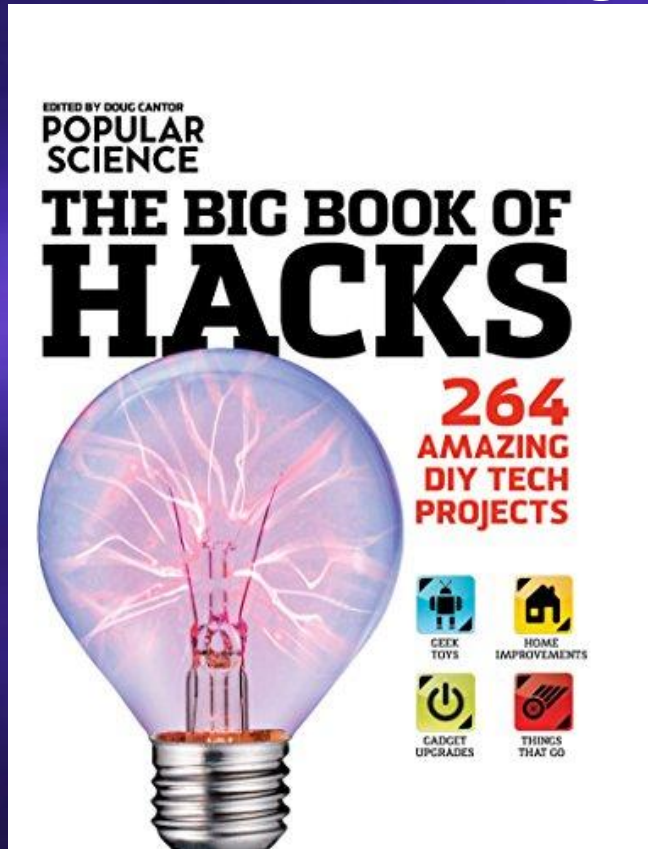


Program 1 makes the sprite show up at the start of the game and disappear when the player presses **space**, the spacebar on their keyboard.

Program 2 makes the Instructions sprite broadcast **start** when it receives the **space** broadcast from program 1. This will start the game!

7- Find Something that Interests Them...

● Books and Magazines-



006 PROGRAM AN ARDUINO

An Arduino is a popular open-source single-board microcontroller. Learn how to program one and let the possibilities take shape.

STEP 1 Arduino microcontrollers come in a variety of types. The most common is the Arduino UNO, but there are specialized variations. Before you begin building, do a little research to figure out which version will be the most appropriate for your project.

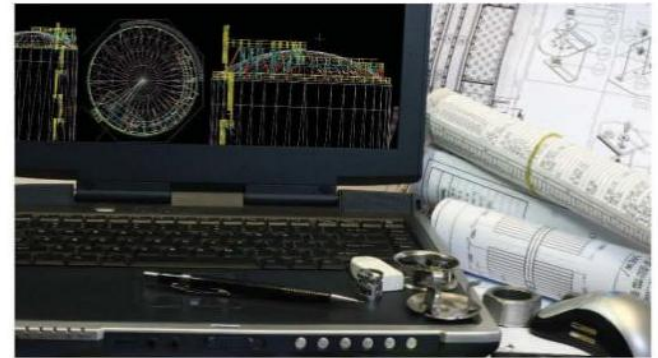
STEP 2 To begin, you'll need to install the Arduino Programmer, aka the integrated development environment (IDE).

STEP 5 Test preloaded programs. Press the up arrow to begin response.

STEP 6 To use need to have programmed the Arduino own sketch. header desc defining var conditions a routine, wh

017 Get Familiar with CNC Software

So you want to get into laser-cutting, 3D printing, plasma-cutting, or another supercool preprogrammed manufacturing method. First things first: Take a primer in the software that controls these machines and allows you to design and create whatever you dream up.



The CNC (Computer Numerical Control) software tool chain consists of three distinct "layers" between your draft idea and the finished, gleaming end product. Today, these functions are increasingly being integrated together in all-in-one programs, but it's still very helpful to understand what's going

programs are available online, even websites with full-featured CAD packages that run right in your browser window.

CAM (COMPUTER-AIDED MANUFACTURING) This type of software analyzes your digital model and adapts it to construction on some particular

7- Find Something that Interests Them...

- Books and Magazines-
- Discount KRIS3499



PROJECTS AND PUZZLES
Searching for Prime Numbers

Figuring out how to find prime numbers is one of the most challenging problems in math. Try different ideas.

[READ ARTICLE](#)



PROJECTS AND PUZZLES
Fun Summer Projects

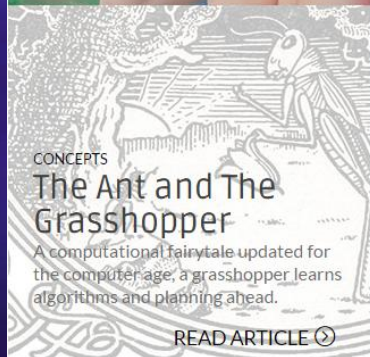
There are many ways to learn technology while playing. Here are technologies and resources you might want to find online this summer.

[READ ARTICLE](#)

PROJECTS AND PUZZLES
Makey Makey Go!

A super portable version of Makey Makey, there's lots of experiments you can do with the new Makey Makey Go!

[READ ARTICLE](#)



CONCEPTS
The Ant and The Grasshopper

A computational fairytale updated for the computer age, a grasshopper learns algorithms and planning ahead.

[READ ARTICLE](#)



NOTEBOOK
So You Want to be a Coder?

A book about the daily life of many different programmers who do neat things with code.

[READ ARTICLE](#)



Kids, Code, and Computer Science
help kids code + explore computer science

The First Computers

Six women were hired to program the first electronic digital computer, ENIAC, in 1945. They were called computers.

PLUS: Make Kittens with JavaScript and How to Keep Your Code DRY

October 2015 \$9.00 USD
0 74470 29391 1 0 >

7- Find Something that Interests Them...

- Course –
 - Codecademy.com
 - Pluralsight.com
- Academic Class(online /textbook)-
 - EdX - UC Berkley, Columbia University, MIT
 - Homeschool Programming
- Minecraft – Code Minecraft Mods
- Hardware – DIY Electronics, Arduino, and Raspberry Pi

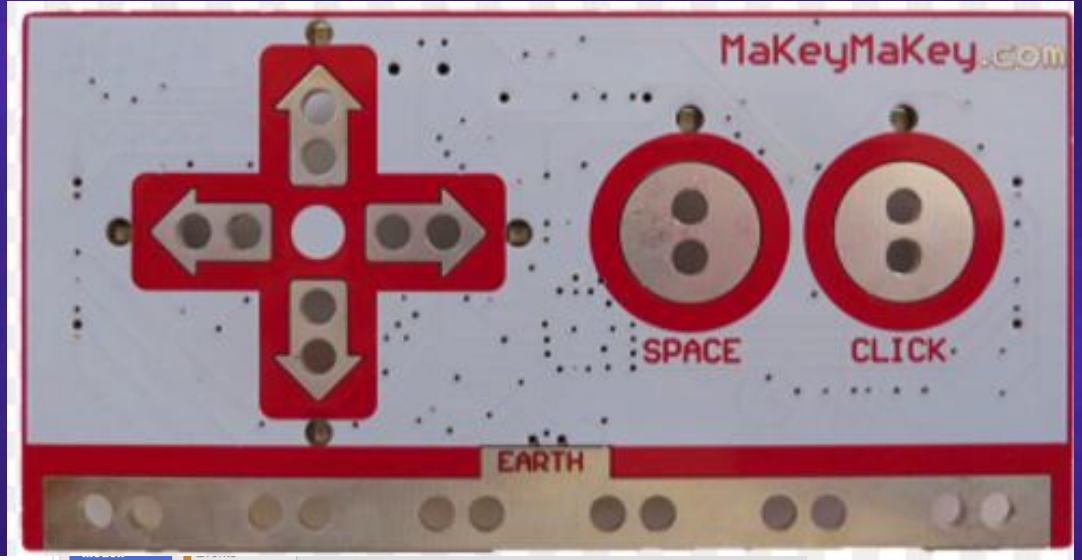
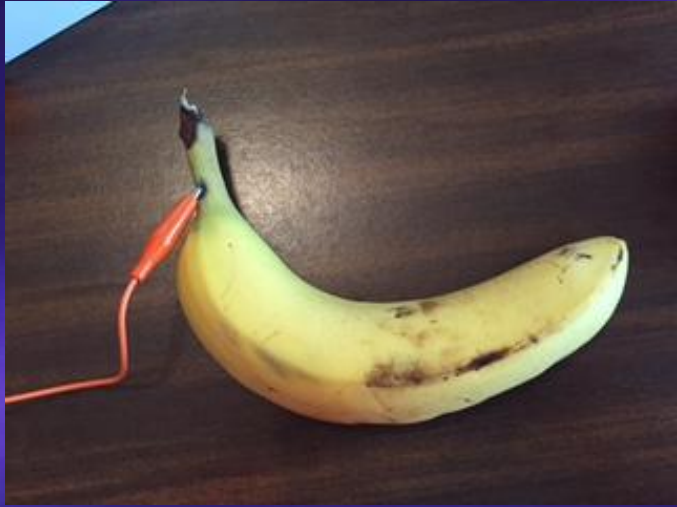
8- Hardware – DIY Electronics, Arduino, and Raspberry Pi, Oh My!

