Vocabulary: Living Things

Word Part	Meaning	Vocabulary Word
Sci-	To know	Science
Erg-	To do work	Energy
syn	To make	Synthesis
Sym-	Together	Symbiosis
Sys-	To put together	System
A-	Without	Abiotic
Homeo	Same	Homeostasis
		Stimulus

Format

Word	Part of speech	Word parts
Definition		

Science		

Energy		

Synthesis		

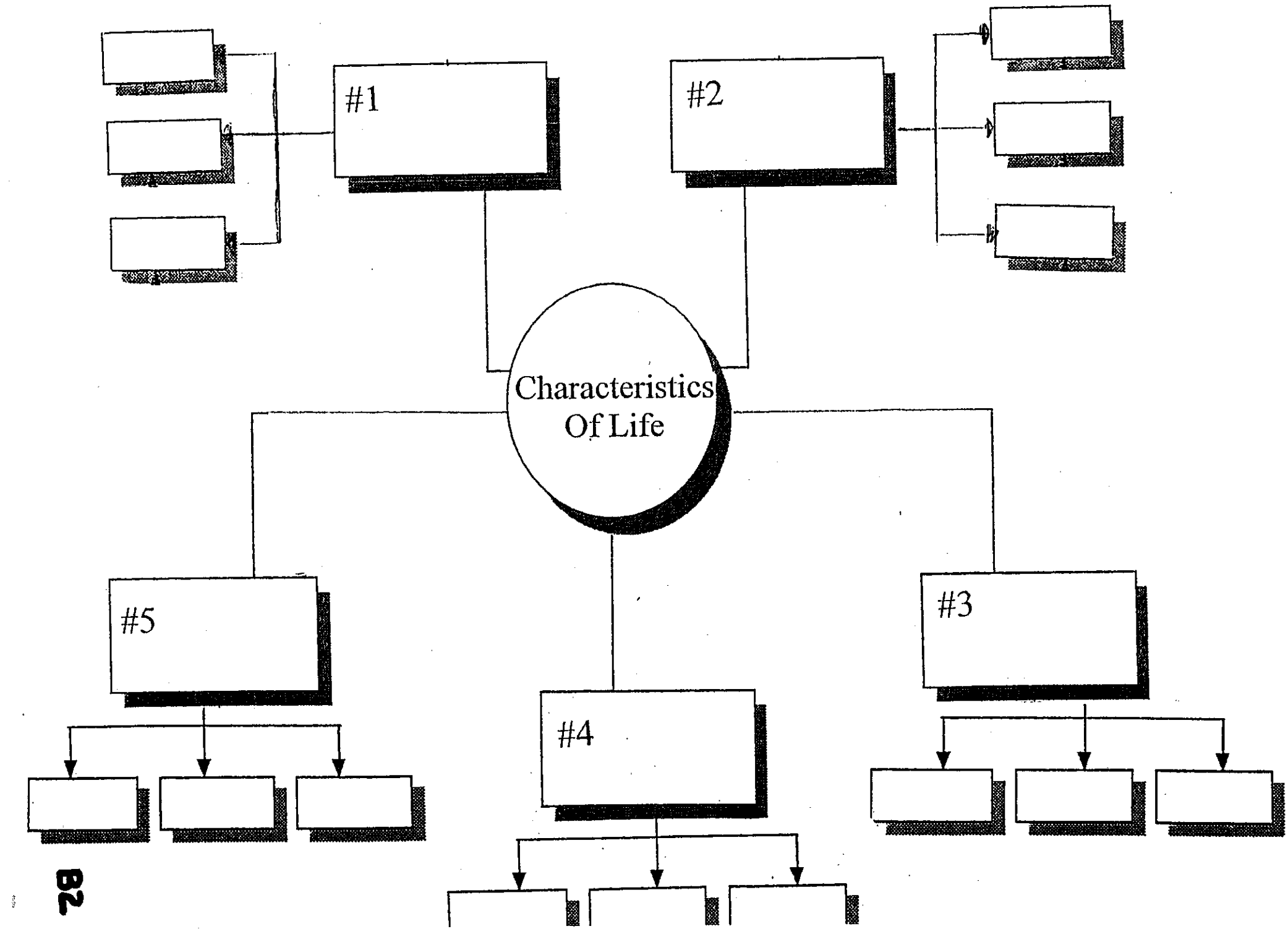
Symbiosis		

System		

Abiotic		

Homeostasis		

Stimulus		


#1
#2
Characteristics
Of Life
#5
#4
#3

Characteristics of Life Entry

Respond to these questions in one paragraph. DO NOT COPY from the notes, textbook or each other. This does YOU no good!!!! ALSO, avoid the desire to answer with random information as this is not what is being asked for.

1. **Initially, what did you believe the 5 characteristics of life were? Explain what you meant by each.**

2. **What are the actual 5 characteristics of life. *Give a brief* explanation of each.**

3. **Discuss how your initial list compares with the actual list. Does it align exactly to a characteristic, fit into one of the actual , or has no correlation?**

4. **Explain how many of the 5 characteristics of life something must possess in order to be considered alive.**

Final draft MUST be typed in 12-14 point font and 1.5 or double spaced. NO HANDRITTEN PAPERS WILL BE ACCEPTED.

Characteristics of Living Things Paragraph Rubric

	2	1	0
Initial characteristics	Paragraph clearly explains the initial characteristics and explains each in a precise manner	Paragraph explains the initial characteristics but the explanation is somewhat unclear	Paragraph lists initial characteristics but fails to explain each
Actual characteristics	Paragraph clearly explains the actual characteristics and explains each in a precise manner	Paragraph explains the actual characteristics but the explanation is somewhat unclear	Paragraph may list actual characteristics but fails to explain each
Comparison	Paragraph clearly compares the initial list with the actual list and aligns the initial characteristics into the actual	Paragraph compares the initial list with the actual list and aligns the initial characteristics into the actual.	Paragraph fails to compare the initial list with the actual or comparison may be very confusing to the reader
Consideration	Paragraph precisely explains how many of the five characteristics of life something must possess in order to be considered alive. Examples may be provided.	Paragraph explains how many of the five characteristics of life something must possess in order to be considered alive. May be somewhat unclear.	Paragraph does not explain how many of the five characteristics of life something must possess in order to be considered alive or explanation may be very unclear.
