

Second Grade

The performance expectations in second grade help students formulate answers to questions such as: "How does land change and what are some things that cause it to change? What are the different kinds of land and bodies of water? How are materials similar and different from one another, and how do the properties of the materials relate to their use? What do plants need to grow? How many types of living things live in a place?" Second grade performance expectations include PS1, LS2, LS4, ESS1, ESS2, and ETS1 Disciplinary Core Ideas from the NRC Framework. Students are expected to develop an understanding of what plants need to grow and how plants depend on animals for seed dispersal and pollination. Students are also expected to compare the diversity of life in different habitats. An understanding of observable properties of materials is developed by students at this level through analysis and classification of different materials. Students are able to apply their understanding of the idea that wind and water can change the shape of the land to compare design solutions to slow or prevent such change. Students are able to use information and models to identify and represent the shapes and kinds of land and bodies of water in an area and where water is found on Earth. The crosscutting concepts of patterns; cause and effect; energy and matter; structure and function; stability and change; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. In the second grade performance expectations, students are expected to demonstrate gradeappropriate proficiency in developing and using models, planning and carrying out investigations, analyzing and interpreting data, constructing explanations and designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understanding of the core ideas.

- 2.Structure and Properties of Matter 2.Structure and Properties of Matter Students who demonstrate understanding can: 2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. [Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.1 2-PS1-2. Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.* [Clarification Statement: Examples of properties could include, strength, flexibility, hardness, texture, and absorbency.] [Assessment Boundary: Assessment of quantitative measurements is limited to length.] 2-PS1-3. Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object. [Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.] 2-PS1-4. Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot. [Clarification Statement: Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.] 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 **Crosscutting Concepts Disciplinary Core Ideas** Planning and Carrying Out Investigations PS1.A: Structure and Properties of Matter Patterns Planning and carrying out investigations to answer questions or Different kinds of matter exist and many of them can be Patterns in the natural and human test solutions to problems in K-2 builds on prior experiences and designed world can be observed. (2-PS1-1) either solid or liquid, depending on temperature. Matter progresses to simple investigations, based on fair tests, which can be described and classified by its observable **Cause and Effect** Events have causes that generate provide data to support explanations or design solutions. properties. (2-PS1-1) Plan and conduct an investigation collaboratively to produce Different properties are suited to different purposes. (2observable patterns. (2-PS1-4) Simple tests can be designed to gather data to serve as the basis for evidence to answer a question. PS1-2),(2-PS1-3) A great variety of objects can be built up from a small set evidence to support or refute student ideas (2-PS1-1) Analyzing and Interpreting Data of pieces. (2-PS1-3) about causes. (2-PS1-2) Analyzing data in K-2 builds on prior experiences and progresses to PS1.B: Chemical Reactions **Energy and Matter** collecting, recording, and sharing observations. Heating or cooling a substance may cause changes that Objects may break into smaller pieces and be put together into larger pieces, or Analyze data from tests of an object or tool to determine if it can be observed. Sometimes these changes are works as intended. (2-PS1-2) reversible, and sometimes they are not. (2-PS1-4) change shapes. (2-PS1-3) **Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in K-2 builds on prior experiences and progresses to the use of evidence and ideas Connections to Engineering, Technology, in constructing evidence-based accounts of natural phenomena and and Applications of Science designing solutions. Make observations (firsthand or from media) to construct an Influence of Engineering, Technology, evidence-based account for natural phenomena. (2-PS1-3) and Science on Society and the Natural **Engaging in Argument from Evidence** World
- Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and
- representations about the natural and designed world(s).
 Construct an argument with evidence to support a claim. (2-PS1-4)

Connections to Nature of Science

Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

 Scientists search for cause and effect relationships to explain 			
natural events. (2-PS1-4)			
Connections to other DCIs in second grader NIA			

