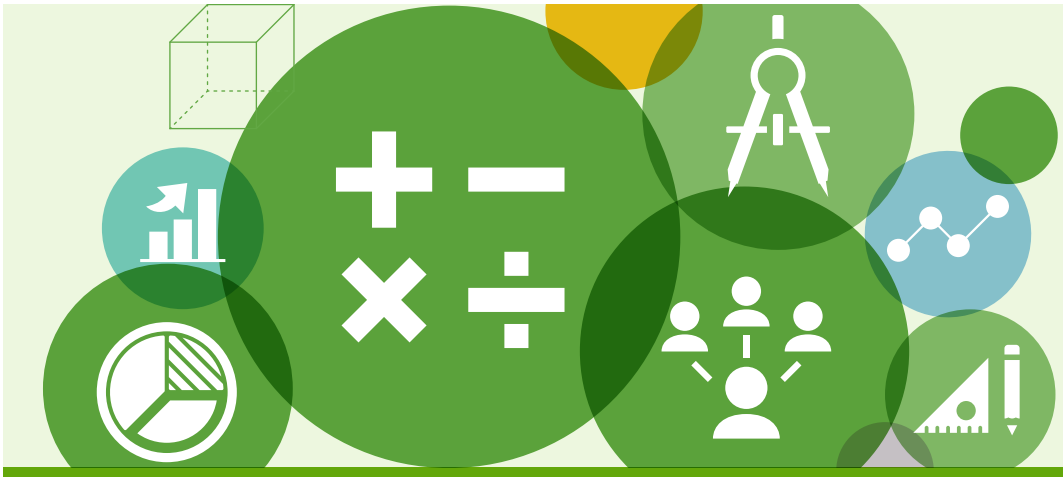


STUDENT VERSION

PATTERNS OF ASSOCIATION – QUALITY OF ENGLISH SPOKEN BY PEOPLE WHO SPEAK SPANISH IN THEIR HOMES

Activity Item

The following item is part of this activity and appears within this student version.

- Item 1: Quality of English Spoken in Primarily Spanish-Speaking Homes in the United States, 2016–2021

Student Learning Objectives

- I will be able to create a scatter plot from a data table.
- I will be able to interpret a scatter plot to determine associations between two quantitative variables.

The American Community Survey (ACS) is conducted monthly by the U.S. Census Bureau and is designed to show how communities are changing. Through asking questions of a sample of the population, it produces national data on more than 35 categories of information, such as education, income, housing, and employment. In this activity, you will create a scatter plot to examine the trends in the quality of English spoken by U.S. residents who primarily speak Spanish at home. These data were self-reported on the ACS questionnaire from 2016 through 2021. You will measure two variables: the percentage of Spanish-speaking residents who reported speaking English "very well" and the percentage of Spanish-speaking residents who reported speaking English "less than very well."

In creating your scatter plot, think about the following questions: When one variable increases, does the other also increase? How quickly or slowly does one variable change as the other changes?

NAME:_____ DATE:_____

Part 1 – Create a Scatter Plot

Item 1, below, shows the percentages of the U.S. population speaking Spanish at home who reported speaking English either "very well" or "less than very well" from 2016 through 2021.

Item 1: Quality of English Spoken by People Who Speak Spanish at Homes in the United States, 2016–2021

	2016	2017	2018	2019	2021
Percentage who reported speaking English "very well"	59.0	60.0	60.8	61.4	60.5
Percentage who reported speaking English "less than very well"	41.0	40.0	39.2	38.6	40.0

