

Frequency Tables (pages 88–91)



You can organize large amounts of data in a **frequency table**, which shows the number of times each item appears. A frequency table has a **scale** that includes all of the numbers in the data. A frequency table also has an **interval**, which separates the scale into equal parts. The **range** of the data is the difference between the greatest and least numbers in the data.

EXAMPLE

Luis surveyed T-shirt shops in Port Aransas to find the average prices (in dollars) of souvenir T-shirts. The average prices he found at each shop were: 9, 10, 12, 9, 18, 12, 13, 10, 5, 8, 16, and 11. Create a frequency table with these data.

Cost (\$)	Tally	Frequency
1–5		1
6–10		5
11–15		4
16–20		2

- The range for this data is $18 - 5$, or 13.
- The frequency table includes all of the data, so the scale will be from 1–20.
- The interval, which divides the data into four equal parts, is 5.

Try This Together

1. Every student in the Pet Lovers Club has at least one pet. The number of pets each member has is 1, 2, 1, 1, 3, 2, 4, and 6. Make a frequency table with this data. Identify the range, scale, and interval.

Hint: The scale must include all of the data, and the interval must divide the data into equal-sized parts.

PRACTICE

Find the range for each set of data. Choose an appropriate scale and interval for a frequency table.

- 5, 3, 2, 1, 4, 6, 9
- 111, 125, 101, 94, 136
- 15, 10, 24, 20, 37, 40
- 5, 6, 11, 0, 14, 12, 8, 16, 18
- 220, 340, 130, 180, 230, 340, 100
- 20, 10, 50, 60, 40, 30, 90, 70
- Draw a number line that shows a scale of 0 to 10 and an interval of 2.

9. **Food** Alex’s class is having a pizza party. The set of data shows what kinds of pizza people ordered. Make a frequency table of the data.

Kind of Pizza				
P	V	M	V	M
S	P	S	M	P
P	S	P	V	V

S = sausage
P = pepperoni
M = mushroom
V = vegetable



10. **Standardized Test Practice** What is the range of this set of data?

15, 10, 12, 16, 18, 5, 3, 46, 35, 21, 26

A 41

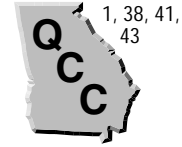
B 31

C 36

D 43

Answers: 1. See Answer Key. 2–7. Sample scales and intervals are given. 8. 8; 1–10, 2 3. 30; 10–44, 5 4. 42; 90–139, 10 5. 240; 100–349, 50 6. 18; 0–19, 2 7. 80; 0–99, 20 8–9. See Answer Key. 10. D

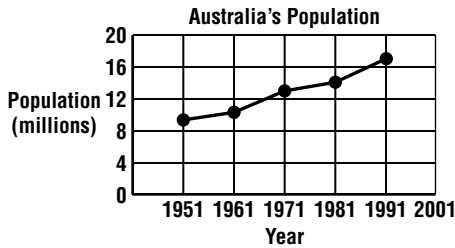
Making Predictions (pages 94–97)



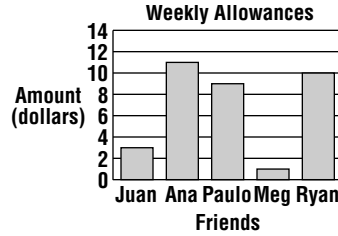
The following examples show a **line graph** and a **bar graph**.

EXAMPLES

A Line Graph



B Bar Graph

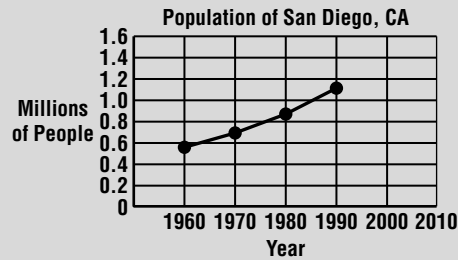


You can make predictions from a line graph because it shows a trend over time. You can also make predictions from a bar graph based on the comparisons it shows.

