



## TOPIC

Life Sciences – Virology, Immunology, Epidemiology

## LEARNING OBJECTIVES

- Design viruses that will affect Whyvillians with certain symptoms and durations.
- Learn that viruses affect different people differently, based on their receptivity to the virus.
- Learn standards-based concepts of how viruses work in body.

## CONTENTS OF THIS GUIDE

1. Class Preparation
2. Sample Outline
3. Worksheet
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In the Make-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 is a “virus receptor simulator.” Students design viruses and try to get the viruses to impart certain symptoms to the victims. Some Whyvillians are more susceptible to particular viruses.

Students are presented with a small grid which represents the viral envelope. Altering the colors of the viral envelope alters its behavior and virulence to populations. Students are presented with a series of challenges, each more difficult than the last. They must design their viruses to reflect the criteria of the challenge. They will receive bonuses to their Whyville salaries for progressing through the levels.

## 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 *Make-A-Virus Walkthrough*.
- 2) Navigate through Whyville and find the Make-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 the game for a few minutes to understand the mechanics of the activity.
- 5) Game instructions and additional information can be found on the Make-A-Virus Introduction page, which precedes the game.
- 6) Skim through the attached worksheet. Decide if it is applicable 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
 Students can then play the game in the remaining time. [Explore]
- 4) Conduct a short class discussion on what the students learned about viruses and the immune system. [Reflect]
- 5) Have students play through all four levels within Make-A-Virus, designing viruses and infecting as much of their sample population as possible. [Accomplish]
- 6) Have students complete the attached worksheet for a daily grade. [Connect]

### 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.

**WHERE TO NEXT? RELATED CONTENT WITHIN WHYVILLE**

SUBJECT MATTER	WHYVILLE DESTINATION
Immunology, Epidemiology, Virology	Bioplex – Vaccine Lab, Whack-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)**

<b>NGSS Subcategory</b>	<b>Standard ID</b>	<b>Standard Description</b>
Constructing Explanations and Designing Solutions	MS-PS1-6	Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints.
Engineering Design	MS-ETS1-4	Models of all kinds are important for testing solutions.
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.
ETS1.C: Optimizing the Design Solution	MS-ETS1-4	The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.
ETS1.C: Optimizing the Design Solution	MS-ETS1-3	Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design.
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-LS1-3	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)**

<i>CC Subcategory</i>	<i>Standard ID</i>	<i>Standard Description</i>
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.
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.

<b>TEKS Category</b>	<b>Chapter</b>	<b>Standard ID</b>	<b>Standard Description</b>
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.
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.

<b>TEKS Category</b>	<b>Chapter</b>	<b>Standard ID</b>	<b>Standard Description</b>
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