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| **Lesson Title: How do you kill something that isn’t alive?** | **Unit #:**  1 | **Lesson #:**  2 | **Activity #:**  4 |
| **Activity Title: Staying Alive…Life is Complicated!** |

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| **Estimated Lesson Duration:** | **9 days** |
| **Estimated Activity Duration:** | **4 days** |

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| **Setting:** | **Classroom, school grounds** |

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| **Activity Objectives:** |

The student will be able to:

* List the characteristics of living things.
* Explain homeostasis and provide an example.
* Compare eukaryotes, prokaryotes, and viruses in terms of size, reproduction/replication, energy use, heredity, and homeostasis.
* Define pathogen and provide examples.
* Define the terms abiotic and biotic and provide examples.

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| **Activity Guiding Questions:** |

* How big are viruses and bacteria?
* Are viruses and bacteria alive?
* How can we “kill” viruses and bacteria?
* What is the difference between human cells and bacterial cells and viruses?
* How do cells reproduce?
* How big are cells and viruses?
* Where do cells get their energy?
* What are the common causes of illness?
* What is a pathogen?
* How does illness spread?
* How do abiotic factors affect homeostasis?

| **Next Generation Science Standards (NGSS)** | |
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| **Science and Engineering Practices (Check all that apply)** | **Crosscutting Concepts (Check all that apply)** |
| ☒ Asking questions (for science) and defining problems (for engineering) | ☐ Patterns |
| ☐ Developing and using models | ☒ Cause and effect |
| ☒ Planning and carrying out investigations | ☐ Scale, proportion, and quantity |
| ☒ Analyzing and interpreting data | ☐ Systems and system models |
| ☐ Using mathematics and computational thinking | ☐ Energy and matter: Flows, cycles, and conservation |
| ☐ Constructing explanations (for science) and designing solutions (for engineering) | ☒ Structure and function. |
| ☐ Engaging in argument from evidence | ☐ Stability and change. |
| ☒ Obtaining, evaluating, and communicating information |  |

| **Ohio’s New Learning Standards for Science (ONLS)** |
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| **Expectations for Learning - Cognitive Demands (Check all that apply)** |
| ☒ Designing Technological/Engineering Solutions Using Science concepts **(T)** |
| ☒ Demonstrating Science Knowledge **(D)** |
| ☐ Interpreting and Communicating Science Concepts **(C)** |
| ☐ Recalling Accurate Science **(R)** |

| **Common Core State Standards -- Mathematics (CCSS)** | |
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| **Standards for Mathematical Practice (Check all that apply)** | |
| ☒ Make sense of problems and persevere in solving them | ☒ Useappropriate tools strategically |
| ☐ Reason abstractly and quantitatively | ☐ Attendto precision |
| ☐ Construct viable arguments and critique the reasoning of others | ☒ Look for and make use of structure |
| ☐ Model with mathematics | ☐ Look for and express regularity in repeated reasoning |

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| **Unit Academic Standards (NGSS, ONLS and/or CCSS):** |

Cells:

• Eukaryotic cells and prokaryotic cells

• Characteristics of life regulated by cellular processes

• The essential functions of cells involve chemical reactions that involve water and carbohydrates, proteins, lipids and nucleic acids

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| **Materials**: (Link Handouts, Power Points, Resources, Websites, Supplies) |

* Unit Power Point
* Computers
* Poster Paper
* Markers
* Glue Sticks
* Construction Paper

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| **Teacher Advance Preparation:** |

* Make Administrators and Custodians aware of the assignment
* Schedule custodian and administrator into classroom

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| **Activity Procedures:** |

Day 15: Improving the School Environment

* Final Observation of petri dishes
* Warm-up: List one school facility or procedure that could be changed to decrease the spread of pathogens. Explain why it would have an effect.
* Share answers with team mates.
* Set expectations: Team members are to stay together, students are to not disrupt classes by gathering information quietly. Teams are to take notes, including illustrations when appropriate, while surveying school grounds. Questions regarding procedures and facilities should also be recorded.
* Make a list of the places you plan to investigate in order to gather information, get approved by teacher.
* 20 minutes to investigate school grounds, make a list of possible recommendations, prepare to interview an administrator or custodian to investigate if the recommendation is feasible. Write questions to ask during interview.
* Interview administrator and custodian in regards to feasibility. Make list of questions that need to be answered by someone other than the administrator and custodian (ex: central office, school board). Email appropriate individual to get answers.

Day 16: Define the problem

* Teams choose one facility or procedure to improve.
* Individuals list 3 ideas for improvement.
* Teams select 1 to implement.
* Write a proposal: Explain the need for the change, propose the change to be made, and explain the design of the change. Use the rubric provided.

Day 17: Share solutions.

* Teams present proposals to the class.
* Feedback is provided/ redesign
* Create a public campaign to share solutions and gain school community buy in.
* Use the project rubric provided.

Day 18: Final Product

* Teams present campaign.
* Feedback is provided/redesign
* Final product is turned in.
* Class votes on the campaign and strategy to present to the school community.
* Students will track the implementation throughout the school year through attendance data and student hygiene surveys.

Post- test tomorrow.

**Summative Assessments:** These are optional; there may be summative assessments at the end of a set of Activities or only at the end of the entire Unit.

10 question Post test

Final product for Challenge: Campaign to share with the school community.

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| **Differentiation:** Describe how you modified parts of the Lesson to support the needs of different learners.  Refer to Activity Template for details. |

* Written directions provided along with verbal directions.
* Teams are grouped heterogeneously.
* Assistance from lead teacher and instructional specialist.
* Rubrics provided for proposal and campaign

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| **Reflection:** This lesson was very successful. The groups did a fantastic job of preparing to interview our facilities administrator who came to our classroom halfway through the bell. The groups came up with ideas that ranged from changing how the students line up for lunch, to how lunch trays are distributed and where hand sanitizer dispensers should be located. The groups were excited to share their final recommendations and ideas for communicating with the student body. The majority of the groups created posters, which need improvement before hanging up around school grounds, while others wrote announcements and newsletters. In the future I will require all groups to create an infographic using free online resources and to write an announcement. I would also require all groups to address aspects of personal hygiene beyond hand washing. |