

## Sample Assessment Tasks for MS-LS1-1

<b>MS-LS1-1</b>	<b>Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. [Clarification Statement: Emphasis is on developing evidence that living things are made of cells, distinguishing between living and non-living things, and understanding that living things may be made of one cell or many and varied cells.]</b>
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### Overarching Question for the Unit

*How can one explain the ways cells contribute to the function of living things?*

### Elements of the DCIs:

- All living things are made up of cells, which is the smallest unit that can be said to be alive.
- An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular).
- Students will tell the difference between living and nonliving things.

### Crosscutting Concepts:

- **Cause and Effects: Mechanisms and Prediction:** Cause and effect relationships may be used to predict phenomena in natural or designed systems
- **Scale, Proportion, and Quantity:** Phenomena that can be observed at one scale may not be observable at another scale.

### Science and Engineering Practices

- **Planning and Carrying out Investigations:** Conduct an investigation and/or evaluate and/or revise the experimental design to produce data to serve as the basis for evidence that meet the goals of the investigation.
- **Constructing Explanations:** Apply scientific ideas, principles, and/or evidence to construct, revise and/or use an explanation for real world phenomena, examples, or events.
- **Engage in Argument from Evidence:** Construct, use, and/or present an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.

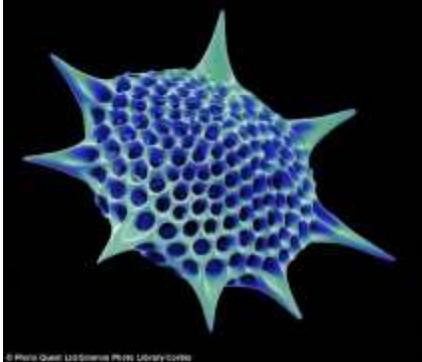
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## TASK 1:

You are a marine biologist studying invasive species in the Raritan Bay. Invasive species are accidentally carried in bilge water of container ships. When a ship pumps out the water, the organisms are introduced into the bay.

As you were examining a recent water sample under a microscope, you observed the following unknown object (See Figure 1). Because this is an unknown object, you need to isolate it and determine if it is a threat to the Raritan Bay ecosystem. You place the sample in a container filled with salt water and place it under artificial sunlight. Over the next two weeks you measure the dissolved oxygen in the water and its temperature.

Figure 1: Unknown Species (size 0.75um)



### Dissolved Oxygen Data

Sample	SatDO	Temp (°C)
Day 1	8	19
Day 2	8.1	20
Day 3	8.3	20
Day 4	8.6	20
Day 5	8.9	20
Day 6	9.2	20
Day 7	9.4	20
Day 8	10	20
Day 9	10.1	20
Day 10	10.1	20
Day 11	10.1	20
Day 12		20
Day 13		20
Day 14		20

### Running Records from Day 14

*There are now 200 objects in the sample*

*The objects vary in size*

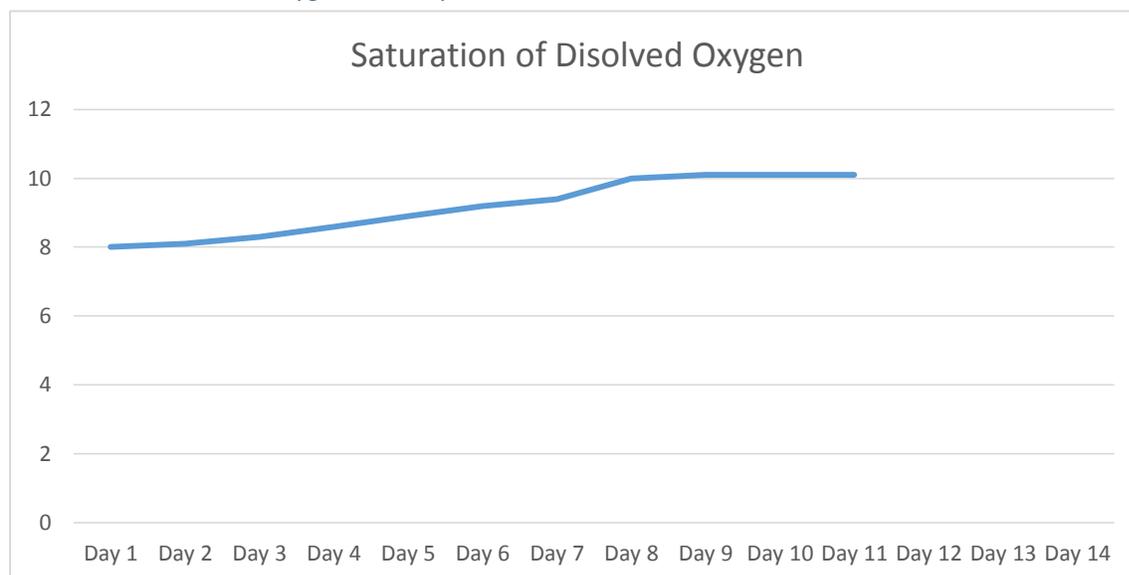
*Water temperature is stable*

*DO sensor has not collected data since Thursday.*

*Artificial sunlight is also not functioning. Apparently the DO sensor and light are plugged into the same surge protector which has been unplugged from the wall.*

