



Physical Science with Earth Science

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STANDARDS	PAGE REFERENCES
I. HISTORY AND NATURE OF SCIENCE	
A. Scientific World View The student will understand the nature of scientific ways of thinking and that scientific knowledge changes and accumulates over time.	
1. The student will be able to distinguish among hypothesis, theory and law as scientific terms and how they are used to answer a specific question.	Student Edition: 7-10, 12, 853-854 Teacher Wraparound Edition: AC 9; DI 8; FF 8; IL 12; RC 12; SC 4E; SJ 11; US 142
2. The student will be able to explain how scientific and technological innovations as well as new evidence can challenge portions of or entire accepted theories and models including but not limited to cell theory, atomic theory, theory of evolution, plate tectonic theory, germ theory of disease and big bang theory.	Student Edition: 7, 38-39, 358, 581-583, 836-837 <i>National Geographic</i> 582 Teacher Wraparound Edition: D 12; DI 10; FYI 82; IH 7; IL 12; RC 7, 12; SC 576F; SJ 11; TPK 836; US 142
3. The student will recognize that in order to be valid, scientific knowledge must meet certain criteria including that it: be consistent with experimental, observational and inferential evidence about nature; follow rules of logic and reporting both methods and procedures; and be falsifiable and open to criticism.	Student Edition: 12, 186 <i>Science and History</i> 146 Teacher Wraparound Edition: CA 13; DI 7; IH 9; RC 7; SJ 11

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4. The student will explain how traditions of ethics, peer review, conflict and general consensus influence the conduct of science.	Student Edition: 10, 50, 858 Teacher Wraparound Edition: AC 48, DI 7; RC 7, 12, 47
5. The student will recognize that some scientific ideas are incomplete, and opportunity exists in these areas for new advances.	Student Edition: 206-207, 218-219, 221, 229, 237, 354-358, 836-839 <i>National Geographic</i> 205, 582 Teacher Wraparound Edition: FYI 204; IM 355; RC 53; SC 216E
B. Scientific Inquiry The student will design and conduct a scientific investigation.	
1. The student will design and complete a scientific experiment using scientific methods by determining a testable question, making a hypothesis, designing a scientific investigation with appropriate controls, analyzing data, making conclusions based on evidence and comparing conclusions to the original hypothesis and prior knowledge.	Student Edition: 7-10, 850-858 <i>Lab</i> 28-29, 88-89, 144-145, 242-243, 344-345, 414-415, 446-447 Teacher Wraparound Edition: AC 9; DI 8; FF 8; RP 6; SC 4E; US 8
2. The student will distinguish between qualitative and quantitative data.	Student Edition: The difference between qualitative and quantitative data is discussed on 854. Teacher Wraparound Edition: AIL 742
3. The student will apply mathematics and models to analyze data and support conclusions.	Student Edition: 11, 22-26, 852-853, 857-858, 875-876 <i>Applying Math</i> 24, 132, 297 <i>Lab</i> 27 <i>MiniLAB</i> 25 Teacher Wraparound Edition: AC 23; DI 23; FYI 24; SC 4F
4. The student will identify possible sources of error and their effects on results.	Student Edition: 10, 858 Teacher Wraparound Edition: AD 119, 279, 311, 381, 637, 676-677, 777; DI 23
5. The student will know that professional scientists and engineers have ethical codes.	Student Edition: 11, 46-50 <i>MiniLAB</i> 47 Teacher Wraparound Edition: AC 48; D 49; DLI 50; IE 48; PR 12, 50; RP 46

