



# LESSON 7

# Dot Plots, Histograms, and Box Plots

MATH CONTENT TOPICS: Q.2.a, Q.6.b, Q.7.a  
MATH PRACTICES: MP.1.e, MP.2.c, MP.3.a, MP.4.c

## 1 Learn the Skill

**Dot plots** provide a quick and easy way of organizing sets of data with modest numbers of values (e.g., those less than 50). They consist of a number line on which each occurrence of a value is noted by a dot; the number of dots associated with each value indicates the frequency of that value in the data set. **Histograms** are made up of adjoining bars of equal width. A histogram's bars have lengths that correspond to an associated scale. Unlike dot plots, histograms may be used with any size data set and are used to show frequency.

**Box plots** are a convenient way of showing and comparing sets of numerical data using five characteristics of each data set: the median value, the lower (25%) and upper (75%) quartile values, and the maximum and minimum values.

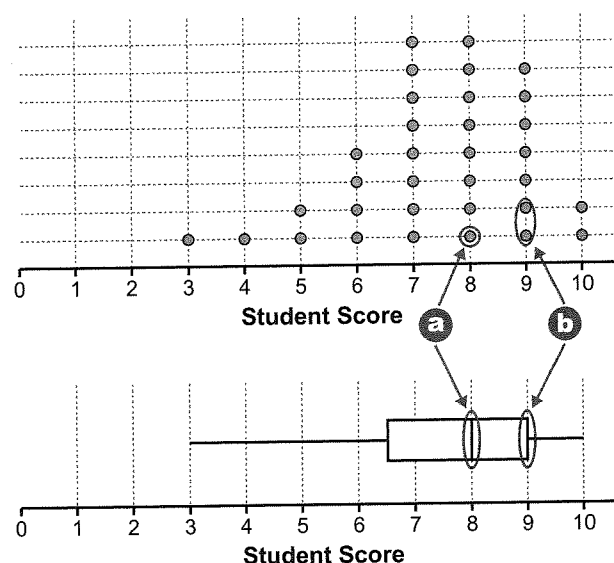
## 2 Practice the Skill

By practicing the skills of representing, displaying, and interpreting data using dot plots, histograms, and box plots, you will improve your study and test-taking abilities, especially as they relate to the GED® Mathematical Reasoning Test. Study the information and plots below. Then answer the question that follows.

- a** A dot plot contains detailed information about a data set and allows for determination of quantities such as mean, mode, and range. For example, since there is an odd number of students (33), the median score value will be the 17<sup>th</sup> value (8.0), counting in from either end. This appears as the mid-line in the box plot.

- b** Since the median value is an actual data point, that data point is not considered to be part of the upper or lower halves of the data set. The *lower quartile* is the median of the lower half of the data set. The *upper quartile* is the median of the upper half of the data set. Since there are 16 points in each half, the quartile values will be half-way between the 8<sup>th</sup> and 9<sup>th</sup> data values. In the case of the upper quartile, both values are 9; the upper quartile value then is 9.0. This appears as the upper bound of the box in the box plot.

A class of 33 students takes a 10-point quiz. The following dot plot (top) and box plot (bottom) represent the distribution of student scores.



1. Using the dot plot, what is the lower quartile student score for this quiz?

- A. 6.0  
B. 6.5  
C. 7.0  
D. 7.5

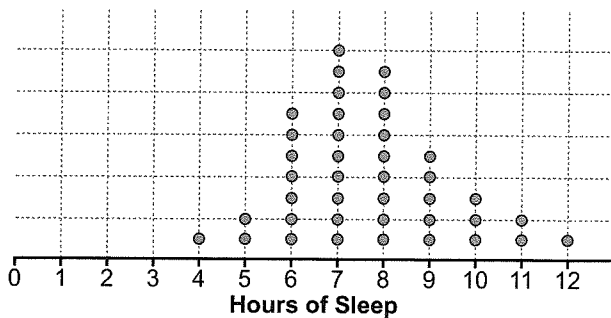
### USING LOGIC

The circled points were found by counting from left to right, starting at the top of each column of dots. You can check your work by counting from right to left, also starting at the top of each column of dots.

### 3 Apply the Skill

**DIRECTIONS:** Study the information and dot plot, read each question, and choose the **best** answer.

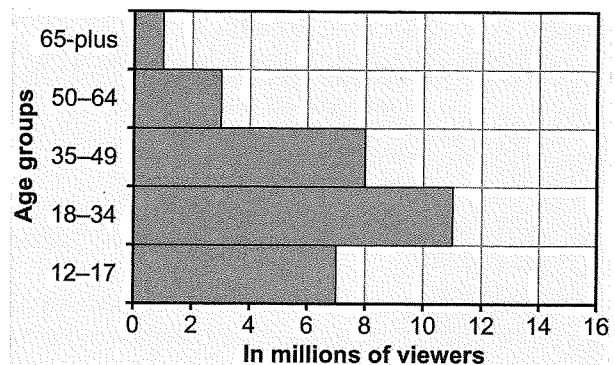
A sleep study is conducted on 40 people for one week. The average number of hours of sleep per night per subject is rounded to the nearest hour. The tabulated results are shown in the following dot plot.



