

Name \_\_\_\_\_

Date \_\_\_\_\_

## 8.SP.1234

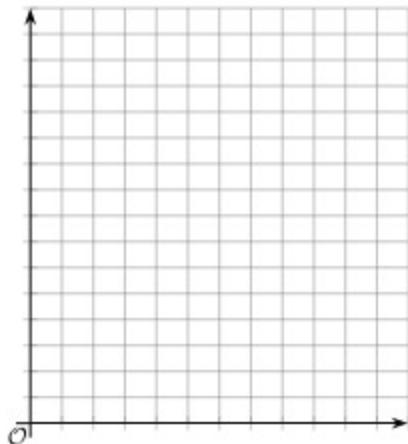
Foundations for Algebra-P03-308893-801-Salvo • Released Thursday, Apr 03, 2025 6:10 PM

### Problem 1

In hockey, a player gets credited with a “point” in their statistics when they get an assist or goal. The table shows the number of assists and number of points for 15 hockey players after a season.

Make a scatter plot of this data. Make sure to scale and label the axes.

assists	points
22	28
16	18
46	72
19	29
13	26
9	13
16	22
8	18
12	13
12	17
37	50
7	12
17	34
27	58
18	34



Submit your scatter plot using the tools below.

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### Problem 2

Select **all** the representations that are appropriate for comparing bite strength to weight for different carnivores.

A Histogram

B Scatter plot

C Dot plot

D Table

E Box plot

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### Problem 3

When is it better to use a table? When is it better to use a scatter plot?

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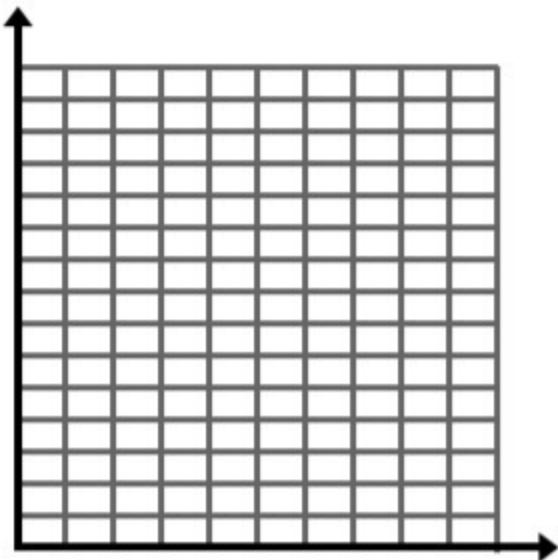
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### Problem 4

Create a scatter plots of the following set of data. Think about how to scale each axis based on the data set.

$x$	1	2	3	4	5
$y$	2	5	9	12	14



Draw your scatter plot on paper, take a picture, and upload it using the image upload icon  
If you do not have the ability to upload an image of your work type "Plot is on paper."



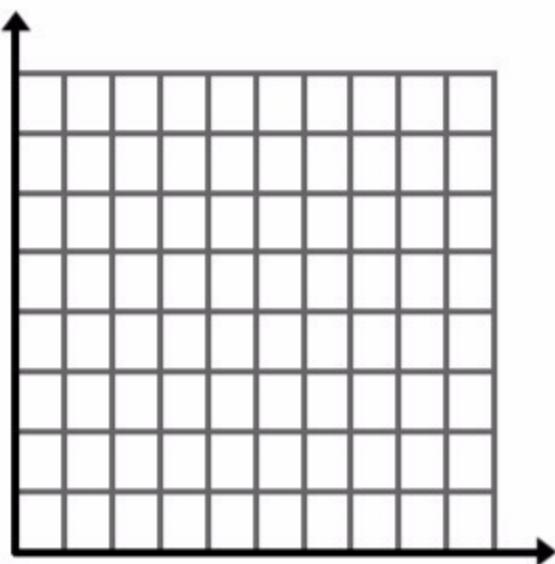
**The Utah Middle School Math Project**

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### Problem 5

Create a scatter plots of the following set of data. Think about how to scale each axis based on the data set.

$x$	0	2	2	4	4	5	6	6	7	8
$y$	5	6	5	5	7	6	4	6	5	6



Draw your scatter plot on paper, take a picture, and upload it using the image upload icon



If you do not have the ability to upload an image of your work type "Plot is on paper."

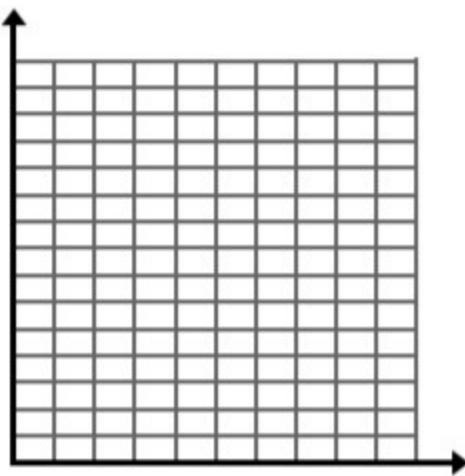
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### Problem 6

Create a scatter plots of the following set of data. Think about how to scale each axis based on the data set.

$x$	0	1	2	3	4	5
$y$	1.4	1.7	2	2.2	2.4	2.8



Draw your scatter plot on paper, take a picture, and upload it using the image upload icon



If you do not have the ability to upload an image of your work type "Plot is on paper."

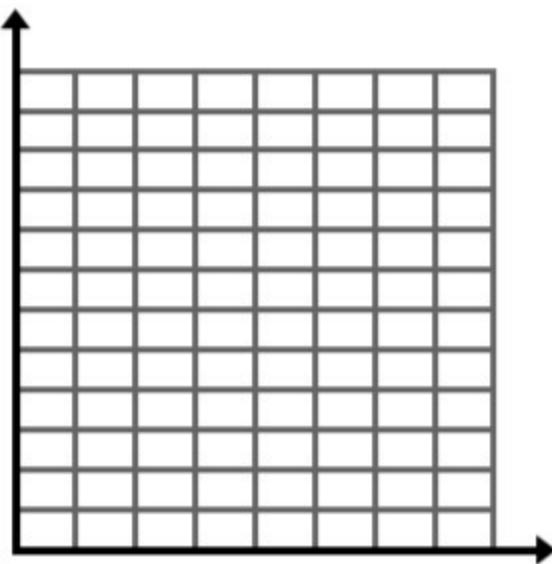
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### Problem 7

Create a scatter plots of the following set of data. Think about how to scale each axis based on the data set.

$x$	10	10	20	30	30	40	40	50	60	80
$y$	9	10	9	8	9	7.5	8	7	6	5



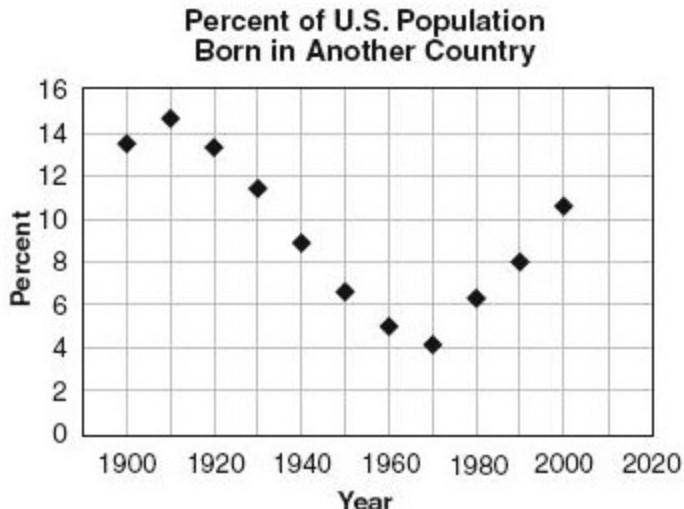
Draw your scatter plot on paper, take a picture, and upload it using the image upload icon  
If you do not have the ability to upload an image of your work type "Plot is on paper."

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### Problem 8

The graph below shows the percent of the U.S. population born in another country.



Which best describes the pattern of association between the year and the percent of the U.S. population born in another country?

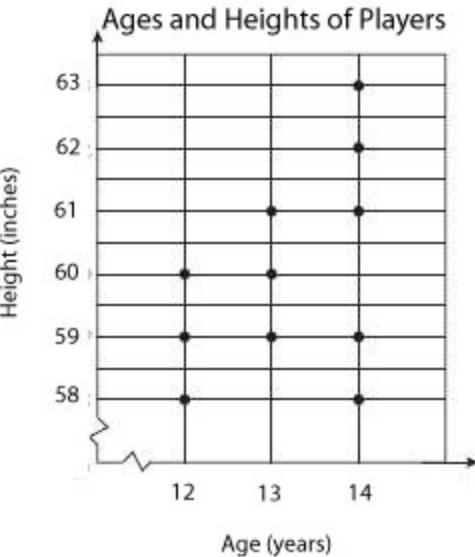
- linear and variable
- linear and negative
- nonlinear and negative
- nonlinear and variable

### Problem 9

The scatterplot below shows the ages and heights of 11 players on the school football team. Each dot represents one player.

What is the total number of 14-year-olds who are

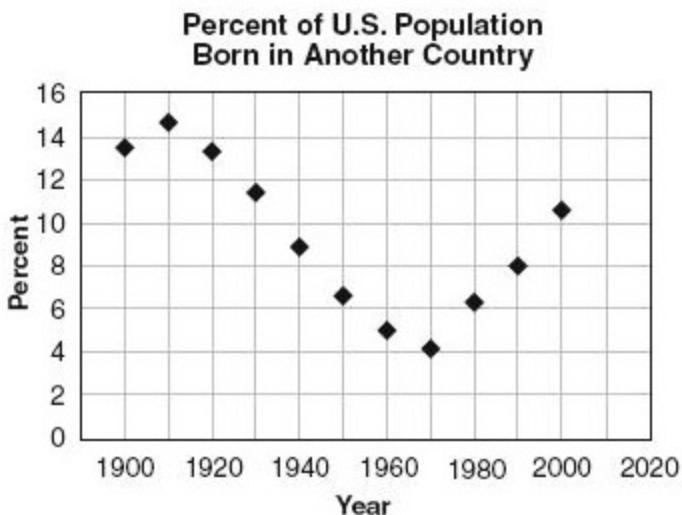
more than 60 inches tall?



---

### Problem 10

The graph below shows the percent of the U.S. population born in another country.



If the trend since 1970 continues, in 2010 approximately what percent of the U.S. population will have been born in another country? Evaluate to the nearest whole number.

%

---

## Problem 11

Are older students always taller? Do taller students tend to have bigger hands? To investigate these questions, the class will gather data.

A person's *arm span* is the distance between the tips of their index fingers, when their arms are fully spread out.

- A person's *hand span* is the distance from the tip of their thumb to the tip of their little finger, when their fingers are fully spread out.
- A person's *hand span* is the distance from the tip of their thumb to the tip of their little finger, when their fingers are fully spread out.

Each partner should:

- Measure the other partner's height, arm span, and hand span for their right hand to the nearest centimeter.
- Record the other partner's measurements and age (in months) in the table.

	height (cm)	arm span (cm)	hand span (cm)	age (months)
partner A				
partner B				

One partner records the data from your table in a table of data for the entire class



Create and fill in the table using the table button

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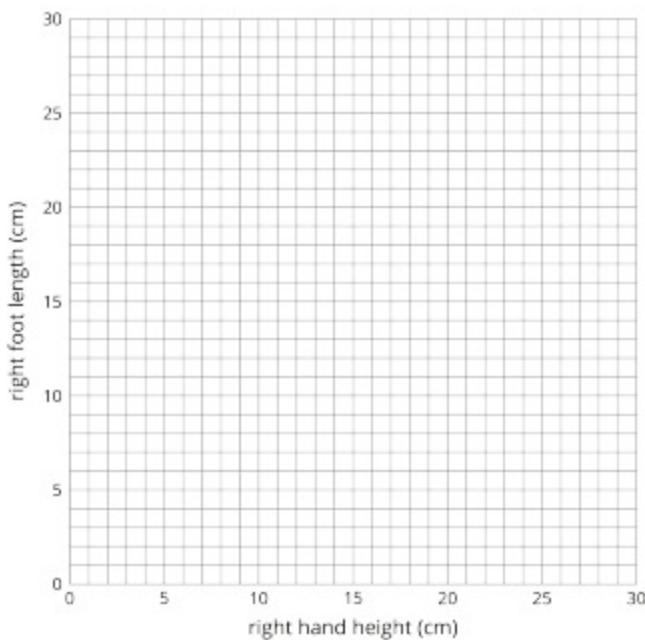
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### Problem 12

Here is a table that shows measurements of right hand length and right foot length for five people.

	right hand length (cm)	right foot length (cm)
Person A	19	27
Person B	21	30
Person C	17	23
Person D	18	24
Person E	19	26

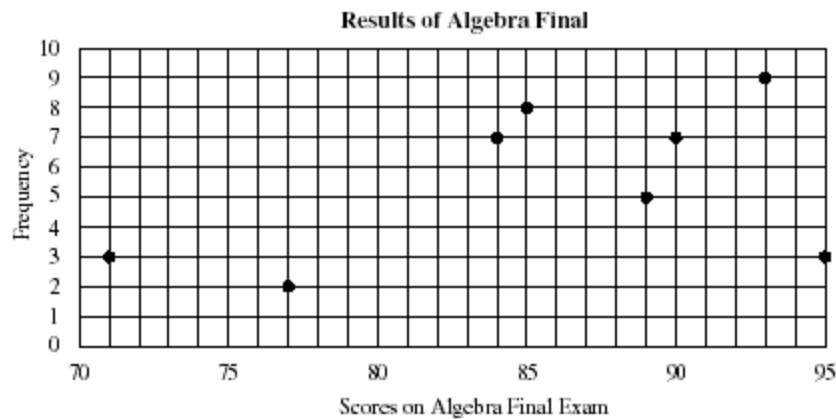


1. Draw a scatter plot for the data.
2. Circle the point in the scatter plot that represents Person D's measurements.

*Submit your scatter plot using the tools below.*

**Problem 13**

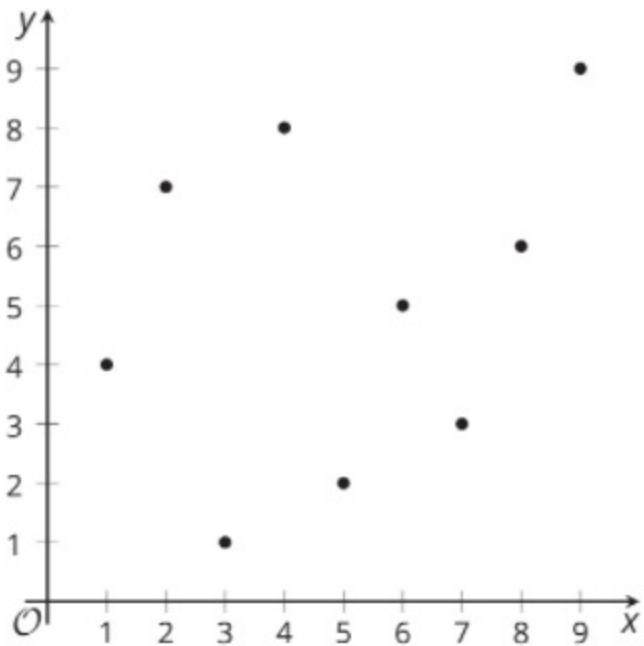
The graph below shows the frequency of test scores on the algebra final exam. **mode** of the algebra final exam scores?



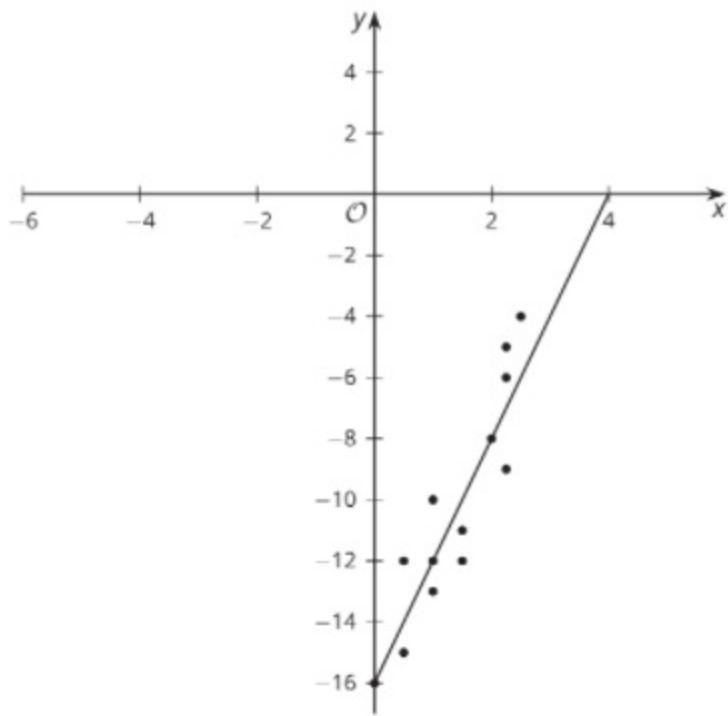
**Problem 14**

Which one doesn't belong?

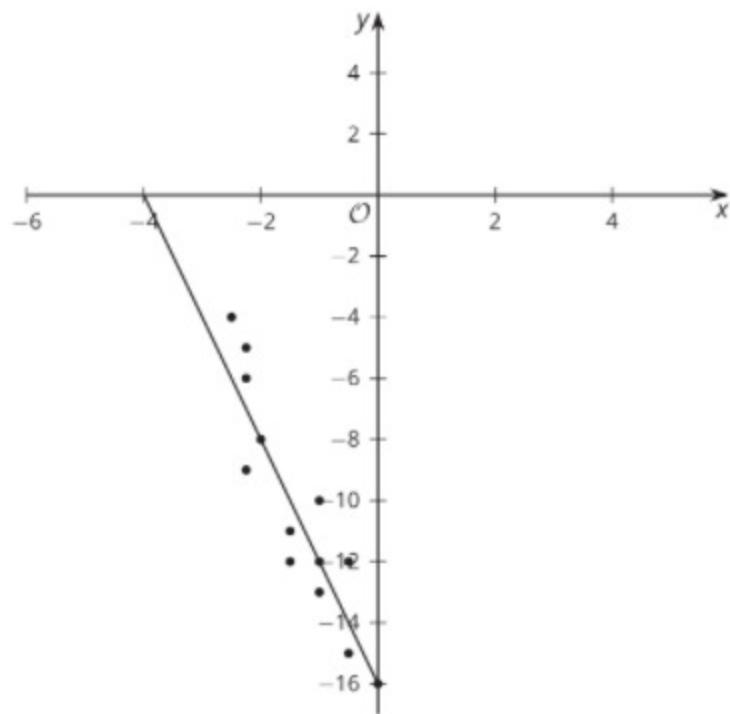
A.



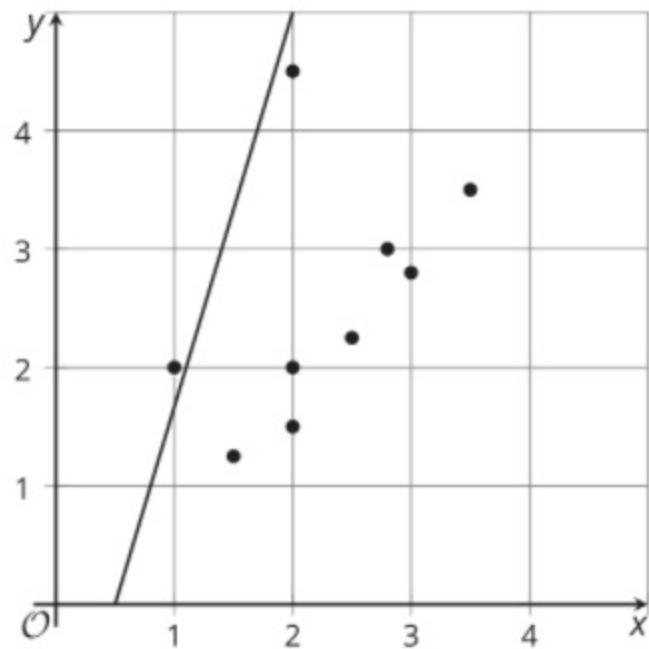
B.



C.



D.



A

B

C

O

D

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**Problem 15**

Draw a scatter plot that shows a positive linear association and clustering.

*Submit your scatter plot using the tools below.*

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**Problem 16**

Draw a scatter plot that shows a negative non-linear association and no clustering.

*Submit your scatter plot using the tools below.*

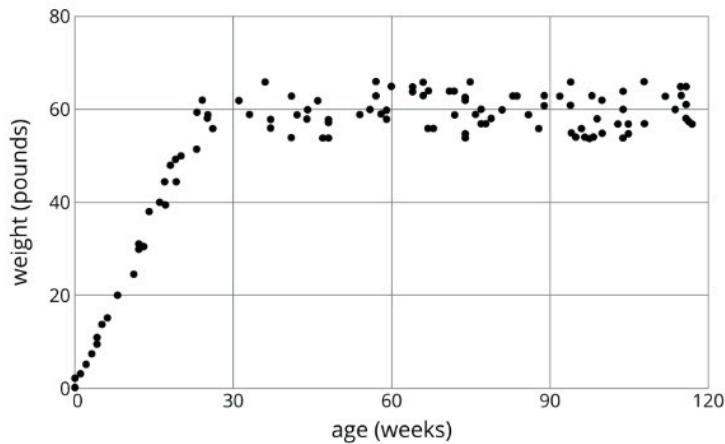
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### Problem 17

Here is a scatter plot:



Select **all** the following that describe the association in the scatter plot:

- A Linear association
- B Non-linear association
- C Positive association
- D Negative association
- E No association

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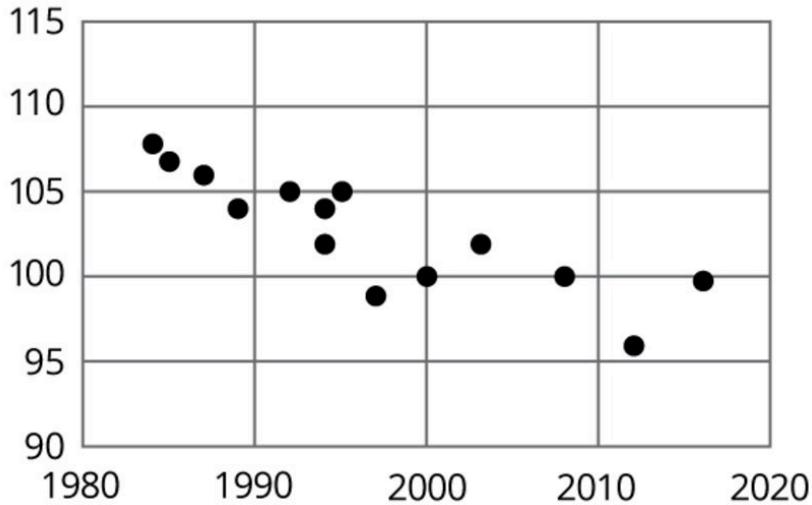
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### Problem 18

Using the data in the scatter plot, what can you tell about the slope of a good model?



- The slope is positive.
- The slope is zero.
- The slope is negative.
- There is no association.

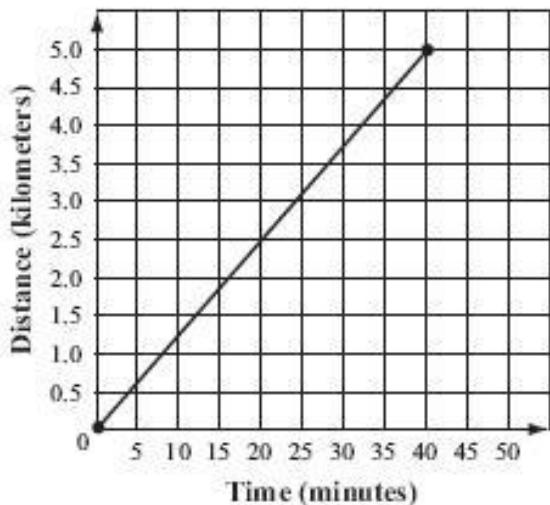
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### Problem 19

On an exercise bicycle, Robin pedaled a total distance of 5 kilometers at a constant speed. The graph below shows the distance Robin pedaled over time.



If she had pedaled at the same rate for 60 minutes, what distance would she have pedaled?

- A 0.125 km
- B 0.75 km
- C 7.5 km
- D 12.5 km

### Problem 20

Select **all** the relationships that demonstrate a negative association between variables.

- A Number of absences from school and final grades
- B Outside temperature and ice cream sales
- C Price of houses and house sales
- D Number of rainy days and car accidents
- E Number of hours playing video games and grades

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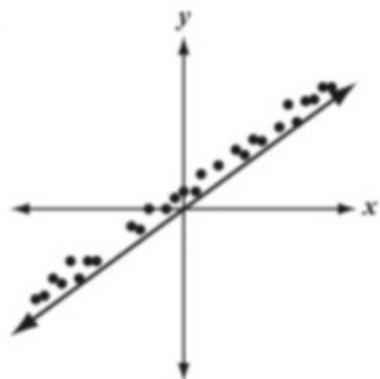
**Problem 21**

A scatterplot is shown below.



Which of the following **most** closely approximates the line of best fit for the data in the scatterplot?

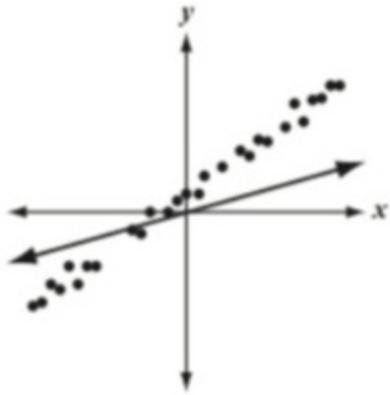
A



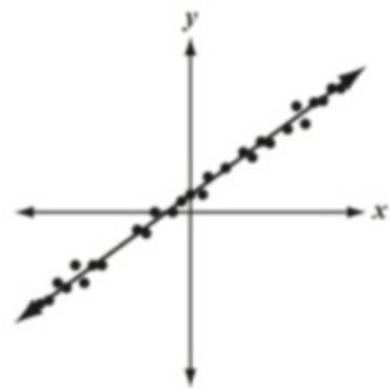
B



C



D

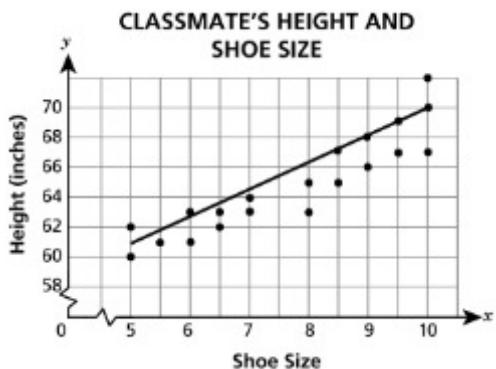


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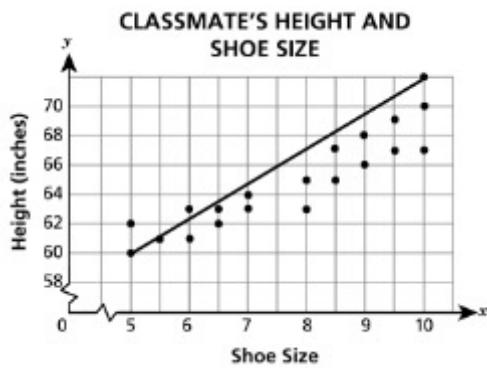
**Problem 22**

The shoe sizes and the heights for 20 classmates were plotted as ordered pairs on a scatter plot. A line of best fit was drawn to model the data. Which scatter plot shows the most accurate line of best fit?

