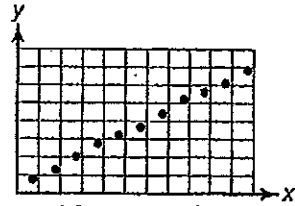


Scatter Plots



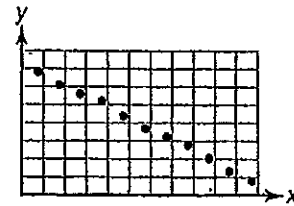
Getting the Idea

A **scatter plot** is a graph in which ordered pairs of data are plotted. You can use a scatter plot to determine if a relationship, or an association, exists between two sets of data. There are different kinds of associations.



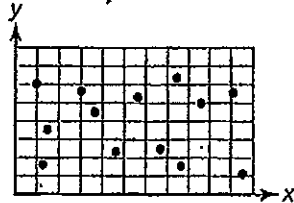
positive association

The points slant up from left to right, as if on a line. So, this is an example of a linear association. As the x -values increase, the y -values also tend to increase.



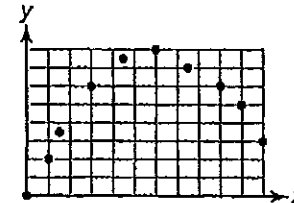
negative association

The points slant down from left to right, as if on a line. So, this is another example of a linear association. As the x -values increase, the y -values tend to decrease.



no association

The ordered pairs look randomly scattered. The plot shows no relationship between the x - and y -values.



nonlinear association

The ordered pairs are related, but do not resemble a straight line. For example, this plot shows that as the x -values increase, the y -values increase at first and then decrease.

An association does not have to be true for every pair of values in a scatter plot. It should be true for most of the data points. Look at how the data cluster together to help you decide.

Practice

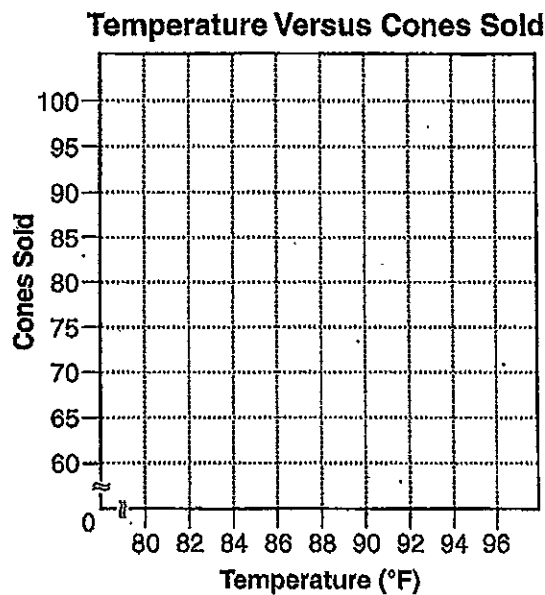
Directions: Use the following information to answer questions 1 through 4.

Christina works at the ice cream shop during summer vacation. She uses the following table to record the highest temperature each day for two weeks and the number of ice cream cones she sold on each of those days.

Temperature Versus Cones Sold

Temperature (°F)	85	87	91	95	88	83	80	82	88	90	93	85	87	83
Cones Sold	76	77	70	100	91	79	67	73	78	87	92	95	85	68

1. Use the information from the table to create a scatter plot of the data.



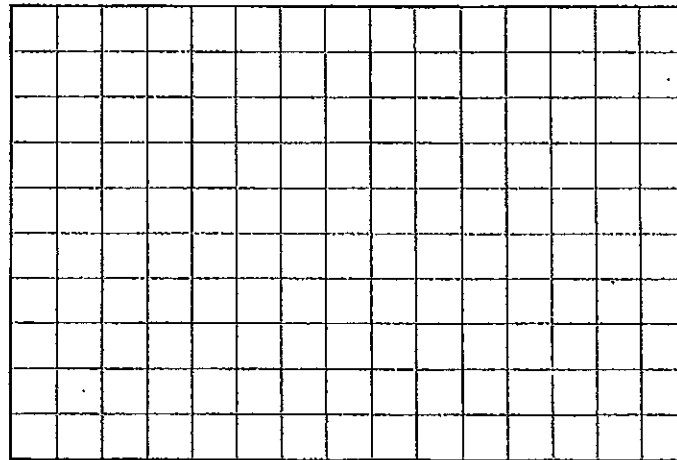
2. Does the scatter plot represent a clustering of data points? _____
3. Is there a relationship between the high temperature and the number of ice cream cones sold each day?

4. Are there any outliers in the data? If so, what are the ordered pairs of the point(s)?

7. Paula has a lemonade stand, which she operates rain or shine. The table below shows the daily high temperature and the number of cups of lemonade she sold each day last week. It rained on Saturday, but it was sunny every other day.

Day	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Daily High Temperature (in °F)	84	90	92	87	87	95	93
Number of Cups Sold	10	30	36	18	20	48	5

- A. Create a scatter plot of these data on the grid below. Be sure to title your scatter plot, label each axis, and choose a scale that allows you to plot all the data. (Remember, you can draw a squiggle mark to indicate a break in an axis if you wish.)



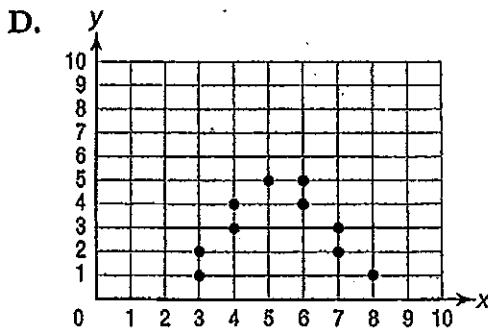
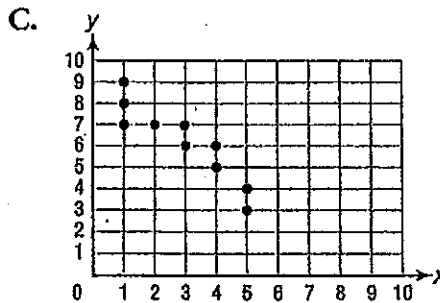
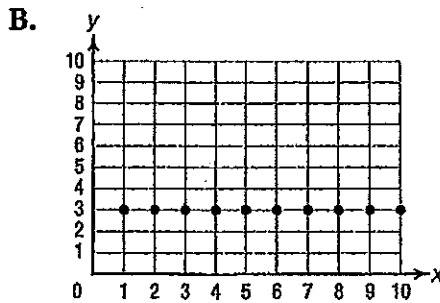
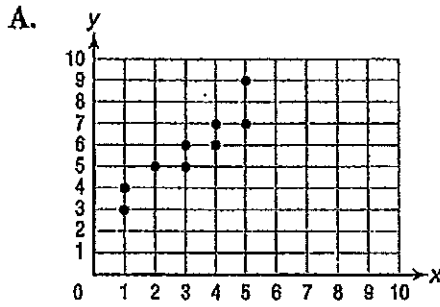
- B. What type of association, if any, is shown by the scatter plot? If you excluded any outliers, identify them and explain why.



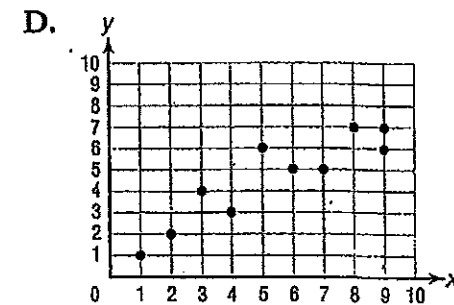
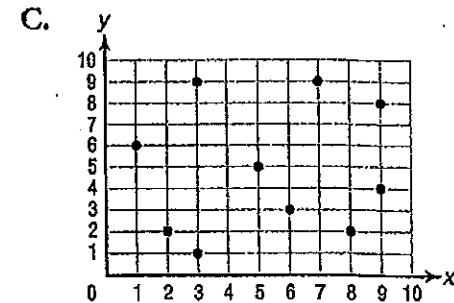
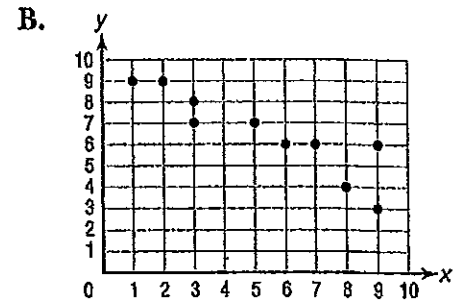
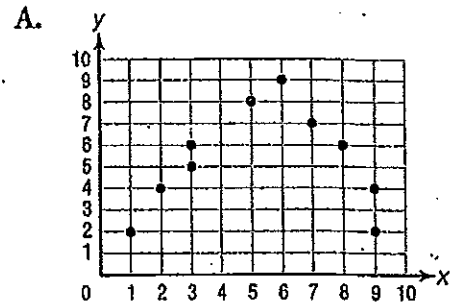
Lesson Practice

Choose the correct answer.

