Creating Scatter Plots

Subject Area(s) Data Analysis & Probability

Associated Unit

Associated Lesson

Activity Title Analyzing Data With Scatter Plots

Grade Level 7 (6 - 8)

Time Required 1 hr

Group Size variable – depending upon the number of computers with spreadsheet software available.

Summary
This activity allows students to practice collecting data and performing an analysis with a scatter plot. Student use basic measurements and then spreadsheet & data analysis software to create a scatter plot for analysis.

Engineering Connection
Engineers use simple spreadsheet software to aid in the collection and analysis of data. When investigating the relationship between two dependent variables Scatter Plots can be a valuable representation of data enabling engineers to view trends that may exist. In this activity students explore the use of scatter plots to examine trends in collected data.

Keywords
Scatter Plot, Trend, Data Analysis

PA Educational Standards
• Science & Technology:
  o 3.6 Technology Education
  o 3.7 Technology Devices

• Math:
2.3 Measurement and Estimation
2.4 Mathematical Reasoning and Connections
2.5 Mathematical Problem Solving and Communication
2.6 Statistics and Data Analysis

Pre-Requisite Knowledge
1) Review the process of recording measurements using charts and tables.

Learning Objectives
After this lesson, students should be able to:
• Understand how to create a scatter plot and perform data analysis using the plot.

Materials List
Tape Measure
Computer with Spreadsheet, Data Analysis software installed

Introduction / Motivation
Renewable energy is energy generated from natural sources such as sun, wind, and rain. Engineers and scientists are interested in developing methods of using these resources to generate energy suitable for human use. Wind turbines (commonly called windmills) are one method of using the wind to generate electricity. Water can also be used to generate electricity by turning water turbines. Likewise, the sun can be used as a source of energy as well. One tool used to harness the sun's energy is a solar cell. Solar cells convert solar energy into electricity. In turn, this electricity can be used as needed by people.

In this lab you will explore the relationship between the amount of sunlight present and the amount of electricity generated by a solar cell. Engineers strive to develop solar cells that maximize the amount of energy produced from the cell.

Vocabulary / Definitions

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<tr>
<th>Word</th>
<th>Definition</th>
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<tr>
<td>Scatter Plot</td>
<td>A graph designed to show whether there is a relationship between two changing factors.</td>
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<tr>
<td>Dependent Variable</td>
<td>A variable that the researcher measures or records</td>
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<td>Independent Variable</td>
<td>A variable or condition that is deliberately manipulated by scientists to test the response in an experiment.</td>
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Procedure
1) Ask students to hypothesize about the relationship between the lengths of parts of their body (e.g. length of arm and length of hand).
2) Using the unlabeled table on the worksheet allow students to correctly label the columns prior to collecting data. Each column should be labeled with the name of the body part and unit of measure (e.g. Hand (in) or Foot (cm))

3) Allow students to measure and record the lengths of the body parts using the tape measure. Students can record the data individually, in small groups, or as a class.

4) Using the unlabeled chart on the worksheet allow students to correctly label the horizontal and vertical axis with the name of the body part and unit of measure (e.g. foot (cm) on horizontal and hand (in) on vertical)

5) Ask students to graph the data for their individual measurement on the chart.

6) Discuss whether one point is enough to understand if a relationship exists between the lengths of the body parts.

7) Ask students to add data points from their group (or about 3 other students) to their chart. Discuss whether the additional points are enough to determine if a relationship exists. Lead students to understand that more data points are required but would be easier analyzed using software as a tool.

8) Using the spreadsheet and analysis software ask students to label columns and record the data for the entire class. Students can complete this step individually, in small groups, or as a class depending upon the number of computers available.

9) Using the data recorded in the spreadsheet create a scatter plot. The specific method for creating the plot will vary according to the specific software title used.

10) Discuss whether the additional data points are enough to understand if a relationship exists. Discuss the differences between the chart appearances by comparing charts from the single student, four students, and entire class.

**Attachments**
- Scatter Plot Worksheet
- Troubleshooting Worksheet

**Troubleshooting Tips**

**Assessment**

Post-Activity Assessment

Using the worksheet and the plots with varying number of points students can discuss the relationship between the body parts. Depending upon the data you can ask questions such as, do they have an inverse relationship? Or are they related at all?

You can ask if the relationship is related to student’s age. You can discuss randomness or bias in the class as a sample and whether the pattern in their data would be accurate for all individuals their age or everyone in the world.

Students should be able to discuss the above issues as well as methods of increasing the sample size and minimizing bias

**Owner**

Drexel University GK-12 Program

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Scatter Plot Worksheet

Name________________________________________________

Date______________________

Question: Is there a relationship between the length of your arm and length of your hand? (Other body parts can be used as well.)

Hypothesis:

Data Table:

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Plot Area: