Gizmos

Name: _____ Date: _____

Student Exploration: Solving Using Trend Lines

Vocabulary: correlation, scatter plot, trend line

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

1. Anita is taller than Becca. How would you expect their shoe sizes to compare? _____

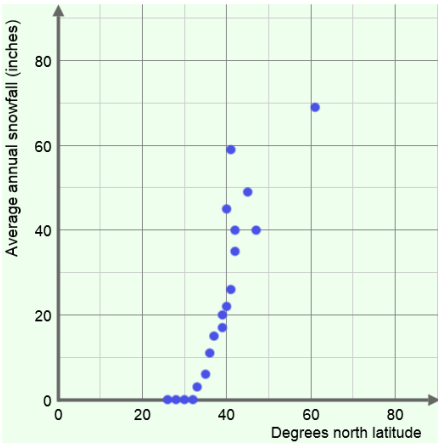
   _____

2. Explain your answer to question 1. _____

   _____

Gizmo Warm-up

In the *Solving Using Trend Lines* Gizmo, you will examine **scatter plots**, like the one shown to the right, related to weather at different latitudes. You will explore how the latitude of U.S. cities tends to be related to snowfall, temperature, and precipitation.



1. In the Gizmo, on the **CONTROLS** tab, be sure **Compare latitude and snowfall** is selected.

   A. What variable is shown on the horizontal axis?

   _____

   B. What variable is shown on the vertical axis? _____

2. Mouseover several points on the graph. You will see the coordinates of each point and the city that point represents.

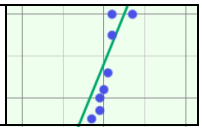
   A. Give the coordinates of one of the points. (_____, _____)

   B. Which city does your point represent? _____

   C. Fill in the blanks below to explain exactly what this point tells you.

   _____ is located at _____

   and averages _____ a year.

Activity A: **Trend lines**	Get the Gizmo ready: • Be sure **Compare latitude and snowfall** is selected on the **CONTROLS** tab.	

1. The scatter plot in the Gizmo compares the latitude of a city to the average annual snowfall.
   A. Look at the point closest to the upper right-hand corner. Give the coordinates of the point, and the city represented. _____
   B. Now, find the point closest to the lower left-hand corner. Give the coordinates of the point, and the city represented. _____
   C. Why are these cities the most extreme in this scatter plot? _____
   _____
   D. A line that fits the points in a scatter plot well is called a **trend line**. Do you think the trend line for this data has a positive, negative, or near-zero slope? _____
   Select **Show least squares fit line** to see the trend line.
   E. The positive slope indicates a positive **correlation**. Fill in the blanks to explain this.
   As degrees north _____, the average snowfall tends to _____
   F. Click on the **TABLE** tab. Does this data agree with the statement above? _____

2. Select the **CONTROLS** tab. Be sure **Compare latitude and snowfall** and **Show least squares fit line** are selected. Look at the equation of the trend line, given below $y = mx + b$.
   A. What do x and y represent? _____
   B. What is the slope (m) and y-intercept (b) of this line? m = _____ b = _____
   C. In general, where are the data points located in relation to the line? _____
   _____
   D. Select **Show probe**. Drag the purple probe slowly across the graph. Place the probe at $x = 45°$ north latitude. In the colorful table, what do ***y* (line)** and ***y* (data)** tell you?
   _____
   _____

(Activity A continued on next page)

Activity A (continued from previous page)

3. On the **CONTROLS** tab, turn off **Show probe** and **Show least squares fit line**. Select **Compare latitude and temperature**.

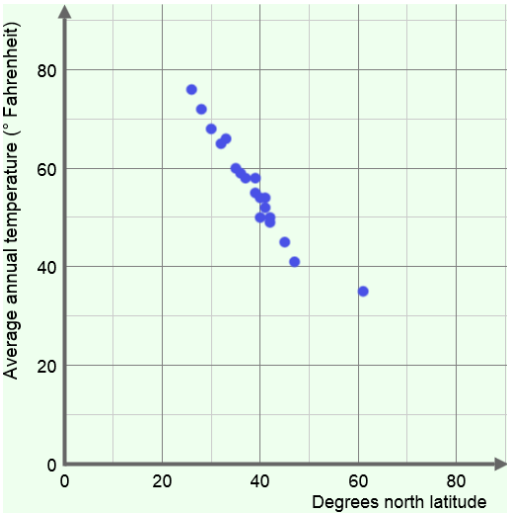
   A. What variables are represented in this scatter plot? _____

   _____

   _____

   B. On the scatter plot to the right, sketch a possible trend line for this scatter plot. Click on **Show least squares fit line** to check. Is the slope positive, negative, or near zero?

   _____



   C. Fill in the blanks to tell what the slope indicates about the relationship between the variables.

   As degrees north _____, the average temperature tends to _____

   The correlation between these variables is negative.

4. On the **CONTROLS** tab, turn off **Show least squares fit line**. Select **Compare latitude and precipitation**.

   A. What two variables are being compared? _____

   _____

   B. Do you think this scatter plot shows a positive correlation, a negative correlation, or no correlation? _____ Explain. _____

   _____

   Click on **Show least squares fit line** to check your answer.

   C. You should have seen that there is essentially no correlation between latitude and precipitation. Explain why this makes sense. _____

   _____

   _____

Activity B: **Predicting trends**	Get the Gizmo ready: • Select **Compare latitude and snowfall** on the **CONTROLS** tab.	$y = mx + b$ $y = 2.41x - 67.66$

1. Turn on **Show least squares fit line**. Look at the equation $y = 2.41x - 67.66$.

   A. What do *x* and *y* represent? _____

   B. Suppose you know the location of a United States city in degrees north latitude. How can you use this equation to predict the average annual snowfall of that city?

   _____

   C. Columbia, South Carolina, is located at 34 degrees north latitude. Use the equation to estimate the average annual snowfall for Columbia. Show your work in the space to the right. Turn on **Show probe** and **Show calculation** to check your work.

   D. What is the estimated average snowfall for a city at the Equator (0°)? _____

   E. Is that a reasonable estimate? _____ Explain. _____

   _____

2. On the **CONTROLS** tab, select **Compare latitude and temperature** and **Show least squares fit line**. Turn off **Show probe**.

   A. Honolulu, Hawaii, sits at 21 degrees north latitude. Use the equation in the Gizmo to estimate the average annual temperature of Honolulu. Show your work in the space to the right. Turn on **Show probe** and **Show calculation** to check your work.

   B. Mobile, Alabama, is located at 31 degrees north latitude. Would you expect the average annual temperature for Mobile to be greater than or less than Honolulu?

   _____ Explain. _____

   _____

   C. What is the equation's estimate for the average temperature in Mobile? _____

   D. How much cooler is that than the average temperature in Honolulu? _____

   Explain why, based on the equation. _____

   _____