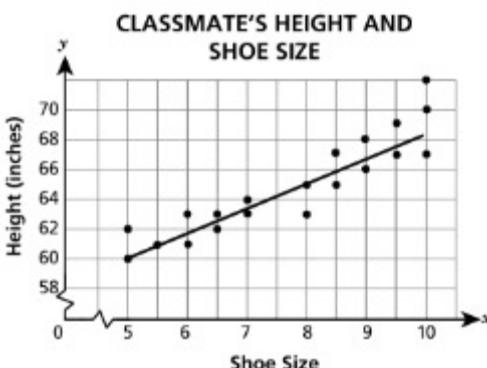
A



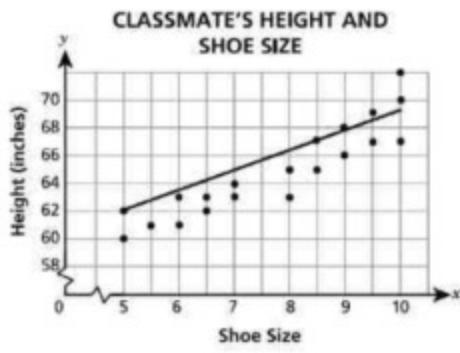
B



C



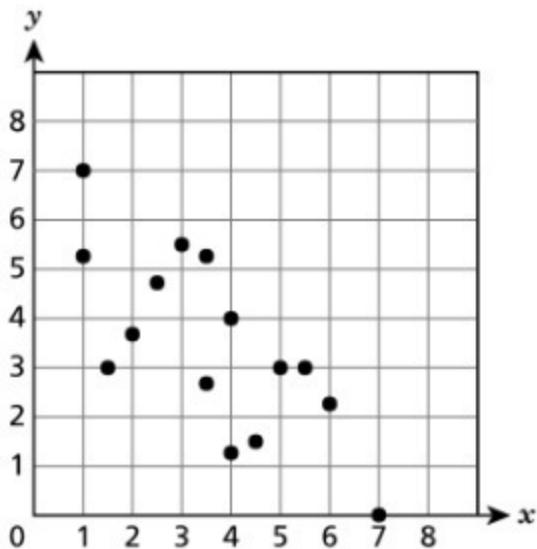
D



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**Problem 23**

A set of data is represented on the scatter plot below.



Which equation best models the set of data?

A  $y = -\frac{3}{4}x + 6$

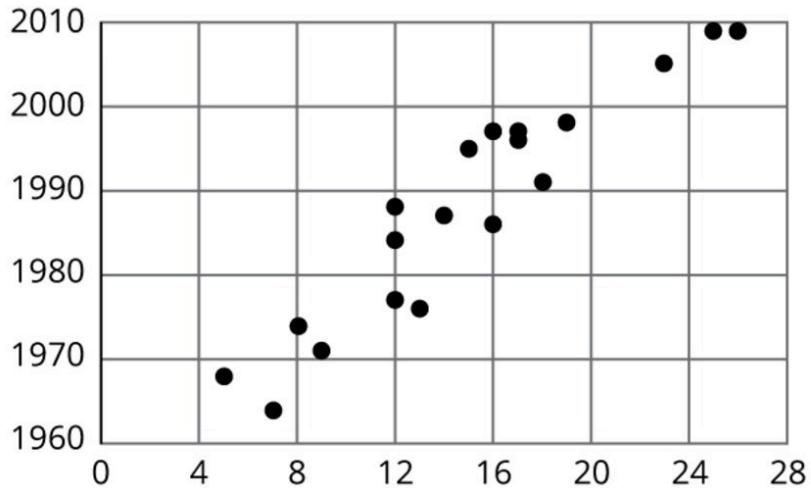
B  $y = \frac{3}{4}x - 6$

C  $y = -6x + \frac{3}{4}$

D  $y = 6x - \frac{3}{4}$

### Problem 24

Using the data in the scatter plot, what is a reasonable slope of a model that fits this data?



- A -2.5
- B -1
- C 1
- D 2.5

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### Problem 25

Which statement **best**describes the data in a scatter plot where the y-values are decreasing as the x-values are increasing?

- A The data can best be modeled by a vertical line.
- B The data can best be modeled by a horizontal line.
- C The data can best be modeled by a line with a positive slope.
- D The data can best be modeled by a line with a negative slope.

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### Problem 26

The students in Colin's school district are given a test every other year. In grade 3, the test has 10 questions. In grade 5, it has 17 questions, in grade 7, 32 questions, and in grade 9, 45 questions. Colin made a scatter plot of these data points, using grade as the

x-value and y-value. He found the number of questions as the equation for the line of best fit to be  $y=x-10$ . Which of the 6 data points is farthest from the line of best fit?

- (3, 10)
- (5, 17)
- (7, 32)
- (9, 45)

### Problem 27

Amir was taking practice exams for the big test that he had coming up. The first time he took a practice exam, he had not studied at all and got 10 questions wrong. After he had studied for an hour, he got 8 questions wrong. After 2 hours, he got 6 questions wrong. After 3 hours, 3 questions wrong, after 4 hours, 2 questions wrong, and after 5 hours he finally got no questions wrong. He plotted this data on a scatter plot using the elapsed time (in hours) as the

x-variable, y-variable. and the Which is number of most likely questions the he got wrong as the equation of best fit for his data?

- $y = -10x + 2$
- $y = -2x + 10$
- $y = 2x - 10$
- $y = 10x - 2$

### Problem 28

Amir was taking practice exams for the big test that he had coming up. The first time he took a practice exam, he had not studied at all and got 10 questions wrong. After he had studied for an hour, he got 8 questions wrong. After 2 hours, he got 6 questions wrong. After 3 hours, 3 questions wrong, after 4 hours, 2 questions wrong, and after 5 hours he finally got no questions wrong. He plotted this data on a scatter plot using the elapsed time (in hours) as the

x-variable, y-variable. and the Which is number of most likely questions the he got wrong as the equation of best fit for his data?

- $y = -10x + 2$
- $y = -2x + 10$
- $y = 2x - 10$
- $y = 10x - 2$

### Problem 29

Maria kept track of the amount of rain that fell each day during the first week of November. On November 1, 1.1 inches of rain fell, on November 2nd, 0.8 inches of rain fell, on the 3rd, 0 inches fell, on the 4th, 0 inches fell, on the 5th, 1.2 inches of rain fell, on the 6th, 0.4 inches of rain fell, and on the 7th, 0 inches of rain fell. Maria correctly determined the equation of the line of best fit as

$y = x + 0.9$ , where  $x$  represents the day and  $y$  represents the number of inches of rain that fell. Which statement best describes the line of best fit for this data?

- The data points are all on the line of best fit, so it is a perfect representation of the data.
- The data points are all close to the line of best fit, so it is a good representation of the data.
- Almost all of the data points are close to the line of best fit, so it is a good representation of the data.
- Most of the data points are quite far from the line of best fit, so it is not a good representation of the data.

### Problem 30

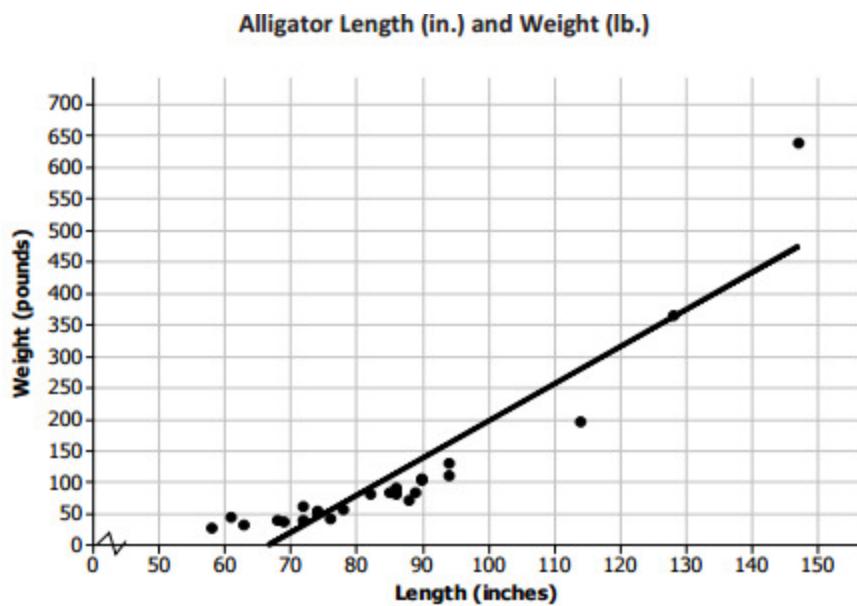
Maria kept track of the amount of rain that fell each day during the first week of November. On November 1, 1.1 inches of rain fell, on November 2nd, 0.8 inches of rain fell, on the 3rd, 0 inches fell, on the 4th, 0 inches fell, on the 5th, 1.2 inches of rain fell, on the 6th, 0.4 inches of rain fell, and on the 7th, 0 inches of rain fell. Maria correctly determined the equation of the line of best fit as

$y = x + 0.9$ , where  $x$  represents the day and  $y$  represents the number of inches of rain that fell. Which statement best describes the line of best fit for this data?

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- The data points are all close to the line of best fit, so it is a good representation of the data.
- Almost all of the data points are close to the line of best fit, so it is a good representation of the data.
- Most of the data points are quite far from the line of best fit, so it is not a good representation of the data.

### Problem 31

Scientists captured a small sample of alligators and measured both their length (in inches) and weight (in pounds). Torre used their data to create the following scatter plot and drew a line to capture the trend in the data. She and Steve then had a discussion about the way the line fit the data. What do you think they were discussing and why?

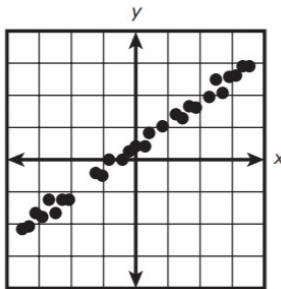


*Data Source: James Landwehr and Ann Watkins, Exploring Data, Quantitative Literacy Series (Dale Seymour, 1987).*

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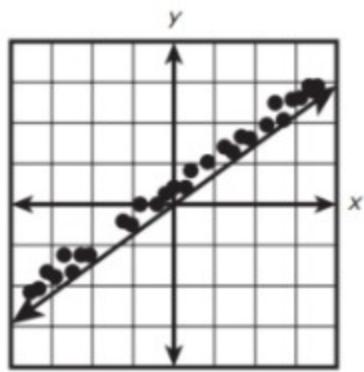
**Problem 32**

A scatterplot is shown.

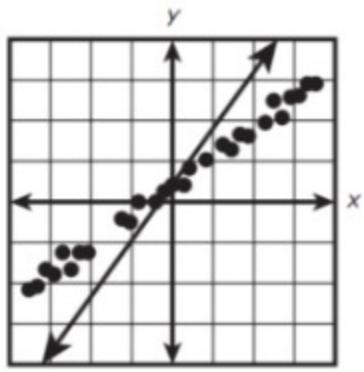


Which of the following **most** closely approximates the line of best fit for the data in the scatterplot?

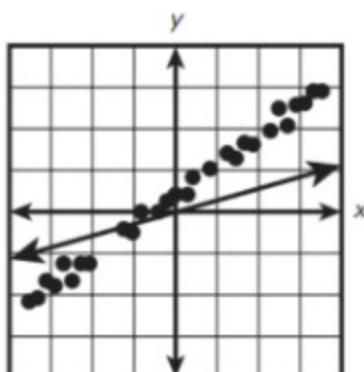
A



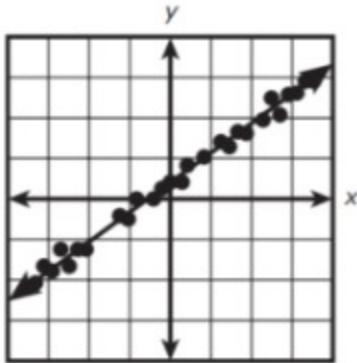
B



C



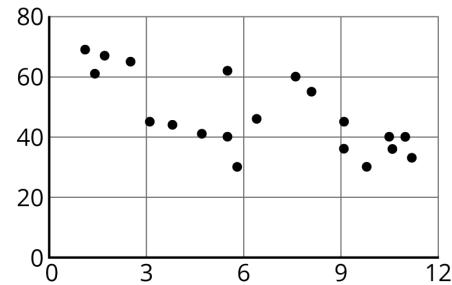
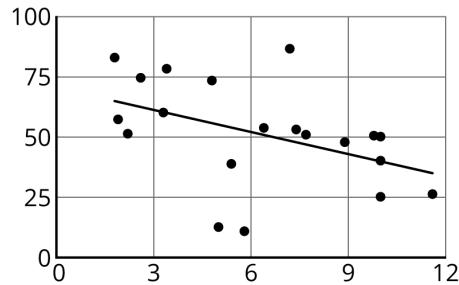
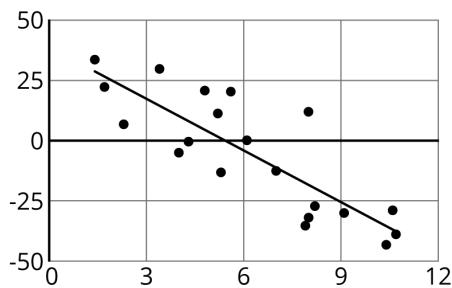
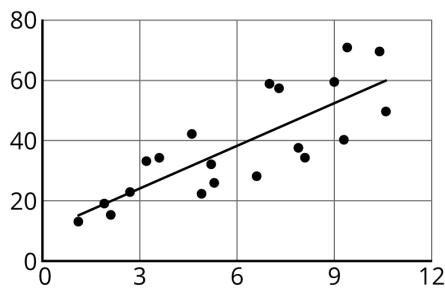
D



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**Problem 33**

Which one doesn't belong?



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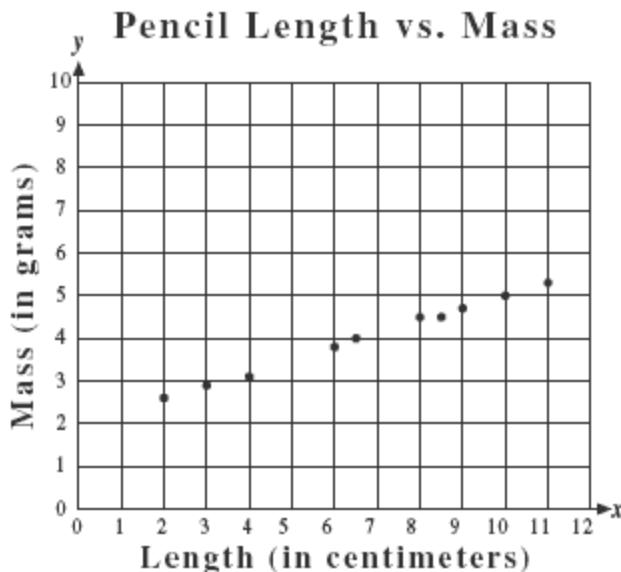
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### Problem 34

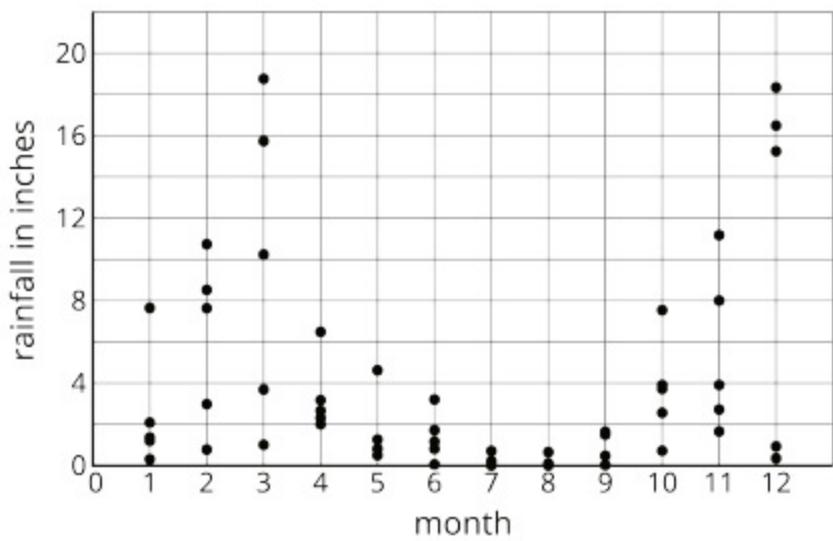
The scatterplot shows the length and mass of 10 pencils. If  $x = \text{length in centimeters}$  and  $y = \text{mass in grams}$ , which of the following equations most closely approximates the line of best fit?



- $y = 1/3x + 2$
- $y = 1/3x$
- $y = 1/2x + 2$
- $y = 1/3x + 5$

### Problem 35

What do you notice? What do you wonder?



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### Problem 36

Students in Mrs. Munson's mathematics class measured the outside temperature each day for 4 days. They recorded their measurements in tables. Which table shows data points that would not fall on a straight line, but could be approximated using a line of best fit?

**Monday**

Time	Temperature (°F)
9:00	45
9:15	47
9:30	49
9:45	51
10:00	53

**Tuesday**

Time	Temperature (°F)
9:00	50
9:15	52
9:30	53
9:45	55
10:00	56

**Wednesday**

Time	Temperature (°F)
9:00	60
9:15	60
9:30	60
9:45	60
10:00	60

**Thursday**

Time	Temperature (°F)
9:00	60
9:15	59
9:30	58
9:45	57
10:00	56

A

B

C

D

### Problem 37

Mrs. Miller's 8th grade class is collecting clothes for the Salvation Army.

Mrs. Miller wanted to predict the number of articles of clothing collected by the end of the clothes drive. To make this prediction, on the 8th day she decided to change the graph from a line graph to a scatter plot and then determine the equation for the line of best fit.



Which equation most likely represents the line of best fit for this data?

$y = -7x - 1$

$y = -x - 7$

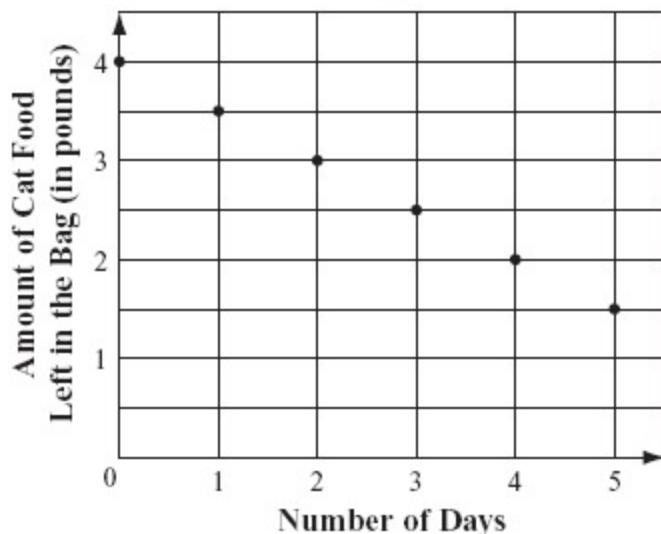
$y = x + 7$

$y = 7x + 1$

### Problem 38

Michael bought a 4-pound bag of cat food. He fed his cat the same amount of food from the bag each day, as shown in the graph below.

**Michael's Bag of Cat Food**

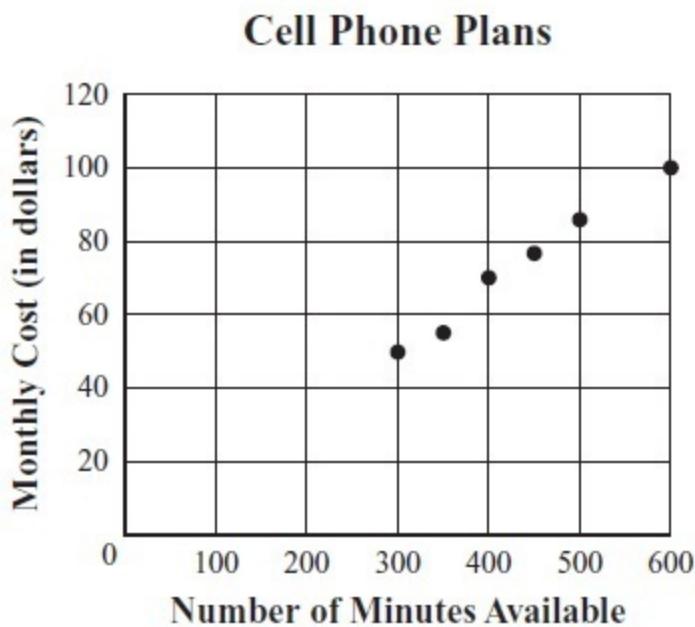


Michael determined the line of best fit for the data to be  $y = -0.5x + 4$ . Which statement best describes the relationship of the data points to the line of best fit that Michael determined?

- The data fits the line exactly.
- The data falls close to the line of best fit, but does not fit it exactly.
- The data falls far from the line of best fit, but it appears to be the correct equation.
- The data falls far from the line of best fit because it appears to be the wrong equation.

**Problem 39**

The scatterplot below shows the relationship between the number of minutes available for a cell phone plan and the monthly cost, in dollars, of different cell phone plans.

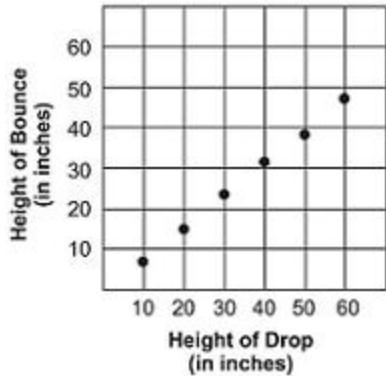


The company started offering a plan with only 100 minutes at a cost of \$40 per month. Which statement best describes how this new data point that represents the new plan compares to the predicted value at 100 minutes on the line of best fit on the scatterplot above?

- The new data point is close to the predicted value on the line of best fit.
- The new data point is much lower than the predicted value on the line of best fit.
- The new data point is much higher than the predicted value on the line of best fit.

### Problem 40

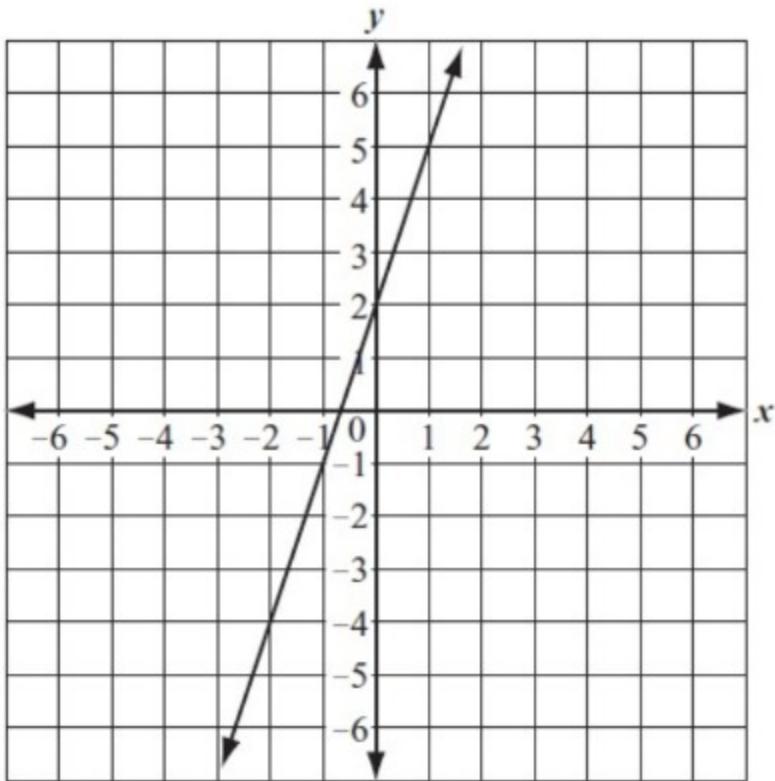
Linda and Kwame dropped a rubber ball from various heights and measured the height of the first bounce each time. They recorded their data in this graph. Which is most likely the equation for the line of best fit of their data?



- $y = -0.8x + 0.2$
- $y = -0.2x + 0.8$
- $y = 0.2x - 0.8$
- $y = 0.8x - 0.2$

### Problem 41

The graph below shows a relationship between values of  $x$  and  $y$ .



- A The value of  $y$  increases by  $\frac{1}{3}$ .
- B The value of  $y$  decreases by  $\frac{1}{3}$ .
- C The value of  $y$  decreases by 3.
- D The value of  $y$  increases by 3.

### Problem 42

A company performed power tests on a set of batteries of the same type. The company determined that the equation

where  $x$  is the number of hours of use and

$y$  is the percent of battery power remaining, models the battery life. Based on the equation, what is the

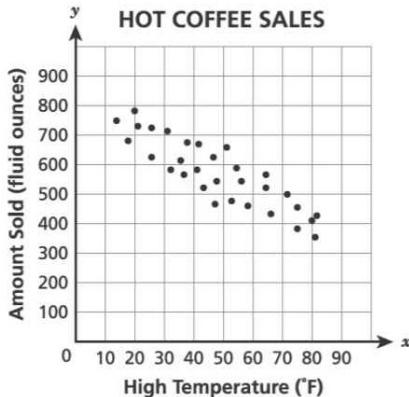
**best** prediction of the percent of remaining power for a battery after 11 hours of use?

- A 1.2%
- B 2.1%
- C 10%
- D 97.9%

Massachusetts Department of Elementary and Secondary Education

### Problem 43

The owner of a coffee shop compared the amount of hot coffee per day, in fluid ounces, sold and the daily high temperature, in degrees Fahrenheit, per day. Her data are shown in the scatter plot below.



If these data are modeled by the line

$$y = -5.9x + 850,$$

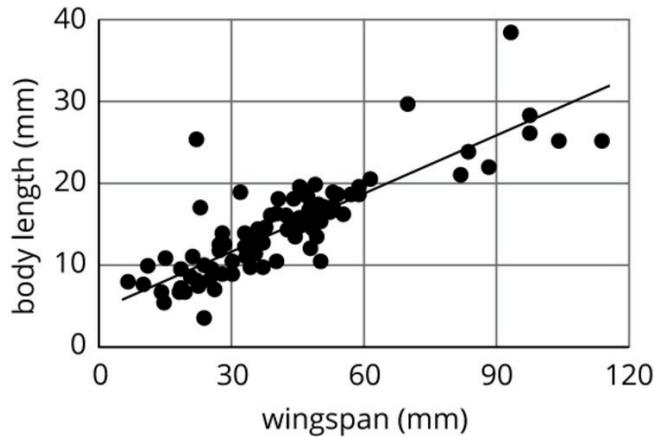
which statement

**best**describes a valid prediction the owner could make?

- A For each temperature increase of  $10^{\circ}\text{F}$ , the shop can expect to sell about 60 fluid ounces more hot coffee.
- B For each temperature decrease of  $10^{\circ}\text{F}$ , the shop can expect to sell about 6 fluid ounces more hot coffee.
- C On a day with a high temperature of  $0^{\circ}\text{F}$ , the shop can expect to sell about 145 fluid ounces of hot coffee.
- D On a day with a high temperature of  $0^{\circ}\text{F}$ , the shop can expect to sell about 850 fluid ounces of hot coffee.

### Problem 44

The linear model for some butterfly data is given by the equation  $y = 0.238x + 4.642$ . Which of the following best describes the slope of the model?



- A For every 1 mm the wingspan increases, the length of the butterfly increases 0.238 mm.
- B For every 1 mm the wingspan increases, the length of the butterfly increases 4.642 mm.
- C For every 1 mm the length of the butterfly increases, the wingspan increases 0.238 mm.
- D For every 1 mm the length of the butterfly increases, the wingspan increases 4.642 mm.

### Problem 45

Joe has been depositing the same amount of his earnings from his job each week into his savings account, as shown by his bank statement below. Which equation represents Joe's account balance (

y, in \$) x, in )  
over weeks since  
time ( week day  
0?

