

# Scatter Plots

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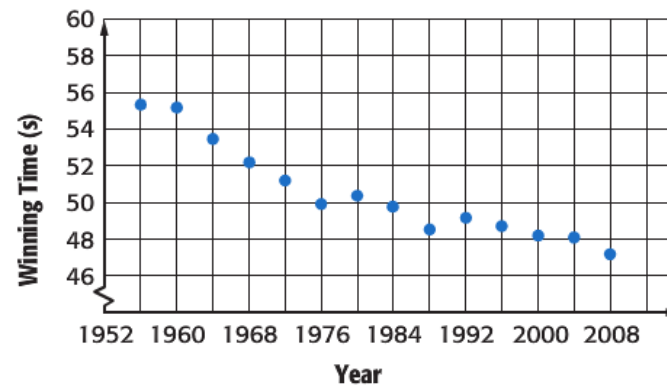
Lesson 9.1

# VOCABULARY:

**Bivariate Data** - Data with two variables, or pairs of numerical observations.

°C	0	5	10	15	20	25	30
°F	32	41	50	59	68	77	86

**Scatter Plot** - Shows the relationship between bivariate data graphed as ordered pairs on a coordinate plane.

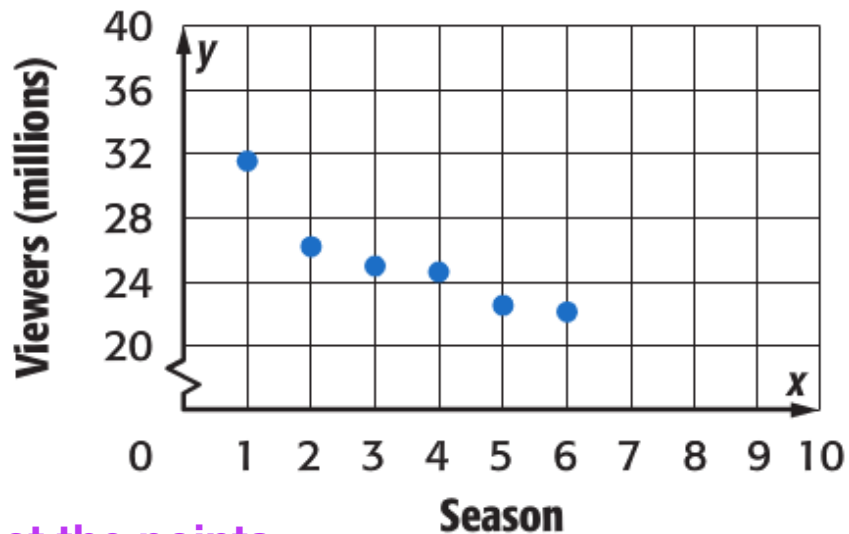


# Construct a Scatter Plot

1. Construct a scatter plot of the number of viewers who watched new seasons of a certain television show.

1. Label your x- and y- axis.  $x = \text{season}, y = \text{viewers}$

2. Graph each ordered pair.  $(\text{season}, \text{viewers})$



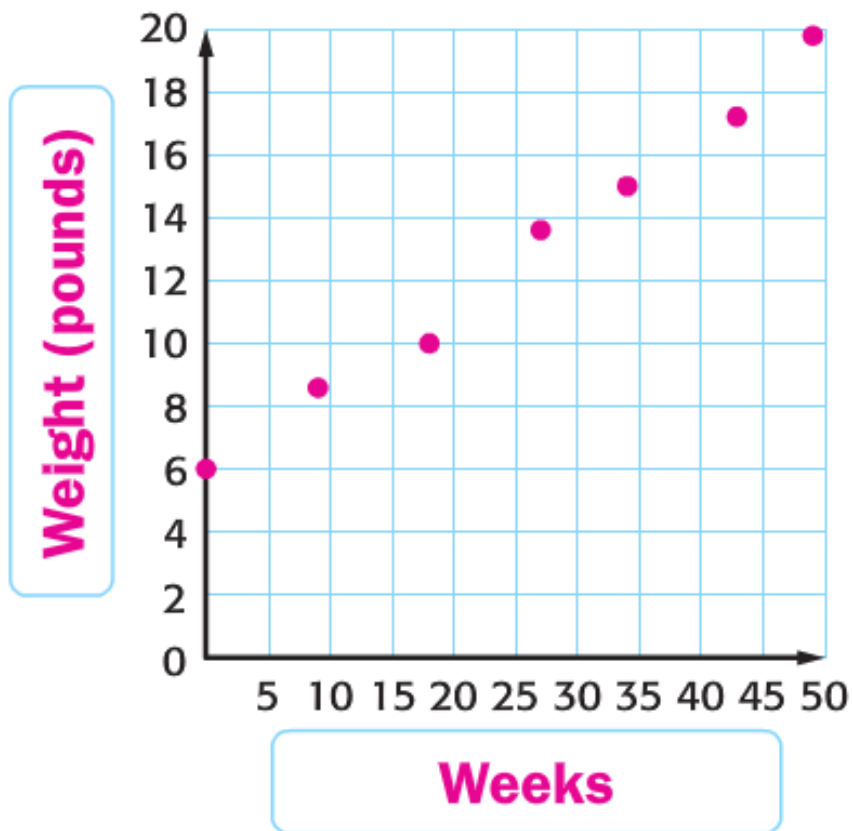
3. Do not connect the points.