Try This Together

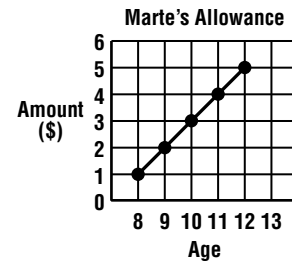
- The line graph shows how the population of San Diego has grown since 1960. Predict the population of San Diego in the year 2010.

Hint: Where do you expect to see the line in the year 2010?

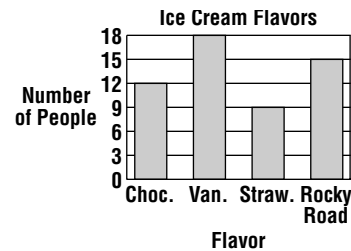


PRACTICE

- Money Matters** The line graph shows how much allowance Marte receives every week. Predict how much allowance she will receive every week when she is 13 years old.



- Standardized Test Practice** The bar graph shows the most popular ice cream flavors at an ice cream shop in May. Use the graph to predict what the most popular flavor will be in June.



A chocolate

B vanilla

C strawberry

D rocky road

Answers: 1. Sample answer: 1.5 million 2. \$6 per week 3. B

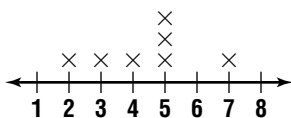
Line Plots (pages 98–101)



A **line plot** is a picture of information on a number line. To make a line plot, determine the scale and interval from your data, just as you do when you make a frequency table. Then draw the number line to fit the scale and mark the interval. Finally, place an “×” above the number line to represent each data point.

EXAMPLE

For one week, Juko kept track of how many glasses of water she drank each day. Here are the results: 2, 5, 3, 5, 7, 4, and 5. Create a line plot with these data.



The scale must include all of the numbers in the data set, so you can choose 1–8.

You can choose an interval of 1.

Notice how the line plot shows a group of marks at 5.

Data that are grouped closely together are called a **cluster**.

Try These Together

Make a line plot for each set of data.

1. 1, 5, 6, 3, 3, 8, 4, 5, 6

2. 30, 25, 60, 45, 60, 25, 45

Hint: Each scale must include all of the numbers in the data set.

PRACTICE

Make a line plot for each set of data.

3. 130, 160, 140, 180, 160, 160

4. 32, 35, 32, 32, 31, 36, 38, 38, 39

5. 82, 86, 85, 95, 84, 96, 95, 84

6. 2, 6, 5, 8, 6, 6, 3, 1, 1, 9, 4

7. **Nutrition** The data at the right shows the daily recommended number of servings from each food group. Draw a line plot of these data.

Food Group	Minimum Number of Servings
Dairy Products	2
Meat, Fish, and Eggs	2
Vegetables	3
Fruits	2
Bread and Grains	6



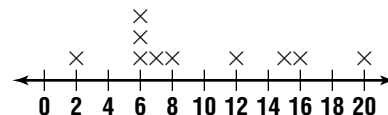
8. **Standardized Test Practice** Look at the line plot at the right. Where do you find a cluster?

A 0–5

B 6–10

C 11–15

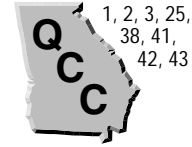
D 16–20



Answers: 1–7. See Answer Key. 8. B

Mean, Median, and Mode

(pages 102–105)



You can summarize a set of data with a single number in three ways: the mean, median, and mode.

Mean	The mean of a data set is the arithmetic average . To find the mean, add all of the numbers in the data set and then divide by the number of items in the set.
Mode	The mode of a data set is the number(s) or item(s) that appear most often. Sometimes there is no mode, or two or more modes.
Median	The median is the middle number in a data set when the data are arranged in numerical order. When there is an even number of items in a data set, the median is the mean of the two middle numbers.

EXAMPLE

Find the mean, mode, and median for 1, 3, 3, 4, 6, 6, 6, 8, and 8.

To find the mean, you must average the numbers.

$$\frac{1 + 3 + 3 + 4 + 6 + 6 + 6 + 8 + 8}{9} = 5$$

To find the mode, look for the number that appears most often.

The number 6 appears most often, so the mode is 6.

