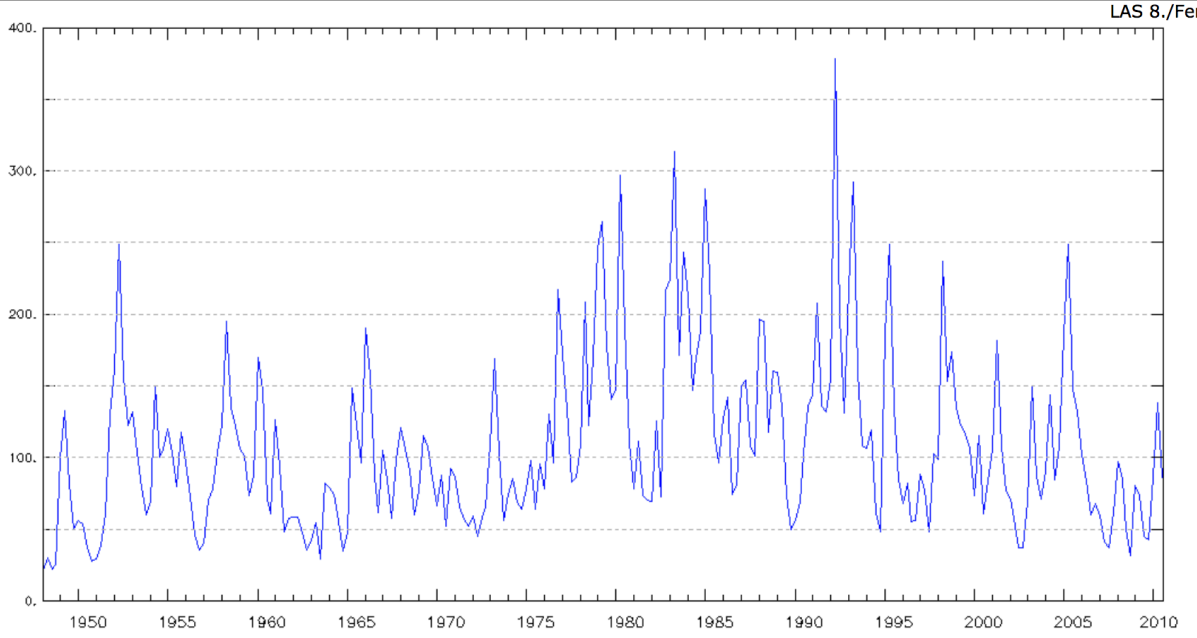
My NASA Data - Lesson Plans

Data Literacy Cube: Graph Data using Soil Moisture Data

OPeNDAP URL: https://mynasadata.larc.nasa.gov/thredds/dodsC/las/soil_moisture/data_usr_local_fer_data_data_soil_moisture.nc_Count_Globe_init_soilw.jnl
DATA SET: Soil Moisture
VARIABLE: Monthly Mean Soil Moisture (CPC) (mm)
LONGITUDE : 115.2W
LATITUDE : 35.2N
- Subsampled 3 in T

LAS 8./Ferret 7.3 NOAA/PMEL



Overview

Use the Data Literacy Cube 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 Cube per group/student
- 1 matching differentiated Graph 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

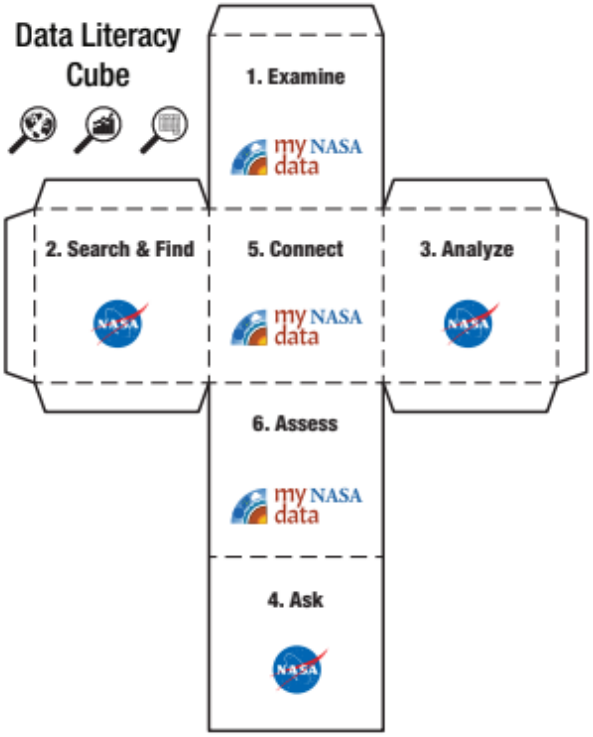
Video: Getting Started with the MND Earth System Data Explorer