Television Ratings	
Season	Viewers (millions)
1	31.7
2	26.3
3	25.0
4	24.7
5	22.6
6	22.1

The table is flanked by two vertical arrows. The left arrow is labeled 'x' and points downwards. The right arrow is labeled 'y' and points downwards.

**Got It?** Do this problem to find out.

Construct a scatter plot of the weight of an alligator at various times after hatching.

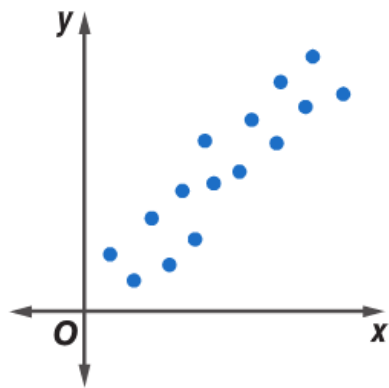


Weeks	Weight (pounds)
0	6
9	8.6
18	10
27	13.6
34	15
43	17.2
49	19.8

# Types of Associations

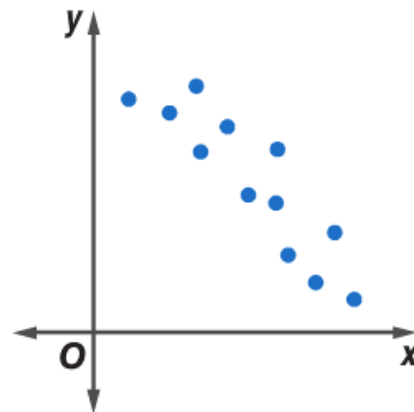
## Variable Association

### Positive Association



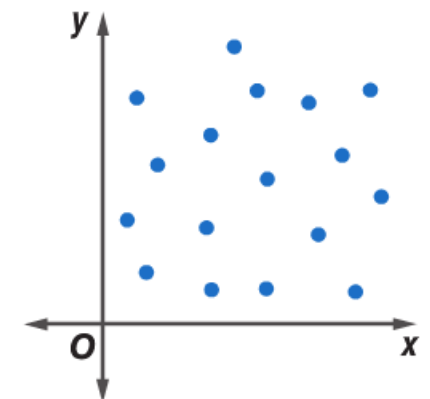
As  $x$  increases,  
 $y$  increases.

### Negative Association



As  $x$  increases,  
 $y$  decreases.

### No Association

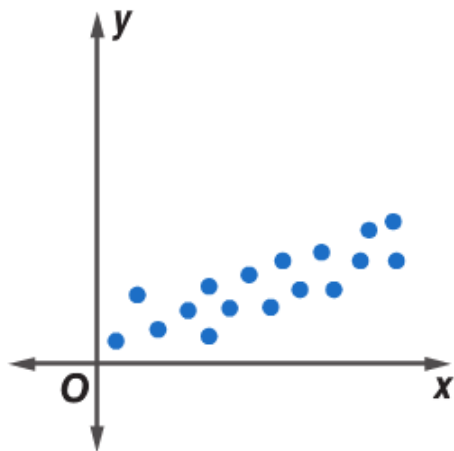


No obvious pattern.

# Types of Associations

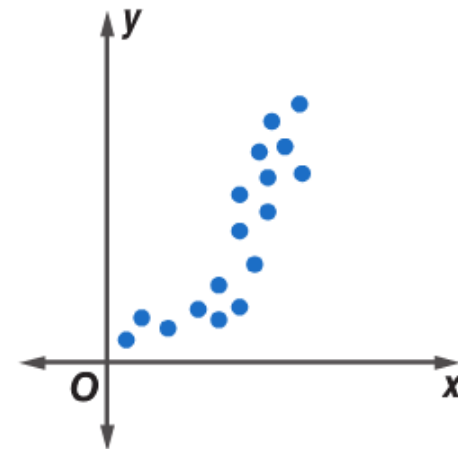
## Linear Association

Linear



The data points lie close to a line.

