

Leapfrog Program **Course Title: Medical Mysteries**

Course Description

Students become medical detectives as they study mysterious symptoms and discover the causes and cures of illness and disease. Hands-on science experiments and multimedia research projects engage students in developing observation skills, problem-solving strategies, and knowledge of biology.

Essential Questions

- Why are some symptoms and illnesses hard to identify?
- What strategies do doctors and scientists use to solve medical mysteries?
- What do you predict will happen in the future regarding the development of new technology and understandings, which will help solve more medical mysteries?

Outcomes

Upon successful completion of this course, students will have:

- a. Researched and discussed case studies of medical mysteries that have been solved
- b. Evaluated the studies to identify the successful strategies used for identifying the cause(s) of mysterious symptoms
- c. Conducted experiments replicating some of the techniques and discoveries used to solve medical mysteries
- d. Recorded data and observations through writing, dictation, drawing, and creating charts and tables
- e. Researched and discussed examples of medical mysteries that have not yet been solved
- f. Formed hypotheses about how the mysteries might be solved
- g. Created a final project demonstrating new knowledge of how doctors and scientists diagnose disease and illness

Instructional Strategies

During our week together, students will work on a variety of hands-on and inquiry-based projects to further their knowledge of biology, illnesses, and how doctors and scientists solve medical mysteries. Hands-on experiments and simulations will be scaffolded so that each student may receive the appropriate amount of support. Students will work on whole-class, small group, paired, and independent activities. Students will work in small, flexible groups for their research and investigations. Students will be able to demonstrate their knowledge through a variety of media. Classmates will have several opportunities to discuss their experiments and findings in order to build and extend upon their knowledge. Each day will end with an independent reflection of what was learned and what new questions are arising from their discoveries.

Resources and Materials

- **Books**
 - a. Asher, D., *Epidemiologists: Life Tracking Deadly Diseases*, 2003, ISBN: 0-8239-3633-3

- b. Ballard, C., *From Cowpox to Antibiotics: Discovering Vaccines and Medicines*, 2006, ISBN: 1-4034-8839-8
- c. Friedlander, M. P., *Outbreak: Disease Detectives at Work*, 2000, ISBN: 0-8225-2860-6
- d. Gates, P. *The History News: Medicine*, 1997, ISBN: 0-7636-0316-3
- e. Gray, S. H., *Disease Control*, 2009, ISBN: 978-1-60279-228-9
- f. Miller, D. A., *Pandemics*, 2007, ISBN: 1-59018-965-5
- g. Ollhoff, J., *A History of Germs: The Black Death*, 2010, ISBN: 978-1-60453-497-9
- h. Ray, K., *Typhoid Fever*, 2002, ISBN: 0-8239-3572-8
- i. Senker, C., *The Black Death 1347-1350: The Plague Spreads Across Europe*, 2006, ISBN: 1-4109-2278-2
- j. Walker, R. *Epidemics & Plagues*, 2006, ISBN: 0-7534-6035-1

- **Web sites**

- a. NOVA Teachers http://www.pbs.org/wgbh/nova/teachers/resources/subj_05_03.html This website contains a variety of classroom activities that can help teach students about health sciences, including disease and medicine.
- b. Lemon Penicillin and Mold <http://hubpages.com/hub/Science-Experiments-Lemon-Penicillin-and-Mold> This is an experiment that can help children learn about mold and how it is connected to Penicillin.
- c. Centers for Disease Control and Prevention <http://www.cdc.gov/> A website about disease and health information
- d. Kids' Quest <http://www.cdc.gov/ncbddd/kids/index.html> A section of the CDC website that is designed for kids and their exploration of disease and health information
- e. BAM? Body and Mind <http://www.bam.gov/teachers/epidemiology.html> This is another section of the CDC website that has lessons that introduce students to epidemiology.
- f. Disease Detectives <http://www.pbs.org/wgbh/aso/resources/guide/medact4index.html> An activity that can help students understand some factors that affect the spread of disease and the challenges of epidemiology
- g. Antibiotics Vs. Bacteria Video <http://www.newtonapple.tv/video.php?id=1279> This website features a video that will give you a better understanding of bacteria, antibiotics, and viruses.
- h. Infection! Detection! Protection! <http://www.amnh.org/nationalcenter/infection/> This website has interactive activities and games that can help students learn about infectious diseases and what they can do to prevent them.
- i. Pandemic 2 <http://www.freewebarcade.com/game/pandemic-2/> A simulation game in which you must evolve a disease to wipe out the human race.
- j. Disease Detectives <http://www.diseasedetectives.org/> Check out real disease detectives at work and play interactive games about disease detection and prevention.
- k. How Lou Got the Flu http://www.amnh.org/nationalcenter/infection/04_lou/04_lou.html Read this story about how Lou got the flu! Learn about the virus and how some doctors think it got to Lou.
- l. Viral Disease http://www.explorit.org/stumper/stumper_2.html This activity requires some investigation. You are given some background information about a virus. Then, you must attempt to identify the virus!
- m. Diagnosis <http://topics.nytimes.com/topics/news/health/columns/diagnosis/index.html> A collection of diagnosis columns published in *The New York Times*.