1. Which scatter plot shows a positive association for the data?

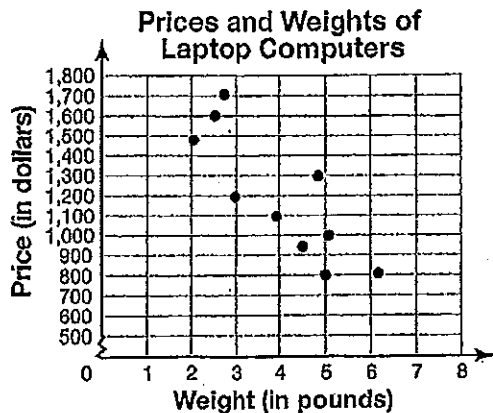


2. Which scatter plot shows a nonlinear association for the data?



Use the scatter plot for questions 3 and 4.

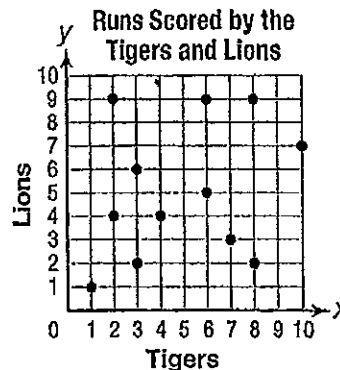
The scatter plot below compares the weights of laptop computers to their prices.



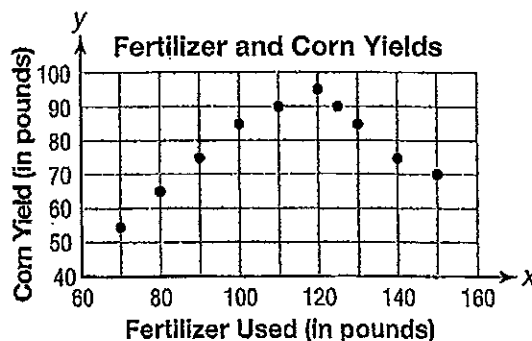
3. If the data above contain an outlier, which coordinates best represent it?
- A. (2.5, 1600)
 - B. (5, 800)
 - C. (6.25, 800)
 - D. There is no outlier for these data.

4. Which best describes the association shown by the scatter plot?
- A. positive, linear association
 - B. negative, linear association
 - C. nonlinear association
 - D. no association

5. Which best describes the association between the runs scored per game by the Tigers and the runs scored per game by the Lions?



- A. negative association
 - B. no association
 - C. nonlinear association
 - D. positive association
6. The scatter plot compares the amount of fertilizer used per acre and the corn yield for that acre. Which best describes the association?



- A. negative association
- B. no association
- C. nonlinear association
- D. positive association

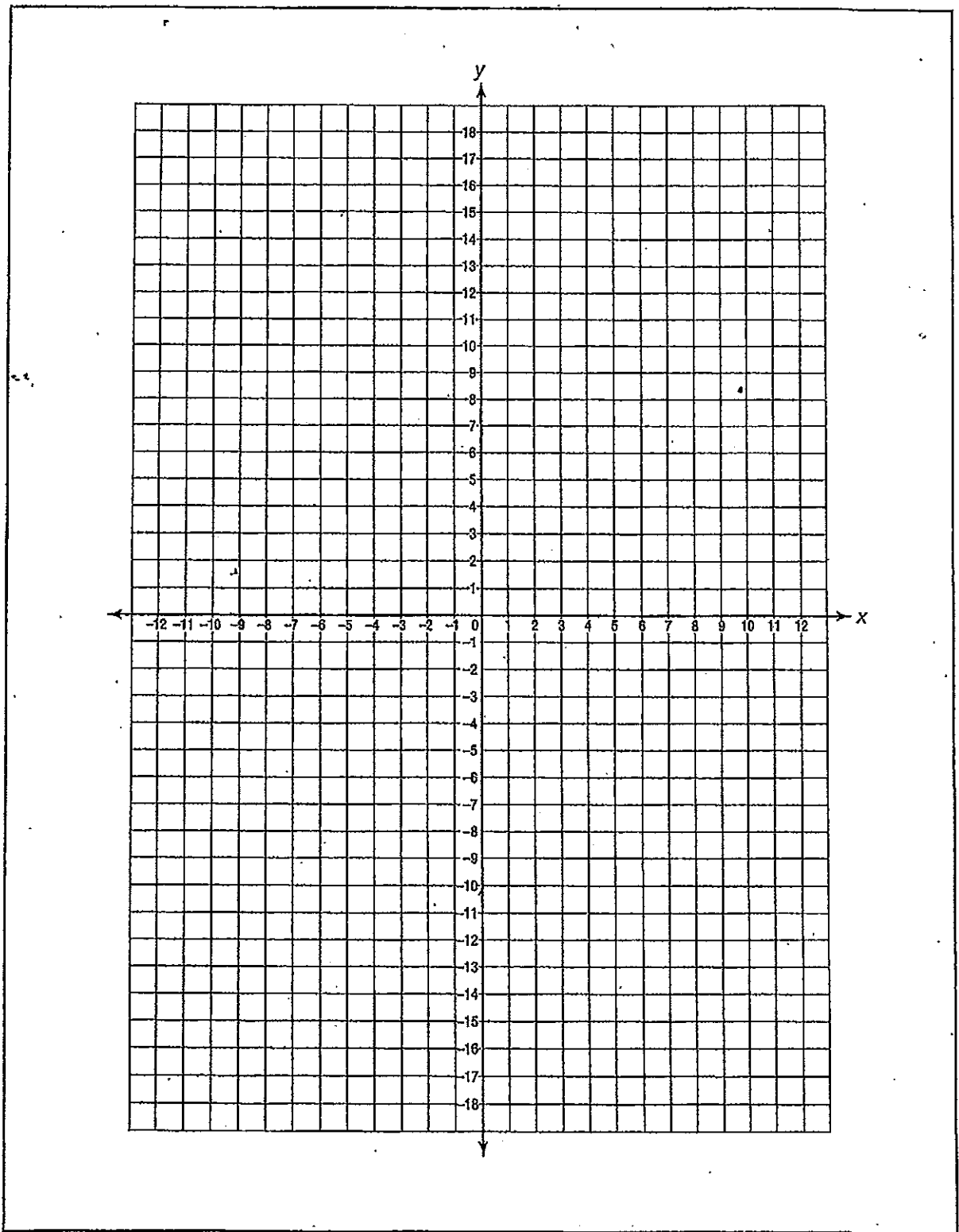
Scatter Plot Lab

Directions:

1. Pick one partner to be "x" and the other partner to be "y"
2. Listen to the music. For each song, rate the music on a scale of (-10, 10).
 - 10 means you can't stand it (like fingernails of a chalkboard),
 - 10 means you love it (could listen to the song all day)
 - 0 means you are neutral (don't love it or hate it).
3. Share your results with your partner and make your results the ordered pair (x; y).
4. Graph the point to create a scatter plot.
5. Answer the questions about your graph.

