**Experimental Design Reference**

*(Keep this in your binder for reference)*

Scenario: A group of students is assigned a project in their 6th grade Earth Science class. They decide to determine the effect of sunlight. They grow 12 radish plants in 100g of potting soil. They water the plants with 25 mL of water each day. The plants are subjected to 24 hours darkness, 12 hours sunlight/12 hours darkness, and 24 hours sunlight. (They use Grow-Lights to simulate sunlight). After 5 days, they measure the height of all the plants in each pot.

1. **Independent Variable**: (IV) (Also known as the **manipulated variable**)—the variable you purposely change or manipulate. Will be the CAUSE of the changes in your experiment.

*Example: The sunlight*

1. **Dependent Variable**: (DV) (Also known as the **responding variable**)—the variable you will measure after the experiment is set up. Will be EFFECT of the action you took.

Example: The height of the plants

1. **Title**: Communicates what the experiment is about.

Acceptable format: The Effect of (the independent variable) on (dependent variable).

*Example*: The Effect of Sunlight on the Height of Plants.

1. **Hypothesis**: Communicates what you think is going to happen in the experiment.

Acceptable format: If (the independent variable) is (*increased, decreased, changed*), then (the dependent variable) will (*increase, decrease, change).*

*Example:* If the sunlight is *increased*, then the height of the plants will *increase*.

1. **Constants**: All the other variables that remain the same for all the trials—otherwise they could affect the results (they could also change the DV) and distort the connection between the ONE IV you manipulated and the DV.

 *Example*: 100g potting soil and 25 mL of water each day

1. **Control**: The group that does NOT contain the IV—the no treatment group of normal treatment group. Helps establish a baseline result that you can compare with your experimental groups.

*Example:* The plants that receive 12 hours sunlight/12 hours darkness (which best simulates real life)—this will allow you to compare the results for the experimental plants growing in 24 hours darkness and 24 hours sunlight.

1. **Trials**: The number of times the experiment is repeated. The more times you can repeat the experiment and get the same results, the more valid your conclusions are.

**Graphing Skills Checklist**

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Tips for Graphing…

Sometimes you may not be sure whether to make a bar graph or a line graph of your data. The appropriate type of graph depends on the type of data collected.

**Line Graph**: Use when the *IV* is a *continuous* range of measurements, and when the intervals between the numbers have meaning.



*Ex: amount (of something), time, distance*

**Bar Graph**: Use when the *IV* is a *category*, not a number. The intervals between groups have no meaning, so we don’t draw a line between them.



*Ex: Days of the week, colors, brand names*

**Other Important Information…**

1. Label all parts of your graph for full credit
	1. **Title** - must contain both the IV and DV
	2. **Scale** - even numbered system
	3. **X axis** - contains IV and units of measure
	4. **Y axis** - contains DV and units of measure
	5. **Key** - if you have more than one line or bar
2. Identify a trend in your data—what happens to the DV as the IV changes?
	1. Trends will often be linear in this class—this means drawing a line of best fit, which goes through as many points as possible, leaving leftover points on both sides of the line.
	2. If the trend is not linear, draw a smooth curve as best you can