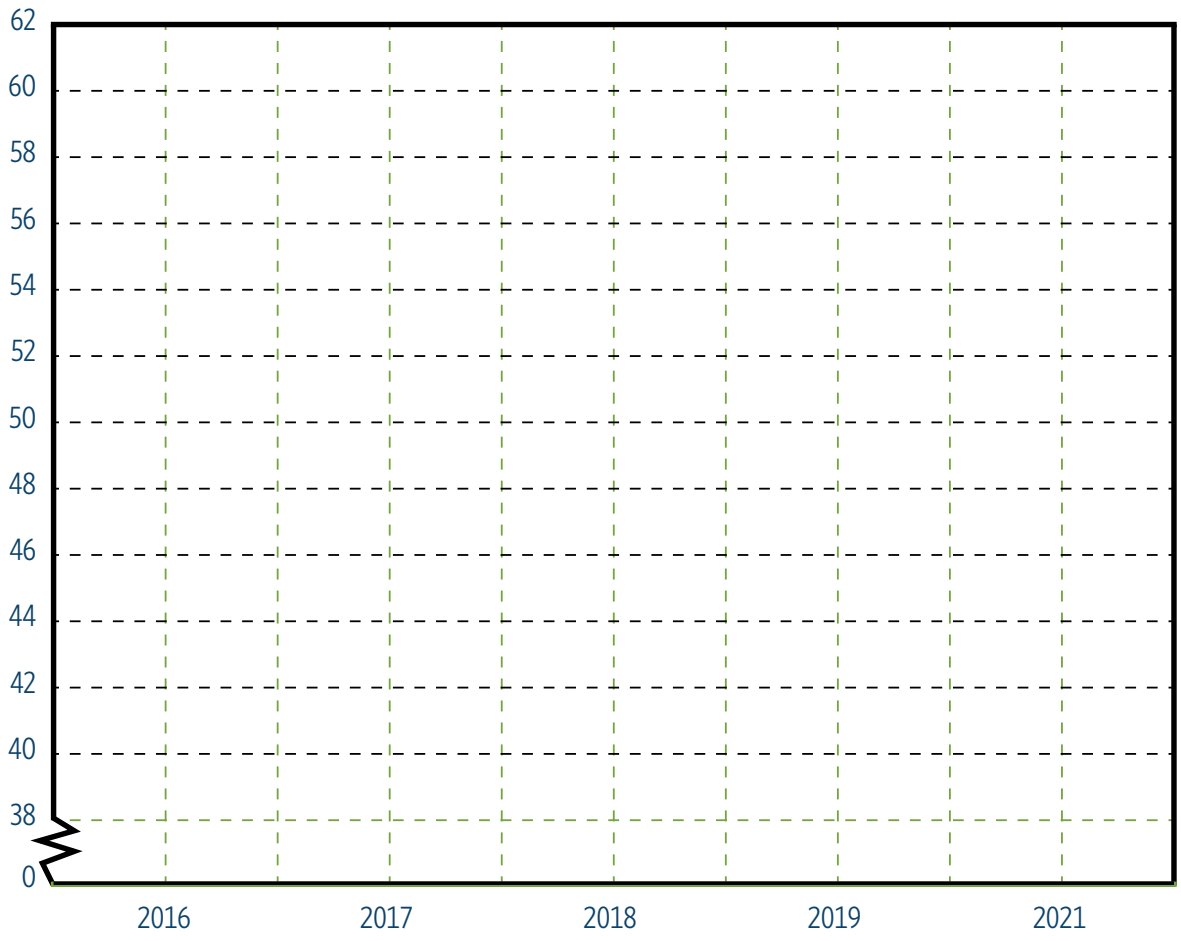
Source: U.S. Census Bureau, 2016, 2017, 2018, 2019, and 2021 American Community Survey 1-Year Estimates, Table B16001

Note: Due to the impact of COVID-19 pandemic, the Census Bureau released experimental estimates from 2020 1-year data. Therefore it is not included in this activity.

To represent each variable on your scatter plot, you will need to use two different colored pencils. Fill in the boxes of the legend below with each color.

Legend:	Speaks English "Very Well"	Speaks English "Less Than Very Well"

1. Now, using the colors that you marked in your legend, place 10 dots on this graph to represent the 10 data points — 5 in each category.



