Name_____

CASE

# Project 3.2.4 Mad Science

## Purpose

On the television show Mythbusters®, viewers have seen simple experiments with soda and candy to complex problems with specialized equipment, explosives, and safety bunkers. The hosts of the show take on nearly any question or myth presented to them. Yet, before beginning the quest to prove or disprove a myth, the hosts always study the topic, ask questions, make a plan, determine the materials they need, and conduct the experiment safely. More importantly, when an experiment fails or does not prove a scientist's hypothesis, he or she reevaluates and tries a new approach. In science, disproving an assumption is not a failure, but an opportunity to try again. The only failure is when a scientist gives up before every angle has been investigated.

A scientist uses many processes to solve a problem. They make calculated observations of what is occurring using all of their senses. They use those observations to predict outcomes. During an experiment, measurements are made to verify if predictions are true. These measurements may be quantitative or qualitative. Quantitative measurements have assigned numbers, such as 30ml. Qualitative measurements are descriptive, such as "cloudy" water. Once a scientist has observed, he or she will communicate their results and form a conclusion. A conclusion will infer ideas of what occurs in the real world, rather than a controlled laboratory.

To become a good investigator and problem solver, one must have an inquisitive mind, the ability to see beyond busted experiments, and the determination to try again. Using the processes of science will help you set up quality experiments and obtain meaningful results.

## Materials

**Per class:**

- Ice
- Water
- Microwave

**Per group of four students:**

- Assigned equipment

**Per student:**

- Safety goggles
- Lab apron
- Disposable gloves
- Pencil
- *Agriscience Notebook*
- *Project 3.2.4 Evaluation Rubric*

## Procedure

For this project, your assignment is to design an experiment using water and science equipment assigned to you. Then develop a skit modeling the science processes and proper laboratory practices using the resources available to you. You will work with the group of students from *Project 2.2.3 Teaming Up*. Review the norms your group established in the previous project. Revise any if necessary and discuss how to improve your group functionality. Your group will be assigned one of the following categories.

| Category 1 | Category 2 | Category 3 | Category 4 | Category 5 |
|---|---|---|---|---|
| • LabQuest2<br>• pH sensor<br>• Beaker | • Electronic balance<br>• Beaker<br>• Pipet | • Alcohol burner<br>• Ring stand<br>• Beaker | • LabQuest2<br>• Temperature sensor<br>• Beaker | • Graduated cylinder<br>• Beaker |

Your experiment must meet the following parameters:

- Use all equipment assigned to you.
- Additional equipment is available upon request and approval of your teacher.
- Ask and answer a question as the basis of an experiment using water of varying temperatures and equipment assigned to you.

**Part One – Determining Roles and Responsibilities**

1. As a group, review your norms and expectations from *Project 2.2.3 Teaming Up*. Discuss any changes or improvements that need to be made.
2. Review the components for the remainder of this project. In Table 1 of the *Lab Preparation Worksheet*, make a list of all tasks with anticipated deadlines that need to be accomplished.
3. Assign roles and tasks to each team member and record those names in Table 1.
4. At the beginning of each class period, share your progress toward your tasks with your group. Discuss what has been completed and what remains to do.
5. Use the rubric you developed in project *2.2.3 Teaming Up*.to assess your group's work daily. Review group assignments, reassign items if necessary, assign new items, and continue work.

**Part Two – Developing the Question and Prediction**

In your group, discuss possible questions you may have about the properties of water. List those questions on the *Lab Preparation Worksheet*. For your experiment, you will have access to ice, water, and a microwave to heat the water if desired. You must use the equipment assigned to you to help answer your question.

Circle the question your group will answer during this project. Now develop a prediction of what you think the answer to your question is. Record your prediction on the *Lab Preparation Worksheet*.

**Part Three – Setting up the Experiment**

Determine how you will conduct your experiment, make a list of all materials, and write step-by-step procedures on the *Lab Preparation Worksheet*. You may use additional paper if necessary.

**Part Four – Putting on the Show**

The final component of this project is for your group to present your experiment. Due to time, you may present as if on a cooking show where steps that take time are prepared ahead and ready as the host presents. Working with your group, develop a presentation that meets the skit parameters and the criteria for group presentations.

***Skit Parameters:***

- Use all equipment assigned to you
- Include and demonstrate a minimum of four science processes discussed in the presentation, *The Processes of Science*
- Conduct the experiment you designed
- Display how data will be collected
- Use group communication and presentation skills
- Wear proper personal protective equipment
- Presentation is three to five minutes in length
- All group members participate in the development and presentation of the skit equally

Refer to *Project 3.2.4 Evaluation Rubric* for additional assessment information.

## Conclusion

1. List and describe the science processes your group used.

2. Why is personal protective equipment important in science labs?

3. What challenges did you face working in a group?

Name_____

# Project 3.2.4 Lab Preparation Worksheet

**Table. 1 *Tasks***

| Task | Due Date | Team Member |
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**Table 2. *Questions***

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**Table 3. *Prediction***

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**Table 4. *Materials***

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**Table 5.** ***Procedures***