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<p>6. The student will give examples of how different domains of science use different bodies of scientific knowledge and employ different methods to investigate questions.</p>	<p>Student Edition: 13, 38-45, 52-57 <i>MiniLAB</i> 40, 47 <i>National Geographic</i> 44 Teacher Wraparound Edition: AC 48; CC 39; DLI 45; IH 9; IL 54; RC 40; RS 39</p>
<p>C. Scientific Enterprise The student will understand the relationship between science and technology and how both are used.</p>	
<p>1. The student will compare and contrast the purposes and career opportunities of engineering, technology and science.</p>	<p>Student Edition: 38-41, 43-45 <i>National Geographic</i> 44 Teacher Wraparound Edition: CD 132; IC 56, 408, 440, 472, 592, 753; PR 56; RP 52</p>
<p>2. The student will provide an example of a need or problem identified by science and solved by engineering or technology.</p>	<p>Student Edition: 52-57, 503-506 <i>Accidents in Science</i> 60 <i>Science and History</i> 312, 448, 478, 810 Teacher Wraparound Edition: CD 17; D 579; DLI 57; RP 52</p>
<p>3. The student will provide an example of how technology facilitates new discoveries and the development of scientific knowledge.</p>	<p>Student Edition: 52-57, 503-506 <i>Accidents in Science</i> 712, 744 <i>Science and History</i> 312, 382, 448, 478, 810 Teacher Wraparound Edition: CD 410; D 53</p>
<p>4. The student will know that technological changes and scientific advances are often accompanied by social, political, environmental and economic changes.</p>	<p>Student Edition: 11-13, 41-45, 46-50, 54-55 <i>National Geographic</i> 44 <i>Science and Society</i> 510, 678 Teacher Wraparound Edition: AC 11; CD 489, 503; DI 44; FYI 53; PR 12; RC 42; SJ 55</p>
<p>5. The student will recognize that science and technology are influenced by cultural backgrounds and beliefs and by social needs, attitudes, values and limitations.</p>	<p>Student Edition: 11-13, 41-45, 46-50, 54-55 <i>National Geographic</i> 44 <i>Science and Society</i> 510, 678 Teacher Wraparound Edition: AC 11; CD 489; DI 44; FYI 53; PR 12, 50; RC 42, 47; RP 46; SJ 55; VL 48</p>

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<p>D. Historic Perspectives The student will recognize the historical and cultural context of scientific endeavors and how they influence each other.</p>	
<p>1. The student will be able to trace the development of a scientific advancement, invention or theory and its impact on society.</p>	<p>Student Edition: 186-187, 201, 206, 218-219; 356-361 <i>Accidents in Science</i> 210 <i>National Geographic</i> 233, 531 Teacher Wraparound Edition: CC 188; CD 187; IH 201, 219; SC 352E</p>
<p>2. The student will provide examples of scientific advancements contributed by other civilizations and cultures.</p>	<p>Student Edition: 186, 354-358, 581-583, 588 <i>National Geographic</i> 582 Teacher Wraparound Edition: CD 115, 132, 167, 187, 236, 306, 336, 410, 427, 434, 565, 788, 722; IH 201</p>
<p>3. The student will compare and contrast the differences between scientific theories and theories from other bodies of knowledge, and the importance of each in a science discussion.</p>	<p>Student Edition: 206 <i>Accidents in Science</i> 210 <i>Science and Language Arts</i> 30 Teacher Wraparound Edition: CB 210; IM 721; IP 188</p>
<p>II. PHYSICAL SCIENCE</p>	
<p>A. Structure of Matter The student will understand the nature of matter including its forms, properties and interactions.</p>	
<p>1. The student will identify protons, neutrons and electrons as the major components of the atom, their mass relative to one another, their arrangement and their charge.</p>	<p>Student Edition: 392, 578-583, 584-585, 786-788 <i>MiniLAB</i> 581, 789 Teacher Wraparound Edition: AC 787; D 585; MM 787; RC 579; RS 579; US 579; VL 581</p>
<p>2. The student will be able to explain the relationship of an element's position on the periodic table to its atomic number and atomic mass.</p>	<p>Student Edition: 584-587, 588-594, 786, 789, 896-897 Teacher Wraparound Edition: AC 590; FYI 589; IC 804; IM 586; PR 595; QD 585; RS 586</p>