Typed	Paragraph is typed and possesses an appropriate and descriptive title.	Paragraph may be typed but does not posses an appropriate title.	Paragraph is handwritten.
Grammar and Spelling	Paragraph possesses correct grammar and spelling.	Paragraph may consist of some grammar or spelling errors.	Paragraph consists of many grammar or spelling errors.

Scientific Method

Standard

Investigation and Experimentation

1. **Scientific progress is made by asking meaningful questions and conducting careful investigations.** As a basis for understanding this concept, and to address the content the other four strands, students should develop their own questions and perform investigations. Students will:

Concepts

a. select and use appropriate tools and technology (such as computer linked probes, spread sheets, and graphing calculators) to perform tests, collect data, analyze relationships, and display data.

b. identify and communicate the sources of error inherent in experimental design.

c. identify discrepant results and identify possible sources of error or uncontrolled conditions.

d. formulate and revise explanations using logic and evidence.

f. distinguish between a guess, a hypothesis and a theory as these terms are used in science.

g. recognize the use and limitations of models and theories as scientific representations of reality.

k. recognize the cumulative nature of scientific evidence.

l. analyze situations and solve problems that require combining concepts from more than one topic area of science and applying these concepts.

Vocabulary: Scientific Method / General Use

Word Part	Meaning	Vocabulary Word
sci-	to know	science
-thesis	to place	hypothesis
hypo-	below	hypoallergenic
erg-	to do work	energy
meter	to measure	metric
-ic, -ics	pertaining to	scientific
syn	to make	synthesis
sym-	together	symbiosis
sys-	to put together	system
a-	without	abiotic

Format

Word	Part of speech	Word parts
Definition		

science		

hypothesis		

hypoallergenic		

energy		

metric		

scientific		

synthesis		

symbiosis		

system		

abiotic		

Scientific Method

The Scientific Method

A. Read the Passage and answer the questions that follow.

On July 20, 1976, the Viking 1 lander touched down on the dust red surface of Mars. A few months later, the Viking II lander arrived on another Martian plain. The primary mission of these two robot spacecraft was to determine if there was life on Mars.

