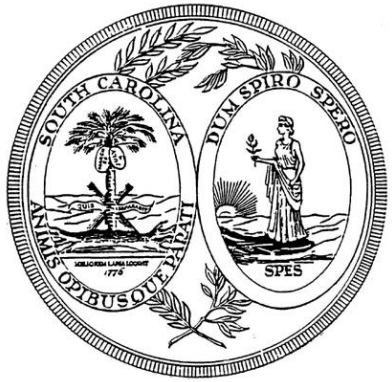
South Carolina Academic Standards and Performance Indicators for Science 2014



Instructional Unit Resource

2nd Grade

South Carolina Academic Standards and Performance Indicators for Science 2014
Second Grade Science Instructional Unit Resource

As support for implementing the *South Carolina Academic Standards and Performance Indicators for Science 2014*, the standards for Second Grade have been grouped into possible units. In the Overview of Units below, the titles for those possible units are listed in columns. Refer to the Overview document to note these unit titles and how Standards, Conceptual Understandings, Performance Indicators, Science and Engineering Practices, and Crosscutting Concepts align. Following the Overview of Units, an Instructional Unit document is provided that delivers guidance and possible resources in teaching our new *South Carolina Academic Standards and Performance Indicators for Science 2014*. The purpose of this document is to provide guidance as to how all the standards in this grade may be grouped into units and how those units might look. Since this document is merely guidance, districts should implement the standards in a manner that addresses the district curriculum and the needs of students. This document is a living document and instructional leaders from around the state will continuously update and expand these resource documents. These documents will be released throughout the 2016-2017 school year with the intentionality of staying ahead of instruction. Teachers should also note that links to the Standards document, A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas, the SEP Support Document, and the Support Document 2.0 are embedded throughout the Instructional Unit format for reference.

Acknowledgments

Jean Baptiste Massieu, famous deaf educator, made a statement that is now considered a French proverb. “Gratitude is the memory of the heart. Indeed, appreciation comes when you feel grateful from the depths of your heart. The head keeps an account of all the benefits you received and gave. But the heart records the feelings of appreciation, humility, and generosity that one feels when someone showers you with kindness.” It is with sincere appreciation that we humbly acknowledge the dedication, hard work and generosity of time provided by teachers and instructional leaders across the state that have made and are continuing to make the Instructional Unit Resources possible.

Grade 2 Overview of Units

Unit 1	Unit 2		Unit 3	Unit 4	
EARTH SCIENCE: WEATHER	PHYSICAL SCIENCE: SOLIDS AND LIQUIDS		PHYSICAL SCIENCE: EXPLORING PUSHES AND PULLS	LIFE SCIENCE: ANIMALS AND THEIR ENVIRONMENT	
Standard	**Standard**		**Standard**	**Standard.**	
2.E.2	2.P.3		2.P.4	2.L.5	
Conceptual Understanding	**Conceptual Understanding**		**Conceptual Understanding**	**Conceptual Understanding**	
2.E.2A	2.P.3A	2.P.3B	2.P.4A	2.L.5A	2.L.5B
Performance Indicators	**Performance Indicators**		**Performance Indicators**	**Performance Indicators**	
2.E.2A.1 2.E.2A.2 2.E.2A.3 2.E.2A.4	2.P.3A.1 2.P.3A.2 2.P.3A.3 2.P.3A.4	2.P.3B.1 2.P.3B.2 2.P.3B.3	2.P.4A.1 2.P.4A.2 2.P.4A.3 2.P.4A.4 2.P.4A.5	2.L.5A.1 2.L.5A.2 2.L.5A.3	2.L.5B.1 2.L.5B.2 2.L.5B.3 2.L.5B.4
***Science and Engineering Practices**	***Science and Engineering Practices**		***Science and Engineering Practices**	***Science and Engineering Practices**	
2.S.1A.2 2.S.1A.4 2.S.1A.8	2.S.1A.2 2.S.1A.3 2.S.1A.4 2.S.1A.7 2.S.1A.8		2.S.1A.2 2.S.1A.3 2.S.1A.4 2.S.1B.1	2.S.1A.2 2.S.1A.4 2.S.1A.6 2.S.1A.8	
***CrossCutting Concepts**	***CrossCutting Concepts**		***CrossCutting Concepts**	***CrossCutting Concepts**	
1, 2, 3, 7	1, 2, 5, 6		2, 3, 5, 7	1, 2, 5, 6, 7	

**Teachers have the discretion to enhance the selected SEPs and CCCs.*

Unit Title
Physical Science: Exploring Pushes and Pulls
Standard http://ed.sc.gov/scdoe/assets/file/agency/ccr/Standards-Learning/documents/South_Carolina_Academic_Standards_and_Performance_Indicators_for_Science_2014.pdf
Standard 2.P.4 The student will demonstrate an understanding of the effects of pushes, pulls, and friction on the motion of objects.

