Maryland State Department of Education
Preparing World-Class Students

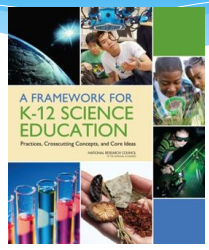
NGSS 101

Next Generation Science Standards
Adoption & Implementation

NEXT GENERATION SCIENCE STANDARDS
For States, By States

To what extent have you interacted with this document?

A. I've read it thoroughly.
B. I've skimmed it for general information.
C. It's on my bookshelf.
D. Huh?

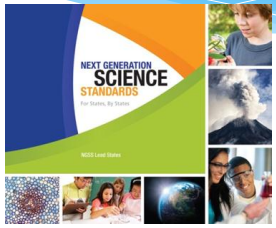


http://www.nap.edu/catalog.php?record_id=13165

2

How about this one?

A. I've read it thoroughly.
B. I've skimmed it for general information.
C. It's on my bookshelf.
D. No clue



SCIENCE

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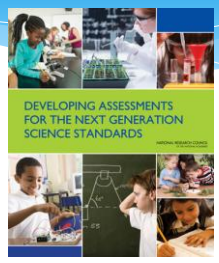
Or this one?

A. I've read it thoroughly.
B. I've skimmed it for general information.
C. It's on my bookshelf.
D. It's the first time I've seen it.



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Why, What, Who, When & Where

- Explain the reasons for building new science standards.
- Describe the process and timeline for constructing the Framework and the NGSS.
- Describe the structure of a standard within NGSS.
- Discuss the implications of the "shifts" in NGSS for teaching and learning.
- Examine instructional strategies that reflect the intent of NGSS.

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For States, By States

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Why were the NGSS developed?

Goal

For all students to:

- Have appreciation for the beauty and wonder of science
- Have sufficient knowledge of science and engineering to engage in public discussions
- Be careful consumers of scientific information relevant to their daily lives
- Continue to learn about science outside school
- Have the skills to enter careers of their choice, including (but not limited to) science, engineering and technology.

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Data to Inform Action

TIMSS 2015

OECD PISA

NAEP NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS

7

The National Assessment of Educational Progress (NAEP)

* **NAEP** is the largest nationally representative and continuing assessment of what America's students know and can do in various subject areas.

NAEP NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS

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2009 NAEP Science Results

Grade 4

34%

of students perform at or above Proficient

Grade 8

30%

of students perform at or above Proficient

Grade 12

21%

of students perform at or above Proficient

National Assessment of Educational Progress (NAEP), 2009 Science Assessment, p. 8

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Program for International Student Assessment

- **PISA** is an international assessment that measures 15-year-old students' **reading, mathematics,** and **science literacy**.
- PISA also includes measures of general or **cross-curricular competencies,** such as **problem solving**.
- PISA emphasizes **functional skills** that students have acquired as they near the end of compulsory schooling.

OECD PISA

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2009 PISA Science Results Grade 10

29%

of students scored at or above level 4—the level at which students can complete higher order tasks.

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Highlights from PISA 2009, p. 26

Trends in International Mathematics and Science Study

TIMSS provides reliable and timely data on the **mathematics** and **science** achievement of U.S. students compared to that of students in other countries.

IEA TIMSS 2015

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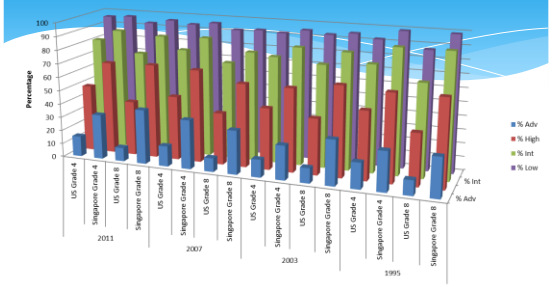
TIMSS Performance: US v. Singapore



