

Quiz: Full Speed Ahead

Introduction to Mobile Robotics > Full Speed Ahead

1. What is the difference between downloading a program and running a program? Which one do you need to do first, and how often do you need to do it?

Downloading a program sends the program from the computer to the NXT. It doesn't cause the robot to execute the code, merely store it for later use. **Running the program actually tells the NXT to execute the commands that were given, so the robot starts moving** (or taking data, or whatever else it is you told it to do).

You must download the program from the computer to the NXT before you can run it, and again any time you write or change code, otherwise the NXT won't have the new/modified program on it to run. You can run the program at any time after it has been downloaded.

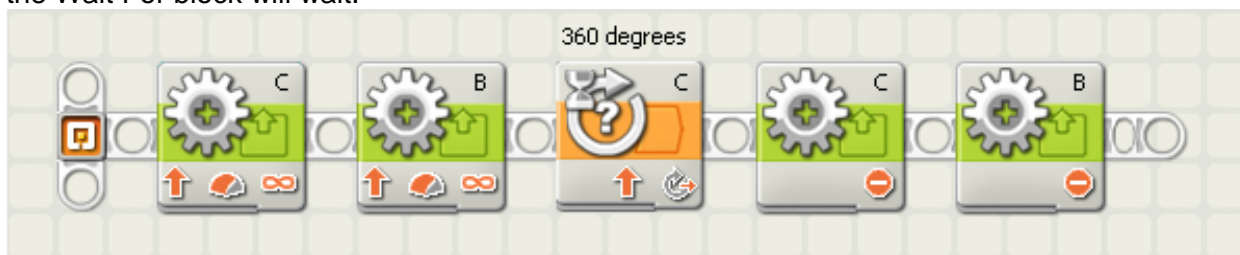
2. Predict what the robot will do when this program is downloaded and run.



The robot will do nothing, because the instant the “Turn Motors On” commands from the first two Motors Blocks are executed, the “Turn Motors Off” commands from the second two Motor Block are reached, because there is no Wait For Block separating the two sets of commands. So the robot will turn the motors on and then instantly turn them off again, resulting in no movement.

Students may also predict that the robot may “shudder,” meaning that the motors will turn on for a split second and then immediately turn off again, but it will result in a visible, if minimal, motion. This is dependant on how long the robot takes to get to the next command in the code. In the NXT, it is almost instantaneous, so there will be no perceptible motion. However, other robots with other firmware may indeed “shudder” when this program is run. This answer, while incorrect, is not an unreasonable thing to predict, and you may want to credit the student for thinking of it. The easiest way to find out the correct answer is to write the code and try it.

3. Write a brief one or two sentence explanation of what each block does in this program. Assume that the comment “360 degrees” accurately describes the amount of rotation that the Wait For block will wait.



Block 1: Turns on Motor C in the forward direction

Block 2: Turns on Motor B in the forward direction

Block 3: Waits until Motor C has turned 360 degrees

Blocks 4 and 5: Turns off both motors, stopping the robot

4. Jenny starts up her programming software, but the block palette on the left seems different, and she can't find the blocks that she used last time. What has she forgotten to do?

Her palette looks like:



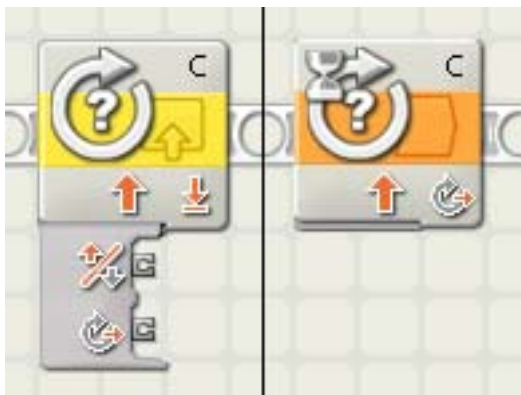
Instead of:



Jenny has forgotten to change over to the Complete palette by clicking the button at the bottom of the left side. This is a very easy mistake, and a very common one. However, the activities in Robotics Engineering all use the multi-colored Complete palette, so it is very important that all students know how to get to it.

The “How to Use the NXT Software” video reviews this and several other important points about the NXT software, and may be a good review for the class.

5. Explain what each of the two blocks shown below does, the difference between them, and give an example of what each might be used for.



The block on the left is the yellow Rotation Sensor block, configured to reset the rotation sensor (as seen in the Continue section activity “There and Back (2)”). **The block on the right is the orange Wait For block, configured to wait for the rotation sensor to reach a certain value in the forward direction**, so we commonly call it the Wait For Rotation block.

Their functions are actually quite different. The Rotation Sensor block shown will reset the rotation counter on the indicated motor (C in this case) so that it reads 0 again wherever this block is inserted in the program. The Wait For Rotation block will monitor the rotation counter, and wait until it reaches a certain value before proceeding on to the next block along the Sequence Beam. The only thing they have in common (and what causes confusion) is their appearance.

The Rotation Sensor Reset block is used to “clear” the sensor and start counting again, and helps to ensure that separate behaviors of the robot that use the same rotation sensor do not interfere with each other (see Continue section activity “There and Back (2)”). The Wait For Rotation block is used to tell the robot when it has gone a certain number of rotations (or degrees) and should move on to the next behavior, like stopping after a certain distance has been reached.