| -Standard 6.4.1 Learning Episode 4 | |
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| **Title:** Water Data Analysis Questions | **Overview:** Students will create scientific questions that include variables that can be graphed and analyzed. |
| **Overarching Performance Expectations (Standard):**<br>**SEEd -6.4.1** Analyze data to provide evidence for the effects of resource availability on organisms and populations in an ecosystem. Ask questions to predict how changes in resource availability affects organisms in those ecosystems. Examples could include water, food, and living space in Utah environments.<br>**Math Standard 6.EE.9**<br>Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. | |
| **Lesson Performance Expectation** Students will ask testable questions that can be graphed and analyzed using independent and dependent variables.<br>**CCC:** patterns, cause and effect<br>**SEP:** Analyzing and Interpreting Data, Asking questions | |

| GATHER | |
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| **Student Purpose**<br>1. In science journals students do a pre-write describing what they think the **difference** is between a scientific and nonscientific question.<br>2. Ideas from pre-write are listed on the board under labels scientific and nonscientific. | **Teacher Guidance**<br>1. Give the students time to do a pre-write to describe what they think the difference is between a scientific and non-scientific question.<br>2. On the board create a chart labeled scientific and nonscientific to list student ideas. |
| **Teacher Preparation:** | |
| **Management Strategies:** https://teachingcenter.wustl.edu/resources/teaching-methods/discussions/discussion-strategies/ Look at the 5-Minute Informal Writing in Response to a Question strategy. | |

| REASON | |
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| **Student Purpose**<br>1. Students use sticky notes 1 per group to write a question they think the field scientist had that led to the collection of data for the graphs they have just studied. Teacher reads the questions | **Teacher Guidance**<br>1. Pass out sticky notes to groups. Have students write a question they think the field scientist asked when collecting data for the water chemistry graphs recently reviewed by students. |

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| collected, students decide which label fits the question type, scientific or non- scientific.<br>2. As scaffolding students will watch the slideshow/s for background on how to construct questions that are scientific and testable (include independent and dependent variables).<br>3. Students discuss which questions are testable and which are not testable.<br>4. Students decide if questions need to be re-organized on board. They select the ones that best fit the graphs. | Assign graphs accordingly, groups 1&2 Graph 1, groups 3&4 Graph 2, groups 5& 6 Graph 3<br>2. Collect questions and read them. Place questions under headings (scientific, non-scientific) as directed by the class.<br>3. Show slide show to present criteria that is specific to a scientific question. *see teacher preparation box for web links<br>4. Decide if any questions need to be moved, select the question that best matches the graph by referencing independent and dependent variable correctly. |
| **Teacher Preparation:** Students will need Water Data Graph Analysis Sheets to reference. Give each group sticky notes, have slideshows loaded and ready to present one or all depending on what background students need.<br>https://www.slideshare.net/emteacher/science-questions<br><br>https://www.monroecti.org/cms/lib07/PA03000492/Centricity/Domain/37/variables.pdf | |
| **Management Strategies**<br>This video gives background for how to write scientific questions with independent and dependent variables. This introduces students to variables and graphing if incorporating Math standard 6.EE.9<br>https://www.youtube.com/watch?v=OsX3W_mT0XI | |

| **COMMUNICATE** | |
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| **Student Purpose**<br>1. Pass out exit slips. Have students refer to their student field data table from episode 2 as a reference.<br>2. Students will write 2 testable questions they would use to guide the construction of a graph representative of field data patterns and/or cause and effect relationships.<br><br>3. Students turn in exit slip questions. These questions will guide the making of groups who will create graphs to determine the relationships between factors measured in the field. | **Teacher Guidance**<br>1. Pass out exit slips. Have students refer to their student field data table from episode 2 as a reference.<br>2. Direct students to write 2 testable scientific questions that incorporate the field data.<br>Provide examples students could ask.<br>General questions might be:<br>• What are the relationships between the nonliving and living parts of the river?<br>• Do the relationships between these parameters change further downstream or in relation to land uses near the stream?<br>• How do these relationships change |

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| | seasonally? Monthly?<br>More specific:<br>• Does temperature change over time?<br>• What is the relationship between oxygen and temperature?<br>• What is the amount of pH at each site? Does this change over time?<br>• Does weather effect turbidity?<br>• Are water and air temperature related? |
| **Teacher Preparation**<br>Students will need Student field data sheets<br>Copies as needed of exit slips (students may write answers in journals). | |
| **Management Strategies**: To help students who are struggling students can be paired together for the next episode. Collect questions and sort question types so that 2-3 people are in a group based on a question they asked. These students can help one another to select the appropriate data related to their question and how to analyze it. | |

Standard 6.4.1: Learning Episode 4
Water Data Analysis Questions

Name _____

# Exit Slip: Scientific Questions you could ask and graph

- ✓ Look at the Water Field Data Sheet.
- ✓ Create scientific questions that can be inferred by graph analysis.
- ✓ Write down 2 testable questions that can be graphed.

**Question 1:**

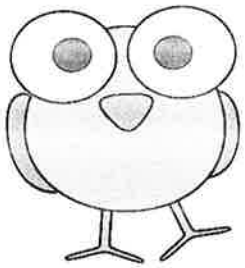
**Question 2:**

Need some help getting started? You can use these question frames:

- What causes _____?
- Why does _____ happen when _____?
- What would happen if _____?
- How does _____ affect _____?
- How do(es) _____ contribute to _____?

(6.4.1) Learning Episode 3 Water Data Analysis

Exit Slip: Scientific Questions you could ask and graph



Look at the 6th grade Pineview Reservoir data. Create scientific questions that can be inferred by graph analysis.

Write down 2 testable questions that can be graphed.

Question 1:

Does The tempeture effect the level of oxegin

Question 2:

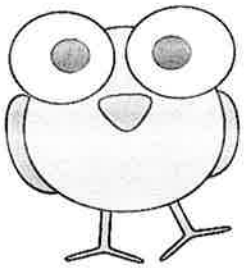
Does the color matter of the Age

Need some help getting started? You can use these question frames:

- What causes _____?
- Why does _____ happen when _____?
- What would happen if _____?
- How does _____ affect _____?
- How do(es) _____ contribute to _____?

(6.4.1) Learning Episode 3 Water Data Analysis

Exit Slip: Scientific Questions you could ask and graph



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Look at the 6th grade Pineview Reservoir data. Create scientific questions that can be inferred by graph analysis.

Write down 2 testable questions that can be graphed.

Question 1:

How much does the water temp. chang every 2 weeks?

Question 2:

How does the air temp chang the water temp?

Need some help getting started? You can use these question frames:

- What causes _____?
- Why does _____ happen when _____?
- What would happen if _____?
- How does _____ affect _____?
- How do(es) _____ contribute to _____?