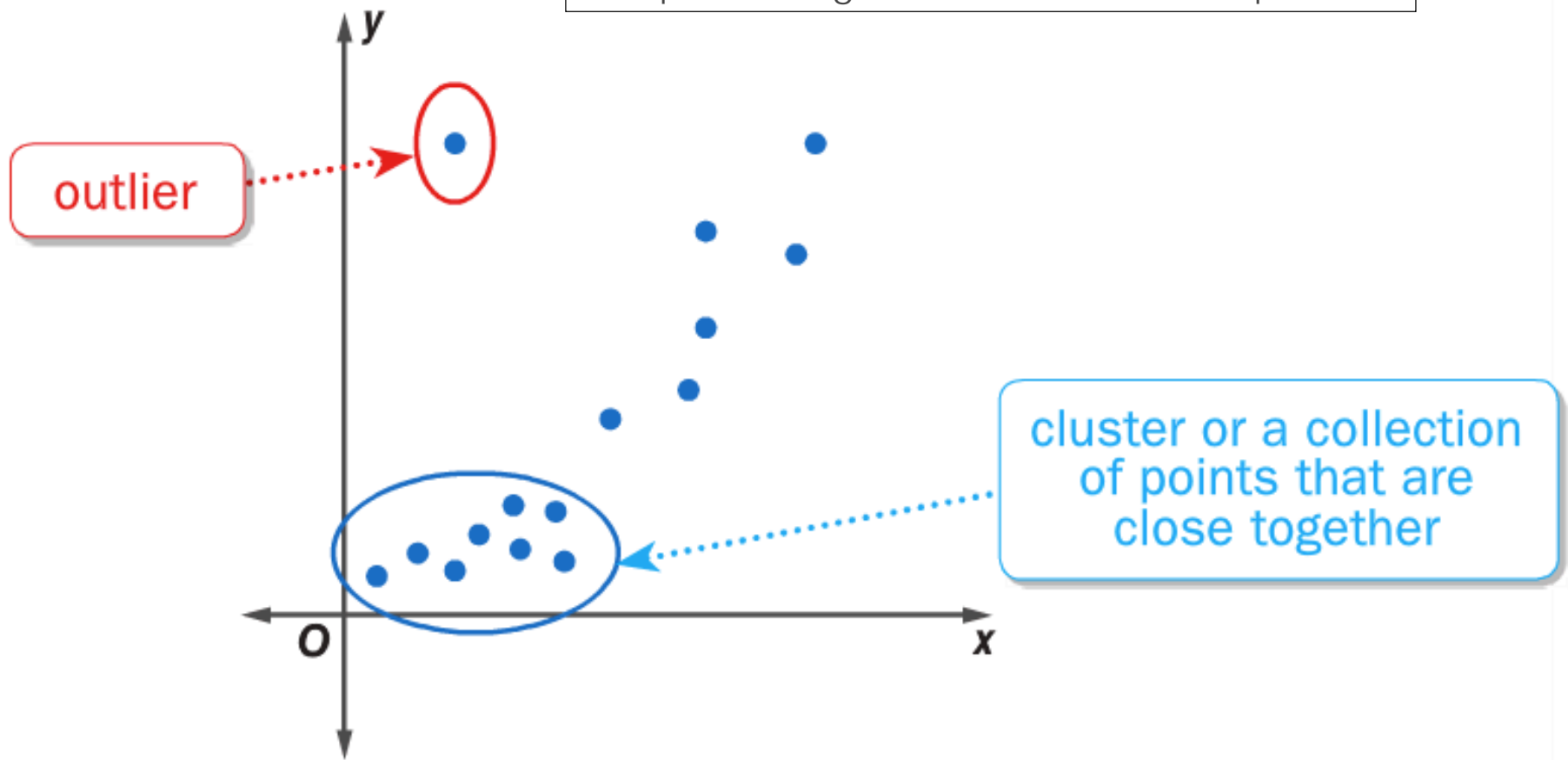
Nonlinear



The data points lie in the shape of a curve.