2. Label each of your axes and write a title at the top of the scatter plot.

3. What is the explanatory variable on your scatter plot?

4. What is the response variable for each set of data points?

5. If data points on a scatter plot form a positive slope, it means they have a positive association. In these cases, as you look from left to right on the scatter plot, the line appears to move "uphill." This means that as the explanatory variable increases, the response variable tends to increase as well.
   a. Which category of data shows a positive association over time?

   b. Could you explain why that association may be positive?

6. If data points on a scatter plot form a negative slope, it means they have a negative association. In these cases, as you look from left to right on the scatter plot, the line appears to move "downhill." This means that as the explanatory variable increases, the response variable tends to decrease.
   a. Which category of data shows a negative association over time?

   b. Could you explain why that association may be negative?

7. Use a straight edge to draw a best fit line through the data points, or a straight line through the center of the data points, for speaking English "very well." Do the same to try to connect the data points for speaking English "less than very well." Which set of data more closely follows a straight line?

8. Summarize the association between the percentage of Spanish-speaking residents who reported speaking English "very well" and the years 2016 through 2021:

9. Write a question about the scatter plot for a classmate to answer:

10. When your teacher directs you, turn to a classmate near you and ask your question from #9. How well did your classmate answer the question? Did you need to reword the question so that your classmate could understand what you were asking? Did you follow up with another question? Explain.

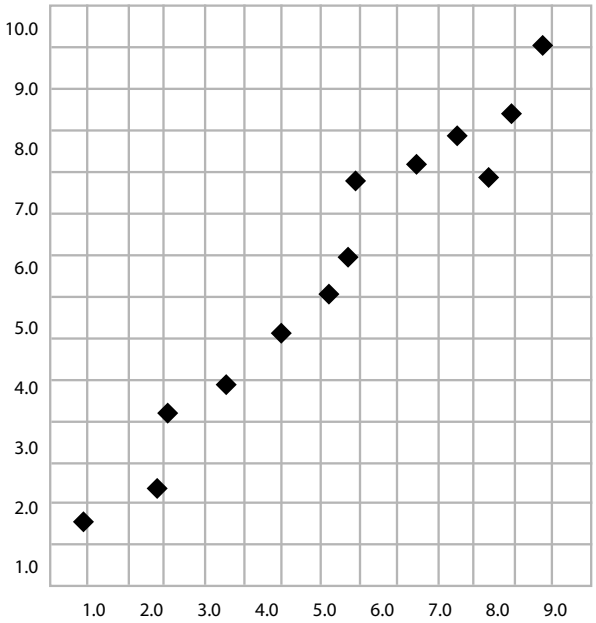
11. Is there a relationship between the percentage of Spanish speakers who reported speaking English "very well" and the percentage of Spanish speakers who reported speaking English "less than very well"?

Part 2 – Apply What You've Learned

What have you learned about association? Comment on the direction, form, and strength of each association below:

1.

x = hours since rain started to fall
y = centimeters of rain collected in a rain gauge



Direction:

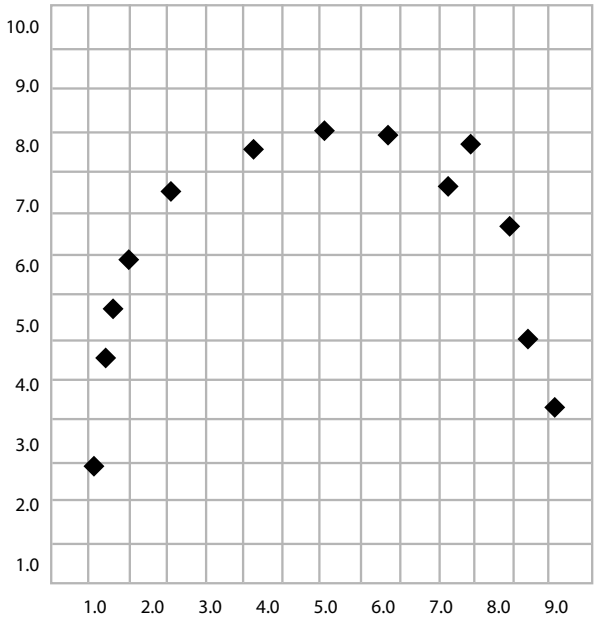
Form:

Strength:

Explanation:

2.

x = weeks since a video game was released
y = number of video games sold by one Internet vendor



Direction:

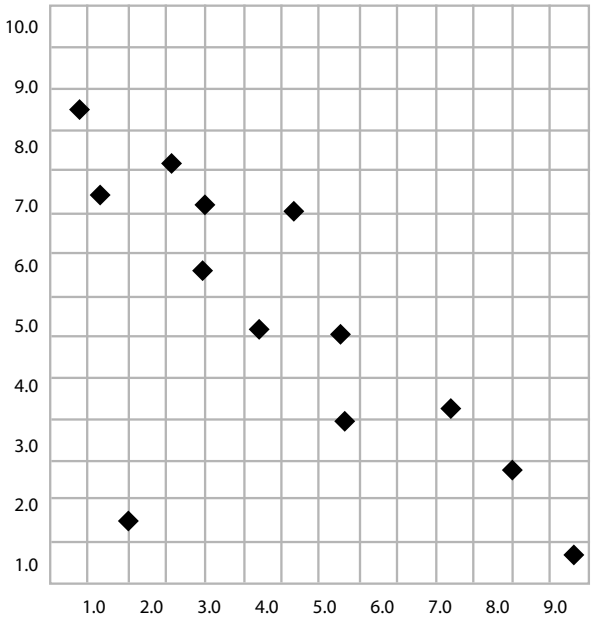
Form:

Strength:

Explanation:

3.

x = number of hours spent practicing recital music
y = number of mistakes made (as recorded by music instructor)



Direction:

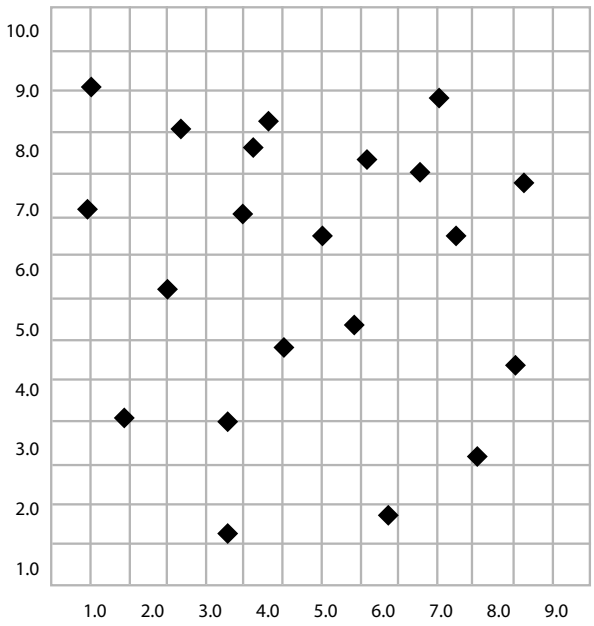
Form:

Strength:

Explanation:

4.

x = number of baseball cards owned by a student
y = number of minutes it takes a student to walk to school



Direction:

Form:

Strength:

Explanation:

Part 3 – Determine and Explain Negative and Positive Associations

For each pair of variables, note whether you expect the association to be positive or negative, and explain why:

Scenario	Positive or Negative?	Explanation
1. x = child's age (years) y = child's height (centimeters)		
2. x = days a student misses school y = hours spent on makeup work		
3. x = ounces of insecticide used y = mosquito population (hundreds per acre)		
4. x = hours a student spends watching TV y = hours a student spends playing video games		
5. x = hours spent studying the spelling of vocabulary words y = number of vocabulary words spelled incorrectly		
6. x = hours spent digging a hole y = depth of the hole (feet)		