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<p>3. The student will compare and contrast the properties of an element and its isotopes, and describe how isotopes can be used in research, medicine and industry.</p>	<p>Student Edition: 584-587, 672-673, 789, 804 <i>Applying Science</i> 586 <i>National Geographic</i> 805 Teacher Wraparound Edition: D 585; DI 586; FYI 585; ILS 586; IP 673; PR 789</p>
<p>4. The student will use the periodic table to identify regions, families, groups and periods.</p>	<p>Student Edition: 588-597, 703-704, 896-897 <i>MiniLAB</i> 589 Teacher Wraparound Edition: AC 590; D 593; FF 591, 594; PR 595; QD 590; RP 588; SJ 704; UA 591</p>
<p>5. The student will explain how neutral atoms become ions.</p>	<p>Student Edition: 692, 764, 766, 768-770, 771-774 Teacher Wraparound Edition: DI 767, 773; FYI 766; IH 705; MM 768; RC 770, 773; US 772; VL 768</p>
<p>6. The student will be able to explain how atoms form compounds through bonding.</p>	<p>Student Edition: 690-692, 694-702 <i>Accidents in Science</i> 712 <i>Lab</i> 710-711 <i>Launch Lab</i> 687 <i>MiniLAB</i> 698 <i>National Geographic</i> 699 Teacher Wraparound Edition: AC 690, 697; AS 692, 702; D 696; ILS 695; PR 701; QD 691; RP 694</p>
<p>7. The student will compare and contrast the states of matter in terms of interactions between particles.</p>	<p>Student Edition: 254-259, 260-265, 266-270 <i>Applying Math</i> 255, 258 <i>Launch Lab</i> 253 <i>National Geographic</i> 268 Teacher Wraparound Edition: AC 255; CD 263; D 264; FF 256; IA 261; LD 261; QD 258; RC 261; RP 254</p>
<p>8. The student will differentiate between an atom and a molecule.</p>	<p>Student Edition: 554, 578-583, 697, 700 <i>MiniLAB</i> 581, 698 <i>National Geographic</i> 582, 699 Teacher Wraparound Edition: RC 579; RP 578; UA 700</p>

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9. The student will differentiate between an element and a compound.	<p>Student Edition: 552-554, 608, 688-689, 700-702, 703-709 <i>Lab</i> 710-711 <i>MiniLAB</i> 555 <i>National Geographic</i> 553</p> <p>Teacher Wraparound Edition: AC 690; CD 707; D 700; PR 701; RC 554, 689; SC 550E; SJ 554; US 700</p>
<p>B. Chemical Reactions The student will describe chemical reactions and the factors that influence them.</p>	
1. The student will describe chemical reactions using words and symbolic equations.	<p>Student Edition: 720-725, 726-729 <i>Applying Math</i> 728 <i>Launch Lab</i> 719 <i>MiniLAB</i> 724</p> <p>Teacher Wraparound Edition: DLI 725; FF 723; FYI 723, 727; PR 724; RP 720; SJ 723; VL 724</p>
2. The student will explain the influence of temperature, surface area, agitation and catalysts on the rate of a reaction.	<p>Student Edition: 734-740 <i>Lab</i> 741, 742-743 <i>MiniLAB</i> 738 <i>National Geographic</i> 737</p> <p>Teacher Wraparound Edition: AC 735; FYI 736, 739; IH 740; IL 739; ILS 735; PR 739; RC 738; SC 718F; US 735</p>
3. The student will distinguish between a chemical reaction and a nuclear reaction.	<p>Student Edition: Chemical and nuclear reactions are compared and contrasted on page 720.</p>
4. The student will explain how the rearrangement of atoms and molecules in a chemical reaction illustrates conservation of mass.	<p>Student Edition: 567, 720-722 <i>Applying Math</i> 566 <i>Lab</i> 568-569</p> <p>Teacher Wraparound Edition: CA 567; D 723; FF 723; IM 566; RC 566, 721; RP 720; SC 718E; UA 722</p>

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5. The student will describe how combining acids and bases produces a neutral solution.	Student Edition: 752, 764-770 <i>Lab 775</i> <i>MiniLAB 766</i> Teacher Wraparound Edition: AS 770; D 769; DI 769; PR 770; RP 752; SJ 753; VL 768
C. Energy Transformations The student will understand energy forms, transformations and transfers.	
1. The student will know that potential energy is stored energy and is associated with gravitational or electrical force, mechanical position or chemical composition.	Student Edition: 130-133, 256 <i>Applying Math 132</i> <i>Lab 134</i> Teacher Wraparound Edition: FF 129; IE 139; IH 143; QD 132; RC 129, 256; SC 126E
2. The student will differentiate between kinetic and potential energy and identify situations where kinetic energy is converted into potential energy and vice versa.	Student Edition: 135-141 <i>Applying Math 130</i> <i>Lab 134</i> <i>MiniLAB 131</i> <i>National Geographic 138</i> Teacher Wraparound Edition: AP 126; D 129; QD 130; SC 126F; US 130
3. The student will differentiate between AC and DC current.	Student Edition: 442-444 <i>Lab 445</i> <i>National Geographic 441</i> Teacher Wraparound Edition: AC 443; CC 491; DI 441; FYI 442, 443; PR 443; SJ 442
4. The student will describe the production, storage and transmission of electricity.	Student Edition: 438-444, 497, 501-505 <i>MiniLAB 502</i> <i>National Geographic 441</i> Teacher Wraparound Edition: CC 440; D 440; DI 441; FYI 497, 504; RC 439, 503; RP 438; SJ 439; US 439

