



What does science have to do with *cleaning cycles*? **GET REAL SCIENCE!**

Company Background

Alliance Laundry Systems invents, designs, and produces products for commercial laundry systems. They lead the world in commercial laundry sales, product range, reach and R&D investment. They have five respected brands that are sold and supported by a global network of select distributors. Alliance Laundry Systems is located in Ripon, WI.

Get Real Science Video Link: [What does science have to do with cleaning cycles?](#)

YouTube Video Link: <https://youtu.be/tXk0TX1zIHQ>

Teacher Note

This lesson is written to accompany the above video. It is recommended that you watch the entire video in advance. This will help you to anticipate student misconceptions and questions and prepare ways to support their sense making.

If this is the first time that you are using the system models and modeling with your students, take the time to review the [Next Generation Science Appendix F](#) section on developing and using models for appropriate grade level expectations.

Lesson Summary

In this lesson students will design an investigation to determine which variables make a fabric most clean. The focus of this lesson is experimental design where students will be selecting their experiment variables to conduct a controlled experiment.

Standards Alignment

Next Generation Science Standards Performance Expectations

- | | |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------|
| 5-ESS3-1 | Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. |
| MS-ESS3-3 | Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. |
| HS-ESS3-4 | Evaluate or refine a technological solution that reduces impacts of human activities on natural systems. |

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing & Interpreting Data Obtaining, Evaluating, & Communicating Information Constructing Explanations & Designing Solutions	ESS3.C Human Impacts on Earth Systems ETS1.B: Developing Possible Solutions	Patterns Systems and System Models Cause and Effect

Materials

Cold water	Beakers or plastic cups	Fruit juice	Cheetos
Detergent soap	Plastic spoons	T-shirt material	Chocolate
Hot water	Dirt	Towel material	Grass stain
10 mL graduated cylinder		Coffee	Socks (students can bring in)

Procedure

- Show students the [Get Real Science Video](#) from Alliance Laundry.
 - Break 1: What are the 4 factors that go into a wash cycle? Have students brainstorm what the four factors might be.
 - Continue to show the video.
- Ask students if any of them do their own laundry at home or if they've ever tried to get a stain out of their clothes. Tell students that today they will be investigating which variables can help remove a stain most effectively.
- Students should get into groups of 4. Hand out one "Stains Lab" worksheet to each student.
- Assign roles to each group member.
 - Leader - this student is the only person who can ask the teacher questions
 - Reader - this student reads the lab procedure. Hand out one "Stains Lab Procedure" to the reader of each group.
 - Runner - this student will select the materials and return them when finished
 - Timekeeper - this student will make sure the group is working efficiently
- Have students record the names of group members next to assigned roles on "Stains Lab" worksheet.
- Assign one stain to each group. Stain options are dirt, fruit juice, coffee, Cheetos, chocolate, grass stain. Have students record the assigned stain on the "Stains Lab" worksheet.
- Students should then work on Part I of the lab procedure: design the investigation. Remind the "reader" that they will need to read the procedure to the group. They will choose one variable to test: detergent, temperature, time, speed.
- Once they are complete, they will need you to initial Part I to proceed to conducting the experiment. Make sure students have a controlled experiment. All variables should be the same in their lab except for the variable they are testing. For example, if they are using temperature as their independent variable, they can change the temperature but all other variables should be the same.
- Students will start Part II of the lab where they conduct the investigation and then proceed to Part III where they summarize their results.
- Once completed, have students share their findings with the class. Have students sit with their groups during the discussion. Have each group come up with one question they have for the group after they share their findings. Questions can be related to their procedure, possible errors in the lab, things that surprised them, etc. This helps students develop their question asking abilities and engaging in group discussion. The leader of each group should read the group's question.
- Have students complete the lab conclusion question as a group. They may need to visit other groups to get information from their labs.

Name _____ Date _____

Get Real Science
Stains Lab Procedure

Procedure

Pre-Lab

1. Your teacher will assign each group member one of the roles below. Record the roles on the “Stains Lab” worksheet.
 - a. Leader - this student is the only person who can ask the teacher questions
 - b. Reader - this student reads the lab procedure
 - c. Runner - this student will select the materials and return them when finished
 - d. Timekeeper - this student will make sure the group is working efficiently

Part I: Design the Investigation

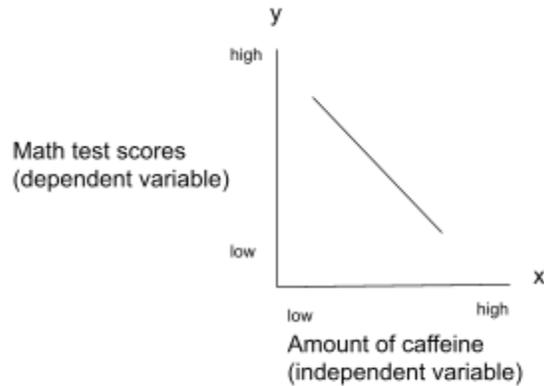
2. Your teacher will assign your group a stain. **Write this down on the “Stains Lab” worksheet.**
3. In the video, they described 4 variables that make a difference in removing a stain.
4. The independent variable is the variable that you will manipulate or change in your experiment. Choose one of the independent variables below that you’d like to investigate and **write on your lab worksheet.**

time *temperature* *detergent* *speed*

5. **Create a prediction and write on your “Stains Lab” worksheet.** Circle either increase or decrease, then write down your independent variable.
6. Design your lab setup. Your independent variable is the one you can change for each trial. All other variables should stay the same. As a group, decide how you want to run your experiment. **Fill out the “Design Table” on your “Stains Lab” worksheet.** Circle one choice in each of the gray boxes. Indicate which fabric and stain you will be using by writing that in the gray boxes.
7. Ask your teacher to approve your experimental design and have them initial your lab sheet. Once approved you can move to part II.