The median is the middle number in the data set.

The data are already arranged in numerical order. There are 9 items in the set, so the fifth one, or 6, is the median.

Try These Together

Find the mean, mode(s), and median for each set of data.

1. 17, 15, 15, 12, 16, 18, 19

Hint: Arrange the data in numerical order.

2. 1, 5, 8, 9, 5, 6, 9, 5, 2, 10

Hint: Arrange the data in numerical order.

PRACTICE

Find the mean, mode(s), and median for each set of data.

3. 46, 52, 23, 28, 32, 25, 23, 51

4. 106, 180, 152, 148, 132, 152

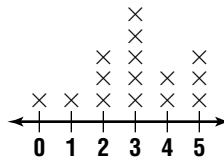
5. 21, 22, 23, 25, 23, 24, 23

6. 200, 350, 375, 425, 200, 250

7. Number of Pets per Student

8. Scores on Spelling Quiz

Number of Pets	Tally	Frequency
0		4
1		11
2		8
3		5



9. **Standardized Test Practice** The low temperatures in San Diego for one week in the winter were 55°, 52°, 59°, 59°, 53°, and 52° F. What was the mean low temperature?

A 55°

B 56°

C 58°

D 59°

Answers: 1. 16, 15, 16 2. 6, 5, 5, 5 3. 35, 23, 30 4. 145, 152, 150 5. 23, 23, 23 6. 300, 200, 300 7. 1.5, 1, 1 8. 3, 3, 3 9. A

Stem-and-Leaf Plots

(pages 108–111)



You can use a **stem-and-leaf** plot to display data. In a stem-and-leaf plot, the last digit in each data item is the **leaf**. The digits in front of the leaf become the **stem**.

EXAMPLES

Create stem-and-leaf plots with the following data.

A Gladys has four dogs. They weigh 42, 58, 53, and 61 pounds.

Use the tens digits to form the stems, and the ones digits to form the leaves. So $4|2 = 42$.

There are two values, 53 and 58, that have a five in the tens place. This causes the 5 stem to have leaves of 3 and 8, to represent 53 and 58.

Stem	Leaf
4	2
5	3 8
6	1

$4|2 = 42$

B Gladys also has three cats. They weigh 10, 13, and 9 pounds.

Use a **back-to-back stem-and-leaf plot** to compare the weights of Gladys's dogs and cats.

For dogs, $2|4 = 42$ pounds.

For cats $0|9 = 9$ pounds.

Dogs	Stem	Cats
	0	9
	1	0 3
	2	
	3	
2	4	
8 3	5	
1	6	

$2|4 = 42$ $0|9 = 9$

Try These Together

Make a stem-and-leaf plot for each data set.

1. 11, 5, 6, 12, 23, 24, 28, 21, 18, 17

2. 36, 41, 25, 28, 30, 45, 45, 40, 26, 29

PRACTICE

Make a stem-and-leaf plot for each data set.

3. 15, 13, 26, 12, 14, 23, 26, 21, 15

4. 92, 86, 85, 66, 73, 72, 64, 75, 84, 81

5. 2, 6, 3, 5, 11, 15, 16, 18, 7, 9, 19

6. 56, 54, 28, 41, 33, 26, 58, 64, 24, 45

7. **Music** The data table lists prices of compact discs (CDs) in two different music categories at Annie's Music Shop. Make a back-to-back stem-and-leaf plot of the prices of classical music compact discs and country music compact discs. Which category of music CDs is priced lower at Annie's Music Shop?

Type of Music CD	Prices
Classical	8, 7, 15, 13, 13, 12, 10, 14, 16, 11, 13, 15, 9
Country	12, 9, 14, 15, 16, 16, 17, 14, 15, 12, 11, 9, 9



8. **Standardized Test Practice** Look at the stem-and-leaf plot of prices of tickets to a play. In which interval do the greatest number of prices fall?