Song	x	y	(x,y)
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Math Tools: Coordinate Grid



7

Questions about your Scatter Plot

1. Does your scatter plot show a positive correlation, negative correlation, or no correlation?
2. What does the correlation stated in question 1 say about the type of music you and your partner like? Do you have similar tastes, or different tastes? How can you tell?
3. Find a song that you both liked. What quadrant is that point in?
4. Find a song that you both disliked. What quadrant is that point in?
5. How could the lab been done differently to change the outcomes of the results? List three things.
6. Suppose you and your partner switched who was "x" and who was "y." Would this change the correlation? Give an example to explain your answer.
7. How many times did you and your partner agree on the exact rating of a song? What number songs were they?

Directions: Use the following information to answer questions 5 through 8.

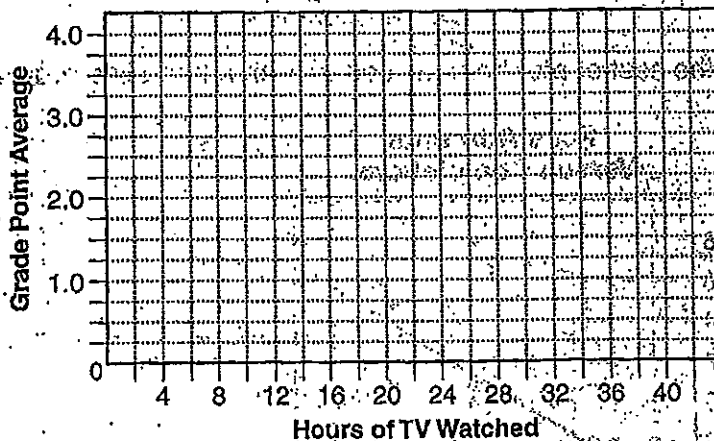
The following table shows the relationship between the average amounts of television 12 students watch per week and their grade point averages. The grade point average has a maximum value of 4.0.

Hours of TV Watched Versus Grade Point Average

Hours of TV Watched	9	6	19	26	12	4	28	21	20	8	35	16
Grade Point Average	2.72	3.01	0.89	1.81	3.23	3.74	1.42	2.45	2.9	3.96	1.00	2.53

5. Use the values from the table to construct a scatter plot of the data.

**Hours of TV Watched Versus
Grade Point Average**



6. Does the scatter plot represent a clustering of data points?

7. Is there a relationship between the hours of TV watched by students and their grade point averages?

8. Are there any outliers in the data? If so, what are the ordered pairs of the point(s)?

9

Trend Lines



Getting the Idea

If there is a linear association between the data on a scatter plot, you can draw a **line of best fit** to show the general trend of the data. This line is also called a **trend line**. There is usually no line that will fit every data point exactly, but the line should be as close to as many of the points on the scatter plot as possible, with about as many points above the line as below it and including at least a few points on the line.

Example 1

The scatter plot shows the heights and weights of players on a basketball team. Draw a line of best fit for these data and discuss how well the line you draw models the trend of the data.

Strategy Draw a line of best fit. Then describe the general trend.

Step 1. Draw a line of best fit to show the general trend of the data.

Try to draw a line that has about as many points above it as below it.

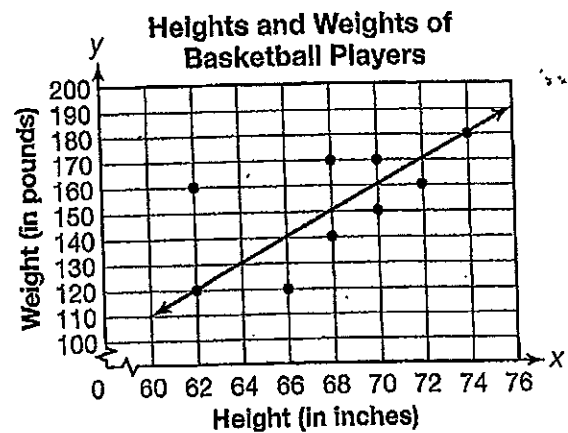
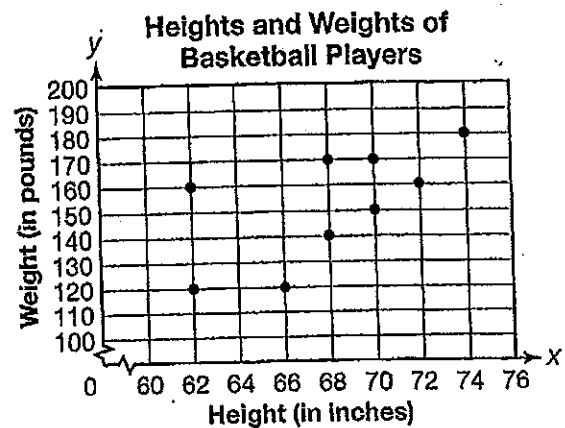
Step 2. Analyze your line of best fit.

The line shows a positive association. So, the taller a player is, the heavier his weight is.

The line includes two of the data points and has three points above it and four points below it. The points that do not lie on the line are not very close to the line.

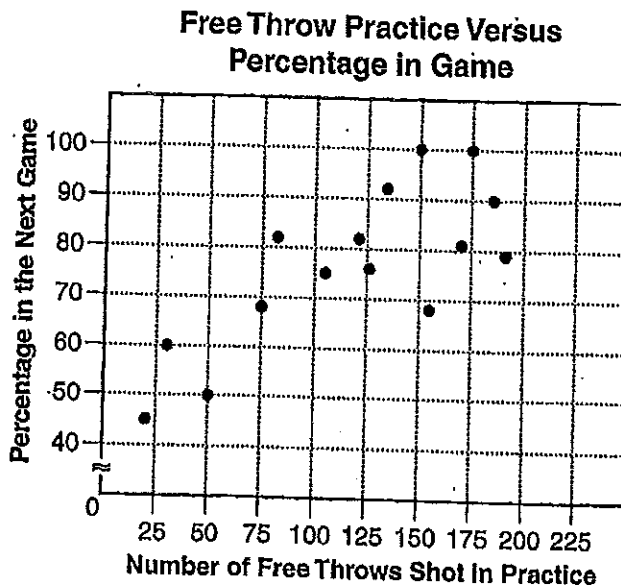
So, it is a decent model, but not a great model, for these data.

Solution The line of best fit drawn in Step 2 shows the general trend that, the taller the player, the greater the weight.



Directions: Use the following information to answer questions 5 through 8.

Joey kept track of the number of free throws that his team shot in practice and the percentage that they made in the next game. He displayed his findings in the scatter plot shown below.



5. Draw a trend line on Joey's scatter plot.
6. Does the trend line show a negative, positive, or no association?

7. Does the trend line show a linear association or a nonlinear association?

8. A student takes 60 free throws during practice. Predict the free throw percentage that the student is likely to have during the next game.

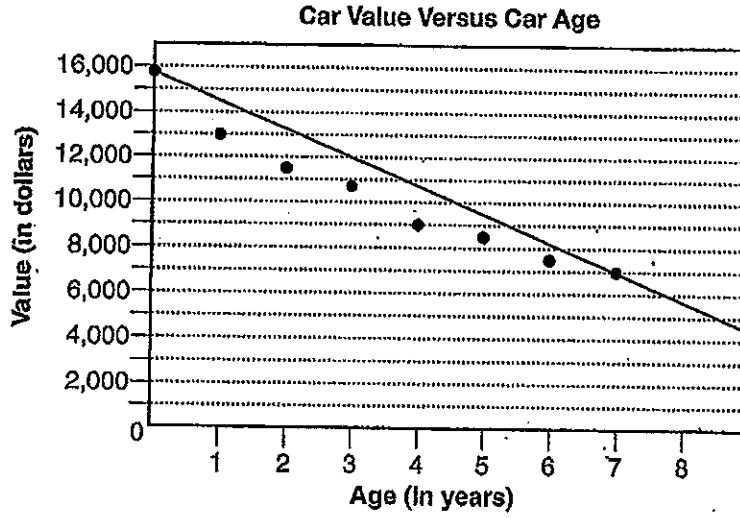
Directions: Use the following information to answer questions 9 and 10.

The following table shows the value of Samantha's car for each of the last seven years that she has owned it.

