SEPUP
Issue-Oriented Science

Issues, Evidence, and You

GRADE 8  NORTH CAROLINA EDITION

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GRADE 8 NORTH CAROLINA EDITION

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

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Experiencing Science

ISSUES, EVIDENCE, AND YOU · GRADE 6, NORTH CAROLINA EDITION

Studying Soil Scientifically
Plate Tectonics
The Earth in Space
Exploring Space
Waves
Studying Materials Scientifically
Focus Activities

ISSUES, EVIDENCE, AND YOU · GRADE 7, NORTH CAROLINA EDITION

Body Works
Cell Biology and Disease
Genetics
Energy
Force and Motion
Weather and Atmosphere
Focus Activity

ISSUES, EVIDENCE, AND YOU · GRADE 8, NORTH CAROLINA EDITION

The Chemistry of Materials
Water
Energy
Ecology
Evolution
Bioengineering
Focus Activities

The Focus Activities contain North Carolina focus lessons for Units C, Water, and E, Ecology. Lessons 39A, 39B, 41A, and 81A are copyright ©2015 LAB-AIDS and are used with permission.

Additional SEPUP instructional materials include:
SEPUP Modules: Grades 6–12
Science and Sustainability: Course for Grades 9–12
Science and Global Issues—Biology: Course for High School Biology

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SEPUP
Lawrence Hall of Science
University of California at Berkeley
Berkeley CA 94720-5200

e-mail: sepup@berkeley.edu
Website: www.sepuplhs.org

17 Colt Court
Ronkonkoma NY 11779
Website: www.lab-aids.com

This student book is a compilation of SEPUP publications, customized to align to the North Carolina Essential Standards for science, Grade 7. The sequence of units provided below indicates the order that they appear in this publication.

From *Issues and Physical Science:*

The Chemistry of Materials

From *Issues and Physical Science:*

Water

From *Issues and Physical Science:*

Energy

From *Issues and Life Science:*

Ecology

From *Issues and Life Science:*

Evolution

From *Issues and Life Science:*

Bioengineering

Focus Activities

NORTH CAROLINA
RECOMMENDED SCOPE AND SEQUENCE

The recommended scope and sequence for grade 8 is displayed in the following tables. Additional activities have been included along with an estimated instructional time that does not include assessment, note-booking, or review time.

UNIT	NC STANDARD	ESTIMATED TIME
The Chemistry of Materials When you buy a new product, do you think about what materials it is made of? How it was manufactured? What will happen to it when you no longer have a use for it? In this unit you will consider these questions as you investigate the chemistry of materials. With this information, you will be able to analyze the environmental impact of a product and decide which products to purchase. *Issue Focus:* Would you pay more for a "green" computer? **SCIENCE CONCEPTS:** • Physical and chemical properties • Elements and compounds • The Periodic Table • Chemical reactions • Chemistry of materials • Conservation of mass	8.P.1.1 8.P.1.2 8.P.1.3 8.P.1.4	7 weeks
Water In this unit you will investigate the interesting physical and chemical properties of water, what happens to substances once they are dissolved in water, and chemical testing for contaminants. *Issue Focus:* What are risks to healthy drinking water? **SCIENCE CONCEPTS:** • Water quality • Elements and compounds • Atoms and molecules • Mixtures and solutions • Solubility • Particle theory of matter • Acids and bases This unit also includes three activities in the "Focus Activities" section at the back of the student book, numbered 39A, 39B, and 41A, continuing the storyline in the Water unit. These were developed to exactly match standards 8.E.1.1, 8.E.1.2, and 8.E.1.3.	8.E.1.1 8.E.1.2 8.E.1.3 8.E.1.4	9 weeks

