

A Look inside the Lab: Safety Hoods

OVERVIEW

The VMP Next Step Science resources provide mini lessons, videos, and other materials related to the practice of science. These resources are meant to enhance the exploration of a particular topic or offer insights into the profession of scientific research.

The Next Step Science “A Look inside the Lab” series is comprised of reading passages and videos designed to introduce students to pieces of laboratory equipment and the scientists who use them. The series can be used to enhance an existing lesson or as a starting point for introducing a concept.

Each mini lesson includes:

- Short video featuring scientists from the Children’s Hospital of Philadelphia Research Institute discussing their work and how they utilize the lab equipment on a day-to-day basis
- Related reading passage
- Teacher guide
- Student worksheet

Additional VMP “A Look inside the Lab” videos and materials can be found at vaccinemakers.org/next-step-science.

OBJECTIVES

“A Look inside the Lab” series activities are designed to:

- Introduce students to equipment commonly used in medical research laboratory settings and explore how the technology impacts and serves society
- Introduce students to scientists, science careers, and the types of investigations that scientists conduct on a day-to-day basis
- Provide an opportunity for students to read informational text about scientific topics to enhance their understanding of how science is done and consider how scientists develop possible solutions to problems

Safety Hoods Lesson Objectives:

- Students will understand the different types of safety hoods.
- Students will be able to explain how safety hoods work and why they are useful laboratory tools.
- Students will explore the responsibility of prioritizing safety in scientific research.

LESSON RESOURCES

- Lesson video, *A Look inside the Lab: Safety Hoods*, <https://vimeo.com/530462007>
- Video transcript PDF:
[https://vaccinemakers.org/sites/default/files/resources/Look in Lab SafetyHoods video transcript FINAL.pdf](https://vaccinemakers.org/sites/default/files/resources/Look%20in%20Lab%20SafetyHoods%20video%20transcript%20FINAL.pdf)
- Reading passage, *The Responsibility of Working in a Lab*,
[https://vaccinemakers.org/sites/default/files/resources/Look Lab SafetyHoods reading%20passage FINAL.pdf](https://vaccinemakers.org/sites/default/files/resources/Look%20Lab%20SafetyHoods%20reading%20passage%20FINAL.pdf)
- Student worksheet:
[https://vaccinemakers.org/sites/default/files/resources/Look Lab SafetyHoods worksheet FINAL.pdf](https://vaccinemakers.org/sites/default/files/resources/Look%20Lab%20SafetyHoods%20worksheet%20FINAL.pdf)
- Resources related to safety hoods
 - Hoods, Case Western Reserve University Environmental Health & Safety, <https://case.edu/ehs/laboratory-safety/hoods>
 - What is a Safety Hood?, Fisher American, https://fisheramerican.com/blog/what-is-a-safety-hood/?srsltid=AfmBOorloDqEWEbQ9E636EhFWvqkaorbya35Yh_Omx3qY2CpaSp_pQmI
 - Fume Hoods, Princeton University Environmental Health & Safety, <https://ehs.princeton.edu/laboratory-research/laboratory-safety/laboratory-equipment-and-engineering/fume-hoods>
 - Safe Laboratory Practices & Procedures, National Institute of Health (NIH) Department of Occupational Health and Safety, https://ors.od.nih.gov/sr/dohs/safety/laboratory/Pages/student_goodlab.aspx#:~:text=Wear%20clothing%20and%20shoes%20that,contact%20lenses%20in%20the%20laboratory
 - Laboratory Safety, CDC Laboratory Safety Portal, <https://www.cdc.gov/labsafety/index.html>
 - Laboratories, Occupational Safety & Health Administration (OSHA), <https://www.osha.gov/laboratories>
 - 10 Science Lab Safety Rules for Kids, ScienceFirst, <https://www.sciencefirst.com/10-science-lab-safety-rules-for-kids/>

- General Lab Safety, Amoeba Sisters, video, <https://www.youtube.com/watch?v=MEIXRLcC6RA>
- Lab Safety games/interactives
 - Lab Safety Rules, Virtual Science Teachers, game, <https://view.genially.com/62a72ad663e3e200183566ef>
 - Science Lab Safety, Genially Education, game, <https://view.genially.com/60380f9592731boda9088d98/interactive-content-science-lab-safety-escape-room>
 - Lab Safety, LabXchange, game, https://www.labxchange.org/library/items/lb:LabXchange:7ac0b41c:lx_simulation:1

LESSON

The lesson progression outlined below can be completed in two to three 50-minute class sessions. If the “Extension” activity is included, additional time may be required.