**Joe's Account**

Date	Balance (\$)
Day 7	3988.00
Day 14	4288.00
Day 21	4588.00
Day 28	4888.00

- $y = 300 + 3688x$
- $y = 300 + 3988x$
- $y = 300x + 3688$
- $y = 300x + 3988$

### Problem 46

Tessa is baking multiple trays of muffins for the bake sale.

- The oven takes 10 minutes to warm up before the first tray of muffins can be baked.
- Each tray of muffins takes 20 minutes to bake.

Which table shows the relationship between the number of trays of muffins Tessa bakes and the total oven time?

Number of Trays of Muffins	Total Oven Time (minutes)
1	30
2	40
3	50
4	60

Number of Trays of Muffins	Total Oven Time (minutes)
1	10
2	30
3	50
4	70

Number of Trays of Muffins	Total Oven Time (minutes)
1	30
2	50
3	70
4	90

Number of Trays of Muffins	Total Oven Time (minutes)
1	30
2	60
3	90
4	120

A

B

C

D

### Problem 47

A hotdog vendor is trying to calculate his profit, when he sells  $x$  hotdogs, using the equation  $y = 3x - 100$ . What does the slope of this equation represent?

- His costs are \$100.
- He sells each hot dog for \$3.
- Each hot dog costs him \$3 to produce.
- He needs to sell 100 hot dogs to make a profit.

### Problem 48

Bob is part of an environmental group that researches owls. Every 5 years, the group tags owls and estimates the number of owls in a particular area.

According to the data  $y = x + 2800$  can be used to determine the number of owls in the area where they have collected so far, 140 since 1970. What does the slope of the equation,  $y = x + 2800$ , represent?

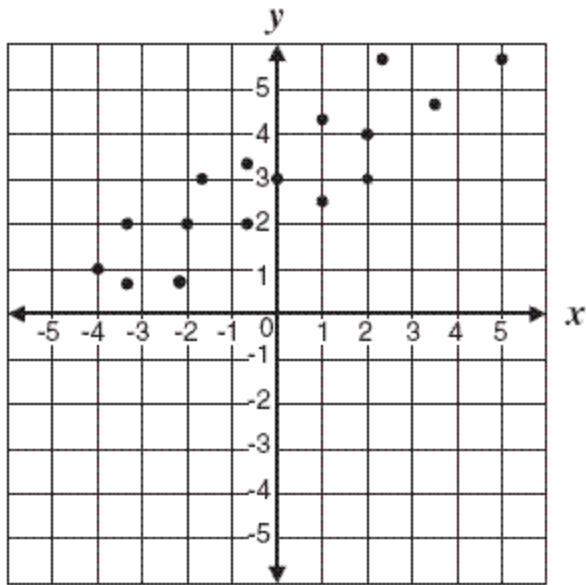
#### Owls in Area

<u>Year of Result</u>	<u>Population Size</u>
1970	2800
1975	3500
1980	4200
1985	4900

- There were 2800 owls in 1970.
- The population of owls grows by 140 each year.
- The population of owls grows by 140 every 5 years.
- There were 2100 owls when they started tracking the owls.

**Problem 49**

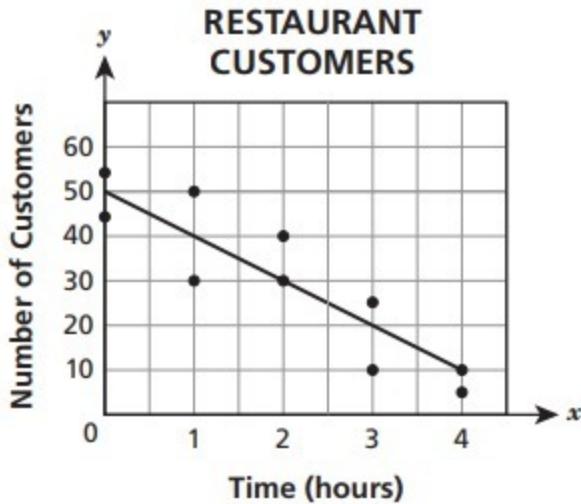
Which of the following equations best represents the data in the above graph?



- $y = 2x + 3$
- $y = (1/2)x + 3$
- $y = (1/2)x - 3$
- $y = 2x - 3$

### Problem 50

The scatter plot below shows the numbers of customers in a restaurant for four hours of the dinner service on two different Saturday nights. The line shown models this relationship, and represents 7 p.m.



What does the value of the  $y$ -intercept represent?

- A the average number of customers at 7 p.m.
- B the average number of customers at 11 p.m.
- C the average change in the number of customers each hour
- D the average change in the number of customers during four hours of the dinner service

### Problem 51

The winning time for the men's 400-meter race in each of the Olympic Games from 1976 to 1996 can be modeled by the equation  $y = -0.054x + 44.54$ , where  $x$  is the number of years after 1976 and  $y$  is the winning time in seconds. If the relationship continues, which equation could be used to predict the winning time in the year 2020?

A  $y = -0.054(1976) + 44.54$

B  $y = -0.054(2020) + 44.54$

C  $y = -0.054(24) + 44.54$

D  $y = -0.054(44) + 44.54$

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### Problem 52

A researcher found an association between a dog's stride length and its speed: the longer  $s$ , as a function of step  $l$ , a dog's steps, the faster it goes. The predicted speed in meters per second,  $s$ , is

$$s = 4l - 1.6$$

What does the rate of change of the function tell you about the association between stride length and speed?

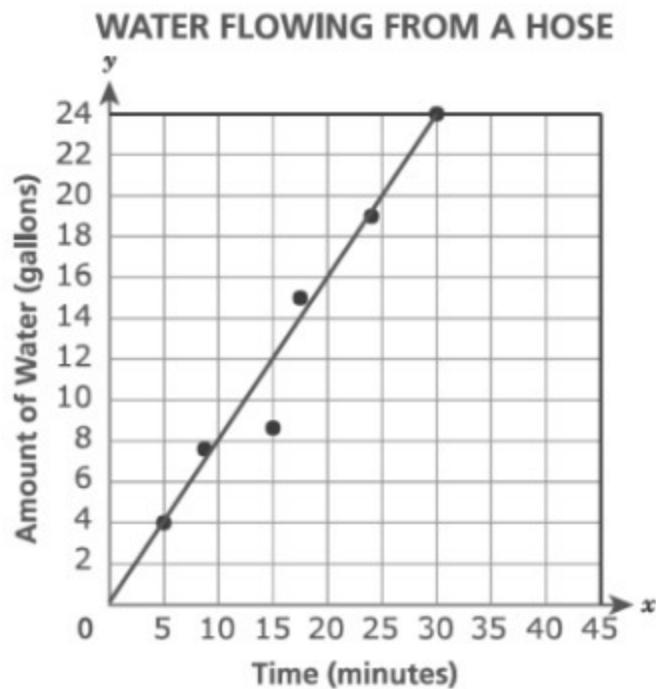
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**Problem 53**

The scatter plot below can be used to find the approximate rate at which water flows through a garden hose. The line of best fit for the scatter plot can be described by the equation  $y = \frac{4}{5}x$ .



If the rate, in gallons per minute, continues, approximately how many gallons of water will flow from the hose in 45 minutes?

- A 24
- B 36
- C 39
- D 56

### Problem 54

A newspaper conducted a survey to find out how many high school students play video games. The two-way table below displays the data from the survey.

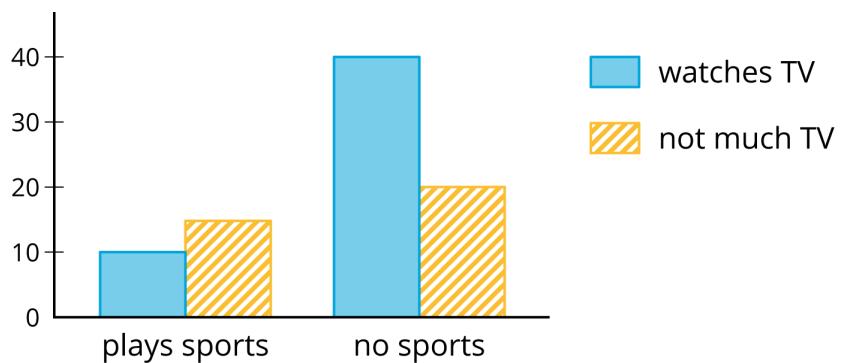
VIDEO GAME SURVEY			
	Boys	Girls	Total
<b>Do Play Video Games</b>	1,593	1,361	2,954
<b>Do Not Play Video Games</b>	858	1,635	2,493
<b>Total</b>	2,451	2,996	5,447

Based on these data in the table, which statement is true?

- A There were 2,451 boys surveyed, and about 29% of them play video games.
- B There were 2,996 girls surveyed, and about 45% of them play video games.
- C There were 5,447 students surveyed, and about 54% of them do not play video games.
- D There were 2,493 students surveyed, and about 34% of them are girls who do not play video games.

### Problem 55

What do you notice? What do you wonder?



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### Problem 56

A principal surveyed 75 seventh-grade and eighth-grade students. She asked them if they prefer to obtain news from the Internet or to obtain news from television. She created a table to display the data, as shown.

		News Preference	
		Internet	Television
Students	Seventh Grade	16	34
	Eighth Grade	10	15

Based on the table, select the **three** correct statements.

- A 49 eighth-grade students participated in the survey.
- B 50 seventh-grade students participated in the survey.
- C 26 out of 49 students prefer to obtain news from the Internet.
- D 3 out of 5 eighth-grade students prefer to obtain news from television.
- E 8 out of 25 seventh-grade students prefer to obtain news from the Internet.

**Problem 57**

A school club had a T-shirt sale to raise money. After the sale, an inventory showed that 108 blue T-shirts and 96 green T-shirts had been sold. The sizes of these T-shirts included 60 small, 86 medium, and 58 large. Which table correctly represents these data?

A

Number of T-shirts Sold			
Color	Small	Medium	Large
Blue	60	86	58
Green	60	86	58

B

Number of T-shirts Sold			
Color	Small	Medium	Large
Blue	34	46	28
Green	26	40	30

C

Number of T-shirts Sold			
Color	Small	Medium	Large
Blue	30	43	29
Green	30	43	29

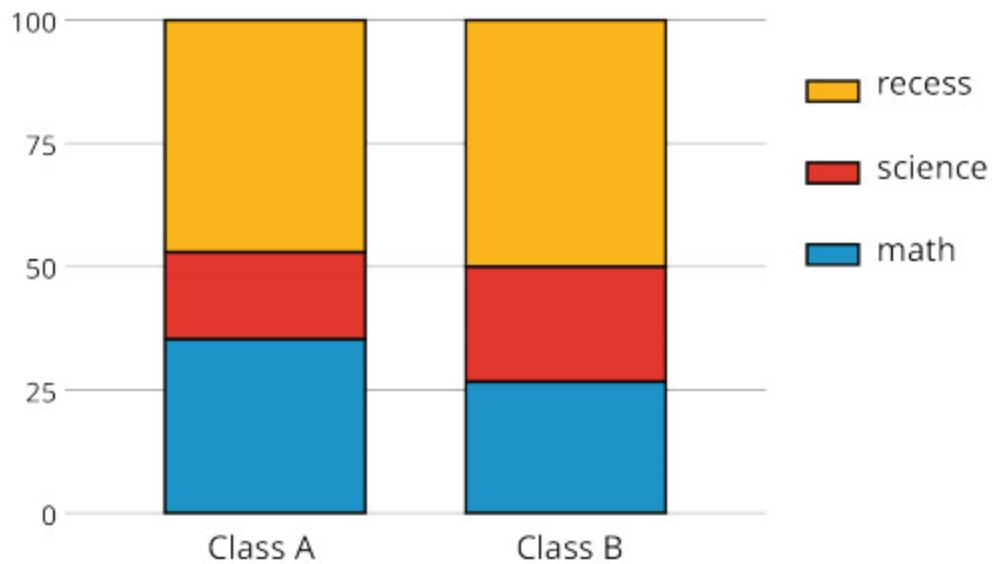
D

Number of T-shirts Sold			
Color	Small	Medium	Large
Blue	26	40	30
Green	34	46	28

**Problem 58**

Here are a two-way table and segmented bar graph for data from students in two classes. Do they show evidence of differences between the two classes?

	<b>prefers math</b>	<b>prefers science</b>	<b>prefers recess</b>
<b>Class A</b>	6	3	8
<b>Class B</b>	8	7	15



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### Problem 59

Julie wants to know if there is an association between gender and the type of movie a person prefers. She surveys 500 people and discovers the following.

- 35% of the people surveyed prefer comedy movies

$$\frac{3}{10}$$

- $\frac{2}{7}$  of the people surveyed prefer action movies

- 95 people surveyed prefer romance movies

$$\frac{2}{7}$$

- Of the females surveyed,  $\frac{2}{7}$  prefer romance movies

- 35% of the males surveyed prefer comedy movies

Complete the two-way frequency table to display the data.

	Romance	Comedy	Action	Drama	Totals
Male					
Female				52	280
Total					



Create and fill in the table using the table button

**The Utah Middle School Math Project**

[The Utah Middle School Math Project](https://utahmath.org) (CC by 4.0)

### Problem 60

Use the two-way frequency table given below to answer the questions that follow.

	<b>Facebook</b>	<b>Instagram</b>	<b>Twitter</b>	<b>Totals</b>
<b>Middle School</b>	16	5	3	24
<b>High School</b>	10	10	7	27
<b>College</b>	5	7	12	24
<b>Total</b>	31	22	22	75

Analyze the two-way table. What arguments can you make about the data? Use numerical evidence to support your answer.

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### Problem 61

Sameer was trying to convince his parents to start giving him an allowance. They told him that in order to get an allowance he would have to start mowing the lawn or doing the dishes every night. He surveyed his classmates to determine if this was fair or not.

	Does Neither Chore	Only Mows Lawn	Only Washes Dishes	Does Both Chores
Gets an Allowance	12	8	9	11
Does not Get an Allowance	16	2	3	6

Does this table support Sameer's argument that he should be able to get an allowance without doing any additional chores? Why or why not?

- No, because 28 out of 67 of his classmates do neither of the chores.
- No, because 28 out of 40 of his classmates who get an allowance have to do at least one of the chores.
- Yes, because 12 of his classmates get an allowance without doing either chore while only 11 of his classmates do both chores to get an allowance.
- Yes, because 12 of his classmates get an allowance without doing either chore while only 8 mow the lawn and only 9 do the dishes to get an allowance.

### Problem 62

A teacher posted the table below to show the number of students who finished all of their homework on time for the last unit and the number of students who got an A or a B on that unit's exam.

	Got an A or a B on exam	Did not get an A or a B on exam
Finished all homework on time	14	4
Did not finish all homework on time	3	9

To the nearest whole percent, what is the relative frequency of students in the entire class who did not finish all of the homework on time and did not get an A or B on the exam?

- 30%
- 33%
- 43%
- 47%

### Problem 63

Bernie randomly surveyed people walking by about whether they have a pet cat or dog, both, or neither. The results of his survey are shown below.

	Has a cat	Does not have a cat
Has a dog	12	21
Does not have a dog	18	29

According to the information from Bernie's survey, what percent of dog owners do NOT own a cat? (Estimate your answer.)

15%

21%

26%

64%

### Problem 64

A science class wants to estimate the number of frogs in a pond behind their school. Students start by tagging 40 frogs and letting them go. Then the class takes four samples and records the number of tagged frogs in each sample. In between samples, the frogs are let go, and the class waits until the following day for the next sample. The results are given in the following table:

	Number of Frogs Sampled	Number of Tagged Frogs in Sample
Day 1	15	3
Day 2	20	5
Day 3	16	4
Day 4	30	7

Which of the following is the best estimate of the total number of frogs in the pond?

9

10

170

250

### Problem 65

John wants to estimate the number of marbles in a box. He starts by taking 400 marbles out of the box and marking them. Then he puts the marbles back into the box and shakes it to mix the marbles. Next, he takes four samples and documents the number of marked marbles in each sample. In between samples, John returns the marbles to the box and shakes it. The results are given in the following table.

Number of Marbles Sampled	Number of Marbles Marked
100	32
90	35
82	25
102	36

Which is the best estimate of the total number of marbles in the box?

130

140

1170

1340

### Problem 66

A random sample of 100 eighth-grade students are asked to record two variables: whether they have a television in their bedrooms and if they passed or failed their last math test. The results of the survey are summarized below.

- 55 students have a television in their bedrooms.
- 35 students do not have a television in their bedrooms and passed their last math test.
- 25 students have a television and failed their last math test.
- 35 students failed their last math test.

Complete the two-way table.

	<b>Pass</b>	<b>Fail</b>	<b>Total</b>
<b>Television in the Bedroom</b>			
<b>No Television in the Bedroom</b>			
<b>Total</b>			

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### Problem 67

A random sample of 100 eighth-grade students are asked to record two variables: whether they have a television in their bedrooms and if they passed or failed their last math test. The results of the survey are summarized below.

- 55 students have a television in their bedrooms.
- 35 students do not have a television in their bedrooms and passed their last math test.
- 25 students have a television and failed their last math test.
- 35 students failed their last math test.

Calculate the row relative frequencies and enter the values in the table above. Round to the nearest thousandth.

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### Problem 68

Mr. Jensen is determining the types of breakfast foods the school will offer for next year. He surveys the students who eat breakfast at school. He asks them to choose the food they prefer, eggs or cereal, and the drink they prefer, milk, juice, or water. The results of the survey are shown below.

	Milk	Juice	Water
Eggs	6	8	3
Cereal	8	10	5

Out of all of the students who said they preferred juice to drink, what is the relative frequency who said they preferred eggs rather than cereal, to the nearest percent?

- A 44%
- B 47%
- C 56%
- D 80%

### Problem 69

Ian took a survey of randomly selected students to determine the number of students in his school who are colorblind. The results of his survey are shown below.

	Colorblind	Not Colorblind
Male	16	84
Female	1	99

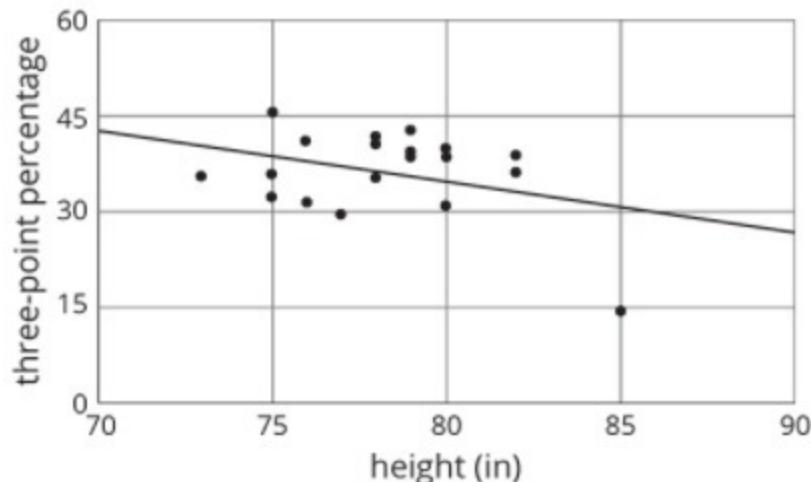
According to the results of the survey, how many colorblind males are there in the entire school of 1,000 students?

- A 80
- B 85
- C 160
- D 170

### Problem 70

The scatter plot shows the heights (in inches) and three-point percentages for different basketball players last season.

Circle any data points that appear to be outliers.



Submit your work using the tools below.

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### Problem 71

Compare any outliers to the values predicted by the model.

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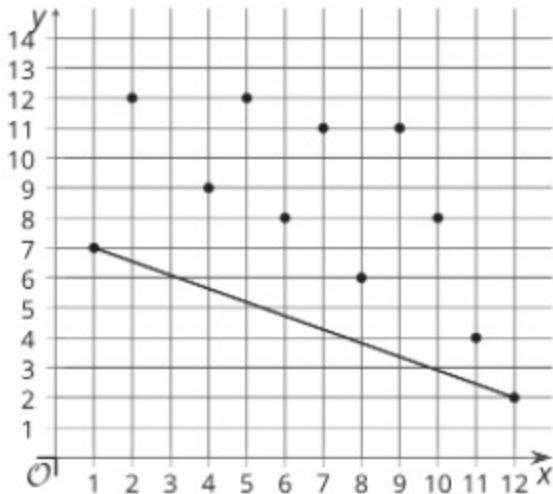
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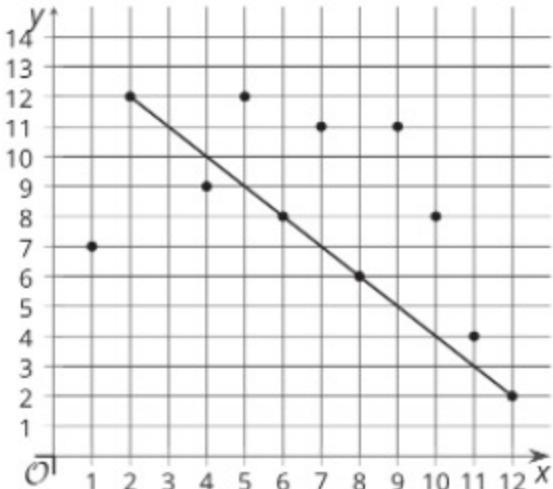
### Problem 72

Here are 3 copies of the same scatter plot. Each student tries to draw a line that models the data well.

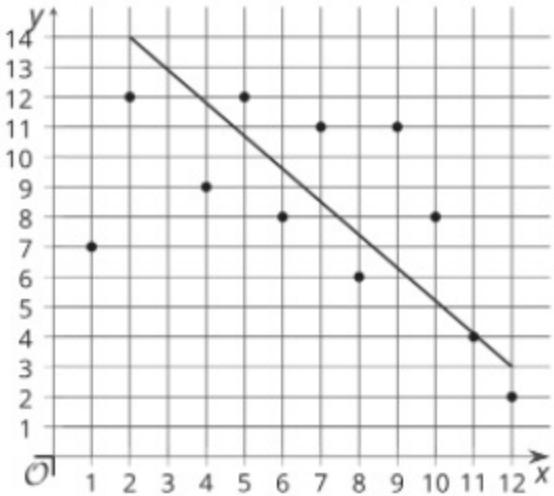
Noah says his line fits the data well because the line connects the leftmost point to the rightmost point.



Andre says his line fits the data well because it passes directly through as many points as possible.



Lin says her line fits the data well because the points are somewhat evenly arranged around the line with about half the points above the line and half the points below the line.



Do you agree with any of these students? Which one?

Noah

Lin

Andre

None of the Above

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### Problem 73

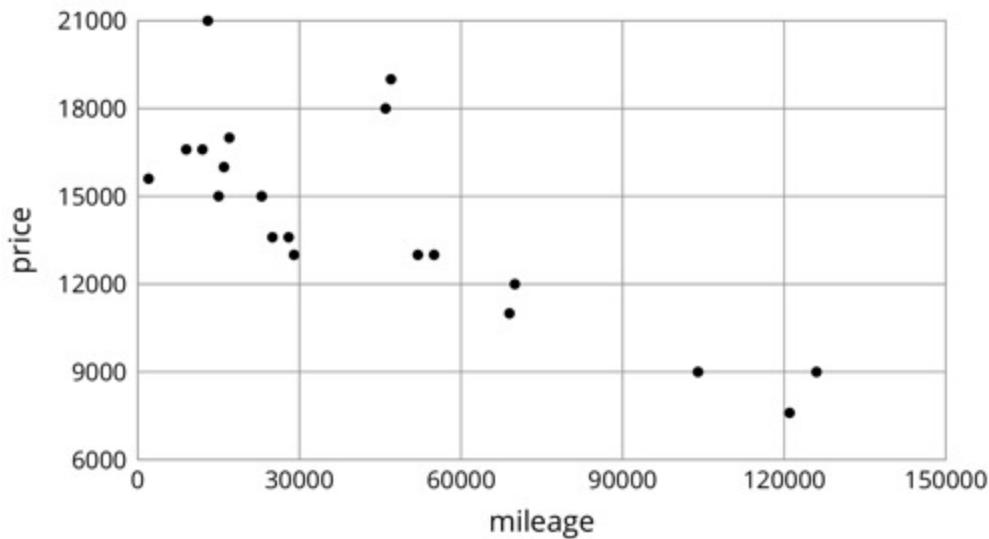
Explain your reasoning.

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### Problem 74

For the scatter plot, decide if there is an association between the two variables, and describe the situation using one of these sentences:

- For these data, as \_\_\_\_\_ increases, \_\_\_\_\_ tends to increase.
- For these data, as \_\_\_\_\_ increases, \_\_\_\_\_ tends to decrease.
- For these data, \_\_\_\_\_ and \_\_\_\_\_ do not appear to be related.



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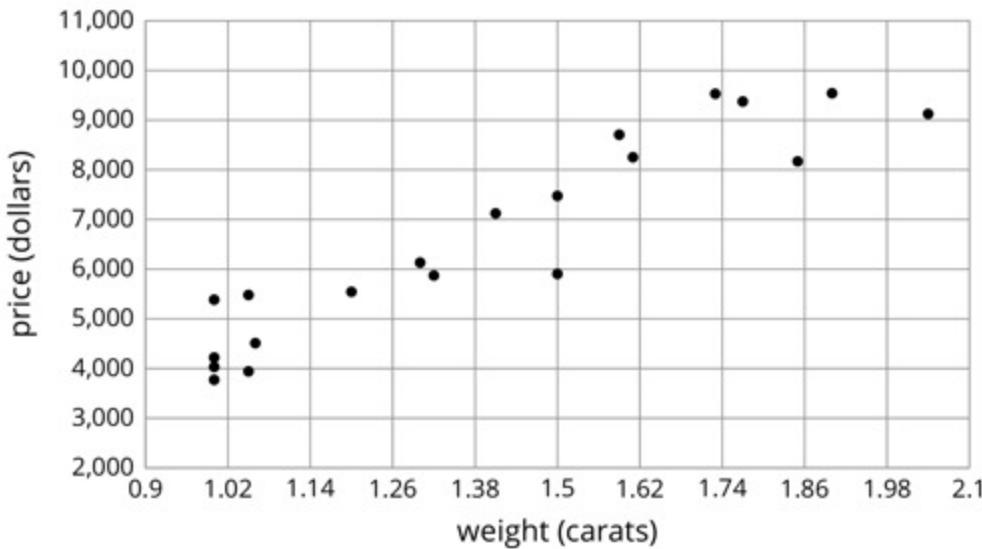
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### Problem 75

For the scatter plot, decide if there is an association between the two variables, and describe the situation using one of these sentences:

- For these data, as \_\_\_\_\_ increases, \_\_\_\_\_ tends to increase
- For these data, as \_\_\_\_\_ increases, \_\_\_\_\_ tends to decrease.
- For these data, \_\_\_\_\_ and \_\_\_\_\_ do not appear to be related.



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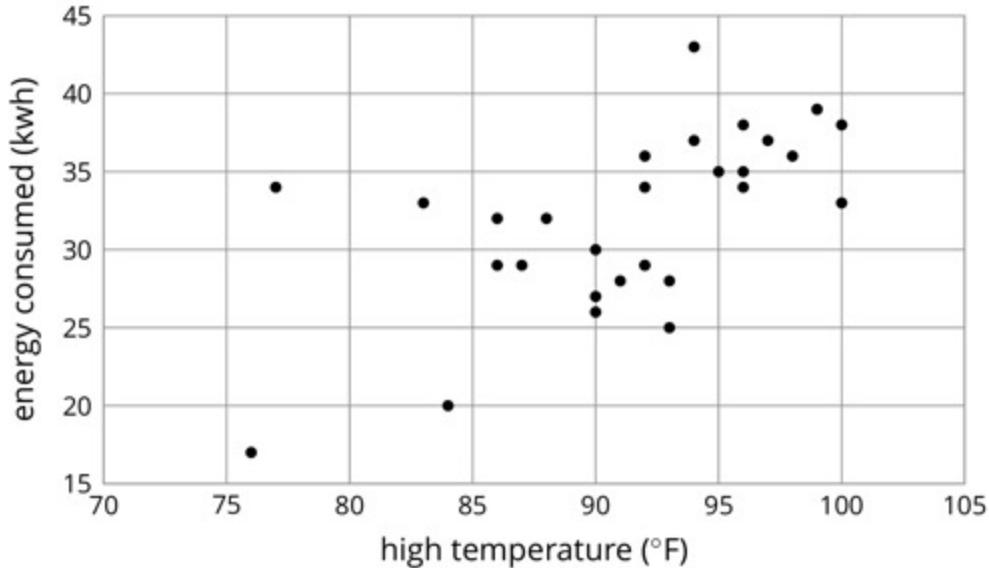
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### Problem 76

For the scatter plot, decide if there is an association between the two variables, and describe the situation using one of these sentences:

- For these data, as \_\_\_\_\_ increases, \_\_\_\_\_ tends to increase.
- For these data, as \_\_\_\_\_ increases, \_\_\_\_\_ tends to decrease.
- For these data, \_\_\_\_\_ and \_\_\_\_\_ do not appear to be related.



