**Zombie Outbreak**

Target Grade Level(s): 5-8

Subject(s): Math/Science

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**Problem Statement:** At the start of the 21st century humanity has been brought to the brink. Environmental natural disasters- the symptom of global warming- have created a skeleton of what the world used to be. The last deadly disaster created something even worse than anticipated, a deadly zombie outbreak.

Washington is in a state of emergency. At the epicenter, an unknown virus has spread from Seattle and is quickly moving over land and across the Puget Sound. There are mixed reports about those infected, but no clear cut source for the disease. We are looking for a way to cure, survive (contain) and/or eradicate.

Once infected those carriers are able to spread their sickness to other people. We are unsure how the virus is spread, but it appears that air or close personal contact may play a role in becoming infected.

As a result of this disease, physical structures and buildings have been destroyed during the looting and riots that occured after the outbreak. Scattered buildings remain standing but power, water, and sewer remain scarce. There is enough food storage to last for now.

Societal decay is a major problem as the pathogen spreads. How well can your team plan for and react to the collapse. You must work as a team to decide what you will do to deliver a cure. Think about the strategies that will make you successful in avoiding infection and curing those that are infected.

*Luckily, the virus strain is specific to the human race only, leaving animals and plants free.*

*Students are free to ask who the virus affects, something the teacher will disclose to students if not asked by the end of lesson 1.*

(Teacher only)

Clarifying Information : Zombies look for a highly populated area to “POP”. This is a fungal infection, students will learn about this from research (<https://askabiologist.asu.edu/zombie-ants><https://www.sciencedaily.com/releases/2014/08/140825142124.htm><https://www.livescience.com/47751-zombie-fungus-picky-about-ant-brains.html>). At first they may think it is bloodborne due to the fact that our zombies “explode”. But, through their research and further clues they will determine that it is an airborne fungus. Possible cure would be a competing fungus (<https://news.nationalgeographic.com/news/2012/05/120504-zombie-ant-fungus-science-environment-rainforest/> )

It is possible to contain the fungus infected person by containing the head. You can determine they are infected by their bulging eyes, twitching ear lobes and snotty dribble that appears to be a yellowish-greenish grainy mushroom.

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**Unit Overview and Table of Contents**

Teachers will have the opportunity to pick a single unit path as it pertains to the zombie problem; or proceed sequentially through each unit path. The three possible options for solving the zombie outbreak are as follows; create and distribute a cure, defend and isolate the healthy against the infected, or prevent the spread of the outbreak further.

Below is the Unit Path outline and options showing the lesson names, the subjects used and taught in each lesson, and a brief description of what happens during each lesson.

Day 1:

* Lesson Hook : Simulation and spread of an infectious disease
  + Activity
    - Each student gets a color coordinated marked on their hand
    - Teacher will determine what colors are infected, now sick, or die, or not infected, etc.
    - Infected sick with symptoms - red (~20%)
    - Infected carrier - orange (~15%)
    - Dead in 5 minutes - black (1-2 students)
    - Not sick or carrier - blue (~65%)
    - Teacher will not say anything about why/what the colors mean yet.
  + Video
    - Shows the simulation and spread of an infectious disease
    - [Simulation video here](https://www.bing.com/videos/search?q=virus+spread+simulator&&view=detail&mid=DFAA88C8E986E633DEFADFAA88C8E986E633DEFA&FORM=VRDGAR)
* Problem Setup:
  + Discussion:
    - What do you know about infectious diseases and how they spread?
    - What is the difference between a pandemic and an epidemic?
    - What do people who are infected look like?
    - Can it be not obvious? Can they be infected and not look sick?
  + Teacher then fills in what the colors mean- and explain to students.
    - If you are direct contact (sitting right next to) an red, you are now red if you were orange. If you were red you are now black.
    - If you are sitting in a group with someone orange, you are now orange if you are blue, you remain orange if you are orange.
    - Anyone sitting at a group with black mark turns red (unless you are already black).
  + Brief math lesson!
    - Worksheet of different potential seating arrangements and showing who gets sick and who does- different scenarios.
      * Idea- it happens much quicker than you think it does
  + Present the problem statement

Days 2-4

* Unit Path 1: Cure
  + Separate Healthy Cells Lesson
    - Candy-Yumminess
      * Moving M&Ms with utensils to not get infected
      * Sampling Groups Lesson
    - Math - Proportional Reasoning
  + Spread analysis
    - Touch on growth and exponential work
  + Cure Delivery System Lesson
    - Engineering design
  + Final Assessment

**Provide the following items for the entire unit:**

**Standards (NGSS, CCSS, CTE):**

**NGSS**

**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.

**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.

**MS-LS1-3:** Use argument supported by evidence for how the body is a systems composed of groups of cells.

**MS-LS1-5:** Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

**MS-LS1-8:** Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

**MS-LS2-1:** Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

**MS-LS2-2:** Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

**MS-LS2-4:** Construct an argument supported by empirical evidence that change to physical or biological components of an ecosystem affects populations.

**MS-LS3-1:** Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organisms.

**MS-ETS1-1**: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

**MS-ETS1-2:** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

**MS-ETS1-3:** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

**MS-ETS1-4:** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

**CCSS**

**7.EE.3:** **(touch on but not mastery)** Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategcally

**6.EE.9:** Use Variables to represent two quantities in a real-world problem that change in relationship to one another.

**6.RP.1:** Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

**6.RP.3c:** Find percent of a quantity.

**6.SP.2:** Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall.

**6.SP.4:** Display numerical data in plots on a number line, including dot plots, histograms and box plots.

**RST.6-8.1:** Cite specific textual evidence to support analysis of science and technical texts.

**SL.8.5:** Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

**CTE**

**Things to remember: Medical fields**

**Soft Skills:**

Leadership

Decisiveness

Negotiation and Conflict Resolution

Problem Solving

Creativeness and Inventive Thinking

Communication and Teamwork

Responsibility

Respect

Reflection

Resourcefulness

Intrapersonal skills

Growth mindset

**Locally and/or Personally Relevant for Students:**

Geographic location and contagious disease epicenter is based in the Puget Sound region.

Students will select and research professionals to help combat, eradicate, and cure the pandemic. These professionals will represent a broad spectrum of age, gender, background, ethnicity, etc which will make them uniquely suited to help battle the spread of infectious diseases.

**Connections to career and educational pathways:**

This unit will require students to identify a cohort of professionals who can work together to prevent the spread of the disease. This process will require the help and support of all professions and people of all backgrounds. Engineering, manufacturing, biology and medicine, amongst many other supporting professions, will play a central role in the solution to the problems posed in this lesson.

Engineers (Structural, Mechanical, Biosystems, Chemical, Environmental, Materials, etc)

Infectious Disease Experts

Farmer

Agriculturalist

Medical Professionals

Microbiologist

Laboratory Technicians

Mathematician

Technical Writers

Manufacturing

Resource Managers