You’ve learned how to display data on a line plot. Take a look at this problem.

A random sample of teenagers ages 13 and 14 were asked: On average, how many text messages do you send per day? Here are the results:

0, 10, 10, 10, 10, 20, 20, 20, 30, 50, 50, 50, 90, 100, 100

Display the data in a dot plot. What can you say about the results?

Explore It

Use the math you already know to solve this problem.

- Draw a dot plot to represent the data. Instead of an “x,” draw a dot to represent each person’s response.

**Text Messages Sent per Day**

- How many teenagers were surveyed? How do you know?

- Describe the shape of the graph.

- Count the number of dots at 0 and at 10. What do these numbers mean?

- What is one conclusion you can draw from this dot plot?
On the previous page, you displayed the data in a dot plot and analyzed the data. Dot plots are best for small data sets. Each dot represents one piece of data in the data set.

Dot plots are one way to display and analyze data. Another way is to put data points into groups. Let’s say you were interested in finding out how many teenagers send 50 or more text messages per day and how many send less than 50 text messages per day. You can count the number of dots in those categories and make a table.

<table>
<thead>
<tr>
<th>Text Messages Sent per Day</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–49</td>
<td>9</td>
</tr>
<tr>
<td>50–100</td>
<td>6</td>
</tr>
</tbody>
</table>

Then, you can display the data in a histogram.

A histogram groups the data using intervals, or bins, on a number line. The height of each bar represents the number of data points in that group.

**Reflect**

1. Explain the difference between a dot plot and a histogram.

   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
Read the problem below. Then explore how to display data in a histogram.

Caroline looked at the text messaging data and drew the histogram to the right. She noticed that this histogram does not show how most of the data points are clustered around 10 and 20 text messages per day.

Draw a histogram to show the data grouped in a different way.

Model It

You can use more intervals and display the data in a table to help understand this problem.

<table>
<thead>
<tr>
<th>Text Messages Sent per Day</th>
<th>Number of Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–20</td>
<td>8</td>
</tr>
<tr>
<td>21–40</td>
<td>1</td>
</tr>
<tr>
<td>41–60</td>
<td>3</td>
</tr>
<tr>
<td>61–80</td>
<td>0</td>
</tr>
<tr>
<td>81–100</td>
<td>3</td>
</tr>
</tbody>
</table>

Model It

You can display the data in a histogram to look at the data in another way.
Now you will use the models to explain how histograms display data.

2 Look at the histogram in the second Model It. What do the numbers on the vertical axis mean?

________________________

What do the numbers on the horizontal axis mean?

________________________

3 What does the height of each bar represent?

________________________

4 What does it mean that there is no bar at the interval 61–80?

________________________

5 Compare the histogram at the top of the previous page with the histogram at the bottom of that page. Which histogram better represents the spread of the data? Explain.

________________________

________________________

________________________

6 How does changing the interval, or bin, size change the way a histogram looks?

________________________

________________________

Try It

Use what you just learned about histograms to solve this problem.

7 20 sixth graders were asked:
How many potted plants are in your home?

Draw a histogram to represent the data, which are shown below.

0, 1, 2, 2, 3, 4, 4, 5, 5, 6, 6, 6, 6, 7, 8, 8, 9, 11, 12
Read the problem below. Then explore how to display data in a box plot.

Michelle looks at the text messaging data and wants to describe the spread of numbers above and below the median.

0, 10, 10, 10, 10, 20, 20, 20, 30, 50, 50, 50, 90, 100, 100

Describe the spread of the data above and below the median.

**Model It**

You can display the data in a box plot to help you solve this problem.

You can find the median. Then find the upper and lower quartile. The **lower quartile** is the median of the lower half of the data. The **upper quartile** is the median of the upper half of the data.

A **box plot** is a 5-number summary.

Another number, the **interquartile range (IQR)**, is the difference between the upper quartile and lower quartile. It represents the middle 50% of the data.
Connect It

Now you will solve the problem and explain what the different parts of a box plot mean.