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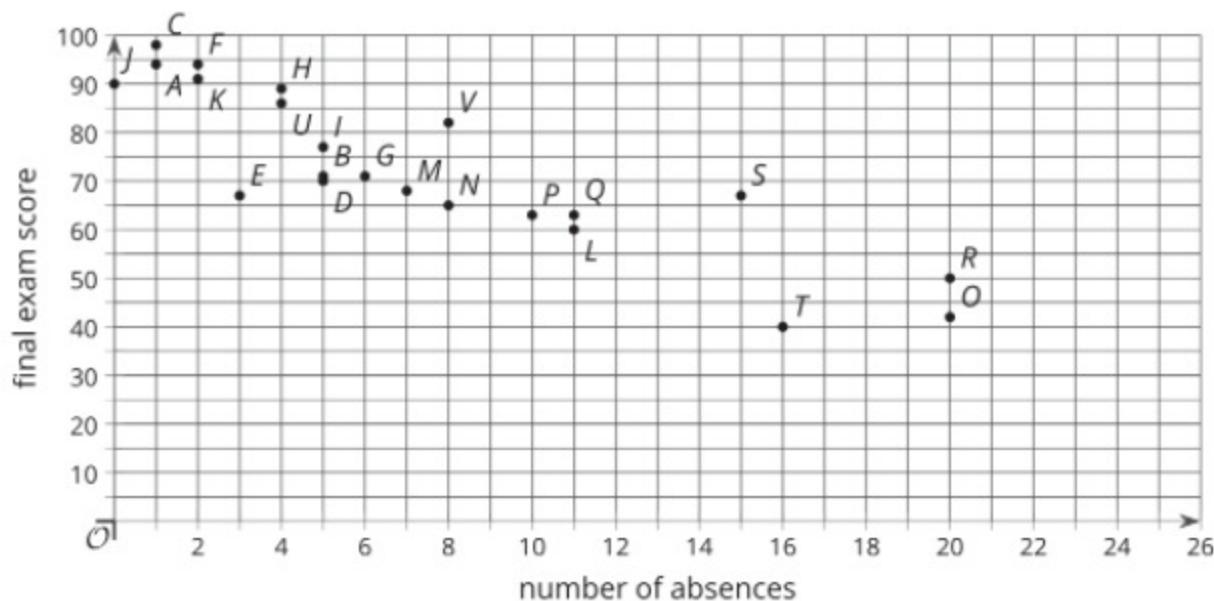
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### Problem 77

Here are a table and scatter plot representing the number of students' absences and their final exam scores.

student	number of absences	final exam score	student	number of absences	final exam score
A	1	94	M	7	68
B	5	71	N	8	65
C	1	98	O	20	42
D	5	70	P	10	63
E	3	67	Q	11	63
F	2	94	R	20	50
G	6	71	S	15	67
H	4	89	T	16	40
I	5	77	U	4	86
J	0	90	V	8	82
K	2	91	W		
L	11	60			



What are the coordinates of the point in the scatter plot that represents student G?

Write your answer in the following format:

(x,y)

with no spaces.

---

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**Problem 78**

What are the coordinates of the point in the scatter plot that represents student R?

Write your answer in the following format:

(x,y)

with no spaces.

---

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**Problem 79**

What is the final exam score of the student who has perfect attendance?

---

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**Problem 80**

What are the final exam scores of the students with the most absences?

What is the lower score?

---

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**Problem 81**

What is the higher score?

---

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**Problem 82**

How many absences does the student with the highest score have?

Do not include units (absence) in your answer.

---

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**Problem 83**

How many absences does the student with the lowest score have?

---

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**Problem 84**

If student W has 12 absences, what final exam score do you estimate the student will have?

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### Problem 85

Plot this point on the scatter plot.

Draw your scatter plot on paper, take a picture, and upload it using the image upload icon



If you do not have the ability to upload an image of your work, type "Scatter plot is on paper."

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### Problem 86

Is there an association between the weight of a candle and the amount of time it burns?

Make a prediction.

**The Utah Middle School Math Project**

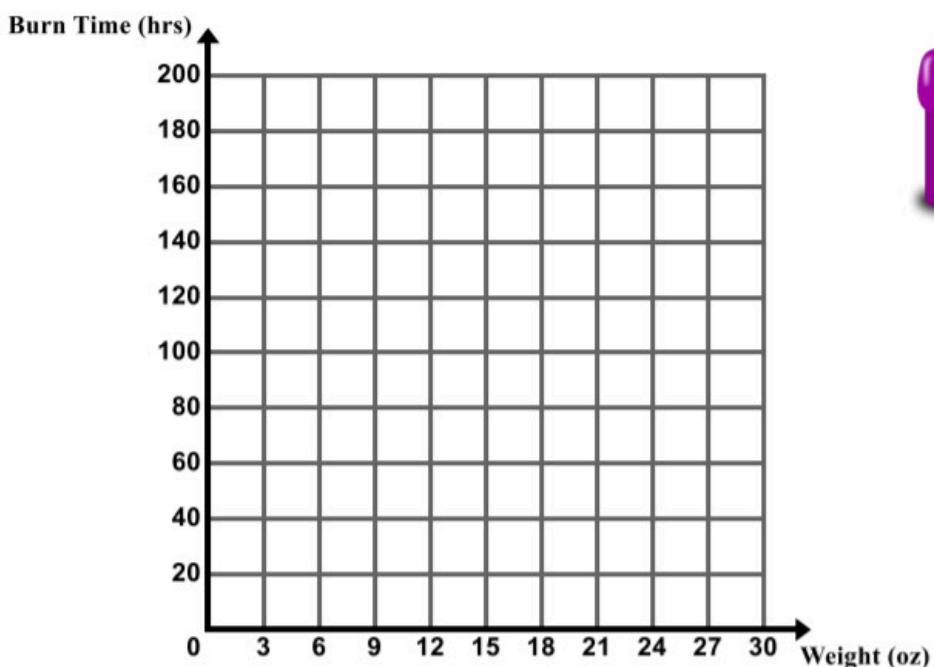
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### Problem 87

A company that manufactures candles tests the amount of time it takes for several candles of several different weights to burn. The results are shown in the table below.

Candle Weight (ounces)	2	2	2	3	3	4	4	5	5	5	10	10	10	16	16	16	22	22	26	26	
Burn Time (hours)	15	16	18	20	33	34	35	38	40	36	40	80	80	95	100	98	120	125	175	174	180

Make a scatter plot of the data on the graph provided.



Draw your scatter plot on paper, take a picture, and upload it using the image upload icon  
If you do not have the ability to upload an image of your work type "Plot is on paper."



### Problem 88

Using the scatter plot, is there an association between the weight of a candle and how long it burns?

Yes

No

Not enough information

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### Problem 89

Describe the association between the weight of a candle and how long it burns. Describe any trends or patterns you observe in the data including clusters and outliers.

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### Problem 90

How much would a candle have to weigh to burn for one year?

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### Problem 91

Here is data on the number of cases of whooping cough from 1939 to 1955.

year	number of cases
1941	222,202
1950	120,718
1945	133,792
1942	191,383
1953	37,129
1939	130,188
1951	68,687
1948	74,715
1955	62,786
1952	45,030
1940	183,866
1954	60,866
1944	109,873
1946	109,860
1943	191,890
1949	69,479
1947	156,517

Make a new table that orders the data by year.

Create and fill in the table using the table button



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### Problem 92

Which years in this period of time had fewer than 100,000 cases of whooping cough?

1939

1940

1941

1942

1943

1944

1945

1946

1947

1948

1949

1950

1951

1952

1953

1954

1955

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### Problem 93

Based on this data, would you expect 1956 to have closer to 50,000 cases or closer to 100,000 cases?

Closer to 50,000 cases

Closer to 100,000 cases

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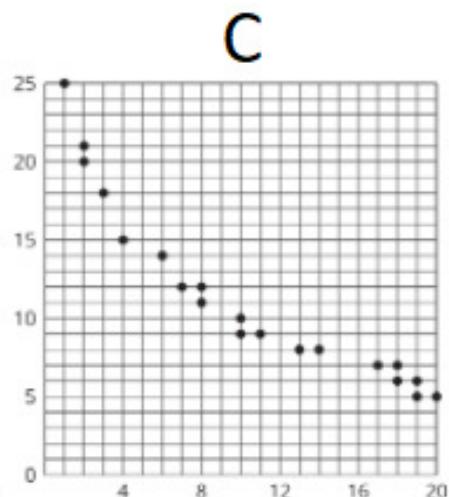
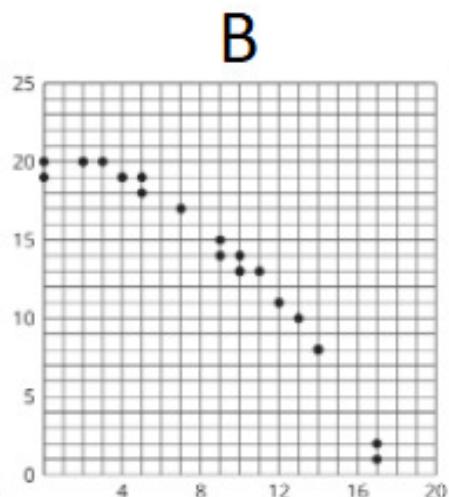
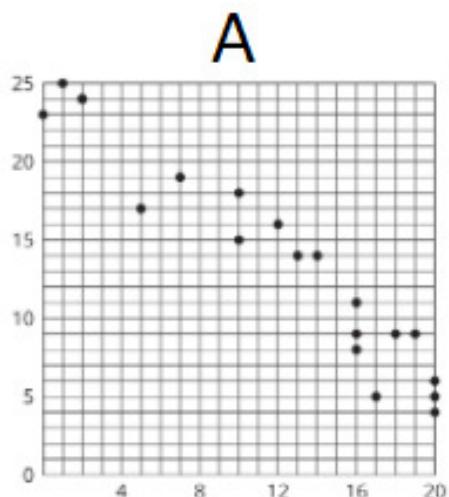
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### Problem 94

Look at the scatter plots, and determine which one is best modeled by a linear model.



Graph A

Graph B

Graph C

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### Problem 95

Draw a linear model that fits the data well on the appropriate scatter plot. Compare your line with a partner's. If your lines are different, determine which line is the better fit line.

Draw your graph on paper, take a picture, and upload it using the image upload icon

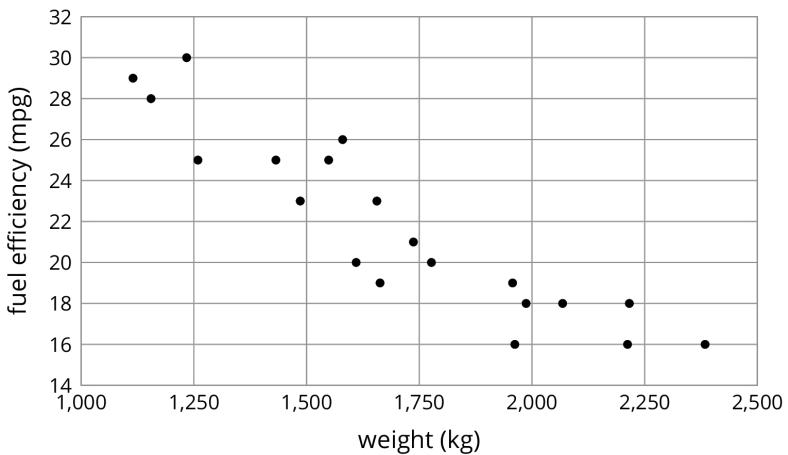
If you do not have the ability to upload an image of your work, type "Graph is on paper."

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### Problem 96

Here is a scatter plot that shows weights and fuel efficiencies of 20 different types of cars.

If a car weighs 1,750 kg, would you expect its fuel efficiency to be closer to 22 mpg or to 28 mpg?



- 22 mpg
- 28 mpg

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### Problem 97

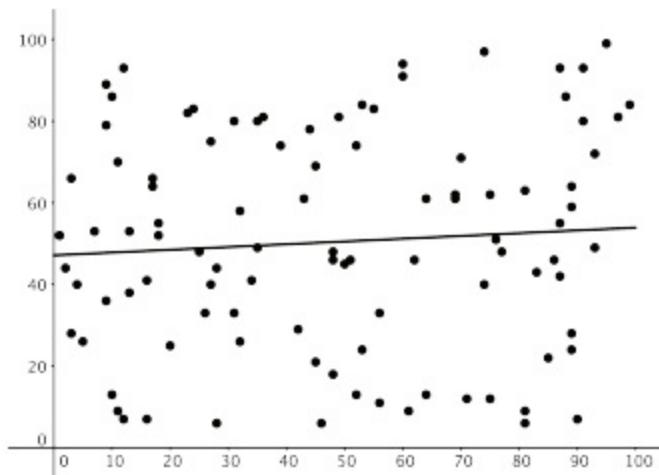
Explain your reasoning.

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### Problem 98

Although the data may be accurate, displaying the data incorrectly can tell the wrong story.

What is wrong with this graphic representation of data?



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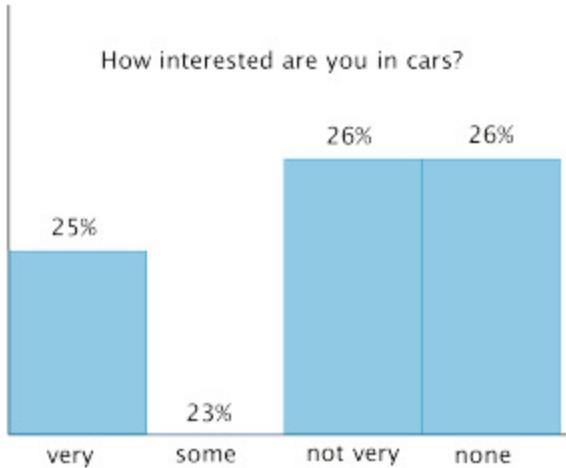
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### Problem 99

Although the data may be accurate, displaying the data incorrectly can tell the wrong story.

What is wrong with this graphic representation of data?



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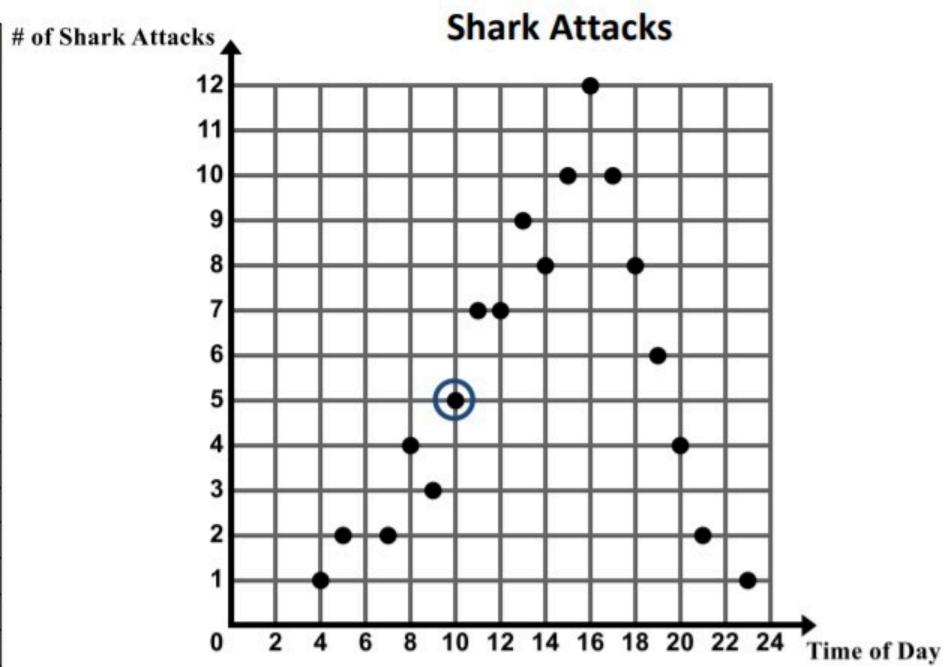
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### Problem 100

A long stretch of a popular beach is overseen by the local coast guard. Over a period of 60 years the coast guard has kept track of the number of shark attacks occurring along the coast as well as the hour during the day in which the attack occurred. The table and corresponding scatter plot show this data.

\*Note: The time of day is given by a 24 hour clock, also known as military time.

Hour during the day	Number of Shark Attacks
04:00	1
05:00	2
07:00	2
08:00	4
09:00	3
10:00	5
11:00	7
12:00	7
13:00	9
14:00	8
15:00	10
16:00	12
17:00	10
18:00	8
19:00	6
20:00	4
21:00	2
23:00	1



What does the circled data point represent in the context?

**The Utah Middle School Math Project**

[The Utah Middle School Math Project](https://utahmath.org/math-project/problems/100) (CC by 4.0)

### Problem 101

Describe the association that exists between the time of day and the number of shark attacks. Give a possible explanation as to why this graph is shaped the way it is.

[The Utah Middle School Math Project](https://utahmath.org/math-project/problems/100) (CC by 4.0)

### Problem 102

Draw a scatter plot that shows a negative, linear association and has one clear outlier. Circle the outlier.

*Submit your scatter plot using the tools below.*

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### Problem 103

Draw a scatter plot that shows a positive association that is not linear.

*Submit your scatter plot using the tools below.*

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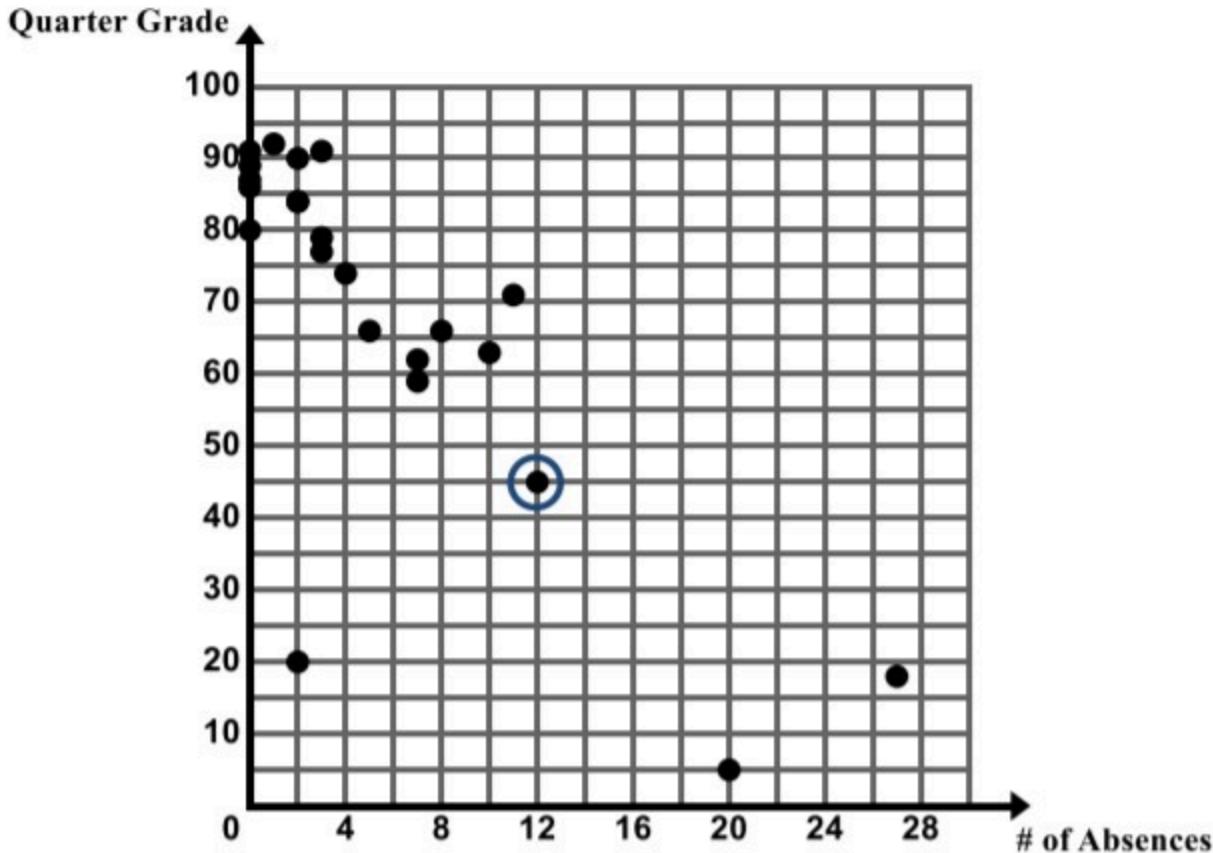
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### Problem 104

Ms. Ganchero is a math teacher. She wonders if there is an association between the number of absences a student has in her class and the grade they earn at the end of the quarter. In order to analyze this relationship, Ms. Ganchero created the scatter plot below which shows the number of absences a student has in a quarter and their final grade at the end of the quarter.



While reviewing the scatter plot, Ms. Ganchero realized that she did not plot the data for two students. Rachel was absent 5 times and received a final grade of 72 and Lydia was absent 10 times and received a final grade of 55. Plot and label these two data points on the scatter plot above.

Plot and label your two points on paper, take a picture, and upload it using the image upload icon If you do not have the ability to upload an image of your work type "Graph is on paper."

**The Utah Middle School Math Project**

### Problem 105

What does the circled data point represent in the context?

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### Problem 106

Provide an explanation for the cluster of points in the upper left corner of the graph.

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### Problem 107

Do there appear to be any outliers in the data?

Yes

No

Not enough information

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### Problem 108

What is the outlier(s)?

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### Problem 109

Provide an explanation for the outlier(s).

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### Problem 110

Does the scatter plot suggest a relationship between absences and grade?

Yes

No

Not enough information

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### Problem 111

Describe any trends or patterns you observe in the data.

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### Problem 112

To save money, drivers often try to increase their mileage, which is measured in miles per gallon (mpg). One theory is that speed traveled impacts mileage. Suppose the following data are recorded for five different 300-mile tests, with the car traveling at different speeds in miles per hour (mph) for each test.

Speed (mph)	Mileage
50	32
60	29
70	24
80	20
90	17

For the data in this table, is the association positive or negative?

- positive
- negative

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### Problem 113

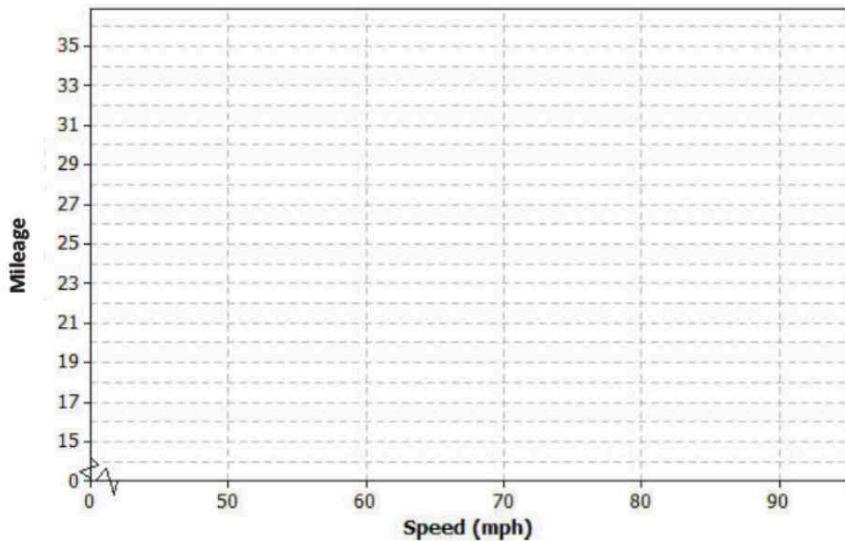
Explain how you decided.

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### Problem 114

Construct a scatter plot of these data using the following coordinate grid. The vertical axis represents the mileage, and the horizontal axis represents the speed in miles per hour (mph).

Speed (mph)	Mileage
50	32
60	29
70	24
80	20
90	17



Submit your scatter plot using the tools below.

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**Problem 115**

Draw a line on your scatter plot that you think is a reasonable model for predicting the mileage from the car speed.

*Submit your scatter plot using the tools below.*

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**Problem 116**

Estimate and interpret the slope of the line you found in the previous part.

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### Problem 117

Suppose additional data were measured for three more tests. These results have been added to the previous tests, and the combined data are shown in the table below.

Speed (mph)	Mileage
20	25
30	27
40	30
50	32
60	29
70	24
80	20
90	17

Does the association for these data appear to be linear?

- Yes
- No

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### Problem 118

Why or why not?

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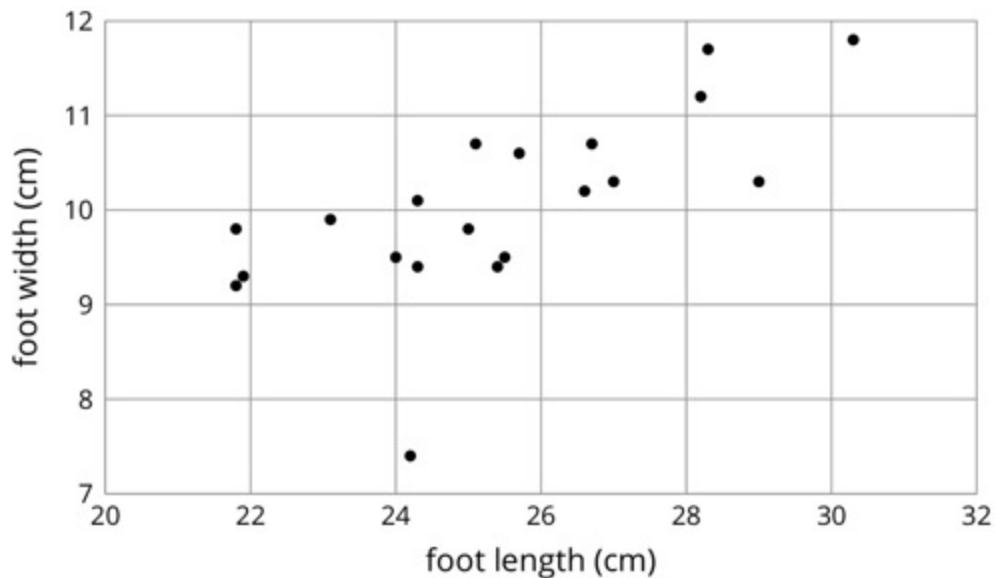
### Problem 119

If your only concern was mileage and you had no traffic constraints, what speed would you recommend traveling based on these data? Explain your choice.

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### Problem 120

Here is a scatter plot that shows lengths and widths of 20 different left feet.



Estimate the widths of the longest foot and the shortest foot.

