Dear Family,

This week your student is exploring how to display and describe data collected to answer **statistical questions**. The data collected to answer a statistical question are expected to vary, or show **variability**.

You can collect data to answer this statistical question.

How old are the students in the swim class?

You can use a table to show the **frequency** of each data value, or the number of times each value occurs. A frequency table displays the **distribution** of the data.

Your student will be displaying and describing distributions of data sets like the one below.

Age	Frequency
9				
10	卌|
11			

This list shows the number of pets owned by each of 11 students.

1, 0, 0, 1, 0, 1, 1, 3, 1, 1, 0

➤ **ONE WAY** to display the data distribution is in a frequency table.

Number of Pets	Frequency
0					
1	卌|
2	
3		

You can describe the data as being spread out from 0 pets to 3 pets.

The data show that most people have 0 pets or 1 pet.

➤ **ANOTHER WAY** is to use a **dot plot**.

Each dot represents one data value.

Number of Pets
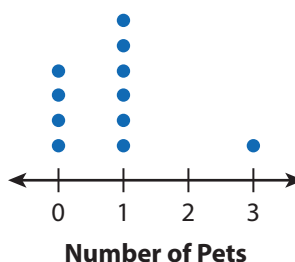
The shape of the data distribution shows one large group of data points at 0 and 1, with a single point at 3.

Both displays show the data values in order from least to greatest and can help you describe the distribution of the data.

Use the next page to start a conversation about statistical questions.

Activity Thinking About Statistical Questions Around You

➤ **Do this activity together to investigate statistical questions in the real world.**

Did you know that scientists collect data to study earthquake patterns? They do this by using special equipment to measure the magnitude, or strength, of an earthquake each time one occurs.

Scientists use the data they collect to help predict when the next earthquakes may happen. Scientists ask and answer statistical questions such as *What magnitudes of earthquakes occur in this region?* and *How often do earthquakes of these magnitudes occur?*

Earthquakes near Bluffdale, Utah
February 13 - April 20, 2019
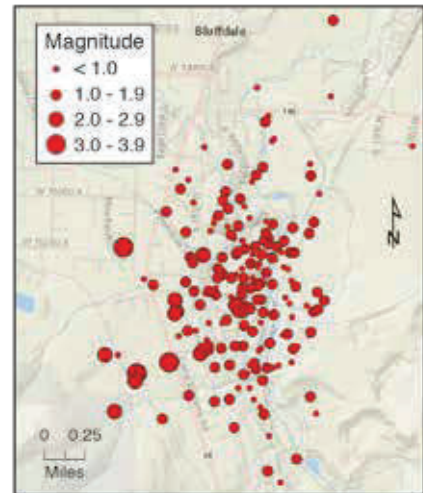
University of Utah Seismograph Stations

? Where else do you see statistical questions being used in the world around you?

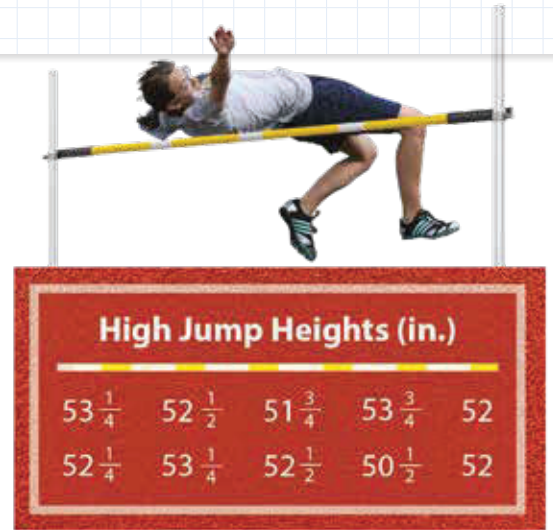# Explore Statistical Questions and Data Distributions

Model It

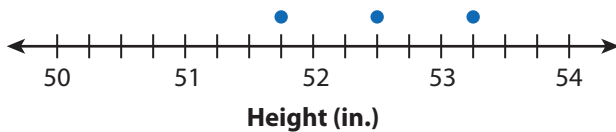➤ **Complete the problems about data and statistical questions.**

1 Keiko is on her school's track team. She collects data to answer this question.

How high did members of the track team jump in yesterday's high jump event?

Complete the **dot plot** to show Keiko's data.

High Jump Heights

High Jump Heights (in.)