8 What is the median of this data set? What does this number mean?

________________________________________________________________________

________________________________________________________________________

9 Is there a wider spread above or below the median? Explain.

________________________________________________________________________

________________________________________________________________________

10 Explain what the length of the rectangular box represents.

________________________________________________________________________

11 Explain what the lines extending from the ends of the box represent.

________________________________________________________________________

________________________________________________________________________

12 What is the IQR of this data set? Does it include outliers?

________________________________________________________________________

________________________________________________________________________

Try It

Use what you just learned about box plots to solve this problem.

13 Display the data from problem 7 in a box plot. What is the IQR? _________________

0, 1, 2, 2, 3, 4, 4, 5, 5, 6, 6, 6, 6, 7, 7, 8, 8, 9, 11, 12
Read the problem below. Then explore how to analyze the data.

The test scores of students in a math class are listed below.

80, 72, 82, 80, 80, 88, 88, 84, 92, 92, 92, 96, 70, 90, 98, 92, 88, 92, 90, 80, 84

Construct a dot plot, histogram, and box plot to display and analyze the data.

**Model It**
You can display the data in a dot plot.

![Dot Plot](image)

**Model It**
You can display the data in a histogram.

![Histogram](image)

**Model It**
You can display the data in a box plot.

![Box Plot](image)
Connect It

Now you will compare the three data displays on the previous page.

14 Which graph is best for finding out the most common test score? Explain.

15 How does drawing a dot plot help order the data values from least to greatest?

16 Explain which graph is best if you want to know how many people scored a B on the test. (In the students’ math class, a B is a score from 80 to 89.)

17 Explain which graph is best for a teacher who wants to know the range of scores for the bottom 25%, the middle 50%, and the top 25%.

18 Why is it important to display data in different ways?

Try It

Use what you just learned about analyzing data to solve this problem. Show your work on a separate sheet of paper.

19 Brittany asked her classmates: How much time, in minutes, do you spend reading each day? Here are the results: 10, 20, 20, 20, 30, 30, 30, 30, 30, 40, 40, 40, 60, 60, 60.

Display the data in a dot plot, a histogram, and a box plot. Next to each graph, write down something you notice about the data.
Jenny recorded the temperature (°F) for 20 days this winter.

| 58 | 58 | 52 | 50 | 50 | 48 | 52 | 40 | 35 | 40 | 32 | 40 | 32 | 30 | 28 | 20 | 24 | 18 | 18 |

Draw a box plot to represent the data.

Look at how you can show your work.

18, 18, 20, 24, 28, 30, 32, 32, 35, 35, 40, 40, 40, 48, 50, 50, 52, 52, 58, 58

20 Display the temperatures from the student model in a dot plot.

The student ordered the temperatures from least to greatest and found the minimum, lower quartile, median, upper quarter, and maximum.

Pair/Share

How is this box plot different from the others in this lesson?

How many dots will be on this dot plot?

Pair/Share

Is the dot plot skewed or symmetrical? Are there any outliers?
Look at the temperatures from the student model problem.

0–9, 10–19, 20–29, 30–39, 40–49, 50–59

First, complete the table below.

<table>
<thead>
<tr>
<th>Temperatures (°F)</th>
<th>Number of Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–9</td>
<td></td>
</tr>
<tr>
<td>10–19</td>
<td></td>
</tr>
<tr>
<td>20–29</td>
<td></td>
</tr>
<tr>
<td>30–39</td>
<td></td>
</tr>
<tr>
<td>40–49</td>
<td></td>
</tr>
<tr>
<td>50–59</td>
<td></td>
</tr>
</tbody>
</table>

Now, use the table to draw a histogram that represents the data. Remember to label your axes.

Which of the following questions can be answered using the histogram you drew in problem 21?

A  How many days was the temperature below freezing (32°F)?
B  How many days was the temperature above 50°F?
C  What is the median temperature?
D  What were the highest and lowest temperatures recorded?

Felix chose A as the correct answer. Explain why the histogram cannot answer that question.

---

Why might you notice a skew in the histogram more than in the dot plot?

Which question asks about the number of days for a certain group of temperatures?