Car Value Versus Car Age

Age (in years)	0	1	2	3	4	5	6	7
Value (in dollars)	15,800	13,000	11,500	10,800	9,000	8,500	7,500	7,000

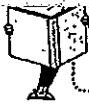
Samantha graphed the data from her table in a scatter plot and then drew a trend line on it.



9. Does Samantha's trend line model the data set well?

10. Explain why the trend line does or does not model the data set well.

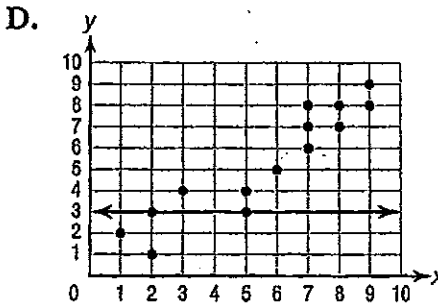
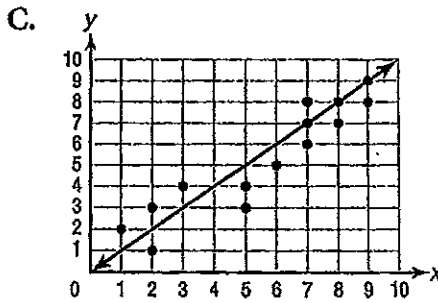
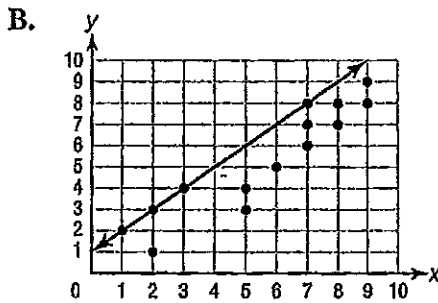
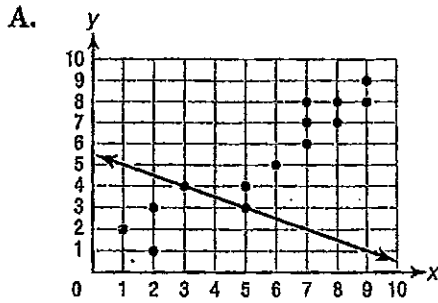
12



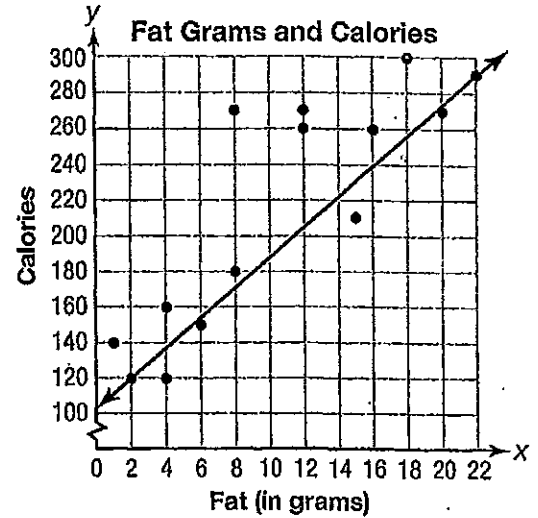
Lesson Practice

Choose the correct answer.

1. Which of these lines best fits the given data?



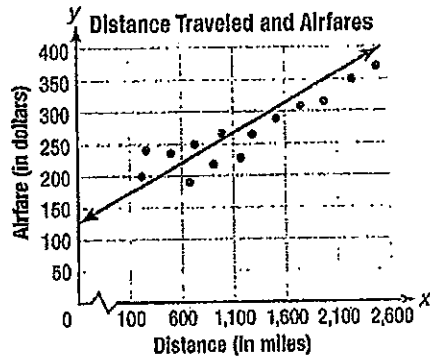
2. The scatter plot compares the number of grams of fat to the number of calories in some foods. A line of best fit has been drawn for these data.



Which statement is true about the line of best fit drawn above?

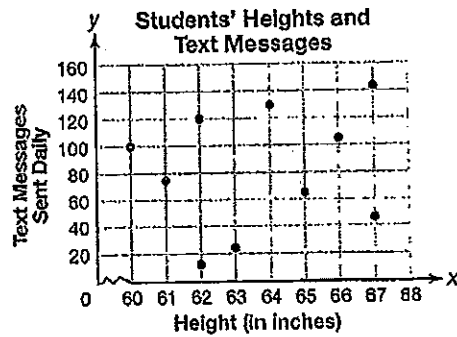
- A. The line comes close to most points, so it is a very good model for the data.
- B. The line shows the correct association, but it does not come close to most points.
- C. The scatter plot shows no association, so a line should not be used to model the data.
- D. The data do not resemble a straight line, so a nonlinear model would be better for these data.

3. The scatter plot shows the airfares paid and the distances that customers traveled. A line of best fit has been drawn for these data.



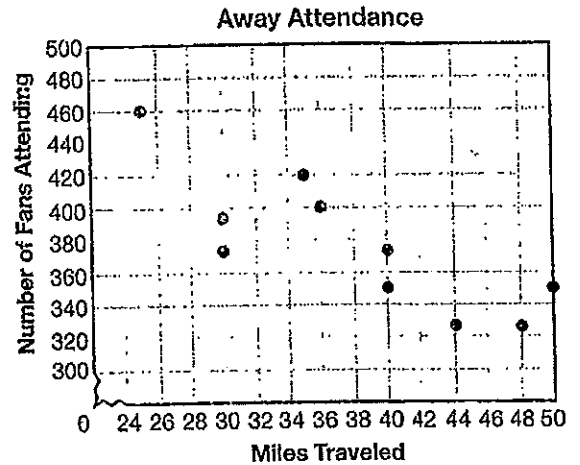
Based on the data in the scatter plot, which is the best prediction for the cost of a 100-mile trip?

- A. \$75
 B. \$100
 C. \$175
 D. \$250
4. The scatter plot below compares students' heights to the number of text messages they send daily. What would be the best prediction of the number of text messages sent by a student who is 68 inches tall?



- A. 20
 B. 45
 C. 110
 D. The scatter plot shows no association, so it is not possible to make a prediction.

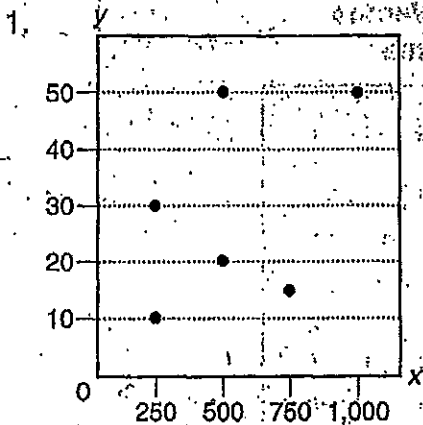
5. The scatter plot below shows the attendance at a sports team's away games. What would be the best prediction of the number of fans who would attend an away game if they had to travel 33 miles?



- A. 360
 B. 400
 C. 440
 D. The scatter plot shows no association, so it is not possible to make a prediction.

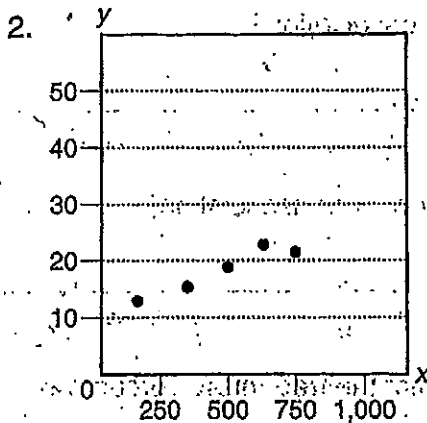
Practice

Directions: For questions 1 through 4, write whether each scatter plot shows a positive, negative, or no association. If the scatter plot shows an association, draw a trend line and make a given prediction.