Engage

Time: 15-20 minutes

Have students:

- Brainstorm things people use for protection in their lives or jobs. For each suggestion, prompt: *Who uses each? Why? Is it a piece of protective clothing/equipment or is it a procedure? Does it protect the person using it, the people around them, or both?*
- Guide the discussion so that students consider these items regarding laboratory safety, noting that equipment and protocols are designed to protect the scientists, the people around them, and, as applicable, their samples.
- During the discussion, ensure that safety hoods are listed as a protective type of equipment and determine if students are familiar with the different types.

Explore

Time: 20-30 minutes

Have students:

- Read the passage, “The Responsibility of Working in a Lab.”
- Watch the video, *A Look inside the Lab: Safety Hoods*.
- Work in small groups to complete the lesson vocabulary list.
Vocabulary list: anaerobic bacteria, chemical fume hood, cell line, HeLa cells, laminar flow hood, personal protective equipment (PPE)

Explain

Time: 15-20 minutes

Have students:

- Work in groups to discuss and answer the student worksheet questions related to the passage and video.
- Lesson questions:
 - List three different types of safety hoods and why each one is used.
 - Explain the importance of proper lab etiquette and safety.
 - List five safety rules when in a lab setting.
 - Using an example from the reading passage, describe what you learned from it about lab safety or what surprised you. Make sure your answer specifies which example you used and includes three to five sentences.

Elaborate

Time: 20-30 minutes

Have students:

- Working in a small group, choose (or be assigned) one type of safety hood and develop a visual resource (poster, infographic, video) that describes how the hood works. If time allows, have each group present their findings to the class.

Evaluate

Time: 15-20 minutes

Have students:

Work individually to write a paragraph that addresses one of these prompts:

- Why is lab safety so important?
- Discuss one thing you learned about lab safety in this lesson that was surprising to you.

Extension (Optional)

Time: varied

Have students:

- Participate in a lab safety game or activity. Options are noted in the lesson resources list.

RUBRIC: STUDENT WORKSHEET – Lesson Vocabulary

Anaerobic bacteria	Bacteria that grow and survive in oxygen-free environments, as opposed to aerobic bacteria which require oxygen. In humans, this type of bacteria are most often found in the gastrointestinal tract.
Chemical fume hood	A piece of laboratory equipment that offers a ventilated work environment to protect the scientist from being exposed to harmful chemicals or matter.
Cell line	A population of cells cultured from a single origin cell. Often used in scientific research.
HeLa cells	A cell line derived from the cancerous cervical cells of Henrietta Lacks. These cells can reproduce indefinitely in a laboratory setting.
Laminar flow hood	A type of laboratory safety hood that offers a protected work environment by managing air flow; this type of environment decreases that chance that biological specimens will be contaminated while working with them.
Personal protective equipment (PPE)	Items worn by a scientist or healthcare worker to prevent exposure to chemicals or pathogens. Examples include gowns, gloves, and goggles.

RUBRIC: STUDENT WORKSHEET – Lesson Questions

1. List three different types of safety hoods and why each one is used.

Answers may vary. Student responses should include the following main points.

- Laminar flow hood
 - Laminar flow hoods are used to create a sterile environment to prevent contamination in cell culture work.
- Chemical fume hood
 - A safety hood designed to prevent the scientist from exposure to hazardous chemicals.
- Anaerobic chamber
 - A chamber used for bacteria that survive in an oxygen-free environment.

2. Explain the importance of proper lab etiquette and safety.

Answers may vary. Students should be able to determine the importance of keeping oneself and others from harm in a laboratory setting.

3. List five safety rules when in a lab setting.

Answers may vary, but can include the following:

1. Always wear appropriate personal protective equipment (PPE), such as lab coats and safety goggles.
2. Do not eat or drink in the lab.
3. Don't taste or touch any chemical.
4. Dispose of all waste in appropriate types of waste containers.
5. Properly label all chemicals and containers and make sure they are stored in appropriate types of storage containers.
6. Store chemicals properly, based on their type. For example, flammables should be stored in a cabinet designed for such.
7. Know where emergency eye wash and showers are located.
8. Do not have personal or extra items in the lab.
9. Don't joke around and pay attention to rules for everyone's safety.
10. Follow instructions carefully.

4. Using an example from the reading passage, describe what you learned about lab safety or what surprised you. Make sure your answer specifies which example you used and includes three to five sentences.

Answers may vary. Students should be able to articulate what they learned about lab safety from the lesson and reference one of the examples from the reading passage in their response.