TIMSS 2011 Science, p. 88-89, p. 116-117

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TIMSS Performance

United States v Singapore Benchmark Achievement

Grade 4	% Advanced		% High		% Intermediate		% Low	
	US**	Singapore*	US	Singapore	US	Singapore	US	Singapore
2011	15	33	49	68	81	89	96	97
2007	15	36	47	68	78	88	94	96
2003	13	25	45	61	78	86	94	95
1995	19	14	50	42	78	71	92	89
Grade 8	**% Advanced**		**% High**		**% Intermediate**		**% Low**	
	US***	Singapore*	US	Singapore	US	Singapore	US	Singapore
2011	10	40	40	69	73	87	93	96
2007	10	32	38	61	71	80	92	93
2003	11	33	41	66	75	85	93	95
1999	12	29	37	60	67	84	87	95
1995	11	29	38	64	68	91	87	99

* Rank = 1; ** Rank = 5; ***Rank = 9

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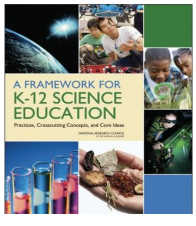
TIMSS 2011 Science, p. 88-89, p. 116-117

Where do you start when developing new standards?



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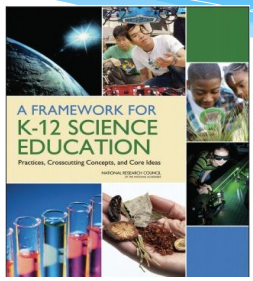
Building on the Past; Preparing for the Future

16

A New Vision of Science Learning that Leads to a New Vision of Teaching



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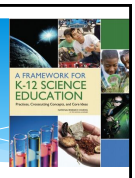
Vision for Science Education



"The framework is designed to help realize a vision for education in the sciences and engineering in which **(all) students**, over **multiple years** of school, **actively engage** in science and engineering **practices** and apply **crosscutting concepts** to deepen their understanding of the **core ideas** in these fields."

A Framework for K-12 Science Education pp. 8-9

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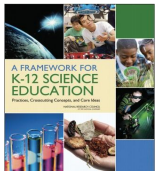
The framework is built on the notion of learning as a developmental progression.



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It is designed to help children continually build on and revise their knowledge and abilities, starting from their curiosity about what they see around them and their initial conceptions about how the world works.

Framework, p.11

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Who developed the NGSS?

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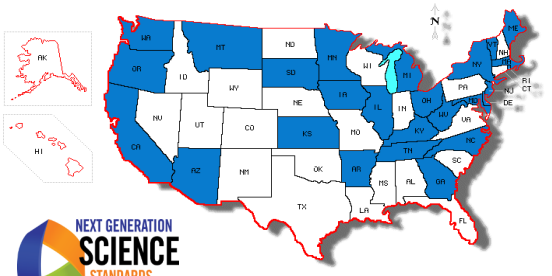
NGSS Lead States



NEXT GENERATION SCIENCE STANDARDS
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http://www.nextgenscience.org/maryland

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What does a standard look like in the NGSS?

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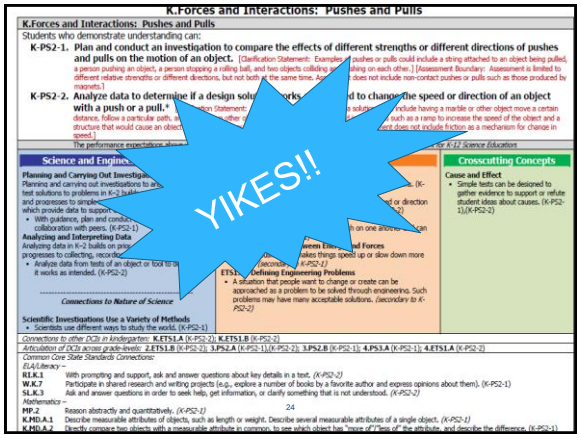
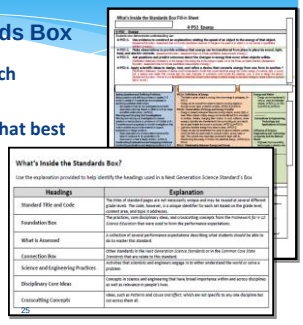


What's Inside the Standards Box?