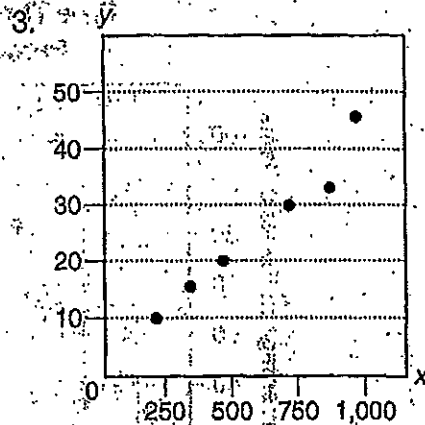
association: _____

prediction for y when x is 300: _____



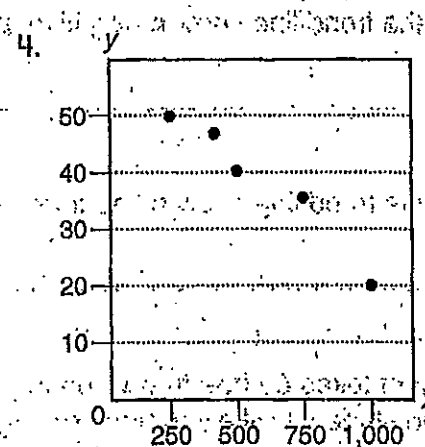
association: _____

prediction for y when x is 1,000: _____



association: _____

prediction for y when x is 600: _____



association: _____

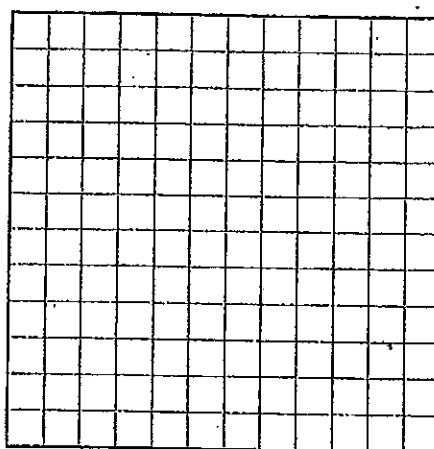
prediction for y when x is 850: _____

6. The table below shows the heights and arm spans of 9 people.

Heights and Arm Spans

Height (in meters)	1.5	1.7	2.0	1.6	1.7	2.1	1.8	1.6	1.8
Arm Span (in meters)	1.4	1.6	1.9	1.6	1.7	2.1	1.7	1.5	1.8

- A. Make a scatter plot of the data above. Then draw a line of best fit for the data.

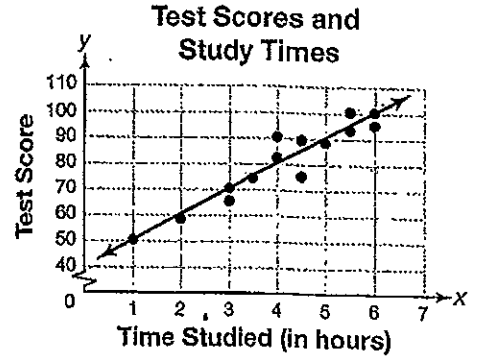


- B. Predict the arm span of a person whose height is 1.3 meters. Explain how you made your prediction.

LESSON
31

Using Linear Models to Interpret Data

EXAMPLE A Ms. Jones collected data from a sample of 14 students to determine the association between the numbers of hours they studied for a test and their test scores. She created this scatter plot to show her data. The line shows the general trend of the data.



Write an equation for the linear model. Explain what the slope and y-intercept represent in this situation.

1 Identify the slope, m .

The line passes through (1, 50) and (6, 100).

$$m = \frac{\text{change in } y}{\text{change in } x} = \frac{100 - 50}{6 - 1} = \frac{50}{5} = 10$$

Since y represents test scores and x represents study times, the slope shows that, on average, every 1 hour of study increases a test score by 10 points.

2 Identify the y-intercept, b .

If extended to the y-axis, the line passes through (0, 40). So, $b = 40$.

This shows that if a student did not study at all (i.e., studied for 0 hours), his or her score would likely be about 40.

3 Use slope-intercept form, $y = mx + b$, to write a linear model for the data.

Substitute 10 for m and 40 for b .

► The linear model is $y = 10x + 40$. According to the model, a student who does not study at all is likely to score 40 points. However, for each hour a student studies, this score is likely to increase by 10 points.

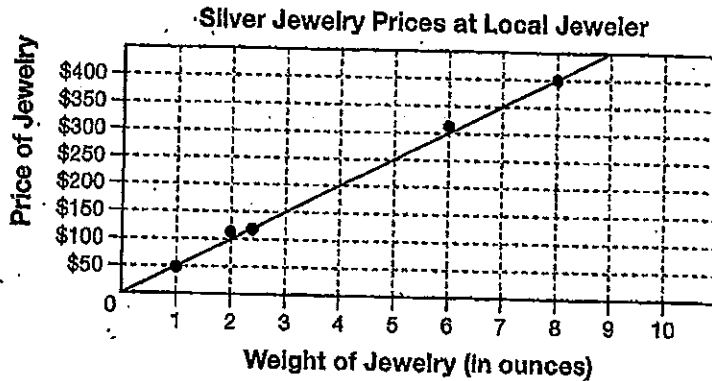
DISCUSS

Explain why the linear model shown is not a perfect predictor of the score a student will receive if he or she studies for a certain number of hours.

Practice

Directions: For questions 1 and 2, interpret the slope and y-intercept of the trend line for the situation. Then write an equation for the trend line.

- The following scatter plot shows the prices and weights of several pieces of her jewelry, as well as a trend line that shows their relationship.

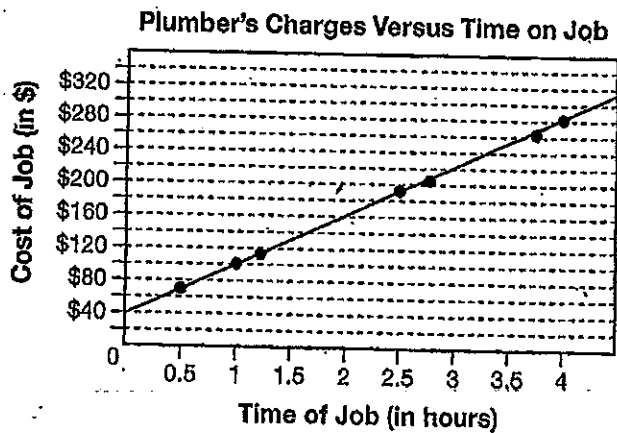


Interpret the slope: _____

Interpret the y-intercept: _____

Equation: _____

- The following scatter plot shows a plumber's charges (not including parts) and the time he spends at each job, as well as a trend line that shows their relationship.

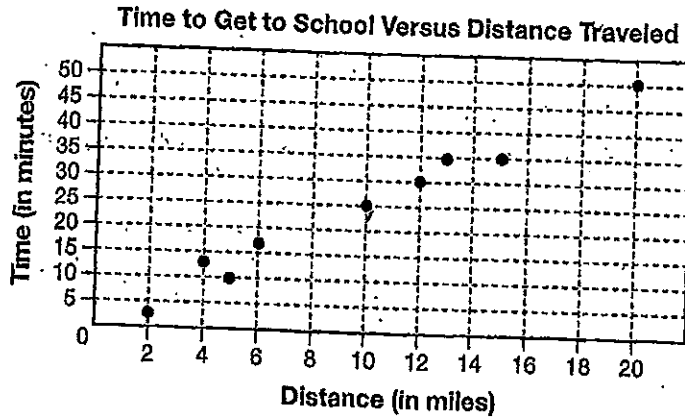


Interpret the slope: _____

Interpret the y-intercept: _____

Equation: _____

Directions: Answer questions 3 through 5 based on the following scenario and scatter plot. A student in Ms. Petricelli's 8th-grade class asked 9 of her friends how far they live from school. She then asked her friends how long it takes them, on average, to get from home to school. The student plotted the data points in the following scatter plot.



3. Draw a trend line on the student's scatter plot.

Explain why your trend line is accurate.

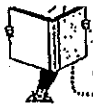
4. What is the y-intercept of your trend line?

Explain what the y-intercept of the trend line means in terms of the scenario.

5. What is the slope of your trend line? _____

Explain what the slope of the trend line means in terms of the scenario.

(19)



Lesson Practice

Choose the correct answer.

Use the information for questions 1 and 2.

