

Skill check:

Solve the equation for y:

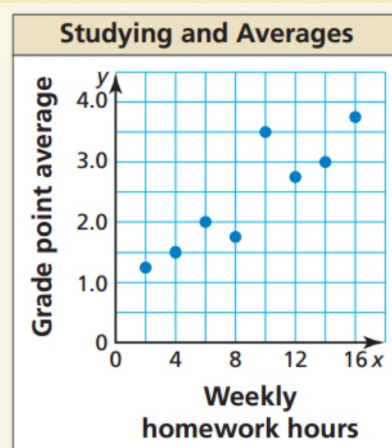
$$2y + 1 - x = 7x$$

4-4 Scatter plots & lines of best fit

Vocabulary:

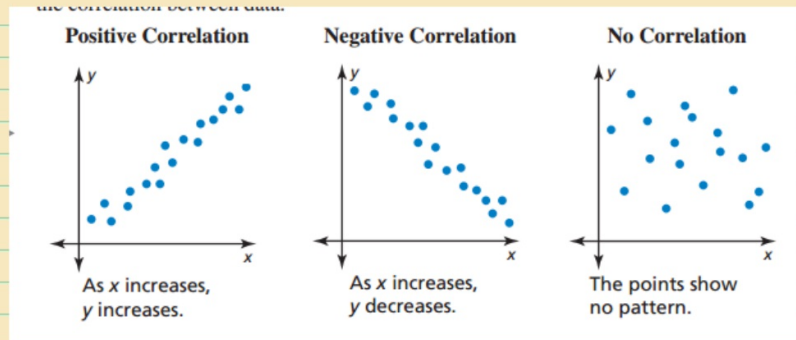
1.) Scatter plot

Graph that shows a relationship between two data sets



2.) Correlation

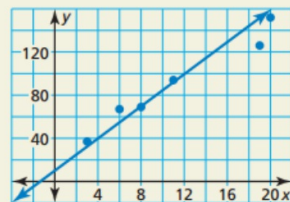
Is a relationship between data sets



3.) Line of Fit

Is a line drawn on a scatter plot that is close to most of the data pairs.

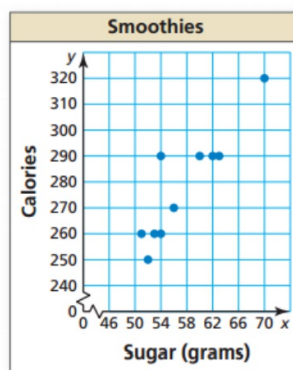
22. **HOW DO YOU SEE IT?** The scatter plot shows part of a data set and a line of fit for the data set. Four data points are missing. Choose possible coordinates for these data points.



Example 1: Interpreting a scatter plot

The scatter plot shows the amounts x (in grams) of sugar and the numbers y of calories in 10 smoothies.

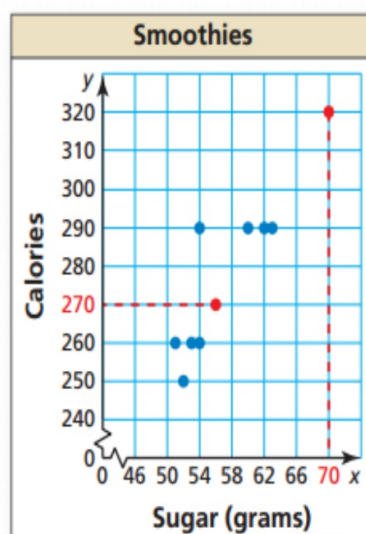
- How many calories are in the smoothie that contains 56 grams of sugar?
- How many grams of sugar are in the smoothie that contains 320 calories?
- What tends to happen to the number of calories as the number of grams of sugar increases?



Answer to Example 1

SOLUTION

- Draw a horizontal line from the point that has an x -value of 56. It crosses the y -axis at 270.
▶ So, the smoothie has 270 calories.
- Draw a vertical line from the point that has a y -value of 320. It crosses the x -axis at 70.
▶ So, the smoothie has 70 grams of sugar.
- Looking at the graph, the plotted points go up from left to right.
▶ So, as the number of grams of sugar increases, the number of calories increases.