Exploring the Standards Box

- Read the explanation for each heading
- Write a heading in the box that best explains each section of the Standards Box.



What's Inside the Standards Box?

Use the explanation provided to help identify the headings used in a Next Generation Science Standard's Box

Headings	Explanation
Standard Title and Code	The titles of standard pages are not necessarily unique and may be reused at several different grade levels. The code, however, is a unique identifier for each set based on the grade level, content area, and topic it addresses.
Foundation Box	The practices, core disciplinary ideas, and crosscutting concepts from the Framework K-12 Science Education that were used to form the performance expectations.
What is Assessed	A collection of science performance expectations describing what students should be able to do to master this standard.
Connection Box	Other standards in the next Generation Science Standards or in the Common Core State Standard that are relate to this standard.
Science and Engineering Practices	Activities that scientists and engineers engage in to either understand the world or solve a problem.
Disciplinary Core Ideas	Concepts in science and engineering that have broad importance within and across disciplines as well as relevance to people's lives.
Crosscutting Concepts	Ideas, such as Patterns and cause-and-effect, which are not specific to any one discipline but cut across them all.

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Title and Performance Expectations

4-PS3 Energy

Title and Code
The titles of standard pages are not necessarily unique and may be reused at several different grade levels . The code, however, is a unique identifier for each set based on the grade level, content area, and topic it addresses.

What is Assessed
A set of performance expectations describing what students should know and be able to do to master this standard

4-PS3 Energy	
Students who demonstrate understanding can:	
4-PS3-1.	**Use evidence to construct an explanation relating the speed of an object to the energy of that object.** [Assessment Boundary: Assessment does not include quantitative measures of changes in the speed of an object or any precise or quantitative definition of energy.]
4-PS3-2.	**Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.** [Assessment Boundary: Assessment does not include quantitative measurements of energy.]
4-PS3-3.	**Ask questions and predict outcomes about the changes in energy that occur when objects collide.** [Clarification Statement: Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.] [Assessment Boundary: Assessment does not include quantitative measurements of energy.]
4-PS3-4.	**Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.*** [Clarification Statement: Examples of devices could include electric circuits that convert electrical energy into motion energy of a vehicle, light, or sound; and, a passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device.] [Assessment Boundary: Devices should be limited to those that convert motion energy to electric energy or use stored energy to cause motion or produce light or sound.]

A Closer Look at a Performance Expectation

K-LS1 From Molecules to Organisms: Structures and Processes

K-LS1 From Molecules to Organisms: Structures and Processes
Students who demonstrate understanding can:

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. • Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-LS1-1)	**LS1.C: Organization for Matter and Energy Flow in Organisms** • All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (K-LS1-1)	**Patterns** • Patterns in the natural and human designed world can be observed and used as evidence. (K-LS1-1)
Connections to Nature of Science **Scientific Knowledge is Based on Empirical Evidence** • Scientists look for patterns and order when making observations about the world. (K-LS1-1)		

Note: Performance expectations combine practices, core ideas, and crosscutting concepts into a single statement of ***what is to be assessed.***

They are not instructional strategies or objectives for a lesson.