Last year, Mr. Wu collected data to determine the association between the number of hours that students spent on a research project and their final grades on the project. The equation $y = 60 + 5x$ was a good linear model for determining y , a student's final grade on the project, after working on it for x hours.

1. Mr. Wu assigned the same project this year. If a student spends 6 hours working on the project, which grade does the linear model predict the student will receive?
A. 30
B. 70
C. 90
D. 93
2. What association is shown by the linear model?
A. Every 5 hours of work on the project increases a student's grade by 5 points.
B. Every 5 hours of work on the project increases a student's grade by 60 points.
C. Each additional hour of work on the project increases a student's grade by $\frac{1}{2}$ point.
D. Each additional hour of work on the project increases a student's grade by 5 points.

Use the information for questions 3 and 4.

Macy determined that the number of additional blooms produced by a flower bush is related to the number of times she adds special plant food to its soil over the course of the season. The table below represents several ordered pairs in her linear model.

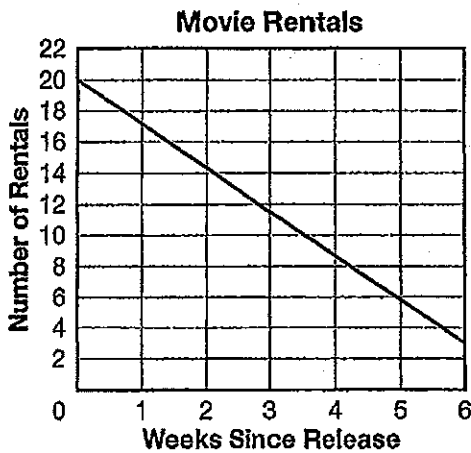
Times Added	Number of Additional Blooms
0	0
1	2
2	4
3	6
4	8

3. What does the slope of the linear model show?
A. It shows that each time the plant food is added, the bush produces exactly 2 blooms.
B. It shows that each time the plant food is added, the bush produces 2 more blooms than it ordinarily does.
C. It shows that each time the plant food is added, the bush produces 2 fewer blooms than it ordinarily does.
D. It shows that adding plant food is not associated with an increase in the number of blooms.

4. If Macy adds special plant food to the soil 6 times this season, how many additional blooms would you predict the bush to produce?
- A. 6
 - B. 8
 - C. 12
 - D. 14

Use the graph for questions 5 and 6.

A video store owner determined that the number of times a particular movie is rented is associated with the number of weeks since it was first released. The linear model below is a good representation of this association.



5. What does the y -intercept represent?
- A. It shows that during the week a movie is released, it is rented about 20 times.
 - B. It shows that 6 weeks after a movie is released, it is rented about 3 times.
 - C. It shows that 3 weeks after a movie is released, it is rented about 6 times.
 - D. It shows that 20 weeks after a movie is released, it is rented 0 times.
6. What does the slope represent?
- A. It shows that the number of times a movie is rented increases by 3 each week after its release.
 - B. It shows that the number of times a movie is rented decreases by 3 each week after its release.
 - C. It shows that a movie is rented 3 times as often each week after its release.
 - D. It shows that there is no association between the number of times a movie is rented and how many weeks have passed since its release.

Use the information for questions 7 and 8.

Last semester, Ms. Allen collected data to determine the association between her students' television viewing the day before an exam and their final grades on the exam. The equation $y = 100 - 8x$ was a good linear model for determining y , a student's final grade on the exam, after watching TV for x hours the night before.

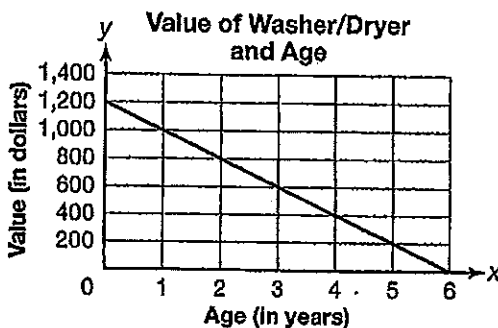
7. If a student spends 4.5 hours watching television the night before the next exam, which grade does the linear model predict the student will receive?

- A. 95 C. 64
B. 88 D. 36

8. What association is shown by the linear model?

- A. Watching one additional hour of TV the night before an exam decreases a student's exam grade by 8 points.
B. Watching one additional hour of TV the night before an exam decreases a student's exam grade by 100 points.
C. Each additional hour of TV watching increases a student's grade by 8 points.
D. A student would need to watch a minimum of 100 hours of TV to have his or her grade affected.

9. Last year, when Mr. Smith bought a new washer/dryer combo, he collected pairs of data in a scatter plot to help him understand how the value of his appliance would change over time. He then created and graphed the linear model shown below.



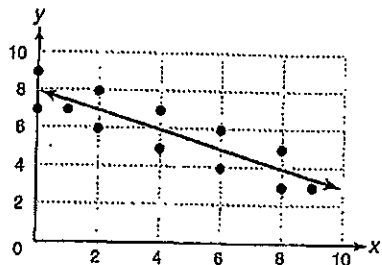
- A. Identify the x - and y -intercepts. What does each tell you about the problem situation?

- B. Identify the slope of the graph. Use the slope to describe the association between the age of the washer/dryer and its value.

Practice

Identify the slope and y-intercept for each linear model given.

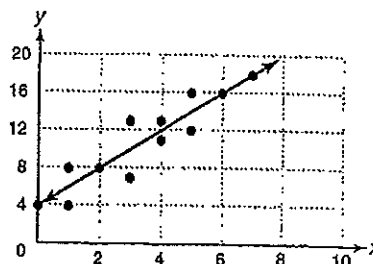
1. The linear model is $y = -0.5x + 8$.



slope: _____

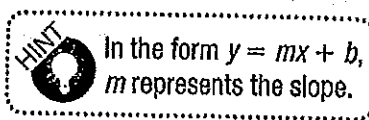
y-intercept: _____

2. The linear model is $y = 2x + 4$.



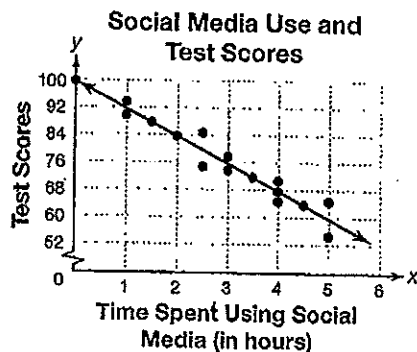
slope: _____

y-intercept: _____



Choose the best answer.

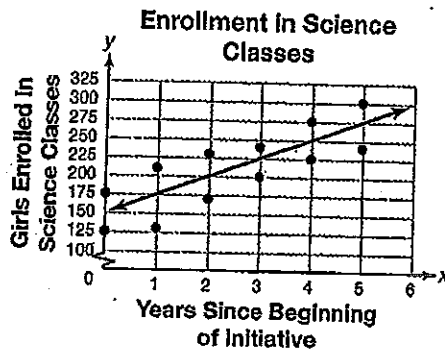
3. The scatter plot shows the numbers of hours that students spent using social media the night before a test, and their test scores. The data is modeled by the function $y = -8x + 100$. Which is the best interpretation of the y-intercept of this model?



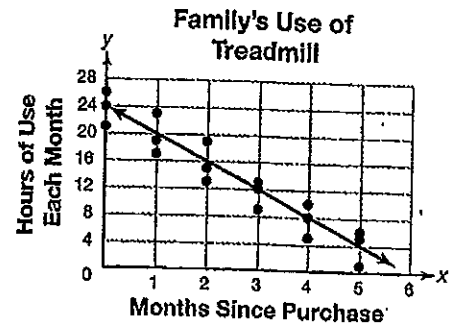
- A. The use of social media the night before a test does not affect a student's score.
- B. Students who use social media for 8 hours the night before are most likely to score 100.
- C. Students who use social media for 0 hours the night before are most likely to score 100.
- D. Using social media for 100 hours the night before lowers a student's score by 0 points.

Identify the slope and y-intercept for each model. Then tell what each represents in the problem.

4. The scatter plot shows the number of years since a new science initiative for girls was started and the number of girls enrolled in science classes at several high schools. The data is modeled by the function $y = 25x + 150$.