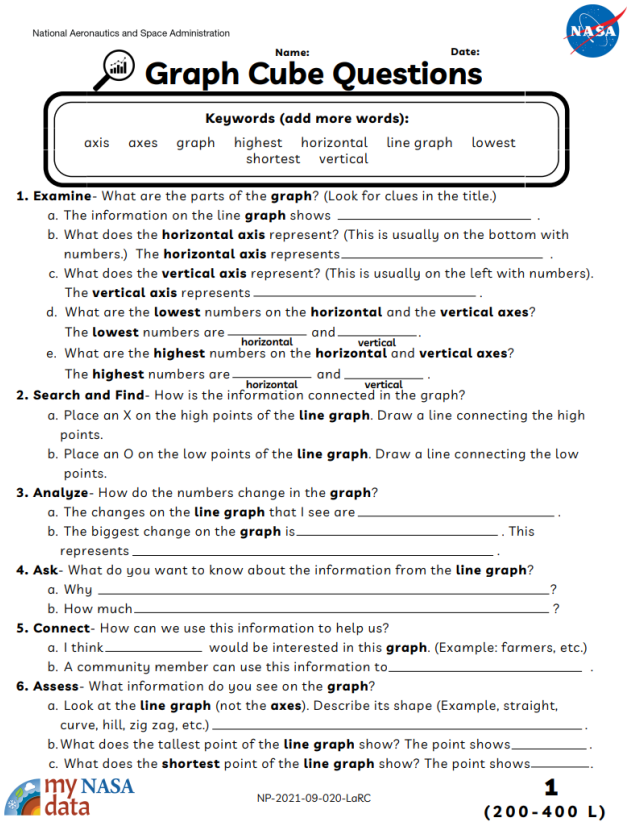
Video

Getting Started with the MND Earth System Data Explorer | https://www.youtube.com/watch?v=DX0EGRaAf8I | Source: My NASA Data

Procedure

1. Distribute one 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 all 6 are answered.





National Aeronautics and Space Administration

Name: Date:

Graph Cube Questions

Keywords (add more words):

axis axes graph highest horizontal line graph lowest shortest vertical

1. Examine- What are the parts of the **graph**? (Look for clues in the title.)

a. The information on the line **graph** shows _____ .

b. What does the **horizontal axis** represent? (This is usually on the bottom with numbers.) The **horizontal axis** represents _____ .

c. What does the **vertical axis** represent? (This is usually on the left with numbers). The **vertical axis** represents _____ .

d. What are the **lowest** numbers on the **horizontal** and the **vertical axes**? The **lowest** numbers are _____ (horizontal) and _____ (vertical).

e. What are the **highest** numbers on the **horizontal** and **vertical axes**? The **highest** numbers are _____ (horizontal) and _____ (vertical) .

2. Search and Find- How is the information connected in the graph?

a. Place an X on the high points of the **line graph**. Draw a line connecting the high points.

b. Place an O on the low points of the **line graph**. Draw a line connecting the low points.

3. Analyze- How do the numbers change in the **graph**?

a. The changes on the **line graph** that I see are _____ .

b. The biggest change on the **graph** is _____ . This represents _____ .

4. Ask- What do you want to know about the information from the **line graph**?

a. Why _____ ?

b. How much _____ ?

5. Connect- How can we use this information to help us?

a. I think _____ would be interested in this **graph**. (Example: farmers, etc.)

b. A community member can use this information to _____ .

6. Assess- What information do you see on the **graph**?

a. Look at the **line graph** (not the **axes**). Describe its shape (Example, straight, curve, hill, zig zag, etc.) _____ .

b. What does the tallest point of the **line graph** show? The point shows _____ .

c. What does the **shortest** point of the **line graph** show? The point shows _____ .

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National Aeronautics and Space Administration

Name: **Date:**

Graph Cube Questions

Keywords (add more words):

data decrease graph increase label time range
unit scale time range variable X-axis Y-axis

1. Examine- What are parts of the **graph**?

a. The title tells me _____ .

b. The **label** on the **x-axis** is _____ .

The **label** on the **y-axis** is _____ .

c. The **unit** on the **x-axis** is _____ .