$53\frac{1}{4}$ $52\frac{1}{2}$ $51\frac{3}{4}$ $53\frac{3}{4}$ 52

$52\frac{1}{4}$ $53\frac{1}{4}$ $52\frac{1}{2}$ $50\frac{1}{2}$ 52

Height (in.)

2 A **statistical question** is a question that can be answered by collecting data that are expected to vary.

a. In problem 1, why is Keiko's question a statistical question?

b. Keiko's teammate Lillie asks *How high did the track team's captain jump in yesterday's high jump event?* Is Lillie's question a statistical question? Why or why not?

DISCUSS IT

Ask: How does your dot plot in problem 1 show that the data vary?

Share: I think the question *How high did the team's captain jump in the last 10 high jump events?* is a statistical question because . . .

Learning Targets   SMP 2, SMP 3, SMP 7
• Recognize a statistical question as one that anticipates variability in the data related to the question.
• Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
• Summarize numerical data sets in relation to their context by reporting the number of observations.

Model It

➤ **Complete the problems about statistical questions.**

3 Keiko and Lillie ask more questions about their track team. Complete the table.

	Keiko's and Lillie's Question	What data do Keiko and Lillie need to collect?	Are the data likely to vary?
a.	What is a typical time for a member of the track team to run the 100-meter dash?	several 100-meter dash times for each team member	yes
b.	How many team members ran in yesterday's track meet?	the number of members who ran in the meet	
c.	How much faster did Lillie run the 100-meter dash than Keiko in yesterday's track meet?		
d.	How much faster does Lillie usually run the 100-m dash than Keiko?		
e.	Is the high jump or the 100-meter dash more popular among spectators at track meets?		

4 Which questions from the table in problem 3 are statistical questions?

5 Write another statistical question that Keiko and Lillie could ask about their track team.

**6** **Reflect** Does a question need to have more than one answer to be a statistical question? Explain.

DISCUSS IT

Ask: Which question in problem 3 does not require numerical data to answer?

Share: I think I could draw a dot plot for data collected to answer my question because . . .

Prepare for Understanding Statistical Questions and Data Distributions

1 Think about what you know about data. Fill in each box. Use words, numbers, and pictures. Show as many ideas as you can.

What Is It?

What I Know About It

data

Examples

Examples

Examples
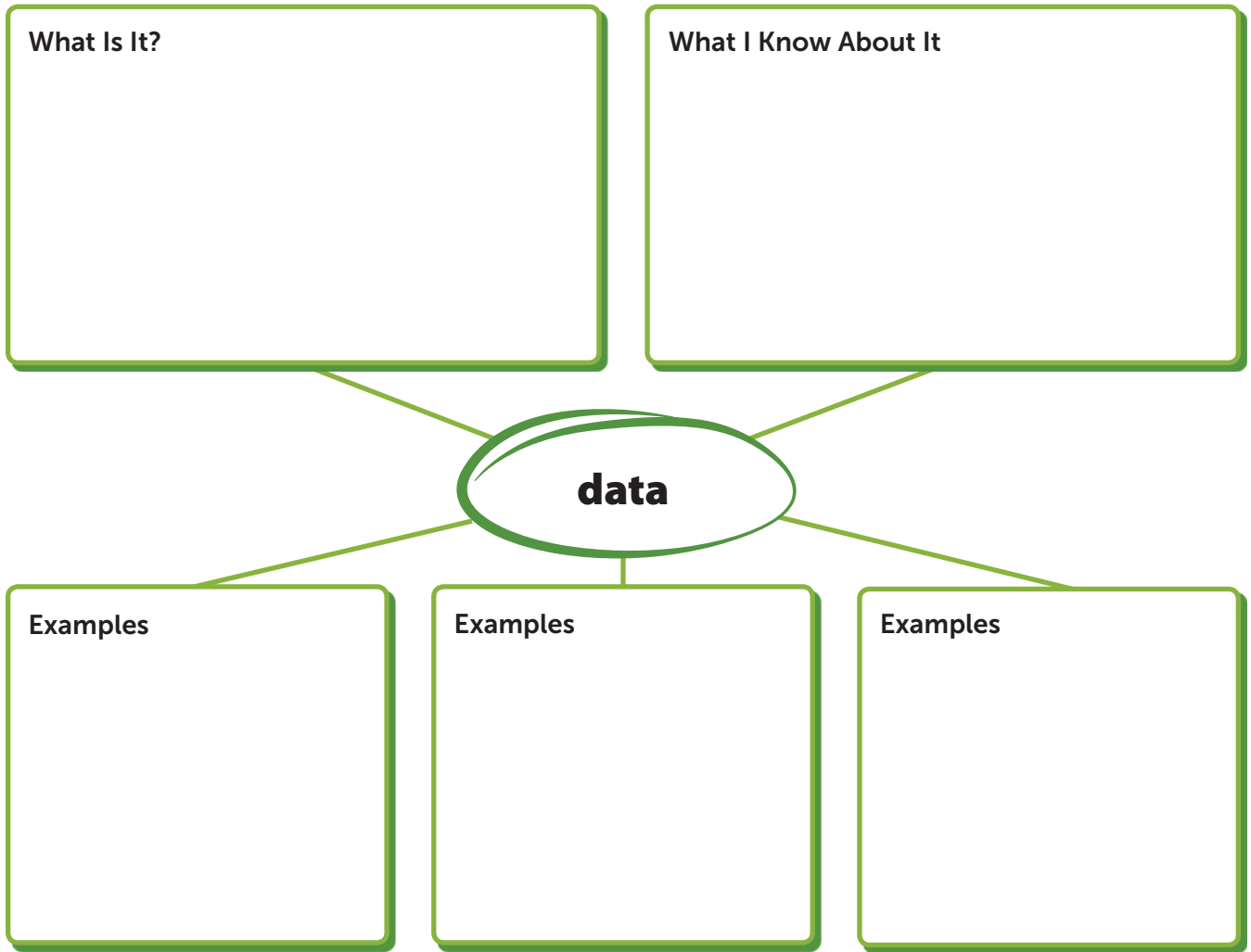
2 Adsila says that she can display the set of data shown in the table by making a dot plot. Do you agree with Adsila? Explain.

