LESSON

16.5 Histograms

COMMON CORE 6.SP.4

Display numerical data in plots on a number line, including ... histograms. ... *Also 6.SP.5*

ESSENTIAL QUESTION

How can you display data in a histogram?

EXPLORE ACTIVITY Real World

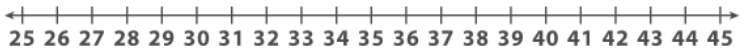
COMMON CORE 6.SP.5, 6.SP.4

Grouping Data in Intervals

The members of the high-school basketball team practice free throws. Each player attempts 50 free throws. The number of free throws made by each player is listed below.

25, 29, 29, 30, 33, 34, 35, 35, 36, 39, 42, 44

A Use a dot plot to represent the data.



B On your dot plot, circle the dots that are in each interval of the frequency table below. Then complete the frequency table.

Interval	Frequency
20–29	
30–39	
40–49	

Enter the number of data values for the interval 30–39.

C Analyze the data. How were the data collected? How many data values are there? What are the mean, median, range, and IQR of the data?

EXPLORE ACTIVITY *(cont'd)*

Reflect

1. Can you use the dot plot to find the mean and the median of the data? Can you use the frequency table? Why or why not?

2. How do you find the number of data values in a data set from a dot plot? How can you find the number of data values from a frequency table?

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Using a Histogram

A **histogram** is a type of bar graph whose bars represent the frequencies of numeric data within intervals.

EXAMPLE 1

Real World

COMMON CORE 6.SP.4, 6.SP.5

A birdwatcher counts and records the number of birds at a birdfeeder every morning at 9:00 for several days.

12, 3, 8, 1, 1, 6, 10, 14, 3, 6, 2, 1, 3, 2, 7

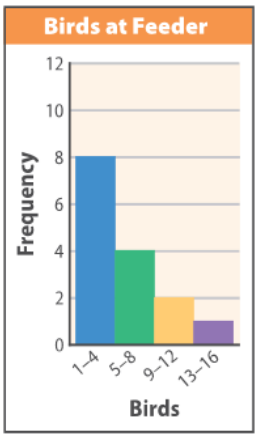
Make a histogram of the data.

Math Talk
Mathematical Practices
How does the histogram show the total number of days the birdwatcher counted birds?

STEP 1 Make a frequency table.

Divide the data into equal-sized intervals of 4. Make a frequency table.

Interval	Frequency
1–4	8
5–8	4
9–12	2
13–16	1



STEP 2 Make a histogram.

The intervals are listed along the horizontal axis. The vertical axis shows the frequencies. For each interval, draw a bar to show the number of days in that interval. The bars should have equal widths. They should touch but not overlap.

Reflect

3. **What If?** Suppose the birdwatcher continues his observation for three more days and collects these new data values: 5, 18, and 2. How could you change the histogram to include the data?

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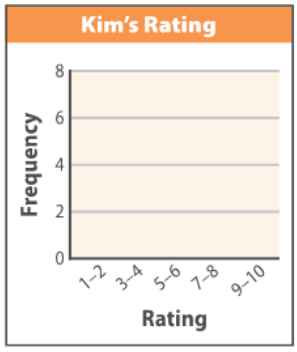
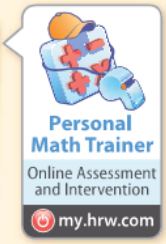
YOUR TURN

4. Kim has started rating each movie she sees using a scale of 1 to 10 on an online site. Here are her ratings so far:

6, 9, 8, 5, 7, 4, 8, 8, 3, 7, 8, 7, 5, 1, 10

Make a histogram of the data.





Analyzing a Histogram

By grouping data in intervals, a histogram gives a picture of the distribution of a data set.

EXAMPLE 2 Real World COMMON CORE 6.SP.5

Use the histogram from Example 1. What are some conclusions about the data that can you make from the shape of the distribution?

The highest bar is for the interval 1–4, which means that on more than half the days (8 out of 15), the birdwatcher saw only 1–4 birds. The bars decrease in height from left to right, showing that it was more likely for the birdwatcher to see a small number of birds rather than a large number on any given day.

YOUR TURN

5. Use your histogram from Your Turn 4. What are some conclusions you can make about Kim's movie ratings from the shape of the distribution?

