

4. Energy

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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 on 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.]

4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. [Clarification Statement: Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; non-renewable energy resources are fossil fuels and fossil materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels.]

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

Science and Engineering Practices

Asking Questions and Defining Problems

Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying quantitative relationships.

- Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. (4-PS3-3)

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

- Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (4-PS3-2)

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

- Use evidence (e.g., measurements, observations, patterns) to construct an explanation. (4-PS3-1)
- Apply scientific ideas to solve design problems. (4-PS3-4)

Obtaining, Evaluating, and Communicating Information

Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluate the merit and accuracy of ideas and methods.

- Obtain and combine information from books and other reliable media to explain phenomena. (4-ESS3-1)

Connections to other DCIs in fourth grade: None

Assessment of DCIs across grade-levels: **MS-PS2-3** (4-PS3-3); **MS-PS3-1** (4-PS3-4); **MS-PS3-2** (4-PS3-4); **MS-PS3-3** (4-PS3-4); **MS-PS3-4** (4-PS3-4); **MS-PS3-5** (4-PS3-4); **MS-PS3-6** (4-PS3-4); **MS-PS3-7** (4-PS3-4); **MS-PS3-8** (4-PS3-4); **MS-PS3-9** (4-PS3-4); **MS-PS3-10** (4-PS3-4); **MS-PS3-11** (4-PS3-4); **MS-PS3-12** (4-PS3-4); **MS-PS3-13** (4-PS3-4); **MS-PS3-14** (4-PS3-4); **MS-PS3-15** (4-PS3-4); **MS-PS3-16** (4-PS3-4); **MS-PS3-17** (4-PS3-4); **MS-PS3-18** (4-PS3-4); **MS-PS3-19** (4-PS3-4); **MS-PS3-20** (4-PS3-4); **MS-PS3-21** (4-PS3-4); **MS-PS3-22** (4-PS3-4); **MS-PS3-23** (4-PS3-4); **MS-PS3-24** (4-PS3-4); **MS-PS3-25** (4-PS3-4); **MS-PS3-26** (4-PS3-4); **MS-PS3-27** (4-PS3-4); **MS-PS3-28** (4-PS3-4); **MS-PS3-29** (4-PS3-4); **MS-PS3-30** (4-PS3-4); **MS-PS3-31** (4-PS3-4); **MS-PS3-32** (4-PS3-4); **MS-PS3-33** (4-PS3-4); **MS-PS3-34** (4-PS3-4); **MS-PS3-35** (4-PS3-4); **MS-PS3-36** (4-PS3-4); **MS-PS3-37** (4-PS3-4); **MS-PS3-38** (4-PS3-4); 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Next Generation Science Standards NGSS Lead States, 2013-09-15 Next Generation Science Standards identifies the science all K-12 students should know. These new standards are based on the National Research Council's A Framework for K-12 Science Education. The National Research Council, the National Science Teachers Association, the American Association for the Advancement of Science, and Achieve have partnered to create standards through a collaborative, state-led process. The standards are rich in content and practice and arranged in a coherent manner across disciplines and grades to provide all students an internationally benchmarked science education. The print version of Next Generation Science Standards complements the nextgenscience.org website and provides an authoritative offline reference to the standards when creating lesson plans. Arranged by grade level and by core discipline, making information quick and easy to find. Printed in full color with a lay flat spiral binding. Allows for bookmarking, highlighting, and annotating.

STEM Road Map Carla C. Johnson, Erin E. Peters-Burton, Tamara J. Moore, 2015-07-03 STEM Road Map A Framework for Integrated STEM Education is the first resource to offer an integrated STEM curricula encompassing the entire K-12 spectrum with complete grade level learning based on a spiraled approach to building conceptual understanding. A team of over thirty STEM education professionals from across the U.S. collaborated on the important work of mapping out the Common Core standards in mathematics and English language arts, the Next Generation Science Standards performance expectations, and the Framework for 21st Century Learning into a coordinated integrated STEM education curriculum map. The book is structured in three main parts: Conceptualizing STEM, STEM Curriculum Maps, and Building Capacity for STEM, designed to build common understandings of integrated STEM. Provide rich curriculum maps for implementing integrated STEM at the classroom level and supports to enable systemic transformation to an integrated STEM approach. The STEM Road Map places the power into educators' hands to implement integrated STEM learning within their classrooms without the need for extensive resources, making it a reality for all students.

