

Grand Slam!



Lesson: Grand Slam!

Level: Beginner

Objectives:

- 1) Collect, organize, display, and interpret data for a specific purpose or need.
- 2) Determine and use the range, mean, median and mode to analyze and compare data, and explain what each indicates about the data.
- 3) Read, create, and use line graphs, histograms, circle graphs, box-and-whisker plots, stem-and-leaf plots, and other representations when appropriate.
- 4) Compare increasingly complex displays of data, such as multiple sets of data on the same graph.

Materials:

GPS receivers
 Kickballs
 Field or large playing area
 Object to mark home plate
 Field sheets
 Student Maps

Math:

NM-DATA.3-8.2

Data Analysis & Probability

-Students will select and use appropriate statistical methods to analyze data.

NM-PROB.REP.PK-12.3

Representation

-Students will use representations to model and interpret physical, social, and mathematical phenomena.

Physical Education & Health:

NPH-K-12.2

Movement Concepts

-Students will demonstrate understanding of movement concepts, principles, strategies, and tactics as they apply to the learning and performance of physical activities.

Other Standards:

NM-NUM.3-8.1, 8.2, 8.3 Number and Operations

NM-MEA.3-8.1, 8.2 Measurement

NM-DATA.3-8.1 Data Analysis

NM-PROB.PK-12.1, 12.2

NM-PROB.COMM.PK-12.1, 12.2, 12.3, 12.4 Communication

NM-PROB.CNN-PK-12.1 Connections

NM-PROB.REP.PK-12.1

Representation

Procedures:

Let's go **EduCaching™**!

You will not need to hide anything, nor will you need to mark waypoints for anything, so there is no preparation section for this lesson. You will need to take the students out to a ball field or any large open area where they have plenty of room to kick a kickball. You will need to set up some sort of a home plate. The students must plot a waypoint for home plate.

You can teach or review this procedure of inputting waypoints with them as a large group. Assemble small groups of students together and give a GPS receiver to one student in each group. The student with the GPS will stand out in the field, just like an outfielder would. Their job is to track the final position of a kicked ball without interfering with it in any way. In other words, if a ball is kicked by one of their group members, they must run over to it, follow it until it comes to a stop, and then input a waypoint for the ball at its location. They may give the waypoint a name. For example, it could be called Sarah1, because it is Sarah's 1st kick. The other group members will line up in a batting order to kick the ball as far as possible (no bunts allowed!). You can pitch the ball to each student or have a student volunteer so you can assist in the field. Each student should have three kicks that are logged into their group's GPS unit. The students who have been recording the kicks will kick at the end and may give the receiver to a teammate or just log their kick themselves, then hurry back to the end of the kicking line for their remaining kicks.

Back At Headquarters: Once the students get back inside the room, have them split up into groups with their GPS unit and their field maps and student sheets. The first thing they must do is to draw a rough map of their playing field and record on their maps the locations of each kick for their group. They may color and label each group members kicked ball points accordingly. They will use the information stored in their receiver to do this. They must then, using the receiver again, find the distance between home plate and each kicked ball and mark that distance on their maps by drawing a line from home plate to the kicked ball and labeling its length. Now that they have the data plotted on their student maps, it's time to go to the field sheets and use the information to calculate mean, median, range, and mode. The students will need to have a background in how to find these landmarks prior to this lesson.

The students will use all the data from their group collectively for this next part. Have them determine the range from the shortest kick to the longest kick. Have them write down all the kick distances to find the median distance and to see if there is a mode. Then, they can determine what the mean (average) kick distance is by adding up all the distances and dividing by the number of kicks total. The students will fill in this information on their field sheets.

Now, being the competitive students that they are, they will probably want to compare their results with the other groups. So, ask for each group's range and write all these on the board. Have the students determine a new range for the entire class and write this on their field sheets. Then, ask for each group's mean distance and have the class calculate the mean distance for the whole class and write this in on their field sheets. Continue to do the same for the other information so that the class is looking at a new set of calculated data. You can end the lesson here or move on to the variation below for further extension.

Variations: Now that the class has manipulated data in their small group and as a whole class, you can do something more with the data. If applicable, have your students create box-and-whisker plots for their group and total class information. Another idea is to take all the information from all students' field sheets and make it available to each group (by photocopying or by writing info. on the board). Then, give each group a graphing task so that they can represent the data in an understandable way. For example, groups can:

- *make a bar graph showing the mean distances for each group*
- *make a bar graph showing the maximum distance for each group*
- *make a line graph showing whether groups got better at kicking over time, or worse*
- *make a circle graph showing percentage of students who kicked different distances*

There are many other ways to represent the data collected, but this is a good start. Then, have the groups present their data to the class.