Connections to other DCIs in second grade: N/A

Articulation of	^c DCIs across grade-levels: 4.ESS2.A (2-PS1-3); 5.PS1.A (2-PS1-1),(2-PS1-2),(2-PS1-3); 5.PS1.B (2-PS1-4); 5.LS2.A (2-PS1-3)
Common Core	e State Standards Connections:
ELA/Literacy -	-
RI.2.1	Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (2-PS1-4)
RI.2.3	Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-PS1-4)
RI.2.8	Describe how reasons support specific points the author makes in a text. (2-PS1-2),(2-PS1-4)
W.2.1	Write opinion pieces in which they introduce the topic or book they are writing about, state an opinion, supply reasons that support the opinion, use linking words (e.g., <i>because, and, also</i>) to connect opinion and reasons, and provide a concluding statement or section. (2-PS1-4)
W.2.7	Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-PS1-1),(2-PS1-2),(2-PS1-3)
W.2.8	Recall information from experiences or gather information from provided sources to answer a question. (2-PS1-1),(2-PS1-2),(2-PS1-3)
Mathematics -	-
MP.2	Reason abstractly and quantitatively. (2-PS1-2)
MP.4	Model with mathematics. (2-PS1-1),(2-PS1-2)
MP.5	Use appropriate tools strategically. (2-P51-2)
	Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (2-PS1-1),(2-PS1-2)

*The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

The section entitled "Disciplinary Core Ideas" is reproduced verbatim from A Framework for K-12 Science Education: Practices, Cross-Cutting Concepts, and Core Ideas. Integrated

Every human-made product is designed by

applying some knowledge of the natural

from the natural world. (2-PS1-2)

world and is built using materials derived

2.Interdependent Relationships in Ecosystems

2.Interdependent Relationships in Ecosystem	5					
Students who demonstrate understanding can:						
	o determine if plants need sunlight and water to g	row. [Assessment Boundary: Assessment				
is limited to testing one variable at a time.]						
2-LS2-2. Develop a simple model that mimics	s the function of an animal in dispersing seeds or p	ollinating plants.*				
2-LS4-1. Make observations of plants and an	imals to compare the diversity of life in different h	abitats. [Clarification Statement:				
Emphasis is on the diversity of living things in each of	of a variety of different habitats.] [Assessment Boundary: Assessment do	bes not include specific animal and plant				
names in specific habitats.]						
The performance expectations above were develo	pped using the following elements from the NRC document A Framework	for K-12 Science Education:				
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts				
 Developing and Using Models Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions. Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2) Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-LS2-1) Make observations (firsthand or from media) to collect data which can be used to make comparisons. (2-LS4-1) 	 LS2.A: Interdependent Relationships in Ecosystems Plants depend on water and light to grow. (2-LS2-1) Plants depend on animals for pollination or to move their seeds around. (2-LS2-2) LS4.D: Biodiversity and Humans There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1) ETS1.B: Developing Possible Solutions Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. <i>(secondary to 2-LS2-2)</i> 	 Cause and Effect Events have causes that generate observable patterns. (2-LS2-1) Structure and Function The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2) 				
Connections to Nature of Science						
Scientific Knowledge is Based on Empirical Evidence Scientists look for patterns and order when making						
observations about the world. (2-LS4-1)						
Connections to other DCIs in second grade: N/A						
	S3.A (2-LS2-1); K.ETS1.A (2-LS2-2); 3.LS4.C (2-LS4-1); 3.LS4.D (2-L	S4-1): 5.LS1.C (2-LS2-1): 5.LS2.A (2-LS2-				
2),(2-LS4-1)						
Common Core State Standards Connections:						
ELA/Literacy –						
W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-LS2-1),(2-LS4-1)						
W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-LS2-1),(2-LS4-1)						
SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and						
feelings. (2-LS2-2)						
Mathematics – MP.2 Reason abstractly and quantitatively. (2-LS2-1),(2-LS4-1)						
MP.2 Reason abstractly and quantitatively. $(2-LS2-1), (2-LS4-1)$ MP.4 Model with mathematics. $(2-LS2-1), (2-LS4-1)$						
MP.5 Use appropriate tools strategically. (2-LS2-1)						
2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare						
problems. (2-LS2-2),(2-LS4-1)	problems. (2-LS2-2),(2-LS4-1)					

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2.Earth's Systems: Processes that Shape the Earth