Choose the question that can be answered and explain why.
Solve the problems. Mark your answers to problems 1 and 2 on the Answer Form to the right. Be sure to show your work.

1. The box plots below compare the average gallons of water that Town X and Town Y use every month.

Which of the following statements is true?

A. The interquartile range (IQR) for Town X is greater than the IQR for Town Y.
B. Town Y has a greater maximum value than Town X does.
C. 50% of the people in Town Y use more than 1,000 gallons of water per month.
D. The median of Town X is greater than the median of Town Y.

2. The box plot below represents the heights of the basketball players on a college team.

What percent of basketball players are taller than 82 inches?

A. 25%
B. 50%
C. 75%
D. 100%
A crayon factory recorded the number of broken crayons per box in a dot plot.

Part A

Construct a histogram that shows both the number of boxes and the number of broken crayons.

Part B

Look at the histogram you made in Part A. Describe at least one advantage a histogram has over a box plot when it comes to displaying the crayon factory’s data.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Lesson Objectives

• Create dot plots, histograms, and box plots, including labeling and scaling axes appropriately.
• Know when data are best represented on dot plots, histograms, or box plots.
• Describe the overall pattern of data, determine variability, and identify striking deviations from the overall pattern.

Prerequisite Skills

• Choose appropriate and consistent scale and interval for a given data set.
• Accurately plot a set of numerical data in a dot plot.
• Calculate the median and range of a data set.

Vocabulary

lower quartile: the middle number between the minimum and the median in an ordered set of numbers

upper quartile: the middle number between the median and the maximum in an ordered set of numbers

box plot: a 5-number summary that includes the minimum, the lower quartile, the median, the upper quartile, and the maximum

interquartile range (IQR): the difference between the upper quartile and lower quartile

Learning Progression

Skill in data display and analysis are important in our information-filled world. We use data to evaluate product reviews, understand and interpret the news, and make everyday decisions. Data analysis is important in the sciences and social sciences in high school and beyond.

In Grades 3–5, students created picture and bar graphs. In Grade 6, students have analyzed data displayed in various ways. Now students learn to organize data in appropriate representations such as dot plots, histograms, and box plots. They display the same data using different representations. By comparing different graphs of the same data, students develop an understanding of the benefits of each type of representation.

In later grades, students will continue to study measures of central tendency and variability and use them to understand sets of data. They will also continue to learn how to display data effectively.

Ready Toolbox

Prerequisite Skills

<table>
<thead>
<tr>
<th>Ready Lessons</th>
<th>6.SP.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tools for Instruction</td>
<td>✓ ✓</td>
</tr>
<tr>
<td>Interactive Tutorials</td>
<td>✓ ✓</td>
</tr>
</tbody>
</table>

CCLS Focus

6.SP.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

Standards for Mathematical Practice: SMP 2–7 (see page A9 for full text)
Part 1: Introduction

Lesson 28

Display Data on Dot Plots, Histograms, and Box Plots

You've learned how to display data on a line plot. Take a look at this problem.

A random sample of teenagers ages 13 and 14 were asked: On average, how many text messages do you send per day? Here are the results:

0, 10, 10, 10, 10, 20, 20, 20, 30, 50, 50, 50, 90, 100, 100

Display the data in a dot plot. What can you say about the results?

Explore It

Use the math you already know to solve this problem.

Draw a dot plot to represent the data. Instead of an “x,” draw a dot to represent each person’s response.

Text Messages Sent per Day

<table>
<thead>
<tr>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>50</th>
<th>100</th>
</tr>
</thead>
</table>

- How many teenagers were surveyed? How do you know?
  15: Possible answer: because there were 15 responses.

- Describe the shape of the graph.
  Almost all the responses are 50 or less; there is a cluster of data points around
  10 and 20. The outliers are 90 and 100. There is a peak at 10.

- Count the number of dots at 0 and at 10. What do these numbers mean?
  5 teenagers surveyed send less than 20 text messages per day.

- What is one conclusion you can draw from this dot plot?
  Possible answer: Most of the teens surveyed send less than 50 text messages
  per day. No one surveyed sends 60, 70, or 80 texts per day. 3 people said
  they send 90 or more texts per day.