- **Materials**

- a. Journal
- b. Markers
- c. Ruler
- d. Scissors
- e. Scotch Tape
- f. Clean, empty jar with wide opening

Student Assessment

- **Pre-Assessment**

We will use a KWL chart on the first day of class to discuss what students “Know” and “Want to know” about diseases, prevention, and medical mysteries. We will also discuss what students know about the scientific method. Each student will be given an opportunity to share their information with the class or with a teacher. These charts will be displayed throughout the week and information will be added to it.

- **Documentation of Learning**

Students will create an open-ended, creative group project sharing information about a medical mystery that has been solved. Students will participate in several experiments and simulations to help them learn about bacteria and the spread of disease. They will also conduct experiments that replicate techniques used to solve medical mysteries. During each experiment, students will use the scientific method to document their thinking process throughout the experiment. Students will explain how the experiments effectively demonstrate the spread of disease and prevention of disease. Students will research and share information about medical discoveries and advancements through an interactive timeline. Students will also write a newspaper article about an unsolved medical mystery and their hypothesis for possible solutions. Students will document their discoveries in a reflection journal at the end of each day.

- **Post-Assessment**

The students will share their final products, experiments, and simulations at the *Expo!* Each child will be able to explain the outcomes of each activity and describe what the experiments taught them about diseases and prevention. Students will display their posters and newspaper articles that explain solved and unsolved mysteries. Students will also share their interactive, human timeline. On the last day of our session, parents are invited to the Expo to view all student work. At the end of the course students will receive a written evaluation based on general class performance, discussion, participation (whole group and small group) evaluations, and written work. Final student evaluations are written and mailed out by September 15. Please refer to the Leapfrog Family handbook for more information.

Schedule

Date	Topic(s)	In-class Activities	How will you document learning for assessment?
7/18	<p>-Case Study: How Lou Got the Flu</p> <p>-Can Buildings Make You Sick?</p> <p>-Introduction to Mold and Penicillin</p> <p>-Medical Mystery Diseases and Symptoms</p>	<p>--Students will read the story <i>How Lou Got the Flu</i> and discuss the hypotheses made in the story.</p> <p>--Students will set up an experiment that will help them learn about mold and how it is linked to Penicillin.</p> <p>--Students will set up an experiment to study the airborne particles inside a building compared to those outside.</p> <p>--Students will begin working on their Solved Medical Mysteries projects... focusing on where the disease started and symptoms of the disease.</p> <p>--Students will begin research for their History of Medical Mysteries and Discoveries Timelines... focusing on diseases.</p> <p>--Students will begin research for their Unsolved Mystery Newspaper... focusing on the symptoms.</p>	<p>Scientific method notes from lemon mold experiment</p> <p>Scientific method notes from airborne particles experiment</p> <p>Brainstorming ideas for medical mysteries project and newspaper</p> <p>Journal entry reflection and discussion</p>
7/19	<p>-Case Study: <i>New York Times</i></p> <p>-Bacteria and Antibiotics</p> <p>-Medical Mysteries: Causes, Trial and Error, and Why the Mysteries are Hard to Solve</p>	<p>--Students will read about and discuss a real-life case study from <i>The New York Times</i>.</p> <p>--Students will watch a video and conduct a simulation that will help them learn about bacteria and antibiotics.</p> <p>--Students will continue working on their Solved Medical Mysteries projects... focusing on how the cause was discovered.</p> <p>--Students will continue research for their History of Medical Mysteries and Discoveries Timelines... focusing on cures and medicines.</p> <p>--Students will continue research for their Unsolved Mystery Newspaper... focusing on trials and errors, why the mystery is hard to solve.</p>	<p>Participation, notes, and analysis of bacteria simulation</p> <p>Research for medical mysteries project and newspaper</p> <p>Dictation of what is new information is being discovered through research</p> <p>Journal entry reflection and discussion</p>

