Lesson Title	Scientific Methods
Length of Lesson	1 day (90 minutes)
Created By	Hannah Box
Subject	Chemistry
Grade Level	10th-12th
State Standards	Chemistry 1b, 1c, 3c
DOK Level	DOK 3
DOK Application	Critique, hypothesize, investigate
National Standards	9-12: A & B: Inquiry & Physical Science
Graduate Research Element	Even at the Ph.D. level the scientific method is used. Whether developing a proposal, analyzing data, or suggesting conclusions, the scientific method is central.

Student Learning Goal:

Students will review the steps of the scientific method and how it can be used outside of the science classroom.

State Standards:

1b. Clarify research questions and design laboratory investigations. (DOK 3)

1c. Demonstrate the use of scientific inquiry and methods to formulate, conduct, and evaluate laboratory investigations (e.g., hypotheses, experimental design, observations, data analyses, interpretations, theory development). (DOK 3)

3c. Classify chemical reactions by type. (DOK 2)

National Standards: 9-12:

A: Inquiry:
Scientists conduct investigations for a wide variety of reasons. For example, they may wish to discover new aspects of the natural world, explain recently observed phenomena, or test the conclusions of prior investigations or the predictions of current theories.

B: Physical Science:
A large number of important reactions involve the transfer of either electrons (oxidation/reduction reactions) or hydrogen ions (acid/base reactions) between reacting ions, molecule, or atoms. In other reactions, chemical bonds are broken by heat or light to form very reactive radicals with electrons ready to form new bonds. Radical reactions control many processes such as the presence of ozone and greenhouse gases in the atmosphere, burning and processing of fossil fuels, the formation of polymers, and

explosions.

Materials Needed (supplies, hand-outs, resources):

Season 4, episode 22 of the discovery channel series Mythbusters, worksheet that is attached to this lesson, proscopes, Diet Coke and Mentos for each student.

Lesson Performance Task/Assessment:

Students will be asked to complete a worksheet while watching the mythbusters perform experiments. Students will be given the materials to investigate the reaction.

Lesson Relevance to Performance Task and Students:

Students will be asked to complete a worksheet while watching the mythbusters perform experiments. This will help them to recognize the steps of the scientific method that are hiding within the exciting experiments.

Anticipatory Set/Capture Interest:

Show the video that is attached to this lesson.

Guided Practice:

As a group discuss the steps of the scientific method as a brief review. The students will watch a "Mythbusters" episode that explores the science behind why Mentos cause Diet Coke to explode. The Mythbusters will use the scientific method to approach the "myth" and once they prove the myth, they discuss the science behind this phenomenon and recreate it over and over. The students will be asked to complete the worksheet that is attached so that they walk through the scientific method with the mythbusters.

After the video, the students will be asked to create an addition experiment using the scientific method as their guide. Use the proscopes to show the surface of the Mentos. Have the students go outside and allow them to perform the reaction.

Independent Practice:

Students will complete the worksheet independently. They will use what they have learned from the mythbusters and what their life experiences have taught them to design another experiment that could be performed to prove/bust the myth. Finally, each student will have the chance to perform the reaction.

Remediation and/or Enrichment:

Remediation: Individual IEP. Go through the worksheet as a group to make sure that they understand that what the mythbusters are doing is going through the steps of the scientific method.

Enrichment: Have students carry out their own experiments to test the myths that the mythbusters proved/busted.

Check(s) for Understanding:

Do you think that the scientific method is used outside of the classroom?

Can you think of any improvements on the experiments the mythbusters performed?

Were your results similar to those of the mythbusters? What was the difference? What could be done to fix this?

Can you think of any other examples of this type of reaction?

Closure:

Students will take on the role of "mythbuster" and use the scientific method to prove/disprove a common myth. They will learn what chemical reaction is taking place and then have the chance to perform this reaction. They will see that the scientific method is used in everyday life outside of the science classroom.

Possible Alternate Subject Integrations:

Chemistry: While we are using this lesson when covering types of reactions, this lesson would fit in well when covering atomic theory because Antoine Lavoisier made the modern scientific method the standard.

General Science: This can be used to teach the scientific method or a review.

Teacher Notes:

The Diet Coke and Mentos can be scaled down to use 20oz bottles of Diet Coke and 4 Mentos.

Also Wal-Mart brand can be used as well.

To make the process of getting the Mentos into the bottle quickly, place the candy in a test tube so that the students just need to invert the tube into the soda bottle.