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## My NASA Data - Lesson Plans

### Data Literacy Cube: Graph Data with Antarctic's Contribution to Sea Level Rise Graph

#### Grade Band

- 6-8
- 9-12

#### Time

- 30 minutes

#### 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 *Antarctic Ice Sheet Contribution to Global Sea Level*.

#### Materials Required

- [1 Cube per group/student \(or die\)](#)
- [1 differentiated Graph Cube Question Sheet](#) per student
- 1 sheet of paper per student
- Pencil
- Graph (as a handout or projected on the screen)

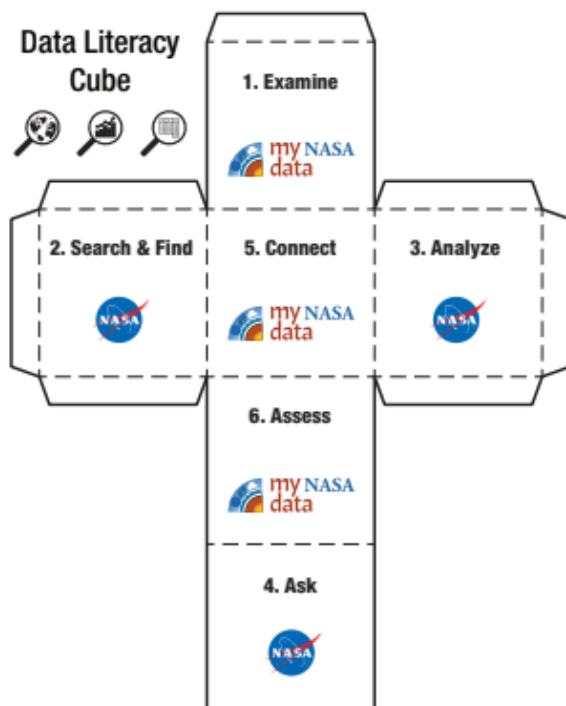
#### Teacher Preparation:

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.

## Procedure

1. Distribute one Cube per group (or die), as well as the related Graph [Cube Question](#) sheets 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 all six 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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(200-400 L)



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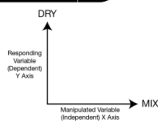
## Graph Cube Questions

### 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**?

- The title tells me \_\_\_\_\_.
- The **label** on the **x-axis** is \_\_\_\_\_.  
The **label** on the **y-axis** is \_\_\_\_\_.
- The **unit** on the **x-axis** is \_\_\_\_\_.  
The **unit** on the **y-axis** is \_\_\_\_\_.
- 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?

- Place an X on the high points of the **graph**. Draw a line connecting these points.
- Place an O on the low points of the **graph**. Draw a line connecting these points.
- The **time range** for the data is from \_\_\_\_\_ to \_\_\_\_\_.

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

- Look at the **data**. Describe their shape. (Example, straight, curve, hill, etc.).
- The bottom of the **graph** is the \_\_\_\_\_ **axis**. This manipulated **variable** is \_\_\_\_\_.
- The left side of the **graph** is the \_\_\_\_\_ **axis**. This responding **variable** is \_\_\_\_\_.
- The numbers on the **graph** show \_\_\_\_\_.

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

- Why \_\_\_\_\_?
- How much \_\_\_\_\_?

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

- I think \_\_\_\_\_ would be interested in this **data**. (Example: farmers, etc.)
- How could this community member use these **data**?

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

- Look at the **line graph** (not the **axes**). Describe its shape. (Example, straight, curve, hill, zig zag, etc.) The shape is \_\_\_\_\_.
- The data from the **graph** \_\_\_\_\_ (Example: **increase, decrease**, etc.)
- The information on the **graph** tells me that \_\_\_\_\_.



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**2**  
**(210-400 L)**



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## Graph Cube Questions

- Examine**- What are parts of the graph?
  - What variable is represented on the x-axis? What is the range of values?
  - What variable is represented on the y-axis? What is the range of values?
  - What are the units of measurement for the x and y axes?
  - What geographic location does the data on the graph represent?
- Search and Find**- How is the information connected in the graph?
  - Place X on the high points of the line graph. Draw a line connecting the points.
  - Place O on the low points of the line graph. Draw a line connecting the points.
  - Do the data repeat in recognizable ways? Explain.
  - What kinds of patterns or trends do you see in the distribution of the data? Explain.
  - How do the patterns you see in the graph relate to other things you know?
- Analyze**- How are the data in the graph related?
  - Describe the relationship between the variables: positive, negative, or none.
  - Brainstorm one science variable that you predict to be directly proportional.
  - Brainstorm one science variable that you predict to be inversely proportional.
- Ask**- What are science questions you can answer with these data?
  - What are the attributes of \_\_\_\_\_?
  - What would happen to \_\_\_\_\_ if \_\_\_\_\_?
  - How does \_\_\_\_\_ compare/contrast with \_\_\_\_\_?
- Connect**- How can we use this information to help us?
  - I think \_\_\_\_\_ would be interested in these data because \_\_\_\_\_.
  - What real-world problems could this community member use these data to solve?
  - What parts of the Earth System are involved in this/these events?
  - What other science processes are related to this event?
- Assess**- What information do you see on the graph?
  - What is the numerical range of the data? Mean? Median? Mode?
  - How is the mean different from the mode in these data?
  - Are there any outliers? If so, what are they?

