My NASA Data

Using Mathematics and Computational Thinking with MND

Scientists and engineers use mathematics and quantitative thinking to representing variables, behaviors, and their relationships. Mathematics is used to create models and simulations; statistically analyze data; and recognize, communicate, and look for relationships with other variables.

Although there are differences in how mathematics and computational thinking are applied in science and in engineering, mathematics often brings these two fields together by enabling engineers to apply the mathematical form of scientific theories and by enabling scientists to use powerful information technologies designed by engineers. Both kinds of professionals can thereby accomplish investigations and analyses and build complex models, which might otherwise be out of the question. (NRC Framework, 2012, p 65)

K-2: Mathematical and computational thinking in K-2 builds on prior experiences and progresses to recognizing that mathematics can be used to describe the natural and designed world(s).

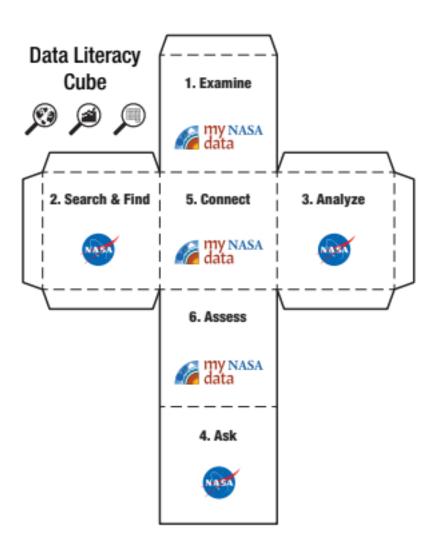
- Use counting and numbers to identify and describe patterns in the natural and designed world(s).
- Describe, measure, and/or compare the quantitative attributes of different objects and display the data using simple graphs.
- 3-5: Mathematical and computational thinking in 3-5 builds on K-2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions.
 - Organize simple data sets to reveal patterns that suggest relationships.
- 6-8: Mathematical and computational thinking in 6-8 builds on K-5 experiences and progresses to identifying patterns in large datasets and using mathematical concepts to support explanations and arguments.
- 9-12: Mathematical and computational thinking in 9-12 builds on K-8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis

to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.

- Use digital tools (e.g., computers) to analyze very large datasets for patterns and trends.
 - Use mathematical or computational representations of phenomena to describe explanations. (HS-ESS1- 4)(HS-ESS3- 6)
 - Create a computational model or simulation of phenomena, designed device, process, or system. (HS-ESS3- 3)

Data Literacy Cube

The Data Literacy Cube can be used to foster mathematics and computational thinking. The Cube is available for analyzing maps, graphs and data. The cube has differentiated questions to scaffold learners in their analysis.





Keywords (add more words):

collect/collected data highest value instrument lowest value measure

1. Examine- What are the data (information) about?
a. The data (information) are about Example: air temperature, precipitation, plants, etc.
b.By looking at the data I see
2. Search and Find- How were the data measured?
a.The data were collected by Example: me, scientist, satellite, etc.
b. The instrument used to measure this data was a/an
3. Analyze- What do the data show?
a.The place on Earth where the data were collected is
b.I observe that the time when the data were collected is
4. Ask - Write your own questions using the data .
a.Why?
b.How?
5. Connect- How can we use this information to help us?
a. These data help us understand
b.These data can help scientists by
5. Assess- What does the information tell you? Calculate or estimate using the data .
6. Assess- What does the information tell you? Calculate or estimate using the data. a. The highest value is
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Keywords (add more words):

collect/collected data geographic area highest value lowest value time range unit

1. Examine- What are the data (information	on) about?
a. The unit used for the data is	Evenumbar 9C ann lea ann
b.The data represent (are about)	Example: temperature, distance, mass, etc.
2. Search and Find- How were the data m	Example: temperature, distance, mass, etc. easured?
a.The data were collected every	Example: day, week, month, year, etc.
b.The data were collected by	Example: day, week, month, year, etc.
3. Analyze- What does the information tel	Example: me, scientist, satellite, etc. l you? Calculate or estimate the numbers.
using the data .	
a.The highest value is	and represents
b.The lowest value is	and represents
c.The pattern/s I see	in the data is/are
4. Ask- Write your own questions using the	e data.
a.Why does	?
b.How can	?
5. Connect- How can we use this informat	ion to help us?
a.These data help us understand——	
b.These data help explain why ———	 .
	rstand
6. Assess- What do the data show?	
a.The geographic area of Earth wher	e the data were collected is Example: city, state, latitude/longitude, global, et
b.The time range (when did it happer	?) is from to Example: Monday, October, 12:00, etc.
c. Graph the data. (Use graph paper o information.)	Example: Monday, October, 12:00, etc. r create your own graph to show your



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(210-400 L)





Keywords (add more words):

central tendency data Earth System phenomenon sphere time range mean median mode variable unit

1. Examine- What are the data about?	
a.The variable is It represents	
b.The independent variable is	
c. The dependent variable is	
2. Search and Find- How were the data measured?	
a.Theinstrument collected these data.	
b.The data are collected every	Hoar etc
c. The unit used to describe the data is	_
3. Analyze- What does the data show?	tc.
a.The geographic area of Earth that is represented is——————	
b.The time range is fromto	
c. This variable belongs in the sphere of the E Example: Hudrosphere, Atmosphere, etc.	arth System
4. Ask- Write your own questions using the data.	
a.How do, Why, What is	
b.I would like to compare with these data because_	
c. How do these data affect another sphere in the Earth System?	
5. Connect- How can we use this information to help us?	
a.These data help us understand	
b.These data can explain the phenomenon ofbecause _	
6. Assess- What does the information tell you? Calculate or estimate the	ne numbers
using the data .	
a.The range of the data is	
b. The data's mean is equal to; median ; mode	
c.The measure of central tendency that best represents the data	is the
mean, median or mode . This is because	
d.Graph the data (use graph paper or create your own graph to sh	ow your
information). My NASA NP-2021-09-020-LaRC	3 (410-60

(410-600 L)



- 1. Examine- What are the data about?
 - a. What does the variable represent?
 - b. What is the range of the data?
 - c. In which sphere of the Earth System does this variable belong?
- 2. Search and Find- How were the data measured?
 - a. What instrument/s collected these data?
 - b. How frequently were the data collected?
 - c. What unit describes the data?
- 3. Analyze- What does the data show?
 - a. What geographic area on Earth do the data represent?
 - b. What time range do these data represent?
 - c. What area and time data would you like to collect to help you analyze these data?
- 4. Ask- Write your own questions using the data.
 - a. Identify a question related to these data that you could research.
 - b. Identify another scientific variable that you could evaluate with these data.
 - c. How do you think this area compares to other geographic provinces in your region?
 - (i.e., coastal plain, highlands, etc.)
- 5. Connect- How can we use this information to help us?
 - a. What kinds of research questions could we use these data for?
 - b. Describe how you may use these data to explain a naturally occurring event.
 - c. How is technology connected to these data?
- 6. Assess- What information do you see on the graph?
 - a. Are there any outliers? If so, what are they?
 - b. Do the outliers meet your expectations? Why/Why not?
 - Graph the data (use graph paper or create your own graph to show your information).



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