Determine whether each graph shows a *positive, negative*, or *no* correlation. If there is a positive or negative correlation, describe its meaning in the situation.
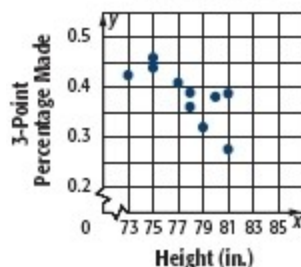
Game Tickets at the Fair
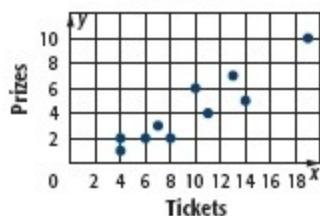
4.

SOLUTION:

The graph shows a positive correlation. As the number of tickets you buy increases, the more game prizes you will win.
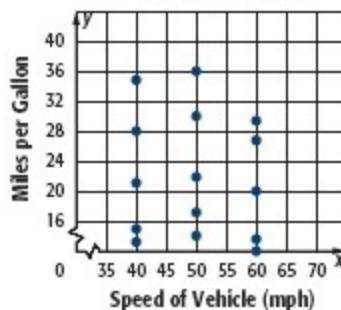
NBA 3-Point Percentage

5.

SOLUTION:

The graph shows a negative correlation. As the NBA player gets taller, his 3-point shooting percentage gets lower.
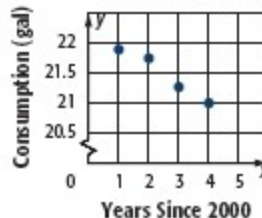
Gas Mileage of Various Vehicles

7.

SOLUTION:

There is no correlation. The various vehicles give too many varying results for there to be a correlation between the speed of the vehicle and the miles per gallon.

8. **MILK** Refer to the scatter plot of gallons of milk consumption per person for selected years.

Consumption of Milk in Gallons

a. Use the points (2, 21.75) and (4, 21) to write the slope-intercept form of an equation for the line of fit.
b. Predict the milk consumption in 2025.
c. Predict in what year milk consumption will be 10 gallons.
d. Is it reasonable to use the equation to estimate the consumption of milk for any year? Explain.

SOLUTION:

a. Find the slope of the line containing the given points.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{21.75 - 21}{2 - 4}$$

$$= \frac{0.75}{-2}$$

$$= -0.375$$

Use the slope and either of the two points to find the *y*-intercept.

$$y = mx + b$$
$$21 = -0.375(4) + b$$
$$21 = -1.5 + b$$
$$22.5 = b$$

Write the equation in slope-intercept form for the line of fit.

$$y = mx + b$$
$$y = -0.375x + 22.5$$

b. Substitute 25 for x in the equation found in part **a** to predict how much milk will be consumed in 2025.

$$y = -0.375x + 22.5$$
$$y = -0.375(25) + 22.5$$
$$y = -9.375 + 22.5$$
$$y = 13$$

In 2025, about 13 gallons of milk will be consumed.

c. Substitute 10 for y into the equation from part **a** to find the year that milk consumption will be 10 gallons.

$$y = -0.375x + 22.5$$
$$10 = -0.375x + 22.5$$
$$-12.5 = -0.375x$$
$$\frac{-12.5}{-0.375} = \frac{-0.375x}{-0.375}$$
$$33.3 = x$$

In the year 2033, the milk consumption will be 10 gallons.

d. Yes; if the current trend continues, the consumption of milk will continue to decrease.

10. **ORGANIZE IDEAS** The Body Mass Index (BMI) is a measure of body fat using height and weight. The heights and weights of twelve men with normal BMI are given in the table shown.

Height (in.)	Weight (lb)
62	115
63	124
65	120
67	134
67	140
68	138
68	144
68	152
69	147
72	155
73	168
73	166

a. Make a scatter plot comparing the height in inches to the weight in pounds.

b. Draw a line of fit for the data.

c. Write the slope-intercept form of an equation for the line of fit.

d. Predict the normal weight for a man who is 84 inches tall.

e. A man's weight is 188 pounds. Use the equation of the line of fit to predict the height of the man.

SOLUTION:

a.–b.