Measuring What We Do in Schools Victoria L. Bernhardt, 2017-06-06 What is a true learning organization and how can your school become one? To excel, schools must embrace continuous school improvement and evaluation as well as systems thinking. In *Measuring What We Do in Schools*, author Victoria L. Bernhardt details the critical role program evaluation serves in school success and how to implement meaningful evaluations that make a difference. She provides a roadmap of how to conduct comprehensive, systemwide evaluations of programs and processes, the tools needed to obtain usable, pertinent information, and how to use these data to expand teachers' and administrators' data-informed decision making focus. Educators will learn how to Assess what is working and not working for students, Determine which processes need to change, Use data to improve practices on an ongoing basis. Although challenging for many schools, program evaluation and data analysis can begin with a single program or process over time, building on the expanded knowledge of the school's processes and the results they produce. An effective tool, The Program Evaluation Tool enables schools to easily

identify the purpose and intended outcomes of any school program along with whom it serves and how it should be implemented monitored and evaluated These data can then be used to improve every aspect of a school s programs and processes and the outcomes achieved Filled with practical strategies and featuring an in depth case study this book is designed to help educators see that evaluation work is logical and easy to do They ll gain the confidence to do this work on a regular basis working together to become a true learning organization **STEM Road Map 2.0** Carla C. Johnson,Erin E. Peters-Burton,Tamara J. Moore,2021-03-10 Featuring a team of over thirty STEM education professionals from across the United States the updated and revised edition of this landmark book provides an integrated STEM curriculum encompassing the entire K 12 spectrum with complete grade level learning based on a spiraled approach to building conceptual understanding Taking into account the last five years of evolution in STEM education the second edition includes an increased focus on computer science computational thinking mathematics and the arts as well as cultural relevance and addressing the needs of diverse learners and underrepresented students Divided into three main parts Conceptualizing STEM STEM Curriculum Maps and Building Capacity for STEM each section is designed to build common understandings of integrated STEM provide rich curriculum maps for implementing integrated STEM at the classroom level and offer supports to enable systemic transformation to an integrated STEM approach Written for teachers policymakers and administrators this second edition is fully updated to account for the needs of K 12 learners in the innovation age STEM Road Map 2 0 enables educators to implement integrated STEM learning into their classroom without the need for extensive resources empowering educators and supporting students *Visual Learning and Teaching* Susan Daniels,2020-02-17 A

comprehensive guide to visual learning strategies with easy to use activities Emojis avatars icons Our world is becoming increasingly reliant on visual communication Yet our classrooms still heavily focus on traditional oral and written instruction In this first of its kind resource Dr Susan Daniels channels over twenty years of research and experience into a comprehensive guide of visual learning strategies that enable educators to rise to the challenges of 21st century education no matter what age range they serve within the K 8 population This hands on resource helps educators create a visual toolbox of tools that promote visual literacy across the curriculum and it offers interactive activities to encourage visual learning and communication in all students via mind maps and visual journals Drawing on her experience working with gifted creative and twice exceptional children Dr Susan Daniels has created visual learning strategies that all children can benefit from Digital content includes customizable forms and examples of completed forms as well as a PDF presentation for professional development [A Pedagogical Design for Human Flourishing](#) Cynthia McCallister,2022-03-28 In A Pedagogical Design for Human Flourishing Transforming Schools with the McCallister Model Cynthia McCallister presents a revolutionary paradigm for education that is practical conceptually convincing and grounded in contemporary behavioral science theory Beginning with the assertion that equality of educational opportunity depends on access to experiences that