- Allows kids to engage in more active learning.
- Students improve test scores by 25%-38% using interactive learning techniques
- DIY Electronics—Codebug, Makey Makey, Arduino, Raspberry Pi, Kano Computer
- Robots – EV3, Sphero, Dash and Dot

DIY – Makey Makey



DIY – Makey Makey



Scratch Piano
By: Someone10

↑ → ↓ ← SPACE CLICK

Be Stoked!

Scratch script for a piano:

- Looks
- Sound
- Pen
- Data
- Control
- Sensing
- Operators
- More Blocks

move 10 steps
turn 15 degrees
turn 15 degrees
point in direction 90
point towards
go to x: 75 y: -17
go to mouse-pointer

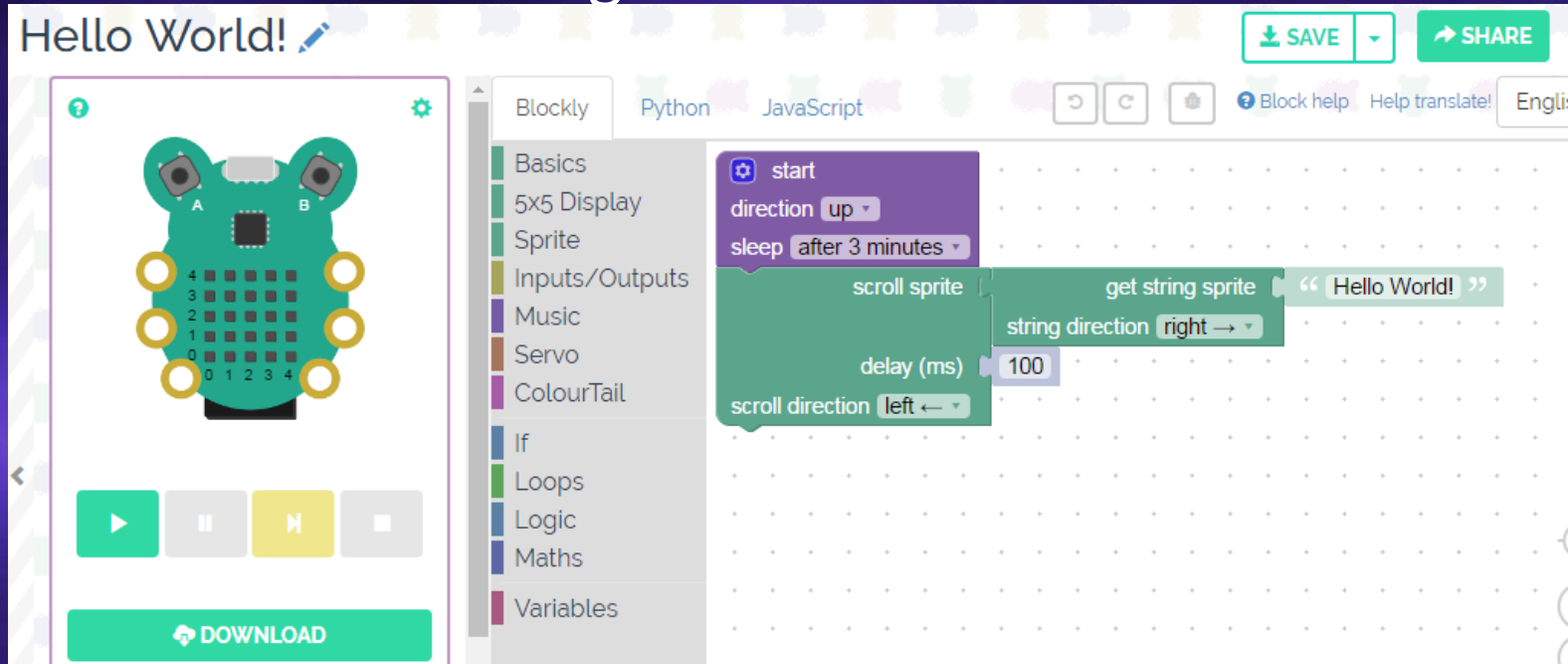
Scratch script for a piano:

when I receive play click
play note 69 for 0.5 beats

when I receive play click
switch costume to c2
wait 0.2 secs
switch costume to c1

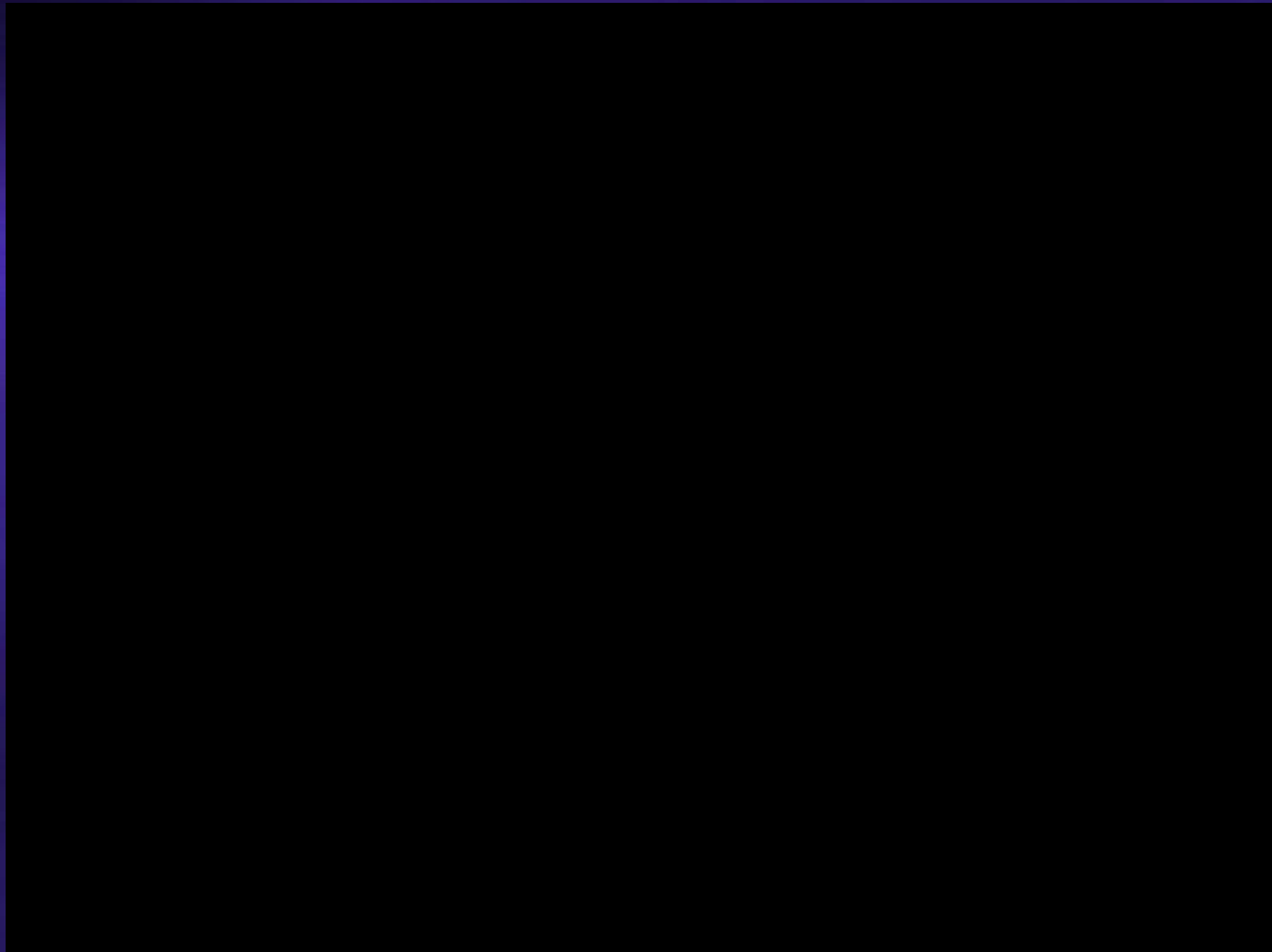
when I receive play click
switch costume to c1
forever
if mouse down? then
broadcast play click
wait until not mouse down?

