

Great Minds® was founded on the belief that every child is capable of greatness. To help them achieve it, children need access to high-quality, knowledge-building curricula. They need an approach to learning that takes them beyond the rote memorization that education publishers have relied on for years. Answering the call for a new science curriculum to support the needed pedagogical changes, our teacher-writers and experts created *PhD Science*®, a phenomenon-based program in which teachers facilitate the learning, but students own it. With *PhD Science*, students rigorously engage in learning that coherently builds their understanding of science.

- **Knowledge Building:** Through hands-on investigations and evidence-based learning, students develop a deep, lasting understanding of science concepts that they can apply far beyond the anchor phenomenon of each module.
- **Coherent Storyline:** Each lesson builds on the lessons before it, so students develop their understanding of science concepts in the context of the anchor phenomenon.
- **Rigorous Engagement:** Students actively engage in a learning cycle of asking questions and sharing initial ideas about phenomena they study, investigating those questions, developing evidence-based explanations, and transferring their new knowledge to explain different phenomena. Supported by differentiation strategies the curriculum provides, all students engage with rigorous content through hands-on investigations, collaborative conversations, and analysis of authentic texts and media.

Learn more  
[greatminds.org/science](https://greatminds.org/science)



### Activity Before Concept, Concept Before Terminology

Rather than simply memorizing definitions, *PhD Science* students develop deep, lasting comprehension of scientific concepts through hands-on investigations and evidence-based learning about the phenomena they are exploring *before* they learn related terminology.

## Three-Dimensional Teaching and Learning with Every Lesson

With *PhD Science*, students build understanding of Disciplinary Core Ideas (DCIs) by engaging in Science and Engineering Practices (SEPs) and applying the lens of Crosscutting Concepts (CCs). Through inquiry and three-dimensional learning, students build enduring knowledge across science domains.

Simply representing the three dimensions in each lesson does not constitute three-dimensional learning. Three-dimensional teaching and integration can only occur when the three dimensions are applied in concert to explain a phenomenon or solve a problem.



CONTENT STAGES	STUDENT ACTIONS AND CORRESPONDING SCIENCE AND ENGINEERING PRACTICES	STRONGLY RELATED 7E PHASES*
WONDER	Observe a rich phenomenon and generate questions. Connect prior understanding to the phenomenon. (SEP:1)	Elicit Engage
ORGANIZE	Develop an initial explanation of the phenomenon. Focus on a question to investigate. (SEP.2 and SEP.6)	Explore
REVEAL	Explore the question through investigation. Analyze data to gather evidence relevant to the question. (SEP.3–5)	Explore
DISTILL	Apply evidence and reasoning to revise the explanation of the phenomenon. Communicate new knowledge. Compare and synthesize with prior understanding and other information. (SEP.2 and SEP.6–8)	Explain
KNOW	Generate new questions. Apply knowledge to explain a different phenomenon or to solve a problem in a different context. Connect knowledge across contexts to develop fundamental science conceptual understanding. (SEP.1 and SEP.6)	Elaborate Extend
ALL		Evaluate


\*Although the Elicit and Engage phases both relate to the Wonder stage and the Elaborate and Extend phases both relate to the Know stage, each 7E phase includes unique elements that should not be conflated in instruction.

## The *PhD Science* Approach to the Learning Cycle

Throughout each module, students engage in the learning cycle to make sense of and explain authentic phenomena. They begin each module by generating questions and developing an initial explanation of the anchor phenomenon. Then students investigate various supporting phenomena to better understand the anchor phenomenon. Students periodically return to the anchor phenomenon to revise their explanation by applying evidence gathered through their investigations and data analysis. At the end of the module, students participate in a Socratic Seminar to reflect on the conceptual understanding they have developed and used to explain multiple phenomena. Students transfer that knowledge to explain a new phenomenon in the End-of-Module Assessment.

The table on the left shows how particular student actions, Science and Engineering Practices, and the 7E phases relate to each stage of the *PhD Science* learning cycle.