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5. The student will be able to describe physical and chemical changes in terms of the law of conservation of energy.	<p>Student Edition: 135-143 <i>National Geographic</i> 138 <i>Science and History</i> 146</p> <p>Teacher Wraparound Edition: DI 136; IE 139; PR 143; QD 136; RS 137; US 139; VL 136</p>
6. The student will compare and contrast the amount of energy released through chemical reactions and nuclear fission and fusion.	<p>Student Edition: 141, 490-493, 494-500</p> <p>Teacher Wraparound Edition: D 491, 492; DI 490; FYI 141, 497; UA 496; US 141</p>
7. The student will describe the risks and benefits of fossil fuels, renewable sources and nuclear power as sources of usable energy.	<p>Student Edition: 486-493, 494-500, 501-506 <i>Applying Science</i> 499 <i>National Geographic</i> 488</p> <p>Teacher Wraparound Edition: A 492; D 487, 491, 503, 506; FYI 497; IS 497; PR 493, 500; QD 491; RC 503</p>
8. The student will describe applications of the different wavelengths of the electromagnetic spectrum.	<p>Student Edition: 462-467, 469-475 <i>Lab</i> 468, 476-477 <i>Launch Lab</i> 455 <i>MiniLAB</i> 463 <i>National Geographic</i> 471</p> <p>Teacher Wraparound Edition: FF 463, 471; IC 472; IH 465; IL 464; QD 470; RP 462; SC 454E, 454F</p>
9. The student will describe energy, work and power both conceptually and quantitatively.	<p>Student Edition: 128-133, 154-159 <i>Applying Math</i> 130, 132, 156, 158 <i>Equations</i> 156, 158, 159 <i>Science and History</i> 146</p> <p>Teacher Wraparound Edition: DI 129, 155; FF 158; FYI 156; QD 132; VL 131</p>

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<p>D. Motion</p> <p>The student will understand the nature of force and motion.</p>	
<p>1. The student will use Newton's three laws of motion to qualitatively and quantitatively describe the interaction of objects.</p>	<p>Student Edition: 98-103, 113-115 <i>Applying Math</i> 102, 116 <i>Equations</i> 102, 116 <i>Lab</i> 118-119 <i>MiniLAB</i> 99 <i>National Geographic</i> 115 Teacher Wraparound Edition: D 101; DI 116; FYI 99; MM 100; QD 102, 115; SJ 114</p>
<p>2. The student will describe the effect of friction and gravity on the motion of an object.</p>	<p>Student Edition: 83-84, 104-111, 140 <i>Lab</i> 112 <i>MiniLAB</i> 83 Teacher Wraparound Edition: DI 105, 109; IL 109; IM 84; LD 83; QD 105; RC 84; RP 104; RS 84</p>
<p>E. Forces of Nature</p> <p>The student will understand the forces of nature and their application.</p>	
<p>1. The student will recognize the factors that affect the presence and magnitude of gravitational, electromagnetic, weak and strong nuclear forces.</p>	<p>Student Edition: 104-105, 394, 786-788 <i>Equations</i> 105 <i>Science and History</i> 120 Teacher Wraparound Edition: FF 105; FYI 787; MM 787; RC 787</p>
<p>2. The student will identify the dominant force or forces in a variety of interactions.</p>	<p>Student Edition: 104-105, 394, 786-788 Teacher Wraparound Edition: FF 105; FYI 787; MM 787; RC 787</p>