DIY - Codebug



- Super cheap and fun way to get kids coding.
- Can code on site and use emulator, then download code to bug and play on the bug.
- www.codebug.co.uk

- Codebug



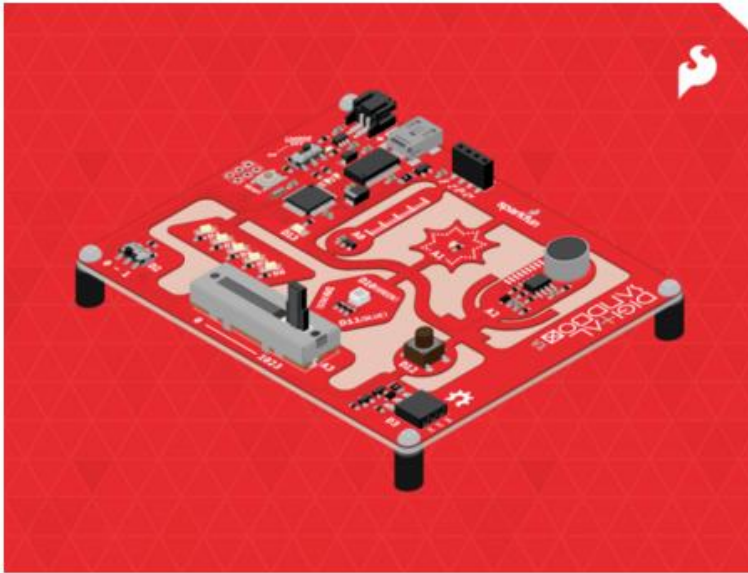
8- Hardware – Arduino

- Arduino – Arduino.cc
 - An open-source prototyping platform based on easy-to-use hardware and software.
 - Inexpensive microcontroller
- Sparkfun.com – Arduino Sandbox

Arduino – Sparkfun.com- Digital Sandbox Tutorial

Welcome to the Digital Sandbox!

The **Digital Sandbox** is a learning platform that engages both the software and hardware worlds. It's powered by a microcontroller that can interact with real-world inputs – like light or temperature sensors – while at the same time controlling LEDs, motors, and other outputs. The Digital Sandbox is equipped with everything, on board, that you will need to complete 13 experiments including controlling an LED, measuring how loud things are, detecting the temperature is, and more. Think of this as a **SparkFun Inventor's Kit** all in one board!



This tutorial walks you through a series of experiments that demonstrate how to program the Digital Sandbox using **ArduBlock**, a graphical programming language for Arduino.

If you're interested in programming your Sandbox using the regular Arduino programming language, check out our parallel tutorial: the **Digital Sandbox Arduino Companion**.

Welcome to the Digital Sandbox!

What is the Digital Sandbox?

Setting up Arduino and ArduBlock

0: Setup, Loop, and Blink

1: Exploring Blink

2: Multi-Blink

3: Dimming (the Hard Way)

4: Dimming (the Easy Way)

5: Color Mixing

6: Number Storage with Variables

7: If This Then That

8: The Reaction Tester

9: Serial Calculator

10: Do the Analog Slide

11: Automatic Night Light

12: Thermal Alert!

13: Sound Detecting

14: Opto-Theremin (Addon)

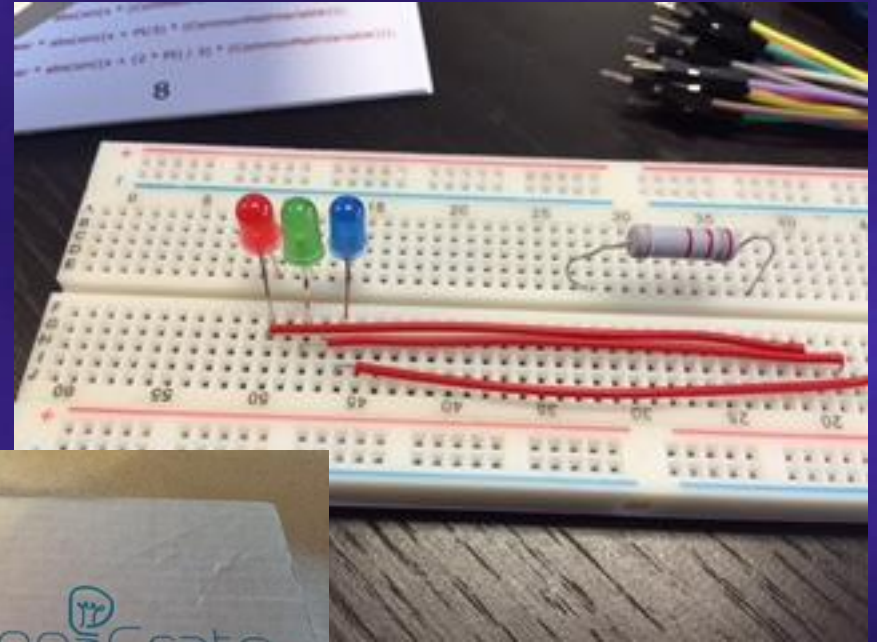
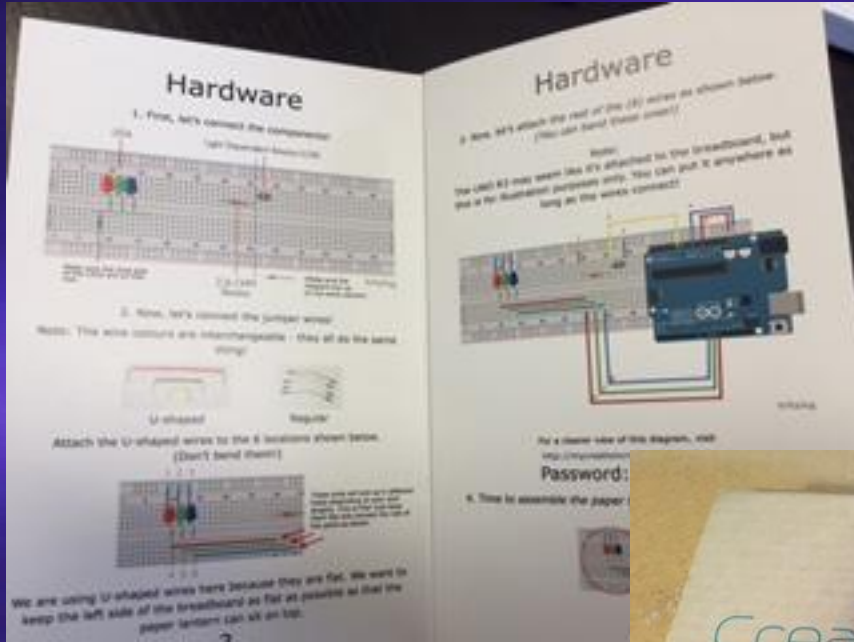
Arduino – Sparkfun Digital Sandbox, using Ardublock.



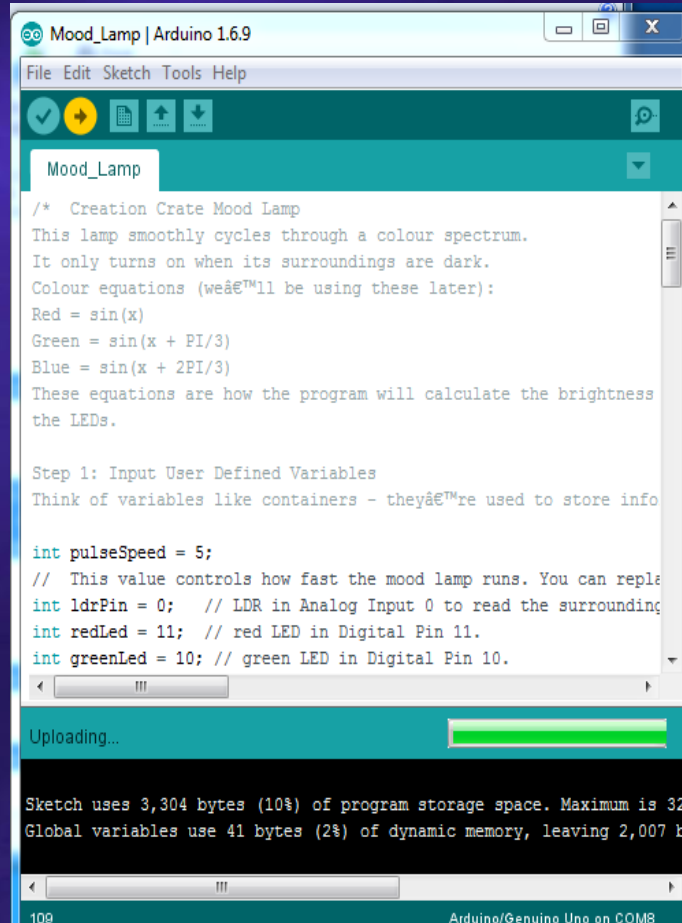
- Arduino Blinking – tutorial from Sparkfun