Part II: Conduct the Investigation

8. **Record all observations on the “Observation Table” of your “Stains Lab” worksheet.**
9. Make the fabric you selected “dirty” with the assigned stain. Try to use the same method and amount for each fabric. Conduct your experiment. **Record all observations on your observation table.** Create a sketch of the fabric after the “washing” and include a description.
10. Analyze your observations to determine any trends or patterns. Create a simple graph that shows the relationship between the variables you tested. You do not need to show numbers on your graph as this is a simple representation of a relationship between two variables. The independent variable should always be placed on the x-axis and the dependent variable should always be on the y-axis.
Ex: The group found that math test scores decreased when more caffeine was consumed.



11. **Create your group's conclusion on the "Stains Lab" worksheet.** Be prepared to share your findings with your class.

Conclusion question

12. This is a Claim, Evidence, Reasoning format. The first section is called the "claim." This is where you state your conclusion. Example: *We think the cold water washed the coffee stain the best.* The "evidence" section is where you would list specific data that was collected in the lab. Example: *Based on group 4 data, the water that was cold and room temperature got the coffee stain out better than the hot water.* The "reasoning" connects your claim to your evidence. Example: *Since the hot water did the least amount of stain removal from the coffee stain and the coldest water did the best at removing the stain, we can conclude that the colder the water, the more efficient at removing coffee stains.*

Name _____ Date _____

Get Real Science
Stains Lab

Roles:

Leader _____ Reader _____

Runner _____ Timekeeper _____

Part I: Design the Investigation

Our group's assigned stain is _____.

Our independent variable is _____.

Our dependent variable is **the amount of stain removed.**

Prediction: Our group predicts that if we **increase / decrease** _____ (independent variable), the **amount of stain removed** (dependent variable) will increase.

Design Table

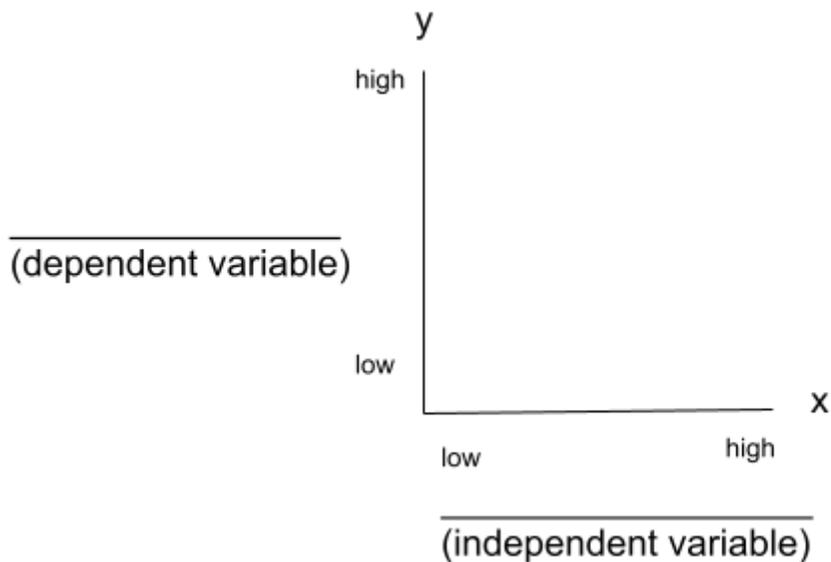
	Test 1	Test 2	Test 3
Time	30 sec / 60 sec / 90 sec	30 sec / 60 sec / 90 sec	30 sec / 60 sec / 90 sec
Temperature	Cold / room temp. / hot	Cold / room temp. / hot	Cold / room temp. / hot
Rate	Slow / medium / fast	Slow / medium / fast	Slow / medium / fast
Detergent	None / 1 mL / 5 mL	None / 1 mL / 5 mL	None / 1 mL / 5 mL
Amount of water in cup	¼ full / ½ full / full cup	¼ full / ½ full / full cup	¼ full / ½ full / full cup
Fabric choice	T-shirt / towel / socks	T-shirt / towel / socks	T-shirt / towel / socks
Stain	Coffee / fruit juice / dirt Cheetos / chocolate / Grass stain	Coffee / fruit juice / dirt Cheetos / chocolate / Grass stain	Coffee / fruit juice / dirt Cheetos / chocolate / Grass stain

Teacher Initials _____

Part II: Conduct the Investigation

Observation Table

	Test 1	Test 2	Test 3
Observations (draw a picture of the fabric after being "washed," use a statement to explain your observations.	Sketch: Describe:	Sketch: Describe:	Sketch: Describe:



Conclusion Question

1. Based on all the group findings, determine which settings would be ideal to remove stains from *potato chips* and *grape soda*. Use evidence for your response. You may need to speak with other groups to get more information regarding their lab results. Use the statement below to help structure your response.

Our claim is that the best stain remover for potato chips and grape soda would include _____ temperature, _____ amount of time washing, _____ amount of detergent and a _____ speed of washing.

Our evidence for this is _____

Our reasoning for this is _____
