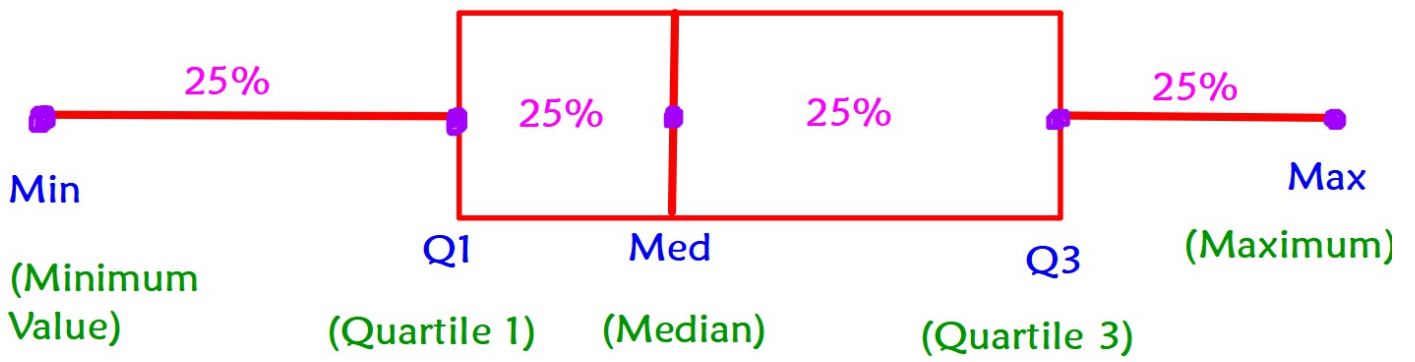# Box-and-Whisker Plots

- Separating data into subsets is a useful way to summarize and compare data sets

- A box-and-whisker plot displays the maximum, minimum, and quartiles of the data set.

- Be sure to order the data from least to greatest when calculating by hand

- Quartiles are values that divide the data set into four equal parts.

# Box-and-Whisker Plots

- The __median__ (or second quartile) separates the data into upper and lower halves.

- The __first__ __quartile__ is the median of the lower half of the data. $Q_1$

- The __third__ __quartile__ is the median of the upper half of the data. $Q_3$

- The __interquartile__ __range__ is the difference between the third and first quartiles. $Q_3 - Q_1$

○ The left whisker extends <u>from the minimum to the first quartile</u>. It represents **25%** of the data.

○ The box extends from the <u>first quartile to the third quartile</u> and has a vertical line through the median. The <u>length of the box represents the interquartile range</u>. It contains **50%** of the data.

○ The right whisker extends <u>from the third quartile to the maximum</u>. It represents **25%** of the data.

25%          25%          25%          25%

Min          Q1          Med          Q3          Max

(Minimum          (Quartile 1)          (Median)          (Quartile 3)          (Maximum)
Value)

Create a box and whisker plot using the following data:
125, 80, 140, 135, 126, 140, 350, 75

Minimum:
Q1:
Q2:
Q3:
Maximum:
Range:
Interquartile Range:

On calculator:

2nd Y= Enter Enter

Select the box and whisker plot Enter

Zoom 9

*Put data into Stat Enter

Trace

Then use arrow keys to get other values

What percentage of the data is between 102.5 and 130.5?

Create a box and whisker plot using the following data:
95, 85, 75, 85, 65, 60, 100, 105, 75, 85, 75

Minimum:
Q1:
Q2:
Q3:
Maximum:
Range:
Interquartile Range:

_____

What percentage of the data is between 95 and 105?

Create a box-and-whisker plot for the following data set:
280, 220, 224, 270, 410, 290, 230, 220

What value is the outlier?

How does it change the shape of the box-and-whisker plot? (Calculate with and without the outlier)

Does it change the center?

Does it change the spread of the data?

# Making Comparisons Using Box-and-Whisker Plots

Create box and whisker plots using the following information:

Data Set A -
Minimum: 1.5, Q1: 2.5, Q2: 4.5, Q3: 7.5, Maximum: 8.5

Data Set B -
Minimum: 3, Q1: 5, Q2: 5.5, Q3: 6, Maximum: 7

What do the interquartile ranges tell you about the data sets?

In which data set is the data less widely spread?

# Histograms

## Problem 2  Making a Histogram

**Television**  The data below are the numbers of hours per week a group of students spent watching television. What is a histogram that represents the data?