Mathematical Discourse

- Is it easier to draw conclusions from the list of numbers or from the dot plot? Explain.
  Students’ preferences will vary, but many will prefer the dot plot because it gives a visual representation of the data.

- What other methods can you use to present the data to help you draw conclusions? Explain what each method is and what information it would give.
  Students might describe different types of graphs and how to make them. They might also talk about statistical measures such as the mean, mode, median, and range.

SMP Tip: Students attend to precision (SMP 6) when checking their graphs for accuracy. Stress the importance of recording each number once in the correct place.
AT A GLANCE

Students learn to display data using a histogram.

STEP BY STEP

• Read Find Out More as a class.

• Talk about the idea of grouped data. Explain that grouped data are useful when it is not necessary to know the exact numbers and is a summary of the results.

• Look at the histogram. Call students’ attention to the labels on each axis of the histogram. Have them explain what each axis shows.

• As students discuss the difference between a dot plot and a histogram, have them go beyond the mechanics of making each. Encourage them to talk about the types of data that would be best displayed by each as well as the types of conclusions they can draw from each.

Hands-On Activity

Make a dot plot and a histogram using the same data.

Materials: poster board, markers, sticky dots, rectangular sticky notes

• Prepare a poster board for a dot plot and another for a histogram. Title each “Hours Spent Watching TV Last Weekend.” On the dot plot, draw and label a number line from 1 through 24. On the histogram, mark a number line with the intervals 0–4, 5–9, 10–14, 15–19, and 20–24.

• Have students estimate how many hours they watched television the previous weekend. Give each student a sticky dot to record their response on the dot plot and a sticky note to record their response on the histogram.

• Have students compare and contrast the two graphs. Have them think of two questions that could be answered by either graph, two that could only be answered using the dot plot, and two that could only be answered using the histogram.

Real-World Connection

Suppose researchers want to know what it is like to be a middle-school student. What questions could they ask that would receive numerical responses?

Examples:

• How long do you spend doing homework, watching TV, playing sports, reading, playing video games, doing chores, or other activities?

• How many times a month do you go to the movies, the mall, the park, the museum, or other destination?

• How much allowance do you get?

• How many pairs of shoes do you have?
**AT A GLANCE**

Students study two histograms that show the same data but give different impressions of the data.

**STEP BY STEP**

- **Read** the problem at the top of the page as a class.
- **Have** a volunteer relate the information given by the first histogram.
- **Discuss** how the intervals in the table are different from the intervals displayed in the first histogram. Note that the number of responses totals the same in both presentations.
- **Ask:** Why are the intervals 0 to 20 and 21 to 40 instead of 0 to 20 and 20 to 40? [If you want to record a 20, you wouldn’t know in which interval to put the 20.]
- **Have** students look at the second histogram. Discuss how its appearance is different than the first one.

**Mathematical Discourse**

- **Is there a rule that says how large to make the intervals in a histogram? If so, what is it?**
  
  No, there is not a rule.

- **What could be a problem if you make the intervals of a histogram too large?**
  Students might say that if the intervals are too large, the histogram will not show how the data cluster.

- **What happens if you make the intervals too small?**
  Students might express the idea that if the intervals are too small, there will be so much separate information that it will be hard to draw conclusions.

- **How do you decide how big to make the intervals?**
  Students might say that they would see where the data cluster and find intervals just small enough to show such clustering.
Students revisit the problem on page 286 and analyze the new histogram. They will compare it with the original histogram.

**STEP BY STEP**

- **Read Connect It as a class.** Be sure to point out that the problems refer to the problem on page 286.
- **Have students summarize the information given by the labels on the axes.** Discuss why the information is necessary for reading the histogram.
- **Have students describe the visual impression given by each histogram and the advantages of each.** When they express their preference for one or the other, encourage them to give solid reasons for their choice.

**SMP Tip:** When students discuss which histogram shows the data most effectively, they must construct viable arguments and critique the reasoning of others (SMP 3). Remind students to give reasons for their choices and relate their reasons to the types of information gained from each histogram.

