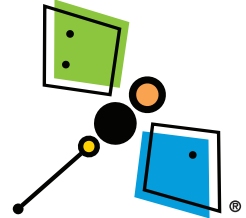


# DragonflyTV: GPS Activity 3

## Batter Up!



**Museum of Nature & Science**  
Dallas, TX  
[natureandscience.org](http://natureandscience.org)



### Baseball

We're Reed and Nick and baseball is our game! We've heard our coach use the term "sweet spot" when we're at bat. That's when a player hits the ball at just the right spot on the bat—and whoosh!—the ball goes really, really far. Since we each use different kinds of bats, we wondered: Is the sweet spot on an aluminum bat the same as the sweet spot on a wood bat?

We headed to the Museum of Nature & Science in Dallas. There we found a hands-on exhibit called Batter Up! We attached our bat to the pendulum and then adjusted where the ball hit on the length of the bat. We tried six different spots, each 2 inches apart, on both kinds of bats to see how far the ball bounced off the bats at each spot. That showed us the sweet spot. Next we headed to the Rough Riders ballpark to knock out some hits. Batter up! Reed hit 30 balls with a wood bat and 30 balls with an aluminum bat. We put chalk on the balls and recorded where each hit connected with the bat. We also measured how far each ball flew.





## Icebreaker

Learn about transfer of energy with this Mega Bounce activity!



**30 minutes**

### DragonflyTV Skill: Experimenting

#### Guide your kids as they

- 1) Hold a basketball chest high, so the bottom of the ball is about 4 feet above the ground. Release the ball from there, and let it bounce off a hard level surface, like a playground or sidewalk.
- 2) Carefully estimate or measure how high the ball bounces on the first bounce. Measure to the bottom of the ball at the moment of the highest part of its bounce.
- 3) Compare the starting position of the ball when you held it to the height it achieved on the bounce.
- 4) Repeat using other kinds of balls, like a golf ball or baseball.
- 5) Wearing safety goggles, hold the basketball chest high again, this time resting a golf ball on top. Carefully release them together, so that the golf ball is in contact with the basketball while they fall. Watch the golf ball fly sky high, but don't forget to notice the basketball, too. Repeat this step if necessary to try to measure or estimate the position of the basketball at the highest part of its bounce. [Note: it should be lower than in step 2.]
- 6) Try other combinations of one ball on top and one on the bottom. The bottom ball gives some of its bounce energy to the top ball. Find the combination that shoots one ball highest of all!

#### You'll need:

- safety goggles
- golf ball
- baseball
- basketball
- tape measure, or yardstick/meterstick
- lots of space outside!

### DFTV Science Helper

This can be a very surprising and entertaining activity for kids. As a safety precaution, be aware that the golf ball can really take off, so goggles or other facial protection is highly recommended. As an added challenge, have the kids develop a method for estimating or comparing the height the top ball achieves.



For other surprising science activities, visit [http://pbskidsgo.org/dragonflytv/sci\\_surprise/index.html](http://pbskidsgo.org/dragonflytv/sci_surprise/index.html)



## Investigation

### Batter Up!



1-2 hours

#### Guide your kids as they

- 1) Pick one type of ball, hold it above a hard level surface so that the bottom of the ball is 1 meter (or 1 yard, if you are using a yardstick) above the surface. Release it, and carefully observe the highest part of the bounce, again measuring the highest location the bottom of the ball reaches. Repeat at least 5 times so an average result can be calculated for that ball.
- 2) Repeat with the remaining balls, doing at least 5 trials with each.
- 3) Calculate the average bounce height of each ball separately, then calculate the "bounciness" of each ball in the following way:  
 "bounciness" = (average bounce height) divided by (starting height)  
 Example: If you started the golf ball at a height of 36 inches and it bounced to a height of 24 inches, then the bounciness = (24 inches) divided by (36 inches) = 0.67
- 4) Make a prediction about how the bounciness relates to how far the ball will fly when hit off of a batting tee. Will the ball with the highest bounciness number go the farthest using the bat?
- 5) Set up each ball on the tee, and give it a whack with the bat. Measure how far it goes. Repeat at least 5 times. Continue with the other kinds of balls, too.
- 6) Make a bar graph that shows how far each ball flew. Did the results come out as you predicted?

#### You'll need:

- a rubberized baseball
- a standard baseball
- a softball
- a racquetball
- a whiffle baseball
- a tennis ball
- a baseball or softball bat
- a tape measure and a yardstick/meterstick
- a batting tee

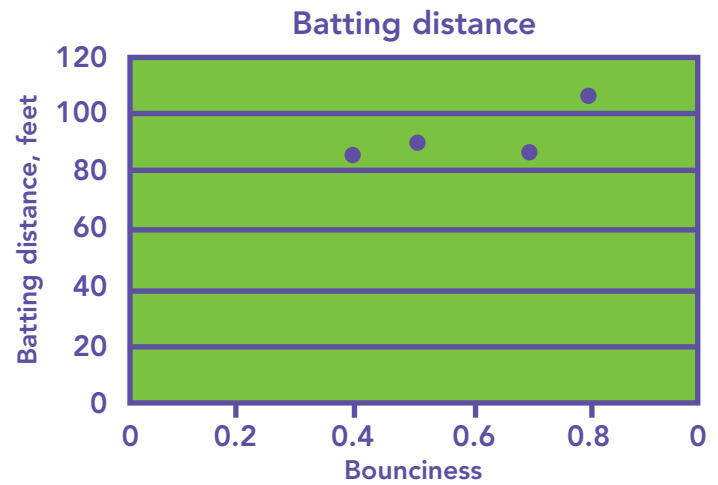
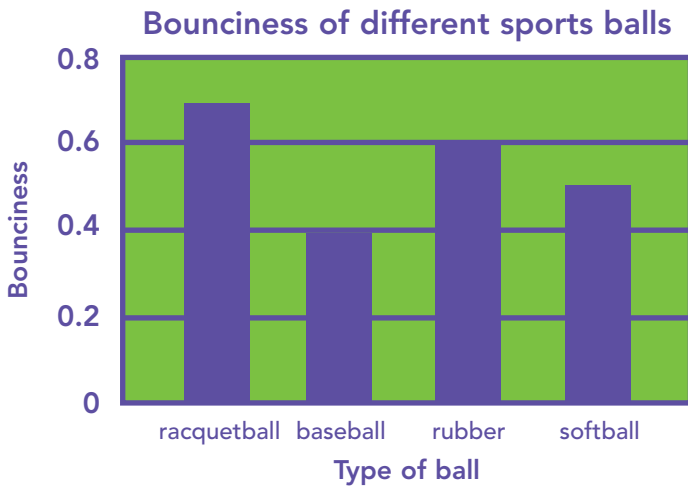
#### DFTV Science Helper

It's hard to have perfect control over the variables in this activity, but coach kids to try to swing the bat the same way each time, and give them permission to throw out data if they make a poor swing, for example. It's important to repeat the test several times (at least 5) to get a reliable result.



## DFTV Kids Synthesize Data and Analysis

Here's an example of two bar graphs you could make from this experiment.



## Keep Exploring!

Many kids assume (or are taught to believe) that a heavier bat hits a ball farther than a light one. Have your kids explore this question. Guide them as they develop a meaningful experiment to explore this question. Hint: heavier bats can hit the ball farther, IF the child is strong enough to swing the bat quickly. Many kids use bats that are too heavy for them. See if this finding comes out of your kids' experiment.