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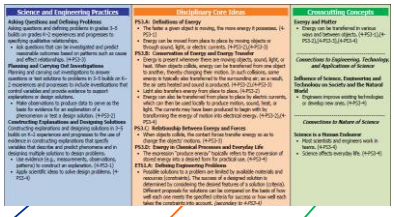
Foundation Box



Foundation Box
The practices, core disciplinary ideas, and crosscutting concepts from the *Framework for K-12 Science Education* that were used to form the performance expectations

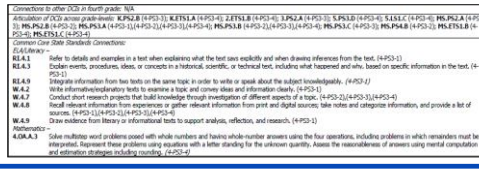
Scientific & Engineering Practices
Activities that scientists and engineers engage in to either understand the world or solve a problem

Disciplinary Core Ideas
Concepts in science and engineering that have broad importance within and across disciplines as well as relevance in people's lives.

Crosscutting Concepts
Ideas, such as *Patterns* and *Cause and Effect*, which are not specific to any one discipline but c[illegible] them all.

The Connection Box

Connection Box
Other standards in the *Next Generation Science Standards* or in the *Common Core State Standards* that are related to this standard



Connections to other DCIs in fourth grade: N/A

Articulation of DCIs across grade-levels: **K.PS2.B** (4-PS3-1); **K.ETS1.A** (4-PS3-4); **2.ETS1.B** (4-PS3-4); **3.PS2.A** (4-PS3-3); **5.PS1.B** (4-PS3-4); **5.LS1.C** (4-PS3-4); **MS.PS2.A** (4-PS3-3); **MS.PS2.B** (4-PS3-2); **MS.PS3.A** (4-PS3-1),(4-PS3-2),(4-PS3-3),(4-PS3-4); **MS.PS3.B** (4-PS3-2),(4-PS3-3),(4-PS3-4); **MS.PS3.C** (4-PS3-3); **MS.PS4.B** (4-PS3-2); **MS.ETS1.B** (4-PS3-4); **MS.ETS1.C** (4-PS3-4)

Common Core State Standards Connections:

ELA/Literacy –

RI.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-PS3-1)

RI.4.3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text. (4-PS3-1)

RI.4.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. *(4-PS3-1)*

W.4.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (4-PS3-1)

W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-PS3-2),(4-PS3-3),(4-PS3-4)

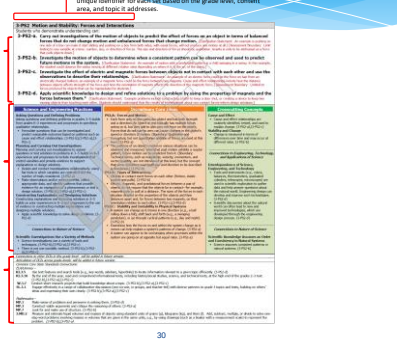
W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-PS3-1),(4-PS3-2),(4-PS3-3),(4-PS3-4)

W.4.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (4-PS3-1)

Mathematics –

4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. *(4-PS3-4)*

Inside the NGSS Box



Title and Code
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What is Assessed
A collection of several performance expectations describing what students should be able to do to master this standard

Foundation Box
The practices, core disciplinary ideas, and crosscutting concepts from the *Framework for K-12 Science Education* that were used to form the performance expectations

Connection Box
Other standards in the *Next Generation Science Standards* or in the *Common Core State Standards* that are related to this standard

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How is content articulated in the NGSS?

NEXT GENERATION SCIENCE STANDARDS
For States, By States

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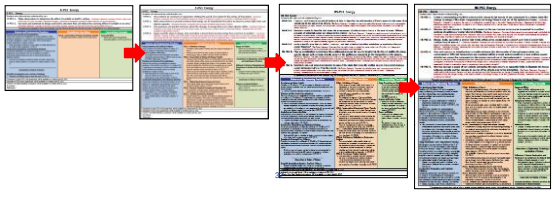
Review and discuss the progression of energy standards with a partner or your team.

Kindergarten | Grade 4 | Middle School | High School



Partner/Group Review and Discussion

NEXT GENERATION SCIENCE STANDARDS

Questions to explore with a partner or team
- How do the standards for Energy build coherently K-HS?
- How does the cognitive rigor progress K-HS?
- What are the opportunities for integration with CCSS and STEM?