Conceptual Understanding
2.P.4A. An object that is not moving will only move if it is pushed or pulled. Pushes and pulls can vary in strength and direction and can affect the motion of an object. Gravity is a pull that makes objects fall to the ground. Friction is produced when two objects come in contact with each other and can be reduced if needed.
New Academic Vocabulary **Some students may need extra support with the following academic vocabulary in order to understand what they are being asked to understand and do. Teaching these terms in an instructional context is recommended rather than teaching the words in isolation. A great time to deliver explicit instruction for the terms would be during the modeling process. Ultimately, the student should be able to use the academic vocabulary in conversation with peers and teachers. These terms are pulled from the essential knowledge portion of the Support Doc 2.0 (http://ed.sc.gov/instruction/standards-learning/science/support-documents-and-resources/) and further inquiry into the terms can be found there.**

Direction	Friction	Gravity	Lubrication	Magnetism	Motion
Pull	Push	Rough surface	Smooth surface	Speed	Texture

Performance Indicators Text highlighted below in *orange* and *italicized/underlined* shows connections to SEP's.
2.P.4A.1 *Analyze and interpret data* from observations and measurements to compare the effects of different strengths and directions of pushing and pulling on the motion of an object. 2.P.4A.2 *Develop and use models* to exemplify the effects of pushing and pulling on an object. 2.P.4A.3 *Construct explanations* of the relationship between the motion of an object and the pull of gravity using observations and data collected. 2.P.4A.4 *Conduct structured investigations* to answer questions about the relationship between friction and the motion of objects. 2.P.4A.5 *Define problems* related to the effects of friction and *design possible solutions* to reduce the effects on the motion of an object.
***Science and Engineering Practices** **Support for the guidance, overviews of grade level progressions, and explicit details of each SEP can be found in the Science and Engineering Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf). It is important that teachers realize that the nine science**

and engineering practices are not intended to be used in isolation. Even if a performance indicator for a given standard only lists one of the practices as a performance expectation, scientists and engineers do not use these practices in isolation, but rather as part of an overall sequence of practice. When educators design the learning for their students, it is important that they see how a given performance expectation fits into the broader context of the other science and engineering practices. This will allow teachers to provide comprehensive, authentic learning experiences through which students will develop and demonstrate a deep understanding of scientific concepts.

2.S.1A.2 Develop and use models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.

2.S.1A.3 With teacher guidance, conduct structured investigations to answer scientific questions, test predictions and develop explanations: (1) predict possible outcomes, (2) identify materials and follow procedures, (3) use appropriate tools or instruments to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form. Use appropriate safety procedures.

2.S.1A.4 Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings.

2.S.1A.6 Construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of scientific investigations, or (3) data communicated in graphs, tables, or diagrams.

2.S.1B.1 Construct devices or design solutions to solve specific problems or needs: (1) ask questions to identify problems or needs, (2) ask questions about the criteria and constraints of the devices or solutions, (3) generate and communicate ideas for possible devices or solutions, (4) build and test devices or solutions, (5) determine if the devices or solutions solved the problem, and (6) communicate the results.

***Cross Cutting Concepts** **(http://www.nap.edu/read/13165/chapter/8)**

The link above provides support from the Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (2012) The text in blue and *italicized/underlined* below provides a brief explanation of how the specific content ties to the CCC's.

2. Cause and effect: Mechanism and explanation: The National Research Council (2012) states that "events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts" (p. 84). *Forces, such as gravity, friction and magnetism, can affect or change the motion of an object.*

3. Scale, proportion, and quantity: The National Research Council (2012) states that "in considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance" (p. 84). *The strength of a push or pull and the direction of a push or pull can affect the motion of an object.*

5. Energy and matter: Flows, cycles, and conservation: The National Research Council (2012) states that "Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations" (p. 84). *Magnetism, gravity, and friction are types of forces that can affect the motion of an object.*

7. Stability and change: The National Research Council (2012) states that "For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study" (p. 84). *The force of gravity is naturally present on objects.*

**Teachers have the discretion to enhance the selected SEP's and CCC's.*

Prior Knowledge
● N/A
Subsequent Knowledge
● 5.P.5 Motion of an object ● 5.P.5A.4 Friction

Possible Instructional Strategies/Lessons

Strategies and lessons that will enable students to master the standard and/or indicator.