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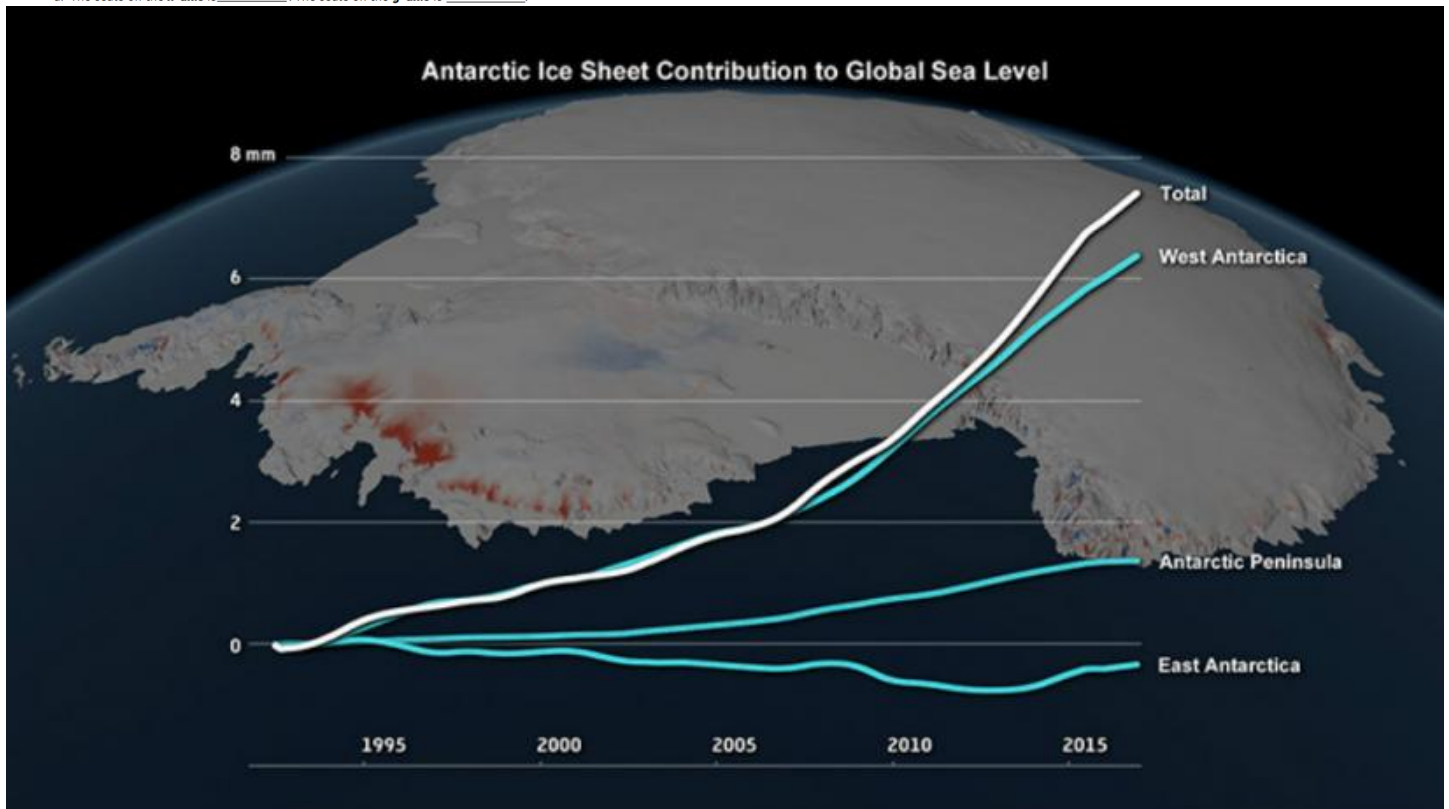
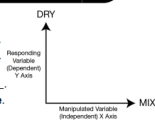
## Graph Cube Questions

### Keywords (add more words):

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

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

- The name of the **variable** on the **x-axis** is \_\_\_\_\_.  
It is the \_\_\_\_\_ **variable**.  
Independent, dependent
- The name of the **variable** on the **y-axis** is \_\_\_\_\_.  
It is the \_\_\_\_\_ **variable**.  
Independent, dependent
- The **unit** on the **x-axis** is \_\_\_\_\_.  
The **unit** on the **y-axis** is \_\_\_\_\_.
- The scale on the **x-axis** is \_\_\_\_\_. The scale on the **y-axis** is \_\_\_\_\_.



Credit: NASA

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## NGSS Three Dimensional Learning

### NGSS Disciplinary Core Ideas

- ESS3D: Global Climate Change

### NGSS Crosscutting Concepts

- Patterns
- Scale, Proportion, and Quantity
- Systems and System Models
- Stability and Change

### NGSS Science and Engineering Practices

- Analyzing and Interpreting Data

## Supported Common Core Math

- CCSS.Math.Content.6.SP.B.5
- CCSS.Math.Content.HSS.ID.A.3

## Learning Objectives

- observe and interpret physical characteristics of the Earth System using graphs of NASA data
- write a claim about the variables in the graph
- analyze how the phenomena changes of time and space
- characterize the independent and dependent variables
- brainstorm the phenomena connects to other parts of the Earth System

## Essential Questions

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

## Student Resources

- [\\_Flooding](#)

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## Teacher Resources

- [Changes in the Antarctic ice sheet's contribution to global sea level, 1992 to 2017](#)