

# Experimental Design Outline

8/09

IBESS Name \_\_\_\_\_ Period \_\_\_\_\_

All experiments have certain components in common. Throughout the year we will be using what is called a “Design Outline” to label and identify the parts of any scientific experiment. This handout will guide you in using this type of outline.

## Consider the following scenario:

After studying about recycling, members of John’s biology class investigated the effect of various recycled products on plant growth. John’s lab group compared the effect of different aged grass compost on bean plants. Because decomposition is necessary for release of nutrients, the group hypothesized that older grass compost would produce taller bean plants. Three flats of bean plants (25 plants/flat) were grown for 5 days. The plants were then fertilized as follows: (a) Flat A: 450 g of 3-month-old compost, (b) Flat B: 450 g of 6-month-old compost, and (c) Flat C: 0 g compost. The plants received the same amount of sunlight and water each day. At the end of 30 days the group recorded the height of the plants (cm), and plant health was described.

## Useful Definitions

**Hypothesis:** a prediction about the relationship between the variables that can be tested. Often written as an “if”, “then” statement.

**Independent Variable (IV):** the variable that is purposefully changed by the experimenter.

**Dependent Variable (DV):** the variable is being measured - and that responds to the I.V.

**Constants (C):** all factors that remain the same throughout the experiment.

**Control:** the standard for comparing experimental effects.

**Repeated Trials:** the number of experimental repetitions, objects, or organisms tested at each level of the independent variable.

## Design Outline

Title: The Effect of Different Aged Compost on Bean Plant Growth.

Hypothesis: If older compost is applied, then plant height will be taller

Independent Variable I.V: Age of Compost

Levels of I.V. (2 or more plus the control, which must be identified)	3 month old compost	6 month old compost	No Compost (control)		
Number of trials you will conduct for each I.V. level	25 plants	25 plants	25 plants		

Dependent Variable(s): describe quantitative and qualitative data  
Quantitative Measurements: Height of plants (cm)  
Qualitative Measurements: Plant Health description

Constants: Amount of light, amount of water, amount of compost

## Practice Experimental Design Scenarios

### 1. Mashed Potato Color

Gloria wanted to find out if the color of food would affect whether kindergarten children would select it for lunch. She put food coloring into 4 identical bowls of mashed potatoes. The colors were red, green, yellow and blue. Each child chose a scoop of potatoes of the color of their choice. Gloria did this experiment using 100 students. She recorded the number of students that chose each color. Gloria also observed, and recorded, their body language while the students ate the mashed potatoes. Gloria made sure that only kindergarten age children participated, she also made sure that each child received the same amount of potato in the same size and color bowl.

### Experimental Organizer

Title:

Hypothesis:

Independent Variable I.V.:

Levels of I.V. (2 or more plus the control, which must be identified)					
Number of trials you will conduct for each I.V. level					

Dependent Variable(s):

Quantitative Measurements:

Qualitative Measurements:

Constants:

## 2. *Aloe vera* and Planaria

Jackie read that *Aloe vera* promoted healing of burned tissue. She decided to investigate the effect of varying amounts of *Aloe vera* on the regeneration of the worm planaria. Using a sterile scalpel she cut the planaria in half to obtain 10 parts (5 heads and 5 tails) for each experimental group. She applied 15 milliliters of *Aloe vera* for each of the following concentration: 0%, 10%, 20%, and 30% to each group. All planaria were maintained in a growth chamber with identical food, temperature, and humidity. Everyday, she observed her planaria and recorded the time required (in days) for complete regeneration. The overall healthiness for each worm was described in paragraph form.

### Experimental Organizer

Title:
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Hypothesis:
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Independent Variable I.V:
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Levels of I.V. (2 or more plus the control, which must be identified)					
Number of trials you will conduct for each I.V. level					

Dependent Variable(s):
Quantitative Measurements:
Qualitative Measurements:

Constants:
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