

5-7

Scatter Plots and Trend Lines

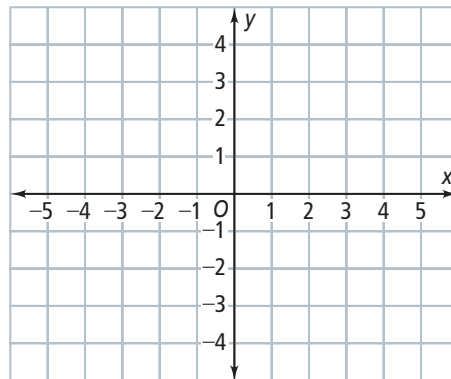


Vocabulary

Review

A *scatter plot* is a graph that relates two sets of data. Plot each *ordered pair* on the graph at the right to make a scatter plot.

1. (2, 3)
2. (-1, -2)
3. (0, 2)
4. (-2, 0)



Vocabulary Builder

correlation (noun) kawr uh LAY shun

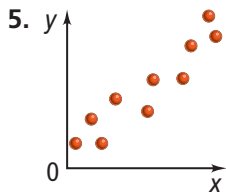
Related Words: correlate (verb), relationship (noun), relate (verb), scatter plot (noun)

Definition: A **correlation** is a measure of the strength of a relationship between two quantities.

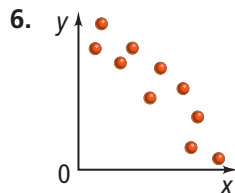
Example: The more a student studies, the higher the student's grades tend to be. So, there is a **correlation** between time spent studying and grades.

Use Your Vocabulary

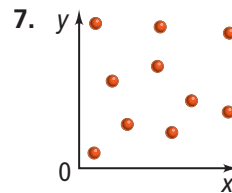
Label each scatter plot *positive correlation*, *negative correlation*, or *no correlation*.



y increases as x increases



y decreases as x increases



x and y are not related



Problem 1 Making a Scatter Plot and Describing Its Correlation

Got It? Make a scatter plot of the data in the table. What type of relationship does the scatter plot show?

Gasoline Purchases								
Dollars Spent	10	11	9	10	13	5	8	4
Gallons Bought	2.5	2.8	2.3	2.6	3.3	1.3	2.2	1.1

8. Let x = dollars spent.

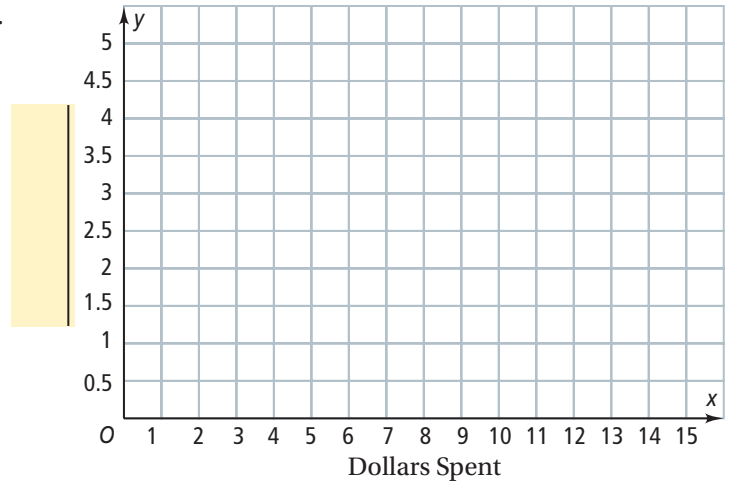
Let y = _____.

9. Use the data to make a scatter plot.

10. Underline the correct word or words to complete each sentence.

The number of gallons bought tends to increase / decrease as the number of dollars spent increases / decreases.

The two sets of data have a positive / negative correlation.



Got It? Reasoning Consider the population of a city and the number of letters in the name of the city. Would you expect a *positive correlation*, a *negative correlation*, or *no correlation* between the two sets of data? Explain your reasoning.