A 1–10

B 32–38

C 11–19

D 20–29

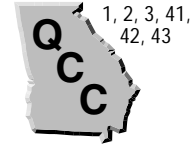
Stem	Leaf
1	1 3 5 7 9
2	0 5 7 9
3	2 4 6

$3|2 = 32$

Answers 1–7. See Answer Key. 8. C

Box-and-Whisker Plots

(pages 114–117)



You can use a **box-and-whisker plot** to summarize data. A box-and-whisker plot divides a data set into four parts.

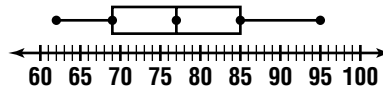
EXAMPLE

Create a box-and-whisker plot for these data:
12, 16, 62, 48, 16, 59, 43, 39.

Step 1	<ul style="list-style-type: none"> Write the data in order from least to greatest. Find the median of the data, which is 41. Find the lower quartile, which is the median of the lower half of the data, or 16. Find the upper quartile, which is the median of the upper half of the data, or 53.5. The lower extreme is the least value. The upper extreme is the greatest value. The lower extreme is 12 and the upper extreme is 62.
Step 2	<ul style="list-style-type: none"> Draw a number line. Graph the values you found in step 1. Draw a box around the lower and upper quartiles and draw a vertical line through the median value. Extend whiskers from each quartile to the extreme points.
Step 3	<ul style="list-style-type: none"> Calculate the interquartile range by subtracting the lower quartile from the upper quartile. The interquartile range for these data is 37.5. Data that are more than 1.5 times the interquartile range from the quartiles are outliers. The limits on outliers are the points beyond which data are considered to be outliers. There are no outliers for these data.

PRACTICE

Use the box-and-whisker plot of test scores.



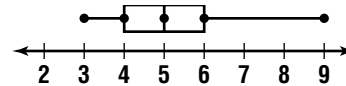
- What is the median?
- What is the lower quartile?
- What is the upper quartile?
- What is the lower extreme?
- What is the upper extreme?
- What is the interquartile range?
- What are the limits on outliers?
- Are there any outliers?

9. **Sports** The table shows the games won by each girls' sports team at Dennison High School. Make a box-and-whisker plot of the data.

Sport	Wins	Sport	Wins	Sport	Wins
Soccer	5	Volleyball	6	Hockey	4
Basketball	7	Softball	7	Kickball	8



10. **Standardized Test Practice** What is the upper extreme of this box-and-whisker plot?



- A** 5 **B** 4 **C** 3 **D** 9

Answers: 1. 77 2. 69 3. 85 4. 62 5. 95 6. 16 7. 45 and 109 8. No 9. See Answer Key. 10. D

Misleading Statistics

(pages 119–121)



Statistics and graphs can be presented in ways that are misleading. For example, the mean is not a good way to describe a data set when there are outliers. Changing the scale of a graph may also make the graph misleading.

EXAMPLE

Darnell was notified that the raffle ticket he bought at the county fair was a winner. He was told that the average prize amount was almost \$4,000. Use the information at the right to explain why Darnell should not expect to win more than \$100.

There are only three prizes over \$100, and 50 prizes of \$100. Because of the large number of \$100 prizes, Darnell is most likely to win only \$100.

Raffle Prizes	
Prize	Amount
Grand Prize	\$100,000
First Prize (2 winners)	\$50,000
Second Prize (50 winners)	\$100

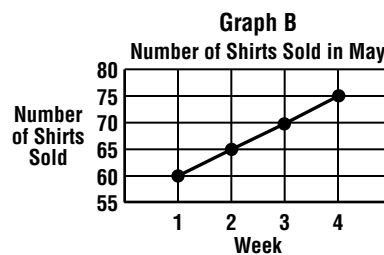
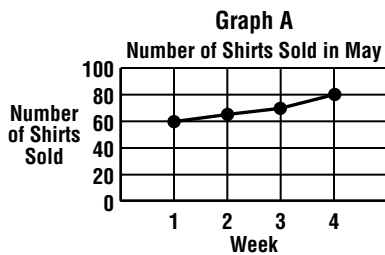
The average winner wins almost \$4,000!

Try This Together

- Abigail's starting salary was \$47,000, three years ago. She has received a \$2,000 raise each year. Create a graph that makes her salary increases look more substantial than they actually are.