The **unit** on the **y-axis** is _____ .

d. The **scale** on the **x-axis** is_____ . The **scale** on the **y-axis** is _____ .

2. Search and Find- How is the information connected in the graph?

a. Place an X on the high points of the **graph**. Draw a line connecting these points.

b. Place an O on the low points of the **graph**. Draw a line connecting these points.

c. The **time range** for the data is from_____ to _____.

3. Analyze- How do the numbers in the **graph** change?

a. Look at the **data**. Describe their shape. (Example, straight, curve, hill, etc.).

b. The bottom of the **graph** is the ____ **axis**. This manipulated **variable** is _____.

c. The left side of the **graph** is the____ **axis**. This responding **variable** is_____.

d. The numbers on the **graph** show_____.

4. Ask- What are questions you can answer with these **data**?

a. Why _____?

b. How much _____ ?

5. Connect- How can we use this information to help us?

a. I think _____ would be interested in this **data**. (Example: farmers, etc.)

b. How could this community member use these **data**?

6. Assess- What information do you see on the **graph**?

a. Look at the **line graph** (not the **axes**). Describe its shape. (Example, straight, curve, hill, zig zag, etc.) The shape is _____ .

b. The data from the **graph** _____ ,(Example: **increase**, **decrease**, etc.)

c. The information on the **graph** tells me that _____ .

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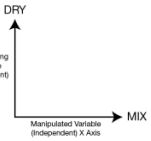
Name: Date:

Graph Cube Questions

Keywords (add more words):

characteristics dependent variable independent variable
unit variable X-axis Y-axis



1. Examine- What are parts of the graph?
- a. The name of the **variable** on the **x-axis** is_____ .
  It is the _____ **variable**.
  independent, dependent
- b. The name of the **variable** on the **y-axis** is_____.
  It is the _____ **variable**.
  independent, dependent
- c. The **unit** on the **x-axis** is _____.
  The **unit** on the **y-axis** is_____.
- d. The scale on the **x-axis** is_____. The scale on the **y-axis** is _____.

2. Search and Find- How is the information connected in the graph?
- a. Place an X on the high points of the graph. Draw a line connecting these points.
- b. Place an O on the low points of the graph. Draw a line connecting these points.
- c. The time range for the data is from _____ to _____.

3. Analyze- How do the data in the graph change?
- a. What are the changes that you see happening on the line graph?
- b. When/where do you see the most change in the data?
- c. When/where do you see the least change in the data?

4. Ask- What are questions you can answer with these data?
- a. What are the **characteristics** of_____?
- b. When did_____happen?
- c. How does_____ compare/contrast with _____?

5. Connect- How can we use this information to help us?
- a. What parts of the Earth are affected by this?
- b. What do you think may cause these events?
- c. What community members may need these data? Why?

6. Assess- What information do you see on the graph?
- a. As the **independent variable** _____, the **dependent variable** will_____ .
  increase(s), decrease(s), stay(s) the same increase(s), decrease(s), stay the same
- b. Based on what you know about these science variables, explain the data.

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Name: Date:

Graph Cube Questions

1. Examine- What are parts of 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. What geographic location does the data on the graph represent?

2. Search and Find- How is the information connected in the graph?
- a. Place X on the high points of the line graph. Draw a line connecting the points.
- b. Place O on the low points of the line graph. Draw a line connecting the points.
- c. Do the data repeat in recognizable ways? Explain.
- d. What kinds of patterns or trends do you see in the distribution of the data? Explain.
- e. How do the patterns you see in the graph relate to other things you know?

3. Analyze- How are the data in the graph related?
- a. Describe the relationship between the variables: positive, negative, or none.
- b. Brainstorm one science variable that you predict to be directly proportional.
- c. Brainstorm one science variable that you predict to be inversely proportional.

4. Ask- What are science questions you can answer with these data?
- a. What are the attributes of _____?
- b. What would happen to _____ if _____?
- c. How does _____ compare/contrast with _____?

5. Connect- How can we use this information to help us?
- a. I think_____ would be interested in these data because _____ .
- b. What real-world problems could this community member use these data to solve?
- c. What parts of the Earth System are involved in this/these events?
- d. What other science processes are related to this event?

6. Assess- What information do you see on the graph?
- a. What is the numerical range of the data? Mean? Median? Mode?
- b. How is the mean different from the mode in these data?
- c. Are there any outliers? If so, what are they?