# OUTLIERS AND CLUSTERS:

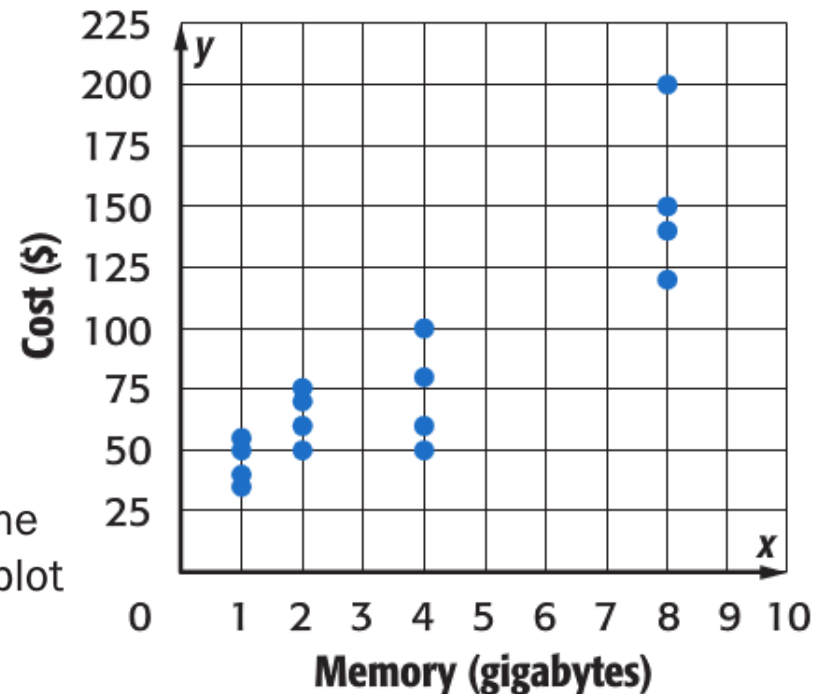
**Outlier** - Data that are more than 1.5 times the interquartile range from the first or third quartiles.



# Example

2. Interpret the scatter plot of the data for the amount of memory in an MP3 player and the cost based on the shape of the distribution.

Consider the different associations and patterns.



**Variable Association** As the amount of memory increases, the cost increases. Therefore, the scatter plot shows a positive association.

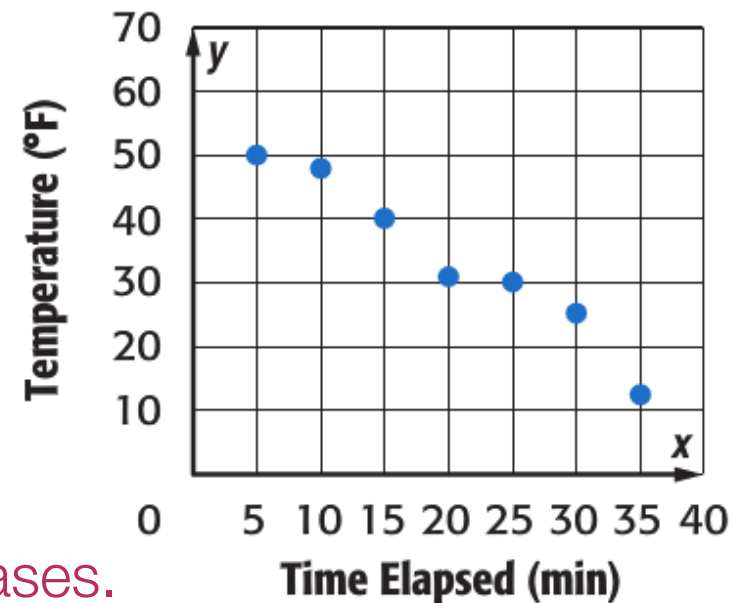
**Linear Association** The data appear to lie close to a line, so the association is linear.

**Other Patterns** There appears to be a cluster of data. One to two gigabytes of memory costs between \$30 and \$75. There does not appear to be an outlier.

# Example

Interpret the scatter plot of the data for the time elapsed and temperature of water based on the shape of the distribution.

Consider the different associations and patterns.



