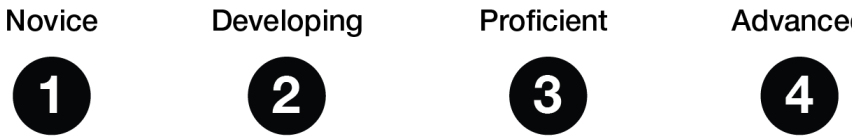
Data Literacy Cube:
A Tool for Differentiated Learning in Earth Science

About this Resource

The tools in this guide are resources to support data literacy in your instructional setting with My NASA Data Earth science data and visualizations. These flexible resources may be used with graphs, data tables, and mapped images of NASA Earth science data (or other sources of Earth data). With these tools, students engage with data by rolling a cube (or die) and answering questions to guide their data analysis. Leveled question sheets provide opportunities for students to connect with data, regardless of language proficiency or academic skill. These tools are aligned with Next Generation Science Standards Science and Engineering Practices and Common Core Mathematics Standards.

Data Literacy Cube Resources

- **Cube template:** Within this guide, you will find a black-line master template for the cube. This template can be constructed for use with the question sheets. Alternatively, gaming dice or virtual dice rollers may be substituted for the cube.
- **Question Sheets:** Question Sheets are leveled for both Lexile and English-language proficiencies. The leveled question sheets contain labeled (bottom left) and unlabeled versions for you to use at your discretion to help you differentiate your instruction. Note: The Lexile range provided on each question sheet represents the text's difficulty. The students' reading comprehension levels should be taken into account when selecting the appropriate question sheet. WIDA standards and proficiency levels help educators determine which level question sheet is best suitable for the student. For further information, visit the following links: Lexile (https://lexile.com/), WIDA standards (https://wida.wisc.edu/sites/default/files/resource/WIDA-ELD-Standards-Framework-2020.pdf).



Level 1 - Novice

- (Lexile Levels - 200-400) (WIDA proficiency level suggestions: 1.5-2.5)
- Intended Audience: elementary students, struggling learners, ELL's, and students with specific accommodations.

Level 2 - Developing

- (Lexile Levels - 210-400) (WIDA proficiency level suggestions: 1.9-2.5)
- Intended Audience: elementary students, struggling learners, ELL's, and students with specific accommodations.

Level 3 - Proficient

- (Lexile Levels - 410-600) (WIDA proficiency level suggestions: 2.5-4.5)
- Intended Audience: students who require reading supports, and those whose sentence and word phrase dimensions are more advanced.

Level 4 - Advanced

- (Lexile Levels - 610-800) (WIDA proficiency level suggestions: 4.5-6)
- Intended Audience: fluent English speakers, academically advanced learners, and abstract thinkers.

- **Keyword List:** A list of keywords is included on various question sheets. It provides the teacher and learner with opportunities to document key vocabulary words that are incorporated in the data analysis prior to starting the activity. Some words have been included in the list, but space is provided for those who wish to add additional words that are important in the lesson.

Keywords (add more words):

area biggest value Earth System
least legend most smallest value

- **Task Card:** The Task Cards provide roles for students to perform while conducting the data analysis. This allows students to specialize in an area of data analysis and recording while contributing to the team. (This is a great way to also include multilingual and other learners.)

Preparation

1. Access Earth science-related maps, graphs, and data for students to analyze. Identify lesson plans and activities that feature data resources in My NASA Data that students will analyze using the Data Literacy Cubes. You may want to print these for students to use. ***NOTE***: These tools can be used with other Earth Science models and visualizations commonly found in textbooks, websites, etc.
    a. Visit My NASA Data to identify content related to Earth Science topics. This website provides activities, lesson plans, and a data visualization tool, the Earth System Data Explorer. **To access NASA data** to use authentic Earth science data, visit the My NASA Data visualization tool, https://mynasadata.larc.nasa.gov/EarthSystemLAS/UI.vm/)
    b. **My NASA Data Cube Icons**: My NASA Data activities feature a Data Literacy cube icon. These icons indicate the compatibility of My NASA Data content to be used with the Data Literacy Cubes. Icons are displayed on the right side of My NASA Data webpages to indicate which activity could be used to engage students with the content on the page.


Maps


Line Graphs


Data Sets

2. Print the appropriate question sheets for the Earth science materials you plan to use with students.
3. Print and prepare the Data Cube using the Cube Template for Students/Groups. (Note: You can also use gaming dice, virtual dice roller, etc. as a substitution.) Consider having students assemble their own cubes, individually or in teams, to foster a sense of ownership. If teams assembled the cubes, consider having the same teams use the cubes throughout the year and keeping the cubes in the classroom. You can also assign roles from the Task Cards. These roles can change throughout the year.
4. Assign question sheets to individual students or groups based on academic levels. Monitor students' progress over the year and assign new level question sheets as needed.
5. Print Task Cards for each group and other resources as needed. See the Task Card Blackline Master in this resource.

Steps

1. Distribute Earth Science maps, graphs, or data to students/groups, as well as cube or dice.
2. Distribute the appropriate leveled-question sheet to students/groups.
3. Prior to beginning the data analysis, consider the following:
    - Review the list of keywords and their meanings with students.
    - Identify any additional keywords your students need to know and add them in the space provided.
    - Use additional scaffolding strategies as needed. You may also wish to include strategies such as: draw pictures on the cube to show what each question is about, write words in their native language, jigsaw, Frayer Model, Round robin, fishbowl, think alouds, storyboards, etc.
4. Assign the roles from the Task Card to the students in each group.
5. Begin the data analysis by instructing students to roll the cube (or numbered die) to answer appropriate question/s. (Allow students to work in a small group setting while they roll the cube and respond to the questions).
    - If additional writing space is required, have students use regular notebook paper (or word processing document) and attach it to the question sheets.
6. Have each group share with another group or with the class after completing their question sheet.
7. Monitor student progress and assign new level sets as students reuse cubes throughout the year.

Data Literacy Cube

1. Examine

my NASA data

2. Search & Find

5. Connect

my NASA data

3. Analyze

6. Assess

my NASA data

4. Ask

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Task Card

Group _____

Role	Name of Student
Project Manager: You will help the group stay focused (no distractions), including keeping up with time.	
Data Manager: You will write the group's answers to the questions, and the group's summary of the data you are assigned.	
Chief Engineer: You will be responsible for selecting the random number (i.e., rolling the die, etc.) and making sure the members in your group respond to the appropriate question.	
Communications Manager: You will present and explain your group's summary of the questions.	
Extra Position:	

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