

Preservice Teacher:  Jessica Thomas

Grade level/Age:  Math I

Subject:  Descriptive Statistics: Scatterplots

Short summary statement of lesson topic/focus, and student activities:

Students will use this lesson to create scatterplots using class data. Students will then learn about positive and negative correlation as depicted on their class scatterplots. Students will reason about why these correlations “make sense” and predict correlations of other variables.

**Materials:** (including media and technology if appropriate)

- Measuring tools: yardsticks and rulers, etc.
- Several bags of 18-22 tokens.
- 2 sheets of posterboard for every class period
- 2 markers
- Interactive whiteboard
- Lesson PowerPoint
- Student notebooks
- Student homework sheet
- Socratic quiz
- Student devices (phones, tablets, computers)

**State Standards and Objectives:** (Include State Technology Standards if appropriate.)

Common Core Standards/NG CSOs	Lesson Objectives	Assessment
Copy and paste the relevant <i><b>content and practice</b></i> standards for this lesson	What do you want students to know/understand and/or be able to do?	Assessments must match objectives. How will students provide evidence of their knowledge, understanding, skill, or dispositions?
<b>M.1HS.DST.5:</b> Represent data on two quantitative variables on a scatterplot and describe how the variables are related. <b>SMP 2:</b> Reason abstractly and quantitatively. Students will make predictions about data based on scatterplots and lines of best fit. <b>SMP 4:</b> Model with mathematics. Students will create visual representations of data and use these models to justify arguments.	<ul style="list-style-type: none"><li>• Students will create scatterplots using data collected from students in the class.</li><li>• Students will determine correlation of variables (positive, negative, or none) by observing trends on the scatterplots.</li><li>• Students will predict correlation between two variables based on their characteristics.</li></ul>	<ul style="list-style-type: none"><li>• Socratic Quiz. This quiz determines student understand of positive and negative correlation by having them observe scatterplots and by having them reason about potential relationships between two variables.</li></ul>

<p><b>SMP 5:</b> Use appropriate tools strategically. Students will use measurement tools to take data, computers to record data, and spreadsheets and graphing calculators to graph data.</p>		
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**Planning Resources:** (list any resources you used in your planning for tasks, prompts, etc.)

Resource (including link, if applicable)	What You Used from Resources
Tylervignen.com	Correlation charts on the blog as a prompt for opening discussion

**Procedures:**

Before/Introduction

Time/ Length	Steps of the Lesson: Teacher behaviors	Student Activities/Behaviors and Expected Reactions/Responses
4 minutes	<p>Whole class discussion of three graphs found on Tyler Vignen’s “Spurious Correlations” site (tylervignen.com). Students will observe the “trends” in the graphs and determine that just because the variables appear related, they might not be. Any graphs from this site can be chosen as the home page is updated frequently. Questions are generic for this reason.</p> <p>Questions:</p> <ul style="list-style-type: none"> <li>• What is this graph demonstrating?</li> <li>• Does it make sense for this variable to affect the other? Why or why not?</li> <li>• Could you predict how many [insert variable] would occur if [insert variable and amount] occurred?</li> <li>• These graphs seem to demonstrate instances of random chance correlation. Can you think of any variables that might truly affect each other?</li> </ul>	<p>Students will be expected to think about the variables being graphed and determine if there is any possible way they would be related. There would probably be some students who would attempt to make up reasons why the variable would be related. Other students may be curious as to how this data and the relationships were discovered.</p>
1 minute	Activity introduction and explanation of stations.	If students are used to group and station work, this activity

	<ul style="list-style-type: none"> <li>• Students will be divided into three groups and rotate clockwise through the stations.</li> <li>• At one station, students will create a scatterplot of the number of letters in their first name vs. their height (to create a scatterplot with no correlation).</li> <li>• At another station, students will create a scatterplot of the length of their legs vs. their height (to create a scatterplot of positive correlation).</li> <li>• At the last station, students will take a handful of counters from the bag and then create a scatterplot of the number of counters out of the bag vs. the number of counters in the bag (to create a scatterplot with a negative correlation).</li> <li>• By the end of the station activity, there will be three scatterplots of class data for us to analyze.</li> </ul>	<p>should not be a problem. If students are not used to this type of activity, students may have more questions about what to do at each station. Students would be reminded that explanations are posted at each station.</p>
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During/Development