Arduino - Creation Crate



● Arduino - Creation Crate



```
/* Creation Crate Mood Lamp
This lamp smoothly cycles through a colour spectrum.
It only turns on when its surroundings are dark.
Colour equations (weâ€™ll be using these later):
Red = sin(x)
Green = sin(x + PI/3)
Blue = sin(x + 2PI/3)
These equations are how the program will calculate the brightness
the LEDs.

Step 1: Input User Defined Variables
Think of variables like containers - theyâ€™re used to store info

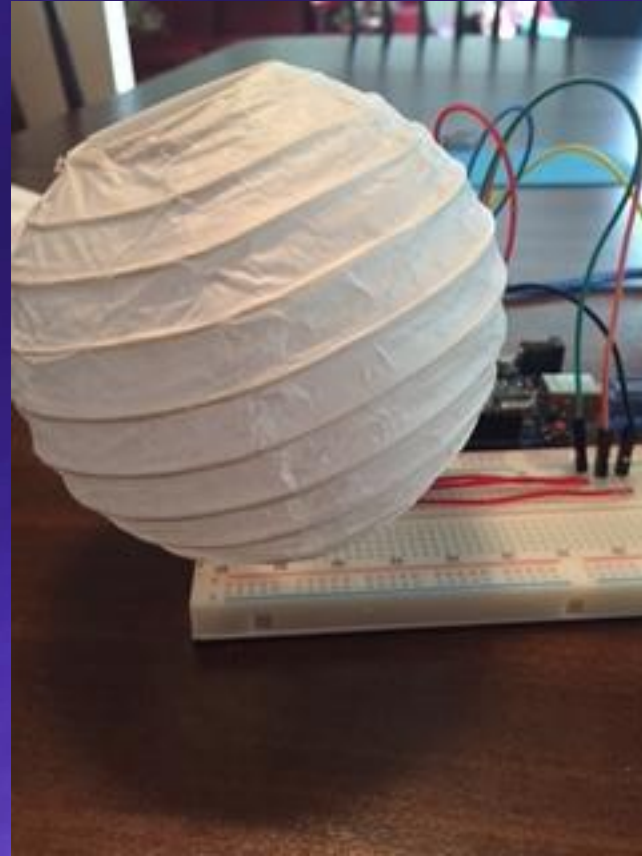
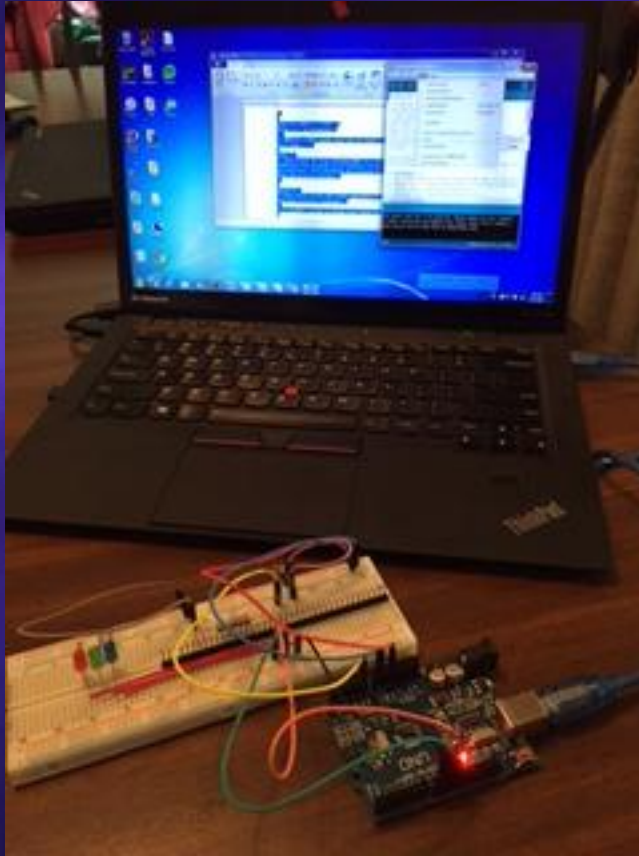
int pulseSpeed = 5;
// This value controls how fast the mood lamp runs. You can repla
int ldrPin = 0; // LDR in Analog Input 0 to read the surroundin
int redLed = 11; // red LED in Digital Pin 11.
int greenLed = 10; // green LED in Digital Pin 10.
```

Uploading...

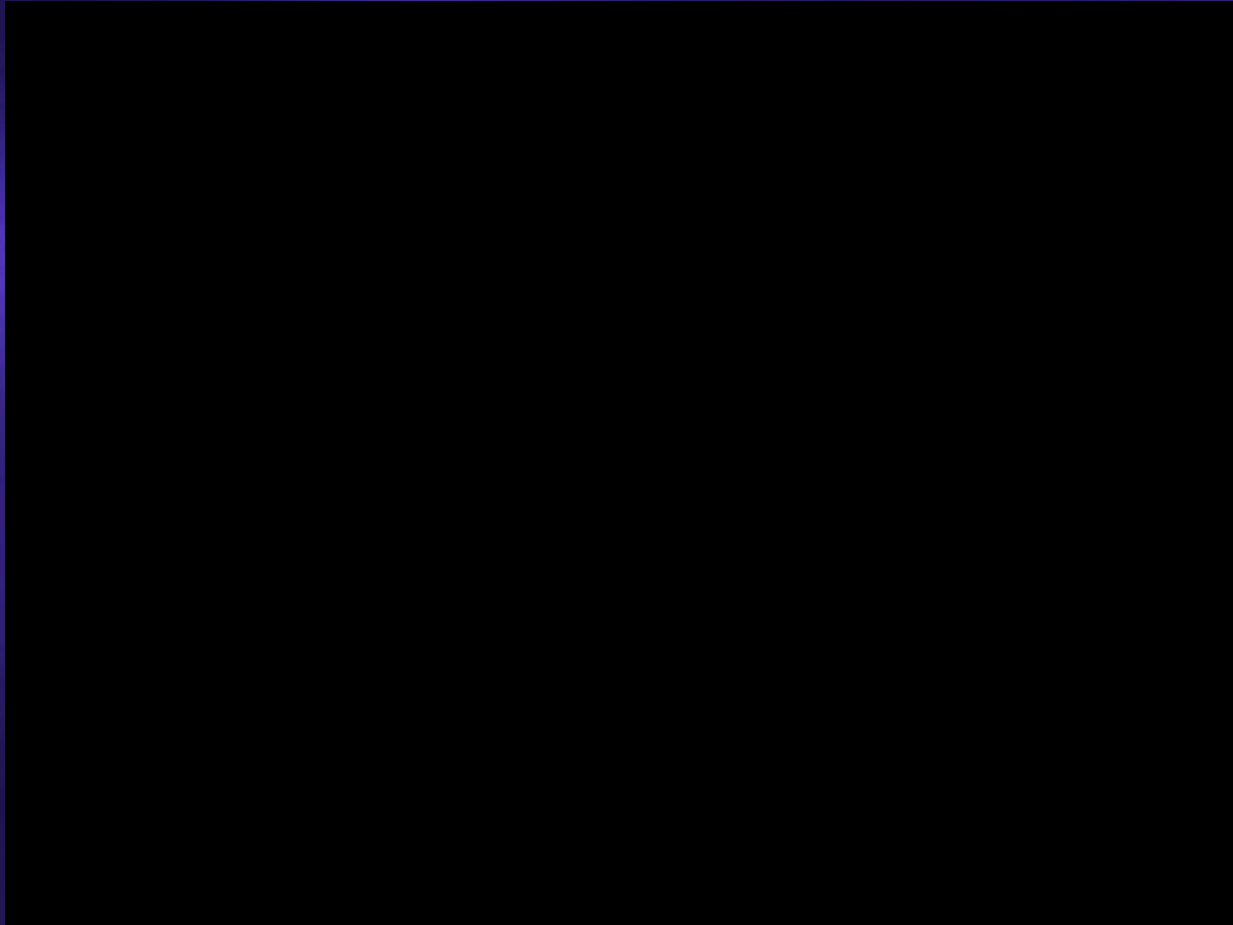
Sketch uses 3,304 bytes (10%) of program storage space. Maximum is 32
Global variables use 41 bytes (2%) of dynamic memory, leaving 2,007 b

109 Arduino/Genuino Uno on COM8

● Arduino - Creation Crate



- Arduino - Creation Crate



8- Hardware - Raspberry Pi

- Raspberry Pi- The Raspberry Pi is a complete, functional, mini-computer.
 - Cheap
 - Small
 - Easy to navigate
 - Portable
 - Software - Raspbian, Minecraft Pi, Python, Scratch, Sonic Pi, ...



[See larger image](#)

Image courtesy [Michael Teeuw](#)

Magic mirror

Developer Michael Teeuw came up with a neat idea for a home project: Create a high-tech mirror that shows you the weather, time, and the day's headlines while you're getting ready for the day.

