

## ***Mathematics: The Language of STEM***

### Scatter Plots and Softball Throw

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#### **CONTENT AND TASK DECISIONS**

**Grade Level(s):** 8<sup>th</sup> grade Pre-Algebra

**Description of the Task:** Does your height make a difference in how far you can throw a softball?

**Indiana Mathematics Content Standards:** 8.DSP.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantitative variables. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.

**Indiana Mathematics Process Standards:** PS.4: Model with mathematics, PS.5: Use appropriate tools strategically, PS.6: Attend to precision, and PS.3: Construct viable arguments and critique the reasoning of others.

**Mathematics Content Goals:** Students will be able to construct a scatterplot from a data set. Students will be able to interpret scatterplots. Students will be able to use and understand the language of scatterplots.

**Language Objectives:** Interpreting scatterplots such as outliers, positive or negative correlation, linear and nonlinear association with their table partner then with a group of four.

**Materials:** several yard sticks, tape measure, long string, graph paper, colored pencils and softballs

**Scatterplots: Does your height make a difference in how far you can throw a softball?**

**Before:**

- **Activate prior knowledge** –The students should know how to plot an ordered pair on a coordinate plane. This will already have been taught in prior lessons. Students will be asked if they think that their height has anything to do with how far they can throw a softball. Ask students to justify their answers. Let them know that we will be finding this out today by measuring their height and how far they can throw a softball. Students will be using a graph to decide the answer to the question. Ask these questions to the students to see what they know about scatter plots. Questions to ask students: Has anyone heard of a scatterplot? Could anyone define it? What are some important components in a scatterplot? Can you define that word? How are scatterplots useful? Do you think this would help us solve our problem?
- **Be sure the problem is understood-** Write the important information that they have given from their prior knowledge on the board. Add any of the vocabulary words that the students have not mentioned to the list and talk about these words. Words that need to be defined are scatterplot, bivariate, positive or negative correlation, linear or nonlinear association, outliers, clustering. Hand out the vocabulary terms after the discussion and have them write in the definitions to these terms.

- **Establish clear expectations-** Hand out the graphing paper for the scatter plots and let the students know that they will be each making a scatterplot from the classroom set of data of each of their heights and the distance of each individual's throw. The scatterplot needs to be neat. The x and y axis needs to be labeled. Talk to the students about numbering the axes and the importance of being accurate with even intervals.

### During:

- **Let go,** - Partners will measure each other's height and write it down on the class list paper. Students will also have a handout with the vocabulary words on it that they should be filling in when they are finished measuring their height. When all students have given me their height we will go outside and measure the softball throw. Students will be in groups of four. Each group will have a clipboard and is responsible for measuring the distance of each student's distance. The number of throws may vary depending on the amount of time. If more than one throw; then have the students take the average of the throws. The field will already be taped off to be able to get the lengths of the throws. When everyone is finished we will go back inside and write the data on the board. The students will each be sitting with their table partners and can collaborate with each other, but each student will be responsible to have their own scatterplot drawing.
- **Listen actively,** - Teacher will write the distance of the throws on the board next to the student's height. We will talk about the importance of the intervals and how they decide on what they should be. I will give them freedom to figure out what are the best intervals for the set of data that we have produced. I will reiterate the fact that they need to label the axes. I will write the important information that needs to be on their graph drawing. All students should be using pencil. Marker or colored pencil can be used after they are finished.
- **Provide appropriate support** – Teacher will be going around the room making sure that everyone is using even intervals and plotting the points correctly. Teacher will ask questions such as, what would be the best intervals to go by on the x-axis. On the y-axis?" "So, what do you think you should do next?" "Would this graph be accurate? Or, "What is missing in this graph?" "Do you see any patterns?" "
- **Provide worthwhile extensions.** Students may highlight and be creative with their graphs when finished. Table partners should start talking about the answer to the question, "Does your height make a difference in throwing a softball? and the reasoning behind it.

### After:

- **Promote a mathematical community of learners** - Once everyone is finished with their graphs students will share with their table partners the answer to the question, "Does the height of a person have anything to do with how far you can throw a softball? After a couple of minutes have the table partners share with another pair of table partners. Give the students a few more minutes for this.

- **Listen actively without evaluation** – Teacher will be walking around the room listening to conversations that are happening in all of the groups.
- **Make connections** - After several minutes have passed, the teacher will ask students to share to the whole class their solution to the question. I will also ask the students how they came up with this solution. Did you see a pattern?
- **Summarize main ideas** - After the solutions have been given, the teacher will ask the students what they learned today. I will add anything that they do not mention and will write these things on the board and congratulate them for a good two days of work!

## ASSESSMENT

**Observe:** Describe how you will observe students to gather evidence about what they are learning, and describe the specific evidence of mathematical understanding that you will look for in your observations. I will be observing students as they are drawing their scatterplots and sharing with their partners and groups. I will be noticing what vocabulary words they are using in their descriptions. I will also be collecting their scatterplots as evidence of their learning.

**Ask:** Specific questions that I will be asking to assess their learning:

1. What is a scatterplot?
2. How is it helpful?
3. What is bivariate data?
4. What is positive, negative or no correlation?
5. What is a linear or non-linear association?
6. Does a person's height have anything to do with how far you can throw a softball?