are sufficiently appropriate and rich to enable the achievement of diverse human potentials she provides a comprehensive school design for intervention that demonstrates how to achieve it Grounded in recent advances in learning science McCallister asserts three necessary conditions for learning the need for learners to have access to diverse rich environmental experiences the need for them to enjoy fundamental freedom and autonomy to direct their own learning and access to full and free forms of association In her model these conditions provide what is necessary for learners to coordinate their minds with others to develop their identities personalities and talents These conditions are animated in concrete procedures that can be adapted to a wide variety of populations in formal informal and remote educational settings The procedures take the form of rules that learners comply with in the exercise of their freedom When they are followed the rules provide a grammar for the social norms that govern the moral worlds of learners and compel them to flourish Tested over two decades in her work as a teacher scholar and school reformer in more than 20 NYC public schools the McCallister Method has delivered an innovative and disruptive approach to schooling that has proven successful in finally transforming low performing industrial schools into 21st century learning organizations Online support material includes assessments records surveys and more to be used in school design and classroom settings

STEM Road Map Carla C. Johnson,Erin E. Peters-Burton,Tamara J.

Moore,2015-07-03 STEM Road Map A Framework for Integrated STEM Education is the first resource to offer an integrated STEM curricula encompassing the entire K 12 spectrum with complete grade level learning based on a spiraled approach to building conceptual understanding A team of over thirty STEM education professionals from across the U S collaborated on the important work of mapping out the Common Core standards in mathematics and English language arts the Next Generation Science Standards performance expectations and the Framework for 21st Century Learning into a coordinated integrated STEM education curriculum map The book is structured in three main parts Conceptualizing STEM STEM Curriculum Maps and Building Capacity for STEM designed to build common understandings of integrated STEM provide rich curriculum maps for implementing integrated STEM at the classroom level and supports to enable systemic transformation to an integrated STEM approach The STEM Road Map places the power into educators hands to implement integrated STEM learning within their classrooms without the need for extensive resources making it a reality for all students

Integrated Curriculum H. Lynn Erickson,Association for Supervision and Curriculum Development,2003 *The Essential Middle School* Jon Wiles,Joseph Bondi,1993

Learning Science: Theory, Research, and Practice Robert S.

Feldman,2019-08-09 Cutting edge insights and perspectives from today s leading minds in the field of learning science The discipline of learning science is fast becoming a primary approach for answering one of the most important questions of our time How do we most effectively educate students to reach their full potential Spanning the disciplines of psychology data science cognitive science sociology and anthropology Learning Science offers solutions to our most urgent educational challenges Composed of insightful essays from top figures in their respective fields the book also shows how a thorough

understanding of this critical discipline all but ensures better decision making when it comes to education Chapters include Exploring Student Interactions in Collaborative Problem Solving with a Multimodal Approach Learning Science Research Through a Social Science Lens Semantic Representation Analysis and its Application in Conversation based Intelligent Tutoring Systems Advancing the Relationship Between Learning Sciences and Teaching Practice Advancing the State of Online Learning Stay Integrated Stay Accessible Stay Curious Designing Immersive Authentic Simulations that Enhance Motivation and Learning High School OER STEM Lessons Leading to Deep Learning For Students and Teachers How to Increase Learning While Not Decreasing the Fun in Educational Games Whether you're creating curricula developing policies or educating students in a classroom setting Learning Science delivers the knowledge insight and inspiration you need to do your part to ensure every student meets his or her full potential **Using Data, Getting Results** Nancy Love,2002

Mapping the Social Landscape: Readings in Sociology Susan J Ferguson,2007-02-23 Drawing from a wide selection of classic and contemporary works the 60 selections in this best selling reader represent a plurality of voices and views within sociology In addition to classic works by authors such as Karl Marx Max Weber C Wright Mills David Rosenhan Kingsley Davis and Wilbert Moore this anthology presents a wide range of contemporary scholarship some of which provides new treatments of traditional concepts By integrating issues of diversity throughout the book Ferguson helps students see the inter relationships of race social class and gender and the ways in which they have shaped the experiences of all people in society *Current Index to Journals in Education* ,2002 **Surveying and Mapping** ,1975 *Evaluation of the Magnet Schools Assistance Program, 1998 Grantees* ,2003 **Book of Abstracts** ,1995 INET'95 Conference Proceedings ,1995

The New York Times Index ,2005 Nature Sir Norman Lockyer,1874 Report of the Committee of Council on Education (England and Wales), with Appendix Great Britain. Council on Education,1897

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