- What is the median value of the hours of sleep reported in this study?
  - 6.5 h
  - 7.0 h
  - 7.5 h
  - 8.0 h
- What is the mode value of the distribution?
  - 6.5 h
  - 7.0 h
  - 7.5 h
  - 8.0 h
- What is the range of the distribution?
  - 4 h
  - 5 h
  - 7 h
  - 8 h
- How many subjects had 9 hours of sleep?
  - 5
  - 6
  - 7
  - 9

**DIRECTIONS:** Study the information and histogram, read the question, and choose the **best** answer.

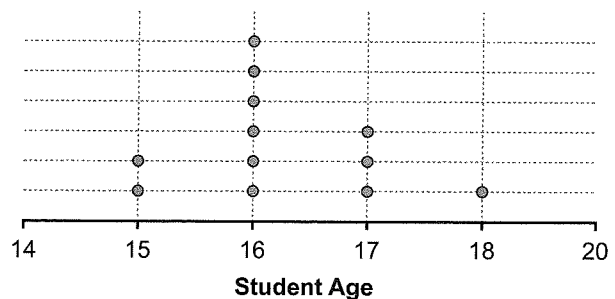
A new prime-time animated television comedy recently aired its first episode. Although targeted to young adults, the new show excited network officials because of its broader appeal across age groups. The histogram below illustrates the new show's ratings popularity—as measured in millions of viewers—across various age groups.



- What pattern can you identify based on the viewership data?
  - The show was equally popular among all age groups.
  - The show was most popular among the 35–49 age group.
  - The show enjoyed high ratings among teens and adults under 50.
  - The show had little popularity among young viewers.

**DIRECTIONS:** Study the information and dot plot, read the question, and choose the **best** answer.

A teacher's class roster shows her students have the following ages.



- What is the range of the data?
  - 3
  - 4
  - 6
  - 16

# Mean, Median, and Mode

MATH CONTENT TOPICS: Q.1.a, Q.2.a, Q.2.e, Q.6.c, Q.7.a  
MATH PRACTICES: MP.1.a, MP.1.b, MP.1.e, MP.2.c, MP.3.a

## 1 Learn the Skill

Mean, median, mode, and range are values used to describe a set of data. The **mean** is the average value of a data set. The **median** is the middle number in a set of data when the values are ordered from least to greatest. In the number set 23, 24, 28, 30, and 75, the median is 28—meaning it's greater than half of the numbers in the set and less than the other half. Note that the median was unaffected by the number 75, which is much larger than the other numbers in the set. In this case, the median more accurately describes the set than the does the mean (36).

The **mode** is the value that occurs most frequently in a set of data. In the number set 23, 24, 24, 28, 30, and 75, 24 is the mode. The **range** is the difference between the greatest value and the least value in a set of data. In the above example, the range is 52.

## 2 Practice the Skill

By practicing the skills of finding mean, median, mode, and range, you will improve your study and test-taking abilities, especially as they relate to the GED® Mathematical Reasoning Test. Read the example and strategies below. Then answer the question that follows.

- a** To find the median of a data set, list the values in order from least to greatest. The number 65 is listed three times in the table. When ordering numbers, be sure to list 65 three times.

- b** When a number set consists of an odd number of values, the middle number is the median. When the set consists of an even number of data points, find the mean of the two middle numbers. Note that the median may not be a number in the set of data. It could be a different whole number, or a whole number that uses a decimal point.

Felipe measured and recorded the heights of runners participating in a neighborhood relay race.

HEIGHTS OF RELAY RACE RUNNERS

Runner	Height (inches)
Carol	63
Steven	68
Pedro	65 <b>a</b>
Julia	65 <b>a</b>
Chantell	67
Camille	64
Frank	72
William	71
Jane	65 <b>a</b>
Jake	72

1. What is the median height of the runners?

- A. 65 inches  
B. 65.2 inches  
C. 66 inches  
D. 67 inches

### USING LOGIC

There are 10 values in the table. When listing values from least to greatest, check that you listed a total of 10 values, including repetitions of the same value.

### 3 Apply the Skill

**DIRECTIONS:** Study the information and table, read each question, and choose the **best** answer.

The running times of a YMCA-sponsored 100-meter race are shown below.

**TIMES FOR THE 100-METER RACE**

Runner	Time (seconds)
David	13.5
Sanya	16.0
Jeremy	12.6
Erica	15.2
Chen	12.8
Yusuf	11.8
Matt	17.2
Sarah	12.1

- What is the range of the runners' times in the 100-meter race?
  - 4.2 s
  - 5.4 s
  - 6.4 s
  - 13.9 s
- What is the median time in the race?
  - 5.4 s
  - 12 s
  - 13.15 s
  - 13.9 s
- What is the difference between Sarah's time and the mean time of the runners?
  - 1.35 s
  - 1.8 s
  - 13.9 s
  - 13.15 s
- Describe the relationship between the median and mean in the above race times.
  - The median was slightly less than the mean.
  - The median was slightly greater than the mean.
  - The median and mean were the same.
  - The mode was greater than both the median and the mean.

**DIRECTIONS:** Study the information and table, read the question, and choose the **best** answer.

The owner of Ice Cream Palace listed the number of milk shakes sold each day for one week.

**DAILY MILK SHAKE SALES**

Day	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
Milk Shakes Sold	22	16	20	26	24	85

- Which value best describes the number of milk shakes sold at Ice Cream Palace on a typical summer day?
  - 20
  - 21.6
  - 23
  - 32.16

**DIRECTIONS:** Study the information and table, read the question, and choose the **best** answer.

Sneaker sales at Sneaker World were recorded each day for one week.

**SNEAKER WORLD SALES**

Day	Total Sales
Monday	\$5,229
Tuesday	\$3,598
Wednesday	\$6,055
Thursday	\$3,110
Friday	\$3,765
Saturday	?

- The mean sales for this one week were \$4,443. The manager misplaced her records for Saturday. What were the sales on Saturday?
  - \$458
  - \$4,901
  - \$4,987
  - \$9,344

**DIRECTIONS:** Read the question, and choose the **best** answer.

- Dex scores 80%, 75%, 79%, and 83% percent on his final exams. Which of the following represents his mean score in percent form?
  - 79.25
  - 79.5
  - 83
  - 317