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| **Lesson Title: How do you kill something that isn’t alive?** | **Unit #:**  1 | **Lesson #:**  2 | **Activity #:**  3 |
| **Activity Title: Staying Alive…Life is Complicated!** |

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| **Estimated Lesson Duration:** | **9 days** |
| **Estimated Activity Duration:** | **5 days** |

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| **Setting:** | **Classroom, LMIC (Libraray Media Information Center)** |

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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?
* What are the common causes of illness?
* How does illness spread?
* What does abiotic mean?
* What does it mean to be alive?
* How do organisms stay alive?
* How do organisms obtain energy?

| **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) |

* Access to LMIC
* Handout: expectations and guiding question development.
* Power Point to be created by teams
* Feedback Form
* [www.cellsalive.com](http://www.cellsalive.com)

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| **Teacher Advance Preparation:** |

* Copy Handouts
* Collaborate with Librarian to prepare for student research
* Collaborate with instructional specialist and schedule for research
* Make a list of possible guiding questions.

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| **Activity Procedures:** |

Day 11: Research Characteristics of life.

* Warm-up Question: How do you know if something is alive?
* Toss answers to share. Assemble list on board. Discuss to narrow down and add to list.
* Introduce research assignment/set expectations pass out handout.
* One member of each team will research eukaryotes, another prokaryotes, and the third prokaryotes.
* Teams will combine the information into a 6 slide Power Point that will be presented on day 5.
* Teams will work to write Guiding Questions for the activity. Questions will be shared out. Class will agree on which should be answered in the power point.

How do they reproduce? How do they maintain homeostasis? How do they obtain energy? How do they pass on hereditary information? How big are they? Where do you find them?

* Move Class to the LMIC. Remind to meet there tomorrow.

Day11 and 12: LMIC Research

* Remind students of expectations: Individuals are researching but are to collaborate with team to create a 6 slide Power Point with findings. Suggest to use Google docs to work on power point together.
* Remind of list of helpful websites on yesterday’s handout.
* Power Point due by the end of the bell day 12.

Day 13 and 14: Present LMIC Research

* Teams present.
* Notes taken, misconceptions addressed
* If time allows at the end of presentations Brainstorm: How can we use this information to help us with our challenge?
* Homework: A pathogen is any agent that causes disease. Provide an example of a pathogenic eukaryote, prokaryote, and virus.

**Formative Assessments:** Link the items in the Activities that will be used as formative assessments.

* Four Point Rubric warm up question at start of class day 11: How do you determine if something is alive?
* Homework Day 14: Provide example of pathogens.
* Research presentations
* Research guiding questions notes

**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.

Power Point presentation and note taking

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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.
* Allow students from different teams researching the same topic to work together (Peer Tutoring)
* List of helpful websites provided for slow starters.
* Assistance from librarian, lead teacher, and instructional specialist.
* Note taking handout

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| **Reflection:** This lesson took 2 days more than I originally planned. The introduction of the lesson and coming up with guiding questions took an entire bell. The groups needed 2 bells to research answers to the guiding questions. I collaborated with our Librarian to create a wiki page that had the rubric, guiding questions, and resources for research. The groups that used the suggested on-line resources found accurate reliable information and had successful presentation. The groups who “Googled” everything were not as successful because of using inaccurate/unreliable information. This became evident during presentations. I found this lesson to be very successful as groups who had accurate information were able to catch misinformation and offer corrections. All groups researched the same topics but not all groups provided exactly the same information, some when more in depth while others did the bare minimum. The repetition of information allowed students to take thorough notes, and misinformation allowed for a chance to address misconceptions. |