

EFFECTS OF ALCOHOL

Teacher Script Day #1

Prep before class:

→ Have copies of the following posters:

1. *Types of Alcohol* (Page 28) or (Pages 30, 31, 32)
2. *Alcohol Serving Sizes* (Page 33)

→ Organize the following supplies for the Lab Experiments:

Serving Size Demonstration

1. Beer Mug
2. Shot Glass
3. Wine Glass
4. Water
5. Liquid Food coloring
6. Measuring cup (Ounces)

Egg Experiment

1. Two raw eggs
2. Two jars or glass containers
3. Water
4. Lab alcohol (200 proof)
5. Paper towels

→ Make enough copies of the following items to hand out to all the students:

1. *Serving Size Demonstration worksheets* (Page 35)
2. *Egg Experiment Science Report* (Pages 36-37) or the *Egg Experiment Writing Response* (Page 38)
3. *Egg Experiment Word Find* (Page 39), *Egg Experiment Crossword Puzzle* (Page 40) and/or the *Where to Go for Help Word Find* (Page 41).

Teacher Tips

- Make certain that the lab alcohol is carefully labeled and monitored since it is poisonous.
- Have students assist with the experiment as much as possible by letting someone pour the water and crack the eggs.
- Encourage participation. Be prepared for students to share personal experiences and stories.
- The points can be modified for various audiences. Some points can be added or deleted depending on the functioning level of the students.

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Lesson Day #1

Introduction – A lesson on alcohol and how it affects our bodies

1. Tell the class: “Today we are going to talk about how alcohol can affect the body.”
2. Ask the class: “What is alcohol?” After they have had a chance to answer, explain that “Alcohol is a drug. It is a type of drug called a depressant; depressants slow down the brain and the body.”
3. Tell the class that there are three types of alcohol and ask “What are the three types or categories of alcohol?” (beer, wine, liquor)
4. Hold up the *Types of Alcohol Posters*. (Page 28 and/or 30, 31, 32)
5. Explain the difference between the three categories
 - A. “Beers, wines and liquors are made from natural ingredients such as malts, hops, grains, plants, vegetables and yeast; these ingredients are then added to water, and are cooked.
 - B. Unique recipes are then followed to create each type of alcohol.
 - C. Cooking the ingredients through fermentation or distillation changes the ingredients to alcohol and carbon dioxide.
 - D. The cooking process used will determine the concentration of alcohol in the product.”

Serving Size Background Information

1. Have a student pass out *Serving Size Demonstration worksheet* (Page 35).
2. Explain what a serving size is and that it is different for each type of alcohol; remind students that a serving of each type of alcohol contains the same amount of alcohol.
 - A. Show the *Alcohol Serving Size Poster* (Page 33).
3. Explain that the purpose of this demonstration is to show that various types of alcoholic drinks can contain the same amount of alcohol, although the total volume of liquid in the drink may vary. For example:
 - A. A 12 ounce glass of beer, a 5 ounce glass of wine and a 1.5 ounce glass of liquor all contain the same amount of alcohol. These are all considered one serving of alcohol.
 - B. These three drinks do, however, have different ratios of alcohol to other liquids.
 - C. The additional liquids that are often found in these alcoholic drinks can consist of water, soda, fruit juices, flavorings and/or additives.
4. Another way to look at this is by using the term “**concentration**”; the word concentration is defined as the amount of a particular substance (alcohol) in a given amount of another substance (additional liquids) – or the amount of alcohol found among the other liquids. The

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concentration of alcohol in beer is lower than the concentration of alcohol in wine or hard liquor.

- A. The liquor category is the most concentrated type of alcohol (on average it contains between 40-60% alcohol)
 - B. Followed by the wine category (which averages 10-12% alcohol)
 - C. Beer is the least concentrated (approx. 6-8% alcohol) - - you may also refer to this as the most diluted of the three drinks.
5. Discuss the term “**proof**” and how it relates to serving size and the term “concentration”.
- A. The percentage of alcohol can also be expressed in terms of a “proof”.
 - B. To calculate the proof of a particular type of alcohol you take the percentage of alcohol and multiply it by two. If a brand of liquor has a 40% alcohol content, it would have a strength of 80 proof; a 50% alcohol content has a strength of 100 proof.
 - C. Since wine averages 10-12% alcohol, wine has a strength of 20 to 24 proof.
 - D. Beer has approximately 6-8% alcohol, therefore it has a strength of 12-16 proof.
 - E. The higher the proof of alcohol, the more concentrated it is.
6. Remember, the total amount of alcohol in a typical serving of beer (12 ounces), wine (5 ounces) and hard liquor (1.5 ounces) is the same.