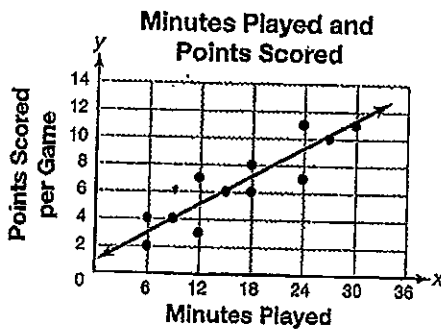


5. The scatter plot shows the number of months since a family purchased a treadmill and the number of hours each family member used it each month. The data is modeled by the function $y = -4x + 24$.



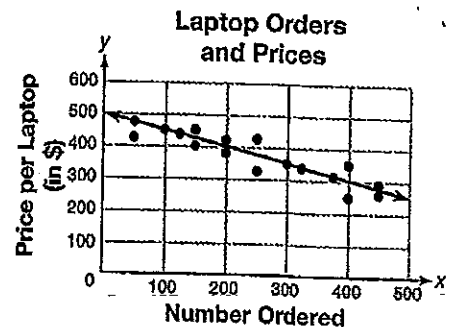
Solve.

6. **INTERPRET** The scatter plot shows the number of minutes that Jayson played during a basketball game and the number of points he scored. The data is modeled by the function $y = \frac{1}{3}x + 1$.



Interpret the slope and y-intercept of the model. Describe the limitations of this model in predicting how many points Jayson might score during an actual game.

7. **EXPLAIN** A company sells laptops to small businesses. The cost per laptop varies, depending on the model selected and the number ordered. The scatter plot shows a sample of laptop orders.



Write an equation for the linear model. Show or explain your work. Then interpret the slope of the model.

Lesson 38: Two-Way Tables

A **two-way table** is a table that shows the frequencies of two sets of categorical data. A two-way table can help identify whether there is an association between two variables.

▶ Example

One hundred 8th-grade students were asked which sport they prefer among baseball, basketball, and football. The following two-way table shows the results of the survey.

Sport	Boys	Girls	Total
Baseball	20	25	45
Basketball	10	15	25
Football	20	10	30
Total	50	50	100

The two-way table shows the preferred sport for 100 8th graders in total. You can look at the rows to see how the boys and girls voted for each sport. You can look at the columns to see how all the boys voted or all the girls voted—or how many voted for each sport in total.

You can analyze this type of table for specific trends. For example, more students prefer football than basketball in total; however, girls prefer basketball more than football. Similarly, baseball appears to be much more popular than football according to the total in the right-hand column. However, boys prefer baseball equally as much as they prefer football.

You can also create a relative-frequency two-way table based on two sets of categorical data. A relative-frequency two-way table shows the relative frequencies for the whole table, the rows of the table, or the columns of the table. The total relative frequencies are always out of 1, so the relative frequency counts will have values of 1 or less. In some cases they will be rounded to the nearest hundredth.

TIP: A two-way table often shows the frequency of an event happening. Therefore, two-way tables are also referred to as **frequency tables**. The entries in the table, therefore, may be called **frequency counts**.

Example 3

Ten students in a class were asked two questions. They were asked to tell if they do chores at home or not. They were then asked if they receive an allowance or not. The results are shown below.

Student Survey

Student	Abby	Bella	Chris	Deb	Erin	Frank	Gus	Hal	Isadore	John
Chores	Yes	Yes	No	No	No	Yes	Yes	Yes	No	Yes
Allowance	Yes	Yes	No	No	No	Yes	Yes	No	Yes	No

Create a two-way table to show the frequency counts for these data.

Strategy Determine how the table will look. Then fill in the frequencies.

Step 1 Determine how the table will look.

Include a column for "allowance" and a column for "no allowance" along the top.

Include a row for "chores" and a row for "no chores" along the left side.

Step 2 Decide how to fill in the first row of cells.

Four students (Abby, Bella, Frank, and Gus) do chores and get an allowance.

The first cell shows "chores" and "allowance." Record 4 in the first cell.

Two students (Hal and John) do chores and get no allowance. Record 2 in the second cell.

Find and record the total for that row: $4 + 2 = 6$.

	Allowance	No Allowance	Total
Chores	4	2	6
No Chores			
Total			

Step 3 Complete the second row in the table. Then add the columns and record those totals.

	Allowance	No Allowance	Total
Chores	4	2	6
No Chores	1	3	4
Total	5	5	10

Solution The two-way table in Step 3 organizes the data.

Practice

Directions: For questions 1 through 4, answer the question based on the given two-way table.

1. The following two-way table shows the number of students who voted for each of the two candidates for class president, by grade.

Candidate	Grade 7	Grade 8	Total
Zoe	45	20	65
Alessandro	30	60	90
Total	75	80	155

How many more 8th graders voted for Alessandro than voted for Zoe?

- A. 15
B. 20
C. 40
D. 80
2. The following two-way table shows the numbers of different colors of cars and SUVs at an auto dealership.

Color	Car	SUV	Total
Red	25	15	40
White	15	10	25
Blue	40	20	60
Green	20	5	25
Total	100	50	150

Which is the least popular color of car in the dealership?

- A. white
B. red
C. green
D. blue

CCSS: 8.SP.1

3. The following two-way table shows the number of students who scored an A, B, or C on the first two tests in a class.

Grade	Test 1	Test 2	Total
A	9	6	15
B	15	20	35
C	6	4	10
Total	30	30	60

How many more students got at least a B on Test 2 compared to Test 1?

4. The following two-way table shows the average number of different types of tickets sold in a movie theater for weekday and weekend screenings.

Tickets Sold	Weekday	Weekend	Total
Child	50	100	150
Adult	60	110	170
Senior	30	40	70
Total	140	250	390

How many more children saw a screening at this movie theater during the weekend than adults during the weekday?



Lesson Practice

Choose the correct answer.

- Eight students in a class were asked two questions. They were asked if they play on a sports team and if they are learning to play a musical instrument. Each row below represents a student's answer.

Team?	no	no	yes	yes	yes	no	no	yes
Instrument?	yes	no	no	no	yes	yes	yes	yes

Which two-way table best displays these data?

A.

	Instrument	No Instrument	Total
Team	4	0	4
No Team	4	0	4
Total	4	0	8

B.

