Name: _____ # Period: _____

Date: _____ Experimental Design Analysis questions

Directions: Carefully read the abstract summary that describes the situation or experiment. Answer each of the questions below.

1. What is the problem being investigated?
2. State the problem in the form of a question in one of the two formats we have learned, either, How does _____ affect _____?, or What is the effect of _____ on _____?
   (If the problem has already been stated for you, skip this question).
3. A good experiment looks to compare 2 variables. What 2 conditions are being compared in this situation? If you are uncertain, look closely at the problem question.
4. Identify the variables:
   a) What is the independent variable? Avoid using 1 word! If it is presented, indicate the general independent variable and the specific independent variable. Remember, the independent variable is the cause.
   b) What is the dependent variable? Avoid using 1 word! If it is presented, indicate the general dependent variable and the specific dependent variable. Remember, the dependent variable is the effect.
5. State the prediction or hypothesis presented. Use if...then in your writing if it has not been stated as such. Do not use I, me, we.
6. Identify the Experimental Group:
7. Identify the Control Group Remember, this can be the 'normal' condition, or the condition without the presence of the independent variable.
8. Name 2 possible constants.
9. How will the dependent variable be measured?
10. How can this data be graphed?
11. In conclusion -

a) Results:

b) Was the hypothesis supported by the data?

c) Error analysis:

d) Recommendations for further study:

	Number of

Abstract scenario 3: How does the temperature of a magnet affect its strength?

Fred was curious about magnets and decided to use this as a topic for his science fair project. When researching magnets he found that magnets are pieces of matter where the positive particles are found on one side of the material and negative particles found on the other. Because of this, magnets can attract other pieces of matter to them. He also found out that particles of matter will move around differently depending upon the temperature. High temperatures cause matter particles to speed up and move further apart from each other; lower temperature cause particles of matter to slow down and move closer together. Fred suspected that if you changed the temperature of a magnet it might change the magnet's ability to attract other pieces of matter to it. He recorded his hypothesis in his lab journal: If ten magnets of the same shape and size are kept at 3 different temperatures (100 degrees C, 0 degrees C and room temperature), then the cooler magnets will attract more paper clips to it because slowing the particles of matter will create a better division of positive and negative particles within the magnet, making it stronger.

For his experiment he took the magnets and placed them in water at the different temperatures. After a period of time he them placed the magnets in a bowl of 250 paper clips and counted the number of paper clips the magnets were able to pick up. After 10 trials he summarized the data in the following table.

Table 1: Average number of paper clips held by magnets at different temperatures

Temperature of water holding the magnet	Number of paper clips held
100 degree Celsius	23.7
0 degrees Celsius	36.6
20 degrees Celsius (room temp)	27.5

When analyzing the results it appeared that temperature of the magnets did have some effect on how well they worked to pick up materials. In reflecting on the procedure Fred wondered if he let the magnets remain at the temperatures for a long enough time. He allowed 10 minutes, and thought perhaps more time should have been allowed. He also kept picking up paper clips for 5 minutes, and thought that perhaps that was allowing time for the magnets to change temperature. He also became curious as to how magnets would react in water, and was thinking this would be a good idea for next year's science fair project.