

History of Plagues 6th – 8th Grade Lesson

- **MS College and Career Standards: MS CCRS: L.6.1, L.6.1.1, L.6.1.2, L.6.1.4, L.6.1.5, L.6.1.6, L.6.4.5, L.8.4, L.8.4A.2**
- **NGSS Standards: MS-LS1-1, MS-LS1-2, MS-LS1-3, MS-LS2-1, MS-LS2-2, MS-LS2-3, MS-LS2-4, MS-LS2-5, MS-LS3-1, MS-LS3-2, MS-LS4-1, MS-LS4-2, MS-LS4-3, MS-LS4-4, MS-LS4-5, MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, MS-ETS1-4**

State lesson objectives:

1. **Analyze the historical impact of the Black Death through a video presentation.**
2. **Investigate the chronological development of plagues via a PowerPoint presentation.**
3. **Examine the mechanisms of plague transmission and the importance of preventative measures such as hygiene and vaccinations.**
4. **Conduct a laboratory experiment to observe the propagation of bacteria from various surfaces.**
5. **Collaboratively engage in a question and answer session to consolidate understanding of the lesson content.**
6. **(For the extension) Conduct research on a specific plague and present the findings to the class.**
7. **Discuss the significance of global collaboration in the prevention and management of plagues.**
8. **Reflect on the acquired knowledge and its applicability to everyday life and personal health.**

Kid Friendly Objectives:

1. **Watch a cool video about the Black Death and learn how it changed the world.**
2. **Discover the history of plagues through a fun PowerPoint presentation.**
3. **Find out how plagues spread and why it's important to wash our hands and stay healthy.**
4. **Do a super interesting lab experiment to see how germs can spread from one place to another.**
5. **Work together to answer questions and show off what we've learned about plagues.**
6. **(For the extension) Research a specific plague and share the interesting facts with our classmates.**
7. **Understand why people from all over the world need to work together to stop plagues.**
8. **Reflect on what we've learned and think about how it can help us in our everyday lives.**

Resources needed to teach this lesson:

Reagents would have been mailed to the Teacher premade. Please see the end of the lesson plan for more complete details.

[Video](#) on the Black Death

PowerPoint presentation on the history of plagues

Handouts for students

Chromebook (1 per student for assessment)

Safety Goggles

Pen

Vial

Pipette

Phenol Red

Engage (12- 15 minutes)

- **Start with a discussion on what students know about plagues.**
- **Show a video on the Black Death to grab their attention and set the stage for the lesson.**
- **Discuss the difference between historical plagues and Covid-19.**

“Today we will be combining history with biology and public health. We are going to be going over some of the causes of the biggest loss of human life. The purpose of this activity is to make you more aware of human diseases.”

Explore (15 minutes)

1. **Conduct a lab to show how easily plagues can spread. Use vials, measuring cups, and Phenol Red as a pH indicator to simulate the spread of disease.**
2. **Discuss the results and what they mean in terms of preventing the spread of plagues.**

Advanced Preparation: each student will need

3. 1 vial
4. 1 pipette

The teacher will need to hold on the bottle of Phenol Red. A pH indicator changing from yellow below pH 6.8 to bright pink above pH 8.2, it is commonly used as an indicator in cell cultures and in home swimming pool test kits.

"We are going to learn why it is so easy for diseases to spread in our population. Today I will be going over some of the most dangerous afflictions to have ever affected us. Afterwards, we will be going over a model for how disease can spread."

Procedure

5. Give each Student one microcentrifuge tube, and pipette. You will see that the tubes are sorted into separate bags. The smaller amount are the infected tubes. Please give ONE student in each class an infected tube (It is important to remember who this student is). The rest should come from the larger bag.
6. Have students copy each students' name onto the handout of names.
7. When directed by your teacher, you will move around the room and when told you will exchange 4 drops of simulated bodily fluids from your test tube to the other persons test tube.

-This simulates the exchanging of bodily fluids from a simple handshake, sneeze or cough.
8. Repeat until you have exchanged "bodily fluid" with 3 people.
9. Have each student return to their desk and record who they received fluids from over the two days. Ensure that their cups are places in the corner of their desk.

