Providing Pathways to Excellence for Each Student

**Biology**

**Unwrap a Standard: *What do students have to know and be able to do?***

**Strand:** Life at the Systems and Organisms Level

**Strand/Reporting Category Weight:** 24.4% of SOL items

**Standard:** BIO.4 (a – d)

The student will investigate and understand that bacteria and viruses have an effect on living systems. Key ideas include

1. viruses depend on a host for metabolic processes;
2. the modes of reproduction/replication can be compared;
3. the structures and functions can be compared;
4. bacteria and viruses have a role in other organisms and the environment; and
5. ~~the germ theory of infectious disease is supported by evidence.~~

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| --- | --- | --- | --- |
| **Emerging (1)** | **Developing (2)** | **Proficient (3)** | **Distinguished (4)** |
| I can identify and explain in simple terms how viruses infect host organisms. | I can use evidence to support the description of bacteria as living and viruses as nonliving. | I can compare a virus and a bacterium in relation to genetic material and reproduction.  I can examine effects of bacteria and viruses on human health. | I can apply my understanding of bacteria and viruses to suggest a solution to a real-life health issue. |

**Achievement/Performance Level Descriptors**

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| **Building Background Knowledge and skills: Flashback Standard**  Standard:  **LS.3** The student will investigate and understand that there are levels of structural organization in living things. Key ideas include  a) patterns of cellular organization support life processes;  b) unicellular and multicellular organisms have comparative structures; and  c) similar characteristics determine the classification of organisms. |

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| **Extending Knowledge and skills: Preview Standard** |

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| **Essential Knowledge/Concepts**  ***What Do Students Need to Know/Understand?***  **List the underlined nouns.**  **Bacteria Diverse Structure Virus Protein**  **Living Systems Reproduction/Replication**  **Organism Host Organism Infection**  **DNA RNA Nucleic Acid Core Lytic Cycle** | **Essential Skills**  ***What Do Students Need to Be Able to Do?***  **List the circled (or *italicized*) verbs.**  **Identify Investigate Explain Justify**  **Examine Compare Apply** |
| **DOK Level**  **Level of content complexity rather than content difficulty.**  **DOK 1 DOK 2 DOK 3** |
| **WONDER Questions**  ***How can we capture student wonder?***  **\*Including open-ended and ‘second’ questions**   * In what ways do bacteria play an important role in the global ecosystem? * What is a virus that currently is circulating among the human population of the world? how can we protect ourselves from this virus? | **Essential Vocabulary**  ***What Do Students Need to Comprehend?***  **List all key vocabulary**  **Bacteria Virus Host Organism**  **Reproduction/Replication West Nile**  **Ebola COVID influenza DNA**  **RNA Vaccine Lytic Cycle Nucleic Acid**  **Microbial Predators Protein Coat** |
| **Learning Objectives aligned to the Standard**  ***What ‘I can’ statement(s) will clarify the objective for students?*** | |
| **Evidence of Student Mastery?**  ***How will we know when they know it?***  ***How will we encourage each student to try?*** | |
| **Specific Instructional Framework?**  ***What will we do to help them know/understand/can do it?***  ***What will we do for students who still don’t know it?***  ***What will we do for students who already know it?*** | |

**Items for the Flashback Standard and each Performance Level Descriptor**

**Alignment to SOL BIO.4.0 (DOK 1) (*Flashback SOL LS.3*)**

1. List the following microscopic items from smallest (top) to largest (bottom)

|  |  |  |
| --- | --- | --- |
| Grain of Salt |  |  |
| Water Molecule |  |  |
| Influenza Virus |  |  |
| Skin Cell |  |  |
| Hemoglobin |  |  |

**Alignment to SOL BIO.4.1 (DOK 1)**

1. Kizzmekia Corbett is an American scientist credited with much of the work in developing a COVID-19 vaccine.

Her team is investigating a specimen in a laboratory. They are attempting to determine whether it is a virus or not. Which of the following would allow her to conclude it is a virus?

Circle your choice.

|  |  |  |
| --- | --- | --- |
| The specimen contains DNA and RNA |  | The specimen is extremely small. |
|  |  |  |
| The specimen has a protein coat. |  | The specimen has no organelles. |

**Alignment to SOL BIO.4.2 (DOK 2)**

1. Complete the Venn Diagram regarding applications of bacteria. Place each of the following in the graphic organizer to make the Venn Diagram true.

|  |  |  |
| --- | --- | --- |
| Biotechnology |  | Fermentation |
|  |  |  |
| Recycling of elements in the environment |  | Making bread soft and fluffy |

**Uses of Bacteria**

**Alignment to SOL BIO.4.2 (DOK 2)**

1. **Part A.** Identify each organism as either Virus (V) or a Bacteria (B)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Flu |  |  | AIDS |  |
| Bad Breadth |  |  | Yogurt |  |
| Common Cold |  |  | Warts |  |
| Ebola |  |  | Strep Throat |  |

**Part B.** List one trait shared by all the organisms identified as a virus.

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**Part C.** List one trait shared by all the organisms identified as a bacterium.

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**Alignment to SOL BIO.4.3 (DOK 2)**

1. Explain in detail, how bacteria can be useful in humans.

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**Alignment to SOL BIO.4.4 (DOK 3)**

1. **Part A.** Name three diseases that cannot be cured by antibiotics.

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**Part B.** Explain why antibiotics do not work against them.

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**My Personal Goals Chart** (to be included in each student’s notebook)

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| **Success Criteria** | **Getting Started** | **On My Way** | **I’m There** | **Things to Remember** |
| I can identify and explain in simple terms how viruses infect host organisms. |  |  |  |  |
| I can use evidence to support the description of bacteria as living and viruses as nonliving. |  |  |  |  |
| I can compare a virus and a bacterium in relation to genetic material and reproduction. |  |  |  |  |
| I can examine effects of bacteria and viruses on human health. |  |  |  |  |
| I can apply my understanding of bacteria and viruses to suggest a solution to a real-life health issue. |  |  |  |  |

Guided Group Lesson Date:

**SOL BIO.4(a-d):** The student will investigate and understand that bacteria and viruses have an effect on living systems. Key ideas include

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| --- | --- | --- | --- | --- |
| Group Members | Emerging | Developing | Proficient | Distinguished |
|  |  |  |  |

Warm-Up:

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| With your partner, complete a *Where Do I Belong* chart to sort the following organisms into those that are viruses and those that are bacterium. Include a discussion of the criteria used to categorize the organisms. |

Vocabulary

**Bacteria Virus Host Organism**

**Reproduction/Replication West Nile Ebola COVID influenza**

**DNA RNA Vaccine Lytic Cycle Nucleic Acid**

**Microbial Predators Protein Coat**

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| --- | --- | --- | --- |
| Emerging | Developing | Proficient | Distinguished |
| Lesson focus:  With your partner, create a ‘*What’s My Rule?*’ for Viruses and a ‘What’s My Rule?’ for Bacterium. Prepare to share with another team and to justify the categories in your chart. | Lesson focus:  Imagine you are a germ, why would it be important for you to evolve? | Lesson focus:  Research the function of each of the adaptive immune system’s components. Work with your group to create a simple graphical model that explains the adaptive immune system. | Lesson focus:  You have been selected to deliver a TED Talk. Your topic is: ‘How does influenza virus change to cause a pandemic?’  Prepare a script, including a justification of your talking-points. |

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| **Observations:** |  | **Next Steps:** |
| What you notice about your students during small group instruction. | What will you do with these students next? change groups, repeat, etc. |