**TRY IT SOLUTION**

7  **Solution:** See the histogram shown; others with different intervals are possible; students may tally the data and decide on intervals. They then may draw a histogram to display the data.

**ERROR ALERT:** Students whose histograms do not reflect the data may have tallied it incorrectly.
Students see how to use a box plot to summarize data.

- Read the problem at the top of the page as a class.
- Review the meaning of the median of a set of data.
- Read the description of the lower and upper quartiles. Ask students to explain in their own words what the lower and upper quartiles are.
- Look at the list of text-messaging data. Go through the process of finding the median, the lower quartile, and the upper quartile.
- Ask students why a box plot is considered to be a five-number summary. Have them look at the box plot and name the five numbers and explain what each one means.
- Read the definition of the interquartile range (IQR). Say that the IQR is the middle half of the data. One fourth of the data are below it, and one fourth of the data are above it. Have students locate the IQR on the box plot.

### ELL Support

- Display the numbers 2, 3, 1, 5, and 8. Have students tell you how to write them in order. Discuss the meaning of lowest or least. Have students identify the least number and label it. Discuss, identify, and label the highest or greatest number. Do the same with 3, the middle or median number.
- Go over the vocabulary again, having students say each term aloud. If students have some mastery of the terms, introduce minimum and maximum, displaying those words as well.
- Display the numbers 4, 8, 11, 12, 15, 17, and 20. Call on students to name the greatest, the lowest, the median, and so on until they have practiced all the words.

### Mathematical Discourse

- **How can you find the median of a set of data?** Students should say that you put the data in order and find the middle number. If there are two numbers in the middle, you average them.
- **How can the steps for finding the median help you find the lower and upper quartiles?** Students should say that you look at all the numbers below the median and then find the median of those numbers. That number is the lower quartile. You repeat this process for the numbers above the median to find the upper quartile. In other words, the lower quartile is the median of the numbers below the median, and the upper quartile is the median of the numbers above the median.
Students revisit the problem on page 288 and analyze the box plot in terms of the data.

**STEP BY STEP**

- Read Connect It as a class. Be sure to point out that the problems refer to the problem on page 288.
- As students answer the problems, have them relate the box plot to the actual data that it represents.
- When needed, explain terms used in the problems such as spread and lines extending from the box.
- Summarize by saying that the middle 50% of the teenagers sent between 10 and 50 texts. One fourth of the teenagers sent 10 or fewer texts, and one fourth sent 50 or more.

**Visual Model**

**Illustrate the spread of data displayed in box plots.**

Use these descriptions to produce and display three box plots:

- **First box plot:** Narrow interquartile range and narrow upper and lower quartiles.
- **Second box plot:** Wide interquartile range and narrow upper and lower quartiles.
- **Third box plot:** Narrow interquartile range and wide upper and lower quartiles.

Tell students that the box plots represent class scores on three tests. Discuss what type of test results each box plot would show.

**TRY IT SOLUTION**

13  *Solution:* Check students’ graphs. The IQR is 4; Students may find the difference between the upper quartile (7.5) and the lower quartile (3.5).

**ERROR ALERT:** Students who wrote 11 added the upper and lower quartiles; students who wrote 12 found the range instead of the interquartile range.
Students are given a set of data and explore three methods of displaying it.

**STEP BY STEP**

- Read the problem at the top of the page as a class.
- Have volunteers describe the characteristics of a dot plot, a histogram, and a box plot.
- Look at the dot plot. Have students explain what types of information they can get from it.
- Have students examine the histogram. After they do so, have them explain how it summarizes the data.
- Finally, have students examine the box plot and explain how it shows the spread of the data.

**Concept Extension**

**Visualize the shape of various graphs based on a description of the data.**

- Describe three card shops to students.
  - **Shop A**: Cards range from $1 to $5 with many cards at each price.
  - **Shop B**: All cards are $2.00, $2.50, or $3.00.
  - **Shop C**: Most cards are bargain cards for $1 or fancy cards for $5 with only a few mid-priced cards.
- Have students think about how a dot plot would look for each shop. Have volunteers sketch and display their ideas. Discuss whether the shape fits the description of the data.
- Have students think about how a histogram would look for each shop. Again, have them share and justify their ideas.
- Finally, have students consider how box plots would look for each shop. As students share their examples, discuss how the upper and lower quartiles and the interquartile range would change in each situation.

