Name: _____ Date: _____ Period: _____ BIN: _____

The Scientific Method: Exploring Experimental Design

Come Fly With Us

When providing the best possible answer to the following questions please apply all learned scientific techniques and procedures, do not use abbreviations, use proper scientific terminology, show work for all mathematical calculations, use all significant figure and scientific notation rules, apply S.E.E.C. writing strategies, and note that at all times spelling counts. Your ability to meet these and all established classroom expectations, including labeling of BINs, providing heading information, and your ability to follow directions may be included in computation of grade.

PROBLEM

How will changing the direction that the paper helicopter blades are folded affect the "flight" of the helicopter?

HYPOTHESIS

ANALYSIS

You have just performed an experiment. Experiments involve changing something to see what happens. In this case, you refolded the helicopter blades. You made this change on purpose to learn about its effect on the flight of the helicopter. The parts of an experiment that change are called variables.

When designing an experiment, you should choose one variable that you will purposely change. You will measure the effect of this independent variable on another variable that you think will respond to the change. The responding variable is called the dependent variable.

If you kept every variable except the folds the same in each test, you were making it a fair test. Why? Only the variable you changed could be causing the dependent variable to change because everything else was kept constant.

To have a fair test, you also need a control, or a standard for comparison. A control for the helicopter experiment would be an "unchanged" helicopter against which you could compare the results. Your control is the helicopter before the blade directions are changed. After the blades have been flipped, you then have your experimental helicopter.

It is important to note that in some experiments, it is impossible to have a control that is completely unchanged. For example, let us say you are trying to determine the effect of light from different light sources on plant growth. The control plant needs some kind of light in order to live through the experiment. So, you have to choose one light source — possibly normal sunlight — to be the standard of comparison.

After you refolded the blades of the helicopter, you dropped the helicopter several times and observed the results. These repeated trials enable you to be more confident of your results. If you conducted your experiment only once, the results could be due to an error or a chance event, such as a draft. But, when you repeat your experiment many times and each time achieves similar results, you can be more confident that your findings are not due to an error or chance.

CONCLUSION QUESTIONS: Complete the following conclusion questions using complete sentences.

1. In the helicopter experiment, what was the independent variable?

2. What was the dependent variable?

3. List three things you should try to keep constant each time you try this experiment.

Read the following paragraph and answer questions 4-10:
Bonita wanted to know if adding mass to her paper helicopter would affect how long it would stay in the air. She predicted that adding some mass would help to stabilize the helicopter and keep it in the air longer than a helicopter without extra mass. She experimented with different numbers of paper clips attached to her helicopter.

4. What is the problem question in Bonita's experiment?

5. What is Bonita's hypothesis?

6. What is her independent variable?

7. What is her dependent variable?

8. What should her constants be?

9. What can she use for a control?

10. Why should Bonita retest her experiment between 5-10 times?

Staple you helicopter to your data table. Staple your data table to the back of this sheet and turn into HW box.