7 Day Lego Curriculum

Step 1: Setting up and Getting Prepared

- If you have an iPad, you'll want to download EV3 Programmer, and Lego Commander

EV3 Programmer [4+]
LEGO® MINDSTORMS®
LEGO
★★★★☆ 3.6, 102 Ratings
Free

LEGO® MINDSTORMS® Commander
LEGO System A/S   Tools
E Everyone
ⓘ This app is compatible with some of your devices.
🔖 Add to Wishlist

- If you have a computer and smart device (Kindle, Android Tablet, Smart Phone, etc.) you'll want to download Mindstorms software on your computer
  - Link to Software: https://education.lego.com/en-us/downloads/mindstorms-ev3/software
  - Make sure you choose the right operating system for your computer!

Download your MINDSTORMS software

| Windows (7, 8.1, 10) ⌄ | English (United States) ⌄ |

DOWNLOAD

916 MB

- You'll also want to download Lego Commander (picture shown above) on your smart device through your App Store/Play Store

You'll need the following guides for when you're connecting your devices to the brick, if you run into trouble, feel free to email ryan.john.swanson@gmail.com for help.

- The following video will show you how to work the bluetooth settings on the brick, and connect a laptop to the brick
  - https://www.youtube.com/watch?v=uWPUTXp4YIA
  - If you have an iPad, the big difference is that you need to check the iPad mode which is the checkbox directly under the bluetooth option
  - If the video doesn't help, refer to one of the troubleshooting guides below
    - https://education.lego.com/en-us/support/mindstorms-ev3/app-bluetooth-support
    - https://www.lego.com/en-us/service/help/products/themes-sets/mindstorms/connecting-your-lego-mindstorms-ev3-to-bluetooth-408100000007886
- The following video will help you to connect the Lego Commander app

- https://www.youtube.com/watch?v=pWKpV7v2YVM
- The only thing not covered in the video is if you have an iPhone/iPod/iPad, make sure that box (which is located under the bluetooth check box) is turned on, and if you don't have an apple device, make sure it's off

Step 2: Learning to Program

- The following link will bring you to a website with all the online curriculum you will need to learn how to program your robots!
  - http://cmra.rec.ri.cmu.edu/previews/ev3_products/ev3_curriculum/
- Start with the basics if you've never worked with EV3's before, otherwise skip ahead to the "Behaviours" section to learn how to program
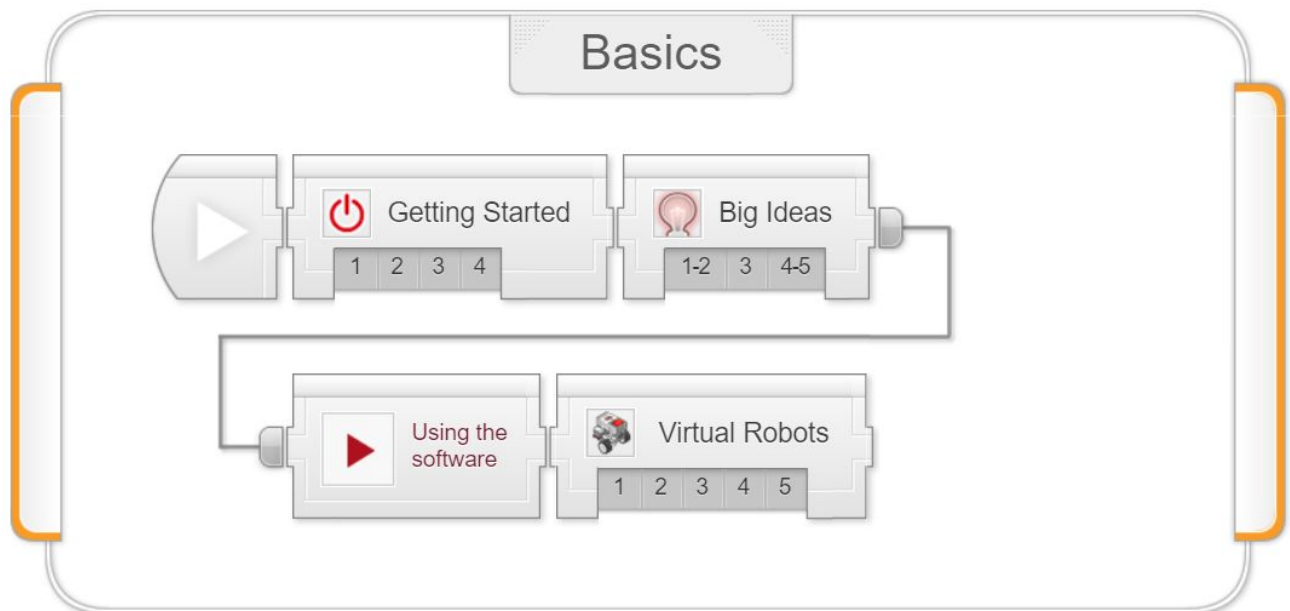
- One of the steps will ask you to build the Robot Educator… click the following links in order for instructions on how to build it. If your kit is missing a part, you'll need to use your creativity to figure out how to make it work with different parts!
  - Robot Driving Base
  - Medium Motor Driving Base

