

Engineering Principles
Computer Science
Pinball Worksheet 2

Name _____

Date _____ Team _____

1. Log on to Scratch <http://scratch.mit.edu/>
2. Select "Try it out."
3. Upload your file saved from last worksheet.
4. **Define Friction**
 - 4.1. Click the **Stage** area (lower left pane) and create a global variable called **Friction**. All the Sprites will be able to see and access this variable.
 - 4.2. Make a Green Flag Event handler that sets **Friction** to 1.0.
 - 4.3. Make an event handler for the letter "f" that subtracts 0.01 from Friction.
 - 4.4. Make an event handler for the letter "r" that sets Friction back to 1.0.
 - 4.5. Test your event handlers to make sure they work.
 - 4.6. Click on the Ball Sprite Icon in the lower left pane to get back to its code.
 - 4.7. In your forever loop add a command to set Speed to Speed * Friction.
 - 4.7.1. **Data** group **Set Speed to 0**.
 - 4.7.2. Replace 0 with **Operator () * ()**.
 - 4.7.3. Go back to the **Data** command group and drag **Speed** and **Friction** into the equation.
 - 4.8. Test and debug your function. If friction is less than 1.0 then your ball should slow down until it is hardly moving.
5. Create a Kicker – this object will repel your ball when the ball hits it.
 - 5.1. Add a new sprite to your project from the **Sprite Library**. This sprite should be generally round, but other shapes like Planet2 or Watermelon will also work. You can reshape or recolor the sprite later.
 - 5.2. Click the **info** button on your new sprite and name it **Kicker**.
 - 5.3. Click on the **Ball** sprite (lower left pane) to see its code.
 - 5.4. Add an **IF-THEN** Control block inside the forever loop.
 - 5.5. Set the **IF** condition to **Touching Kicker? (Sensing** command group)
 - 5.6. Make the ball face away from the **Kicker** by first pointing it towards the Kicker and then turning 180 degrees away. (**Motion** command group)
 - 5.7. Set the **Speed** variable to an appropriate number of your choice (**Data** command group).
 - 5.8. Verify that the ball bounces off the kicker. If friction is enabled, you should see the ball speed up when it hits the kicker.
6. Save your work.
 - 6.1. Find the File menu just above the output pane.
 - 6.2. Select **Download to your computer**.
 - 6.3. Give the file a name and store it in a location of your choosing.
7. **Extra for Experts:** Create a copy of the **kicker** sprite and add code to make it works too.

