

## Activity 3: Good and Poor Experiment Designs

Name \_\_\_\_\_

Date \_\_\_\_\_

Class \_\_\_\_\_

### Key Question

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### I Think

1. *My Hypothesis:* I think that as the size of the magnets *increases*,

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2. *My Reason:* My reason is that

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### Explore Your Ideas

**Experiment:** If the size of a magnet increases, what happens to its strength?

Table 1: Strength of Magnets and Their Sizes			
Distance When Magnet Attracted Paper Clip (mm)	Size of Magnets		
	Small Magnet	Medium Magnet	Large Magnet
Trial 1			
Trial 2			
Trial 3			
Best Value			
Uncertainty			
Our Ranking			

Best Value (calculation) = \_\_\_\_\_

Uncertainty (calculation) = \_\_\_\_\_

- Complete the following statements. Take into account your calculated values for the uncertainties.

For the large magnet, the best value is \_\_\_\_\_ mm and the uncertainty is \_\_\_\_\_ mm.

This means that the true value for the large magnet is probably within the range between \_\_\_\_\_ mm and \_\_\_\_\_ mm.

For the medium magnet, the best value is \_\_\_\_\_ mm and the uncertainty is \_\_\_\_\_ mm.

This means that the true value for the medium magnet is probably within the range between \_\_\_\_\_ mm and \_\_\_\_\_ mm.

For the small magnet, the best value is \_\_\_\_\_ mm and the uncertainty is \_\_\_\_\_ mm.

This means that the true value for the small magnet is probably within the range between \_\_\_\_\_ mm and \_\_\_\_\_ mm.

2. Imagine another team (using completely different magnets) had the following best values and uncertainties for their large, medium, and small magnets:

*Large magnet:* The best value is 48 mm with an uncertainty of 2 mm. Thus, the true value is probably within the range between 46 mm and 50 mm.

*Medium magnet:* The best value is 34 mm and the uncertainty is 3 mm. Thus, the true value is probably within the range between 31 mm and 37 mm.

*Small magnet:* The best value is 31 mm and the uncertainty is 2 mm. Thus, the true value is probably within the range between 29 mm and 33 mm.

What claim can the team make regarding how the strength of the large magnet compares to the strength of the medium magnet?

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3. What claim can the team make about how the strength of the medium magnet compares to the strength of the small magnet?
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## Make Sense of Your Ideas

### Make Sense of the Experiment

Examine the class data table.

1. *Experiment Conclusion:* As the size of the magnets used in this experiment *increases*, the strength of the magnets \_\_\_\_\_.  
*(increases, decreases, or does not seem to depend on size)*

### Team Skills Chart

Complete the Team Skill Chart. Write the name of each team member in the cells in the top row. Write “yes” or “no” in each cell depending on whether she/he did what is stated.

Team Skills Chart					
Place your team members' names here.					
Followed the directions for how to do the experiment.					
Did his/her specific task.					
Took turns measuring the distance when the magnet pulled the paper clip.					

**Make Sense of Good and Poor Experiment Design**

Complete Table 2 using the rankings of the teams who used magnets all made of the same material. Record *strongest*, *middle*, or *weakest*.

<b>Table 2: Strength Rankings for All Magnets of the Same Material</b>			
Ranking of Magnets	Size of Magnets		
	Small Magnet	Medium Magnet	Large Magnet
Team 1			
Team 2			
Team 3			
Team 4			
Team 5			

Complete Table 3 using the rankings of the teams who used one magnet made of a different material. Record *strongest*, *middle*, or *weakest*.

<b>Table 3: Strength Rankings for One Magnet Made of a Different Material</b>			
Ranking of Magnets	Size of Magnets		
	Small Magnet*	Medium Magnet	Large Magnet
Team 6			
Team 7			
Team 8			
Team 9			
Team 10			

\*Magnet made of a different material

2. My conclusion for the experiment where teams used magnets made of the same material:

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3. My conclusion for the experiment where teams used magnets where two were made of the same material and one was made from a different material:

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4. In the experiment, the length of the pendulum was changed and the time to make 10 back and forth swings was measured. Were any other variables deliberately changed?

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5. What variables were kept the same in the pendulum activity?

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6. The pendulum experiment \_\_\_\_\_ (*was, was not*) a fair test because

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**Make Sense of Science Words**

7. In the experiment involving three magnets of the same material, the manipulated variable was \_\_\_\_\_ . The responding variable was \_\_\_\_\_ .
8. In the pendulum experiment, the manipulated variable was \_\_\_\_\_ . The responding variable was \_\_\_\_\_ .

**My Ideas**

The key question for this activity is:



**What makes the design of an experiment good or poor?**

1. Based on what you learned in this activity, write your answer to the key question.

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