Core Idea: Energy			
Coherence *How do the Core Ideas progress K-12*	Cognitive Rigor	Integration with CCSS Math and Literacy	Integration with STEM
Evidence:	Evidence:	Evidence:	Evidence:
What are the implications of NGSS for planning and teaching in your school?			

Discuss and Record your observations:

- How do the standards build coherently K-HS?
- How do core ideas progress K-12.
- How does the cognitive rigor progress K-HS?
- What are the opportunities for integration with ELA, Math, and STEM?

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What are the three dimensions of learning in the NGSS?

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For States, By States

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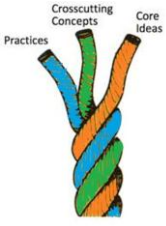
Three Dimensions Intertwined



- The NGSS are written as Performance Expectations
- NGSS will require contextual application of the three dimensions by students.

http://www.nextgenscience.org/hsess3-earth-human-activity

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Dimension 1
Science and Engineering Practices

- Behaviors that scientists engage in as they investigate, build models, analyze data and communicate information
- "Practices" rather than "skills" since knowledge and skills are required that are specific to each practice.
- Engineering involves solving a problem through design.
- Engineering practices make STEM relevant to students.

Framework, pp. 41-82

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Asking Questions. . .

Why are there seasons?

Why did the structure collapse?

How is electric power generated?

What do plants need to survive?

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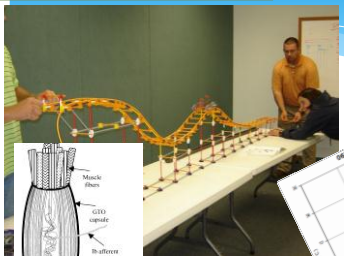
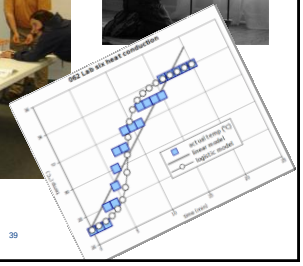
. . . Defining Problems

Developing and Using Models





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Planning and Carrying Out Investigations

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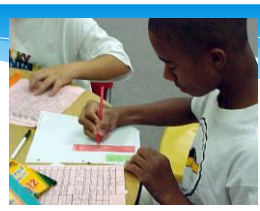
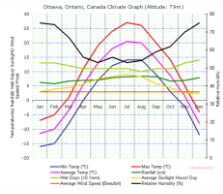
Analyzing and Interpreting Data





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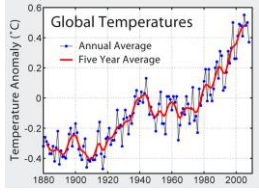
Using Mathematics and Computational Thinking



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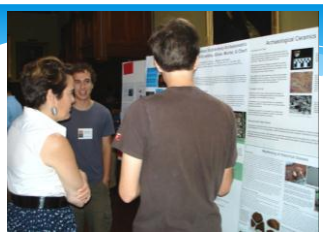

Constructing Explanations (Science) and . . .

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. . . Designing Solutions (Engineering)

44

Engaging in Argument from Evidence

Obtaining, Evaluating, and Communicating Information

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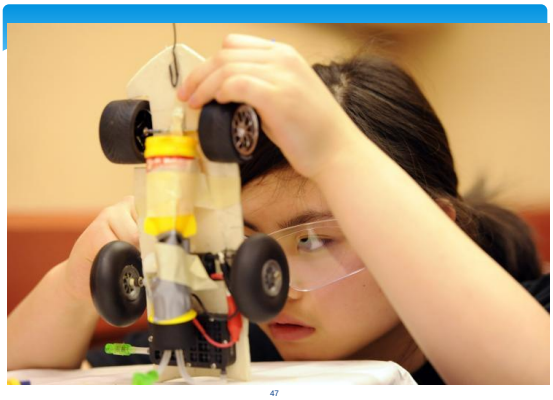