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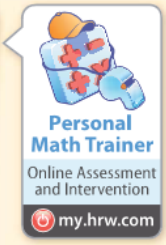


Guided Practice

1. Wendy kept track of the number of text messages she sent each day for three weeks. Complete the frequency table. (Explore Activity)

0, 5, 5, 7, 11, 12, 15, 20, 22, 24, 25, 25, 27, 27, 29, 29, 32, 33, 34, 35, 35

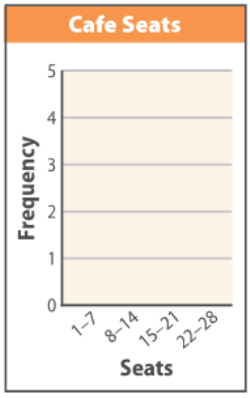
Interval	Frequency
0–9	

Ed counted the number of seats available in each cafe in his town. Use his data for 2–3.

18, 20, 22, 26, 10, 12, 16, 18, 7, 8

2. Complete the frequency table and the histogram. (Example 1)

Interval	Frequency
1–7	
8–14	
15–21	
22–28	



3. What are some conclusions you can make about the distribution of the data? (Example 2)

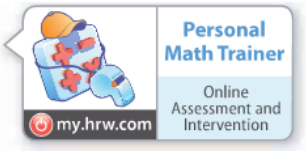
ESSENTIAL QUESTION CHECK-IN

4. How can you display data in a histogram?

Name _____ Class _____ Date _____

16.5 Independent Practice

COMMON CORE 6.SP.4, 6.SP.5

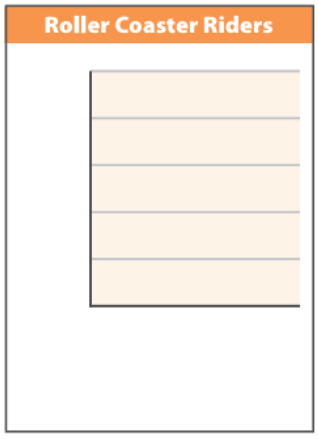


An amusement park employee records the ages of the people who ride the new roller coaster during a fifteen–minute period.

Ages of riders: 47, 16, 16, 35, 45, 43, 11, 29, 31, 50, 23, 18, 18, 20, 29, 17, 18, 48, 56, 24, 18, 21, 38, 12, 23.

5. Complete the frequency table. Then make a histogram of the data.

Interval	Frequency
10–19	



6. Describe two things you know about the riders who are represented by the data.

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7. **Multiple Representations** West Middle School has classes of many different sizes during first period. The number of students in each class is shown.

9, 23, 18, 14, 20, 26, 14, 18, 18, 12, 8, 13, 21, 22, 28, 10, 7, 19, 24, 20

a. Hank made a histogram using intervals of 6–10, 11–15, and so on. How many bars did his histogram have? What was the height of the highest bar? _____

b. Lisa made a histogram using intervals of 0–9, 10–19, and so on. How many bars did her histogram have?

What was the height of the highest bar? _____

c. Besides a histogram, what are some other ways you could display these data?

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H.O.T. FOCUS ON HIGHER ORDER THINKING

Work Area

8. **Communicate Mathematical Ideas** Can you find the mean or median of a set of data from a histogram? Explain.

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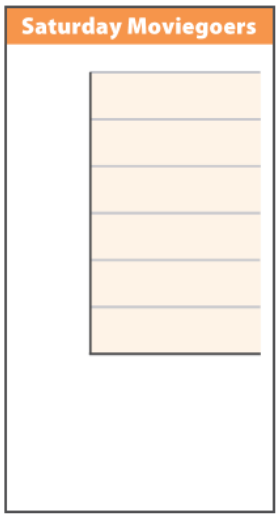
9. **Multistep** A theater owner keeps track of how many people come to see movies on 21 different Saturdays.

Saturday Moviegoers

Interval	Frequency
60–69	1
70–79	3
80–89	10
90–99	7



a. Use the data to make a histogram.

b. **Make a Prediction** The theater owner asks, "How many moviegoers come to the theater on a typical Saturday?" What would you tell the theater owner? Use your histogram to support your answer.

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c. **Communicate Mathematical Ideas** Is the theater owner's question a statistical question? Why or why not?

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10. **Explain the Error** Irina says she can find the range of a set of data from a histogram. Is she correct? Justify your answer.

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