**Mathematical Discourse**

- **What are two conclusions you can draw about the data using the dot plot?**
  Students’ responses will vary. As students respond, have them refer to the dot plot to show why they drew that particular conclusion. Ask others whether they agree, disagree, or have questions to ask so they can understand the speaker’s conclusions.
- **What are two conclusions you can draw about the data using the histogram?**
  Students’ responses will vary.
- **What are two conclusions you can draw about the data using the box plot?**
  Students’ responses will vary.
Students revisit the problem on page 290 and analyze the advantages of each type of graph.

**STEP BY STEP**

- Read Connect It as a class. Be sure to point out that the problems refer to the problem on page 290.
- Students should consider all three graphs when answering each question. In addition to naming the most effective graph for each use, have them explain why it is not possible to get the information from the other graphs.
- Have students summarize what is useful about each type of graph.

**SMP Tip:** As students consider which graph is most helpful for a specific purpose, they are learning to model with mathematics effectively (SMP 4). Encourage them to think about what information they are trying to communicate and which graph communicates the information best.

**TRY IT SOLUTION**

19  **Solution:** Check students’ graphs and observations; Students may tally the data and use them to make each type of graph.

**ERROR ALERT:** Students whose graphs are inaccurate may have tallied the data incorrectly.

---

Now you will compare the three data displays on the previous page.

Which graph is best for finding out the most common test score? Explain.

- The dot plot, because you can look for a peak in the individual data represented.
- How does drawing a dot plot help order the data values from least to greatest? Dot plots show individual data arranged from least to greatest. It shows how many data points are at each value in order.
- Explain which graph is best if you want to know how many people scored a B on the test. (In the students’ math class, a B is a score from 80 to 89)
- A histogram. It groups the data into intervals. The bar height tells the number of data points. The 80–89 interval has a height of 11, so 11 people scored a B.
- Explain which graph is best for a teacher who wants to know the range of scores for the bottom 25%, the middle 50%, and the top 25%.
- A box plot is a 5 number summary of data spread. It shows the middle 50% with a box and the bottom and top 25% with a line.
- Why is it important to display data in different ways? Depending on what information you want from the data, you choose a display to represent the data in a certain way.

---

Use what you just learned about analyzing data to solve this problem. Show your work on a separate sheet of paper.

Brittany asked her classmates: How much time, in minutes, do you spend reading each day? Here are the results: 10, 20, 20, 30, 30, 30, 40, 40, 40, 60, 60, 60. Display the data in a dot plot, a histogram, and a box plot. Next to each graph, write down something you notice about the data.

See sample graphs below.

---

L28: Display Data on Dot Plots, Histograms, and Box Plots

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Lesson 28: Display Data on Dot Plots, Histograms, and Box Plots

Part 5: Guided Practice

### AT A GLANCE

Students display data using different types of graphs.

### STEP BY STEP

- Ask students to solve the problems individually by drawing the type of graph asked for.
- When students have completed each problem, have them Pair/Share to discuss their solutions with a partner or in a group.

### SOLUTIONS

**Ex** The numbers are listed in order, and the quartiles and median are indicated. A completed box plot is shown.

**20 Solution:** Check students’ dot plots; students could solve the problem by showing the data with dots and a number line.

**21 Solution:** See students’ tables and histograms; students could solve the problem by tallying the data and drawing a histogram.

**22 Solution:** B; Felix could not be able to tell the number of days the temperature was below 32°F because the data were grouped in intervals of 10°F. Explain to students why the other two answer choices are not correct:

- C is not correct because you cannot find the exact median with grouped data.
- D is not correct because grouped data do not show the exact minimum and maximum.
Lesson 28

L28: Display Data on Dot Plots, Histograms, and Box Plots

Part 6: Common Core Practice

Solve the problems. Mark your answers to problems 1 and 2 on the Answer Form to the right. Be sure to show your work.