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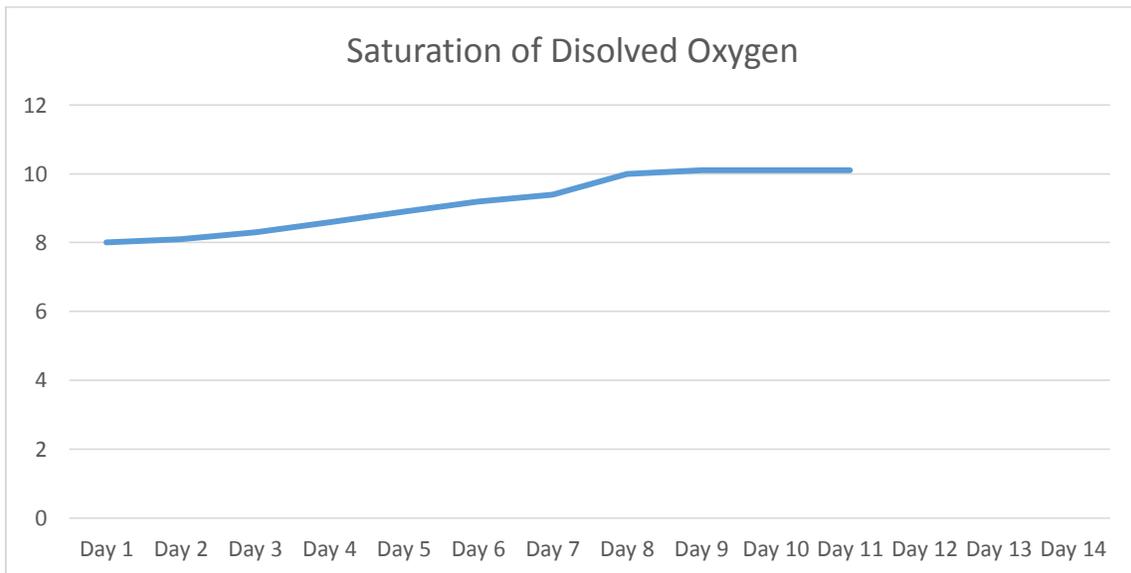
Data Table 1: Dissolved Oxygen in Parts per Million over Time



1. Placing a ship in quarantine and sterilizing bilge water is very expensive and time consuming. Before you make any decisions, you need to be absolutely sure that the unknown substance is living or non-living. Evaluate the experimental design to determine if it will produce sufficient data to serve as the basis for evidence needed to determine if the unknown sample is a threat to the local ecosystem (living). Briefly describe the strengths of the design and how/why it needs to be modified.
2. What can you **claim** regarding the unknown substance? Is it living or non-living?
3. What are two pieces of **evidence** that you collected that support your claim?
4. Share your **reasoning** for how the evidence supports your claim. Be sure to include scientific principles to support your reasoning.

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5. On day 14, you noticed that the dissolved oxygen sensor and light are broken. Predict how the graph would look if the data were to be uninterrupted. Draw a line on the graph, below, to represent your prediction.



6. Support your prediction by describing cause and effect relationships in the data.



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### TASK 3:

Anthropologists from the Newark Museum discovered a sealed pot while exploring an ancient pueblo in Arizona. In the pot, they found a tan substance that they had never found before (See Figure 1). Their first question was “Is it alive?”

Figure 1: Unknown Tan Substance from a Sealed Pot



In order to answer the question, they performed the following investigation.

Step 1: Place 5 grams of the substance and 20 ml of warm water into four sterilized water bottles.

Step 2: Place 1 gram of table sugar in bottle #2, 2 grams of table sugar in bottle #3, and 4 grams of table sugar in bottle #4. Bottle #1 did not have table sugar added.

Step 3: Place a non-latex balloon over the top of each bottle and shake gently.

Step 4: Measure the radius of the balloon each hour for 24 hours.

Step 5: At the end of the 24 hours, add Benedict's solution to determine if sugar is present in the solution.

Figure 2: Picture of Samples at Hour 12 of the Experiment



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Data Table:

	<b>Time elapsed</b>	<b>Bottle #1</b> (Control) 1 mL Substance A NO sugar	<b>Bottle #2</b> 1 mL Substance A 1 g sugar	<b>Bottle #3</b> 1 mL Substance A 2.g sugar	<b>Bottle #4</b> 1 mL Substance A 5 g sugar
Froth (bubbliness)	<b>Start</b>	none	none	none	none
	<b>24 hours</b>	none	a tiny bit	some froth	very frothy
Balloon inflation	<b>Start</b>	not at all	not at all	not at all	not at all
	<b>24 hours</b>	not at all	a little bit	more inflated	the most inflated
Presence of Glucose (yes or no)	<b>Start</b>	no	yes	yes	yes
	<b>24 hours</b>	no	no	no	no

Figure 3: Image of Water Sample from Bottle # 3 (100 X Magnification)



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1. Based on evidence from the experimental data and your observations of all the photos write an argument for one of the following claims:
  - a) The unknown substance A is not alive.
  - b) The unknown substance A is alive.
2. Cite the evidence that you used to make your claim.
3. Share your reasoning and scientific principles to justify your claim.
4. What evidence could the scientists have collected if they had access to a more powerful microscope when they found the mystery substance?

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### TASK 4:

#### Is it alive?

Students are provided multiple samples of commonly found objects and asked to collect evidence to determine if the object is alive, once alive, or non-living.

1. In the space provided, construct a decision tree that can be used when determining if something is living, once alive, or non-living. The decision tree must be based on the scientific principles of Cell Theory.
  
  
  
  
  
  
  
  
  
  
2. Using your decision tree and the resources provided at each station, make a claim about the sample. The claim needs to include your **claim**, the **evidence** you used to make the claim, and your **reasoning** for how the evidence and scientific principles support your claim.

#### *Teacher Note:*

*Station 1: (mystery sample is algae)*

*Station 2: (mystery sample is hair)*

*Station 3: (mystery sample is a burning candle)*

*Station 4: (mystery sample is a coal)*

*Station 5: (mystery sample is a stained onion cell)*

*Station 6: (mystery sample is a fern leaf)*