UNIT	NC STANDARD	ESTIMATED TIME
Energy* In this unit, you will learn about the transfer and transformation of energy in our everyday lives. By exploring how energy can be used more efficiently at home, you will learn the answers to some puzzling questions: Where does all the energy around us come from? Are there different types? Does it ever run out? How does it get from one place to another? *Issue focus:* How can I design an energy-efficient home? **SCIENCE CONCEPT:** • Renewable and nonrenewable energy * The Energy unit appears in both the 7th and 8th grade programs, to meet NCES instructional requirements.	8.P.2.1 8.P.2.2	3 weeks
Ecology What are the relationships between an organism and its environment? What effect do humans have on these relationships? In this unit, you will explore ecology: the study of relationships between organisms, including humans, and the environment. *Issue focus:* Can ecosystems be harmed by introducing a new species? **SCIENCE CONCEPTS:** • Introduced species • Classification • Energy flow in food webs • Populations • Habitats • Producers and consumers • Carrying capacity This unit also includes one activity in the Focus Activities section at the back of the student book. Activity 81A continues the storyline in the Ecology unit. This was developed to exactly match standard 8.L.5.1.	8.L.3.1 8.L.3.2 8.L.3.3 8.L.5.1	7 weeks
Evolution Have you ever wondered about the amazing variety of organisms on Earth? How did they evolve? How are they related? Just as historians study the history of humans, some scientists study the history of life on Earth. They do this by gathering evidence, making connections, creating models, and testing theories. In this unit, you will learn to interpret the many sources of evidence that exist for the evolution of life on Earth. *Issue focus:* Should we bring extinct species back? **SCIENCE CONCEPTS:** • Adaptation • Endangered species • Extinction • Fossil record • Geological time • Law of superposition • Natural selection	8.E.2.1 8.E.2.2 8.L.4.1 8.L.4.2	5 weeks

UNIT	NC STANDARD	ESTIMATED TIME
Bioengineering Investigate the ways in which humans use tools and ideas to adapt to the external environment. They construct artificial heart valves, artificial bones, and a mechanical "arm." Students evaluate and revise their prototypes as they explore the design process. The contributions of various individuals to the fields of science and technology are presented and discussed. *Issue focus:* How would you design replacement artificial limbs? **SCIENCE CONCEPTS:** • Invention • Prototypes • Structure and function • Calories and exercise • Mechanical engineering	8.L.2.1 8.L.5.2	5 weeks
Total of six units	8/9 standards = meets 91%* *Standard 8.L.1 is actually met in 7th grade as students complete the Cell Biology and Disease unit.	Total of 36 weeks

NORTH CAROLINA SCIENCE STANDARDS	SEPUP	
	LOCATION: UNIT TITLE AND ACTIVITY NUMBER	TARGET ASSESSMENT QUESTIONS BY ACTIVITY
MATTER: PROPERTIES AND CHANGE		
8.P.1 Understand the properties of matter and changes that occur when matter interacts in an open and closed container.		
8.P.1.1 Classify matter as elements, compounds, or mixtures based on how the atoms are packed together in arrangements.	Chemistry of Materials 15–16	15 Q5: UC 16 Quick Check
8.P.1.2 Explain how the physical properties of elements and their reactivity have been used to produce the current model of the Periodic Table of elements.	Chemistry of Materials 15–16	15 Q5: UC 16 Quick Check
8.P.1.3 Compare physical changes such as size, shape and state to chemical changes that are the result of a chemical reaction to include changes in temperature, color, formation of a gas or precipitate.	Chemistry of Materials 19, 27–28 Water 45, 50	19 Proc: OD 27Q2: CS, Q3: ET 28 Q3: ET 50 Q5: UC
8.P.1.4 Explain how the idea of atoms and a balanced chemical equation support the law of conservation of mass.	Chemistry of Materials 25	25 Q2
ENERGY: CONSERVATION AND TRANSFER		
8.P.2 Explain the environmental implications associated with the various methods of obtaining, managing, and using energy resources.		
8.P.2.1 Explain the environmental consequences of the various methods of obtaining, transforming and distributing energy.	Energy 70–71	71 Q1: UC
8.P.2.2 Explain the implications of the depletion of renewable and nonrenewable energy resources and the importance of conservation.	Energy 64	64 Q3: ET, Q4: AD

NORTH CAROLINA SCIENCE STANDARDS	SEPUP	
	LOCATION: UNIT TITLE AND ACTIVITY NUMBER	TARGET ASSESSMENT QUESTIONS BY ACTIVITY
EARTH SYSTEMS, STRUCTURES AND PROCESSES		
8.E.1 Understand the hydrosphere and the impact of humans on local systems and the effects of the hydrosphere on humans.		
8.E.1.1 Explain the structure of the hydrosphere including: • Water distribution on earth • Local river basins and water availability	Water 43 Water 39A Focus Activity at back of book Also found in 7th grade Weather & Atmosphere 54, 62	54 Q2 39A Q1–7
8.E.1.2 Summarize evidence that Earth's oceans are a reservoir of nutrients, minerals, dissolved gases, and life forms: • Estuaries • Marine ecosystems • Upwelling • Behavior of gases in the marine environment • Value and sustainability of marine resources • Deep ocean technology and understandings gained	Water 39B Focus Activity at back of book	39B Q1–5
8.E.1.3 Predict the safety and potability of water supplies in North Carolina based on physical and biological factors, including: • Temperature • Dissolved oxygen • pH • Nitrates and phosphates • Turbidity • Bio-indicators	Water 41, 44, 47 Water 41A Focus Activity at back of book	41A Q1–2
8.E.1.4 Conclude that the good health of humans requires: • Monitoring of the hydrosphere • Water quality standards • Methods of water treatment • Maintaining safe water quality • Stewardship	Water 34, 39–43; 51–52	34 Q1: UC 39 Q6 41 Q2: AD 42 Q1–5

