

GRADE 8 MATHEMATICS

(8.12) Probability and statistics. The student uses statistical procedures to describe data. The student is expected to: (C) select and use an appropriate representation for presenting and displaying relationships among collected data, including line plots, line graphs, stem and leaf plots, circle graphs, bar graphs, box and whisker plots, histograms, and Venn diagrams, with and without the use of technology.

(8.13) Probability and statistics. The student evaluates predictions and conclusions based on statistical data. (B) recognize misuses of graphical or numerical information and evaluate predictions and conclusions based on data analysis.

PARENT GUIDE Six Weeks 5 – Lesson 3

For this TEKS students should be able to make inferences, draw conclusions, and make convincing arguments about data. Focus for this lesson is stem and leaf plots.

MATH BACKGROUND

Understanding how to select an appropriate representation of data

Stem and leaf plots are used to represent a large set of data. A **stem and leaf plot** easily displays the greatest, least, and median values in a set of data. A stem and leaf plot gives a quick way of checking how many pieces of data fall into various ranges and displays the value of every piece of data.

Following are the steps to make a stem and leaf plot:

- Title the plot.
- If the data are not already written in order, do so.
- Find the least and greatest values.
- Choose stem values that will include the extreme values.
- Write the stems vertically from least to greatest or greatest to least.
- Draw a vertical line to the right of the values
- Separate each number into stems and leaves. Write each leaf to the right of its stem in order from least to greatest.
- Write a key that explains how to read the stems and leaves.

Example: From the Forbes 1998 Top 40 Entertainers list, here are the top 20 entertainers earnings, in millions of dollars:

225, 200, 175, 125, 115, 77, 65, 58, 57, 56.5, 56, 55.5, 55, 54, 53.5, 53, 53, 52, 49.5, 49

(Source: <http://www.forbes.com>)

Make a stem and leaf plot to summarize the data.

- Title the plot: **Earnings of the Top 20 Entertainers (in millions of dollars)**
- The data is already in order from greatest to least.
- Find the least and greatest values: ____ and ____ million
- Choose stem values that will include the extreme values: ____ million and ____ million

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- Write the stem values vertically from greatest to least.
- Draw a vertical line to the right of the stem values.

Stems

22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4

- Separate each number into **stems** (ten millions) and **leaves** (millions). Write each leaf to the right of its stem in order from least to greatest.

Stems

Leaves

| | |
|----|-----------------------------|
| 22 | 5 |
| 21 | |
| 20 | 0 |
| 19 | |
| 18 | |
| 17 | 5 |
| 16 | |
| 15 | |
| 14 | |
| 13 | |
| 12 | 5 |
| 11 | 5 |
| 10 | |
| 9 | |
| 8 | |
| 7 | 7 |
| 6 | 5 |
| 5 | 2 3 3 3.5 4 5 5.5 6 6.5 7 8 |
| 4 | 9 9.5 |

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- Write a key that explains how to read the stems and leaves.
- Title the stem and leaf plot.

**Earnings of the Top 2 Entertainers
(in millions of dollars)**

| Stems | Leaves |
|-------|-----------------------------|
| 22 | 5 |
| 21 | |
| 20 | 0 |
| 19 | |
| 18 | |
| 17 | 5 |
| 16 | |
| 15 | |
| 14 | |
| 13 | |
| 12 | 5 |
| 11 | 5 |
| 10 | |
| 9 | |
| 8 | |
| 7 | 7 |
| 6 | 5 |
| 5 | 2 3 3 3.5 4 5 5.5 6 6.5 7 8 |
| 4 | 9 9.5 |

Key: 4 | 9 means 49,000,000

11 | 5 means 115,000,000

- From the plot you can see that most of the top earners earned between \$ _____ and \$ _____.
- Only _____ entertainers earned more than \$100,000,000.

Understanding how to make inferences, draw conclusions and make convincing arguments about data

The purpose of a **stem and leaf plot** is to organize the numbers in a set of data so that the numbers themselves make the display. An advantage of representing data with a stem and leaf plot is that it easily identifies the greatest, least, mode and median values in a set of data. Also, it gives a quick way of checking how many pieces of data fall in various ranges. Unlike histograms and frequency tables, the stem and leaf plot displays the value of every piece of data.

A double stem and leaf plot (also called a back-to-back stem and leaf plot) can be used to compare two sets of data. In a double stem and leaf plot, the stem is in the middle. Read from the middle to the left and from the middle to the right.

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Example: The double stem and leaf plot below compares average monthly rainfall in Chicago and Miami.

| Chicago | Stem | Miami |
|-----------|------|--------|
| Leaves | | Leaves |
| 9 6 | 1 | 9 |
| 9 7 6 4 | 2 | 0 1 5 |
| 7 6 6 6 0 | 3 | 1 2 |
| 0 | 4 | |
| | 5 | 9 |
| | 6 | 0 |
| | 7 | 0 8 |
| | 8 | 5 |
| | 9 | 0 |

Key: 6 | 1 | represents 1.6 inches in Chicago
 | 1 | 9 represents 1.9 inches in Miami

Some conclusions that can be drawn from the data shown in the stem and leaf plot are:

- **Chicago has more months with an average rainfall less than 4 inches of rainfall than Miami.**
 This statement can be supported by counting the number of average rainfall amounts less than 4 inches in Chicago and in Miami. Chicago has 12 months with less than 4 inches and Miami has 6 months.
- **Chicago has the lowest average monthly rainfall.**
- This can be supported by the fact that no average rainfall is less than the 1.6 monthly average in Chicago.
- **The difference between the lowest average monthly rainfall and the highest average monthly rainfall in Miami is 7.1 inches.**
 This can be supported by the fact that Miami has monthly rainfall averages from 1.9 to 9 inches.
- **One half of the months Miami has a monthly rainfall greater than 5.8 inches.**
 This statement is supported by counting the total number of months reported and writing a ratio to compare the number of months with rainfall greater than 5.8 inches to the total number of months. Miami has 6 months with rainfall greater than 5.8 inches out of 12 months. The ratio is $\frac{6}{12}$ or $\frac{1}{2}$.