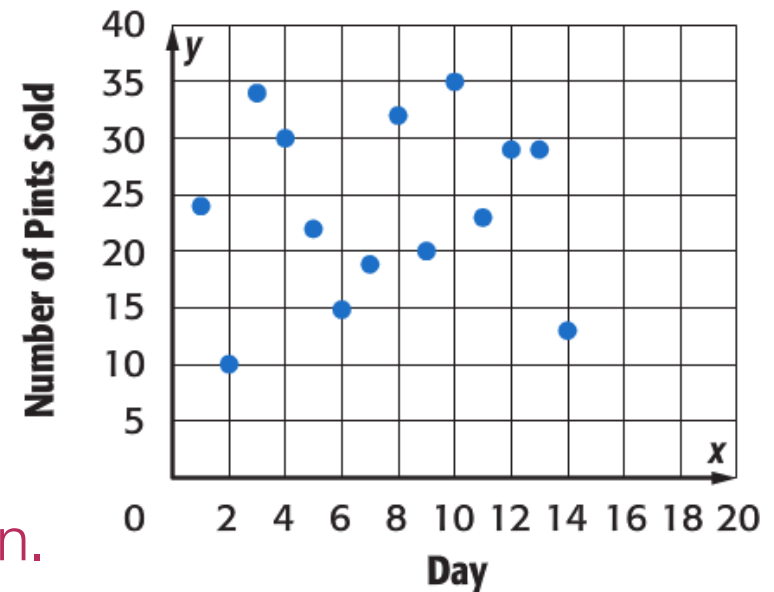
**Variable Association** As the time increases, the temperature of the water decreases. This shows a negative association.

**Linear Association** The data lies close to a line, so it is linear.

**Other Patterns** There are no clusters or outliers.

**Got It?** Do this problem to find out.

Interpret the scatter plot of  
the data for two weeks in  
May and the amount of ice  
cream sold at a shop based  
on the shape of the  
distribution.



**Variable Association** There is no association since the points do not form a pattern.

**Linear Association** Since there is no association, it is neither linear nor nonlinear.

**Other Patterns** There are no clusters or outliers.

**Got It?** Do this problem to find out.

**Interpret each scatter plot.**

**Variable Association**

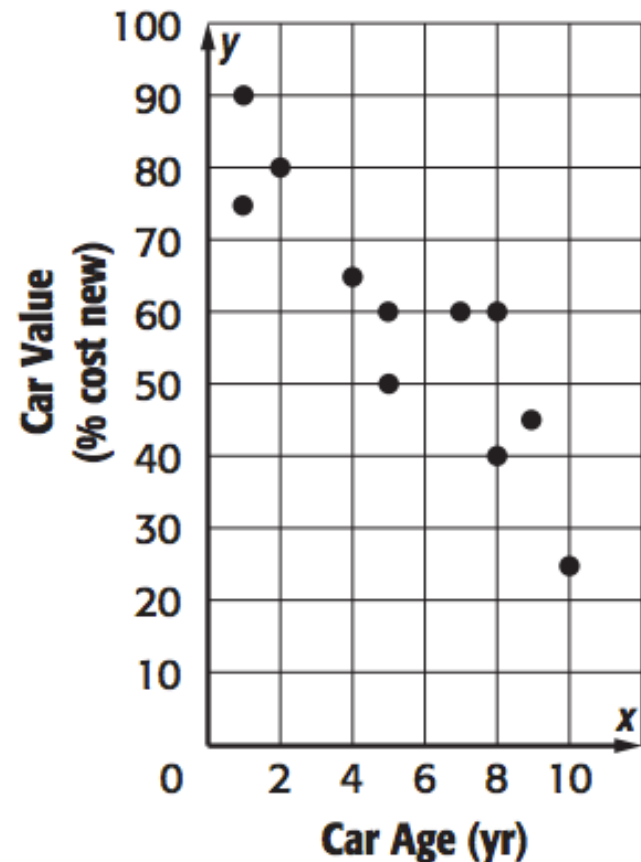
As the car age increases, the value decreases. This shows a negative association.

**Linear Association**

The data lies close to a line, so it is linear.

**Other Patterns**

There are no clusters or outliers.