NORTH CAROLINA SCIENCE STANDARDS	SEPUP	
	LOCATION: UNIT TITLE AND ACTIVITY NUMBER	TARGET ASSESSMENT QUESTIONS BY ACTIVITY
EARTH HISTORY		
8.E.2 Understand the history of Earth and its life forms based on evidence of change recorded in fossil records and landforms.		
8.E.2.1 Infer the age of Earth and relative age of rocks and fossils from index fossils and ordering of rock layers (relative dating and radioactive dating).	Evolution 90–92	90 Q3: SI 91 Q3: UC
8.E.2.2 Explain the use of fossils, ice cores, composition of sedimentary rocks, faults, and igneous rock formations found in rock layers as evidence of the history of the Earth and its changing life forms.	Evolution 93	93 Q4: UC
STRUCTURES AND FUNCTIONS OF LIVING ORGANISMS		
8.L.1 Understand the hazards caused by agents of diseases that effect living organisms.		
8.L.1.1 Summarize the basic characteristics of viruses, bacteria, fungi and parasites relating to the spread, treatment and prevention of disease.	Found in 7th grade Cell Biology & Disease 45	45 Q1, 2, 4
8.L.1.2 Explain the difference between epidemic and pandemic as it relates to the spread, treatment and prevention of disease.	Found in 7th grade Cell Biology & Disease 30–33, 53	30 Q3 32 Q5: ET; 53 Q3: ET
8.L.2 Understand how biotechnology is used to affect living organisms.		
8.L.2.1 Summarize aspects of biotechnology including: • Specific genetic information available • Careers • Economic benefits to North Carolina • Ethical issues • Implications for agriculture	Bioengineering 108 Also found in 7th grade Genetics 67–71	69 Q1–3 70 Q2: RE, SI 71 Q2: ET
ECOSYSTEMS		
8.L.3 Understand how organisms interact with and respond to the biotic and abiotic components of their environment.		
8.L.3.1 Explain how factors such as food, water, shelter and space affect populations in an ecosystem.	Ecology 77, 84–87	77 Q4, 6: AD 84 Q3: OD, AD 85 Q1: AD

NORTH CAROLINA SCIENCE STANDARDS	SEPUP	
	LOCATION: UNIT TITLE AND ACTIVITY NUMBER	TARGET ASSESSMENT QUESTIONS BY ACTIVITY
8.L.3.2 Summarize the relationships among producers, consumers, and decomposers including the positive and negative consequences of such interactions including: • Coexistence and cooperation • Competition (predator/prey) • Parasitism • Mutualism	Ecology 79–81, 84	84 Q3: OD, AD
8.L.3.3 Explain how the flow of energy within food webs is interconnected with the cycling of matter (including water, nitrogen, carbon dioxide and oxygen).	Ecology 80–82 Ecology 81A Focus Activity at back of book	80 Q3 81Q5 81A Q1–5
EVOLUTION AND GENETICS		
8.L.4 Understand the evolution of organisms and landforms based on evidence, theories and processes that impact the Earth over time.		
8.L.4.1 Summarize the use of evidence drawn from geology, fossils, and comparative anatomy to form the basis for biological classification systems and the theory of evolution.	Evolution 94, 98–100	100 Q1–3
8.L.4.2 Explain the relationship between genetic variation and an organism's ability to adapt to its environment.	Evolution 95–97	95 Q4, 5 96 Q3, 4
MOLECULAR BIOLOGY		
8.L.5 Understand the composition of various substances as it relates to their ability to serve as a source of energy and building materials for growth and repair of organisms.		
8.L.5.1 Summarize how food provides the energy and the molecules required for building materials, growth and survival of all organisms (to include plants).	Ecology 79–82 Ecology 81A Focus Activity at back of book Energy 63 Also found in 7th grade Body Works 14–16	80 Q3 81 Q5 82 Q5–6 81A Q1–5 63 Q5 16 Q3
8.L.5.2 Explain the relationship among a healthy diet, exercise, and the general health of the body (emphasis on the relationship between respiration and digestion).	Bioengineering 107 Also found in 7th grade Body Works 14–15, 19, 28	107 Q4, Q5 and Extensions 14 Q2 15 Q4