

Calculations in Science

What will I need to be able to do?

- Basic tools: Measure the central tendency of a data set

- Mean (average) $\bar{X} = \frac{\sum X}{N}$

- Median (middle number) M_d

- Mode (most frequent number) M_o

- Range (difference) = $X_{\max} - X_{\min}$

ΣX = (sigma) sum of each value N = number of X values

Mean, Median, Mode, and Range

First, arrange the numbers in order by size.

Example: 3, 5, 5, 6, 8, 10, 12

Mean

the average
of the numbers

1. Add the numbers together.
2. Divide by how many numbers were added.

$$3+5+5+6+8+10+12=49$$

$$49 \div 7 = 7$$

The mean is 7.

Median

the middle
number of
a sequence

The median is the middle number when numbers are arranged in order by size.

For an even number of numbers, the median is the average of the two numbers in the middle.

**The middle
number is 6.**

The median is 6.

Mode

the number
that occurs
most often

Find the number(s) that occurs most often in the sequence (there may be more than one).

**There are two 5s
and one of each of
the other numbers.**

The mode is 5.

Range

the difference
between the
lowest and
highest values

Subtract the smallest number from the largest number.

$$12 - 3 = 9$$

The range is 9.

Example: The weight of 5 cats in pounds are 12, 14, 12, 16 and 16. Find the mean, median, mode and range of the data set.

- Write all the data in numerical order.
- Find the mean
- Find the median
- Find the mode
- Find the range

Note:

- Although there can be only one average and one middle number, there may be more than one mode.
- Use averages when measurements are more alike than different.
- Use range when measurements have a marked variability.
- Often it is useful to give both.