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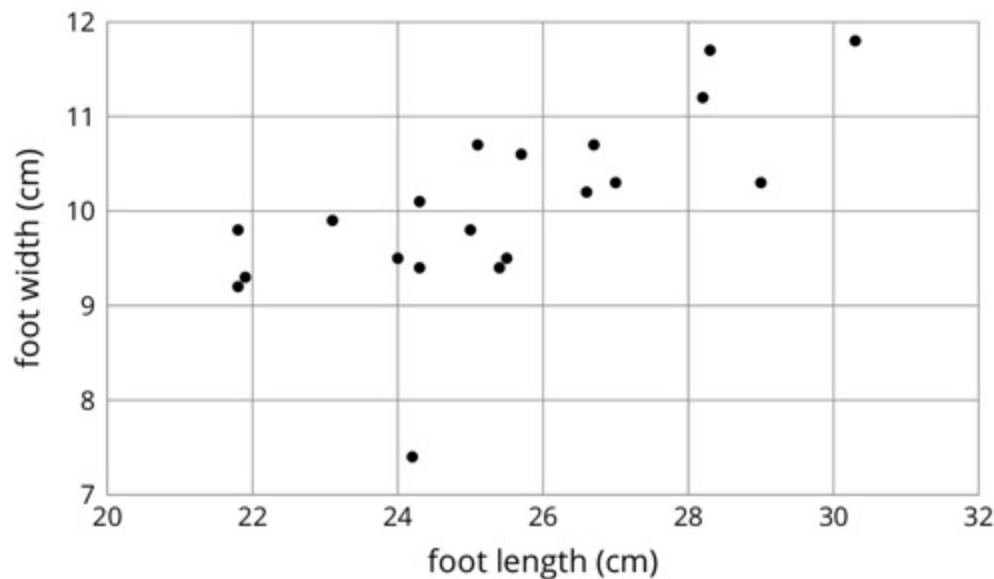
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### Problem 121

Estimate the lengths of the widest foot and the narrowest foot.



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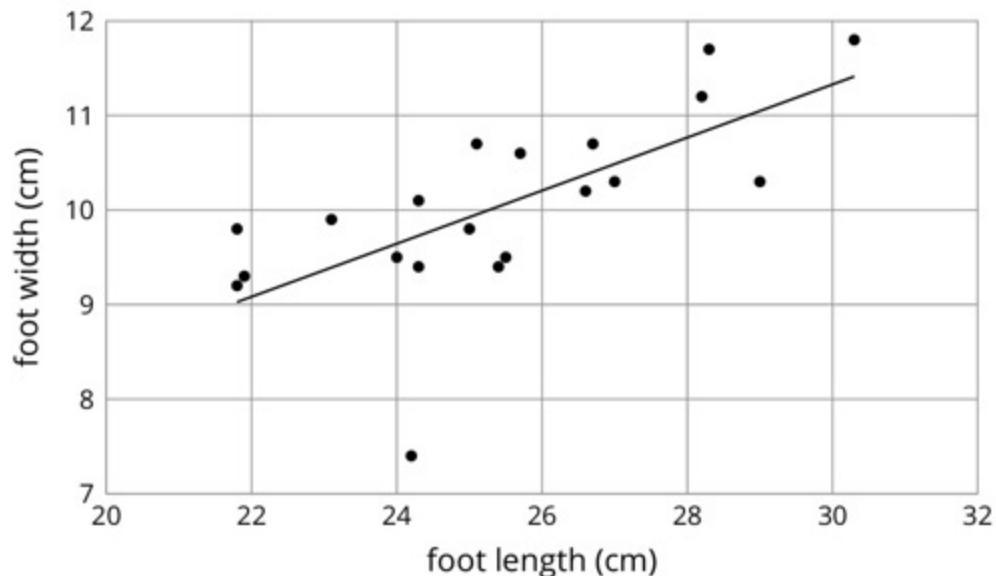
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### Problem 122

Here is the same scatter plot together with the graph of a model for the relationship between foot length and width.



Circle the data point that seems weird when compared to the model.

*Submit your work using the tools below.*

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### Problem 123

What length and width does that point represent?

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### Problem 124

The table below shows the mean temperature in July and the mean amount of rainfall per year for 14 cities in the Midwest.

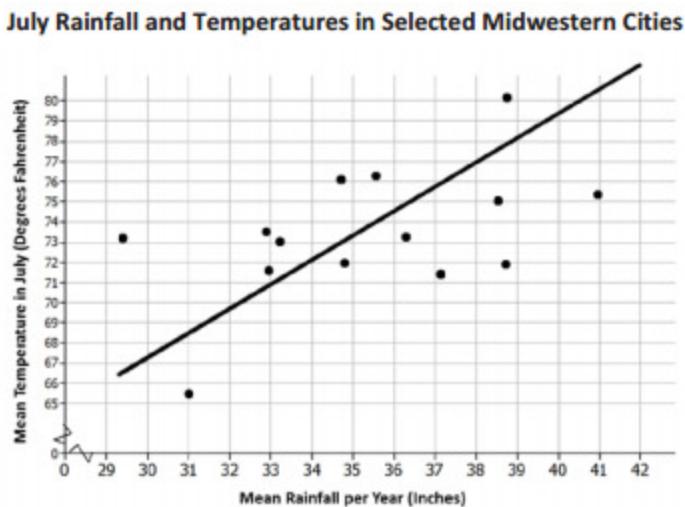
City	Mean Temperature in July (Degrees Fahrenheit)	Mean Rainfall per Year (inches)
Chicago, IL	73.3	36.27
Cleveland, OH	71.9	38.71
Colombus, OH	75.1	38.52
Des Moines, IA	76.1	34.75
Detroit, MI	73.5	32.89
Duluth, MN	65.5	31.00
Grand Rapids, MI	71.4	37.13
Indianapolis, IN	75.4	40.95
Marquette, MI	71.6	32.95
Milwaukee, WI	72.0	34.81
Minneapolis-St. Paul, MN	73.2	29.41
Springfield, MO	76.3	35.56
St. Louis, MO	80.2	38.75
Rapid City, SD	73.0	33.21

What do you observe from looking at the data in the table?

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### Problem 125

Look at the scatter plot below. A line is drawn to fit the data. The plot in the Exit Ticket had the mean July temperatures for the cities on the horizontal axis. How is this plot different, and what does it mean for the way you think about the relationship between the two variables, temperature and rain?

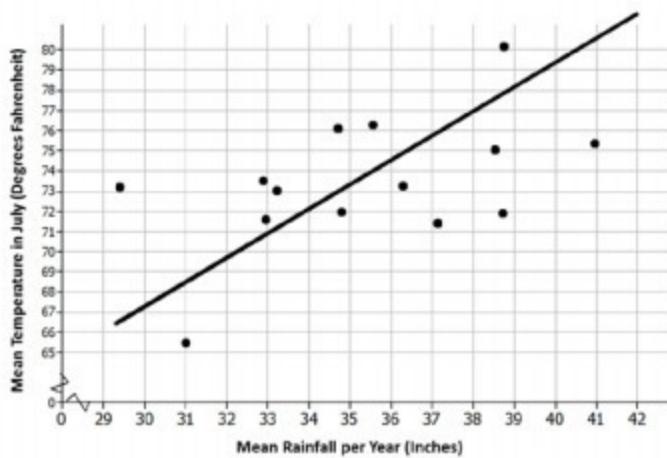


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### Problem 126

The line has been drawn to model the relationship between the amount of rain and the temperature in those Midwestern cities. Use the line to predict the mean July temperature for a Midwestern city that has a mean of 32 inches of rain per year.

**July Rainfall and Temperatures in Selected Midwestern Cities**

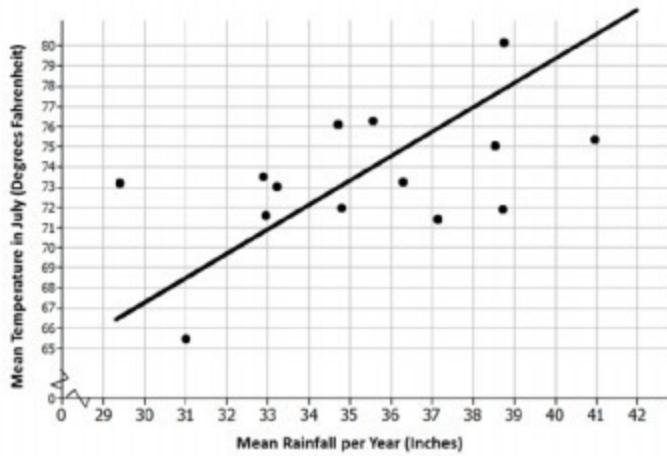


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### Problem 127

For which of the cities in the sample will the line do the worst job of predicting the mean temperature? The best? Explain your reasoning with as much detail as possible.

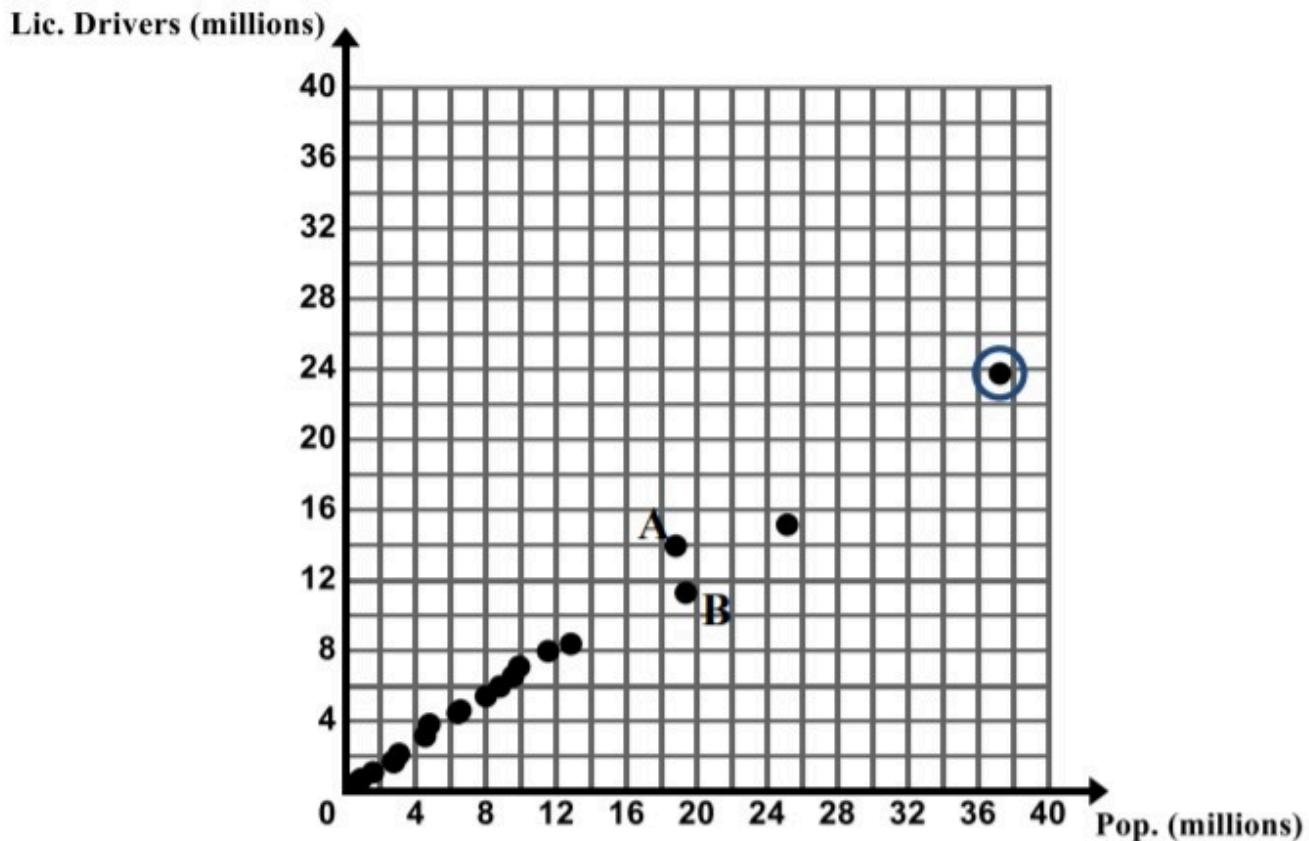
**July Rainfall and Temperatures in Selected Midwestern Cities**



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### Problem 128

The U.S. Census Bureau collects data about the people and economy in the United States. The graph below shows the population (in millions) and the number of licensed drivers (in millions) for 20 different states for the year 2010.



What does the circled data point (37.25, 23.75) represent in the context?

**The Utah Middle School Math Project**

[The Utah Middle School Math Project](http://www.mathematicsmatters1.org/MathematicsMatters1/index.html) (CC by 4.0)

### Problem 129

In 2010, Texas had a population of approximately 25.15 million people and had approximately 15.2 million licensed drivers. Put a star by the data point that represents Texas.

Draw the data point that represents Texas and put a star by it (You do not have to copy the entire graph) on paper,



take a picture, and upload it using the image upload icon

If you do not have the ability to upload an image of your work type "Graph is on paper."

[The Utah Middle School Math Project](#) (CC by 4.0)

### Problem 130

What does the graph show about the relationship between a state's population and the number of licensed drivers in the state?

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### Problem 131

If a state has a population of approximately 32 million people, approximately how many licensed drivers would you expect to find in the state based on the trend in the scatter plot?

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**Problem 132**

If a state has approximately 12 million licensed drivers in a state, what would you expect the population to be in that state based on the trend in the scatter plot?

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**Problem 133**

Compare data points A and B.

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**Problem 134**

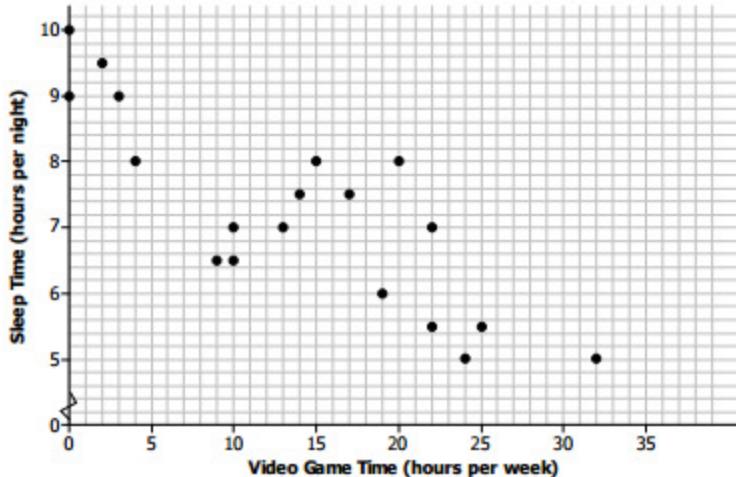
Data point A represents the state of Florida and data point B represents the state of New York. Provide an explanation as to why New York has more total people than Florida but fewer licensed drivers.

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### Problem 135

The scatter plot below shows the results of a survey of eighth-grade students who were asked to report the number of hours per week they spend playing video games and the typical number of hours they sleep each night.

**Mean Hours Sleep per Night vs. Mean Hours Playing Video Games per Week**



What trend do you observe in the data?

engage<sup>ny</sup>

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### Problem 136

What was the fewest number of hours per week that students who were surveyed spent playing video games?

Do not include units (hours) in your answer.

---

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### Problem 137

What was the most number of hours per week that students who were surveyed spent playing video games?

Do not include units (hours) in your answer.

---

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### **Problem 138**

What was the fewest number of hours per night that students who were surveyed typically slept?

Do not include units (hours) in your answer.

---

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### **Problem 139**

What was the most number of hours per night that students who were surveyed typically slept?

Do not include units (hours) in your answer.

---

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### **Problem 140**

Draw a line on your paper that seems to fit the trend in the data and find its equation.

Use the line to predict the number of hours of sleep for a student who spends about 15 hours per week playing video games.



Draw your line on paper, take a picture, and upload it using the upload icon

If you do not have the ability to upload an image of your work, type "Line is on paper."

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### **Problem 141**

Scientists can take very good pictures of alligators from airplanes or helicopters. Scientists in Florida are interested in studying the relationship between the length and the weight of alligators in the waters around Florida.

Would it be easier to collect data on length or weight? Explain your thinking.

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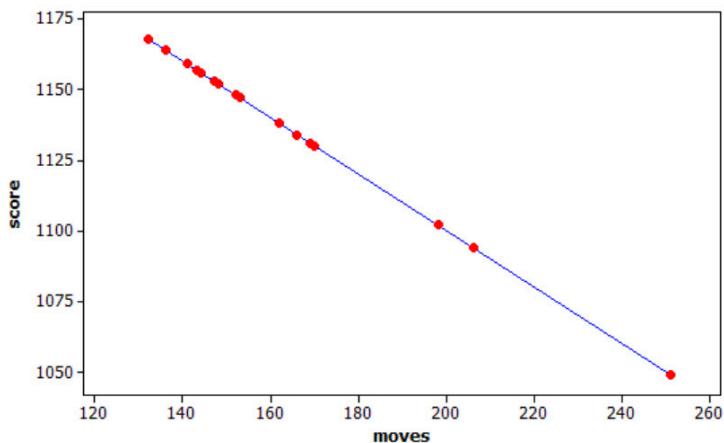
### Problem 142

Use your answer to decide which variable you would want to put on the horizontal axis and which variable you might want to predict.

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### Problem 143

Many computers come with a Solitaire card game. The player moves cards in certain ways to complete specific patterns. The goal is to finish the game in the shortest number of moves possible, and a player's score is determined by the number of moves. A statistics teacher played the game 16 times and recorded the number of moves and the final score after each game. The line represents the linear function that is used to determine the score from the number of moves.



Was this person's average score closer to 1130 or 1110?

1130

1110

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### **Problem 144**

Explain how you decided.

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### **Problem 145**

The first two games she played took 169 moves (1131 points) and 153 moves (1147 points). Based on this information, determine the equation of the linear function used by the computer to calculate the score from the number of moves.

(Let  $y$  = points and  $x$  = number of moves)

Complete the equation below

$y = \underline{\hspace{2cm}}$

Use  $x$  as your variable.

---

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### **Problem 146**

Explain your work.

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### **Problem 147**

Based on the linear function, each time the player makes a move, how many points does she lose?

Do not include units (points) in your answer.

---

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**Problem 148**

Based on the linear function, how many points does the player start with in this game?

Do not include units (points) in your answer.

---

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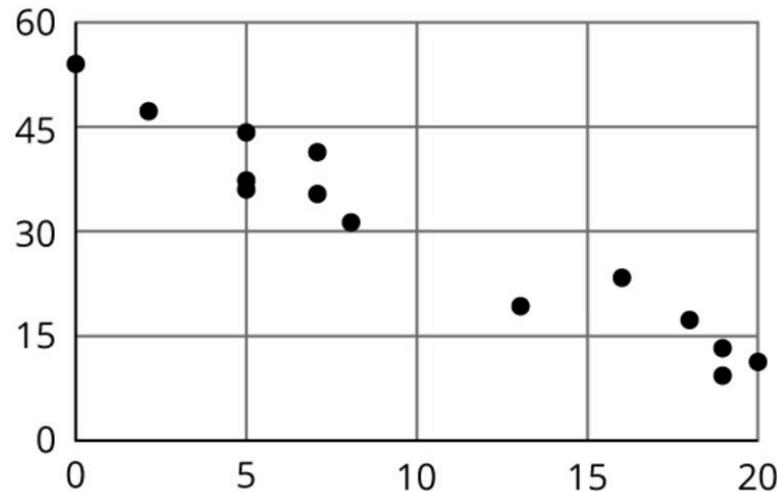
**Problem 149**

Explain your reasoning.

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### Problem 150

Draw a line that you think is a good fit for this data. For this data, the inputs are the horizontal values, and the outputs are the vertical values.



Submit your graph using the tools below.

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### Problem 151

Use your line of fit to estimate what you would expect the output value to be when the input is 10.

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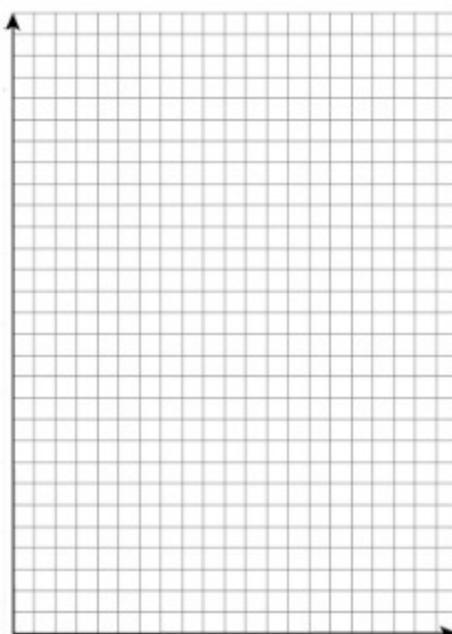
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### Problem 152

Different stores across the country sell a book for different prices. The table shows the price of the book in dollars and the number of books sold at that price.

price in dollars	number sold
11.25	53
10.50	60
12.10	30
8.45	81
9.25	70
9.75	80
7.25	120
12	37
9.99	130
7.99	100
8.75	90



Draw a scatter plot of this data. Label the axes.

*Submit your scatter plot using the tools below.*

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### Problem 153

Are there any outliers? Explain your reasoning.

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### Problem 154

If there is a relationship between the variables, explain what it is.

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### Problem 155

Remove any outliers and draw a line that you think is a good fit for the data.

*Submit your work using the tools below.*

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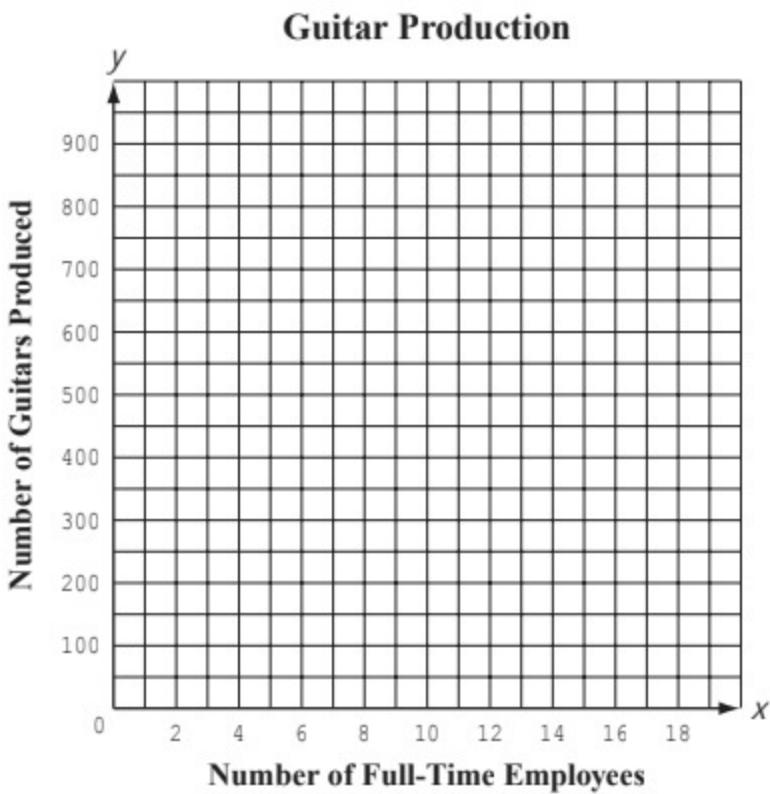
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### Problem 156

The table below shows the number of full-time employees at eight guitar-production companies and the number of guitars produced by each company last year.

Guitar Production								
Number of Full-Time Employees	3	5	6	8	8	10	13	18
Number of Guitars Produced	98	189	235	309	336	412	494	692



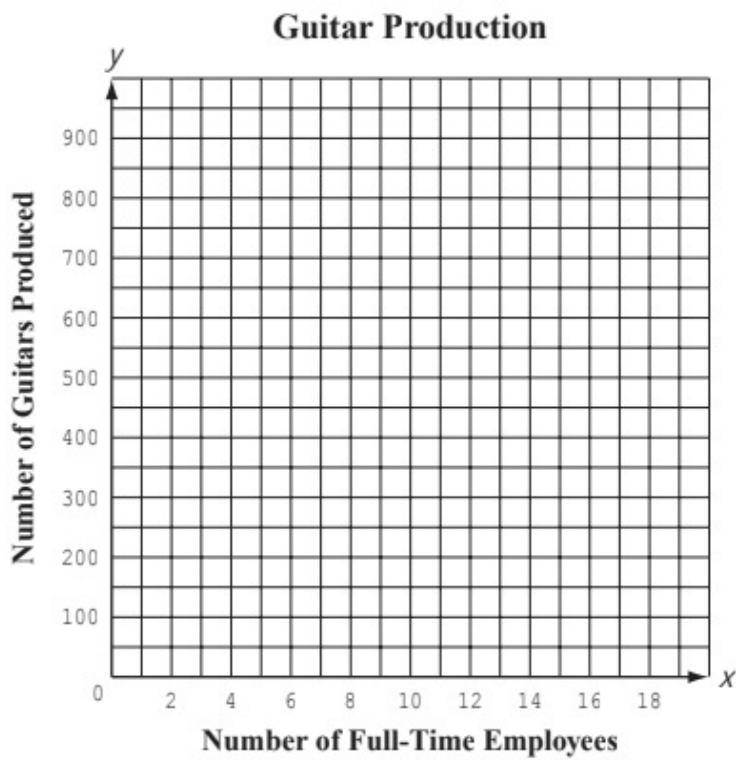
Create a scatterplot using the data from the table and draw a line of best fit for the data.

*Submit your graph using the tools below.*

### Problem 157

The table below shows the number of full-time employees at eight guitar-production companies and the number of guitars produced by each company last year.

Guitar Production								
Number of Full-Time Employees	3	5	6	8	8	10	13	18
Number of Guitars Produced	98	189	235	309	336	412	494	692

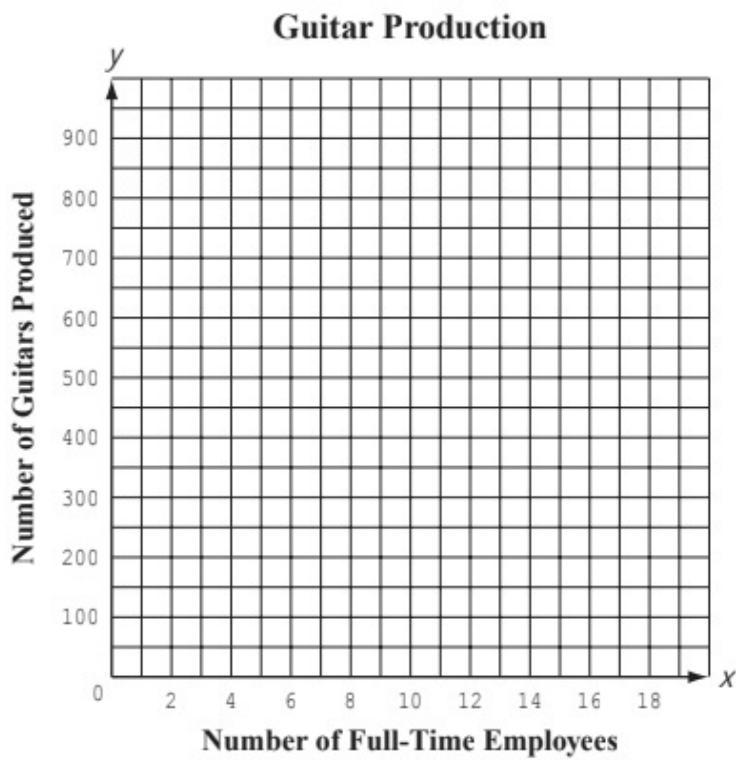


Write an equation that represents the line of best fit you drew in part a. Show or explain how you got your answer.