PRACTICE

- The two line graphs show sales of T-shirts at The Tee Shop for May. Which graph could be misleading? Explain.



- Standardized Test Practice** The Italian Restaurant advertises huge meals. The sizes of many of their meals are shown in the table at the right. What misleading statistic might they be using to describe the serving sizes of their meals?

- A** mean **B** median
C mode **D** distorted facts

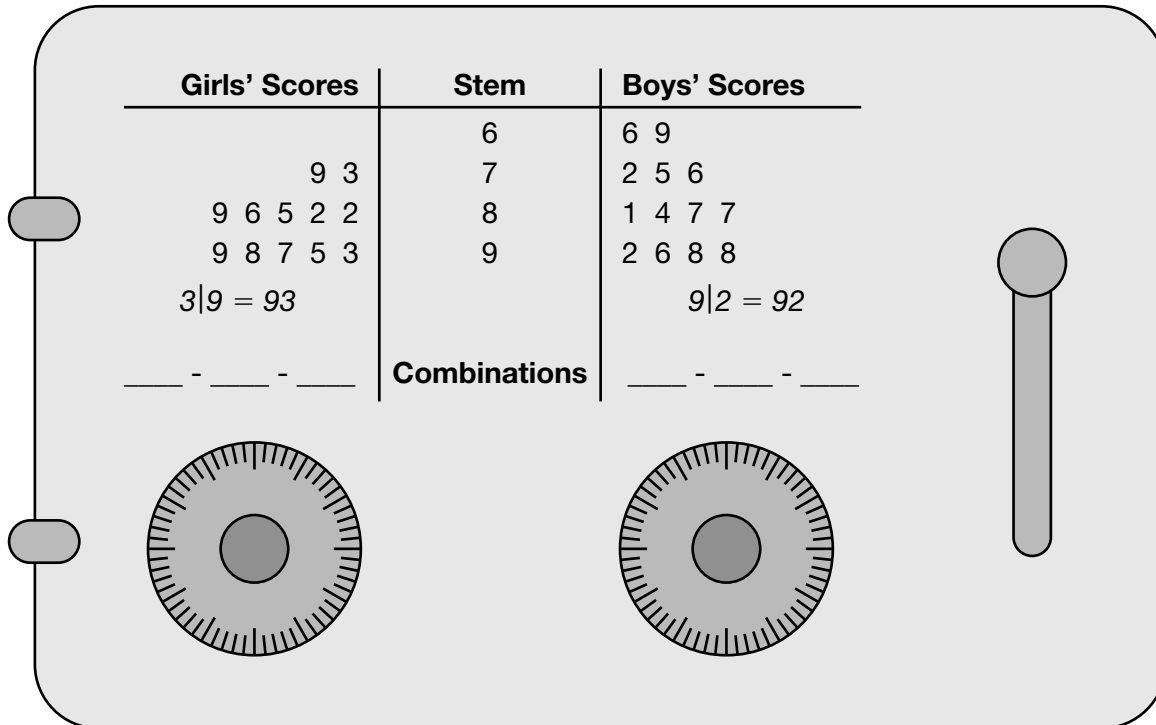
Meal	Serving Size (oz)
Spaghetti	10
Tortellini	12
Manicotti	14
Ravioli	11
Lasagna	15
Fettucine	32

Answers: 1. See Answer Key. 2. Graph B; the vertical scale starts from 55 instead of zero. It makes it look like sales increased more than they actually did. 3. A

Chapter 3 Review

Safe Combinations

To find out what is in a secret safe, you must find the combination to the two locks on the safe. Use the stem-and-leaf plot of midterm-exam scores to answer the questions below to find the combinations for the girls' lock and the boys' lock.



1. How many girls are there in the class?
2. What was the lowest girls' score?
3. What was the highest girls' score?

Use the answers for Exercises 1–3 to fill in the combination for the girls' lock above.

4. How many boys are there in the class?
5. What was the highest boys' score?
6. What was the lowest boys' score?

Use the answers for Exercises 4–6 to fill in the combination for the boys' lock above.

Answers are located on page 113.