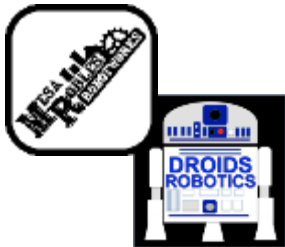


# ADVANCED EV3 PROGRAMMING LESSON

## Ramping Up Speed



By Mesa Robles Robotworks  
and Droids Robotics



# Lesson Objectives

1. Learn what ramp up means
2. Learn how and when to use ramp up
3. Learn how to use the Timer Block

Prerequisites: Data Wires, My Blocks with Inputs & Outputs

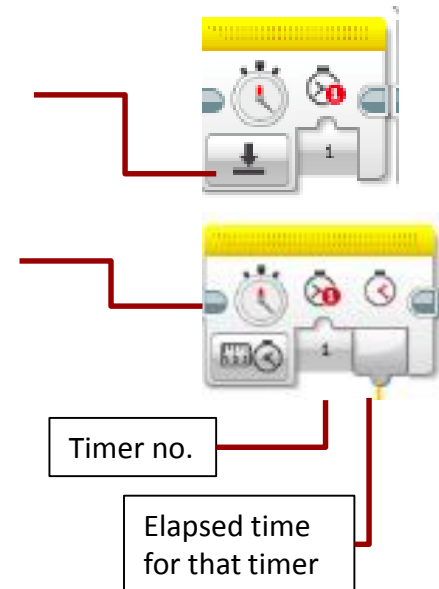
# Why Ramp Up

- Ramping up speed is very helpful when running fast-paced programs
- Usually, if the robot starts up with high speed, then there would be a small jolt in the beginning. The jolt may change the position of the robot.
- With the ramp up, it would start up slowly and increase speed over time (see video on the right)



# New Tool: Timer Block

- The timer block is used to count time
- It is found in the Yellow (sensor tab) in the EV3 Software.
- Multiple timers are available (up to 8 timers)
- You can use the block to reset a specific timer back to 0 secs
- You can use the block to output the time since reset...
- If you are an FLL team, you can use timers to track time or for the ramp up code in this lesson



