BLACK DEATH
(YERSINIA PESTIS)

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UNIT OVERVIEW

• 12th grade, AP Statistics & AP Biology
• Unit Objectives
  • Research “Black Death” and its effects (statistically and health).
  • Understand the transmission of the disease and its effects on the human body.
  • Research the action some Europeans took to prevent the disease (public health measures).
  • Apply the population to statistics and compare to the population to present population.
  • Analyze the difference had the Bubonic Plague never happened.
  • Suppose what would happen if the Bubonic plague happened today in the United States.
## THEMATIC FOCUS

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<thead>
<tr>
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<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
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<tbody>
<tr>
<td><strong>Science</strong></td>
<td>Geographical and contact transmission</td>
<td>Mechanism of disease</td>
<td>Treatment-Antibiotics Lab</td>
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<td><strong>Math</strong></td>
<td>Percent of population affected</td>
<td>Bubonic, Pneumonic and Septicemic</td>
<td>Statistics on how effective</td>
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<td></td>
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<td>statistics</td>
<td>antibiotics are</td>
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**Interdisciplinary connectedness of topics:**

- **Monday**: The science class will go over the geographical and contact transmission, so how and why the plague spread. Math will cover the percent of people that were affected by the plague.

- **Tuesday**: The science and math class will both cover the different mechanisms of diseases that were responsible for the Black Death. The math class will focus on covering the statistics of the three mechanisms of disease, while the science class will be explaining what is actually happening in the human body of those who are infected. Wednesday- Science will explain the role antibiotics play in medicine and have a lab, while students in the math class will research in the library which antibiotics are most effective using statistics and calculations.
SCIENCE TEKS:

§112 Subchapter C. High School
1. (3)E- evaluate models according to their limitations in representing biological objects or events;
2. (3)F- research and describe the history of biology and contributions of scientists
3. (11)B- Investigate and analyze how organism, populations, and communities respond to external factors
4. (11)C- Summarize the role of microorganisms in both maintaining and disrupting the health of both organisms and ecosystems
5. (12)- The student knows that interdependence and interactions occur within an environmental system.
6. (12)A- Interpret relationships, including predation, parasitism, commensalism, mutualism, and competition among organisms.
SCIENCE CCRS:

• Nature of Science: Scientific Ways of Learning and Thinking – 4. Rely on reproducible observations of empirical evidence when constructing, analyzing, and evaluating explanations of natural events and processes.

• III. Foundation Skills: Scientific Application of Communication B3. Scientific Reading- Recognize scientific and technical vocabulary in the field of study and use this vocabulary to enhance clarity of communication.

SCIENCE ELPS:

• 2 (E) use visual, contextual, and linguistic support to enhance and confirm understanding of increasingly complex and elaborated spoken language

• 3(B) expand and internalize initial English vocabulary by learning and using high-frequency English words necessary for identifying and describing people, places, and objects, by retelling simple stories and basic information represented or supported by pictures, and by learning and using routine language needed for classroom communication

• 5 (B) write using newly acquired basic vocabulary and content-based grade-level vocabulary;
SCIENCE SWBAT:

1. Students will be able to follow the geographical transmission of Y. pestis using a map
2. Students will read about the misconceptions that people in the past had about disease and how much science has developed
3. Students will learn about transmissions of disease
4. Students will identify how pathogens affect human and rodent health
5. Students will describe how interactions with the environment cause disease
6. Students will understand how the bacteria and host have a parasitic relationship
MATHEMATICS TEKS

- TEKS: 111.47 Statistics,
- (c.1.A) apply mathematics to problems arising in everyday life, society, and the workplace:
- (c.1.C) select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;
- (c.1.D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;
- (c.1.E) create and use representations to organize, record, and communicate mathematical ideas;
- (c.1.F) analyze mathematical relationships to connect and communicate mathematical ideas; and
- (c.1.G) display, explain or justify mathematical ideas and arguments using precise mathematical language in written or oral communication.
- (c.2.D) distinguish between sample statistics and population parameters;
MATHEMATICS CCRS

- V1: A.1 Plan a study
- V1: B.1 Determine types of data.
- V1: B.2 Select and apply appropriate visual representations of data.
- V1: B.3 Compute and describe summary statistics of data.
- V1: B.4 Describe patterns and departure from patterns in a set of data.
- V1: C.1 Make predictions and draw inferences using summary statistics.
- V1: C.2 Analyze data sets using graphs and summary statistics.
MATHEMATICS ELPS

• 74.4 -3.D speak using grade-level content area vocabulary in context to internalize new English words and build academic language proficiency;

• 74.4 -3.E share information in cooperative learning interactions;

• 744 -4.J demonstrate English comprehension and expand reading skills by employing inferential skills such as predicting, making connections between ideas, drawing inferences and conclusions from text and graphic sources, and finding supporting text evidence commensurate with content area needs;
MATHEMATICS SWBATS

• Create graphs over the following countries population before the Black Death occurred, using percentages and the years: Europe, Germany, France, England and Italy.

• Orally communicate these percentages and the years evaluated to describe the differences in populations amongst these countries.

• Figure out more or less using the percentages and the population of the countries, the amount of people that died. (An estimate)

• Figure out how many people will die today in the United States and Europe, using the percentages from the Black Death and the population as of 2016.

• Depict which mechanism of disease (bubonic, pneumonic, or septicemic) is most or least fatal using statistics.

• Do research on the different antibiotics and which ones based off statistics will be most effective for someone with Yersinia Pestis.
MATHEMATICS POLL

Center for Disease Control and Prevention- Plague (TEKS6)
http://www.cdc.gov/plague/

History and Spread of Plague (TEKS2)

Yersinia pestis- Virulence Factors (TEKS3)

TedEd- The Past, Present and Future of the Bubonic Plague (TEKS4)

Antibiotic Susceptibilities (TEKS1)
http://jac.oxfordjournals.org/content/52/6/1029.full
RESOURCE BANK: MATHEMATICS

• Epidemics of the past

• Plague

• Your 60-second guide to the Black Death

• Black Death
  https://en.wikipedia.org/wiki/Black_Death

• Countries in the world by population (2016)
  http://www.worldometers.info/world-population/population-by-country/

• Three different mechanisms of disease

• Antibiotic effectiveness calculator
  http://www.endmemo.com/bio/antibiotic.php
DEVELOPING A RESOURCE BANK

Our resources are focused on the objectives that will be taught. All resources are scholarly sources and up to date!

We tried to use resources that would help give the students a better understanding of the Black Death.

We chose resources that would give facts needed to complete in class assignments.

The resources used are to get students excited about learning as well.
HOW STUDENTS WILL USE THE RESOURCE BANK AS A MEANS OF ACCOMPLISHING UNIT OBJECTIVES

• Students will be visiting the library on the third day in order to utilize the resources provided. (ex. Math will be using the antibiotics website)

• The resource bank will be used throughout the lesson by displaying videos for students to have a visual understanding of the material.

• Students will receive a printed resource bank from both their math and science teacher in order to have available and reliable sources from home.
BENEFITS OF INTERDISCIPLINARY UNIT OF INSTRUCTION

- Students will be able to form connections between subjects.
- Repetition of material will help them understand better.
- Introduce a “real world” problem to get them excited!
- Students have three days to cover and master material.
- Since it is a three day lesson students will gain more knowledge and information than if everything was tried in one day.
TECHNOLOGY’S ROLE

- Will facilitate understanding (Ex. videos & documentaries)
- Provide a wide range of resources and quickly
- Great resource for visual learners