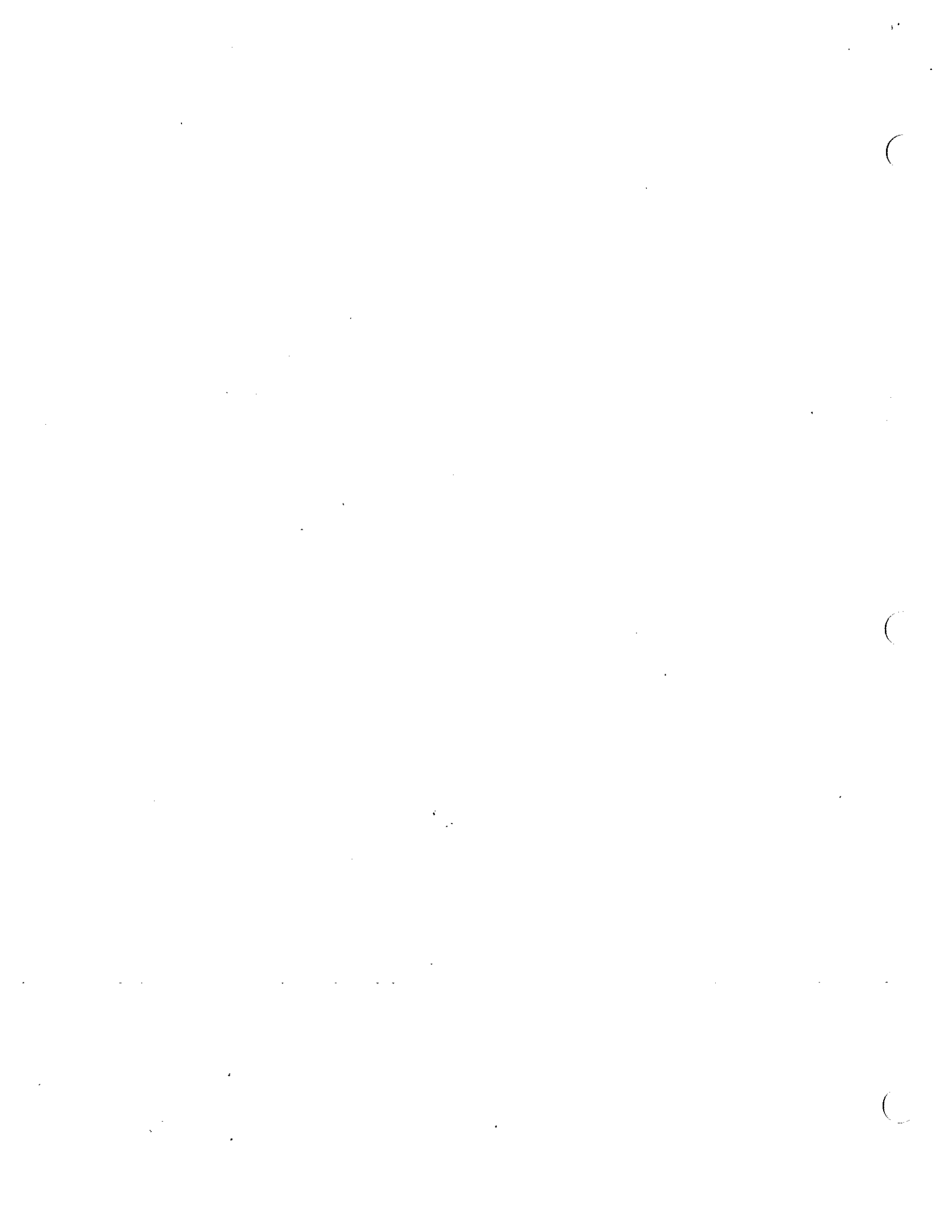
	Instrument	No Instrument	Total
Team	2	2	4
No Team	3	1	4
Total	5	3	8

C.

	Instrument	No Instrument	Total
Team	1	3	4
No Team	2	2	4
Total	3	5	8

D.

	Instrument	No Instrument	Total
Team	2	2	4
No Team	1	3	4
Total	3	5	8



MORE STATISTICS.....

Use the table below for questions 2–4.

A survey of students in a class explored the relationship between gender and vegetarianism.

	Vegetarian	Non-vegetarian	Total
Boys	3	12	15
Girls	6	9	15
Total	9	21	30

2. If a girl is chosen from the class at random, what is the probability that she is a vegetarian?
- A. 6%
B. 20%
C. 40%
D. 60%
3. If a boy is chosen from the class at random, what is the probability that he is **not** a vegetarian?
- A. 80%
B. 62%
C. 50%
D. 12%
4. Which is a reasonable conclusion to draw from these data?
- A. There are more vegetarians in the class than non-vegetarians.
B. Among the boys, there are more vegetarians than non-vegetarians.
C. Among the girls, there are more vegetarians than non-vegetarians.
D. The probability that a girl chosen from the class is a vegetarian is greater than the probability that a boy is a vegetarian.

Example

Fifty students in the 8th-grade class of a middle school were asked what kind of yogurt they like (vanilla or strawberry) and what kind of topping they like (nuts, chocolate chips, or nothing). Identify any trends in the data.

Topping	Nuts	Chocolate Chips	Nothing	Total
Vanilla	9	8	13	30
Strawberry	7	9	4	20
Total	16	17	17	50

To create a relative-frequency two-way table for all 50 students, divide each number in each cell by 50.

Topping	Nuts	Chocolate Chips	Nothing	Total
Vanilla	0.18	0.16	0.26	0.60
Strawberry	0.14	0.18	0.08	0.40
Total	0.32	0.34	0.34	1.00

To create a relative-frequency two-way table for the rows, divide each number in each row by the total of that row. For instance, for students who like vanilla, divide each number in that row by 30.

Topping	Nuts	Chocolate Chips	Nothing	Total
Vanilla	0.30	0.27	0.43	1.00
Strawberry	0.35	0.45	0.20	1.00
Total	0.32	0.34	0.34	1.00

To create a relative-frequency two-way table for the columns, divide each number in each column by the total of that column. For instance, for students who like nuts, divide each number in that column by 16.

Topping	Nuts	Chocolate Chips	Nothing	Total
Vanilla	0.56	0.47	0.76	0.60
Strawberry	0.44	0.53	0.24	0.40
Total	1.00	1.00	1.00	1.00

Unit 5 – Statistics and Probability

CCSS: 8.SP.4

Directions: Answer questions 5 through 8 based on the following scenario and two-way table. Round the relative frequency counts to the hundredths, if necessary.

Two hundred students in a summer camp voted for the location of a field trip.

Trip	Zoo	Park	Aquarium	Total
Boys	50	20	30	100
Girls	40	40	20	100
Total	90	60	50	200

5. Create a relative-frequency two-way table for the whole table.

Trip	Zoo	Park	Aquarium	Total
Boys				
Girls				
Total				

6. Create a relative-frequency two-way table for the rows.

Trip	Zoo	Park	Aquarium	Total
Boys				
Girls				
Total				

7. Create a relative-frequency two-way table for the columns.

Trip	Zoo	Park	Aquarium	Total
Boys				
Girls				
Total				

8. Which relative-frequency two-way table would you use to show the percentages of boys versus girls who voted to go to the zoo? Explain why.

5. Cathy wanted to see if there was a relationship between students' grade levels and school club participation. She made this two-way table to show her results.

	One or More Clubs	Not in Clubs	Total
Grade 6	6	44	50
Grade 7	23	27	50
Grade 8	40	10	50
Total	69	81	150

- A. Find the relative frequencies for the table above. Record those frequencies below.

	One or More Clubs	Not in Clubs	Total
Grade 6			
Grade 7			
Grade 8			
Total			

- B. Draw and state two conclusions about the relationship between a student's grade level and the likelihood that he or she will participate in school clubs.

Two-Way Frequency Tables Worksheet

Name: _____

1. Mr. Smith keeps track of his students' homework completion. He keeps track of how many boys and girls do not complete their homework. He puts students who don't complete their homework into two categories: first-time offenders and repeat offenders. He uses a table to keep track of the results.

	First-Time Offenders	Repeat Offenders	Total
Boys			
Girls			
Total			

- In one month 36 girls and 12 boys did not do their homework for the first time. 12 girls and 30 boys did not do their homework again. Put these figures in your table.
- How many students did not complete all of their homework assignments this month?
- What percentage of the students who did not complete their homework were boys who were First-Time Offenders?
- Are boys or girls more likely to not complete their homework? Explain your reasoning.

2. Complete the two-way table for 9th Grader's school transportation survey:

	Male	Female	Total
Walk		46	
Car	28		45
Bus		12	27
Bike		17	69
Total	129	92	

Construct a relative-frequency two-way table for the whole table.

	Male	Female	Total
Walk			
Car			
Bus			
Bike			
Total			

- What percentage of 9th grade girls walk to school?

3. Heather (a hairdresser) is making a record of all the customers she has had in the last month.

- a. Design and label a table that will show the number of male and female customers who are blond or brunette.

			Total
Total			

- b. In one month she has 40 blond females and only 5 blond males. Put these values in the table.
- c. How many blond customers does she have in total that month?
- d. She has 100 total customers and a total of 20 male customers during the same month. Use this information to finish filling in your table.

4. A large group of people was surveyed about their favorite movie genre. The participants had to give their age and choose their favorite genre from Action, Comedy, and Horror.

	Action	Comedy	Horror	Total
18-25 years old	238	450	312	1,000
25-49 years old	350	472	178	1,000
50+ years old	320	490	190	1,000
Total				

- a. A company that sells a product designed for young adults is looking to advertise before the movies of one of these genres. Which genre should they choose? Explain your reasoning.
- b. If you surveyed 12,000 people total, how many 18-25 year olds would you expect to choose Horror as their favorite genre?
- c. If you surveyed 24,000 people total, how many 25-49 year olds would you expect to choose Comedy as their favorite genre?