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Dimension 2
Crosscutting Concepts

- Have application across all domains of science
- Provide an organizational schema for interrelating knowledge from various science fields
- Include:
  (1) Patterns, similarity, and diversity;
  (2) Cause and effect;
  (3) Scale, proportion and quantity;
  (4) Systems and system models;
  (5) Energy and matter;
  (6) Structure and function;
  (7) Stability and change

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Dimension 3
Disciplinary Core Ideas

- Focus K–12 science curriculum, instruction and assessments on the most important aspects of science
  - Broad importance or key organizing principle
  - Key tool for understanding complex ideas
  - Connected to personal or societal concerns
  - Teachable and learnable at multiple grades

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Disciplinary Core Ideas

Physical Science
PS1: Matter & Interactions

PS2: Motion & Stability: Forces and Interactions

PS3: Energy

PS4: Waves and Their Applications in Technologies for Information Transfer

Life Science
LS1: From Molecules to Organisms

LS2: Ecosystems: Interaction, Energy & Dynamics

LS3: Heredity: Inheritance and Variation of Traits

LS4: Biological Evolution: Unity & Diversity

Earth & Space Science
ESS1: Earth's Place in the Universe

ESS2: Earth's Systems

ESS3: Earth & Human Activity

Engineering Design
ETS1: Engineering Design

Influence of Science, Engineering, and Technology on Society and the Natural World

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Current State Science Standard Sample

Inquiry Standards

Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities utilizing safe laboratory procedures.

Students will use the ideas of system, model, change, and scale in exploring scientific and technological matters.

Content Standards

Distinguish between atoms and molecules.

Recognize that there are more than 100 elements and some have similar properties as shown on the Periodic Table of Elements.

Identify and demonstrate the Law of Conservation of Matter.

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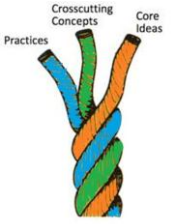
Three Dimensions Intertwined



- The NGSS are written as Performance Expectations
- NGSS will require contextual application of the three dimensions by students.

NEXT GENERATION SCIENCE STANDARDS
For States, By States

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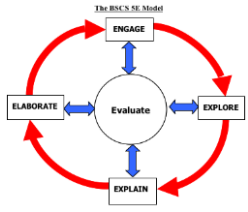
The 5E Instructional Model

- **Appropriate for lessons or units**
- **Activates prior knowledge**
- **Student-centered**
- **Multiple opportunities to explore**
- **Connects to real world scenarios**
- **Assessment opportunities in each E**



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High School

- **Engage**: view images of the "arms" of organisms, and attempt to identify their habitat; discuss adaptations.
- **Explore:** review slides of the Galapagos Islands and examine data on beak depth and tarsal length in finches. How could variation in beak depth help or harm finches?
- **Explain:** read and discuss Darwin's description of natural selection.
- **Elaborate:** examine morphological features of apes and humans. Students build models to compare DNA codes for proteins to determine relatedness of organisms.
- **Explain:** describe findings and predict relationships to ancestor
- **Evaluate:** use graphical evidence for natural selection to construct an explanation for adaptation of populations

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Performance Expectation?

5E	Practices	DCIs	Crosscutting
Engage			
Explore			
Explain			
Elaborate			
Evaluate			

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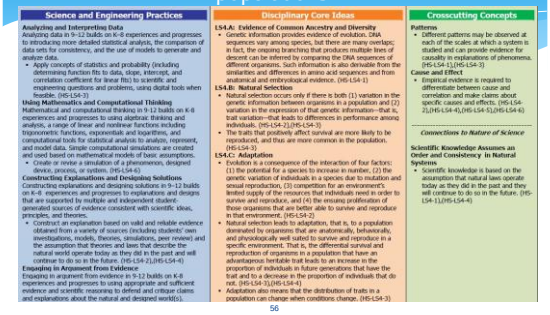
HS-LS4-4 Construct an explanation based on evidence for how natural selection leads to adaptation of populations.



Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in 9-12 builds on K-8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.
- Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible. (HS-LS4-3)

Using Mathematics and Computational Thinking
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.
- Create or revise a simulation of a phenomenon, designed device, process, or system. (HS-LS4-6)

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 9-12 builds on K-8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.
- Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS4-2),(HS-LS4-4)

Engaging in Argument from Evidence
Engaging in argument from evidence in 9-12 builds on K-8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s).

Disciplinary Core Ideas

LS4.A: Evidence of Common Ancestry and Diversity
- Genetic information provides evidence of evolution. DNA sequences vary among species, but there are many overlaps; in fact, the ongoing branching that produces multiple lines of descent can be inferred by comparing the DNA sequences of different organisms. Such information is also derivable from the similarities and differences in amino acid sequences and from anatomical and embryological evidence. (HS-LS4-1)

LS4.B: Natural Selection
- Natural selection occurs only if there is both (1) variation in the genetic information between organisms in a population and (2) variation in the expression of that genetic information—that is, trait variation—that leads to differences in performance among individuals. (HS-LS4-2),(HS-LS4-3)
- The traits that positively affect survival are more likely to be reproduced, and thus are more common in the population. (HS-LS4-3)

LS4.C: Adaptation
- Evolution is a consequence of the interaction of four factors: (1) the potential for a species to increase in number, (2) the genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for an environment's limited supply of the resources that individuals need in order to survive and reproduce, and (4) the ensuing proliferation of those organisms that are better able to survive and reproduce in that environment. (HS-LS4-2)
- Natural selection leads to adaptation, that is, to a population dominated by organisms that are anatomically, behaviorally, and physiologically well suited to survive and reproduce in a specific environment. That is, the differential survival and reproduction of organisms in a population that have an advantageous heritable trait leads to an increase in the proportion of individuals in future generations that have the trait and to a decrease in the proportion of individuals that do not. (HS-LS4-3),(HS-LS4-4)
- Adaptation also means that the distribution of traits in a population can change when conditions change. (HS-LS4-3)

Crosscutting Concepts

Patterns
- Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena. (HS-LS4-1),(HS-LS4-3)

Cause and Effect
- Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-LS4-2),(HS-LS4-4),(HS-LS4-5),(HS-LS4-6)

Connections to Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems
- Scientific knowledge is based on the assumption that natural laws operate today as they did in the past and they will continue to do so in the future. (HS-LS4-1),(HS-LS4-4)

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What shifts are necessary for teaching and learning in the NGSS?

NEXT GENERATION SCIENCE STANDARDS
For States, By States

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Conceptual Shifts in the NGSS

1. K-12 science education should reflect the interconnected nature of science as it is practiced and experienced in the real world.
2. The Next Generation Science Standards are student performance expectations – **NOT** curriculum.
3. The science concepts build coherently from K-12.
4. The NGSS focus on deeper understanding of content as well as application of content.
5. Science and Engineering are integrated in the NGSS from K–12.
6. NGSS content is focused on preparing students for the next generation workforce.
7. The NGSS and Common Core State Standards (English Language Arts and Mathematics) are **Aligned.**

NEXT GENERATION SCIENCE STANDARDS For States, By States

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Maryland and the NGSS: Where are We Going?

