Presenting Statistical Data

Objective: To construct stem-and-leaf plots and box-and-whisker plots.

Vocabulary

First quartile score Median of the bottom half of data which are arranged in order.

Third quartile score Median of the top half of data which are arranged in order.

Example 1   Construct a **stem-and-leaf plot** for the following set of test scores.

75	79	88	67	89	56	94	92	82	83
92	89	94	97	86	68	58	74	48	76
68	95	91	50	93	82	64	97	95	46

Solution   First the stems, derived by dropping the unit's digit from each score, are written in order to the left of a vertical line. For each score the *leaf*, or unit's digit, is then recorded to the right of the corresponding *stem*. For the score of 94, for example, the leaf 4 is recorded to the right of the stem 9.

```
4 | 8, 6
5 | 6, 8, 0
6 | 7, 8, 8, 4
7 | 5, 9, 4, 6
8 | 8, 9, 2, 3, 9, 6, 2
9 | 4, 2, 2, 4, 7, 5, 1, 3, 7, 5
```

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1. Use the distribution of the scores given by the stem-and-leaf plot shown at the right.

   a. List the scores of the distribution in order.

   b. Find the median, the mode, and the range of the scores.

   ```
   4 | 7, 5
   5 | 8, 3, 6, 4
   6 | 4, 1, 5, 8
   7 | 6, 2, 5, 8, 0, 2
   8 | 1, 6, 5
   9 | 7, 3
   ```

2. In an effort to raise money for a charity, twenty students were involved in a basketball free-throw competition. Each person shot 100 free-throws and recorded the number made:

23	41	65	64	95	26	53	50	76	88
30	36	48	85	84	39	70	90	62	76

   Construct a stem-and-leaf plot for the number of free-throws that were made.

3. The students in a marketing class reported the amount of money they earned last week in part-time jobs. They earned (in dollars):

113	126	98	102	91	84	125	154	148	124
118	110	82	104	132	125	143	92	77	120

   Construct a stem-and-leaf plot for their earnings.
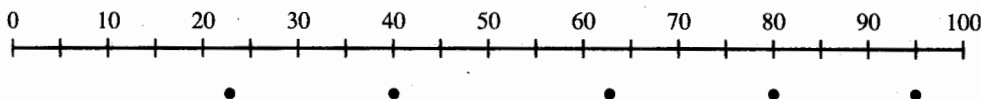

NAME _____ DATE _____ .

Presenting Statistical Data (continued)

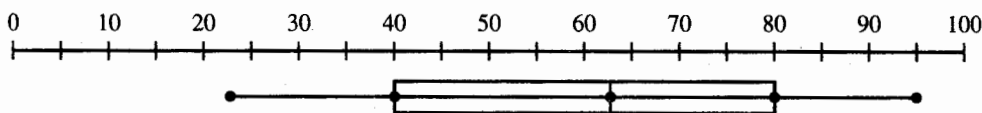**Example 2**   Construct a **box-and-whisker plot** for the data listed in Exercise 2.

Solution   List the numbers in order from smallest to largest. Then find the highest score, lowest score, median score, and first and third quartile scores.

```
┌───────── bottom half of data ─────────┐      ┌───────── top half of data ─────────┐
23  26  30  36  39  41  48  50  53  62        64  65  70  76  76  84  85  88  90  95
lowest              first              median              third              highest
score             quartile             score             quartile             score
                   score                                  score
  ↓                  ↓                   ↓                   ↓                   ↓
 23                 40                  63                  80                  95
```

Identify these five special values with dots below a number line.

```
0      10     20     30     40     50     60     70     80     90    100
├──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┤
            ●              ●              ●              ●         ●
```

Next, make a *box* with the two quartile scores on the outer sides. Draw a line inside the box, through the median dot. Finally, draw *"whiskers"* from the sides of the box to the dots of the lowest and highest scores.

```
0      10     20     30     40     50     60     70     80     90    100
├──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┼──┤
          ●───────┌────────┬────────┐──────────●
                  └────────┴────────┘
```

The box encloses the middle half of the data while the whiskers show the range.

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4. The mean daily temperatures in degrees Fahrenheit for Springfield, as recorded on the fifteenth of each month, are listed:

   39° 44° 49° 56° 62° 69° 73° 74° 68° 60° 48° 44°

Find the:

a. median   **b.** first quartile temperature   **c.** third quartile temperature

d. highest temperature   **e.** lowest temperature   **f.** range

5. Construct a box-and-whisker plot for the data in Exercise 4.

6. Fifteen sales representatives listed the average amount they spent each night for lodging:

   $38 $74 $42 $56 $61 $48 $36 $40 $48 $60 $64 $52 $70 $50 $49

Find the:

a. median   **b.** first quartile amount   **c.** third quartile amount

d. highest amount   **e.** lowest amount   **f.** range

7. Make a box-and-whisker plot for the data in Exercise 6.