LEVEL		MODULE 1	MODULE 2	MODULE 3	MODULE 4				
K	Title	Weather	Pushes and Pulls	Life	Environments				
	Anchor Phenomenon	Cliff Dwellings at Mesa Verde	Tugboats in New York Harbor	Oasis in the Desert					
	Essential Question	<i>How did the cliff dwellings at Mesa Verde protect people from the weather?</i>	<i>How do tugboats move cargo ships through New York Harbor?</i>	<i>How is the oasis different from the rest of the desert?</i>					
	Performance Expectations	K-ESS2-1 K-ESS3-2	K-PS3-1 K-PS3-2 K-2-ETS1-1	K-PS2-1 K-PS2-2	K-2-ETS1-2	K-LS1-1 K-ESS3-1	K-ESS2-2 K-ESS3-3 K-ESS3-1	K-ESS2-1 K-2-ETS1-3	
	Instructional Text(s)	<i>Snow Day!</i>	<i>Tugboat</i>						
1	Title	Survival	Light	Sound	Sky				
	Anchor Phenomenon	Life in Barnum Pond	Wayang Shadow Puppetry	Instruments in the Recycled Orchestra of Paraguay					
	Essential Question	<i>How do pond plants and pond animals survive in their environment?</i>	<i>How do Wayang shadow puppet shows use light to tell a story?</i>	<i>How does the Recycled Orchestra make music?</i>					
	Performance Expectations	1-LS1-1 1-LS1-2	1-LS3-1 K-2-ETS1-1	1-PS4-2 1-PS4-3	1-PS4-1 1-PS4-4	1-PS4-2 1-PS4-3	1-ESS1-1 1-ESS1-2		
	Instructional Text(s)	<i>Over and Under the Pond</i>	<i>Blackout</i>						
2	Title	Matter	Earth Changes	Plants	Habitats				
	Anchor Phenomenon	Birds Building Nests	The Transformation of Surtsey	Return of Plant Life to Mount St. Helens					
	Essential Question	<i>Why do different kinds of birds use certain materials to build their nests?</i>	<i>How can the island of Surtsey change shape over time?</i>	<i>How did plants regrow in the area affected by the Mount St. Helens eruption?</i>					
	Performance Expectations	2-PS1-1 2-PS1-4	2-PS1-2 2-PS1-3 K-2-ETS1-1	2-ESS1-1 2-ESS2-1 2-ESS2-2	2-PS1-2 K-2-ETS1-3 K-2-ETS1-1	2-LS2-1 2-LS2-2	K-2-ETS1-2	2-LS4-1 2-ESS2-2	2-ESS2-3
	Instructional Text(s)	<i>A Nest Is Noisy   The Crayon Man</i>	<i>Life on Surtsey: Iceland's Upstart Island   An Island Grows</i>						

 Physical Science Focus

 Earth Science Focus

 Life Science Focus

LEVEL		MODULE 1	MODULE 2	MODULE 3	MODULE 4				
3	Title	Weather and Climate	Survival	Traits	Forces and Motion				
	Anchor Phenomenon	1900 Galveston Hurricane	Butterfly Survival	Individual Variation in Humpback Whales	Motion in Space				
	Essential Question	<i>How can we prevent a storm from becoming a disaster?</i>	<i>How do butterflies survive over time in a changing environment?</i>	<i>What makes an individual humpback whale unique?</i>	<i>Why do objects move differently in space than on Earth?</i>				
	Performance Expectations	3-ESS2-1 3-ESS2-2	3-ESS3-1 3-5-ETS1-1	3-LS2-1 3-LS4-1 3-LS4-3	3-LS4-4 3-5-ETS1-2	3-LS1-1 3-LS3-1	3-LS3-2 3-LS4-2	3-PS2-1 3-PS2-2 3-PS2-3	3-PS2-4 3-5-ETS1-3
	Instructional Text(s)	<i>Hurricanes!   Tornadoes!   Marvelous Mattie: How Margaret E. Knight Became an Inventor</i>	<i>A Butterfly Is Patient   Amos &amp; Borris</i>	<i>Here Come the Humpbacks!</i>	<i>Moonshot: The Flight of Apollo 11</i>				
4	Title	Earth Features	Energy	Sense and Response	Light				
	Anchor Phenomenon	Formation of the Grand Canyon's Features	Windmills at Work	Elephants Sensing Distant Rainstorms	Visibility of and Communication to Howland Island				
	Essential Question	<i>How did the Grand Canyon's features form?</i>	<i>How do windmills change wind to light?</i>	<i>How do elephants sense rainstorms from more than 100 miles away?</i>	<i>Why didn't Amelia Earhart complete her journey?</i>				
	Performance Expectations	4-ESS1-1 4-ESS2-1 4-ESS2-2	4-ESS3-1 4-ESS3-2 3-5-ETS1-2	4-PS3-1 4-PS3-2 4-PS3-3	4-PS3-4 3-5-ETS1-1	4-LS1-1 4-LS1-2	4-PS4-1	4-PS4-2 4-PS4-3	3-5-ETS1-2 3-5-ETS1-3
	Instructional Text(s)	<i>The Grand Canyon   Who Were the Wright Brothers?</i>	<i>The Boy Who Harnessed the Wind</i>	<i>The Elephant Scientist</i>	<i>Amelia Lost: The Life and Disappearance of Amelia Earhart</i>				
5	Title	Matter	Ecosystems	Earth Systems	Orbit and Rotation				
	Anchor Phenomenon	Changes to the Statue of Liberty's Appearance	Life Around a Mangrove Tree	Balinese Rice Farming	Views from Earth and Space				
	Essential Question	<i>What caused the Statue of Liberty to change over time?</i>	<i>How can trees support so much life?</i>	<i>How has Balinese rice farming endured for 1,000 years?</i>	<i>How can we explain our observations of the Sun, Moon, and stars from Earth?</i>				
	Performance Expectations	5-PS1-1 5-PS1-2 5-PS1-3	5-PS1-4 3-5-ETS1-3	5-LS1-1 5-LS2-1	5-PS3-1 3-5-ETS1-1	5-ESS2-1 5-ESS2-2	5-ESS3-1 3-5-ETS1-2	5-ESS1-1 5-ESS1-2	5-PS2-1
	Instructional Text(s)	<i>Statue of Liberty: A Tale of Two Countries</i>	<i>The Mangrove Tree   Living Sunlight</i>	<i>Cycle of Rice, Cycle of Life   The Buffalo Are Back</i>	<i>Look to the Stars   Look Up! Henrietta Leavitt Pioneering, Woman Astronomer</i>				

Physical Science Focus

Earth Science Focus

Life Science Focus