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## Pathogen Transmission Rates

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Grade Level: 9<sup>th</sup> Grade

Subject / Content area: **Integrated Algebra / Living Environment**

Unit of Study: **Exponential Rates / Immune System**

Lesson Title: **Pathogen Transmission Rates**

**Central Focus for the learning segment: (Challenge Question)**

**Students will understand how disease outbreaks occur and how to prevent them.**

**Central Focus for the lesson:**

**Students will examine how different mode of transmission effect the rate of infection**

**Content Standard(s):** NYS CCLS or Content Standards

***Mathematics:***

**A.R.1 Use physical objects, diagrams, charts, tables, graphs, symbols, equations, or objects created using technology as representations of mathematical concepts**

**A.CM.4 Explain relationships among different representations of a problem**

**A.CN.5 Understand how quantitative models connect to various physical models and representations**

***Living Environment:***

**Standard 1.3.1: Interpretation of data leads to explanations of natural phenomena**

**Standard 4.5.2h: Disease can be caused through various modes of transmission**

**Learning Objectives** associated with the content standards:

- **Students can locate interpret and process research from Centers for Disease Control and Prevention (CDC.gov) about four diseases**
- **Students experiment with modeling four different methods of pathogen transmission.**
- **Student explain relationships and variances among the different models.**
- **Student examine how excel worksheets and graphs connect to the AgentSheets models.**

**Instructional Resources and Materials** to engage students in learning:

*What the teacher needs for this lesson:*

**SMART board, calculators, Pathogen Transmission worksheet, computer, AgentSheets Models, Excel Worksheet**

*What the Student needs for this lesson:*

**Pathogen Transmission worksheet, computer, calculator, writing instrument, AgentSheets Models, Excel Worksheets**

**Instructional Strategies and Learning Tasks** that support diverse student needs. (Include what you and students will be doing.):

**Teacher actions:**

*What will you do to engage students?*

**Guide student navigation through website and research**

**Connect learning segment to prior learning**

**Provide time in class for students to discuss results and compare observations**

**Ask questions and connect learning segments to reinforce concepts**

**Student tasks:**

*What will the students be doing?*

- **Completing guiding questions provided on Pathogen Transmission Worksheet**
- **Asking and answering questions**
- **Research assigned disease on CDC.gov to determine method of transmission**
- **Experiment with their prescribed pathogen on the AgentSheets model**
- **Explain relationships and variance among the different models**
- **Examine the results of the AgentSheets model on graphs**

*How will students apply and practice what they have learned?*

**Groups will relate their findings through collaboration with other groups. Concluding with presentations of all the findings.**

*Will students work with partners or in groups? How are partner/groups formed?*

**Students will work in groups at assigned computer stations. Groups will be assigned by ZPD and composed of learners with differentiated skill sets.**

**Differentiation and planned universal supports:**

**Using Vygotsky's Zone of Proximal Development students will be paired with students of higher or lower skill sets. This support will enable students to collaborate and learn from those who have different skill sets than themselves.**

**Language Function students will develop:**

*Additional language demands:*

**Experiment, Explain, Examine, Interpret**

*Language supports:*

**Pathogen Transmission Worksheet**

**Type of Student Assessments and what is being assessed:**

- **Informal Assessment:**
  - **Pathogen Transmission Worksheet**
  
- **Formal Assessment:**
  - **Presentation to class**

**What is being assessed?**

- **Explanation of the relationships and variances between the AgentSheets models**
- **Interpretation of connections between graphs and AgentSheets models**
- **Accuracy of researched data**
- **Presentation quality**
  
- **Modifications to the Assessments:**
  - **Extended time for struggling students**
  - **Extension for further learning by examining other models**

**Evaluation Criteria:**

**Pathogen Transmission Worksheet is evaluated by checking their answers for completeness and effort.  
Presentation will be taken for a grade in the grade book**

**Relevant theories and/or research best practices:**

**Vygotsky's Zone of Proximal Development (ZPD)**

**STAR Legacy Learning Cycle**

**Lesson Timeline: *How will you organize your instructional time?* **Legacy Learning Cycle****

**First segment (Authentic Problem):**

- **Students will read article ( <http://fox8.com/2014/06/21/ohio-has-largest-measles-outbreak-in-u-s-in-20-years/> ) and be exposed to the need know about outbreaks in airports.**

**Second segment (Idea Genesis):**

- **Students will collaborate and brainstorm answering the Pre-assessment part of the Pathogen Transmission Worksheet.**

**Third segment (Multiple and Expert Perspectives):**

- **Students will be assigned group of three based off ZPD. Students will navigate through the CDC.gov website to discover their assigned diseases' mode of transmission and other relevant information. Also students will be answering the Activity section of the Pathogen Transmission Worksheet.**

**Fourth segment (Research and Revise):**

- **Student will be introduced to the mechanics of AgentSheets by the instructor. In groups, students will experiment with the various AgentSheets worksheets specific to their assigned mode of transmission. Also students will be answering the Activity section of the Pathogen Transmission Worksheet.**

**Fifth segment (Test Your Mettle):**

- **Students will import their AgentSheets data into Excel. After data is imported students will use Excel application to create and analyze a graph on the rate of transmission. Also students will be answering the Conclusion section of the Pathogen Transmission Worksheet.**

**Sixth segment (Go Public!)**

- **Students will present their findings to the other groups. Resulting in all groups having a greater understanding of modes of transmission of diseases.**