2.Earth's	2.Earth's Systems: Processes that Shape the Earth					
Students w	ho demonstrate understanding can:					
2-ESS1-1	L. Use information from several sou	rces to provide evidence that Earth events ca	an occur quickly or slowly.			
		d timescales could include volcanic explosions and earthquakes, v	which happen quickly and erosion of rocks, which			
		nent does not include quantitative measurements of timescales.]				
2-ESS2-1		ned to slow or prevent wind or water from c				
		could include different designs of dikes and windbreaks to hold be	ack wind and water, and different designs for using			
2-ESS2-2	shrubs, grass, and trees to hold back the land.]	e shapes and kinds of land and bodies of wate	ar in an area [Accossment Roundary			
2-1352-2	Assessment does not include quantitative scaling					
2-ESS2-3			e solid or liquid			
2-ESS2-3. Obtain information to identify where water is found on Earth and that it can be solid or liquid. The performance expectations above were developed using the following elements from the NRC document <i>A Framework for K-12 Science Education</i> :						
Scio	nce and Engineering Practices		Crosscutting Concepts			
		Disciplinary Core Ideas	Crosscutting concepts			
	and Using Models	ESS1.C: The History of Planet Earth	Patterns			
	-2 builds on prior experiences and progresses to	 Some events happen very quickly; others occur very cloudy, even a time period much langer than one can 	 Patterns in the natural world can be observed (2 ESC2 2) (2 ESC2 2) 			
	and developing models (i.e., diagram, drawing, a, diorama, dramatization, or storyboard) that	slowly, over a time period much longer than one can observe. (2-ESS1-1)	observed. (2-ESS2-2),(2-ESS2-3) Stability and Change			
	crete events or design solutions.	ESS2.A: Earth Materials and Systems	 Things may change slowly or rapidly. (2- 			
 Develop a 	model to represent patterns in the natural world.	 Wind and water can change the shape of the land. (2- 	ESS1-1),(2-ESS2-1)			
(2-ESS2-2		ESS2-1)				
	Constructing Explanations and Designing Solutions ESS2.B: Plate Tectonics and Large-Scale System Interactions In K-2 builds ESS2.B: Plate Tectonics and Large-Scale System Connections to Engineering, Technology,					
	iences and progresses to the use of evidence and	 Maps show where things are located. One can map the 	and Applications of Science			
	ructing evidence-based accounts of natural	shapes and kinds of land and water in any area. (2-ESS2-				
	nd designing solutions.	2)	Influence of Engineering, Technology, and			
	ervations from several sources to construct an	ESS2.C: The Roles of Water in Earth's Surface	Science on Society and the Natural World			
	based account for natural phenomena. (2-ESS1-1) multiple solutions to a problem. (2-ESS2-1)	 Processes Water is found in the ocean, rivers, lakes, and ponds. 	 Developing and using technology has impacts on the natural world. (2-ESS2-1) 			
	valuating, and Communicating Information	Water exists as solid ice and in liquid form. (2-ESS2-3)				
	aluating, and communicating information in K–2	ETS1.C: Optimizing the Design Solution				
	r experiences and uses observations and texts to	 Because there is always more than one possible solution 	Connections to Nature of Science			
communicate new information.		to a problem, it is useful to compare and test designs.	Science Addresses Questions About the			
 Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, 		(secondary to 2-ESS2-1)	Science Addresses Questions About the Natural and Material World			
icons), and other media that will be useful in answering a			 Scientists study the natural and material 			
	question. (2-ESS2-3)		world. (2-ESS2-1)			
	o other DCIs in second grade: 2.PS1.A (2-ESS2-3)					
	f DCIs across grade-levels: K.ETS1.A (2-ESS2-1); 3. [S1.B (2-ESS2-1); 4.ETS1.C (2-ESS2-1); 5.ESS2.A	LS2.C (2-ESS1-1); 4.ESS1.C (2-ESS1-1); 4.ESS2.A (2-ESS1-1),	(2-ESS2-1); 4.ESS2.B (2-ESS2-2); 4.ETS1.A (2-			
	e State Standards Connections:	(2 1352 1), 3.1352.0 (2 1352 2),(2 1352 3)				
ELA/Literacy -						
RI.2.1		e, when, why, and how to demonstrate understanding of key deta				
RI.2.3		al events, scientific ideas or concepts, or steps in technical proceed	dures in a text. (2-ESS1-1), <i>(2-ESS2-1)</i>			
RI.2.9 W.2.6	Compare and contrast the most important points presented by two texts on the same topic. (2-ESS2-1) With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (2-ESS1-1),(2-ESS2-3)					
W.2.7	Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-ESS1-1)					
W.2.8	Recall information from experiences or gather information from provided sources to answer a question. (2-ESS1-1),(2-ESS2-3)					
SL.2.2	Recount or describe key ideas or details from a text read aloud or information presented orally or through other media. (2-ESS1-1) Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and					
SL.2.5	Create audio recordings of stories or poems; add dra feelings. (2-ESS2-2)	awings of other visual displays to stories or recounts of experience	es when appropriate to clarify ideas, thoughts, and			
Mathematics ·						
MP.2	Reason abstractly and quantitatively. (2-ESS2-1),(2-ESS2-1),(2-ESS2-2)					
MP.4	Model with mathematics. (2-ESS1-1),(2-ESS2-1),(2-ESS2-2)					
MP.5 2.NBT.A	Use appropriate tools strategically. (2-ESS2-1)					
2.NBT.A.3						
2.MD.B.5	Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers)					
	and equations with a symbol for the unknown numb					