Height vs. Weight in 12 Men
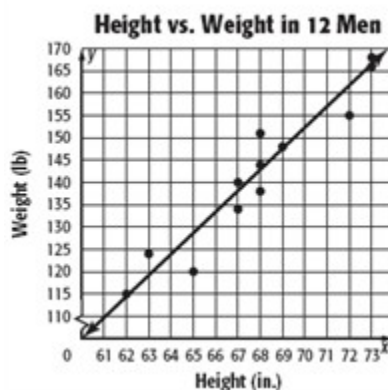
c. Answers will vary depending on which points the student picks. Sample answer: Choose two points on the best fit line: (62, 115) and (69, 147). Calculate the slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{147 - 115}{69 - 62}$$
$$= \frac{32}{7}$$
$$= 4.57$$

Use the slope and either of the two points to find the y-intercept.

$$y = mx + b$$
$$147 = 4.57(69) + b$$
$$147 = 315.33 + b$$
$$147 - 315.33 = 315.33 - 315.33 + b$$
$$-168.33 = b$$
$$y = 4.57x - 168.33$$

d. Let $x = 84$ inches. Substitute this into the equation.

$$y = 4.57x - 168.33$$
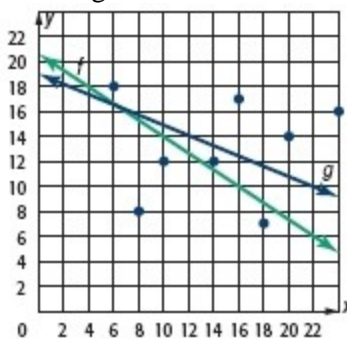$$= 4.57(84) - 168.33$$
$$= 383.88 - 168.33$$
$$= 215.55$$

Sample answer: 215.6 lb

e. If a man's weight is 188 lbs, substitute $y = 188$ and find x.

$$y = 4.57x - 168.33$$
$$188 = 4.57x - 168.33$$
$$188 + 168.33 = 4.57x - 168.33 + 168.33$$
$$356.33 = 4.57x$$
$$\frac{356.33}{4.57} = \frac{4.57x}{4.57}$$
$$77.97 = x$$

Sample answer: about 78 in.

15. **JUSTIFY ARGUMENTS** Determine which line of fit is better for the scatter plot. Explain your reasoning.

SOLUTION:

Line g has the same number of points above the line and below the line. Line f is close to 2 of the points, but for the rest of the data there are 3 points above and 3 points below the line. Whenever there is no line that can be drawn through all the points or even close to all the points, many different lines of fit can be drawn that are *close* to the points. Therefore, neither line g nor line f is a better line of fit for this scatter plot.

18. Which term best describes the correlation shown in the graph?
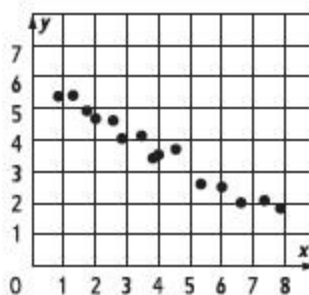
A Positive
B Negative
C Zero
D No correlation

SOLUTION:

The data appears to be correlated since it seems to be linear.
Since the data decreases overtime, it can be described as a negative correlation.
Choice B is correct.

19. Which equation best represents the data in the table?

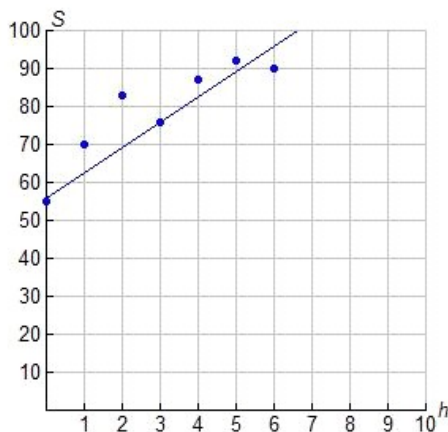| Study Hours, h	0	1	2	3	4	5	6
Exam Score, S	55	70	83	76	87	92	90

F $S = 40 + 15h$
G $S = 60 + 6h$
H $S = 55 + 10h$
J $S = 80 + 3h$

SOLUTION:

Make a scatter plot of the data. Then fit a line to the data.

Use points (1, 70) and (4, 87)

Find the slope.
$$m = \frac{S_2 - S_1}{h_2 - h_1}$$
$$= \frac{87 - 70}{4 - 1}$$
$$= \frac{17}{3} = 5.7$$

Find the equation of the best fit line.
$$S - S_1 = m(h - h_1)$$
$$S - 70 = 5.7(h - 1)$$
$$S - 70 = 5.7h - 5.7$$
$$S = 5.7h + 64.3$$

Choice G is closest to the best fit line.