

## 11.3 Start Thinking

Gather the following information from your classmates:

- Height (in feet and inches)
- Shoe size
- Number of siblings

Use equal intervals to make a histogram for each set of data. Find the mean and median of each set of data. Mark these on the histogram, noting which bars contain each. Compare the mean and median for each. What does a histogram look like when the mean is larger? What does a histogram look like when the median is larger?

## 11.3 Warm Up

**Find the mean, median, and mode of the data. If necessary, round to the nearest tenth.**

1. 2, 1, 4, 3, 6, 5, 8, 7, 10, 9, 12, 11, 14
2. 0, 6, 11, 21, 14, 8, 1
3. 1, 2, 5, 6, 9, 10, 13, 14, 17, 18, 21
4. 6, 6, 13, 13, 27, 44, 34
5. 0, 3, 2, 5, 4, 7
6. 0, 2, 2, 5, 7, 3, 2, 5, 6, 9

## 11.3 Cumulative Review Warm Up

**Find the inverse of the relation.**

1.  $(2, -1)$ ,  $(4, -9)$ ,  $(5, -4)$ ,  $(8, -6)$ ,  $(10, -2)$
2.  $(3, 0)$ ,  $(5, -4)$ ,  $(7, 6)$ ,  $(9, 0)$ ,  $(11, -5)$

3.

<b>Input</b>	4	4	1	6	11
<b>Output</b>	7	5	1	5	7

# 11.3

## Practice A

1. The frequency table shows the results of a survey that asked people how many hours they spend working in the yard per month. Display the data in a histogram. Describe the shape of the distribution.

Hours in yard	0–1	2–3	4–5	6–7	8–9	10–11
Frequency	28	35	25	15	12	4

In Exercises 2 and 3, describe the shape of the distribution of the data. Explain your reasoning.

2. 

Stem	Leaf
1	4 7 8
2	3 4 5 8
3	0 1 1 4 6
4	2 2 4 5
5	0 1 2

Key: 2 | 1 = 21

3. 

Stem	Leaf
3	8
4	5
5	0 1 2 4
6	2 3 3 5 7 8 9
7	1 2 2 4 6 6

Key: 5 | 2 = 52

4. The table shows the last gas purchases at the pump.

Gas Purchases (dollars)						
36	75	42	17	98	93	10
24	15	27	32	23	65	27
54	71	48	43	38	26	58

- a. Display the data in a histogram using six intervals beginning with 10–24.  
 b. Which measures of center and variation best represent the data? Explain.

## 11.3 Practice B

1. The frequency table shows the results of a survey that asked people how many parking tickets they received during the last five years. Display the data in a histogram. Describe the shape of the distribution.

Number of parking tickets	0–1	2–3	4–5	6–7	8–9	10–11
Frequency	18	23	20	14	4	1

In Exercises 2 and 3, describe the shape of the distribution of the data. Explain your reasoning.

2. 

Stem	Leaf
1	2 3 4 5 6 7 8 9
2	0 1 2 3 4 5 6 7 8 9
3	0 1 2 3 4 5 6
4	0 1 7 8 9
5	2 3
6	4
7	5

Key: 2 | 1 = 21

3. 

Stem	Leaf
3	8
4	4 5 5
5	0 2 4 4 5
6	2 3 4 5 5 8 9
7	2 4 6 6 7
8	1 3 3
9	4

Key: 4 | 5 = 45

4. The table shows the results of a survey that asked sophomores and juniors how many school events they attended last month.

- Make a double box-and-whisker plot that represents the data. Describe the shape of each distribution.
- Compare the number of school events attended by sophomores to the number of school events attended by juniors.
- About how many of the juniors surveyed would you expect to attend between 7 and 11 school events?

	Sophomores	Juniors
Survey size	55	52
Minimum	0	2
Maximum	9	15
1st Quartile	3	7
Median	6	12
3rd Quartile	8	14
Mean	9	11
Standard Deviation	2.4	4.3

## 11.3 Enrichment and Extension

### Calculate Standard Deviation of a Population

The *standard deviation* is a measure of how spread out the numbers are in a data set. By definition the formula for standard deviation is the square root of the *variance*. Well, what is variance? Variance is defined as the average of the squared differences of the mean. First, to calculate the variance, find the mean. Then for each number in your data set, subtract the mean and square the number. After this, find the average of these squared differences. Your solution will be the variance of the data set. To calculate the value of the standard deviation, take the square root of the variance.

**Example:** Calculate the standard deviation for the data set 3, 4, 5, 7, 8, 9.

$$\text{First, find the mean: } \frac{3 + 4 + 5 + 7 + 8 + 9}{6} = \frac{36}{6} = 6$$

Second, find the variance:

$$\begin{aligned} \frac{(3 - 6)^2 + (4 - 6)^2 + (5 - 6)^2 + (7 - 6)^2 + (8 - 6)^2 + (9 - 6)^2}{6} &= \frac{9 + 4 + 1 + 1 + 4 + 9}{6} \\ &= \frac{28}{6} \\ &= 4\frac{2}{3} \end{aligned}$$

$$\text{Take the square root to calculate the standard deviation: } \sqrt{4\frac{2}{3}} \approx 2.16$$

**Calculate the mean and the approximate population standard deviation of the data set. Round to the nearest thousandth, when necessary.**

- 75, 83, 96, 100, 121, and 125
- the first 8 natural numbers (1 through 8)
- the first 5 numbers of the Fibonacci sequence (1, 1, 2, 3, 5)
- the test scores of six friends: 56, 65, 70, 72, 81, and 82

# 11.3 Puzzle Time

## What Can You Put Into A Barrel Full Of Water To Make It Lighter?

Write the letter of each answer in the box containing the exercise number.

Describe the shape of the distribution.

1.

<b>Number of books read in a month</b>	1–2	3–4	5–6	7–8	9–10
<b>Frequency</b>	15	12	10	3	1

**K.** skewed left                      **L.** skewed right                      **M.** symmetric

2.

<b>Number of pets in a household</b>	0–1	2–3	4–5	6–7	8–9
<b>Frequency</b>	1	3	6	3	1

**M.** skewed left                      **N.** skewed right                      **O.** symmetric

3.

<b>Number of emails received</b>	0–4	5–9	10–14	15–19	20–24
<b>Frequency</b>	5	6	15	18	20

**A.** skewed left                      **B.** skewed right                      **C.** symmetric

4.

<b>Test scores</b>	51–60	61–70	71–80	81–90	91–100
<b>Frequency</b>	3	5	12	5	3

**C.** skewed left                      **D.** skewed right                      **E.** symmetric

5.

<b>Number of songs downloaded in a week</b>	1–3	4–6	7–9	10–12	13–15
<b>Frequency</b>	12	10	8	3	1

**G.** skewed left                      **H.** skewed right                      **I.** symmetric

3		5	2	1	4
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