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K-2.Engineering Design

K-2.Engineering Design Students who demonstrate understanding can: K-2-ETS1-1. Ask guestions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. 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 Asking Questions and Defining Problems ETS1.A: Defining and Delimiting Engineering Problems Structure and Function Asking questions and defining problems in K-2 builds on prior A situation that people want to change or create can be The shape and stability of structures experiences and progresses to simple descriptive questions. approached as a problem to be solved through engineering. (K-2of natural and designed objects are ETS1-1) Ask questions based on observations to find more related to their function(s). (K-2information about the natural and/or designed world. (K-2-Asking guestions, making observations, and gathering information ETS1-2) ETS1-1) are helpful in thinking about problems. (K-2-ETS1-1) Define a simple problem that can be solved through the Before beginning to design a solution, it is important to clearly development of a new or improved object or tool. (K-2understand the problem. (K-2-ETS1-1) **ETS1.B:** Developing Possible Solutions ETS1-1) Designs can be conveyed through sketches, drawings, or physical **Developing and Using Models** models. These representations are useful in communicating ideas Modeling in K-2 builds on prior experiences and progresses to for a problem's solutions to other people. (K-2-ETS1-2) include using and developing models (i.e., diagram, drawing, **ETS1.C:** Optimizing the Design Solution physical replica, diorama, dramatization, or storyboard) that Because there is always more than one possible solution to a represent concrete events or design solutions. problem, it is useful to compare and test designs. (K-2-ETS1-3) Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2) Analyzing and Interpreting Data Analyzing data in K-2 builds on prior experiences and progresses to collecting, recording, and sharing observations. Analyze data from tests of an object or tool to determine if it works as intended. (K-2-ETS1-3) Connections to K-2-ETS1.A: Defining and Delimiting Engineering Problems include: Kindergarten: K-PS2-2, K-ESS3-2 Connections to K-2-ETS1.B: Developing Possible Solutions to Problems include: Kindergarten: K-ESS3-3, First Grade: 1-PS4-4, Second Grade: 2-LS2-2 Connections to K-2-ETS1.C: Optimizing the Design Solution include: Second Grade: 2-ESS2-1 Articulation of DCIs across grade-bands: 3-5.ETS1.A (K-2-ETS1-1), (K-2-ETS1-2), (K-2 -ETS1-3); 3-5.ETS1.B (K-2-ETS1-2), (K-2-ETS1-3); 3-5.ETS1.C (K-2-ETS1-1), (K-2-ETS1-2), (K-2-ETS1-2 2-ETS1-3) Common Core State Standards Connections: ELA/Literacy RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (K-2-ETS1-1) With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (K-2-ETS1-1),(K-2-ETS1-3) W.2.6 W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (K-2-ETS1-1), (K-2-ETS1-3) SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (K-2-ETS1-2) Mathematics 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (K-2-ETS1-1), (K-2-ETS1-3)