- 2.P.4A.1
  - Physics on the Playground: Provides ideas on having students explore pushes and pulls on the playground. Students can make predictions, record observations, and construct explanations about pushes and pulls. http://www.scholastic.com/teachers/lesson-plan/physics-playground
- 2.P.4A.2
  - Exploring Pushes and Pulls: Students explore pushes and pulls using toys investigating motion, gravity, and friction. They will use observations and measurements to collect, analyze, and interpret data. http://rpsec.usca.edu/Workshops/SISSI/LessonPlans/PushesPulls/PushesPulls_LessonPlan.pdf
- 2.P.4A.3
  - Exploring Pushes and Pulls: Students explore pushes and pulls using toys investigating motion, gravity, and friction. They will use observations and measurements to collect, analyze, and interpret data. http://rpsec.usca.edu/Workshops/SISSI/LessonPlans/PushesPulls/PushesPulls_LessonPlan.pdf
- 2.P.4A.4
  - Exploring Friction: Students explore the force of friction on different materials. http://www.eia.gov/kids/resources/teachers/pdfs/FrictionElementary.pdf

- Racing Balloon Leprechauns: Students experiment with balloon rockets and observe the force and friction of air. http://www.housingaforest.com/racing-balloon-leprechauns/

- 2.P.4A.5
  - Super Fab Lab Investigation: Slide to the Side: Students investigate friction http://scetv.pbslearningmedia.org/resource/065af92f-83d3-497d-a1bf-2f323d82bc1b/065af92f-83d3-497d-a1bf-2f323d82bc1b/

Resources

- South Carolina's Virtual Library: This resource includes games, videos, learning activities, quizzes, BrainPopJr., and homework help. This resource can be found at: http://www.scdiscus.org/discus-kids

- BrainPop Educators: Multiple push and pull lessons. This resource is available at: https://educators.brainpop.com/bp-jr-topic/pushes-and-pulls/

- K12 Reader: This website provides a push and pull informational text and can be found at: http://www.k12reader.com/worksheet/push-and-pull/

- Physics Experiments for Kids: This website provides different push and pull activities for students to complete. This resource can be found at: http://www.weareteachers.com/blogs/post/2014/09/16/simple-physics-experiments-for-kids-pushing-and-pulling

- Gravity Video: This five-minute video describes the earth's gravitational pull. https://www.youtube.com/watch?v=4ij5OgJatgc

- School Tube Video: This Bill Nye video on gravity can be found at: http://www.schooltube.com/video/9d2282cbc5684091a143/Bill%20Nye%20Gravity

- School House Rock video: This gravity video can be found at: https://www.youtube.com/watch?v=yHFtk6Si0Fk

- Paper Helicopters: Students create paper helicopters and observe the force of gravity. This resource can be found at:

https://www.exploratorium.edu/science_explorer/roto-copter.html

Sample Formative Assessment Tasks/Questions

Additional sample formative assessment tasks/questions for grade bands are located at the end of each of the SEP Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf)

- Dragon Racer Challenge: Students use their knowledge gained and experience with the Exploring Friction activity to create the fastest Dragon Racer. Scoring guide also included on website. http://www.cape.k12.mo.us/blanchard/hicks/news%20pages/scienceforce.htm#Friction

- The Marble Challenge: Students use their knowledge gained and experience with the Exploring Pushes and Pulls activities to demonstrate that force has an effect on the motion of marbles. Scoring guide also included on website. http://www.cape.k12.mo.us/blanchard/hicks/news%20pages/scienceforce.htm#PushPull

- Centers/Demonstration Stations: Students use their knowledge gained to demonstrate the effects of pushing and pulling on an object, relationship between the motion of an object, the pull of gravity using observations, and how friction affects objects on motion. At each station, the students explain their thought processes in their science journal. http://www.fortheteachers.org/instructional_strategies/

- Drawings over Time: Students use drawings to assist in constructing explanations of force and motion concepts at different points in the unit. http://www.nsta.org/publications/news/story.aspx?id=53299