Items for Sale	
Type	**Number**
Mugs	6
Stickers	5
T-shirts	12

➤ **Complete problems 3–4.**

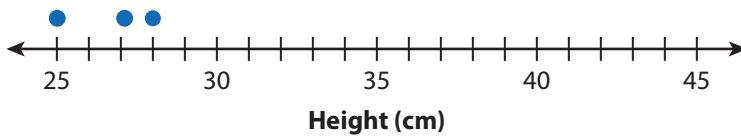**3** A science class is studying the dragonflies at a small pond.

a. Victoria collects data to answer this question.

At what height do dragonflies typically perch when they land?

Complete the dot plot to show Victoria's data.

| Dragonfly Perch Heights (cm)				
32	42	31	36	35
42	25	41	37	27
33	35	28	29	

Dragonfly Perch Heights

Height (cm)

b. Is Victoria's question statistical? Explain.

c. Salvador finds a dragonfly wing. He asks the question *How long is this dragonfly wing?* Is Salvador's question statistical? Explain how you know.

4 A park ranger collects the data shown in the dot plot. What is a statistical question that the park ranger could be trying to answer by collecting the data?

Hiking Trails

Length (mi)
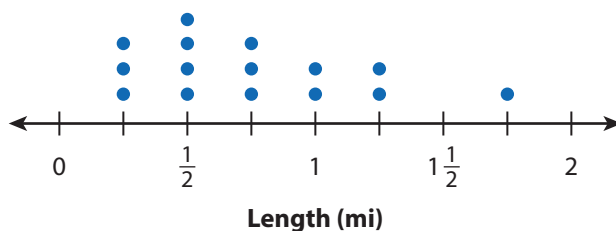
> **Vocabulary**
>
> **statistical question**
> a question that can be answered by collecting data that are expected to vary.

©Curriculum Associates, LLC   Copying is not permitted.

# Develop Understanding of Statistical Questions and Data Distributions

Model It: Data Displays

➤ **Try these two problems about displaying and describing data.**

1. The **frequency** of a data value is the number of times it occurs in a data set. For example, the frequency of the value 3 in the set {3, 5, 3, 4, 9, 1} is 2.

   a. The frequency table below uses tally marks to show how long it took the students in Ms. Gordon's class to complete a math puzzle. Use the frequency table to complete the dot plot.

