**Assessment for Experimental Design**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Fill in the blank:** (10 points) Answers may be used once, more than once, or not at all.

 WORD BANK

Hypothesis Observation Prediction Control Group Prediction Bias Qualitative Data Experiment Analysis

Conclusion Inference Dependent Variable Independent Variable Quantitative Data Scientific Theory Sample Size

Science combines thinking, collaboration, learning from mistakes and making connections. The scientific method begins

with a(n) 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The next step is to develop a tentative, testable, general explanation, which is called

a(n) 2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. It allows scientists to forecast what the outcome might be if they are correct, which is

known as a(n) 3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and is usually written as an “if-then” statement. Scientists then design an investigation which is carried out under controlled conditions and is known as a(n) 4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. One very important decision to make next is the 5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, because the larger it is, the more credible the results of the study will be. Choosing variables for the study is also important. The variable that the investigator directly manipulates is called the 6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. These manipulations can lead to measurable changes in the responding 7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The data that can then be measured using instruments is called 8.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

A well-designed experiment also has a 9. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, which is the untreated group that provides a basis for

comparison. The investigator than analyzes the data using tables and graphs so that a conclusion can

be drawn. This may support or reject the initial 10. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, but does not prove it because future discoveries may contradict these results.

**Matching**: (10 points)

1.\_\_\_\_\_\_Hypothesis A. A phenomenon that can be witnessed and recorded.

2.\_\_\_\_\_\_ Scientific Method B. A possible explanation for the observations made.

3.\_\_\_\_\_ Observation C. A procedure carefully done to examine the validity of a hypothesis.

4.\_\_\_\_\_ Independent Variable D. Descriptive statements based on the five senses

5.\_\_\_\_\_\_ Qualitative Data E. Data that can be counted and measured.

6. \_\_\_\_\_\_ Experiment F. The variable a researcher is measuring.

7. \_\_\_\_\_\_ Quantitative Data G. Manipulated variable.

8. \_\_\_\_\_\_Dependent Variable H. A statement of an observable occurrence that seems to have no

 exceptions.

9. \_\_\_\_\_\_Lab Safety I.  Eye goggles, first-aid kit

10. \_\_\_\_\_\_ Scientific Fact J. step-by-step process that starts with making observations and ends with .  communicating experimental results

**Multiple Choice**: (10 points)

1.In an experiment, the researcher manipulates the:

1. Dependent Variable
2. Independent Variable
3. All Variables
4. One Dependent and One Independent Variable

2.DeShawn is trying to find the best place to put his computer so that it receives the strongest signal. All the following are independent variables except:

a. the number of devices on the router

b. the number of rooms between the computer and the router

c. the signal strength at the computer

d. the distance between the computer and the router

3. Choose the correct order of steps according to proper scientific methods:

a. Hypothesis, Observation, Pose Question, Prediction, Analysis, Conclusion, Design Experiment

b. Prediction, Analysis, Design Experiment, Hypothesis, Conclusion, Pose Question, Observation

c. Observation, Pose Question, Prediction, Hypothesis, Design Experiment, Analysis, Conclusion

d. Observation, Pose Question, Hypothesis, Prediction, Design Experiment, Analysis, Conclusion

4. Carlita wants to measure 35cc of saline for her experiment. Which of the following should she grab from the supply cupboard to measure this?

a. test tube

b. magnifying lens

c. graduated cylinder

d. compound microscope

5.Juan decides that if he posts his selfie at 8pm, he’ll get the most likes. This is an example of:

a. An Independent Variable

b. A Problem

c. A Hypothesis

d. A Conclusion

6. Malaria is a serious disease that people can get if they are bitten by mosquitoes carrying the malaria parasite. Recently, scientists have been able to modify (change) the genes in some mosquitoes so that they cannot spread malaria. In their experiment, they take modified mosquitoes and non-modified mosquitoes and see which group might cause more malaria. In the experiment, the control group is the:

a. modified mosquitoes

b. non-modified mosquitoes

c. malaria parasite

d. number of people who get infected with malaria

7. A scientist was in line to pay for groceries, and she noticed that on the front of a magazine it said, “Investigators discover new pill for weight loss!” Being skeptical, the scientist wanted to determine if the claims were true. Which of the following would be the best way to proceed?

a. Formulate a hypothesis

b. Identify the problem

c. Conduct an experiment

d. Write a conclusion

### 8.  Which of the following statements is true?

 a. It's only important to know where safety equipment is during an accident, not before

 b. Even with proper precautions lab accidents still occur

 c. All lab accidents are preventable

 d. An eye wash station is a good place to rinse chemical spills from anywhere on your body

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### 9. What is the purpose of a ventilation hood?

 A. To contain gases, fumes, and vapors

 B. To contain lab fires

 C. To provide a safe breathing area if there is a lab explosion

 D. To reduce the risk of explosion

10. How many independent variables should be in a well-designed experiment?

A. 0

B. 1

C. 2-3

D. more than 3

**Critical Thinking**: (10 points)

In the following scenarios, identify the Independent Variable (IV) and the Dependent Variable (DV)

1. LaTonya wants to see if fertilizer effects tomato plant size.

IV: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

DV: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Carlos wants to know if the cat population where he lives is influenced by the dog population.

IV: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

DV: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Jack wants to know if not drinking a soda every day will improve his next dental check-up.

IV: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

DV: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Angel wants to know if the weight of her prize pig will affect the number of piglets in the litter.

IV: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
DV: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Sydney wants to know if studying her computational biology notes an extra 15 minutes per day will improve her grade on the next exam

 IV: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

DV: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

#### Why is it important to evaluate the works of other scientists?

1. To make sure that no one scientist gets all the credit
2. To point out all the things they did wrong
3. To produce the best possible science
4. To get your name on a scientific paper
5. In evaluating whether the scientific evidence provided supports the conclusions, what is the first thing to take into consideration?
6. What exactly the conclusions are
7. How long ago the experiment was performed
8. The quality of the data
9. How many conclusions are presented

#### What is the first step of the Scientific Method?

1. Analyzing data
2. Making observations
3. Asking scientific questions
4. Drawing conclusions

#### What must happen before you can analyze data?

1. Run an experiment
2. Formulate a hypothesis
3. Make observations
4. All are correct
5. What is necessary before a good hypothesis can be created?
6. A scientific question needs to be asked
7. Conclusions need to be drawn
8. An experiment needs to be run
9. All are correct

**Design an experiment**: (14 points)

Aaron loves to bake bread. He read in an article that adding vital wheat gluten to the flour makes the bread rise higher. Design an experiment that Aaron could perform to see if this is true.

Pose the question (1 point): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Form a Hypothesis: (2 points): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Make the prediction: (1 point\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

List materials you will require: (4 points) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Explain your procedure in the space below: (4 points)

Also, Design a blank table that could be used for results: (2 points)

Design a table that you can use for your data (2 points):

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