- ○ [Gyro Sensor](#)
- ○ [Touch Sensor](#)
- ○ [Ultrasonic Sensor](#)
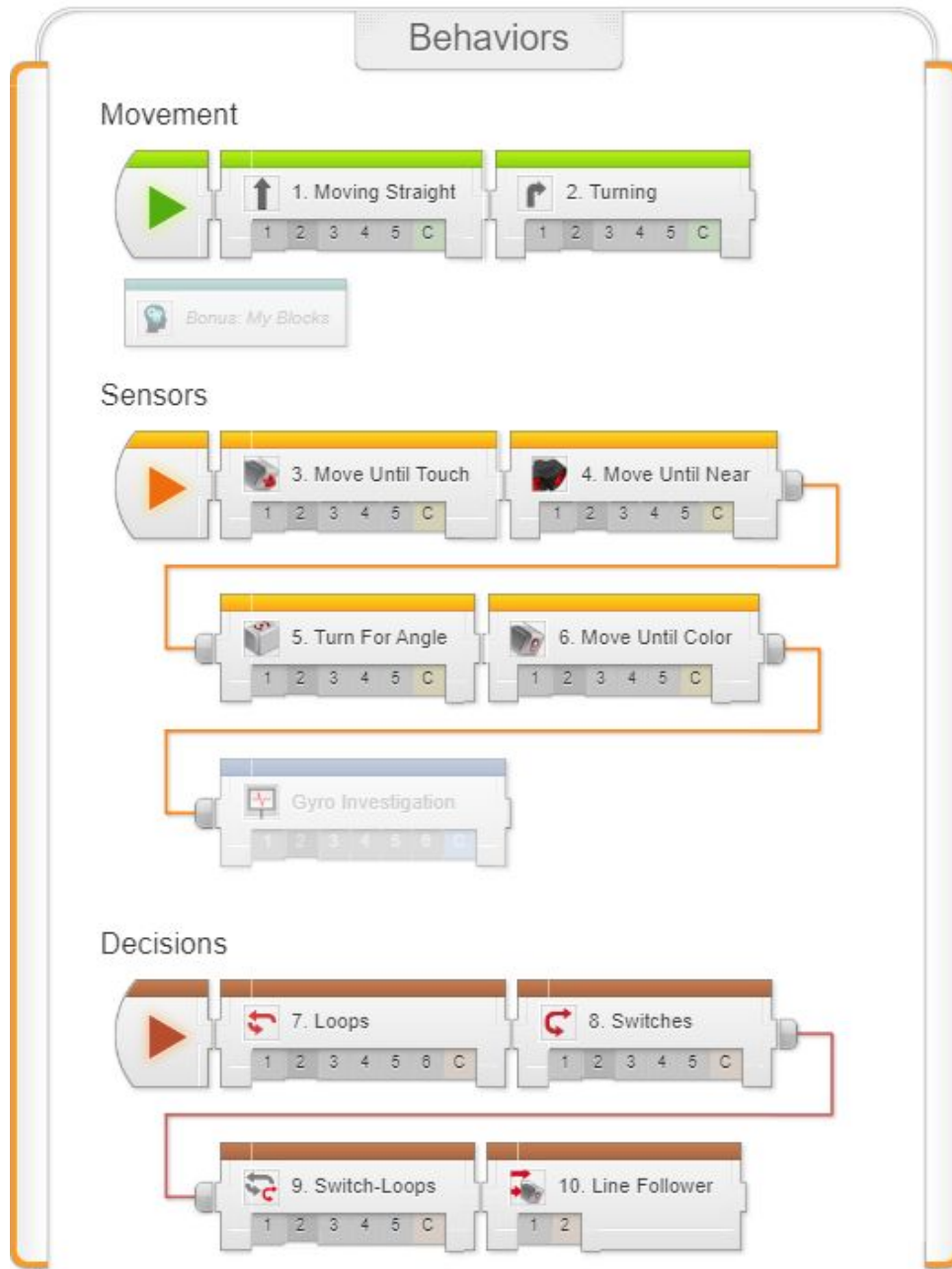
- Click through the guided steps in order to learn how to program your robot to perform various actions
  - ○ Skip the "Move until Color" section
  - ○ Skip the "Line Follower" Section