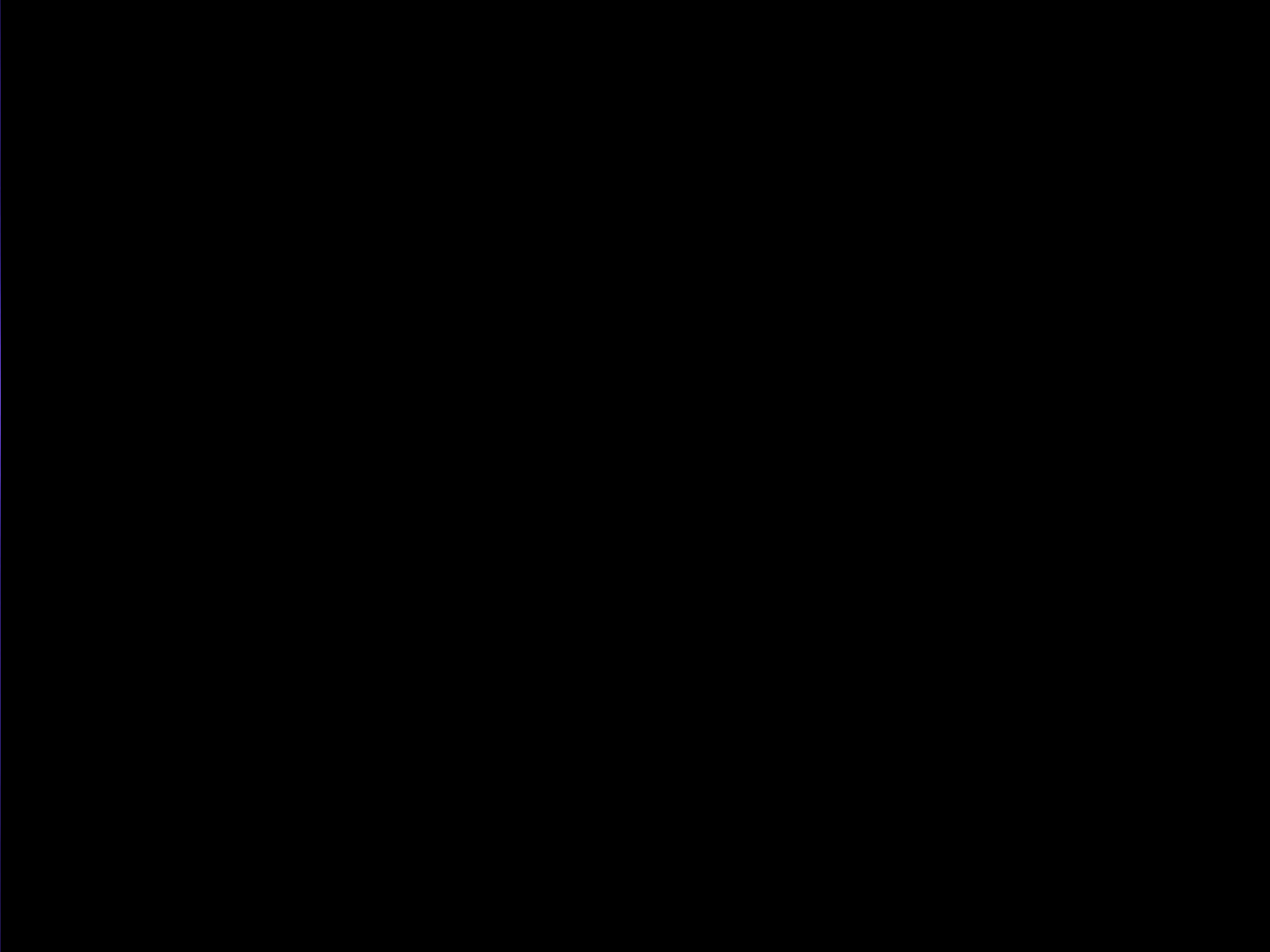
8- Hardware - Kano Computer (Raspberry Pi)

- Raspberry Pi
- Speaker
- Wireless keyboard with trackpad
- Kano OS – pre-loaded with software including Minecraft
- Wi-Fi dongle

GETTING STARTED WITH MINECRAFT PI

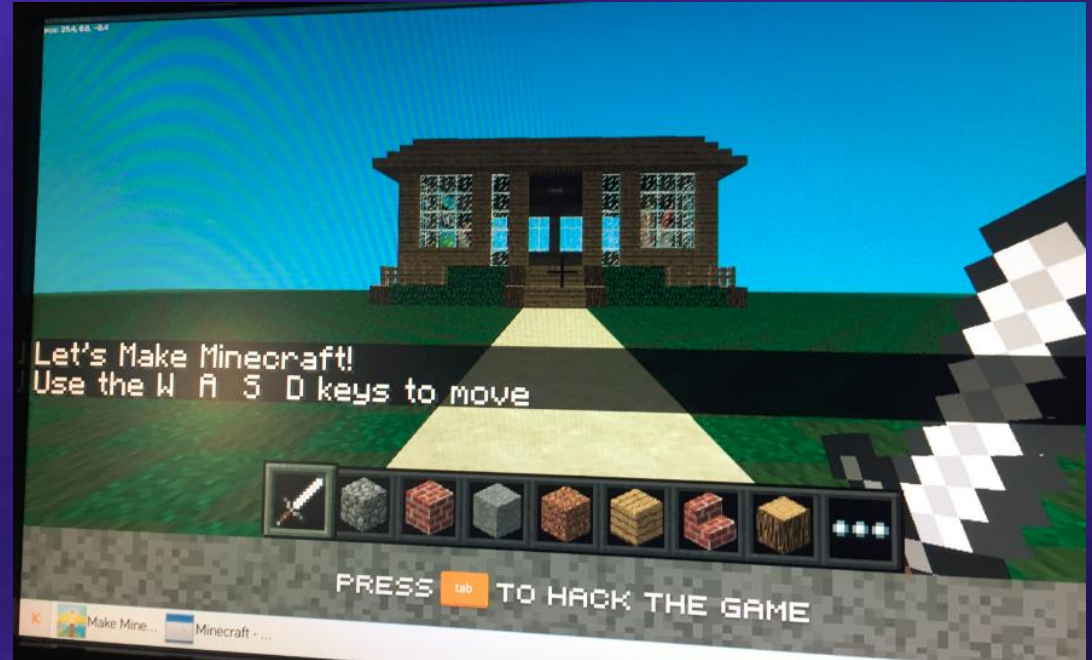
Minecraft is a popular sandbox open-world building game. A free version of Minecraft is available for the Raspberry Pi; it also comes with a programming interface. This means you can write commands and scripts in Python code to build things in the game automatically. It's a great way to learn Python!

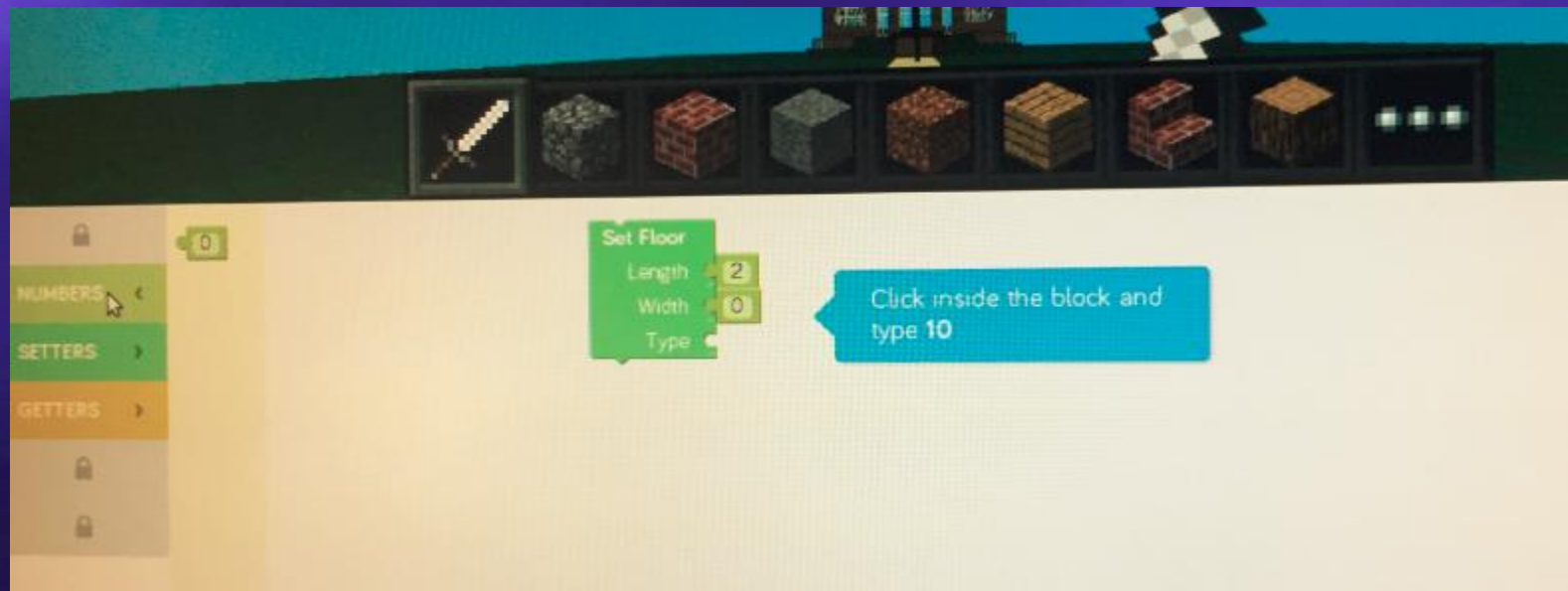
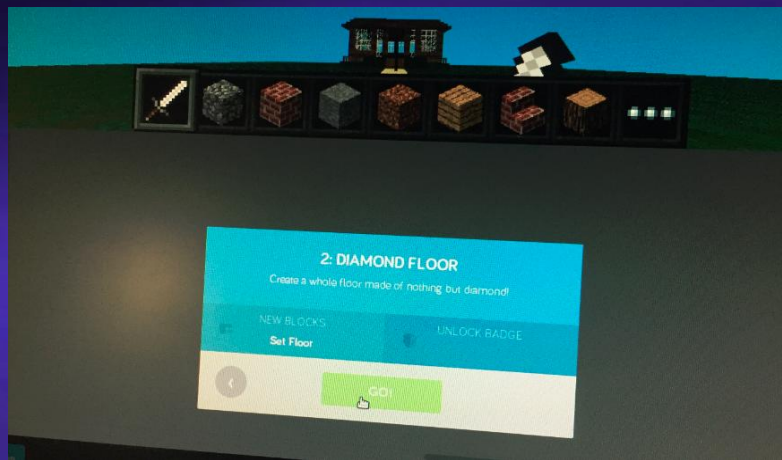