### Problem 158

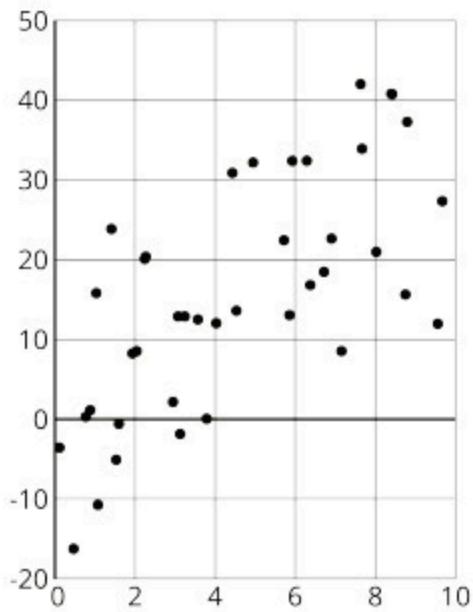
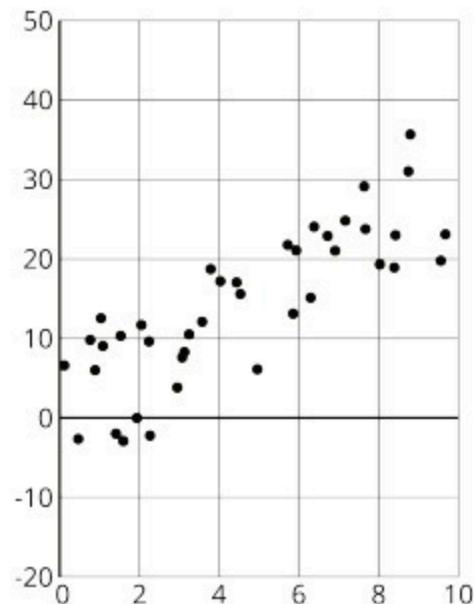
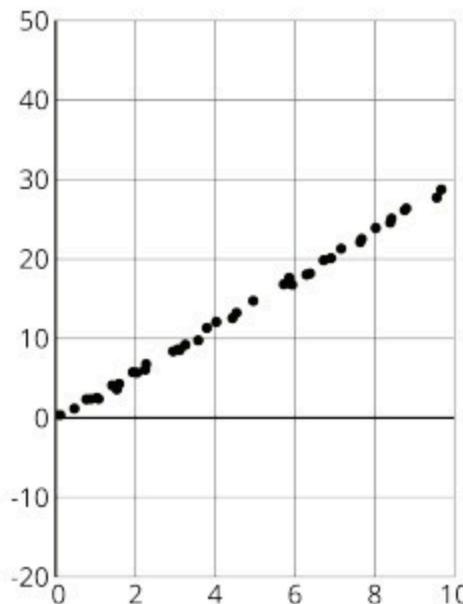
The table below shows the number of full-time employees at eight guitar-production companies and the number of guitars produced by each company last year.

Guitar Production								
Number of Full-Time Employees	3	5	6	8	8	10	13	18
Number of Guitars Produced	98	189	235	309	336	412	494	692



Use your equation to estimate the number of full-time employees needed if a company plans to produce 1000 guitars in a year. Show or explain how you got your answer.

Problem 159



These scatter plots were created by multiplying the  $x$ -coordinate by 3 then adding a random number between two values to get the  $y$ -coordinate. The first scatter plot added a random number between -0.5 and 0.5 to the  $y$ -coordinate. The second scatter plot added a random number between -2 and 2 to the  $y$ -coordinate. The third scatter plot added a random number between -10 and 10 to the  $y$ -coordinate.

For each scatter plot, draw a line that fits the data.

*Submit your work using the tools below.*

### Problem 160

Explain why some were easier to do than others.

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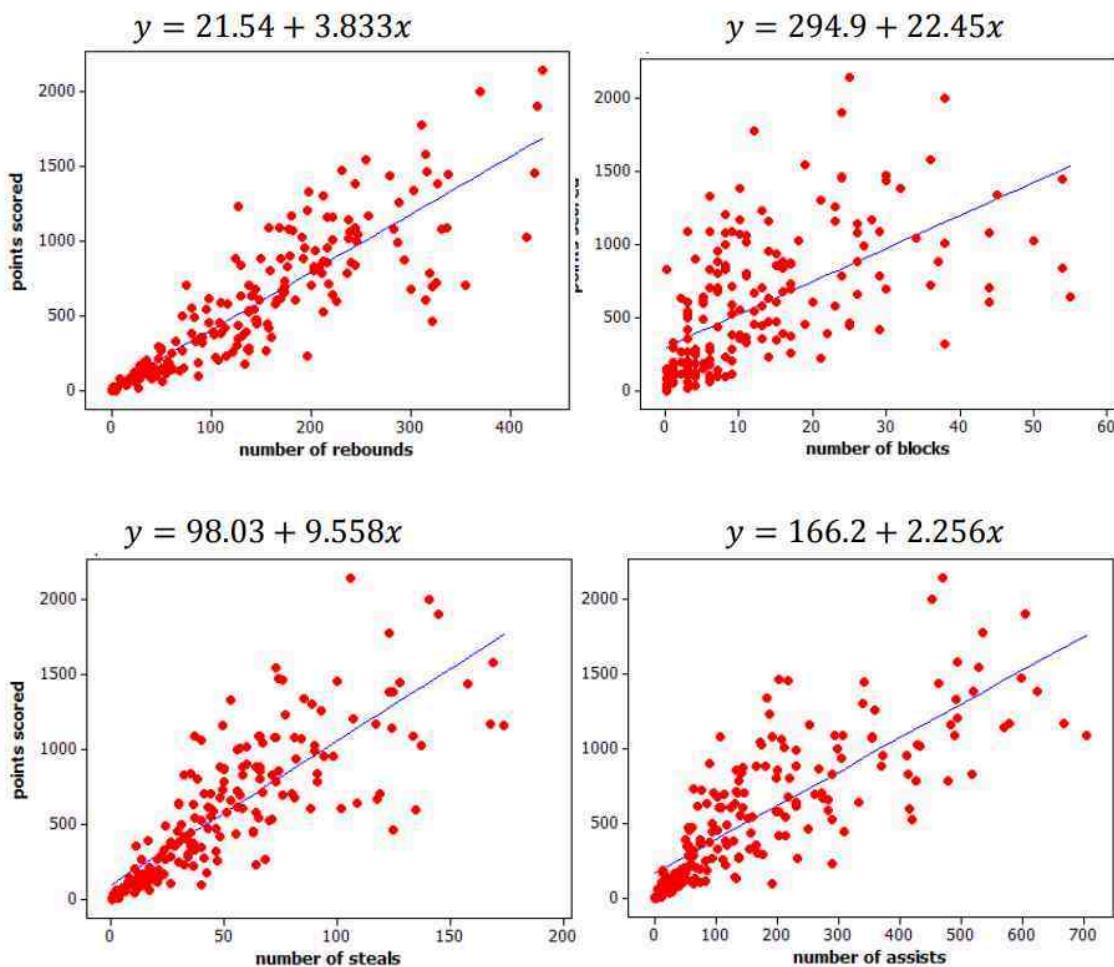
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### Problem 161

Basketball players who score a lot of points also tend to be strong in other areas of the game such as number of rebounds, number of blocks, number of steals, and number of assists. Below are scatter plots and linear models for professional NBA (National Basketball Association) players last season.



The line that models the association between points scored and number of rebounds is  $y = 21.54 + 3.833x$ , where  $y$  represents the number of points scored and  $x$  represents the number of rebounds. Give an interpretation, in context, of the slope of this line.

### Problem 162

The equations on the previous page all show the number of points scored ( $y$ ) as a function of the other variables. An increase in which of the variables (rebounds, blocks, steals, and assists) tends to have the largest impact on the predicted points scored by an NBA player?

rebounds

blocks

steals

assists

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### Problem 163

Which of the four linear models shown in the scatter plots on the previous page has the worst fit to the data?

number of rebounds

number of blocks

number of assists

number of steals

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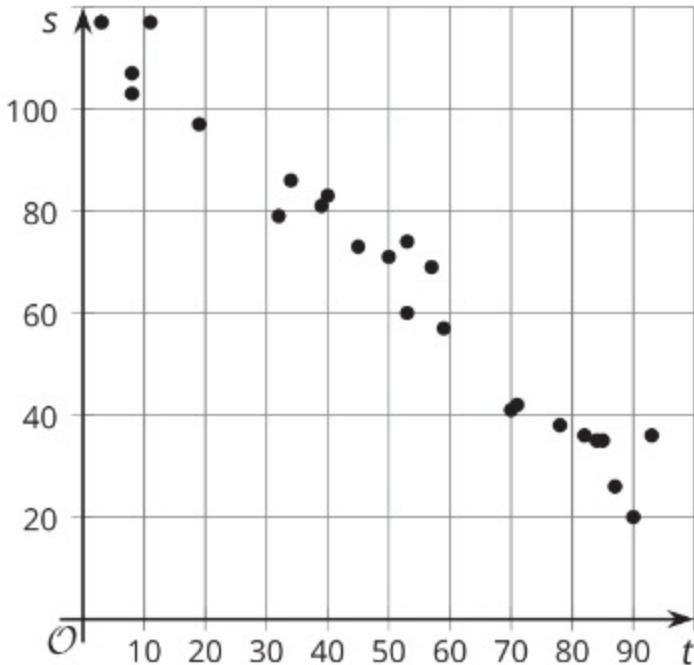
### Problem 164

Explain how you know using the data.

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### Problem 165

A deli owner noticed that as the outside temperature increased, they sold less soup. For each day soup was sold, they plotted the point  $(t, s)$ , where  $t$  represents high temperature and  $s$  represents bowls of soup sold.



On the same axes, draw a line that you think is a good fit for the data.

Submit your graph using the tools below.

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### Problem 166

The deli owner found that the line  $s = -t + 120$  is a good fit for the data. Use this equation to predict how many bowls of soup they might sell on a day when the high temperature is 32 degrees.

bowls of soup

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### Problem 167

The high temperature this Saturday is expected to be 10 degrees colder than the high temperature this Friday. Using the line

$s = -t + 120$ , how many more bowls of soup should the deli expect to sell on Saturday than Friday?

more bowls of soup

---

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### Problem 168

Explain or show your reasoning.

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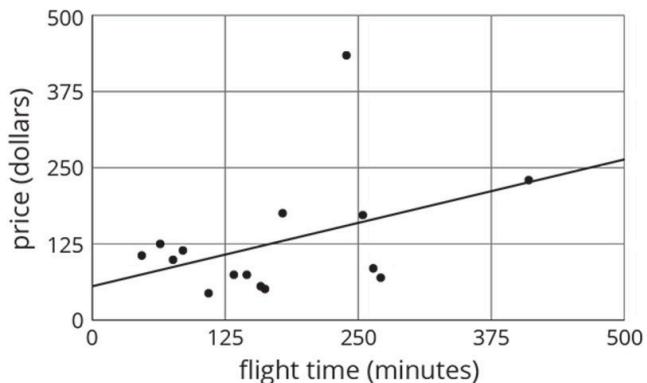
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### Problem 169

Nonstop, one-way flight times from O'Hare Airport in Chicago and prices of a one-way ticket are shown in the scatter plot.



Circle any data that appear to be outliers.

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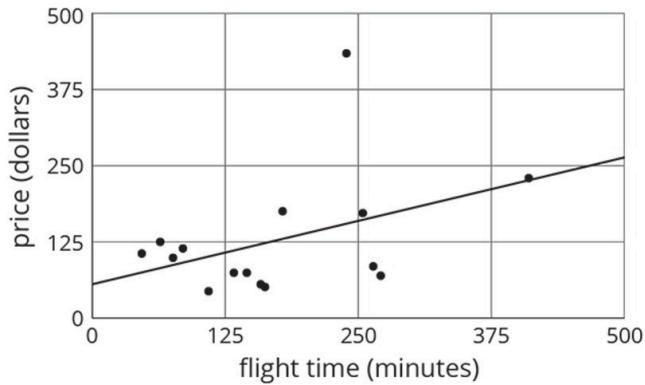
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### Problem 170

Use the graph to estimate the difference between any outliers and their predicted values.



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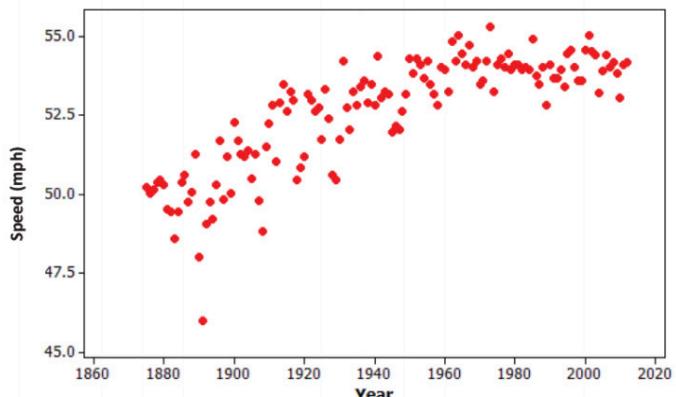
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### Problem 171

The Kentucky Derby is a horse race held each year. The following scatter plot shows the speed of the winning horse at the Kentucky Derby each year between 1875 and 2012.



Data Source: <http://www.kentuckyderby.com/>

(Note: Speeds were calculated based on times given on website.)

Is the association between speed and year positive or negative?

positive

negative

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### Problem 172

Give a possible explanation in the context of this problem for why the association behaves this way considering the variables involved.

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**Problem 173**

Comment on whether speed and year is approximately linear, and then explain in the context of this problem why the association between the form of the association (linear or not) makes sense considering the variables involved.

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**Problem 174**

Circle an outlier in this scatter plot, and explain, in context, how and why the observation is unusual.

*Submit your work using the tools below.*

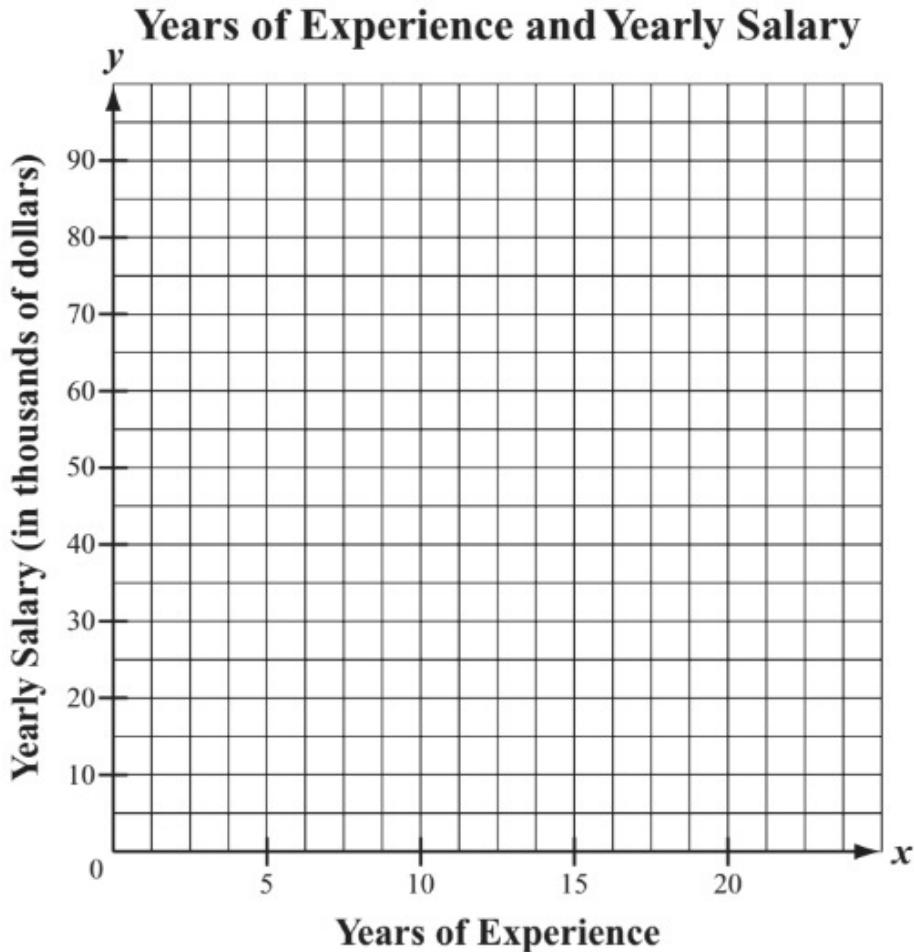
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### Problem 175

The table below shows the number of years of work experience and the yearly salary, in thousands of dollars, of 8 people who have the same job.

Years of Experience and Yearly Salary								
Years of Experience, $x$	0	0	5	5	10	10	20	20
Yearly Salary, $y$ (in thousands of dollars)	25	30	35	40	50	55	70	75

Onto your own graph paper, copy the title, the axes, and the labels exactly as shown below.



On the grid, make a scatterplot using the data from the table and draw a line of best fit for the data.

*Submit your graph using the tools below.*

**Problem 176**

Use the line of best fit to predict the yearly salary, in thousands of dollars, for a person who has the same job and 15 years of work experience. Show or explain how you got your answer.

*Massachusetts Department of Elementary and Secondary Education*

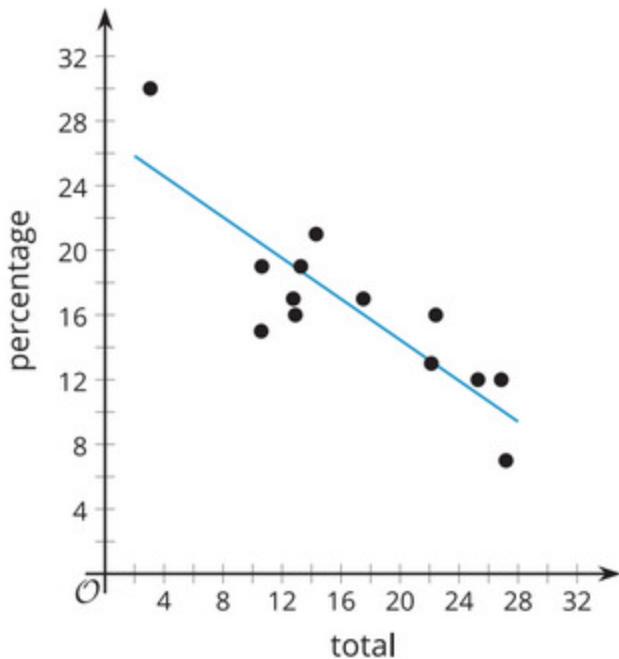
**Problem 177**

Write an equation that represents the line of best fit you drew on the scatterplot. Show or explain how you got your answer.

*Massachusetts Department of Elementary and Secondary Education*

### Problem 178

At a restaurant, the total bill and the percentage of the bill left as a tip are represented in the scatter plot.



The best fit line is represented  $y = -0.632x + 27.1$ , where  $x$  represents the total bill in dollars, and  $y$  represents the percentage of the bill left as a tip.

What does the best fit line estimate for the percentage of the bill left as a tip when the bill is \$15?

%

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### Problem 179

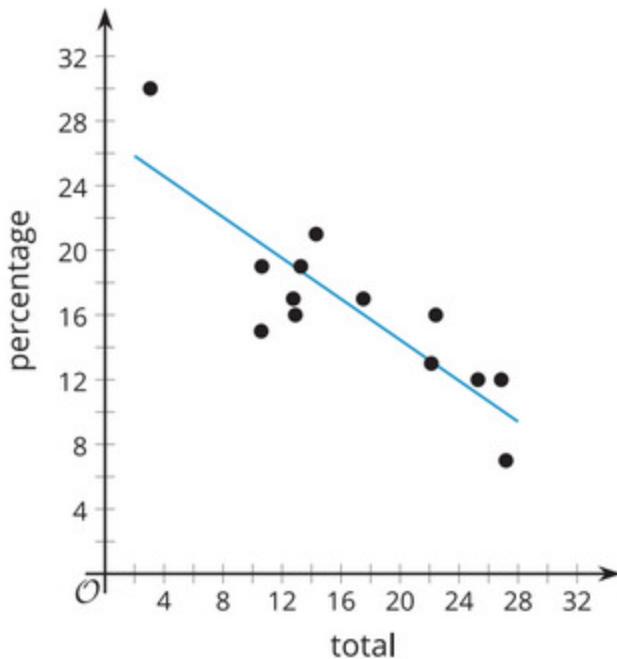
Is this reasonable?

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### Problem 180

At a restaurant, the total bill and the percentage of the bill left as a tip are represented in the scatter plot.



The best fit line is represented  $y = -0.632x + 27.1$ , where  $x$  represents the total bill in dollars, and  $y$  represents the percentage of the bill left as a tip.

What does the best fit line estimate for the percentage of the bill left as a tip when the bill is \$50?

%

---

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### Problem 181

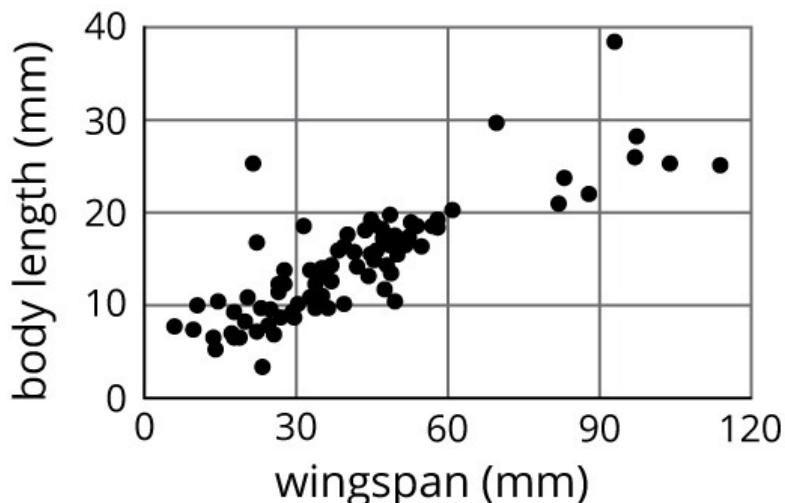
Is this reasonable?

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### Problem 182

Ecologists measure the body length and wingspan of 127 butterfly specimens caught in a single field.



Draw a line that you think is a good fit for the data.

*Submit your graph using the tools below.*

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### Problem 183

Write an equation for the line.

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### Problem 184

What does the slope of the line tell you about the wingspans and lengths of these butterflies?

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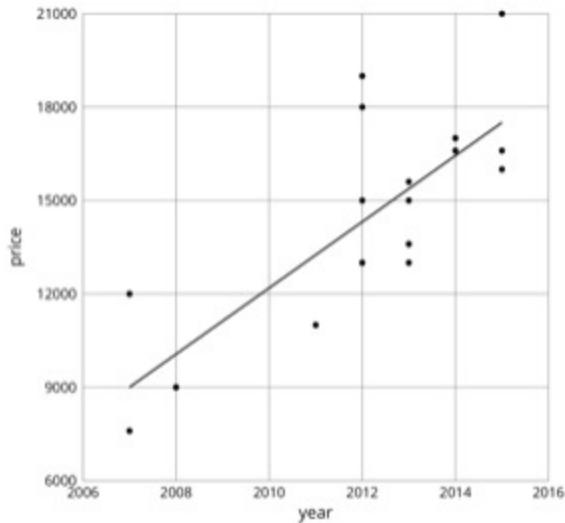
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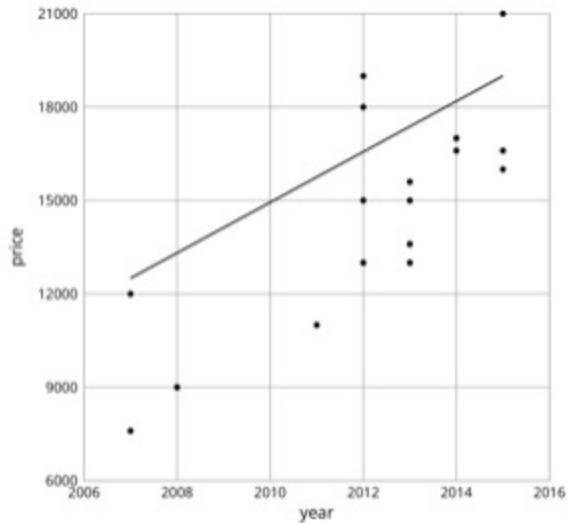
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### Problem 185

The scatter plots both show the year and price for the same 17 used cars. However, each scatter plot shows a different model for the relationship between year and price.



A



B

Look at Diagram A

For how many cars does the model in Diagram A make a good prediction of its price?

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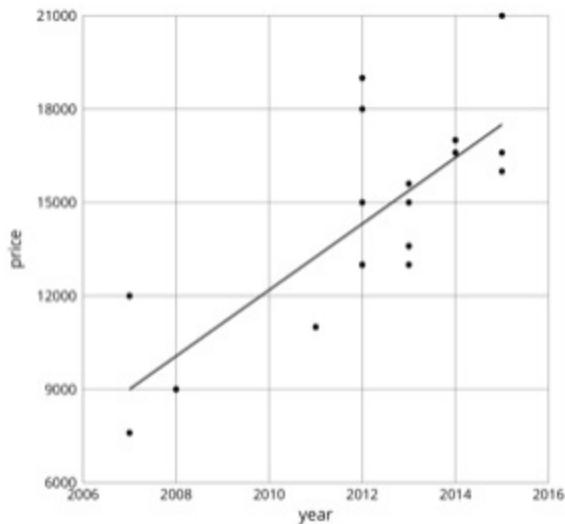
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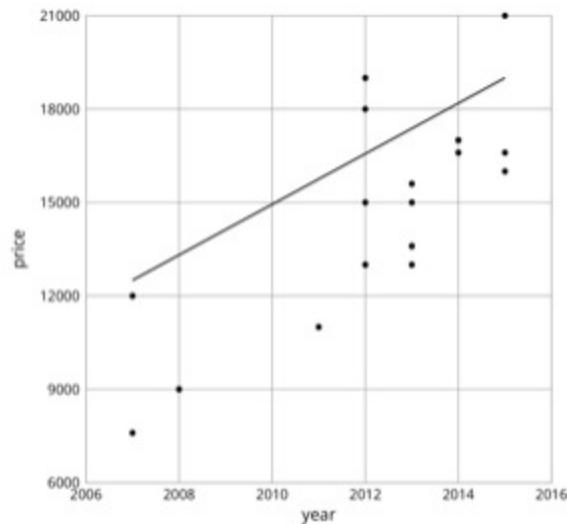
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Problem 186

Look at Diagram A



A



B

For how many cars does the model underestimate the price?

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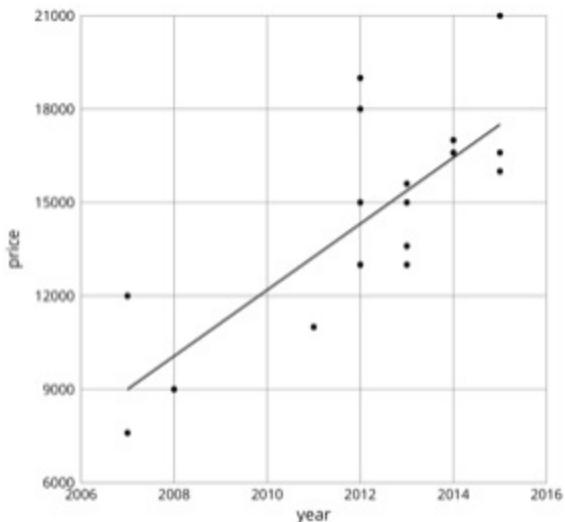
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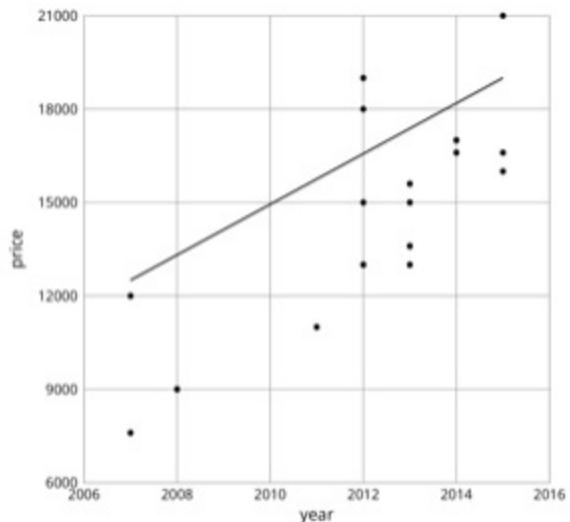
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Problem 187

Look at Diagram A



A



B

For how many cars does the model overestimate the price?