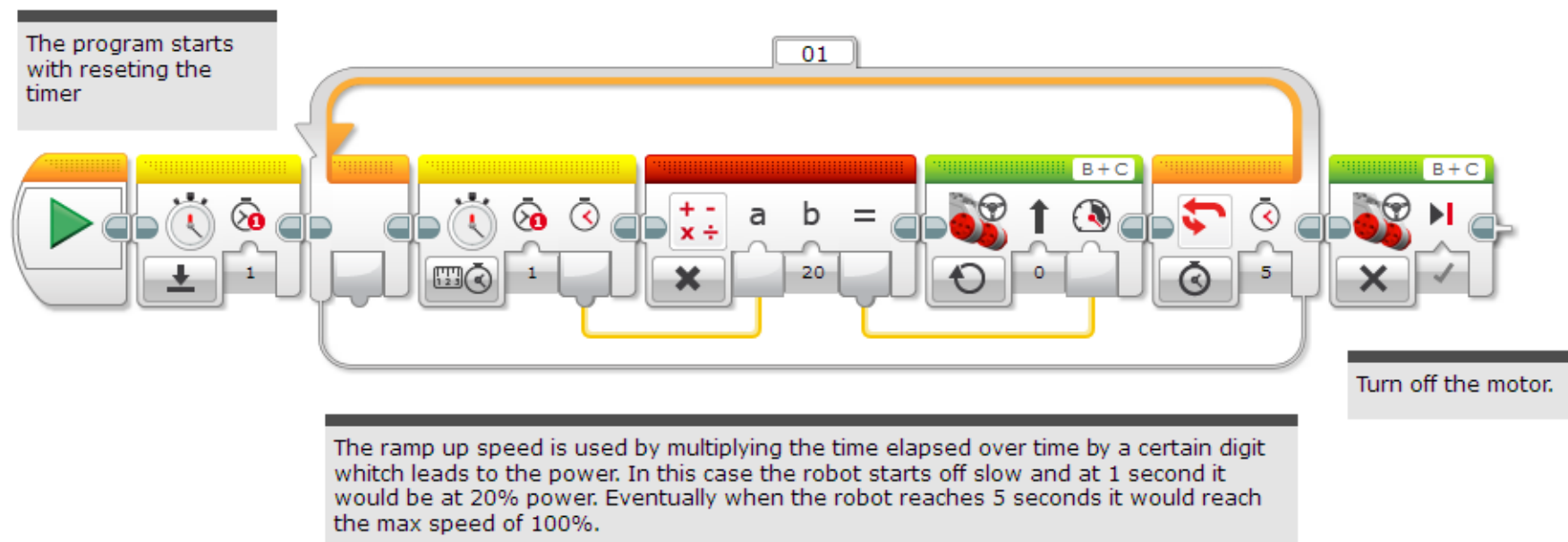
# Ramp Up Challenge 1

Challenge: Write a simple ramp up program that gradually increases the speed by 20 every second for 5 seconds.

## Pseudocode:

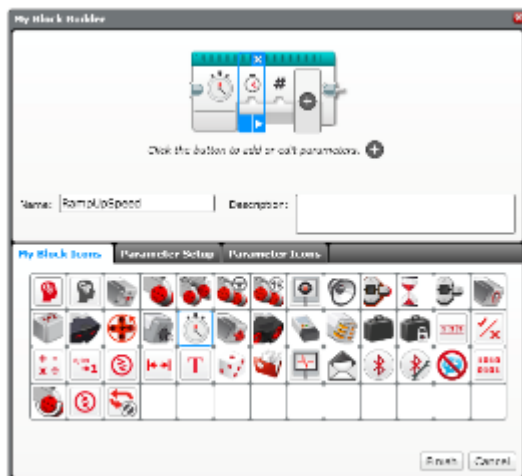
1. Reset timer
2. In a loop, read the number of seconds passed and multiply the power by 20.
3. Still in the loop, take the result of the multiplication and connect it to the move block.
4. Repeat the Loop for 5 seconds
5. Once the program exits the loop, stop the motor

