# **Projectile Data Lab**

Exploring Data to Make Predictions

## Learning Goals (note: 😪 = turn and talk)

- Use data to justify which launcher launches farthest
- Determine an appropriate amount of data to collect to make estimates with reasonable precision

For all prompts, avoid the words, "it" and "they," and instead, describe what you mean when you're tempted to write these words.

#### **Open Play**

Go to Projectile Data Lab, particularly the Variability screen. Describe three main features you find interesting.

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Share your discoveries with a partner. What's one discovery your partner found that you love?

### **Guided Inquiry Activity**

1. Pick a projectile type. Which setup (launcher, configuration) helps you launch the farthest? Record your observations and curiosities as you explore to keep a record of your thinking.

My setups (launcher, configuration, projectile type, etc.)	Observations and curiosities to help me narrow down my answer

2. Your final decision and rationale for deciding which launcher launches farthest.

My final launcher, configuration, projectile type that goes the farthest	Justification for my choice

3. Compare your final decision from #2 with a partner. Then fill in the table below together.

Compare	Similar (list at least 1)	Different (list at least 1)
My partner(s) and I made <b>choices in our</b> <b>setup</b> (projectile type, launcher, configuration) in similar and different ways.		
My partner(s) and I <b>justified</b> our setup in similar and different ways.		
Questions we have about each other's set ups.		

- 4. Make any changes you'd like to get set up for a class tournament (you and your teacher will create rules):
  - a. Tournament 1: Compete with a partner, launch exactly 1 projectile. Longest launch advances. Winners play each other until one winner remains. Record your setup here, justifying your choice. Did you win?
  - b. Tournament 2: Compete with a partner, launch exactly 10 projectiles. Longest *mean* of the 10 advances. Winners play each other until one winner remains.
    Record your setup here, justifying your choice. Did you win?
- 5. Consider the different setups in the two rounds from the tournament from #4.
  - a. Do you think the setup that gives you the best chance to win in Round 1 is the same setup that gives you the best chance to win in Round 2? Why or why not?
  - b. Let's assume you had a "better" setup than your competitor. Would you be more confident winning in a Round 1 style tournament or a Round 2 style tournament?

## **Knowledge Synthesis**

Decide if you have enough information to predict where the next projectile is likely to land. If not, explain why not. If so, make and justify your landing position estimate.

1. Situation 1:



2. Situation 2:



3. Situation 3:



- 4. Estimate the launch angle of the next projectile, then justify your choice. The needle is pointing to the most recent and therefore does not necessarily indicate 'next.' Parts (a) and (b) are from different launchers.
  - a. Below, 50 projectiles were launched:



b. Below, 15 projectiles were launched:



- c. In which situation above are you more comfortable with your estimate for the mean launch angle? Why? What would you change (if anything) to help you be more comfortable?
- d. Does the number of projectiles influence the confidence you have in your estimate for the mean launch angle?