Stop the procedure here and continue the lesson

Explain (15 – 25 Minutes)

- **Present a PowerPoint on the history of plagues, covering major plagues, their causes, and their impacts on society.**
- **Discuss the social and cultural impacts of the loss of human life due to plagues.**

Elaborate/Apply learning (15 – 20 Minutes)

- **Have students use their data sheets to work on discovering who "patient zero" was for the lab activity.**
- **Discuss why some students' results are not positive and what this could mean in the real world.**
- **Explain the importance of tracing the path of infection to find the source.**

Procedure

1. Add a drop of indicator solution to each student's vial. If the solution remains clear, they are healthy. If the solution turns red, they are positive for the disease.
2. Have the students cross out all the names of people who came in contact with the disease and we will work on trying to figure out who is the culprit.



The infected student will be given a basic solution.

Red = positive

Shades of red can be used to discuss the concept of asymptotic if needed.

“Why are some students results not at positive as others? What could this mean in the real world? Why is it not easy to single out the source of infection?”

Insist that students explain the path of infection rather than just guess who the source was. Finally, reveal the source and have students see if they can then trace the path of infection.

Evaluate: (5 minutes)

- Have students complete a virtual assessment to gauge their understanding of the lesson.
- Ask students to provide feedback on the lesson by circling the face that matches their feelings about the lesson.

Can be completed at home.

“Before I leave, I want to thank you for letting me do this activity with you today. Your teacher has a virtual assessment so I could find out if you learned something new today. You can also let me know how you liked the lesson by circling the face that matches your feelings about the lesson. I had fun and I hope you did, too! Remember, stay curious!”

Name: _____ Date: _____

Determining how a virus is spread is crucial in preventing the spread of a virus. Finding patient zero, the first person known to become infected, is a critical part of this process. After scientists determine patient zero it can help them determine the origin of a virus and allow them to inform the public to prevent future infection.

In this activity, you will be simulating an outbreak and then figure out who was patient zero. You will receive a test tube or cup with simulated bodily fluids in it. One or more people in the room have bodily fluids that are infected. It could be you or someone else. To simulate how some viruses like SARS-CoV-2 (the virus that causes COVID-19) spread, you will use a pipette to exchange droplets from your test tube to another person's test tube.

Directions:

1. Obtain a test tube or cup and a pipette from your teacher.
2. When directed by your teacher, you will move around the room and when told you will exchange 4 drops of simulated bodily fluids from your test tube to the other persons test tube.

-This simulates the exchanging of bodily fluids from a simple handshake, sneeze or cough.
3. Repeat until you have exchanged "bodily fluid" with 3 people.
4. When everyone is done you will take you test tube to your teacher to test whether you have become infected using a chemical indicator. If your sample turns pink, you are infected.

Results (completed after you have been tested for the pathogen):

Did you become infected? Yes or No

Who did you have contact with?

The term used to describe the first person infected is "patient zero". Working with your classmates, determine who you think patient zero is. Record your notes below. You may attach extra paper if needed.

Who did you determine to be patient zero? _____

Explain how you came to this conclusion?

Teacher notes and Setup:

Recommended materials:

- Phenolphthalein indicator solution
 - To make the solution from powdered you use .5 gram of powder phenolphthalein for 50ml of 95% ethanol (1g for 100ml) If the solution is pink add a diluted acid until the solution becomes clear and colorless.
- .1M NaOH (Sodium Hydroxide) or other base that will result in a positive test for phenolphthalein indicator solution
- Distilled water
- Test tube (recommend plastic) for each student
- Pipette for each student

Setup:

- Fill all except one test tube with 2ml-4ml distilled water. (Tap water may work but test it with the indicator solution to ensure it does not result in a positive test first.)
- Fill one test tube (patient zero) with 2ml-4ml sodium hydroxide.
- When you distribute the test tubes remember who patient zero is!
- You may choose to organize students into groups to solve the problem.

Modifications:

If you do not have the materials listed above, you can creatively substitute materials. For example, you may choose to use an acid for patient zero and an indicator like bromothymol blue or even pH strips to test each patient. Try to stay away from acid or bases that have a scent as they may be easily recognized by students.

Increase the challenge:

- Add two infected people from the start. This will only work with larger class sizes. Five exchanges with one patient has worked fine for classes as low as 18 and high a 30.
- Do not give students the handout until they are done. Then ask them to record the names of the people they interacted with. Many students will find it to be a challenging task to list the names even though it happened only minutes earlier. This helps students understand some of the challenges that come with identifying who people they encountered.