

A Look inside the Lab: Incubators

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

Incubators Lesson Objectives:

- Students will understand the different types of incubators.
- Students will be able to explain how incubators work and why they are useful laboratory tools.
- Students will explore the relationship between organisms and temperature.

LESSON RESOURCES

- Lesson video, *A Look inside the Lab: Incubators*, <https://vimeo.com/1032086047>
- Video transcript PDF: [https://vaccinemakers.org/sites/default/files/resources/Look in Lab Incubators video transcript FINAL.pdf](https://vaccinemakers.org/sites/default/files/resources/Look%20in%20Lab%20Incubators%20video%20transcript%20FINAL.pdf)
- Reading passage, *Too Cold or Too Hot: Why it Matters*, [https://vaccinemakers.org/sites/default/files/resources/Look Lab Incubators reading%20passage Final.pdf](https://vaccinemakers.org/sites/default/files/resources/Look%20Lab%20Incubators%20reading%20passage%20Final.pdf)
- Resources related to incubators:
 - Laboratory Incubator, ESCO Life Sciences Group, <https://www.escolifesciences.com/products/lab-incubator#:~:text=Lab%20incubators%20are%20essential%20equipment,beverage%20testing%2C%20and%20pharmaceutical%20testing>
 - What is an Incubator Used for in the Lab, Excedr, <https://www.excedr.com/blog/what-is-an-incubator-used-for-in-the-lab>
 - Understanding the Importance of Laboratory Incubators in Scientific Research, Medzell, <https://blog.medzell.net/blog/understanding-the-importance-of-laboratory-incubators-in-scientific-research/>
- Resources related to climate change and the relationship between pathogens and temperature:
 - Spotlight on: The risk of infectious diseases in a changing world, VMP, <https://vaccinemakers.org/news-events/spotlight-risk-infectious-diseases-changing-world>
 - Climate Change, its impact on emerging infectious diseases and new technologies to combat this challenge, *Emerging Microbes and Infections*, <https://www.tandfonline.com/doi/full/10.1080/22221751.2024.2356143#abstract>
 - How Climate Change is Changing Vaccination Planning, the BMJ, <https://www.bmj.com/content/384/bmj.q360>
 - Impact of environmental and climatic changes on future infectious diseases, *International Journal of Surgery*, <https://pmc.ncbi.nlm.nih.gov/articles/PMC10389506/>

- Experts warn climate change will fuel spread of infectious diseases, UC Davis, <https://health.ucdavis.edu/news/headlines/experts-warn-climate-change-will-fuel-spread-of-infectious-diseases-/2024/03>

LESSON

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

Engage

Time: 20-30 minutes

Have students:

- Brainstorm examples from daily life where things must reach or be kept at a certain temperature and discuss why that temperature range is important.

Examples:

- Yogurt maker
- Kombucha
- Bread yeast
- Chicken egg incubator
- Person with a fever
- Reptile/terrarium heat level
- Freezers
- Refrigerators

Foster the conversation to get to the idea that different organisms, pathogens, bacteria, etc. need an ideal temperature in order to thrive/survive. Sometimes our goal is to prevent that thriving/survival (e.g., foods at a picnic), whereas other times, our goal is to promote it (e.g., incubating hatchlings).

- Next, have students brainstorm reasons why temperature might be important in a laboratory setting and foster a conversation about incubators.

Explore

Time: 15-20 minutes

Have students:

- Read the passage, “Too Cold or Too Hot: Why it Matters”
- Watch the short video, *A Look Inside the Lab: Incubators*

Explain

Time: 20-30 minutes

Have students:

- Work individually or in groups to discuss why incubators are an important tool in scientific research. Have each group present their ideas in a full class discussion.
- Facilitate a class discussion about what students found surprising or interesting about the role of temperature in scientific research.

Elaborate

Time: 30-45 minutes

Have students:

- List three things they learned about ideal temperatures, pathogens, and organisms. They should then choose one item to elaborate on by writing a 5-8 sentence paragraph. Students should conduct more in-depth research on their subject of choice and explore the additional information in their paragraph. They should also mention what was most interesting or surprising to them about the topic.

Evaluate

Time: 20-30 minutes

Have students:

- Work individually to write a brief paragraph (4-6 sentences) about what they learned from the passage about the role of temperature in the development of the intranasal flu vaccine. Students should discuss the importance of temperature in a biological context and in the lab.

Extension (Optional)

Time: varied

Have students:

- Read the article “Spotlight on: the risk of infectious diseases in a changing world.”
- Have students write a 3-5 paragraph paper about the role of climate change on the relationship between pathogens and temperature.