Conditions on Mars were thought to be far too harsh for large life forms. There is no liquid water on Mars and the atmosphere is very thin. During the course of a day, the temperature may range from 10°C to -80°C. The large changes in temperature produce strong winds and planet wide dust storms. Because of these conditions, scientists decided to look for microorganisms rather than large life forms.

The Viking space crafts performed several experiments. In one experiment, samples of soil were taken from different locations. The soil samples were put into a nutrient broth that supported the growth of microorganisms on Earth. The amount of carbon dioxide in the broth was tested over a period of time

Scientists were excited to discover that Martian soil produced carbon dioxide in the nutrient broth. However, the amount of carbon dioxide was much smaller than the amount that would have been produced by living things on Earth. Thus, the results of the experiments are not conclusive. Scientists are still not sure if life exists on Mars.

1. What assumptions did scientists make in this experiment?

2. Why did scientists obtain samples from different places on the Martian soil?

3. What characteristic of life was being test for in this experiment?

4. Why can't scientist be sure if life exists on Mars?

B. Now that you have seen some of the assumptions and limitation associated with experimentation, try your hand at analyzing experimental data. Remember that you MUST be objective, regardless of what you are trying to prove.

A scientist wished to determine if a new type of antibiotic, called antibiotic F, was effective against a particular type of microorganism that causes pneumonia. To test the hypothesis, the scientist found 100 volunteers in a large hospital, all suffering from the same type of pneumonia. The scientist gave 50 of the volunteers the new antibiotic for 10 days. The other 50 volunteers were given a sugar pill for 10 days. The sugar pill is called a placebo because it will neither help or harm the participants.

The scientist measured the effectiveness of the antibiotic by measuring each volunteer's temperature. Higher than normal body temperature indicated the presence of the disease-causing microorganisms. When the volunteer's temperature remained normal (37°C) for 3 days, he or she was considered free of the disease-causing microorganism.

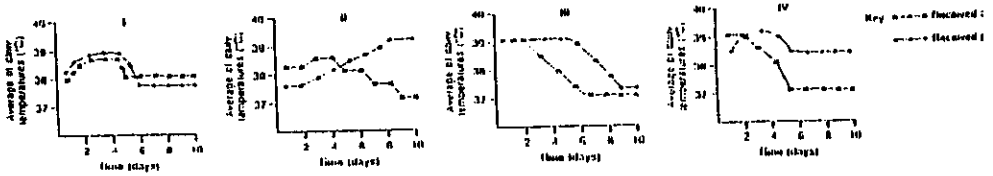
1. What was the scientist's hypothesis?

2. Identify the control group.

3. Identify the experimental group.

4. Identify the Independent Variable and the Dependent Variable.

5. Which graph indicated that the antibiotic was NOT EFFECTIVE against the microorganism? Explain your answer.



6. Which graph supports the scientist's original hypothesis? Explain your answer.

7. Can you think of any other observations the scientist might have made in this experiment?

8. Why did the scientist give the 50 volunteers the placebo?

A Rising Investigation

Holes in bread.

Alecia worked every afternoon with her parents in their restaurant. She made the dough that was cooked into the yummy rolls that everyone loved.

Experiment 1

One day Alecia's friend Robert was at the restaurant helping her. She told him to mix the **traditional yeast mixture** of 5 grams sugar in 200 mL warm water and to put 2 packages of yeast powder into the solution. About 15 minutes later the mixture had a thick foamy layer on top.

"WOW" he said. "What is this stuff?

"It is the air that makes the bread rise." Replied Alecia. "You can tell because of the holes in the bread. The rolls made with the **traditional yeast mixture** and allowed to rise in a warm place are **moist and fluffy**."