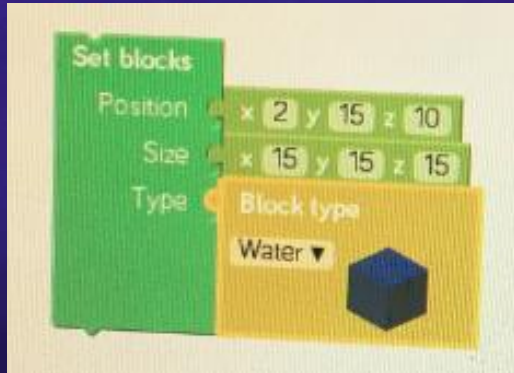
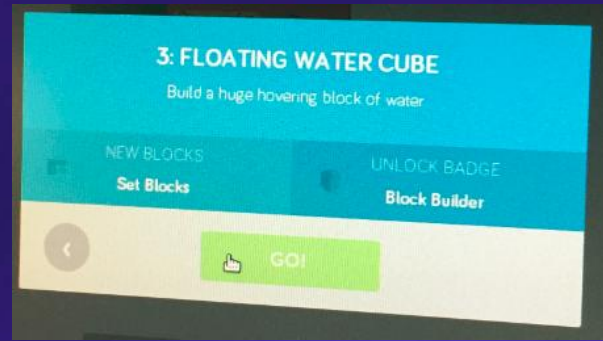




8- Hardware - Kano Computer (Raspberry Pi)

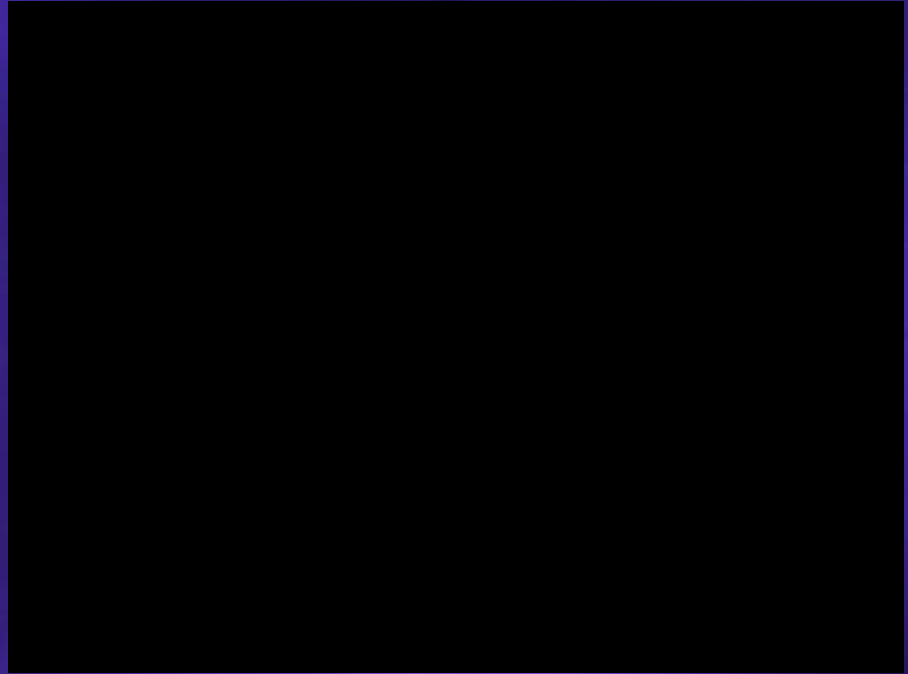






9- Robots– EV3 – education.lego.com

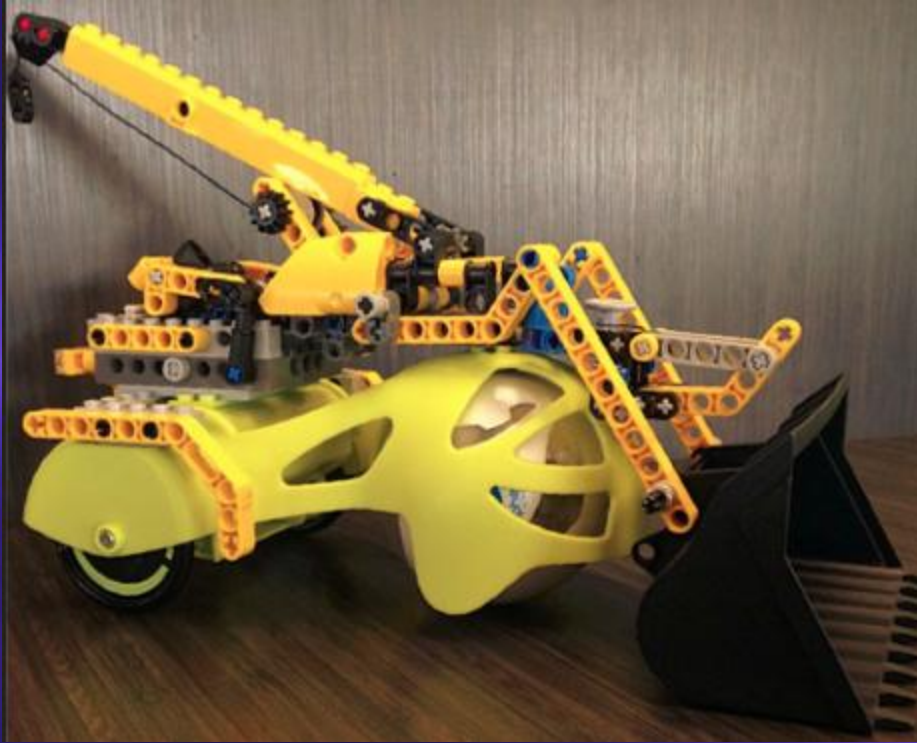
- Build robot
- Code with Brick Program App
- Upload with USB
- Run



9- Robots— Sphero

- Sphero – mini robot
 - flip, spin, color change, and roll
 - Uses a C-based language called OVAL
 - Can use Blockly app
 - Clear shell – see how it works

9- Robots– Sphero






TSA paid IBM \$47,400 for an app that only pointed right or left

The app is so simple it could have been created by nearly any beginning-level app developer.