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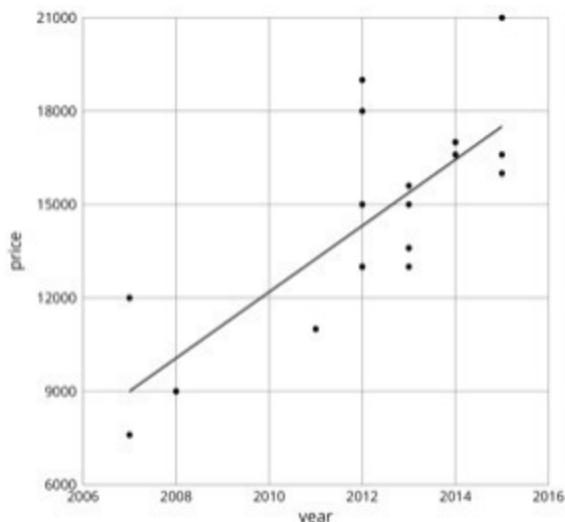
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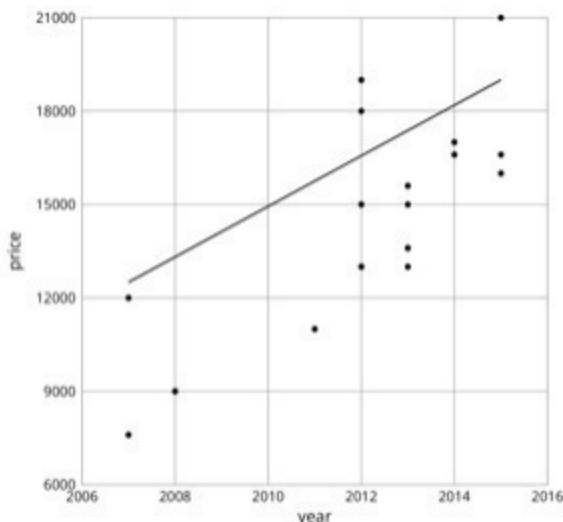
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Problem 188

The scatter plots both show the year and price for the same 17 used cars. However, each scatter plot shows a different model for the relationship between year and price.



A



B

Look at Diagram B.

For how many cars does the model in Diagram B make a good prediction of its price?

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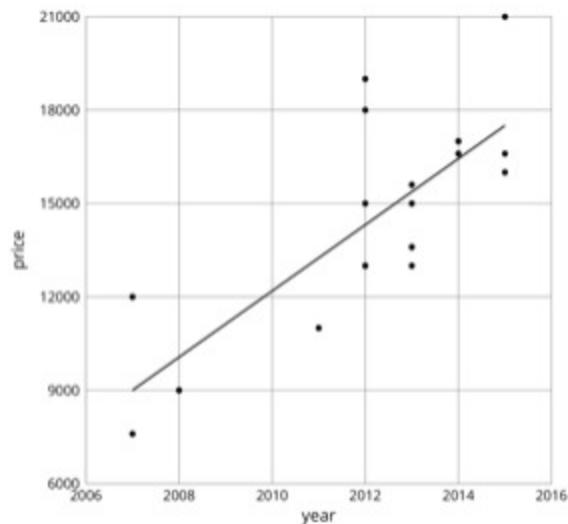
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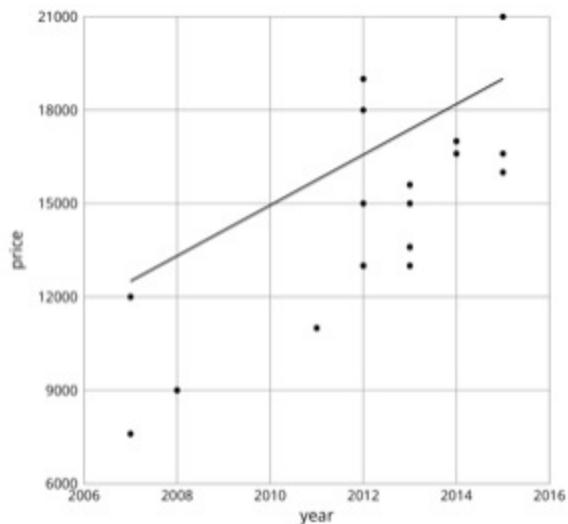
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### Problem 189

Look at Diagram B.



A



B

For how many cars does the model underestimate the price?

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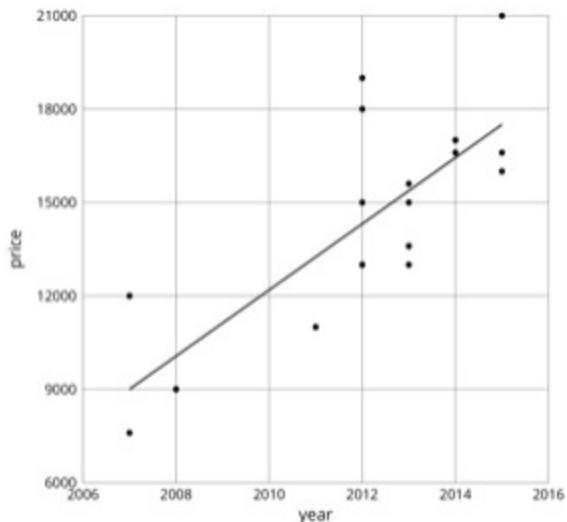
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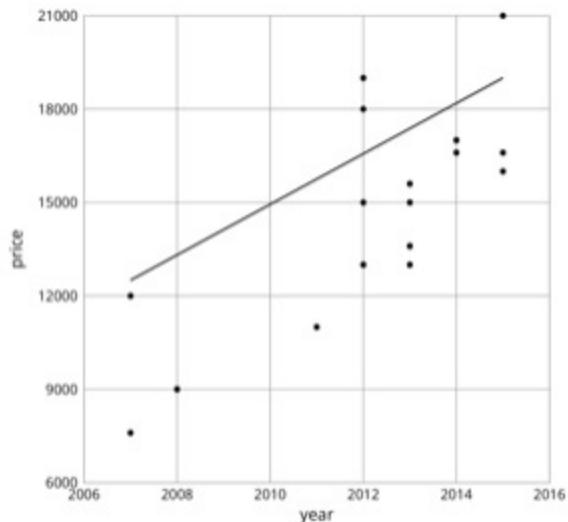
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Problem 190

Look at Diagram B.



A



B

For how many cars does the model overestimate the price?

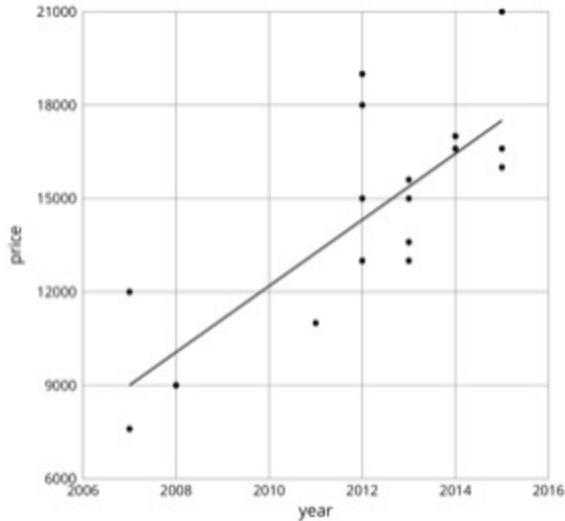
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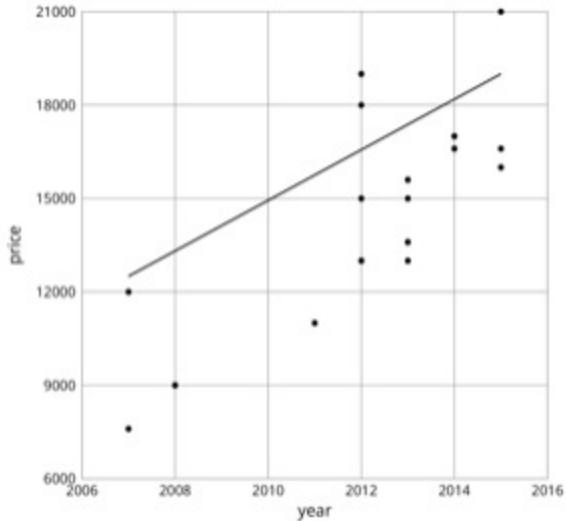
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### Problem 191



A



B

For how many cars does the prediction made by the model in Diagram A differ by more than \$3,000?

\_\_\_\_\_ cars

What about the model in Diagram B?

\_\_\_\_\_ cars

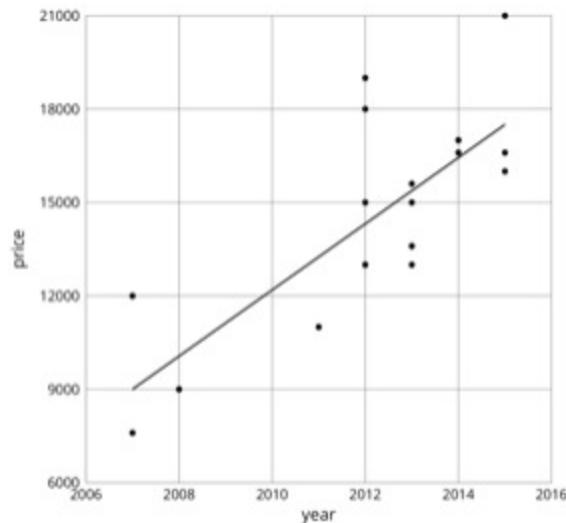
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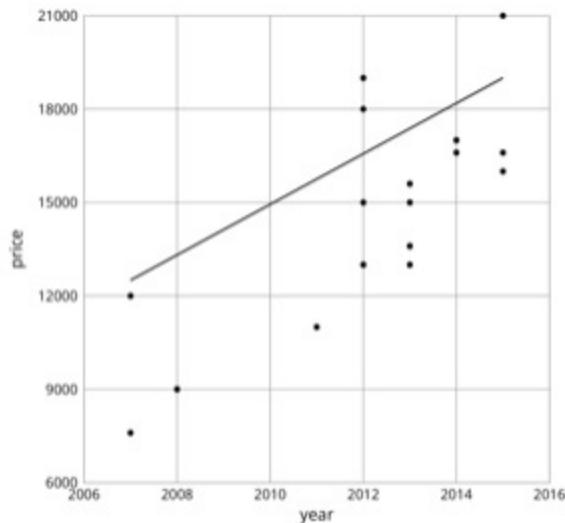
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### Problem 192



A



B

Which model does a better job of predicting the price of a used car from its year?

- Model A
- Model B

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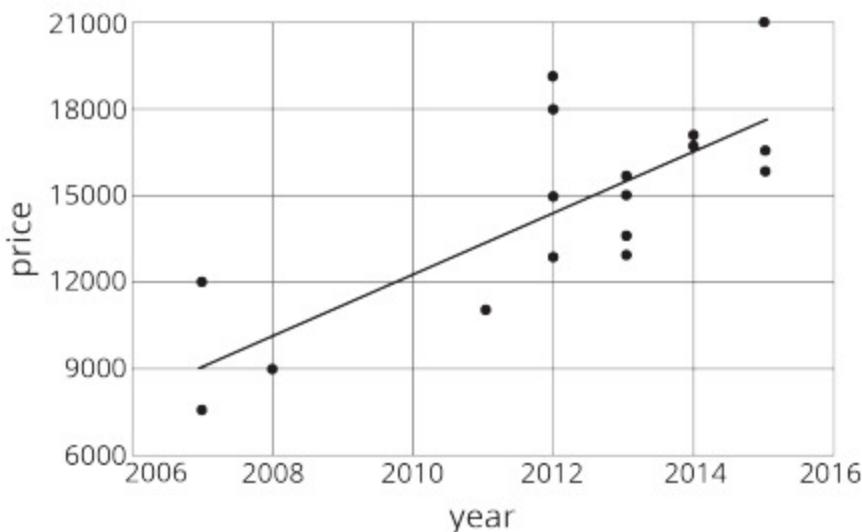
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### Problem 193

Here is a scatter plot that shows the years when some used cars were made and their prices in 2016, together with the graph of a linear model for the relationship between year and price.



Is the slope positive or negative?

- Positive
- Negative

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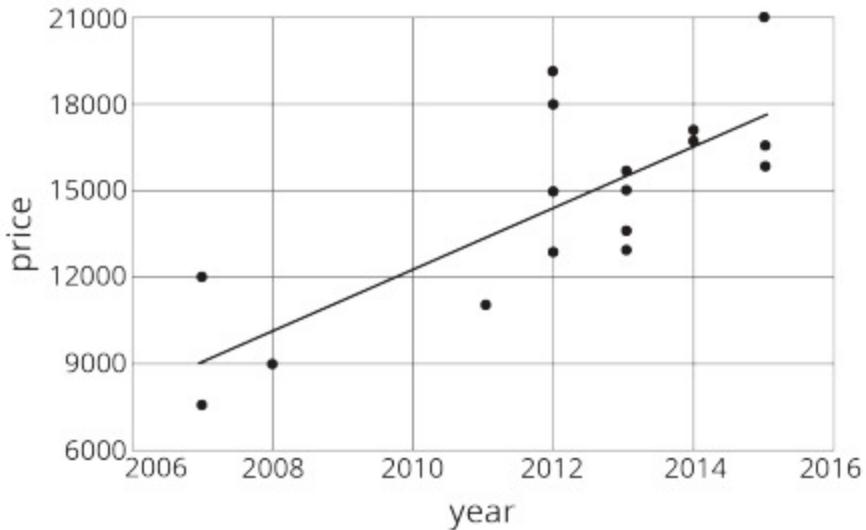
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### Problem 194

Which of these values is closest to the slope of the linear model shown in the scatter plot?



1,000

3,000

-1,000

-3,000

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### Problem 195

Use the value you selected to describe the meaning of the slope in this context.

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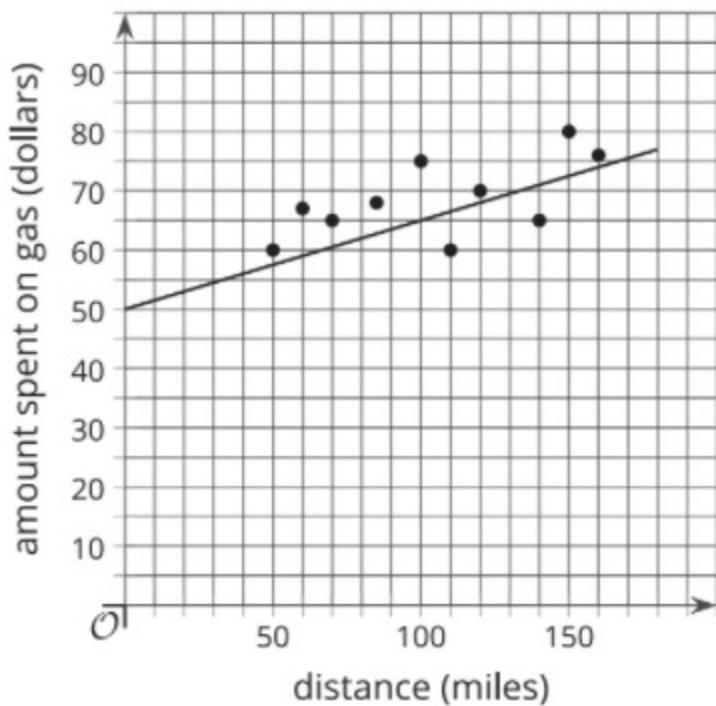
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**Problem 196**

Priya's family keeps track of the number of miles on each trip they take over the summer and the amount spent on gas for the trip. The model, represented by  $y = 50 + 0.15x$ , is graphed with a scatter plot.



Use the graph and equation to complete the table. Then, use the graph, equation, and table to answer the questions.

distance (miles)	amount spent on gas (dollars)	estimated amount spent on gas (dollars)
50	60	
70	65	
100	75	
60	67	
110	60	
140	65	
80	68	
150	80	
160	76	

Create and fill in the table using the table button



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### Problem 197

When Priya's family drove 85 miles, they spent \$68 on gas. How much did they expect to spend based on the linear model?

Do not include units (\$) in your answer.

---

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### Problem 198

How far had the family gone when they spent \$80 on gas?

Do not include units (miles) in your answer.

---

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### Problem 199

How far does the model estimate the family should have driven when they spent \$80 on gas?

Do not include units (miles) in your answer.

---

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### Problem 200

Are there any instances for which the model's estimated amount spent on gas is equivalent to the actual amount spent on gas?

Yes

No

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### Problem 201

Choose one option.

- In general, the model predicts the family will spend more on gas than they actually spend.
- In general, the model predicts the family will spend less on gas than they actually spend.

First option

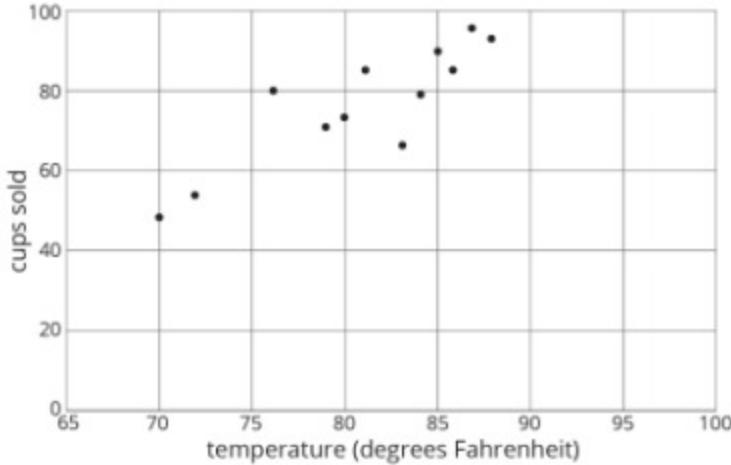
Second option

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### Problem 202

Lin opened a lemonade stand during the summer. She noticed that she sold more lemonade on warmer days. For each day she sold lemonade, she plotted the point

( $t, c$ ), where  $t$  represents high temperature and  $c$  represents cups of lemonade sold.



On the same axes, draw a line that you think is a good fit for the data.

Submit your graph using the tools below.

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### Problem 203

A computer program  $c = 2t - 89$  is a good fit for the data. Use this equation to predict how many cups of lemonade Lin might sell on a day when the high temperature is 74 degrees.

cups of lemonade

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### Problem 204

The high temperature this Sunday is expected to be 5 degrees warmer than the high temperature this Saturday. Using the line  $c=2t-89$ , how many more cups of lemonade should Lin expect to sell on Sunday than Saturday?

more cups of lemonade

---

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### Problem 205

Explain or show your reasoning.

*Submit your reasoning using the tools below.*

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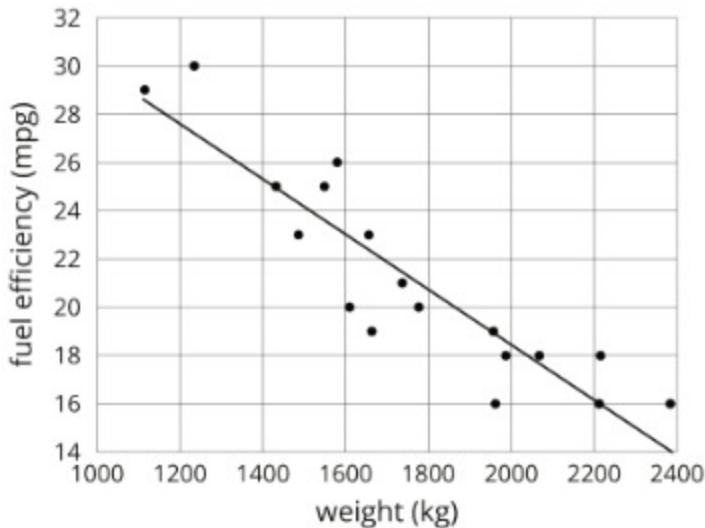
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### Problem 206

The scatter plot shows the weight and fuel efficiency data used in an earlier lesson along with a linear model represented by the equation



What is the value of the slope?

---

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### Problem 207

What does the slope mean in this context?

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### Problem 208

What does the other number in the equation represent on the graph? What does it mean in context?

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### Problem 209

Use the equation to predict the fuel efficiency of a car that weighs 100 kilograms.

mpg

---

Round your answer to the hundredths place.

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### Problem 210

Use the equation to predict the weight of a car that has a fuel efficiency of 22 mpg.

kg

---

Round your answer to the nearest whole.

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### Problem 211

Which of these two predictions probably fits reality better? Explain.

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### Problem 212

In search of a topic for his science class project, Bill saw an interesting YouTube video in which dropping mint candies into bottles of a soda pop caused the soda pop to spurt immediately from the bottle. He wondered if the height of the spurt was linearly related to the number of mint candies that were used. He collected data using 1, 3, 5, and 10 mint candies. Then, he used two-liter bottles of a diet soda and measured the height of the spurt in centimeters. He tried each quantity of mint candies three times. His data are in the following table.

<b>Number of Mint Candies</b>	1	1	1	3	3	3	5	5	5	10	10	10
<b>Height of Spurt (centimeters)</b>	40	35	30	110	105	90	170	160	180	400	390	420

Identify which variable is the independent variable and which is the dependent variable.

engage<sup>ny</sup>

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### Problem 213

Draw a scatter plot that could be used to determine whether the relationship between height of spurt and number of mint candies appears to be linear.



Draw your scatter plot on paper, take a picture, and upload it using the image upload icon  
If you do not have the ability to upload an image of your work type "Scatter plot is on paper."

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### Problem 214

Bill sees a slight curvature in the scatter plot, but he thinks that the relationship between the number of mint candies and the height of the spurt appears close enough to being linear, and he proceeds to draw a line. His eyeballed line goes through the mean of the three heights for three mint candies and the mean of the three heights for 10 candies. Bill calculates the equation of his eyeballed line to be

$$y = -27.617 + (43.095)x,$$

where the height of the spurt ( $y$ ) in centimeters is based on the number of mint candies ( $x$ ). **Do you agree with this calculation?**

He rounded all of his calculations to three decimal places.

Yes

No

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### Problem 215

Show your work.

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### Problem 216

In the context of this problem, interpret in words the slope and intercept for Bill's line.

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**Problem 217**

Does interpreting the intercept make sense in this context?

Yes

No

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**Problem 218**

Explain.

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**Problem 219**

If the linear trend continues for greater numbers of mint candies, what do you predict the height of the spurt to be if 15 mint candies are used?

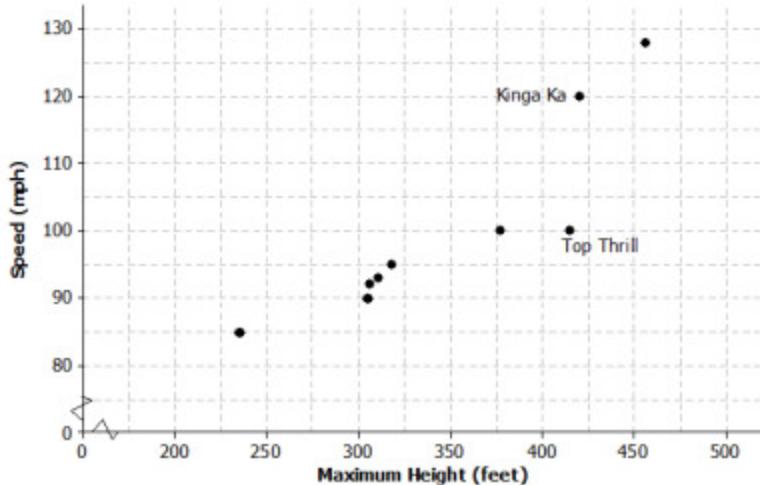
Do not include units (cm) in your answer.

---

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### Problem 220

The scatter plot below shows the height and speed of some of the world's fastest roller coasters. Draw a line that you think is a good fit for the data.



Submit your graph using the tools below.

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### Problem 221

Find the equation of your line. Show your steps.

Submit your work using the tools below.

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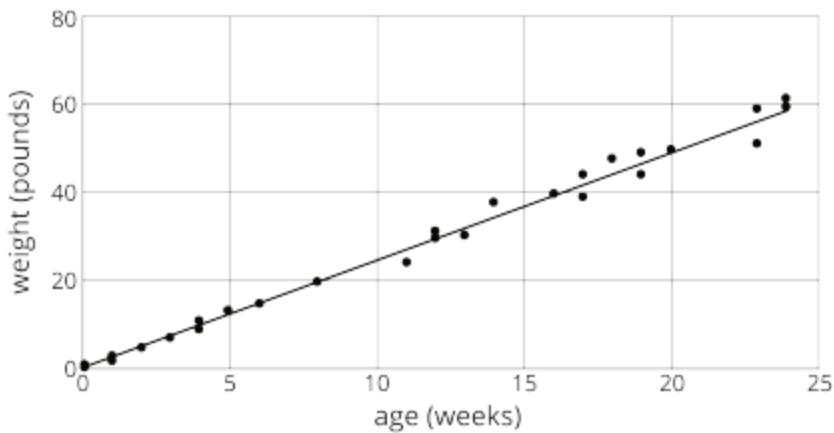
### Problem 222

For the two roller coasters identified in the scatter plot, use the line to find the approximate difference between the observed speeds and the predicted speeds.

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### Problem 223

Here is a scatter plot of weight vs. age for different Dobermans. The model, represented by  $y=2.45x+1.22$ , is graphed with the  $x$  represents age  $y$  represents weight in pounds.



What does the slope mean in this situation?

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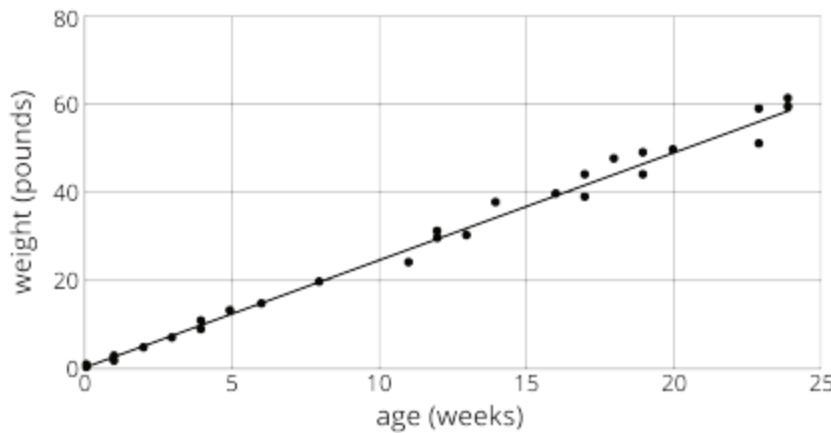
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### Problem 224

Based on this model, how heavy would you expect a newborn Doberman to be?

pounds

---



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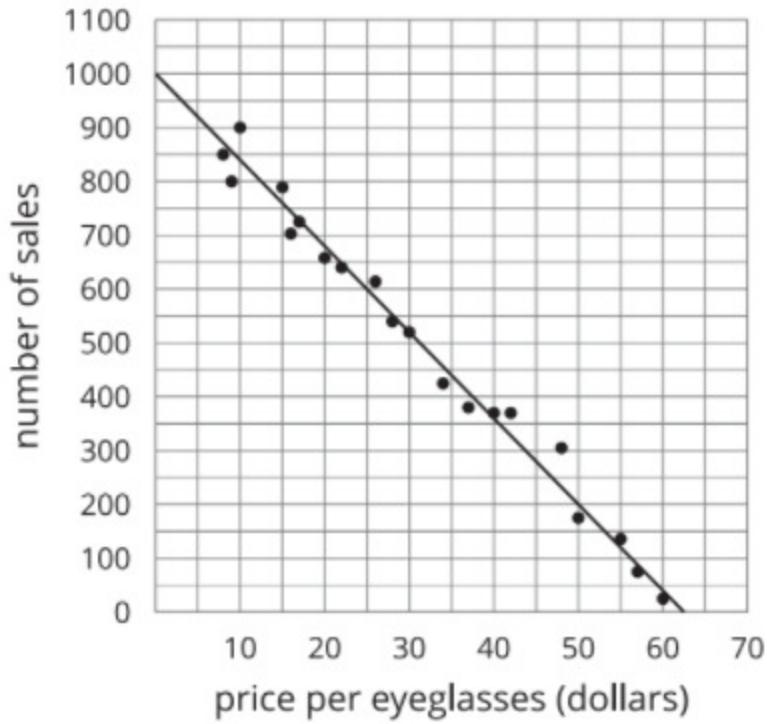
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**Problem 225**



Here are a graph and a table showing the number of sales of eyeglasses based on the price in dollars. The model, represented by  $y = 1,000 - 16x$ , is graphed with a scatter plot. Use the graph and the table to answer the questions.

price per eyeglasses (dollars)	8	9	10	15	16	17	20	22	26	28
number of sales	850	800	900	789	703	725	658	640	614	540

price per eyeglasses (dollars)	30	34	37	40	42	48	50	55	57	60
number of sales	520	425	380	370	370	305	175	136	75	25

How many sales does the model estimate will be made when the eyeglasses are \$50 each?

