



TOPIC

Life Sciences – Virology, Immunology, Epidemiology

LEARNING OBJECTIVES

- Learn the basic structure of a virus and how it reproduces.
- Learn how the body produces antibodies and combats a viral infection.

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In the Whack-a-Virus activity, students learn about virology and immunology. This is a great activity for those exploring the life sciences or for career exploration. The game provides information about viruses, their structure, and behavior and provides information about how our bodies' immune systems respond to viral infections.

The activity is a simulation of a viral infection within the body. The students attempt to prevent viruses from invading the body's cells by attaching the appropriate antibody to the corresponding virus capsid. Doing so will result in the virus being destroyed by the body's macrophage immune system cells. Students can coordinate and work collaboratively to combat the viruses for as long as possible!

NOTE: Some students find the game mechanics difficult at first. Encourage them to be persistent in mastering the game mechanics.

MATERIALS

- Properly configured computers. See our Technical Guide for more information.
- Student handout for daily grade, included in this lesson plan.

WHAT TO DO BEFORE CLASS

- 1) Watch the associated WhyPak video Whack-A-Virus Walkthrough.
- 2) Navigate through Whyville and find the Whack-A-Virus activity within the BioPlex.
- 3) Browse through the tutorial content and determine whether additional content is needed, based on your particular class's needs.
- 4) Play through the game for a few rounds to understand the mechanics of the activity.
- 5) Detailed game instructions can be found below the game field on the Whack-A-Virus webpage.
- 6) Skim through the attached worksheet. Decide if it works for your class.

SAMPLE LESSON OUTLINE

- 1) Conduct a short class discussion on what the students know about viruses and the immune system. Hand out the student worksheet. [Recall]
- 2) Have your students log into Whyville, direct them to the BioPlex and then to the Virus Lab.
- 3) In the Virus Lab, there are two tutorials available to the students. We recommend your students explore through the content on:
 - a) Virus Basics and
 - b) The Immune Response
 prior to playing the Whack-a-Virus game. Let them start playing the game. [Explore]
- 4) Conduct a short class discussion on what the students learned about viruses and the immune system. [Reflect]
- 5) Have students play through the two levels within Whack-a-Virus, trying to block as many invading viruses as possible. [Accomplish]

WhyPaks Lesson Guide Framework

Recall – Ask the students what they already know about the subject.

Explore – The students self-direct themselves through the activity. Teacher facilitates.

Reflect – Refine the students' understanding by using directed inquiries.

Accomplish – The students are presented with a goal to achieve.

Connect – Connect what was learned to standards-based content.

6) Have students complete the attached worksheet for a daily grade. [Connect]

WHERE TO NEXT? RELATED CONTENT WITHIN WHYVILLE

| SUBJECT MATTER | WHYVILLE DESTINATION |
|-------------------------------------|--|
| Immunology, Epidemiology, Virology | BioPlex – Vaccine Lab, Make-a-Virus, Pharmacy, CDC |
| Laboratory Processes and Procedures | Vaccine Lab, Animal C.A.R.E |
| Health, Wellness, Nutrition | WhyEat, Cafeteria, Fitzone |

Next Generation Science Standards (NGSS)

| NGSS Subcategory | Standard ID | Standard Description |
|---|--------------------|--|
| Engaging in Argument from Evidence | MS-PS3-5 | Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon. |
| Life Sciences – Structure, Function, and Information Processing | MS-LS1-1 | Conduct an investigation to provide evidence that living things are made of cells, either one cell or many different numbers and types of cells. |
| Life Sciences – Structure, Function, and Information Processing | MS-LS1-2 | Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. |
| Life Sciences – Structure, Function, and Information Processing | MS-LS1-3 | Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. |

Common Core – ELA: Science and Technical Subjects (CC-ELA)

| CC Subcategory | Standard ID | Standard Description |
|--|--------------------|---|
| Writing for History/Social Studies, Science and Technical Subjects | WHST.6-8.1 | Write arguments focused on discipline content. |
| Writing for History/Social Studies, Science and Technical Subjects | WHST.6-8.7 | Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. |

| <i>CC Subcategory</i> | <i>Standard ID</i> | <i>Standard Description</i> |
|--|--------------------|---|
| Reading for Science and Technical Subjects | RST.6-8.1 | Cite specific textual evidence to support analysis of science and technical texts. |
| Speaking & Listening | SL.8.1 | Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly. |
| Speaking & Listening | SL.8.1.c | Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas. |

Texas Essential Knowledge & Skills (TEKS)

| <i>TEKS Category</i> | <i>Chapter</i> | <i>Standard ID</i> | <i>Standard Description</i> |
|--------------------------------------|----------------|--------------------|--|
| Science – Organisms and Environments | 112.18 | 6.12.A | Understand that all organisms are composed of one or more cells. |
| Science – Organisms and Environments | 112.18 | 6.12.D | Identify the basic characteristics of organisms, including prokaryotic or eukaryotic, unicellular or multicellular, autotrophic or heterotrophic, and mode of reproduction, that further classify them in the currently recognized Kingdoms. |
| Science – Organisms and Environments | 112.19 | 7.12.B | Identify the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, excretory, reproductive, integumentary, nervous, and endocrine systems. |
| Science – Organisms and Environments | 112.19 | 7.12.C | Recognize levels of organization in plants and animals, including cells, tissues, organs, organ systems, and organisms. |
| Science – Organisms and Environments | 112.19 | 7.13.B | Describe and relate responses in organisms that may result from internal stimuli such as wilting in plants and fever or vomiting in animals that allow them to maintain balance. |

| TEKS Category | Chapter | Standard ID | Standard Description |
|-------------------------|----------------|--------------------|---|
| CTE – Career Portals | 127.4 | 1.A | The student explores one or more career clusters of interest. The student is expected to: (A) identify the various career opportunities within one or more career clusters. |
| CTE – Career Portals | 127.4 | 2.A | The student explores pathways of interest within one or more career clusters. The student is expected to: (A) investigate career opportunities within the pathways. |
| CTE – Exploring Careers | 127.3 | 4.A | The student evaluates skills for personal success. The student is expected to: (A) implement effective study skills for academic success. |
| CTE – Exploring Careers | 127.3 | 4.C | Use a problem-solving model and critical-thinking skills to make informed decisions. |
| CTE – Exploring Careers | 127.3 | 4.D | Use effective time-management and goal-setting strategies. |
| CTE – Exploring Careers | 127.3 | 4.E | Effectively use information and communication technology tools. |
| CTE – Exploring Careers | 127.3 | 7.E | The student develops skills for professional success. The student is expected to: (E) explore and model characteristics necessary for professional success such as work ethics, integrity, dedication, perseverance, and the ability to interact with a diverse population. |
| CTE – Exploring Careers | 127.3 | 7.F | Complete activities using project- and time-management techniques. |
| CTE – Exploring Careers | 127.3 | 8.A | The student identifies and explores technical skills essential to careers in multiple occupations, including those that are high skill, high wage, or high demand. The student is expected to: (A) complete actual or virtual labs to simulate the technical skills required in various occupations |