<b>Time/Length</b>	<b>Steps of the Lesson: Teacher behaviors</b>	<b>Student Activities/Behaviors and Expected Reactions/Responses</b>
5 minutes	<p>Students are at their first station. The teacher will walk and monitor each group to assist with measuring heights and plotting points.</p> <ul style="list-style-type: none"> <li>• How many inches are in a yard?</li> <li>• Would it make sense that you are x inches tall?</li> <li>• When we plot points, do we go over or up first?</li> </ul>	<p>Students are at their first station. Students will collect their personal data and graph the point. Students will help others with collecting their data (such as measuring height). Some students may stray from their groups and would have to be reminded to stay with their group. Some students will be interested in having exact data collected and plotted while others will not.</p>
5 minutes	<p>Students move to their second station. The teacher will walk and monitor each group to assist with measuring heights and plotting points.</p> <ul style="list-style-type: none"> <li>• How many inches are in a yard?</li> <li>• Would it make sense that you are x inches tall?</li> <li>• When we plot points, do we go over or up first?</li> </ul>	<p>Students move to their second station. Students will collect their personal data and graph the point. Students will help others with collecting their data (such as measuring height). Some students may stray from their groups and would have to be reminded to stay with their group. Some students will be interested in having exact data collected and plotted while others will not.</p>
5 minutes	<p>Students move to their third and last station. The teacher will walk and monitor each group to assist with measuring heights and plotting points.</p> <ul style="list-style-type: none"> <li>• How many inches are in a yard?</li> </ul>	<p>Students move to their third and last station. Students will collect their personal data and graph the point. Students will help others with collecting their data (such as measuring height). Some students may stray from their groups and would have to be</p>

	<ul style="list-style-type: none"> <li>• Would it make sense that you are x inches tall?</li> <li>• When we plot points, do we go over or up first?</li> </ul>	reminded to stay with their group. Some students will be interested in having exact data collected and plotted while others will not.
9 minutes	<p>Whole class discussion of scatterplots created. Teacher will place these questions on the board for students to consider at their tables for 3 minutes. Each table will have a recorder to write down team thoughts.</p> <ul style="list-style-type: none"> <li>• Now we have three different scatterplots. What do we notice about each of these?</li> <li>• How would you explain what is happening in each of these scatterplots? (What happens as the x-variable increases?)</li> <li>• Teacher will use student input from these questions to help explain/define positive and negative correlation. (2 minutes)</li> </ul>	Students will talk with their table/group about these questions. After table discussions, students will share answers and discuss for 4 minutes. Students should suggest that the points tend to go up or down or have no pattern. Students should suggest that as one variable increases, the other increases/decreases. Students will take notes on the definitions of positive and negative correlations in their math notebooks.
2 minutes	Small group activity on predicting correlations. Teacher will give instructions and pass out cards. The teacher will distribute homework while students are solving scenario cards.	In small groups (3-4) at tables, students will read the scenario cards and decide if the scatterplot produced would have a positive, negative, or no correlation. Students who finish this task early will be asked to create their own scenario and trade with another student to have them determine the possible correlation.

### After/Closure

<b>Time/ Length</b>	<b>Steps of the Lesson: Teacher behaviors</b>	<b>Student Activities/Behaviors and Expected Reactions/Responses</b>
7 minutes	Whole class discussion of scenario cards. The teacher will observe students as a form of formative assessment. Students should be able to explain what type of correlation would exist between the two variables. Students should offer some reason for this, such as, "When you sell more cars, you make more money." Other students might sketch out a scatterplot of potential data points. Students who wish to challenge answers should provide similar reasoning.	A student from each table will read the scenario and explain what correlation his or her group decided would exist and why. Students at other tables will have a chance to debate about the correlation if they believe the suggestion is false. This discussion will summarize the main ideas of the lesson.
2 minutes	Launch Socrative quiz.	Students will take the Socrative quiz on their devices (phone, tablet, or computer).
5 minutes	Teacher will circulate to assist with homework questions as needed.	Students will begin working on the homework assignment.