7  10  1  5  14  22  6  8  0  11  13  3  4  14  5

| Know | Need | Plan |
|------|------|------|
| A set of data values | A histogram of the data values | Make a frequency table. This will help you construct the histogram. |

Use the intervals from the frequency table for the histogram. Draw a bar for each interval. Make the height of each bar equal to the frequency of its interval. The bars should touch but not overlap. Label each axis.
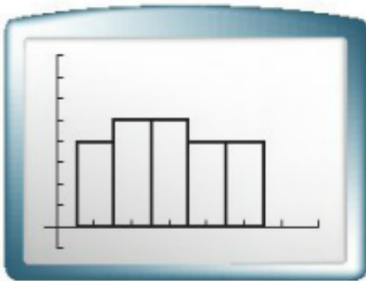
**Watching Television**

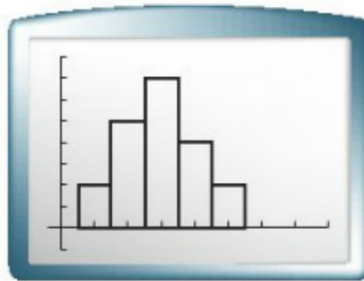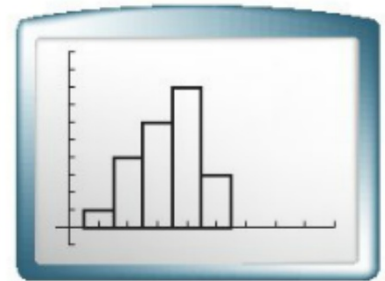| Hours | Frequency |
|-------|-----------|
| 0–5 | 6 |
| 6–11 | 5 |
| 12–17 | 3 |
| 18–23 | 1 |



Watching Television
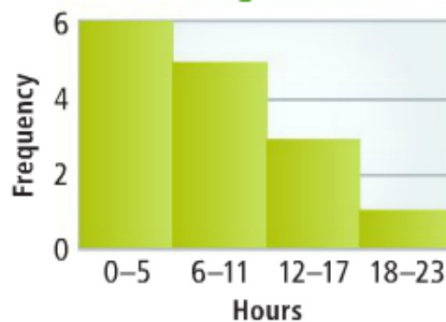
You can describe histograms in terms of their shape. Three types are shown below.



If the bars are roughly the same height, the histogram is *uniform*.



If a vertical line can divide the histogram into two parts that are close to mirror images, then the histogram is *symmetric*.



If the histogram has one peak that is not in the center, the histogram is *skewed*.
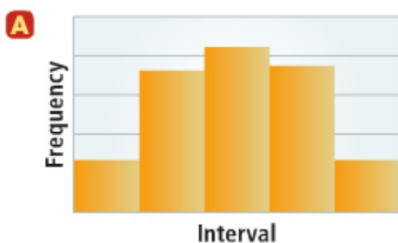
# Quick Examples:

**Think**

Where have you seen symmetry before? The parabolas you graphed in Chapter 9 are symmetric with respect to their axis of symmetry.
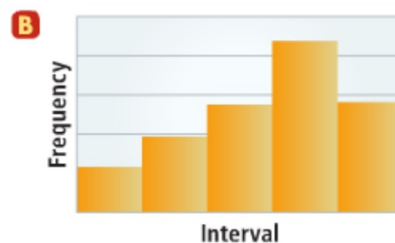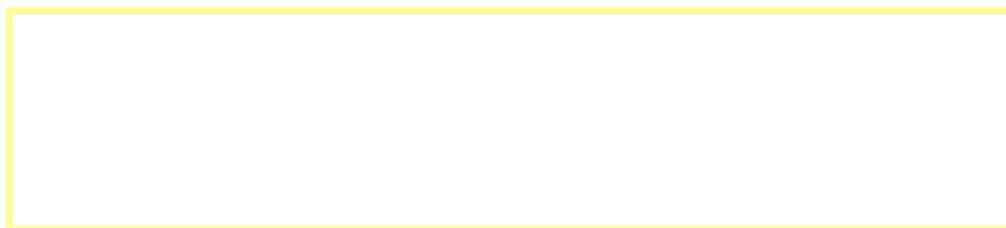
**Problem 3** Interpreting Histograms

Is each histogram *uniform, symmetric,* or *skewed*?

**A**

Frequency

Interval

This histogram is symmetric because the halves are close to mirror images.

**B**

Frequency

Interval

This histogram is skewed because the peak is not in the center.

# Histogram on the Calculator

**3. a.** The following set of data shows the numbers of dollars Jay spent on lunch over the last two weeks. Make a histogram of the data. Is the histogram *uniform, symmetric,* or *skewed?*

17  1  4  11  14  14  5  16  6  5  9  10  13  9

**b. Reasoning** How much money should Jay plan to bring for lunch next week? Explain your reasoning.