My NASA Data - Lesson Plans

Data Literacy Cube: Graph Data using Soil Moisture Data

Overview

Use the Data Literacy Cubes to guide students’ exploration of data to enrich their observations and inferences. This is a flexible resource that may be used with a variety of graphical representations of data. This activity requires a graph for students to evaluate. For the purposes of this lesson, students will analyze a graph of the Monthly Soil Moisture of the Mojave National Preserve, south of Las Vegas, NV shown in mm.

Learning Objectives

- Observe and interpret physical characteristics of the Earth System using graphs of NASA data
- Characterize the independent and dependent variables
- Analyze graphs values with statistics
- Research how the phenomena changes of time and space
- Identify relationships among variables
- Summarize trends in the data
Essential Questions

- How are the data represented in the graph?
- How do we identify changes in these data?
- How does a change in the independent variable affect the other variable?
- What relationships do you claim exists among these variables?

Materials Required

- 1 Graph Cube per group/student
- 1 matching differentiated Graph Cube Question Sheet
- 1 Sheet of paper per student
- Pencil
- Graph

Teacher Preparation:

Print copies of the cube on cardstock and cut out. Assemble the cube with glue. Note: consider laminating after you cut these out for multiple uses. (Gaming dice may be substituted for the cubes.) Also, print off copies of the differentiated Graph Cube Questions. Distribute to students for group or independent work.

Technology Requirements

- Standalone Lesson (no technology required)

Teacher Background Information

For more information about the procedures for accessing MND data on the Earth System Data Explorer, visit our YouTube page and watch the tutorials.

Procedure

1. Distribute one Graph Cube per group, as well as the related differentiated Graph Cube Questions and the graph.
2. Students roll the cube and find the matching question on the Graph Cube Question sheet.
3. Answer one question found under matching question on a sheet of paper, labeling the question with the number and letter of the question.
4. Repeat Steps 2-4 until at least 10 are answered.
Graph Cube

1. Examine the graph.
2. Summarize the graph.
3. Analyze the graph.
4. Brainstorm a question that you can answer using these data.
5. Who would be interested in this graph?
6. Assess the data values.

Graph Cube Questions

1. Examine the graph.
   A. The title tells me ________________________
   B. The bottom of the graph is the ___ axis. The variable is ______
   C. The left side of the graph is the ___ axis. The variable is ______
   D. The time frame for the data is ______ to ______

2. Summarize the graph.
   A. The x-axis shows the (independent/dependent) variable.
   B. The y-axis shows the (independent/dependent) variable.
   C. The data ______ (increase/decrease/follow-a-pattern). Explain.

3. Analyze the graph.
   A. ______ caused the change.
   B. The variable that changed as a result of something else changing is ______
   C. It ______ (increases/decreases/stays the same), then ______
       (increases/decreases/stays the same).
   D. The numbers on the graph show ______.

4. Brainstorm a question that you can answer using these data.
   A. How does...?
   B. I wonder...
   C. How is ______ the same as ______? Different from ______?
   D. How many ______?

5. Who would be interested in this graph?
   A. I think... (e.g. farmers, snow Alpine, etc.) I would be interested in this graph.
   B. These data are important to the ______ community because ______.

6. Assess the data values.
   A. The label on the x-axis is ______. The label on the y-axis is ______
   B. The unit for the x-axis is ______. The unit for the y-axis is ______
   C. The scale for the x-axis is ______. The scale for the y-axis is ______
Graph Cube Questions

1. Examine the graph.
A. The variable on the x axis is _________. It is the (independent/dependent) variable.
B. The variable on the y axis is _________. It is the (independent/dependent) variable.
C. The value of the independent variable affects the dependent variable by _________.

2. Summarize the graph.
A. The variable that changes as a result of another variable changing is _________.
B. The variable that causes the change is _________.
C. As the independent variable _________, the dependent variable _________.
D. The time frame represented in the graph is from _________.
E. The data _________.

3. Analyze the graph.
A. Write a hypothesis about the two variables to explain the graph. If ________, then _________.
B. The quantitative evidence that supports my testable statement is _________.

4. Brainstorm a question that you can answer using these data.
A. How does _________.
B. I wonder _________.
C. How is _________.

5. Who would be interested in this graph?
A. I think _________.
B. These are important to the _________.

6. Assess the data values.
A. The label on the x axis is _________. The label on the y axis is _________.
B. The unit for the x axis is _________. The unit for the y axis is _________.
C. The scale for the x axis is _________. The scale for the y axis is _________.

Graph Cube Questions

1. Examine the graph.
A. What variable is represented on the x axis? What is the range of values?
B. What variable is represented on the y axis? What is the range of values?
C. What are the units of measurement for the x and y axes?
D. If the graph represents a geographic location, identify it on a map or globe.

2. Summarize the graph.
A. Do the data repeat in recognizable ways? Explain.
B. What kinds of patterns or trends do you see in the distribution of the data?
C. How do the patterns you see in the graph relate to other things you know?

3. Analyze the graph.
A. Describe the relationship between the variables: positive, negative, or none.
B. Brainstorm one variable that you predict to be inversely proportional.
C. Brainstorm one variable that you predict to be directly proportional.

4. Brainstorm a question that you can answer using these data.
A. Ask a question beginning with how, what, when, where, or why.
B. I wonder _________.
C. Form a hypothesis using the data on the graph. If ________, then _________.

5. Who would be interested in this graph?
A. Brainstorm who would be interested in the data presented in this graph (i.e., farmers, snow skiers, etc.).
B. Why do you think these data are important to this community?

6. Assess the data values.
A. What is the numerical range of the data? Mean? Median? Mode?
B. How is the mean different from the mode?
C. Are there any outliers? If so, what are they?

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Graph Cube Questions

1. Examine the graph.
   A. The bottom of the graph is the ___ axis. The variable is ________
   B. The left side of the graph is the ___ axis. The variable is ________
   C. The time frame for the data is ________ to ________
   D. The title says ________. It means ________

2. Summarize the graph.
   A. The x axis shows the (independent/dependent) variable.
   B. The y axis shows the (independent/dependent) variable.
   C. The data ___ (increase/decrease/follow a pattern). I know this because ________

3. Analyze the graph.
   A. The independent variable ________ caused the change.
   B. The dependent variable ________ changes when the independent variable changes.
   C. If ________ increases/decreases, the dependent variable increases/decreases/deeps the same.
   D. The numbers on the graph show ________

4. Brainstorm a question that you can answer using these data.
   A. How does ___? I wonder ________
   B. How is ___? Different from ________?
   C. If ________, then ________

5. Who would be interested in this graph?
   A. I think ________ (i.e., farmers, ozone layers, etc.) would be interested in this graph.
   B. These data are important to the ________ community because ________

6. Assess the data values.
   A. The label on the x axis is ________
   B. The unit for the x axis is ________
   C. The scale for the x axis is ________
   D. The label on the y axis is ________
   E. The unit for the y axis is ________
   F. The scale for the y axis is ________