1. The box plots below compare the average gallons of water that Town X and Town Y use every month.

   Town X
   Town Y

   Water Used per Month
   Number of Gallons
   600
   800
   1,000
   1,200

Which of the following statements is true?
A. The interquartile range (IQR) for Town X is greater than the IQR for Town Y.
B. Town Y has a greater maximum value than Town X does.
C. 50% of the people in Town Y use more than 1,000 gallons of water per month.
D. The median of Town X is greater than the median of Town Y.

2. The box plot below represents the heights of the basketball players on a college team.

   Basketball Players' Heights
   Height (inches)
   70 72 74 76 78 80 82 84 86 88 90

What percent of basketball players are taller than 82 inches?
A. 25%
B. 50%
C. 75%
D. 100%

AT A GLANCE

Students use and draw graphs to answer questions that might appear on a mathematics test.

STEP BY STEP

• First, tell students that they will use and draw graphs to answer questions. Then have students read the directions and answer the questions independently. Remind students to fill in the correct answer choices on the Answer Form.

• After students have completed the Common Core Practice problems, review and discuss correct answers. Have students record the number of correct answers in the box provided.

SOLUTIONS

1 Solution: D; Compare the box plots to see which statement is true.

2 Solution: A; Note that the data described are greater than the upper quartile, which is the upper 25%.

3 Part A Solution: Check students’ histogram.

Part B Solution: Students might say that a histogram summarizes the data instead of showing every individual number.
Assessment and Remediation

- Ask students to create a box plot using these numbers: 2, 3, 4, 6, 0, 1, 7, 3, 1, 3, 5.
  [Box plot showing minimum: 0, lower quartile: 1, median: 3, upper quartile: 5, maximum: 7.]
- For students who are struggling, use the chart below to guide remediation.
- After providing remediation, check students’ understanding. Ask students to create a box plot using these numbers: 1, 6, 2, 5, 4, 2, 0, 6, 2, 4, 1.
  [Box plot showing minimum: 0, lower quartile: 1, median: 2, upper quartile: 5, maximum: 6.]
- If a student is still having difficulty, use Ready Instruction, Level 5, Lesson 23.

<table>
<thead>
<tr>
<th>If the error is . . .</th>
<th>Students may . . .</th>
<th>To remediate . . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>a dot plot or histogram</td>
<td>not understand the differences in the types of graphs.</td>
<td>Review how a box plot is different from the other types of graphs.</td>
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<tr>
<td>min.: 2, l.q.: 4, median: 0, u.q.: 1, max.: 5</td>
<td>have neglected to order the numbers first.</td>
<td>Remind students to put the numbers in order.</td>
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<tr>
<td>other incorrect key points</td>
<td>not know how to find the median and quartiles.</td>
<td>Review the technique for finding the median and quartiles.</td>
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Hands-On Activity

Make a human box plot.

Materials: paper, markers, tape
Label separate sheets of paper with these terms: Minimum, Lower Quartile, Median, Upper Quartile, and Maximum. Display an unlabeled number line.

Have students record the number of people who live in their home (or the number of people in their family) on a sheet of paper. Have students stand and arrange themselves in a line from least to greatest.

Identify the 1 or 2 students in the middle. Give the middle student(s) the paper labeled Median. Find the lower and upper quartile, giving those students the appropriate papers. Give the students at each end of the line the Minimum and Maximum papers. Have all the other students sit down.

Discuss the numbers needed on the number line. Number the number line. Have students still standing tape their papers above the appropriate points. Have volunteers explain how to complete the box plot.

Challenge Activity

Conduct a survey and display the results using different types of graphs.

Working individually or in pairs, students should think of a question that classmates can answer with a number less than 30. Students should ask at least 15 classmates the question and record the results.

Students should first organize the data using a dot plot. Then they should decide on reasonable intervals and draw a histogram to display the data. Finally, they should create a box plot that shows the distribution of the data. Remind students to include a title and labels for all data displays.

Students should write a paragraph listing conclusions about the data that they can draw using the dot plot, histogram, and box plot, respectively.