# Challenge 1 Solution

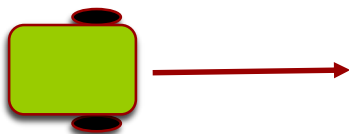


Code by Mesa Robles Robotworks. Modified by Droids Robotics

# Ramp Up Challenge 2

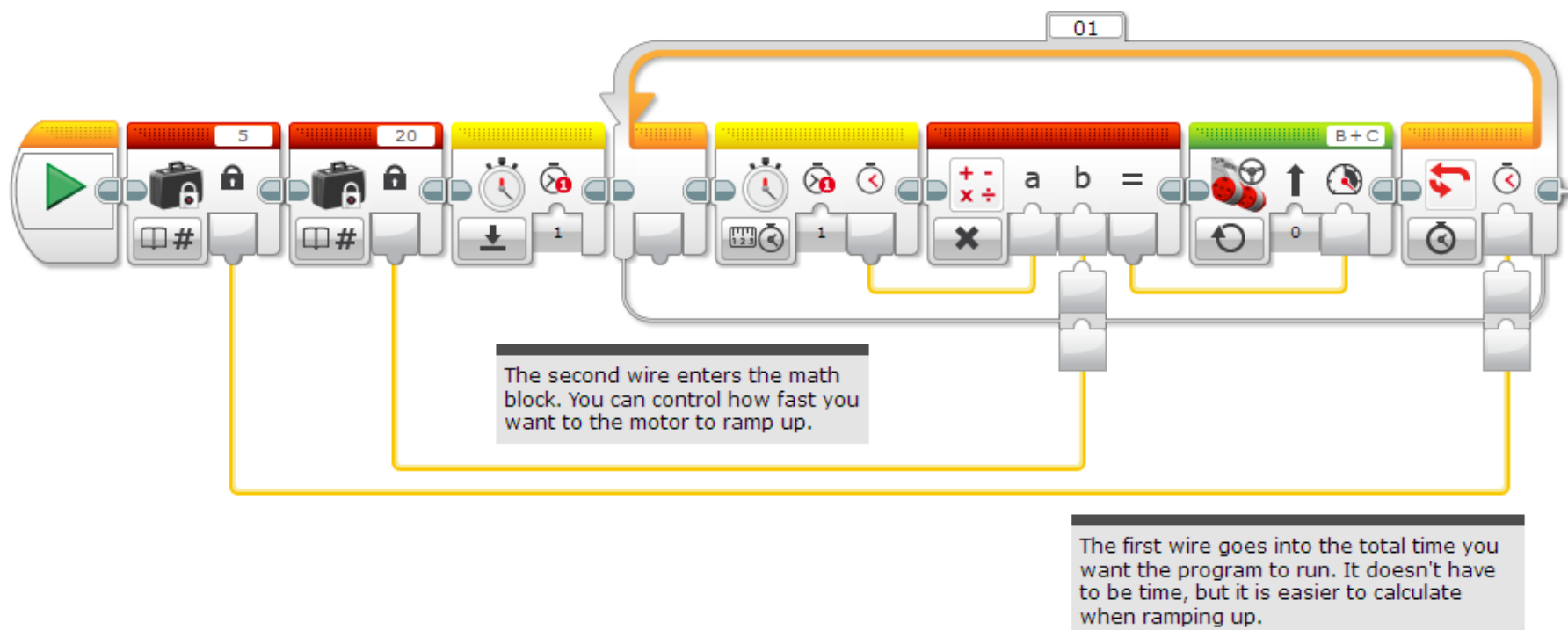


Step 1: Can you now make a ramp up program that takes 2 inputs (total duration of ramp up and how much you want the motor to ramp up per second)? Create a My Block.



Step 2: Ramp up your robot, then move until a black line.

