

PART 3: Experimental Design Practice Problems

Answer Key

Directions: For each problem, identify the control group, experimental group, variables, and determine what the experiment's conclusion.



1. Smithers thinks that a special juice will increase the productivity of workers. He creates two groups of 50 workers and assigns each group the same task (in this case, they're supposed to staple a set of papers). Group A is given the special juice to drink while they work. Group B is not given the special juice. After an hour, Smithers counts how many stacks of papers each group has made. Group A made 1,587 stacks, Group B made 2,113 stacks.

- a. State the **problem** that Smithers is trying to figure out. *Smithers wants to increase productivity of workers.*
- b. Control Group- *Group B*
- c. Experimental Group- *Group A*
- d. Independent Variable- (the thing that Smithers changes)- *special juice*
- e. Control Variable(s) (the things that Smithers leaves the same)- *amount of time (hour)*
- f. Dependent Variable (the thing that you observe/keep data on)- *productivity - # of stacks of paper*
- g. What should Smithers' **conclusion** be?
*The special juice does not increase productivity.
The control group had more stacks of paper.*



2. Homer notices that his shower is covered in a strange green slime. His friend Barney tells him that coconut juice will get rid of the green slime. Homer decides to check this out by spraying half of the shower with coconut juice. He sprays the other half of the shower with water. After 3 days of "treatment" there is no change in the appearance of the green slime on either side of the shower.

- a. State the **problem** that Homer is trying to figure out. *Will coconut juice get rid of the slime?*
- b. Control Group - *shower side w/no juice*
- c. Experimental Group - *coconut juice side of shower.*
- d. Independent Variable (the thing that Homer changes) *coconut juice*
- e. Control Variable(s) (the things that Homer leaves the same) *time (3 days)*
- f. Dependent Variable (the thing that you observe/keep data on) *amount of green slime.*
- g. What should Homer's **conclusion** be?
Coconut juice does not help get rid of green slime.

4. Delia's cat, Mr. Boots, tends to get a lot of hairballs. Delia worries about the pain these hairballs cause her cat and hopes to prevent them from occurring so frequently. She believes that feeding Mr. Boots a teaspoon of tuna flavored hairball gel, three times a week, will help prevent the occurrence of hairballs. In the space below, describe how Delia could test her hypothesis (suggest an experiment). Identify the control variable(s), the independent variable, and the dependent variable.

hypothesis: If Mr. Boots gets a teaspoon of hairball gel 3 times a week, then he will get less hairballs.

indep. variable: tuna flavored hairball gel

depend. variable: # of hairballs

controls: same type + amount of reg. food
same amount of brushing/cleaning

5. Use the space below to design an experiment using the Investigative Question: "Do plants move?". Make sure you identify the independent, dependent, and control variables.

Materials: Flower pot, seeds, plant light, camera

Procedures: take a picture every 2 minutes for 8 days.
switch light to opposite side 2x a day
record the direction of growth/movement

indep. variable: plant light (switching sides)

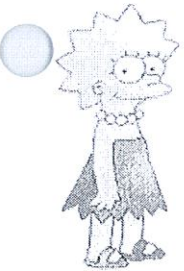
dep. variable: direction/movement of growth

controls: time



3. Krusty was told that a certain itching powder was the new best powder on the market, it even claims to cause 50% longer lasting itches. Interested in this product, he buys the itching powder and compares it to his usual product. One test subject (A) is sprinkled with the original itching powder, and another test subject (B) was sprinkled with the Experimental itching powder. Subject A reported having itches for 30 minutes. Subject B reported to have itches for 45 minutes.

- State the **problem** that Krusty is trying to figure out. *What itching powder works the best?*
- Control Group- *A - original powder*
- Experimental Group- *B - new powder*
- Independent Variable (the thing that Krusty changes) *type of powder*
- Control Variable(s) (the things that Krusty leaves the same) *placement of itching powder.*
- Dependent Variable (the thing that you observe/keep data on) *amount of time itches last.*
- What should Krusty's **conclusion** be?
The new itching powder lasts longer creating more itches.



4. Lisa is working on a science project. Her task is to answer the question: "Does Rogooti (which is a commercial hair product) affect the speed of hair growth". Her family is willing to volunteer for the experiment. Create an experiment that could help to answer this question. Include and identify a control group, experimental group, variable and a conclusion.

- State the **problem** that Lisa is trying to figure out. *Does Rogooti speed up hair growth?*
- Control Group- *no rogooti*
- Experimental Group- *using rogooti*
- Independent Variable (the thing that Lisa changes) *Rogooti hair product*
- Control Variable(s) (the things that Lisa leaves the same) *time using product*
- Dependent Variable (the thing that you observe/keep data on) *hair growth.*

