**Robo-Science: Velocity - Graphing Motion**

1. Open LEGO MINDSTORMS EV3 software.
2. *Open Microsoft Power Point (“PPT”) – this is how you will record and submit your answers.*
   * *PPT Slide 1: Call your title slide “Robo-Science Velocity” and include both partners’ names, class period, and today’s date. Save the file as “RSVLastNames.ppt” (.pptx format is fine).*
3. Scroll down on the left side menu to click on the “Science” rectangle.
4. Select “Force and Motion” then scroll to and select “Velocity”. Click the “Open” button in the bottom right corner to launch the program.
5. Read through the Introduction slide (1/11).
6. Ignore slide 2/11. Instead, skip ahead to slide 4/11 and preview the program. Interpret what instructions will be given to the robot. DO NOT DOWNLOAD YET.
   * *PPT Slide 2: Identify the manipulated (independent) variable and responding (dependent) variable. Write a question that we will answer in this lab. Form a hypothesis.*
7. Click back to slide 3/11. Build your robot according to the instructions through page 31/40, switching roles with your partner between fetching/checking and building every 5 pages. **Skip pages 32/40-39/40.** Connect the wire as shown in step 40/40 to finish the build.
8. Return to slide 4/11 and look at the program again.
   * *PPT Slide 3: Your robot will move a total of 3 meters in approximately 10 seconds, at various speeds. Use Paint to draw a predicted distance-time graph. You do not need to have scale shown on your x- and y-axis, just sketch the general trend line that you think you will see. Save the image and insert it into your PPT.*
9. Connect your robot and download the program 09. Run the program on the floor with plenty of room. Your robot will run backwards and will log the data as it goes.
10. **Wait for instructions**. Import your logged data and look at your graph. Convert degrees to distance (m), using the calculator in the EV3 program.
    * *PPT Slide 4: How does the actual distance-time graph compare with your predicted distance-time graph?*
11. **Wait for Instructions**. Use the point tool to find the start/end points for each segment of the program and calculate speed (slope) for each. Use the predicting tool in EV3 to draw a prediction of what the velocity-time graph will look like.
    * *PPT Slide 5: screen-shot your distance-time graph with the speed-time prediction.*
12. **Wait for instructions**. Use the EV3 calculator to create a velocity-time graph from the distance-time graph.
    * *PPT Slide 6: Screen shot your calculated velocity-time graph.*
    * *PPT Slide 7: How does your predicted speed-time graph compare with the calculated speed-time graph?*
    * *PPT Slide 8: Write a conclusion (MSP-style) based on the experiment, related back to your question and hypothesis.*
    * ***Optional*** *PPT Slide 9: Why does the distance-time graph curve at the end? How could you modify the EV3 program so that it will end with a straight(er) line?*
13. *Do a final save of your PPT and*