← Start ↻

On Start Program

Set Color 

Roll 3s 127 0°

Delay 1s

Set Color 

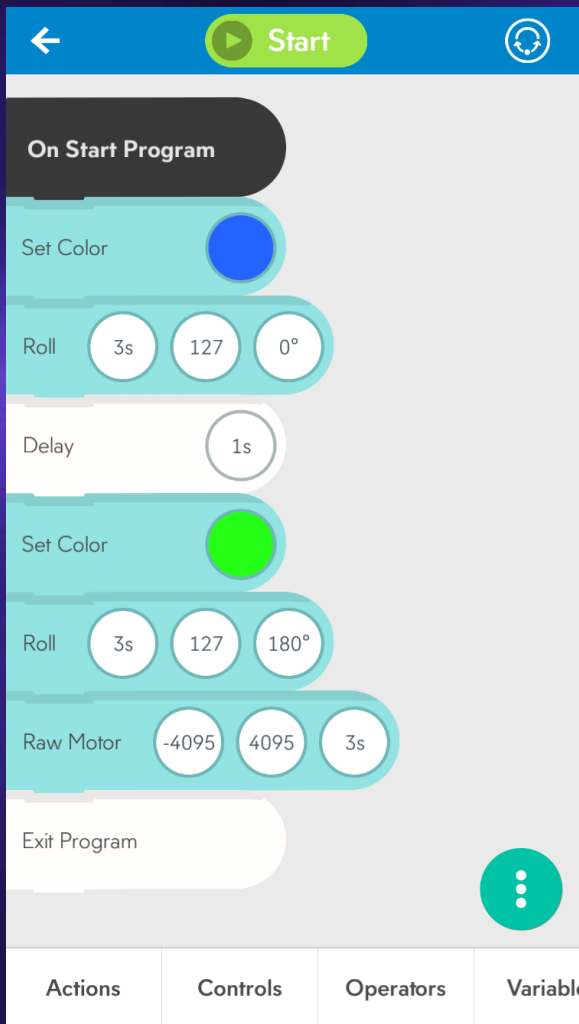
Roll 3s 127 180°

Raw Motor -4095 4095 3s

Exit Program

⋮


Actions Controls Operators Variable




← Start ↻

On Start Program

Loop 3

Set Color 

Delay Random 1 25

Set Color 

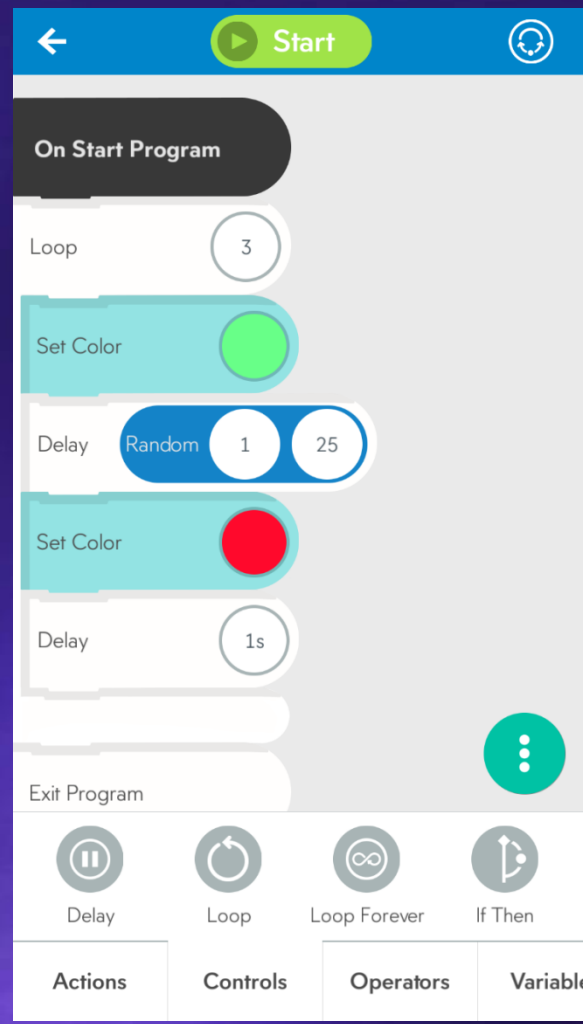
Delay 1s

⋮

Exit Program

⏸ Delay ↺ Loop ∞ Loop Forever ↗ If Then

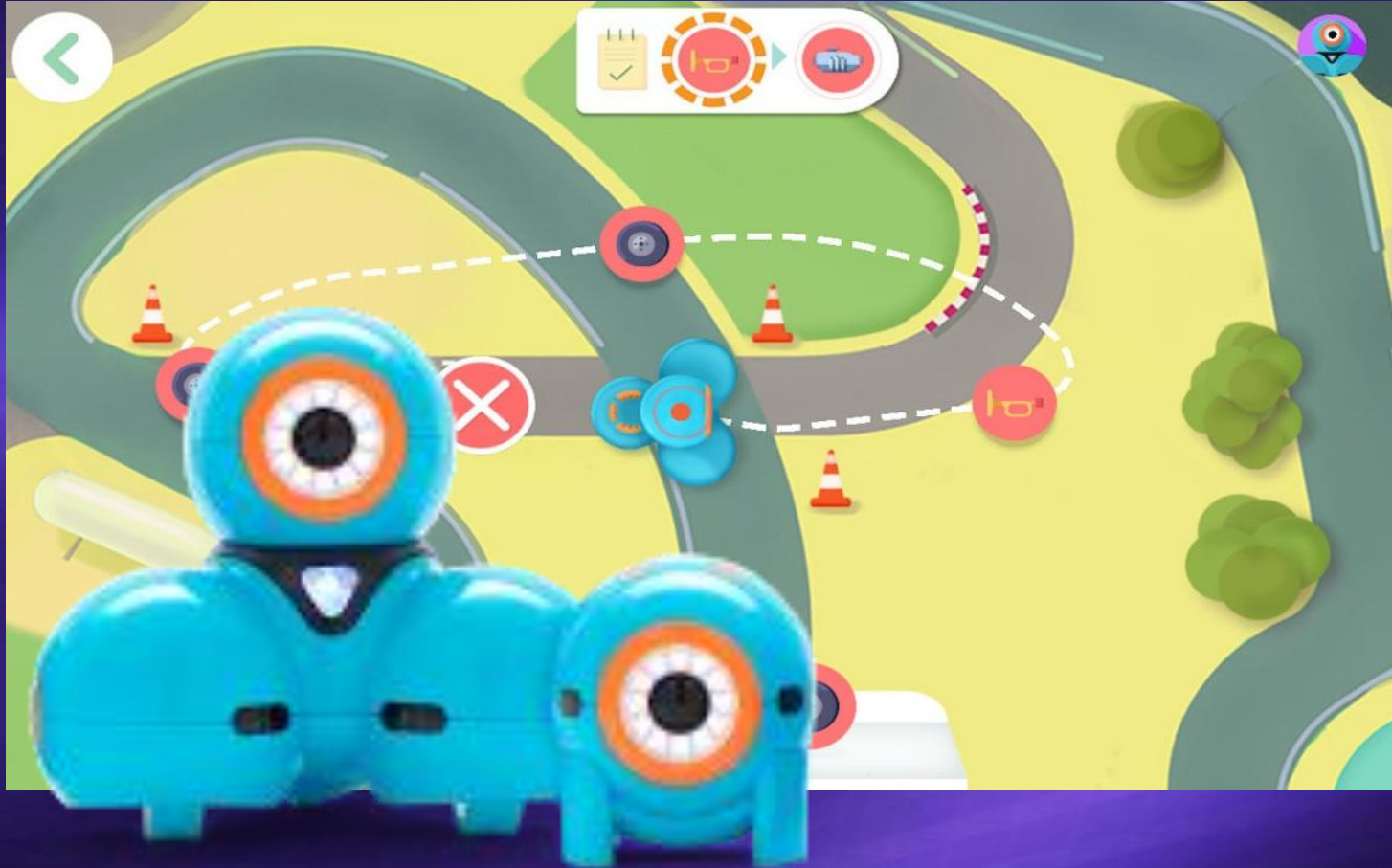
Actions Controls Operators Variable



9- Robots–Dash and Dot from Wonder Labs

- They are engaging for all ages.
- Interact with movement, sensing and audio automatically
 - Can code different reactions to sensors
- They are compatible with Lego's for building add-ons.
- They are so stinking cute.

