Problem Solving Station B

Name: Date: #:

**Activity #1**

Eric is a student who is studying the effects of breakfast on math exam performance. Eric asks (and receives) permission from his math teacher to conduct the experiment using the students in his math class. Eric requests only one class period to conduct the experiment.

Eric decides to use all the students in his class – a total of 20 students – as test subjects. He assigns a specific meal for the students to eat for breakfast the morning of the math exam. He assigns five students to eat cereal with milk, five students to eat waffles with butter and syrup and five students to eat yogurt with strawberries and granola. He requires five students to eat nothing for breakfast.

All the students arrive to class the day of the exam. He creates a 10 question math exam and distributes the same examination to all students in the class. Once all the exams are distributed, he lets the students begin the exam. Two minutes into the exam, the fire alarm goes off. The teacher instructs the students to stop the examination and exit the classroom. The students leave the classroom and exit the school. After 15 minutes, the students are allowed back into the school. By the time the students get back to the classroom, there are only 5 minutes left in the class period. There is not enough time for the students to complete the examination.

**Activity #1 Questions**

1. What feature(s) of a good experimental design is Eric’s experiment lacking? *(Hint: Consider Eric’s sample size and/or number of trials.)*

2. How could these problems affect the data in Eric’s experiment?

3. If Eric performs this experiment again, what procedure should Eric use? Write a detailed description of a good experiment for Eric.

**Activity #2**

Katie is studying the effects of soil chemistry (pH) on hydrangea flower petal color. She wants to learn how soil chemistry can change the petal color of the hydrangeas. She purchases three hydrangea plants from her local nursery. The plants are the same species of hydrangea, they are all the same size and they all have bright pink petals.

Katie plants each plant in a separate container with gardening soil. The containers are all the same size and made of the same material. She manipulates the chemistry of the soil in each container. She makes the soil acidic in the first container, she makes the soil neutral in the second container and she makes the soil basic in the third container.

Katie places all the plants on her front porch in the same location (so they receive the same amount of sunlight). She waters the plants every day (with the same amount of water). On day five of her experiment, she wakes up to find tiny bugs eating the leaves of the hydrangea in the first pot. The bugs eat nearly all the leaves off the plant. It is obvious that the plant can no longer be used for the experiment. The hydrangeas in the second and third pots were not harmed by the bugs.

**Activity #2 Questions**

1. What is the problem with Katie’s experiment?

2. How does this problem affect the data in Katie’s experiment?

3. Katie wants to redo her experiment. Based on what you know about features of good experimental design, how should Katie set up her experimental groups in order to prevent this problem from happening again?

4. Katie decides she is going to repeat her experiment. This time, Katie decides to spray her plants with a pesticide to prevent bugs from eating the leaves.

a. What are good features of this solution?

b. What are poor features of this solution?