11. As an example, think of the city or town that you live in. How many letters are in the name of your city and approximately how many people live there?

12. Now think of another city of a very different size than the one you chose for Exercise 11. How many letters are in the name of this city and approximately how many people live there?

13. Is the size of either city dependent on the number of letters in its name? Yes / No

14. What kind of correlation would you expect between the two sets of data? Explain.

A **trend line** is a line on a scatter plot, drawn near the points, that shows a correlation. There should be about the same number of points above the line as below it.

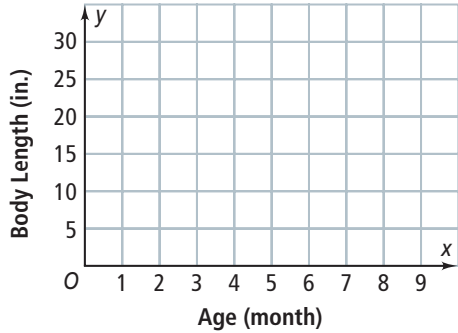


Problem 2 Writing an Equation of a Trend Line

Got It? Make a scatter plot of the data. Draw a trend line and write its equation. What is the approximate body length of a 7-month-old panda?

Body Length of a Panda								
Age (month)	1	2	3	4	5	6	8	9
Body Length (in.)	8.0	11.75	15.5	16.7	20.1	22.2	26.5	29.0

15. Make a scatter plot and draw a trend line.



16. Write the equation of the trend line that you drew.

17. Use the equation of your trend line to estimate the body length of a 7-month-old panda.

18. A 7-month-old panda would be approximately inches in length.



Problem 3 Finding the Line of Best Fit

Got It? For data of tuition and fees charged at public four-year colleges, the equation of the line of best fit is $y = 409.43x - 815,446.71$, where x = the year at the beginning of the academic year and y = cost. Predict the cost of attending a public four-year college in the 2016–2017 academic year.

19. Let $x =$.

20. Complete the steps to find the estimated cost.

$$y = 409.43 \cdot \text{} - 815,446.71$$

$$y = \text{} - 815,446.71$$

$$y \approx \text{}$$

21. The cost of attending a public four-year college in the 2016–2017 academic year will be about \$.

Causation is when a change in one quantity causes a change in a second quantity. A correlation between quantities does not always imply causation.



Problem 4 Identifying Whether Relationships Are Causal

Got It? Consider the cost of a family's vacation and the size of their house. Is there likely to be a correlation? If so, does the correlation reflect a causal relationship? Explain.

22. Is there likely to be a correlation between the cost of a family's vacation and the size of their house? Explain.

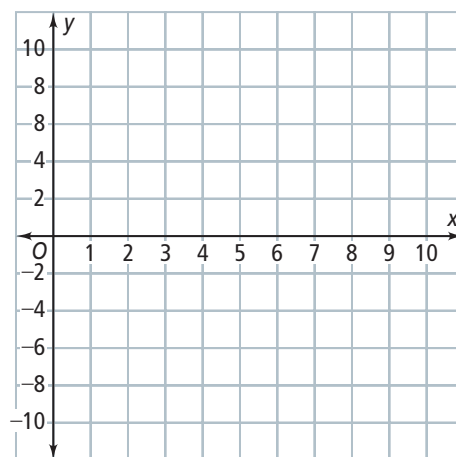
23. If there is a correlation, does the correlation reflect a causal relationship? Explain.



Lesson Check • Do you UNDERSTAND?

Error Analysis Refer to the table below. A student says that the data have a negative correlation because as x decreases, y also decreases. What is the student's error?

x	10	7	5	4	1	0
y	1	0	-2	-4	-7	-9



24. Make a scatter plot of the data.
25. The scatter plot shows a **positive / negative** correlation.
26. Explain the student's error.



Math Success

Check off the vocabulary words that you understand.

- scatter plot correlation trend line causation

Rate how well you can *make a scatter plot and determine the type of correlation*.