● Dash and Dot

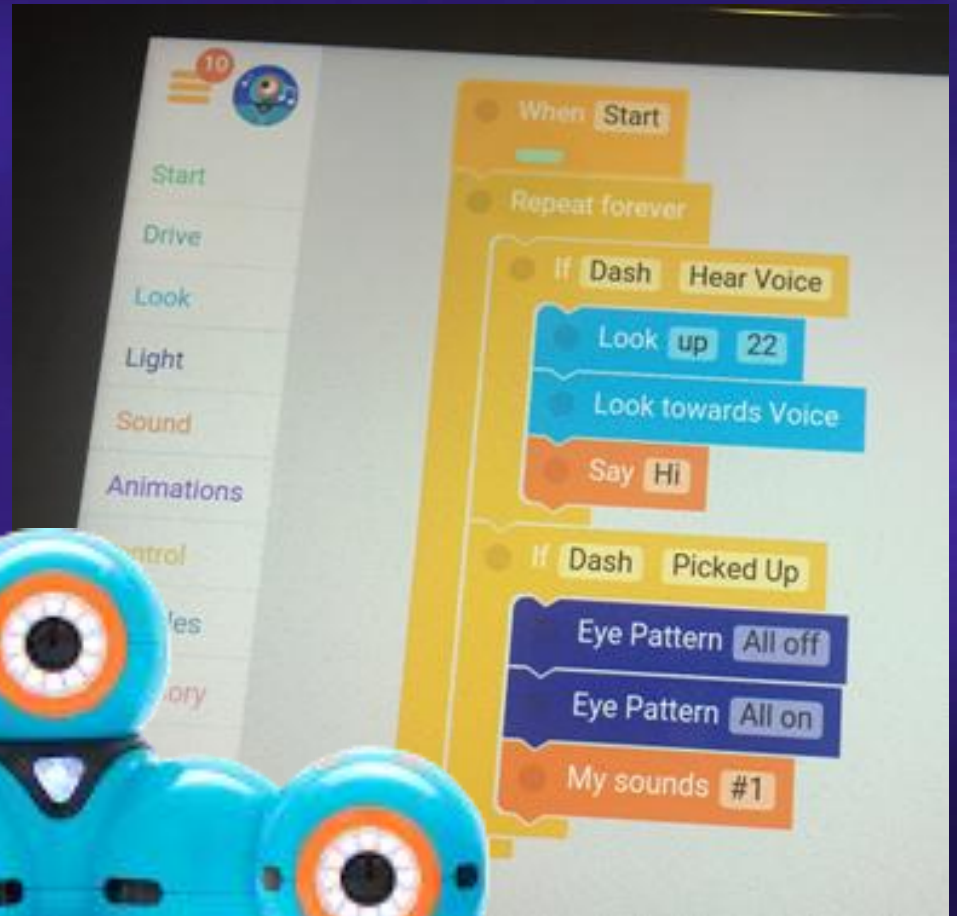


- Algorithm design
- Command sequences
- Sensors and events

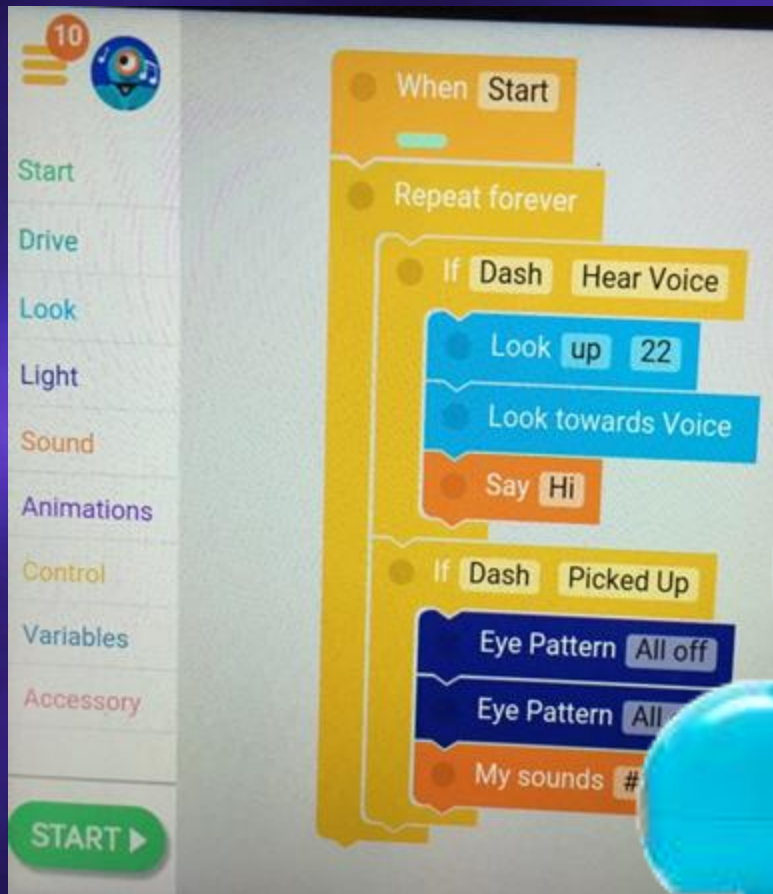
- Dash and Dot
- Building code the way we think



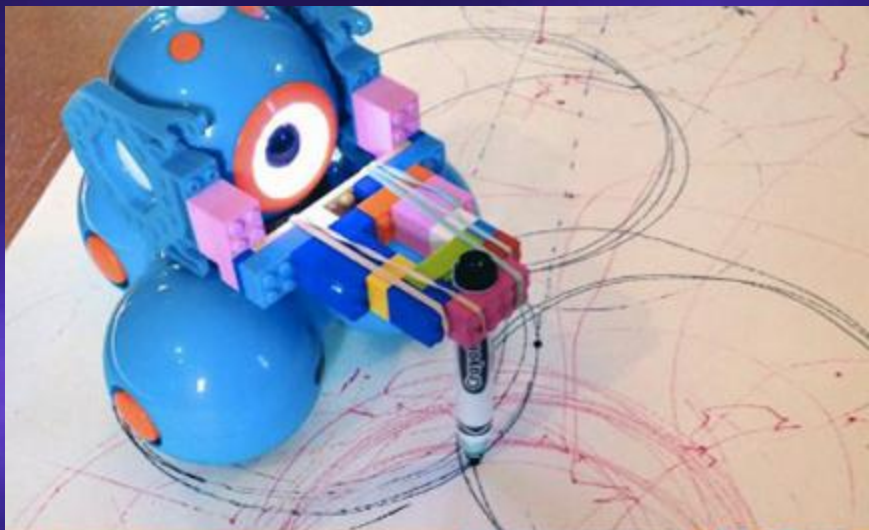
- Dash and Dot
 - Algorithm design
 - Command sequences
 - Control flow
 - Conditionals
 - Loops



● Dash and Dot

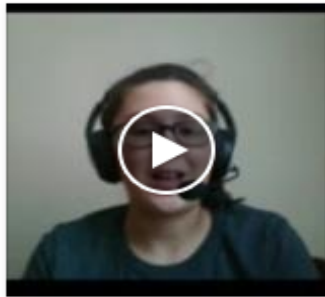


● Dash and Dot



10- Have Them Teach a Class

- Host an Hour of Code
- Speak at a Conference
- <http://tinyurl.com/msch9HOC>



Savannah walks you through an Hour of Code - Minecraft style (Channel 9)

This session offers you the chance to participate in the worldwide movement of Hour of Code™ while being guided step by step through the tutorial in your local...

CHANNEL9.MSDN.COM

HOUR OF CODE FOR CAMPERS

Savannah Boedigheimer

That Conference 2015

Day: Wed, Aug 12 **Time:** 1:00 PM **Location:** Cypress ([map](#))

Level: 3rd Grade - 5th Grade (and up) **Category:** Family

Tags: beginner, Fun, programming, easy

This program is designed to demystify code and show that anybody can learn the basics. This is a beginner workshop for campers who have no experience with programming. Every camper should have the opportunity to learn computer science. The Hour of Code is a global movement reaching tens of millions of students in 180+ countries, and I am bringing it right here to base camp. No experience necessary! Bring a computer if you want to follow along and give it a try.



HOUR OF CODE

DECEMBER 14, 2015

3:30-4:30 PM

MARSHALL LYON COUNTY LIBRARY
201 C STREET, MARSHALL, MN

The Hour of Code program is designed to show that anybody can learn the basics. This workshop will complete a new tutorial. Bring a laptop or tablet or use one in the computer lab. (This is recommended for ages 8 and up.)

Top 10 Ways to Teach Your Kids to Code

- Ages 4-8
 - Robot Turtles, LittleCode
 - Hour of Code/Scratch Jr.
 - Dash and Dot
 - Puzzlets
 - Kano Computer

Top 10 Ways to Teach Your Kids to Code

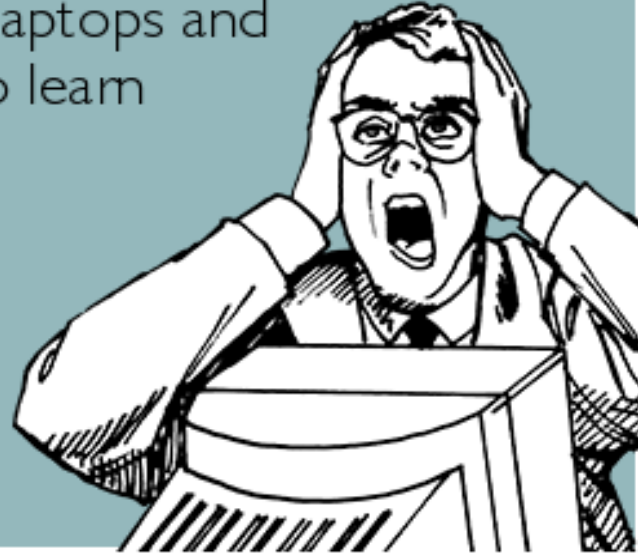
- Ages 7-12
 - Clump
 - Hour of Code/Khan
 - Makey Makey/Codebug
 - Dash and Dot/Sphero
 - Creation Crate/Arduino Kits
 - Kano Computer/ Raspberry Pi

Top 10 Ways to Teach Your Kids to Code

- Ages 11 and up
 - CodeMaster
 - Hour of Code/Made With Code
 - Makey Makey/Codebug
 - Sphero
 - Bits Box / Kids Code and Computer Science Magazine
 - Raspberry Pi, Kano Computer

- List of places to learn to code on Liferhacker-
<http://tinyurl.com/lifehackerlrc>
- Infographic of reasons kids should learn to code:
<http://tinyurl.com/j8pu667>
- List of Apps and Websites for Learning to code,
reviewed – CommonSenseMedia -
<http://tinyurl.com/qzkcdqm>
- Free books/apps/courses for coding on Github-
<http://tinyurl.com/gitfree>
- List of coding tools by type -
<http://tinyurl.com/hffv7sz>
- Minecraft Pi - [**http://tinyurl.com/p76ncen**](http://tinyurl.com/p76ncen)

What, you mean I can't just
hand students laptops and
expect them to learn
something?



somee cards
user card

Slide Information: isatklb.wordpress.com

Questions: isatklb@gmail.com