MARYLAND STATE DEPARTMENT OF EDUCATION Preparing World-Class Students

NEXT GENERATION SCIENCE STANDARDS For States, By States

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Maryland Next Generation Science Standards Implementation and Planning Document

PHASE 1 Spring 2013-2014 Exploration, Awareness, and Statewide Capacity Building	PHASE 2 2014-2015 Classroom Transitions, Shifts, and Practices	PHASE 3 2015-2016 Leveraging Materials, Resources, and Expertise	PHASE 4 2016-2017 Statewide Application, Assessment, and Coordination	PHASE 5 2017-2018 Full PreK-12 Implementation

ONGOING STATEWIDE COORDINATION AND COLLABORATION TO SUPPORT TEACHERS, SUPERVISORS, ADMINISTRATORS

Communication: MSDE, State Science Leadership Team, LEA Science Supervisors				
Develop common messages	General Outreach on Shifts	Ongoing Consistent messaging		
Statewide Capacity/Network Building: MSDE Programs; State Science Leadership Team; LEA Science Supervisors				
Identify existing expertise and gaps	Develop NGSS Support Networks	Ongoing Support of Leadership Network		
Professional Learning: MSDE Programs, State Science Leadership Team, LEA Science Supervisors, Teachers, Administrators, Informal Educators				
Identify professional learning needs: teachers, administrators, and informal educators – LEA Progress Updates	Professional Learning designed for all Stakeholders: Regular Updates at Maryland BOE meetings; Briefings, and IHE	Professional Learning: Implementation for teachers and administrators at all levels at CCRC ; Sessions – NGSS 101; EQuIP NGSS Rubric; Assessment; DL	Professional Learning: Implementation for Informal Educators and ongoing adaptation of Professional Learning	
Instructional Practices/Shifts: MSDE, State Science Leadership Team, LEA Science Supervisors, Teachers, Administrators, Informal Educators				
Focus on the Framework to inform development of PreK – 12 Scope and Sequence which incorporates the Science and Engineering Practices	Continue to focus on equity (all students) and integrating the Science and Engineering Practices and Cross Cutting Concepts	Focus on the integration of the 3 Dimensions (S and E Practices, Cross Cutting Concepts, and Disciplinary Core Ideas)	Instructional Shifts in place Statewide: development of Formative Assessments for use at varied levels	Assessments developed: beginning with classroom assessment and moving to monitoring (large-scale) assessment.
Instructional Materials and Curriculum: MSDE Programs, State Science Leadership Team, LEA Science Supervisors, Teachers				
Evaluate existing material using the EQuIP NGSS Rubric	Adapt existing materials and ongoing exploration of e-innovations	Evaluate newly developed material using the on an ongoing basis		
Assessment: MSDE Programs, LEAs , LEA Science Supervisor, Administrators, Teachers				
Align existing State assessments with NGSS (to the extent feasible)	Focus on developing classroom formative assessment systems	Participate in multi-state assessment consortium with NGSS adopted states		
Data: MSDE, LEAs , Administrators, Teachers				
Determine metrics to be tracked (e.g. course taking, student achievement) to inform instruction	Develop data collection plan for formative & summative assessments	Track and report science related data		
Policy Shifts: MBOE, MSDE, Legislature				
Identify policy changes needed to implement NGSS (e.g. Teacher Certification, Teacher Evaluation, assessments)	Consideration of Alternate Pathways, Early College Admission Program, Approved CTE or Other	Piloting Assessments		

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Outcomes

- Explained the reasons for building new science standards.
- Described the process and timeline for constructing the Framework and the NGSS.
- Described the structure of a standard within NGSS.
- Discussed the implications of the "shifts" in NGSS for teaching and learning.
- Examined instructional strategies that reflect the intent of NGSS.

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Exit Slip

- Write a message that describe the implications of the NGSS for teaching and learning in YOUR classroom.
  - Tweet
  - Message
  - Facebook

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Resources

A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (2012)

http://www.nap.edu/catalog.php?record_id=13165#

Developing Assessments for the Next Generation Science Standards

http://www.nap.edu/download.php?record_id=18409

NSTA

http://ngss.nsta.org/access-standards/

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Next Generation Science Standards
www.nextgenscience.org

National Academy of Sciences
http://sites.nationalacademies.org/dbasse/bose/framework_k12_science/index.htm

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