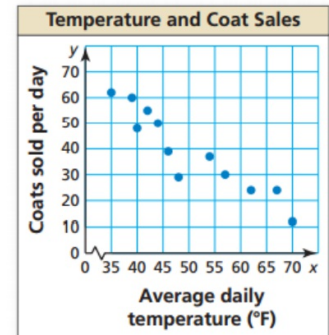
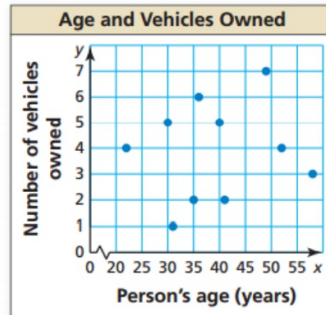


Example 2 Identifying Correlations

Tell whether the data show a *positive*, a *negative*, or *no* correlation.

a. age and vehicles owned

b. temperature and coat sales at a store



Example 2 answer

SOLUTION

a. The points show no pattern. The number of vehicles owned does not depend on a person's age.

▶ So, the scatter plot shows no correlation.

b. As the average temperature increases, the number of coats sold decreases.

▶ So, the scatter plot shows a negative correlation.

Make a scatter plot of the data. Tell whether the data show a *positive*, a *negative*, or *no* correlation.

3.

Temperature (°F), x	82	78	68	87	75	71	92	84
Attendees (thousands), y	4.5	4.0	1.7	5.5	3.8	2.9	4.7	5.3

4.

Age of a car (years), x	1	2	3	4	5	6	7	8
Value (thousands), y	\$24	\$21	\$19	\$18	\$15	\$12	\$8	\$7

Example 3: Line of Best Fit

Steps:

1.) Make a scatter plot of the data

2.) Decide whether the data can model a line

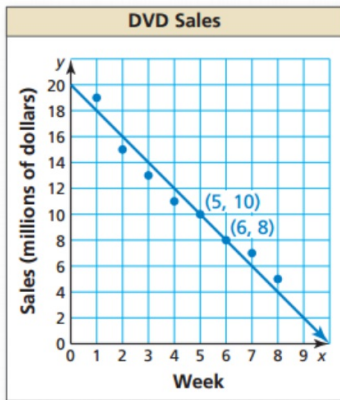
3.) Draw a line to fit the data closely

4.) Write an equation using 2 points on a line. The points do not have to represent actual data pairs, but they must lie on the line of fit.

EXAMPLE 3 Finding a Line of Fit

The table shows the weekly sales of a DVD and the number of weeks since its release. Write an equation that models the DVD sales as a function of the number of weeks since its release. Interpret the slope and y-intercept of the line of fit.

Week, x	1	2	3	4	5	6	7	8
Sales (millions), y	\$19	\$15	\$13	\$11	\$10	\$8	\$7	\$5



SOLUTION

Step 1 Make a scatter plot of the data.

Step 2 Decide whether the data can be modeled by a line. Because the scatter plot shows a negative correlation, you can fit a line to the data.

Step 3 Draw a line that appears to fit the data closely.

Step 4 Write an equation using two points on the line. Use (5, 10) and (6, 8).

The slope of the line is $m = \frac{8 - 10}{6 - 5} = -2$.

Use the slope $m = -2$ and the point (6, 8) to write an equation of the line.

$$y - y_1 = m(x - x_1) \quad \text{Write the point-slope form.}$$

$$y - 8 = -2(x - 6) \quad \text{Substitute } -2 \text{ for } m, 6 \text{ for } x_1, \text{ and } 8 \text{ for } y_1.$$

$$y = -2x + 20 \quad \text{Solve for } y.$$

► An equation of the line of fit is $y = -2x + 20$. The slope of the line is -2 . This means the sales are decreasing by about \$2 million each week. The y-intercept is 20. The y-intercept has no meaning in this context because there are no sales in week 0.