- Windshield Check: Students use the windshield analogy to indicate their level of understanding of concepts learned by placing a sticky note on the windshield. Levels include; crystal clear, foggy, and muddy. https://mrsridgeway.wordpress.com/2012/04/30/the-windshield-formative-assessment/

- Graffiti Wall: Students write down or draw pictures of what they have learned about force and motion on a large piece of paper posted on the wall. Students can add to the wall and reflect on their learning through the remainder of the unit. https://sites.google.com/a/eusd.org/kjosephson/home/formative-assessment/graffiti-wall

References

Ahrens, L. (Writer). (1978). *Schoolhouse rock: A victim of gravity* [Video file]. Retrieved September 21, 16, from https://www.youtube.com/watch?v=yHFtk6Si0Fk

Bill Nye Gravity. (n.d.). Retrieved September 21, 2016, from http://www.schooltube.com/video/9d2282cbc5684091a143/Bill%20Nye%20Gravity

Bittman, E. (n.d.) Simple physics experiments for kids: Pushing and pulling. Retrieved October 7, 2016, from http://www.weareteachers.com/blogs/post/2014/09/16/simple-physics-experiments-for-kids-pushing-and-pulling

Finton, N. (2016). Physics on the playground. Retrieved September 21, 2016, from http://www.scholastic.com/teachers/lesson-plan/physics-playground

Josephson, K. (n.d.). Graffiti Wall. Retrieved October 14, 2016, from https://sites.google.com/a/eusd.org/kjosephson/home/formative-assessment/graffiti-wall

Level, B. G. (n.d.). Discus Kids. Retrieved September 21, 2016, from http://www.scdiscus.org/discus-kids

Make me genius. (n.d.). Gravity. Retrieved September 21, 16, from https://www.youtube.com/watch?v=4ij5OgJatgc

National Research Council. A Framework for k-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas. Washington, DC: The National Academies Press, 2012. doi: 10.17226/13165.

National Science Teachers Association - NSTA. (n.d.). Books & Resources. Retrieved October 14, 2016, from http://www.nsta.org/publications/news/story.aspx?id=53299

Push and pull: Cross curricular focus: Physical science. (n.d.). Retrieved October 14, 16, from http://www.k12reader.com/worksheet/push-and-pull/view/

Pushes and Pulls. (n.d.). BrainPop Educators. (n.d.). Retrieved October 7, 2016, from https://educators.brainpop.com/bp-jr-topic/pushes-and-pulls/

Racing Balloon Leprechauns. (n.d.). Retrieved September 21, 2016, from http://www.housingaforest.com/racing-balloon-leprechauns/

Roto-copter. (1997). Retrieved October 8, 16, from https://www.exploratorium.edu/science_explorer/roto-copter.html

Ruth Patrick Science Center at University of South Carolina (2014). Exploring Pushes and Pulls. Retrieved September 21, 2016 from http://rpsec.usca.edu/Workshops/SISSI/LessonPlans/PushesPulls/PushesPulls_LessonPlan.pdf

Says, J. (2016). Instructional Strategies. Retrieved October 14, 2016, from http://www.fortheteachers.org/instructional_strategies/

Science: Force and motion. (n.d.). Retrieved September 21, 16, from http://www.cape.k12.mo.us/blanchard/hicks/news%20pages/scienceforce.htm#Lessons

Science: Push and pull. (n.d.). Retrieved September 21, 16, from http://www.cape.k12.mo.us/blanchard/hicks/news%20pages/scienceforce.htm#Lessons

Slide to the side: Sid the science id. (n.d.). Retrieved September 21, 2016, from http://scetv.pbslearningmedia.org/resource/065af92f-83d3-497d-a1bf-2f323d82bc1b/065af92f-83d3-497d-a1bf-2f323d82bc1b

South Carolina Department of Education. (2014). South Carolina Academic Standards and Performance Indicators for Science 2014. [PDF document]. Retrieved July 13, 2016, from http://ed.sc.gov/scdoe/assets/file/agency/ccr/Standards-Learning/documents/South_Carolina_Academic_Standards_and_Performance_Indicators_for_Science_2014.pdf

U.S. Energy Information Administration. Elementary Exploration: Friction. (n.d.). Retrieved September 21, 2016, from http://www.eia.gov/kids/resources/teachers/pdfs/FrictionElementary.pdf

The windshield formative assessment. (2012). Retrieved October 14, 2016, from https://mrsridgeway.wordpress.com/2012/04/30/the-windshield-formative-assessment/