**Got It?** Do this problem to find out.

**Interpret each scatter plot.**

**Variable Association**

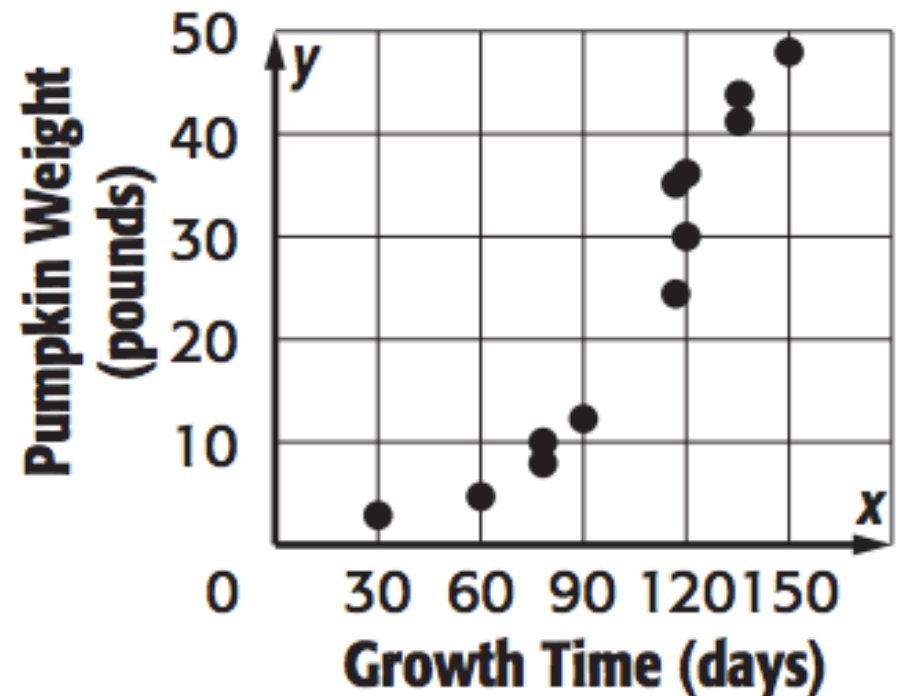
As the number of days increases, the weight increase. This shows a positive association.

**Linear Association**

The data doesn't lie close to a line, so it is linear.

**Other Patterns**

There are no clusters or outliers.



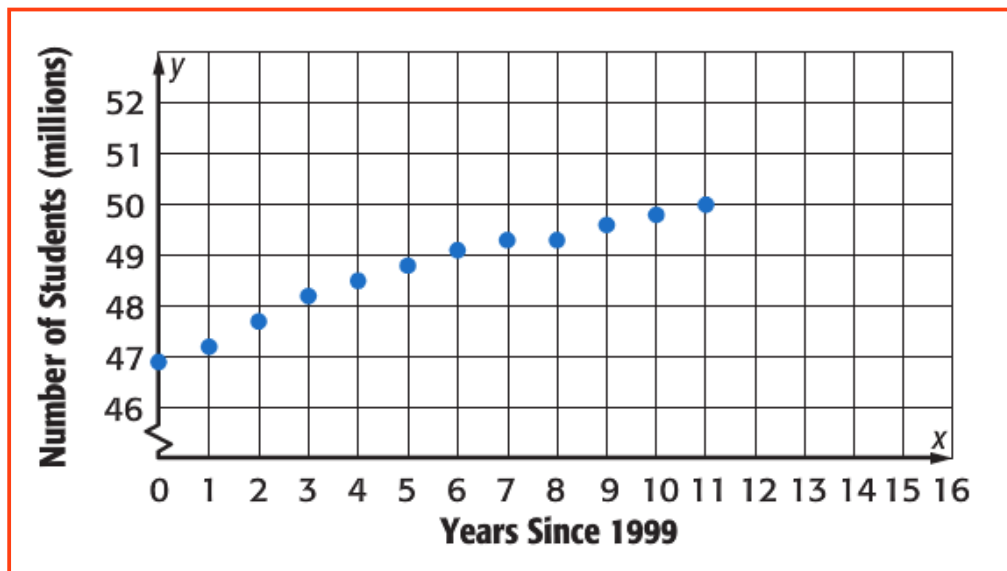
# Example

**3.** The table shows public school enrollment from 1999–2010.

Construct and interpret a scatter plot of the data. If an association exists, make a conjecture about the number of students that will be enrolled in public schools in the year 2015.

<b>Years Since 1999</b>	0	1	2	3	4	5
<b>Number of Students (millions)</b>	46.9	47.2	47.7	48.2	48.5	48.8
<b>Years Since 1999</b>	6	7	8	9	10	11
<b>Number of Students (millions)</b>	49.1	49.3	49.3	49.6	49.8	50.0

## Step 1: Make a Scatter Plot



# Example

## 3. The table shows public school enrollment from 1999–2010.

Construct and interpret a scatter plot of the data. If an association exists, make a conjecture about the number of students that will be enrolled in public schools in the year 2015.

