

Lesson 1-6

Mean, Median, Mode, and Range

<p>Lesson Objectives</p> <ul style="list-style-type: none"> Find mean, median, and mode Make and use stem-and-leaf plots 	<p>NAEP 2005 Strand: Data Analysis and Probability Topics: Data Representation; Characteristics of Data Sets Local Standards: _____</p>
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Vocabulary and Key Concepts

Mean, Median, Mode

Mean = $\frac{\text{sum of data items}}{\text{total \# of data items}}$ (add up all #'s) / (how many #'s there are)

The mean is often referred to as the Average.

Use the mean to describe the middle of a set of data that doesn't have an outlier

An outlier is a data value much higher or lower than the rest of the data. (ex) 30, 31, 33, 35, 76

The median is the middle # when the #'s are in order least to greatest.

For a set containing an even # of data items, the median is the average of the two middle data values. (add the 2 middle #'s & divide by 2)

Use the median to describe the middle of a set of data that does have an outlier

The mode is the data item that appears the most.

It is possible for a set of data to have NO mode, one mode, or more than 1 mode. (ex. letter)

Use the mode when the data are nonnumeric or when choosing the most popular item.

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mean, Median + Mode

Measures of central tendency are used to find the center of the data

The range of a set of data is the highest # minus the lowest #

A stem-and-leaf plot is a display of data made by using the digits of the values.
NO commas !! 20, 24, 32, 35, 36

Key

20 = 20

2 0 4
 3 2 5 6

Examples

① **Applying Measures of Central Tendency** Find the mean, median, and mode of the data below. Which measure of central tendency best describes the data?

14 10 2 13 16 3 12 11

Mean: $\frac{14 + 10 + 2 + 13 + 16 + 3 + 12 + 11}{8} = \frac{81}{8} = 10.125$

\square
 ↑
 total number of data items

Median: 2 3 10 11 12 13 14 16 List the data in order.

Calculator:
(11+12)/2

$\frac{11 + 12}{2} = 11.5$

For an even number of data items, find the mean of the two middle terms.

Mode: none the data item that occurs most often

The mean is 10.125, the median is 11.5, and there is NO mode. The mean is less than 5 of the 8 data items because of the outliers 2 and 3. The median best describes the data.

② **Solving an Equation** Suppose your grades on three science exams are 82, 94, and 89. What grade do you need on your next exam to have an average of 90?

Let x = the grade of the fourth exam.

Mean (average): $\frac{82 + 94 + 89 + x}{4} = 90$

~~$\frac{265 + x}{4} = 90$~~
 $\frac{265}{4} + x = 90$

Simplify the numerator.

Multiply each side by \square .

~~$\frac{(265 + x)}{4} = (90)$~~

Simplify.

$265 + x = 360$

Subtract 265 from each side.

$265 + x - 265 = 360 - 265$

Simplify.

$x = 95$

Your grade on the next exam must be a 95 for you to have an average of 90.

③ **Making a Stem-and-Leaf Plot** Make a stem-and-leaf plot for the data.

~~56 44 63 58 51 59 41~~
~~51 67 50 65 49 66 68~~

4 | 4 7 9
 5 | 0 1 1 6 8 9
 6 | 3 3 5 6 7

Key:
5|1 means 51.

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100, 121, 105, 113, 108, X ; mean = 112

$$\frac{100 + 121 + 105 + 113 + 108 + X}{6} = \frac{112}{1}$$

~~$$\frac{547 + X}{6} = \frac{112}{1}$$~~

$$\frac{547 + X}{6} = \frac{672}{1}$$

$$X = 125$$

#9.

Type A

Type B

6	3	3	2		
3	2	1	1	3	1 1 2
			1	4	3 5 8
				5	2 4

Back
to
Back
Stem +
Leaf
Plot

$$\bullet 33 \leftarrow 3 | 3 | 1 \rightarrow 0.31$$

Type A:

~~.23~~, ~~.23~~, ~~.24~~, .31, .31, ~~.32~~, ~~.33~~, ~~.4~~

15.7

7	15	7
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15.7 → 15 | 7

Practice 1-6

Mean, Median, Mode, and Range

Find the mean, median, and mode. Which measure of central tendency best describes the data?

1. number of cars sold in the past 10 days
1 5 3 2 1 0 4 2 6 1

2. utility bills for the past 6 months
\$90 \$120 \$140 \$135 \$112 \$126

3. prices of a sweater in 5 different stores
\$31.25 \$27.50 \$28.00 \$36.95 \$32.10

4. scores on a 10-point quiz
7 9 10 8 4 2 6 10 8

Find the range.

5. hourly wages
\$7.25 \$6.75 \$8.10 \$9.56 \$7.10 \$7.75

6. ages of students on the quiz team
15 15 14 16 17 16 16 15

Write and solve an equation to find the value of x .

7. 4.8, 1.6, 5.2, x ; mean 3.7

8. 40, 98, 94, 102, 21, x ; mean 88

9. 100, 172, 85, 92, x ; mean 115

10. 25.6, 19.3, 19, x , mean 24

11. A coffee machine is considered reliable if the range of amounts of coffee that it dispenses is less than 2 fluid ounces (fl oz). In eight tries, a particular machine dispensed the following amounts: 7.1, 6.8, 7.6, 7.1, 7.4, 6.8, 7, and 6.7 fl oz. Is the machine reliable? Explain

12. To test the exhaust fumes of a car, an inspector took six samples. The exhaust samples contained the following amounts of gas in parts per million (ppm): 8, 5, 7, 6, 9, and 5. If the maximum allowable mean is 6 ppm, did the car pass the test? Explain.

13. Randy had grades of 85, 92, 96, and 89 on his last four math tests. What grade does he need on his next test to have an average of 92?

14. a. A bakery collected the following data about the number of loaves of fresh bread sold on each of 24 business days. Make a stem-and-leaf plot for the data.

43	39	17	38	50	42	34	28	37	42	40	33
72	36	45	21	29	44	41	37	40	35	51	54

- b. Find the mean, median, mode(s), and range of the data.

15. The back-to-back stem-and-leaf plot shows the number of calls made to each of two police departments in the last 14 days. Find the mean, median, mode(s), and range of each side of the stem-and-leaf plot.

Dept. A	Dept. B
9 5 2 3	1 4
8 6 2 1 4	7 9 9
8 8 8 2 5	0 2 2 2 4
3 2 1 6	1 1 3
7	1

16. The back-to-back stem-and-leaf plot shows the average daytime temperature (in °F) at two different locations for each of the past 15 weeks. Find the mean, median, mode, and range of each side of the stem-and-leaf plot.

Locn. A	Locn. B
9 8 7 6	5 6 6 7 9
7 5 1 0 7	2 4 5 6 8
9 4 3 3 1 8	0 4 7 9
1 0 0 9	1