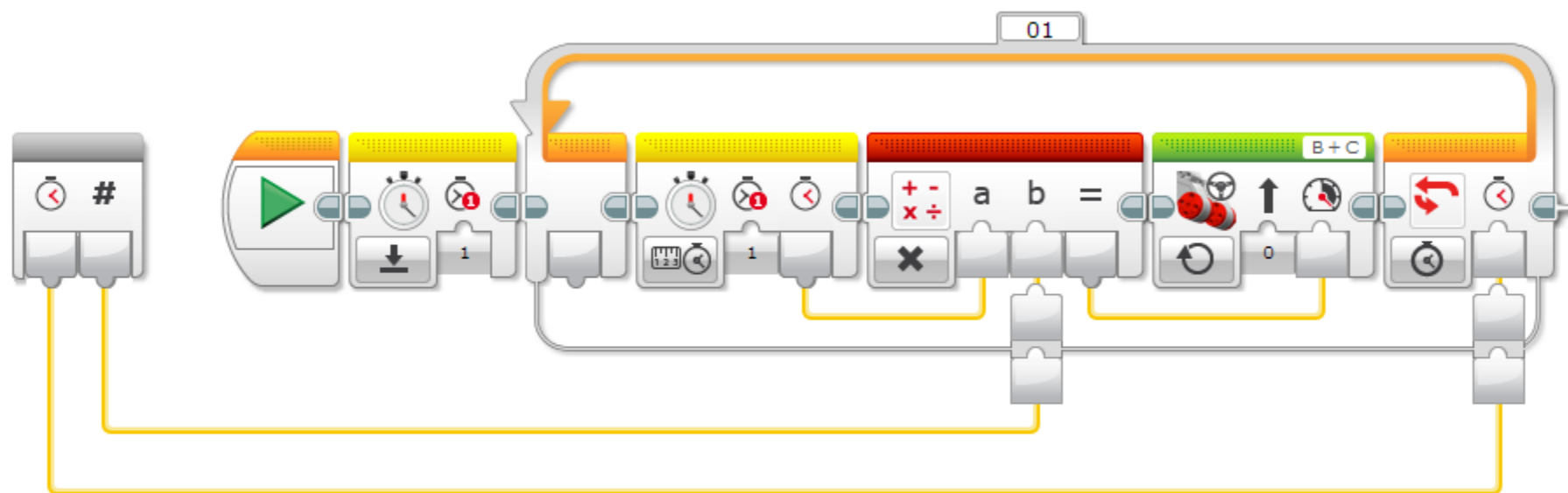
# Creating the My Block



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# Inside the My Block

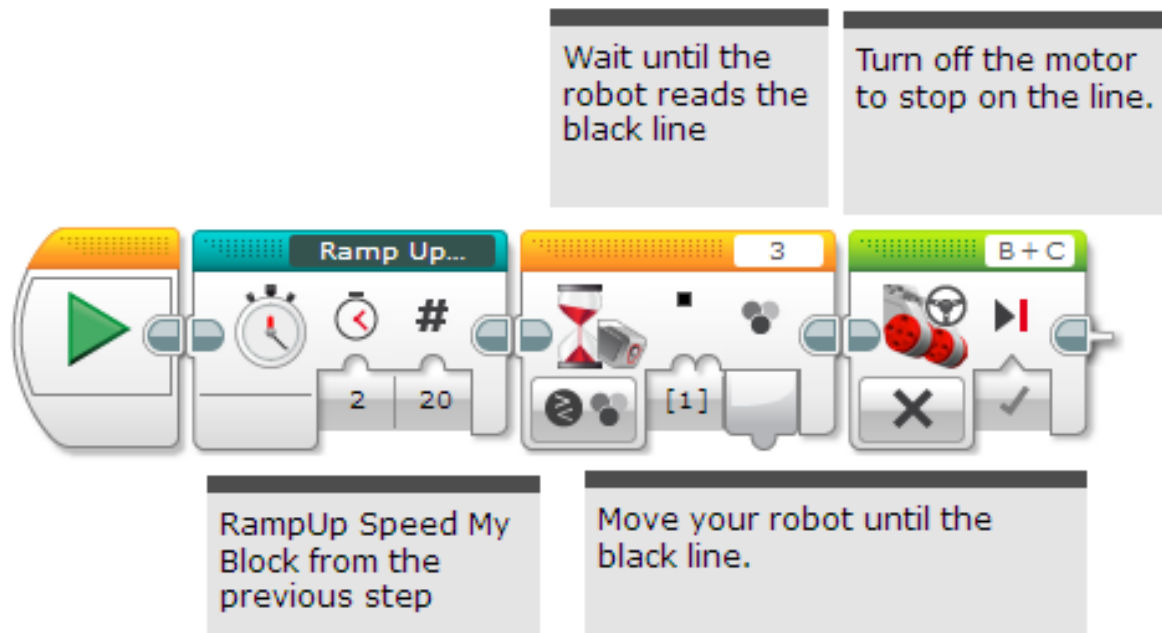


The first wire goes into the total time you want the program to run. It doesn't have to be time, but it is easier to calculate when ramping up.

The second wire enters the math block. You can control how fast you want to the motor to ramp up.

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# Challenge 2 Solution



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# Discussion Guide

1. **What is ramping up?**

Ans. Ramping up is starting slow and getting gradually faster.

2. **Why should you bother?**

Ans. Ramping up can reduce sudden jerk in robot movement.

# Next Steps

- Think about what else you might be able to use a timer block for.

# Credits

- This tutorial was created by Mesa Robles Robotworks ([mesarobotworks@gmail.com](mailto:mesarobotworks@gmail.com))
- Droids Robotics added content to complement the original lesson ([team@droidsrobotics.org](mailto:team@droidsrobotics.org))
- More lessons at [www.ev3lessons.com](http://www.ev3lessons.com)



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