Robert was skeptical. Since he was mixing up some new dough, he decided to bake it **without the yeast** mixture and sure enough, the bread was **flat & hard** after it was cooked.

Experiment 2: Intrigued, Alecia and Robert decided to try again.

This time they each measure out each ingredient and mixed up their own batches of dough. Alecia and Robert added the foamy yeast mixture to each bowl.

They made nice little rolls and Alecia set hers in a warm closet for 30 minutes. Robert was in a hurry and baked his right away. Before they put Alecia's rolls in the oven they noticed that the rolls that were tall and springy. Once baked, Robert's rolls were hard and dry and Alecia's rolls were moist and fluffy. Many little holes could be seen in bread when you broke Alecia's rolls apart.

Experiment 3

Robert was perplexed. What was causing the bread to be so different? They had both added the same things. They came up with the following plan.

First they made a mixture of exactly the same dry and wet ingredients in one bowl. They divided the mixture into three containers. Into the first bowl they added the traditional mixture of water, sugar and yeast. Into the second bowl they added only dry yeast, and into the third bowl they add nothing at all. Again they made little balls and placed them on the pan. They both set them aside in the warm closet for 30 minutes and then baked them in the same oven for the same amount of time.

This time the rolls that had been made with the traditional mixture came out fluffy and moist. The mixture that had been made with the dry yeast got a little fluffy but was still quite flat. The rolls that had been made with no yeast in them were flat & hard.

Much to Alecia's father's dismay, they repeated the test 5 times and got the following information. Sadly, they ran out of ingredients and the restaurant ran out of light, fluffy, moist rolls.

Data table for Experiment 3

Trial	Traditional	Dry Yeast	No yeast
1	Moist/fluffy	Quite flat	Flat & hard
2	Moist/fluffy	Quite flat	Flat & hard
3	burned	burned	burned
4	Moist/fluffy	Quite flat	Flat & hard
5	Moist/fluffy	Quite flat	Flat & hard

QUESTIONS

1. What is a control?
   a. The item in an experiment that has a change done to it.
   b. The item in an experiment that has nothing done to it

2. What is a variable?
   a. The item in an experiment that has a change done to it.
   b. The item in an experiment that has nothing done to it

3. Is the experimental design in Experiment 1 reliable? **Mark all that apply**
   a. Yes
   b. No
   c. Needs multiple trials
   d. Needs a control

4. Does Experiment 1 have **data that is valid?**
   a. Yes
   b. No

5. If you answered "Yes", Why is it valid? If you answered "no" why is it not valid? **Mark ALL that apply**
   a. Experimental design is repeatable, shows more than one trial and data strongly suggests that only rolls made with the traditional yeast mixture come out light and fluffy.
   b. There are too many variables.
   c. There are not enough trials.
   d. There is no control
   e. It is difficult or impossible to replicate

6. Is the experimental design in Experiment 2 reliable? **Mark all that apply.**
   a. Yes
   b. No
   c. Needs multiple trials
   d. Needs a control

7. Does Experiment 2 have **data that is valid?**
   a. Yes
   b. No

8. If you answered "yes", Why is it valid? If you answered "no" why is it not valid? **Mark ALL that apply.**
   a. Experimental design is repeatable, shows more than one trial and data strongly suggests that only rolls made with the traditional yeast mixture come out light and fluffy.
   b. There are too many variables.
   c. There are not enough trials.
   d. There is no control
   e. It is difficult or impossible to replicate

9. Is the experimental design in Experiment 3 reliable? **Mark all that apply**
   a. Yes
   b. No
   c. Needs multiple trials
   d. Needs a control

10. Does Experiment 3 have **data that is valid?**
    a. Yes
    b. No

11. If you answered "Yes", Why is it valid? If you answered "no" why is it not valid? **Mark ALL that apply**
    a. Experimental design is repeatable, shows more than one trial and data strongly suggests that only rolls made with the traditional yeast mixture come out light and fluffy.
    b. There are too many variables.
    c. There are not enough trials.
    d. There is no control
    e. It is difficult or impossible to replicate

12. What should Alecia and Robert test next that may provide more information about what makes the bread rise (get fluffy before baking)?
    a. Different brands of sugar.
    b. Different amounts of yeast.
    c. Determine what the gas is.
    d. Nothing, it was perfect
    e. Why premixing the yeast worked better.