Date	Topic(s)	In-class Activities	How will you document learning for assessment?
7/20	<ul style="list-style-type: none"> -Case Study: <i>New York Times</i> -How a Virus Spreads -How a Pandemic Spreads -Medical Mysteries: Hypothesizing and Evaluating Cures and Treatments -Important Researchers and Doctors Throughout History 	<ul style="list-style-type: none"> --Students will read about and discuss a real-life case study from <i>The New York Times</i>. --Students will conduct a simulation that will show them how quickly a disease can spread. They will discuss how the spread of a disease can be prevented. --Students will explore an interactive computer game that shows how fast a pandemic can spread. --Students will continue working on their Solved Medical Mysteries projects... focusing on evaluating the cure. --Students will continue research for their History of Medical Mysteries and Discoveries Timelines... focusing on important people. --Students will continue research for their Unsolved Mystery Newspaper... hypothesizing possible cures or treatments. 	<ul style="list-style-type: none"> Participation, notes, and analysis of virus spread simulation Research for medical mysteries project and newspaper Dictation of what is new information is being discovered through research Student growth will be reflected in their hypotheses of possible treatments for their unsolved mystery cases Journal entry reflection and discussion
7/21	<ul style="list-style-type: none"> -Case Study: <i>New York Times</i> -Experiment: The Spread of a Virus and Locating “Patient Zero” -Disease Detectives in the Real World -Important Researchers and Doctors Throughout History 	<ul style="list-style-type: none"> --Students will read about and discuss a real-life case study from <i>The New York Times</i>. --Students will conduct an experiment in which they will discover how a disease spreads and attempt to identify “Patient Zero” (the first carrier of the disease). --Students will learn more about real disease detectives through an online investigation. --Students will continue working on their Solved Medical Mysteries projects... focusing on important people who were a part of the solution. --Students will continue research for their History of Medical Mysteries and Discoveries Timelines... creating the final product. --Students will continue research for their Unsolved Mystery Newspaper... creating the final product. 	<ul style="list-style-type: none"> Scientific method notes and analysis from “Patient Zero” experiment Disease detectives online investigation notes Final products for medical mysteries project and newspaper Journal entry reflection and discussion

Date	Topic(s)	In-class Activities	How will you document learning for assessment?
7/22	<p>-Case Study: <i>New York Times</i></p> <p>-Observation and Analysis of Penicillin and Airborne Particles Experiments</p> <p>-Presentations of Final Projects</p>	<p>--Students will read about and discuss a real-life case study from <i>The New York Times</i>.</p> <p>--Students will finish the lemon mold experiment and learn about how experiments with mold led to the discovery of Penicillin.</p> <p>--Students will examine the results of the airborne particles experiment and analyze what this means about the air we breath.</p> <p>--Students will continue working on their Solved Medical Mysteries projects... presenting the final product.</p> <p>--Students will continue research for their History of Medical Mysteries and Discoveries Timelines... presentations.</p> <p>--Students will continue research for their Unsolved Mystery Newspaper... presentations.</p> <p>--Students will share what they have learned at the <i>Expo</i> today!</p>	<p>Scientific method notes and analysis from lemon mold experiment</p> <p>Scientific method notes and analysis from airborne particles experiment</p> <p>Presentations of medical mysteries project and newspaper</p> <p>Presentation of Medical Mysteries and Discoveries Timeline</p> <p>Journal entry reflection and discussion</p>

CTD Statement on Third-Party Web Sites

Instructors are required to thoroughly review any third-party web sites they intend to use in their courses for inappropriate content. However, because web content continuously changes, CTD disclaims any responsibility for any of the content contained on third-party web sites used in course materials. If you become aware of anything that may be inappropriate, please notify CTD staff immediately.