Serving Size Demonstration

1. Have a student pass out the *Serving Size Demonstration worksheet* (Page 35). Have the students fill out the sheet as you do the demonstration, at the end of the demonstration or as homework.
2. In this experiment tap water is used to represent the “additional liquids” in our alcoholic drinks. Food coloring is used to represent the alcohol.
3. Ask for three volunteers to fill the different glasses with water. Once chosen, say: “Each of you will be pouring regular tap water into one of these glasses; one of you will add 12 ounces of water to the beer mug; one of you will add 5 ounces of water to the wine glass; and you (the last student) will pour 1.5 ounces of water into the shot glass. This water represents all of the additional liquids that are found in our alcoholic beverages. These additional liquids could actually be water, or may be juice from fruits and vegetables, liquid flavorings or extracts, etc.”
 - A. Have a student pour 12 ounces of water in the beer mug; say: “Beer contains a large amount of additional liquids, most of which is water.”

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- B. Have another student pour 5 ounces of water into the wine glass; say: “Wine also contains some water, but most of the additional liquid is from the juice of grapes (occasionally dandelions, rice or other types of fruit juice are used).”
 - C. Have a third student pour 1.5 ounces of water into the shot glass; say: “Liquors are largely made of alcohol and can contain small traces of additional liquids including juice from potatoes, and other vegetables.”
4. Adding the alcohol - “Now we will add the alcohol to our three drinks. It is important to remember that all three drinks contain the same amount of alcohol. As I mentioned before, in this demonstration we will use the food coloring to represent the actual alcohol.” Add **one drop** of food coloring to each of the glasses.
 5. **IMPORTANT:** Place a sheet of white paper behind the three glasses; this will help students see the contrast in color between the three glasses.
 6. Observations - The three glasses of water will have different shades of blue.
 - A. The shot glass will have a dark blue color; say: “As you can see by looking at the shot glass, the color is quite dark, this shows how liquor is the most concentrated of our three drinks; the ratio of alcohol to the additional liquids is very high. We can explain this using fractions: For most liquors there is something like 11 parts of alcohol to every 12 parts of water giving us a ratio of 11/12ths. This high fraction indicates a high concentration of alcohol.
 - B. The beer mug will be a light blue color, say: “As you can see by looking at the beer mug, the color is very light, this shows how beer is the least concentrated of our three drinks. For beer, the ratio of alcohol to additional liquids is very low - - (most diluted); for example there may be only 1 part of alcohol for every 12 parts of water giving us a ratio of 1/12th. This low fraction indicates a low concentration of alcohol.
 - C. The wine glass will be a medium blue; there may be 4 parts of alcohol for every 12 parts of water giving us a ratio of 4/12ths.
 7. Discussion
 - A. Ask the students: “Would someone like to summarize what they have learned in this demonstration?” Students should understand that even though the beer glass contains more liquid than the shot glass, they both have the same amount of alcohol - - the amount of additional liquids varies but not the amount of alcohol in each serving.

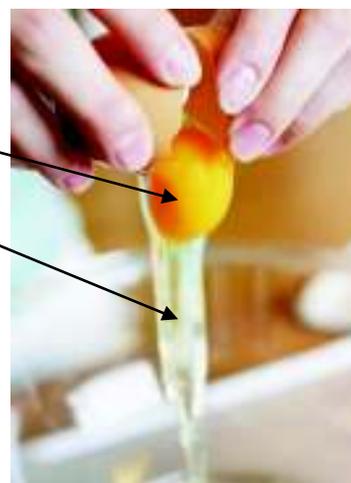
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- B. Ask the students: “If I wanted to consume the drink with the least amount of alcohol which would it be?” This is actually a trick question, since they all have the same amount of alcohol even though the volume of liquid is different.
- C. Which has more alcohol in it a beer or a shot of liquor? (both have the same).
8. Worksheet – If the students filled this out as they watched the demonstration, or at the end of the demo - - collect it now; otherwise, assign as homework and collect tomorrow.

Egg Experiment

(For variations/adaptations, see Page 13)

1. Ask a student to pass out the *Egg Experiment Science Report* (Page 36, 37) or *the Egg Experiment Writing Response* (Page 38).
2. Once everyone has a copy of the appropriate form, tell the students you would like to start the next experiment but you will need their assistance.
3. Ask the students to clap their hands and then rub their hands together very quickly. Ask the students to describe how it felt. Many students say “felt friction” or “feels warm”.
4. Discuss how the heat they felt is a result of friction. The hands rub together and any dead skin cells on the top of your hands shed off. This shows how sensitive the skin is - and how easily the cells in our skin can be damaged. Explain that the cells inside our bodies are sensitive too and can be easily damaged.
5. Hold up a raw egg and ask: “what type of nutrient is found in eggs?” (Protein). Describe how the protein of the egg is similar to the protein of our bodies and our cells.
6. Discuss the two parts of the raw egg (both have protein):
 - A. Yolk – the bright yellow part of the egg
 - B. Albumen – the clear part of the egg
7. Briefly tell students what you will be doing in the experiment. Say: “We are going to put regular tap water into one beaker (container) and lab alcohol in the other. Then we will crack an egg into each container.”
8. The hypothesis
 - A. Ask the students what a hypothesis is; explain what hypothesis is if they do not know (An educated guess).



