

### Core Content

<b>Cluster Title: Investigate patterns of association in bivariate data.</b>
<b>Standard:</b> Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
<b>Concepts and Skills to Master</b>
<ul style="list-style-type: none"> <li>Collect, record, and construct a set of bivariate data using a scatter plot.</li> <li>Determine whether the relationship between bivariate data is approximately linear or nonlinear by examination of a scatter plot.</li> <li>Interpret patterns on a scatter plot such as clustering, outliers, and positive, negative, or no association.</li> </ul>

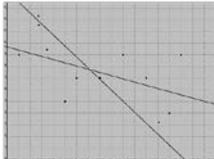
### Supports for Teachers

<b>Critical Background Knowledge</b>													
<ul style="list-style-type: none"> <li>Basic understanding of graphing and linear relationships.</li> </ul>													
<b>Academic Vocabulary</b>													
bivariate data, scatter plot, outlier, clustering, positive association, negative association, linear, nonlinear													
<b>Suggested Instructional Strategies</b>	<b>Resources</b>												
<ul style="list-style-type: none"> <li>Use data from multiple sources to construct a scatter plot.</li> <li>Compare and contrast scatter plots with various degrees of association.</li> </ul>													
<b>Sample Formative Assessment Tasks</b>													
<p><b>Skill-Based Task</b> Construct a scatter plot and describe any association you observe.</p> <table border="1"> <thead> <tr> <th>Height</th> <th>Hand span</th> </tr> </thead> <tbody> <tr> <td>70 in</td> <td>10 in</td> </tr> <tr> <td>72 in</td> <td>9.5 in</td> </tr> <tr> <td>61 in</td> <td>8 in</td> </tr> <tr> <td>62 in</td> <td>9.5 in</td> </tr> <tr> <td>68 in</td> <td>9 in</td> </tr> </tbody> </table>	Height	Hand span	70 in	10 in	72 in	9.5 in	61 in	8 in	62 in	9.5 in	68 in	9 in	<p><b>Problem Task</b> Compare class test scores to hours of television watched.</p> <ul style="list-style-type: none"> <li>Predict whether there is a positive, a negative or no association.</li> <li>Collect data and make a scatter plot.</li> <li>Compare your prediction to the scatter plot result.</li> <li>Describe any association you observe.</li> <li>Interpret your findings and explain your reasoning.</li> </ul>
Height	Hand span												
70 in	10 in												
72 in	9.5 in												
61 in	8 in												
62 in	9.5 in												
68 in	9 in												

### Core Content

<b>Cluster Title: Investigate patterns of association in bivariate data.</b>
<b>Standard:</b> Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
<b>Concepts and Skills to Master</b>
<ul style="list-style-type: none"> <li>Recognize that straight lines can be used on scatter plots to model the relationship between two quantitative variables.</li> <li>Place a straight line on a scatter plot that closely fits the data points.</li> <li>Judge how well the trend line fits the data by looking at the closeness of the data points.</li> </ul>

### Supports for Teachers

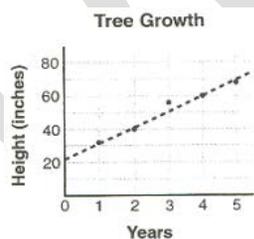
<b>Critical Background Knowledge</b>	
<ul style="list-style-type: none"> <li>Graph a linear relationship.</li> </ul>	
<b>Academic Vocabulary</b>	
linear association, scatter plot, trend line	
<b>Suggested Instructional Strategies</b>	<b>Resources</b>
<ul style="list-style-type: none"> <li>Given a scatter plot and an uncooked spaghetti noodle, have students place the noodle on the scatter plot to create the trend line.</li> <li>Use technology to create scatter plots with a trend line, and then observe changes to the trend line as data points are deleted or added.</li> </ul>	<i>gapminder.org</i> . Gapminder Foundation. <i>nvm.usu.edu</i> . Utah State University, 2010. (scatterplot)
<b>Sample Formative Assessment Tasks</b>	
<b>Skill-Based Task</b> Draw a trend line and describe the closeness of the fit:	<b>Problem Task</b> Which line is the best fit for the data? Justify your answer.
	

### Core Content

<b>Cluster Title: Investigate patterns of association in bivariate data.</b>
<b>Standard:</b> Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.
<b>Concepts and Skills to Master</b>
<ul style="list-style-type: none"> <li>• Use the equation of a linear model to solve problems.</li> <li>• Interpret the meaning of the slope as a rate of change and the meaning of the <math>y</math>-intercept in context given bivariate data.</li> </ul>

### Supports for Teachers

<b>Critical Background Knowledge</b>	
<ul style="list-style-type: none"> <li>• Graphing linear equations</li> </ul>	
<b>Academic Vocabulary</b>	
rate of change, slope, intercept	
<b>Suggested Instructional Strategies</b>	<b>Resources</b>
<ul style="list-style-type: none"> <li>• Find linear models of approximately linear data in newspapers, magazines, or on the Internet and discuss the meaning of the slope and intercepts in context.</li> <li>• Create linear models using data from other disciplines such as science, social studies, or careers and describe the meaning of their slopes and intercepts in context.</li> </ul>	
<b>Sample Formative Assessment Tasks</b>	
<p><b>Skill-Based Task</b></p> <p>Find and interpret the slope and <math>y</math>-intercept of the trend line. Create an equation and use it to predict how much a tree will grow in three years.</p>	<p><b>Problem Task</b></p> <p>Create a story problem that uses a line with a slope of <math>\frac{2}{5}</math> and <math>y</math>-intercept of 3. Describe the meaning of the slope and <math>y</math>-intercept in the context of the problem.</p>



### Core Content

<b>Cluster Title: Investigate patterns of association in bivariate data.</b>
<b>Standard:</b> Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?
<b>Concepts and Skills to Master</b>
<ul style="list-style-type: none"> <li>• Construct a two-way frequency table of categorical data.</li> <li>• Interpret and describe relative frequencies for possible associations from a two-way table.</li> </ul>

### Supports for Teachers

<b>Critical Background Knowledge</b>																	
None																	
<b>Academic Vocabulary</b>																	
relative frequency, categorical data, frequency, two-way table, associations																	
<b>Suggested Instructional Strategies</b>	<b>Resources</b>																
<ul style="list-style-type: none"> <li>• Explore questions such as:                             <ul style="list-style-type: none"> <li>○ Are honor students more likely to wear athletic shoes?</li> <li>○ Is gender related to video console ownership?</li> <li>○ Are eighth graders more or less likely to have a cell phone based on birth order (youngest, middle, or oldest)?</li> </ul> </li> </ul>																	
<b>Sample Formative Assessment Tasks</b>																	
<b>Skill-Based Task</b> Are boys or girls more likely to be in band? <table border="1" data-bbox="191 1193 1010 1347"> <thead> <tr> <th></th> <th>Band</th> <th>No Band</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Girls</td> <td>10</td> <td>7</td> <td>17</td> </tr> <tr> <td>Boys</td> <td>9</td> <td>2</td> <td>11</td> </tr> <tr> <td>Total</td> <td>19</td> <td>9</td> <td>28</td> </tr> </tbody> </table>		Band	No Band	Total	Girls	10	7	17	Boys	9	2	11	Total	19	9	28	<b>Problem Task</b> Construct a two-way table to display data from two or more categories. Explain why you believe there is or is not an association between the two variables.
	Band	No Band	Total														
Girls	10	7	17														
Boys	9	2	11														
Total	19	9	28														