○ You will learn the basics of programming robot movement, programming using sensors, and more advanced programming techniques using sensors

Step 3: Programming Challenge!
- Put your programming skills to the test with a programming challenge!
- Use the Robot Educator robot to navigate an obstacle course that you create!
    - Find an open space in your house with flat, hard floors (not carpet) for the challenge
    - Look for household items including stacks of books, cardboard boxes, and kitchen chairs
    - Set up an obstacle course by randomly placing objects in a 10 foot by 10 foot area (or however much room you have)
        - Make sure you don't move your obstacles once you place them! This will change whether your program works or not
    - Refer to the picture below for inspiration
- Once your obstacle course has been created, start programming your robot to complete it!
    - This process should involve a ton of testing! Write a program, test it, find out where it fails and then tweak your program
- [Optional] Once you complete your obstacle course, mix things up and make a more challenging obstacle course!

Step 4: Bonus Challenge!
- Once you've mastered EV3 programming, we can work on some fun mechanical challenges
- Watch the following video that will explain the mechanical challenge: Finish Line!
    - https://youtu.be/1yNHiCYf2rQ

- You will need to set up a drag racing strip with a starting line and finish line
    - The lines should be around 10 feet apart
- Instead of racing against another team, you'll need to get a timer set up on a phone or computer
    - You'll start the timer when you start driving your robot and you'll end the timer when you cross the finish line

The goal is to beat the Robot Educator robot's time! The first thing you'll need to do is connect your robot to the Lego Commander App as per the guides in Step 1. Again if you have questions or trouble contact ryan.john.swanson@gmail.com for help.

- Once connected to the Robot Educator, run the drag strip and record your time
- Next you'll want to reference the following guide for one way to gear up your robot to increase it's speed
    - Gear Up
- Figure out how to connect the geared up wheel to your robot and then test your speed again! Make sure to record the time
- Once you get the hang of it, try to design a custom drag racer that beats the Robot Educator robot's time by as much as you can!
    - Try to beat the time by:
        - Half the time
        - ⅓ the time
        - ¼ the time
        - Extreme Challenge: 1/10 of the time

Step 5: Puppy Challenge!

Follow the design instructions below to build the Puppy! If you are missing pieces, use your creativity to figure out how to make things work with what you have or contact ryan.john.swanson@gmail.com with questions.

- [Puppy Challenge](#)

Once you have the Puppy built, follow the following instructions for programming the Puppy. This is very challenging, and might require some additional research to complete!

- [Puppy Programming Challenge](#)

Step 6: Free Build!

At this point you have demonstrated your ability to program and build many Lego Mindstorms designs! Use your skills to create whatever you like. For inspiration and guides, use the following link.

- [EV3 Build and Programming Guides](#)

If you finish all of the content above, contact ryan.john.swanson@gmail.com