Minutes	Frequency
5	卌 ‖
6	卌
7	卌
8	‖‖
9	‖

Time to Complete Puzzle

Minutes
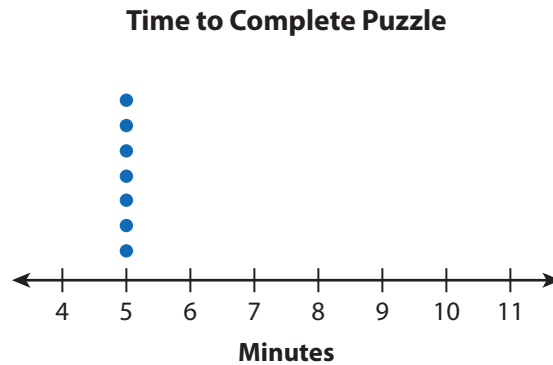
   b. How many students completed the puzzle? How do you know?

2. A **distribution** displays the values in a data set and shows how often the values occur.

   a. How do the dot plot and the frequency table in problem 1 help you see the distribution of the times?

   b. Describe the shape of the distribution in the dot plot.

DISCUSS IT

Ask: What is a statistical question that the dot plot could be used to answer?

Share: A frequency table is similar to a dot plot because . . .

Model It: Data Descriptions

➤ **Try these two problems about describing data distributions.**

3 **a.** Mr. Aba's students do a math puzzle. Use the dot plot to complete the frequency table.

Time to Complete Puzzle
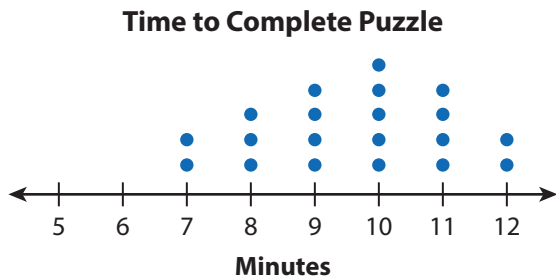
Minutes

Minutes	Frequency
	2
8	
9	
	5
12	

b. The data for Mr. Aba's class is spread from

a fastest time of _____ minutes to a slowest time of _____ minutes.

4 When you describe how spread out data values are, you are describing the **variability** of the data set. The **range** of a data set describes the variability by telling how far apart the greatest and least data values are.

The range of the data for Mr Aba's Class is _____ minutes.

DISCUSS IT

Ask: How would you describe the shape of the distribution for Mr. Aba's students?

Share: I think you can find the range of a data set by . . .

CONNECT IT

➤ **Complete the problems below.**

5 How are a frequency table and a dot plot similar in the way they show the range of a data set? How are they different?

6 Describe the shape and variability of the distribution of the data shown in the dot plot.

African Weaver Ants

Length (mm)
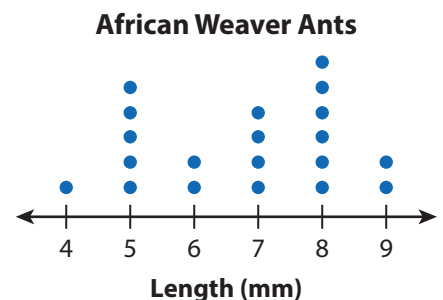
# Practice Statistical Questions and Data Distributions

➤ **Study how the Example shows describing a data distribution. Then solve problems 1–3.**

Example

Students in Mr. Lincoln's class measure the distance they walk with one step. Describe the shape and variability of the distribution of their data set.

Step Lengths (in.)					
21	24	28	26	25	25
25	25	25	24	22	23
23	24	26	22	23	24

You can display the data in a dot plot.

Step Length (in.)
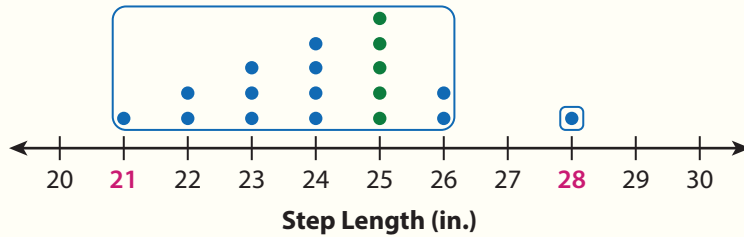
Shape: There is **one large group** of data points with its **highest point** at 25 in. There is a **single point** at 28 in. to the right of the large group.

Variability: The distribution is spread from **21 in.** to **28 in.** Since 28 − 21 = 7, the range is **7 in**.