### Step 2: Interpret the Plot

#### Variable Association

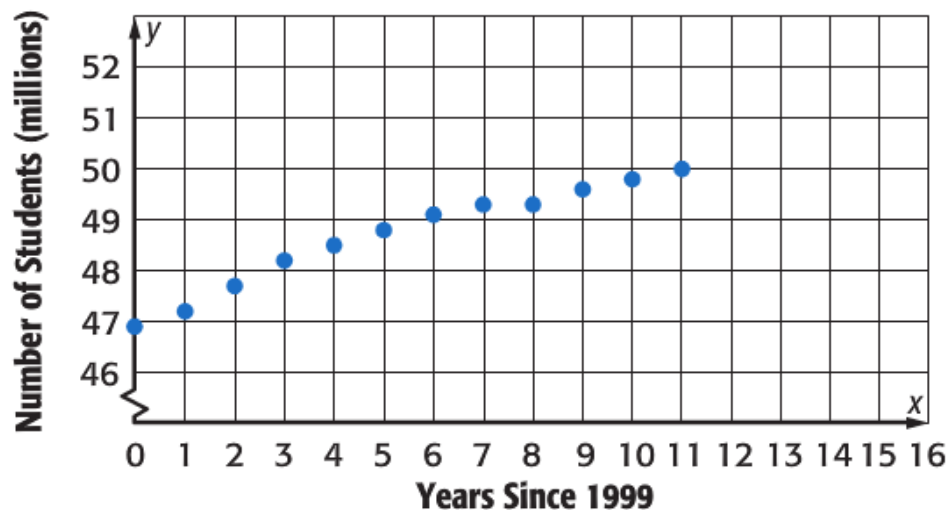
As the years increase, the number of students increases. Therefore, the scatter plot shows a positive association.

#### Linear Association

The data appear to lie close to a line, so the association is linear.

#### Other Patterns

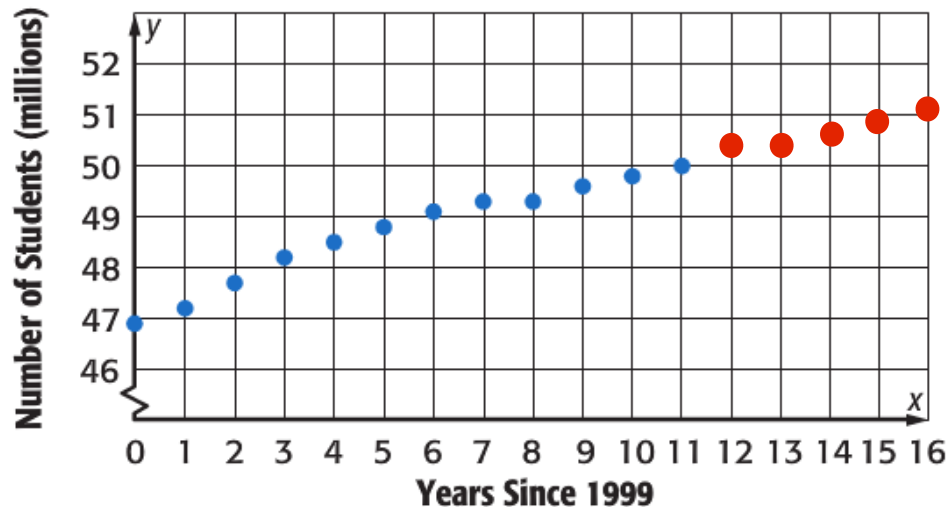
There are no clusters or outliers.



# Example

## 3. The table shows public school enrollment from 1999–2010.

Construct and interpret a scatter plot of the data. If an association exists, make a conjecture about the number of students that will be enrolled in public schools in the year 2015.