Do not include units (sales) in your answer.

---

**Problem 226**

Explain or show your reasoning.

**Problem 227**

How many sales were actually made when the eyeglasses were \$50 each?

Do not include units (sales) in your answer.

---

**Problem 228**

How many times did the model estimate fewer sales than what were actually made?

Do not include units (times) in your answer.

---

**Problem 229**

List the coordinates.

**Problem 230**

How many times were the predicted number of sales and actual number of sales equivalent?

Do not include units (times) in your answer.

---

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**Problem 231**

List the coordinates.

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**Problem 232**

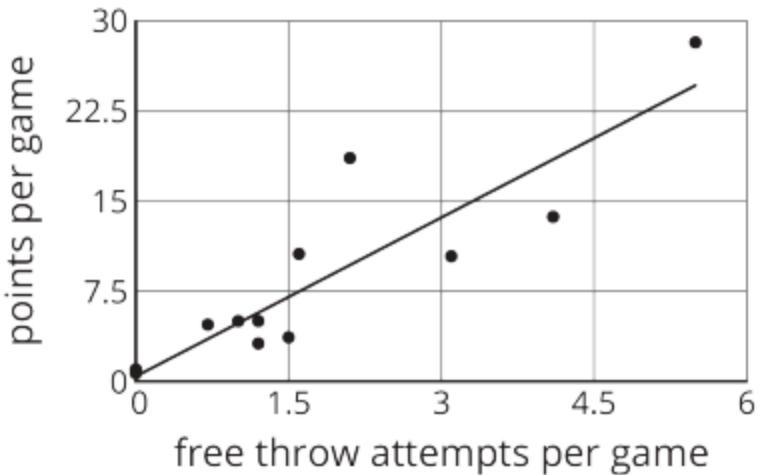
Find a point for which the model predicted there would be at least 25 more sales than were actually made?

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### Problem 233

Here is a scatter plot that compares points per game to free throw attempts per game for basketball players in a tournament.

The model,  $y = 4.413x + 0.377$ , is graphed with the scatter plot. Here,  $x$  represents free throw attempts per game, and  $y$  represents points per game.



Circle any data points that appear to be outliers.

Submit your scatter plot using the tools below.

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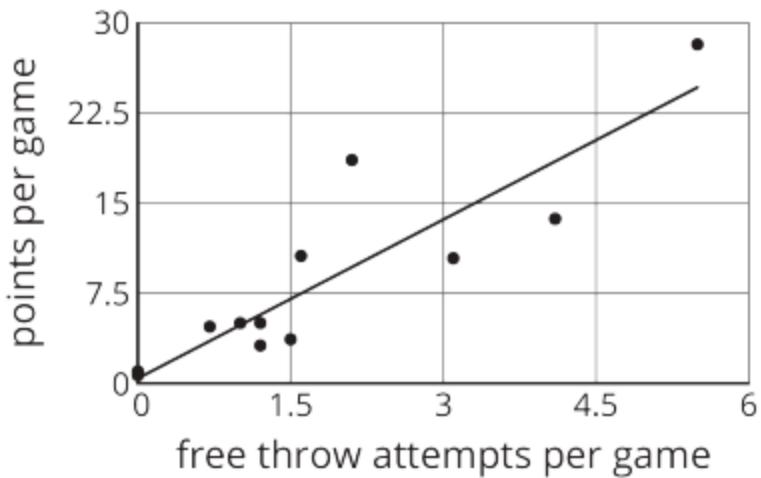
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### Problem 234

What does it mean for a point to be far above the line in this situation?



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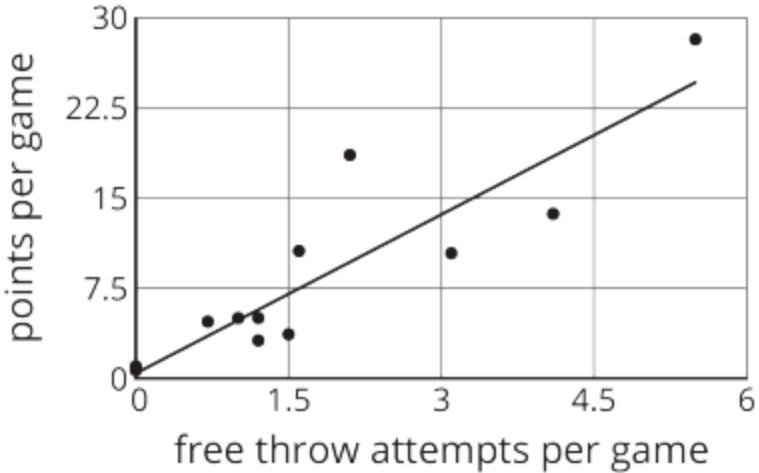
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### Problem 235

Based on the model, how many points per game would you expect a player who attempts 4.5 free throws per game to have? Round your answer to the nearest tenth of a point per game.

points per game

---



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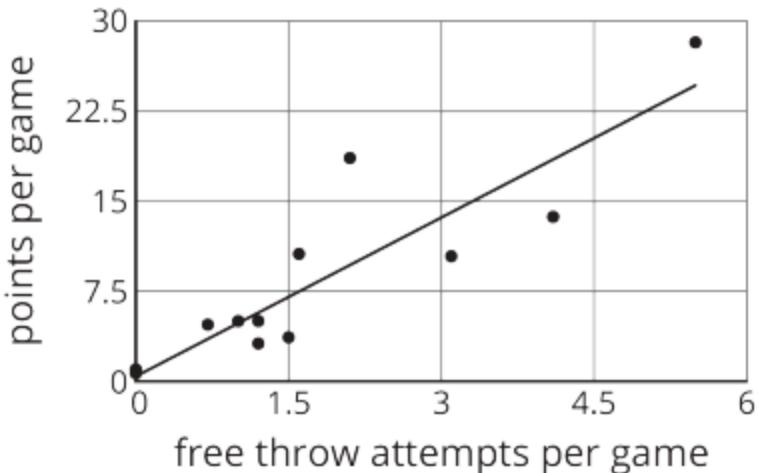
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### Problem 236

One of the players scored 13.7 points per game with 4.1 free throw attempts per game. How does this compare to what the model predicts for this player?



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### Problem 237

From the United States Bureau of Census website, the population sizes (in millions of people) in the United States for census years 1790–2010 are as follows.

Year	1790	1800	1810	1820	1830	1840	1850	1860	1870	1880	1890
Population Size	3.9	5.3	7.2	9.6	12.9	17.1	23.2	31.4	38.6	50.2	63.0

Year	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	2010
Population Size	76.2	92.2	106.0	123.2	132.2	151.3	179.3	203.3	226.5	248.7	281.4	308.7

If you wanted to be able to predict population size in a given year, which variable would be the independent variable, and which would be the dependent variable?

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### Problem 238

Draw a scatter plot.



Draw your scatter plot on paper, take a picture, and upload it using the image upload icon. If you do not have the ability to upload an image of your work type "Scatter plot is on paper."

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### Problem 239

Does the relationship between year and population size appear to be linear?

Yes

No

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### Problem 240

Consider the data only from 1950 to 2010. Does the relationship between year and population size for these years appear to be linear?

Yes

No

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**Problem 241**

One line that could be used to model the relationship between year and population size for the data from 1950 to 2010 is  $y = -4875.021 + 2.578x$ . Suppose that a sociologist believes that there will be negative consequences if population size in the United States increases by more than  $2\frac{3}{4}$  million people annually.

Should she be concerned? Explain your reasoning.

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**Problem 242**

Assuming that the linear pattern continues, use the line given in part (d) to predict the size of the population in the United States in the next census.

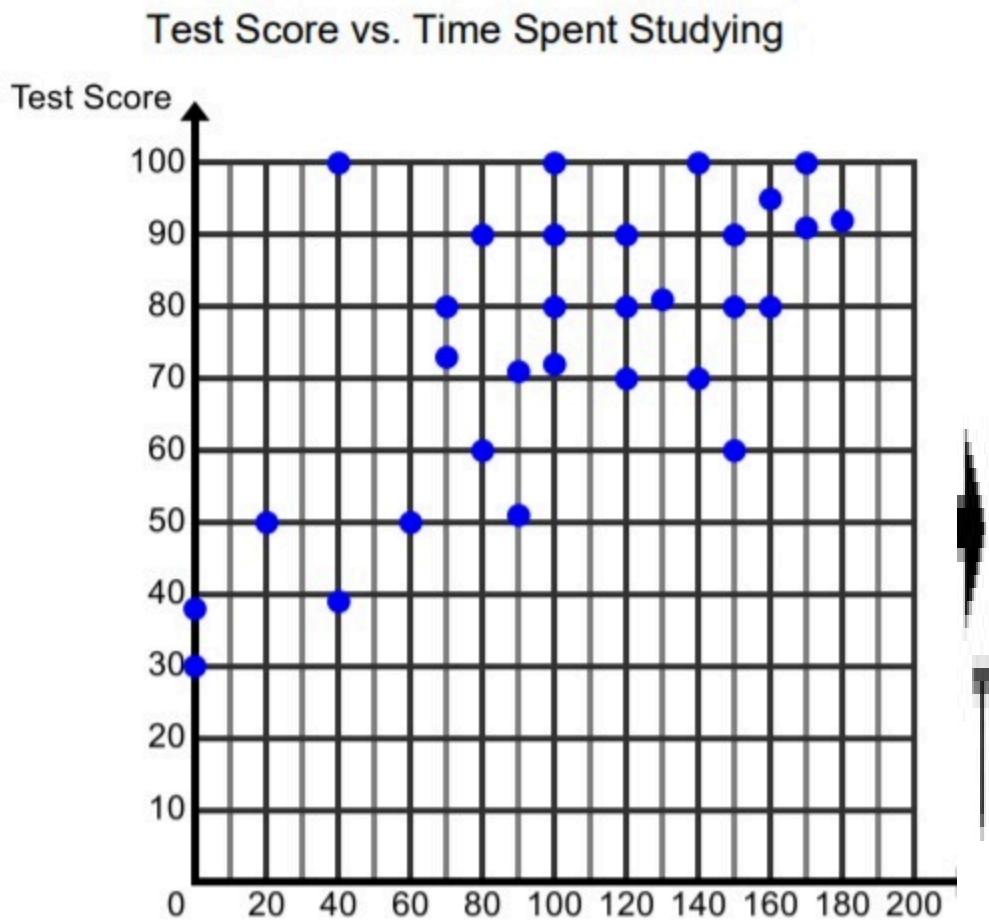
Do not include units (million people) in your answer.

---

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### Problem 243

Jenna is interested in the association between the time spent studying for a test and the score that is earned. She surveys 30 people about the time they spent studying for a test and the score that they earned on the test. Her data is in the scatter plot below.



Describe the association between the two variables.

**The Utah Middle School Math Project**

### Problem 244

Is there any clusters in the data?

Yes

No

Not enough information

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### Problem 245

Is there any point(s) that appear to be outlier(s)?

Yes

No

Not enough information

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### Problem 246

Locate the point(s) that appear to be outlier(s).

You can:

1. Copy the graph above and put a star by any point(s) that appear to be outlier(s) on paper, take a picture, and  
upload it using the image upload icon   
2. Or, you can describe where the outlier(s) is.

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### Problem 247

Provide an explanation for any clusters of data or outliers.

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### Problem 248

Draw a line of best fit on the scatter plot.

Submit your graph using the tools below.

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### Problem 249

Write a prediction function for the line of best fit you drew.



Write the function using the "WIRIS editor" button

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### Problem 250

Explain the meaning of the slope and y-intercept of your line of best fit in the context.

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### Problem 251

Use your prediction function to predict the score for a person who studies for 160 minutes.

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### Problem 252

Compare and contrast the prediction calculated using the equation with the actual data points of the people who studied for 160 minutes.

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### Problem 253

Does the association between these two variables appear to be weak or strong?

Relatively Strong

Relatively Weak

Not enough information to tell

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### Problem 254

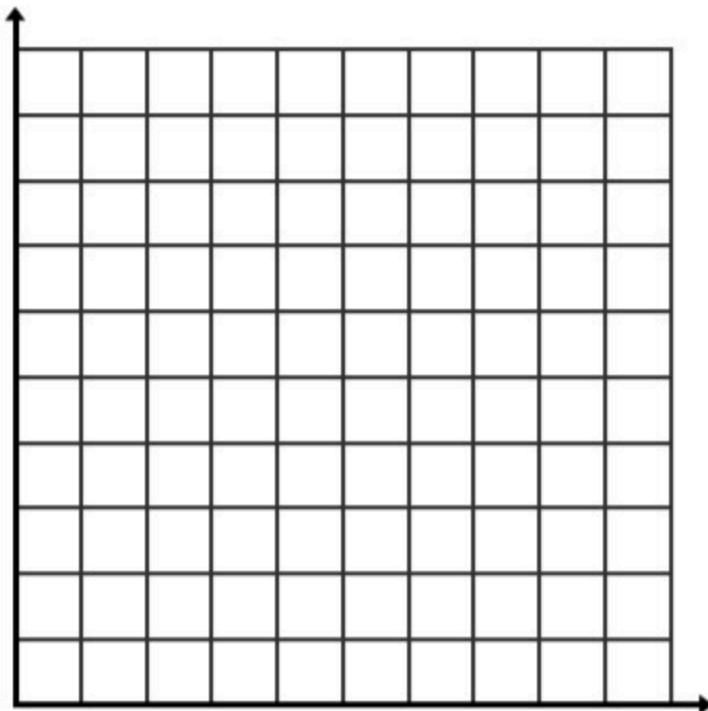
Provide an explanation regarding why the strength is this way.

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### Problem 255

The table gives data relating the number of oil changes every two years to the cost of car repairs.

Oil Changes	3	5	2	3	1	4	6	4	3	2	0	10	7
Repair Costs	\$300	\$300	\$500	\$400	\$700	\$400	\$100	\$250	\$450	\$650	\$600	\$0	\$150



Plot the data on the graph provided, with the number of oil changes on the horizontal axis. You will need to define your own scale.

Submit your scatter plot using the tools below.

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### Problem 256

Write a sentence describing the association between the number of oil changes and the cost of car repairs.

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**Problem 257**

Is the association weak or strong?

Fairly Strong

Fairly Weak

Not enough information

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**Problem 258**

Are there any outliers or clusters that affect the data.

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**Problem 259**

Draw a line of best fit for the data.

Submit your graph using the tools below.

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**Problem 260**

Assess how well the line fits the data.

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### **Problem 261**

What is the slope of the line of best fit and what does it represent?

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### **Problem 262**

What is the y-intercept of the line and what does it represent?

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### **Problem 263**

Write a prediction function in slope-intercept form that you could use to predict the cost of repairs,  $y$ , for any number of oil changes,  $x$ .



Write the function using the "WIRIS editor" button

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### **Problem 264**

Use your prediction function to predict how much a person would spend on car repairs if they were to get 8 oil changes.

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### Problem 265

If a person spent \$1,000 dollars on car repairs how many oil changes would you expect them to have?

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### Problem 266

Based off of this data what would you recommend as the ideal number of oil changes to get every two years?

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### Problem 267

Researchers at a media company want to study news-reading habits among different age groups. They tracked print and online subscription data and made a 2-way table.

	internet articles	print articles
18 - 25 year olds	151	28
26 - 45 year olds	132	72
45 - 65 year olds	48	165

Create a segmented bar graph using one bar for each row of the table.

*Submit your bar graph using the tools below.*

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### Problem 268

Is there an association between age groups and the method they use to read articles? Explain your reasoning.

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### Problem 269

A scientist is interested in whether certain species of butterflies like certain types of local flowers. The scientist captures butterflies in two zones with different flower types and records the number caught.

	zone 1	zone 2
eastern tiger swallowtail	16	34
monarch	24	46

Does the data show an association between butterfly type and zone?

Yes

No

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### Problem 270

Explain your reasoning.

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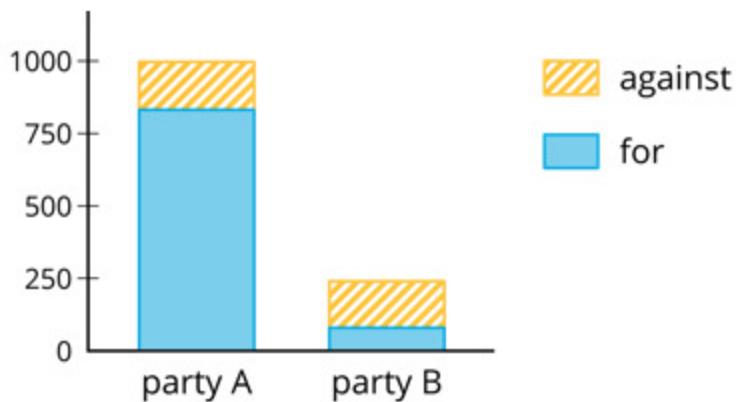
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### Problem 271

A pollster attends a rally and surveys many of the participants about whether they associate with political Party A or political Party B and whether they are for or against Proposition 3.14 going up for vote soon. The results are sorted into the table shown.

	for	against
party A	832	165
party B	80	160

- A news station reports these results by saying, “A poll shows that about the same number of people from both parties are voting against Proposition 3.14.”
- A second news station shows this graphic.



Are any of the news reports misleading?

Yes

No

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## Problem 272

Explain your reasoning.

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## Problem 273

Create a headline, graphic, and short description that more accurately represents the data in the table.

*Submit your work using the tools below.*

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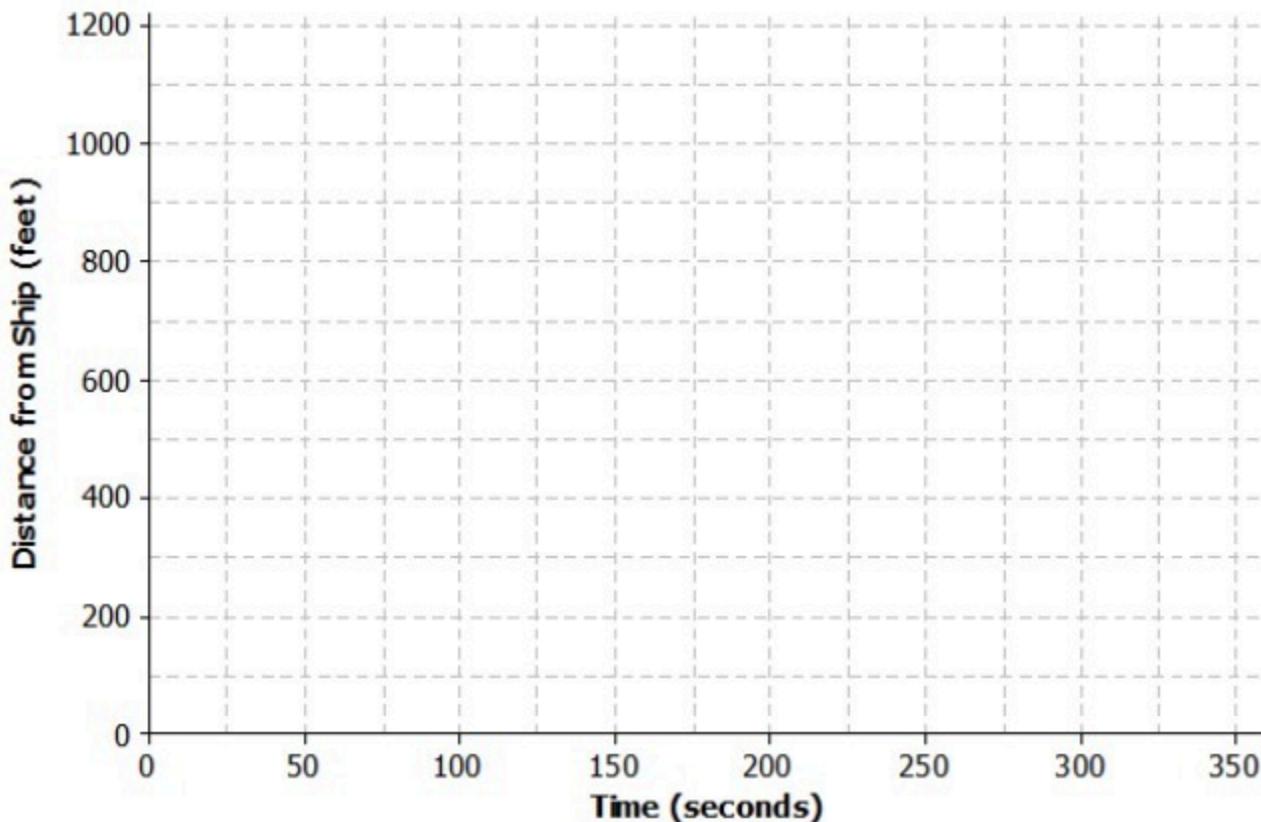
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**Problem 274**

Suppose a dolphin is fitted with a GPS that monitors its position in relationship to a research ship. The table below contains the time (in seconds) after the dolphin is released from the ship and the distance (in feet) the dolphin is from the research ship.

Time (seconds)	Distance from the Ship (feet)	Increase in Distance from the Ship
0	0	—
50	85	
100	190	
150	398	
200	577	
250	853	
300	1,122	

Construct a scatter plot of distance versus time on the grid below.



Draw your scatter plot on paper, take a picture, and upload it using the image upload icon If you do not have the ability to upload an image of your work type "Scatter plot is on paper."



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**Problem 275**

Find the additional distance the dolphin traveled for each increase of 50 seconds. Record your answers in the table above.

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**Problem 276**

Based on the table, do you think that the data follow a linear pattern?

Yes

No

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**Problem 277**

Explain your answer.

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### **Problem 278**

Describe how the distance that the dolphin is from the ship changes as the time increases.

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### **Problem 279**

Sketch a smooth curve that you think fits the data reasonably well.

Draw your graph on paper, take a picture, and upload it using the image upload icon   
If you do not have the ability to upload an image of your work type "Graph is on paper."

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### **Problem 280**

Estimate how far the dolphin will be from the ship after 180 seconds. Explain how you made your estimate.

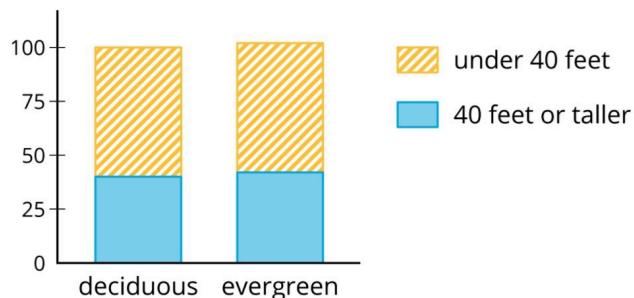
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### Problem 281

An ecologist is studying a forest with a mixture of tree types. Since the average tree height in the area is 40 feet, he measures the height of the tree against that. He also records the type of tree. The results are shown in the table and segmented bar graph.

Is there evidence of an association between tree height and tree type?

	under 40 feet	40 feet or taller	total
deciduous	45	30	75
evergreen	14	10	24
total	59	40	99



- Yes
- No

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### Problem 282

Explain your reasoning.

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### Problem 283

Every student at Abigail Douglas Middle School is enrolled in exactly one extracurricular activity. The school counselor recorded data on extracurricular activity and male and female students for all 254 eighth-grade students at the school.

The counselor's findings for the 254 eighth-grade students are the following:

- Of the 80 students enrolled in band, 42 are male.
- Of the 65 students enrolled in choir, 20 are male.
- Of the 88 students enrolled in sports, 30 are female.
- Of the 21 students enrolled in art, 9 are female.

Complete the table below.

		Extracurricular Activities			
		Band	Choir	Sports	Art
Gender	Female				
	Male				
	Total				

Create and fill in the table using the table button 

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### Problem 284

Write a sentence explaining the meaning of the frequency 38 in this table.

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### Problem 285

Use the table provided above to calculate the following relative frequencies.

What proportion of students are male and enrolled in choir?

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### **Problem 286**

What proportion of students are enrolled in a musical extracurricular activity (i.e., band or choir)?

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### **Problem 287**

What proportion of male students are enrolled in sports?

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### **Problem 288**

What proportion of students enrolled in sports are male?

---

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### Problem 289

In Miss Marble's music collection there are...

- 208 songs in total
- She has 150 songs in her "Workout Music" playlist
- 162 of the songs in the total music collection are Pop songs
- 38 Classical songs are in her "Music for Studying" playlist

Complete the table for about the Miss Marble's music collection.

	<b>Workout Music</b>	<b>Music for Studying</b>	<b>Totals</b>
<b>Classical</b>			
<b>Pop</b>			
<b>Totals</b>			



Create and fill in the table using the table button

**The Utah Middle School Math Project**

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### Problem 290

How many total songs are in her "Music for Studying" playlist?

Answer: \_\_\_\_\_ songs

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### Problem 291

How many classical songs are in her "Workout Music" playlist?

Answer: \_\_\_\_\_ songs

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### Problem 292

What percentage of **songs in the collection** are pop?

Answer: \_\_\_\_\_ % (to 1 decimal place)

---

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### Problem 293

What percentage of **songs in the collection** are for studying?

Answer: \_\_\_\_\_ % (to 1 decimal place)

---

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### Problem 294

What percentage of **the classical music** is music for studying?

Answer: \_\_\_\_\_ % (to 1 decimal place)

---

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### Problem 295

What percentage of **songs in the collection** are classical music for studying?

Answer: \_\_\_\_\_ % (to 1 decimal place)

---

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### Problem 296

Paul tosses a dice and spins a coin 150 times as part of an experiment. He records 71 heads and a six 21 times. On 68 occasions, he gets neither a head nor a six.

Complete the table.

	Six	Not a Six	Totals
Head			
Tail			
Totals			



Create and fill in the table using the table button

**The Utah Middle School Math Project**

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### Problem 297

How many times did he toss a tails and a six?

Answer: \_\_\_\_\_ times

---

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### Problem 298

How many times did he toss a heads?

Answer: \_\_\_\_\_ times

---

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### Problem 299

Use the two-way frequency table given below about Miss Marbles' music playlists to answer the following questions.

	<b>Workout Music</b>	<b>Music for Studying</b>	<b>Totals</b>
<b>Classical</b>	8	38	46
<b>Pop</b>	142	20	162
<b>Totals</b>	150	58	208

Is there an association between what Miss Marble is doing (exercising or studying) and what she is listening to?

Yes

No

Not enough information

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### Problem 300

Use numerical evidence to support your answer.

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