1 **a.** How many students measured their step length in the Example? Use the dot plot to explain how you know.

b. What statistical question do you think the students in Mr. Lincoln's class are trying to answer?

c. How do you know that the question you wrote is statistical?

Vocabulary

distribution
a representation that shows how often values in a data set occur.

statistical question
a question that can be answered by collecting data that are expected to vary.

variability
how spread out or close together values in a data set are.

2 Customers who buy an adventure game sold by an app store can give the game a rating from 1 star to 5 stars. The frequency table shows the number of 1-star, 2-star, 3-star, 4-star, and 5-star ratings.

Number of Stars	Frequency
1	ЖЖ II
2	ЖЖ
3	I
4	III
5	ЖЖ II

a. The game has a total of _____ ratings.

b. Make a dot plot of the data set shown in the frequency table.

c. Describe the shape and variability of the distribution.

d. How would the shape and variability of the distribution change if the game receives 20 more ratings of 5 stars?

3 The dot plot shows the data Gavin collects to answer the question *What is a typical number of seconds that I can stay in a handstand?*

Gavin's Handstand Times

Time (s)

a. Why is Gavin's question a statistical question?
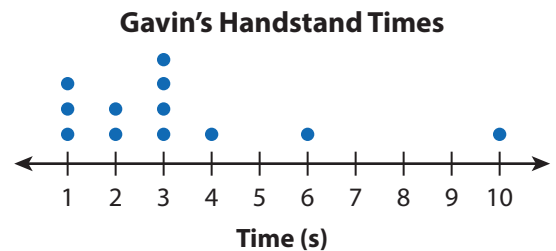
b. Describe the shape and variability of the distribution of Gavin's data set.

Refine Ideas About Statistical Questions and Data Distributions

Apply It   **Math Toolkit** graph paper, number lines

➤ **Complete problems 1–5.**

1 **Evaluate** Rafael says that the question below is a statistical question because there is more than one possible answer. Explain why Rafael is incorrect and tell how you could modify the question so that it is a statistical question.
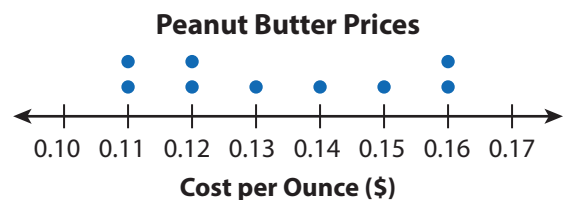
Does my math teacher prefer reading history books or graphic novels?

2 **Compare** Which question would likely result in more variability if you asked each student in your school? Explain.

About how many hours per week do you play sports?

What grade are you in?

3 **Predict** The dot plot shows the cost per ounce of different brands of peanut butter sold at a store. The store plans to add a new brand of peanut butter. The new brand has a 16-oz jar that sells for $3.84. Based on its cost per ounce, do you think the new brand is a good deal compared to the other brands? Use the distribution shown in the dot plot to support your answer.

Peanut Butter Prices

0.10 0.11 0.12 0.13 0.14 0.15 0.16 0.17

Cost per Ounce ($)

4 The data show the flight times, in minutes, of 21 toy drones.

PART A Use a model to represent the distribution of the flight times.

Drone Flight Times (min)						
3	7	7	4.5	5	5	5
10	9	9	10	7	6.5	6.5
5	3	4.5	3.5	6.5	5.5	5

PART B About how long does a drone typically fly? Explain your reasoning.

5 **Math Journal** Agustin collects the data set shown in the dot plot to answer the question *How many days each week do students in my class eat a cafeteria lunch?* Why is Agustin's question statistical? Describe the distribution of the data collected to answer this statistical question.

Cafeteria Lunches

Days per Week
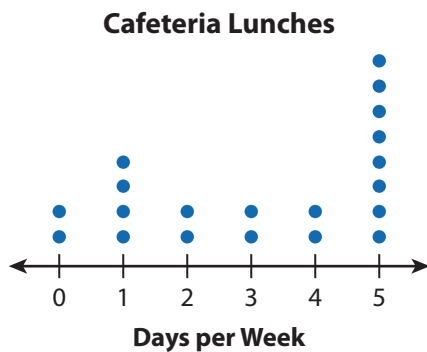
✅ End of Lesson Checklist

☐ **INTERACTIVE GLOSSARY** Find the entry for *statistical question.* Write two important things you learned about statistical questions in this lesson.