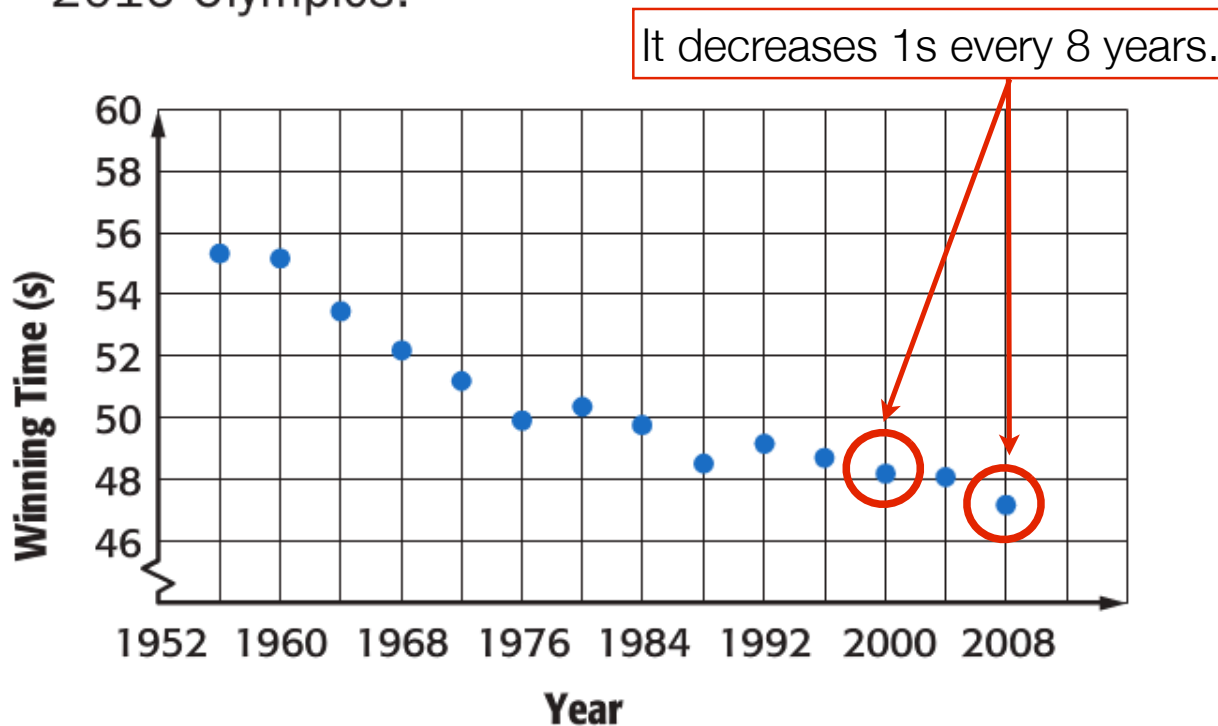
### Step 3: Make a Conjecture

To make a conjecture about the number of students that will be enrolled in public schools in the year 2015, follow the pattern until the x-value is 16. Then find the corresponding y-value.

There will be about 51 million students enrolled in 2015.

**Got It?** Do this problem to find out.

Interpret the scatter plot shown for the men's Olympic 100-meter freestyle swim winning times. If an association exists, make a conjecture about the winning time in the 2016 Olympics.



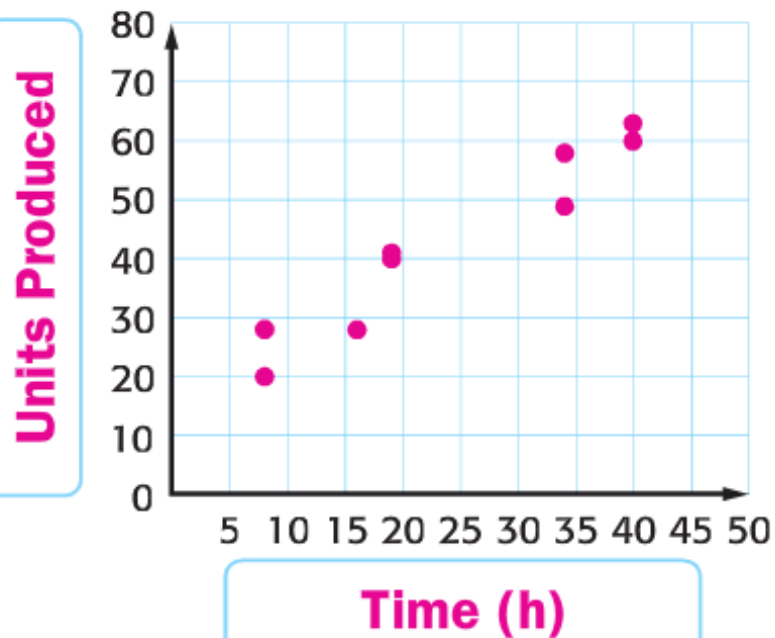
**The scatter plot shows a negative linear association. There are no clusters or outliers. The winning time in 2016 will be about 46.5 seconds.**

**Got It?** Do this problem to find out.

The table shows the number of units produced in a certain number of hours at a manufacturing plant. (Examples 1–3)

<b>Time (h)</b>	8	19	16	40	34	8	40	19	34
<b>Units Produced</b>	20	41	28	60	49	28	63	40	58

a. Construct a scatter plot of the data.



b. Interpret the scatter plot of the data.

As the time increases, the units produced increases. This shows a positive linear association. There are no clusters or outliers.

c. Make a conjecture about the number of units produced in 50 hours. **about 70 units**

# Homework:

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**Pg. 671 - 674**

**# 2 - 16 (evens)**