

# Scientific Investigation Fact Sheet

## Controlled Experiments

**Variable:** Anything that varies in an experiment.

**Independent Variable:** What is being tested or changed.

**Dependent Variable:** The results from changing the I.V.

**Constant:** Anything that stays the same in the experiment.

**Control:** Standard situation without the I.V. for comparison.

\* The more **trials** you test, the more valid your results. \*

**“A student wants to test how different colors of light affect the growth of a plant. She plans to grow the plants in red, blue, green, and white light.”**

**Independent Variable:** The color of light

**Dependent Variable:** Plant growth

**Constants:** Type of plant, amount of light, amount of water

**Experimental Trials:** Plants with red, blue, green light.

**Control:** Plants with white light.

## Data and Statistics

**Mean:** Add all values and divide by the number of values.

**Median:** The middle value. (if numbers are in order)

**Mode:** The value that occurs most often.

**Range:** The spread of data. (Greatest – Least)

2, 5, 9, 3, 5, 4, 7

Order the Data Set: 2, 3, 4, 5, 5, 7, 9

**Mean:**  $2+3+4+5+5+7+9 / 7$  Values    *The Mean is 5*

**Median:** 5 is in the middle    *The Median is 5*

**Mode:** There are 2 5's.    *The Mode is 5*

**Range:**  $9 - 2 = 7$     *The Range is 7*

## Scientific Notation

**Scientific Notation:** used to express very large and very small numbers.

$6.23 \times 10^5$

A **positive exponent** means a number greater than 1  
 $3.0 \times 10^8$  m/s is the speed of light (300,000,000 m/s)

A **negative exponent** means a number less than 1  
 $8.0 \times 10^{-6}$  m is the width of a blood cell (0.000008 m)

**Scientific to Numbers:**  $7.5 \times 10^{-3}$  to 0.0075

- 1) Move the decimal to according to the exponent.
- 2) Fill any empty spaces with zeros.

**Numbers to Scientific:** 35,000 to  $3.5 \times 10^4$

- 1) Move the decimal until there is 1-9 in the ones place.
- 2) Drop any outside zeros.

## The Metric System

The **metric system (SI Units)** is a simplified system of measurements that is based on powers of 10.

King    Henry    Doesn't    Usually    Drink    Chocolate    Milk

Kilo-    Hecto-    Deca-    Unit    Deci-    Centi-    Milli-

**Biggest** -----> **Smallest**

- 1) Start with the unit given.
- 2) Move the decimal left/right to the unit you're converting.
- 3) Move the decimal according to the number of steps taken and add additional zeros for any empty spaces.

**Convert 1.25 km to \_\_\_\_\_ m**

- 1) Move the decimal right from –kilo to unit.
- 2) Move the decimal 3 places and add any zeros.

**1.25 km is 1,250 m**