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- B. Have the students write down a hypothesis. Say: “I want you to come up with a hypothesis stating what you think will happen to the egg cracked into the alcohol and what will happen to the egg cracked into the water; write it on your paper.”
 - C. Give them a few minutes to complete the writing.
 - D. Ask some of the students to share what they wrote.
9. Testing the hypothesis - “Now we are going to test our hypothesis.”
- A. Ask a student to fill one beaker or container halfway with water. Explain the importance of water in our bodies.
 - 1) Water constitutes approximately 2/3 of the human body.
 - 2) A newborn baby is made up of approximately 77% water
 - 3) A grown up man is approx. 65%
 - 4) A grown-up woman is approx. 58%
 - 5) An elderly person is approx. 50% water
 - B. Have a student crack one of the eggs and drop it into the water.
 - C. Ask the students to describe what they see. (The egg will sit in the water with very little change.)
 - D. The teacher should then fill the other beaker (container) halfway with lab alcohol. Explain that only an adult can legally handle the lab alcohol, so you have to pour it. Explain to the students that lab alcohol is 200 proof and that it is poisonous.
 - E. Ask the students: “If this lab alcohol is 200 proof, what percentage of alcohol is it?” (The answer is 100% alcohol.)
 - F. Have another student crack the remaining egg and drop it into the lab alcohol.
 - G. Ask the students to describe what they see. (The albumen or clear part of the egg will turn white immediately as if “cooking.” The yolk or the bright yellow part of the egg will also start to film over with time as if it is cooking.)
 - H. Allow the eggs to sit in the water and alcohol containers for a minute or so.
 - I. Describe the changes that occur in the eggs:
 - 1) Water/Egg – “See how the albumen of the egg in water is still clear and the yolk is a bright yellow color.”
 - 2) Alcohol/Egg – “Look at how the albumen of the egg in the alcohol has turned white in color; also notice how the yolk of the egg is not as bright in color, how it is becoming a duller shade of yellow.”

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- J. Allow students to walk up to the front of the class to get a closer view of the eggs in the beakers.
 - K. Do not allow students to handle the alcohol filled beaker.
10. Writing Activity --While the students take turns coming up to see the eggs, have them complete the *Egg Experiment Science Report* or the *Egg Experiment Writing Response* activity worksheet.

11. Discussion

- A. Ask the students how the egg is like the cells in our bodies and what they think alcohol will do to our cells when ingested.
 - B. Review the legal drinking age in your state.
 - 1) The legal drinking age for every state in the United States is 21 years old.
 - C. Ask the students why some people choose to drink and why some people choose not to drink; list their answers on the blackboard or overhead.
 - D. Ask the students to think of things in a person's life that could put them at a higher risk of having alcohol and other drug problems. List these on the board or on a chart. Some of the key risks to include are:
 - 1) Medication use
 - 2) Peer pressure
 - 3) Health problems
 - 4) Isolation
 - 5) Communication difficulties
 - 6) Chronic pain
 - 7) Family problems
 - 8) Access to drugs
12. Review -- Go back to the beakers; hold them up for the class to see. Review the effects of the alcohol on the egg, emphasizing the "cooking" process
13. Assign homework, *Egg Experiment Word Find*, *Egg Experiment Crossword Puzzle* and/or the *Where to Go for Help Word Find* (Pages 39, 40, 41).
14. Have a student help pass out your choice of homework. These activities will help reinforce today's lesson.

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Egg Experiment - Variations

For the purpose of accommodating this activity for use with diverse groups, modification or substitution of components in this lesson may be necessary. The following alternatives may be incorporated at the discretion of the teacher and given permission of the administration to have alcoholic substances on campus.

- Use 100 proof vodka, or other high proof, clear liquor. The results will be similar to that of the laboratory alcohol, although the egg will not become as solid, and will take slightly longer to react.
- Beer can be used as a comparative sample. Be aware that because of the color of beer, and the relatively low alcohol level, the visible effects of change will be greatly decreased. The egg will, over time, develop a sac-like structure around the yolk, but will not turn white and solidify like 100 proof liquors.
- It may be beneficial to demonstrate several different alcohol samples concurrently. Using 200 proof laboratory alcohol provides participants with the opportunity to easily and quickly observe the expected effects on the egg. Vodka and beer should be used for groups where being concrete is a necessity. In some cases, participants may deny evidence of damaging effects if lab alcohol is the only example given. The rationalization that “No one drinks lab alcohol,” “I only drink mixed drinks,” or “I only drink beer” may be more easily overcome if a complete spectrum of samples including water, lab alcohol, vodka, and beer are presented.