Practice

For each of the scenarios below answer questions A–D.

A. *Identify the independent variable, levels of the independent variable, dependent variable, number of repeated trials, constants, and control (if present).*
B. *Identify the hypothesis for the experiment. If the hypothesis is not explicitly stated, write one for the scenario.*
C. *Draw an experimental design diagram, which includes an appropriate title and hypothesis.*
D. *State at least two ways to improve the experiment described in the scenario.*

1. Ten seeds were planted in each of 5 pots found around the house that contained 500g of "Pete's Potting Soil." The pots were given the following amounts of distilled water each day for 40 days: Pot 1, 50 ml; Pot 2, 100 ml; Pot 3, 150 ml, Pot 4, 200 ml; Pot 5, 250 ml. Because Pot 3 received the recommended amount of water, it was used as a control. The height of each plant was measured at the end of the experiment.

2. 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.

3. Susie wondered if the height of a hole punched in the side of a quart-size milk carton would affect how far from the container a liquid would spurt when the carton was full of the liquid. She used 4 identical cartons and punched the same size hole in each. The hole was placed at a different height on one side of each of the containers. The height of the holes varied in increments of 5 cm, ranging from 5 cm to 20 cm from the base of the carton. She put her finger over the holes and filled the cartons to a height of 25 cm with a liquid. When each carton was filled to the proper level, she placed it in the sink and removed her finger. Susie measured how far away from the carton's base the liquid had squirted when it hit the bottom of the sink.

4. Sandy heard that plants compete for space. She decided to test this idea. She bought a mixture of flower seeds and some potting soil. Into each of 5 plastic cups she put the same amount of soil. In the first cup she planted 2 seeds. In the second cup she planted 4 seeds, in the third cup 8 seeds, and in the fourth cup she planted 16 seeds. In the last cup she planted 32 seeds. After 25 days, she determined which set of plants looked best.

5. Ester became interested in insulation while her parent's new house was being built. She decided to determine which insulation transferred the least heat. She filled each of 5 jars half-full with water. She sealed each jar with a plastic lid. Then she wrapped each jar with a different kind of insulation. She put the jars outside in the direct sunlight. Later, she measured the temperature of the water in each jar.

Experimental Design Diagrams

Scenario 5 **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 planaria. She bisected the planaria to obtain 10 parts (5 heads and 5 tails) for each experimental group. She applied concentrations of 0%, 10%, 20%, and 30% *Aloe vera* to the groups. Fifteen ml of *Aloe vera* solutions were applied. All planaria were maintained in a growth chamber with identical food, temperature, and humidity. On Day 15, Jackie observed the regeneration of the planaria parts and categorized development as full, partial, or none.

Title=

Hypothesis=

IV:			
# trials			

DV:-

-

C:-

-

-

Flaws or recommendations: -

-

-

ExD Template

Title:

Hypothesis:

Independent Variable (IV):

Groups	
Repeated Trials	

Dependent Variable (DV):

Control:

Constants: *
*
*
*

Experimental Design: Pre-Lab

** complete this ExD planning form BEFORE beginning the lab

Name _____ Date _____

✎ Lab TITLE: *(The effect of _____ on _____).*

✎ HYPOTHESIS: *(Use an if..... then.....format . State the cause & effect relationship between the D.V. and the I.V. Must be testable.)*

✎ INDEPENDENT VARIABLE: *(What is the cause agent? What are you changing?)*

Experimental Groups	
# of Trials	

✎ DEPENDENT VARIABLE: *(What is being measured?)*

✎ CONTROL: *(What is the experimental group being compared to?)*

✎ EXPERIMENTAL CONSTANTS: *(Variables not altered during the experiment)*

✎ SKETCH OF EXPERIMENTAL SET-UP, with labels: *(put on back)*

B12