STANDARDS	PAGE REFERENCES
III. EARTH AND SPACE SCIENCE	
A. Earth Structure and Processes The student will understand that the interactions of the atmosphere, biosphere, lithosphere, hydrosphere and space have resulted in ongoing change of the Earth system over geologic time.	
1. The student will identify the internal and external sources of energy for the Earth.	Student Edition: 193-194, 354-361, 362-369, 370-372, 373-378 <i>Lab</i> 196, 379 <i>National Geographic</i> 368 Teacher Wraparound Edition: AC 376; AP 352; FYI 360, 363, 374; SC 352E-352F; SJ 372; UA 357
2. The student will apply the laws of thermodynamics to explain the cycling of materials and transfer of energy in the Earth system.	Student Edition: 193-194, 269, 274, 520, 663 <i>National Geographic</i> 268 Teacher Wraparound Edition: AC 193; D 520; DI 274; IL 274; LD 193; QD 194; US 269
3. The student will illustrate how biological processes have played significant roles in determining the character of the atmosphere, biosphere, hydrosphere and lithosphere over time.	Student Edition: 486-491, 518-519, 529-534 <i>National Geographic</i> 488, 531 Teacher Wraparound Edition: FYI 530; MM 530;
4. The student will use the theory of plate tectonics to analyze relationships among earthquakes, volcanoes, mountains, fossil deposits, rock layers and ocean features.	Student Edition: 354-361 <i>Applying Math</i> 357 Teacher Wraparound Edition: AC 355; FYI 82, 359, 360; QD 360; US 359; VL 356
5. The student will describe how glaciers, gravity, wind, temperature changes, waves and rivers cause weathering and erosion.	Student Edition: 646-652, 654-662 <i>MiniLAB</i> 647, 656 Teacher Wraparound Edition: D 658, 660; FF 658; FYI 649, 657; IL 659; PR 651; RC 648, 650; RP 646, 654; UA 656

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<p>6. The student will describe the rock cycle and compare and contrast the processes responsible for the formation of igneous, sedimentary and metamorphic rocks.</p>	<p>Student Edition: 617-623, 624-629, 630-635 <i>Applying Math</i> 621 <i>Lab</i> 636-637 <i>National Geographic</i> 633 <i>Science and Society</i> 638 Teacher Wraparound Edition: FYI 625, 632, 634; IM 618; QD 619, 621, 626, 631; RC 622, 627</p>
<p>7. The student will use evidence found in fossils, rock layers, ice cores, radiometric dating and globally gathered data to explain how Earth has changed over short and long periods of time.</p>	<p>Student Edition: 355, 627, 671-675 <i>Lab</i> 676-677 <i>Science and History</i> 600 Teacher Wraparound Edition: CA 673; FYI 671, 672; IP 673; QD 670, 671; SJ 670; VL 672</p>
<p>The student will investigate the impact humans have on the environment.</p>	
<p>1. The student will identify and research an environmental issue and evaluate its impact.</p>	<p>Student Edition: 48-50, 492, 518-519, 668 <i>Applying Science</i> 49 Teacher Wraparound Edition: AC 492; D 49, 492; FYI 48, 519; IE 48, 466, 561, 668; IH 48</p>
<p>B. The Water Cycle, Weather and Climate The student will explain the causes and effects of the Earth’s atmospheric and hydrologic processes.</p>	
<p>1. The student will explain how the transfer of energy and motions of the Earth contribute to global climatic processes including wind, waves and ocean currents.</p>	<p>Student Edition: 267-269, 529-534, 535-539 <i>Lab</i> 540-541 <i>National Geographic</i> 268, 531 <i>Science and Language</i> 542 Teacher Wraparound Edition: AC 268, 533; D 532; DLI 539; IH 536; LD 537; QD 268; UA 530; US 269</p>
<p>2. The student will trace the cyclical movement of carbon and water through the lithosphere, hydrosphere, atmosphere and biosphere.</p>	<p>Student Edition: 536, 663-668 <i>Applying Math</i> 665 <i>National Geographic</i> 666 Teacher Wraparound Edition: AC 665; CC 667; DLI 668; FYI 537, 664; LD 665; PR 668; QD 664; RC 668; RP 663</p>

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<p>3. The student will demonstrate the effect of the Earth's tilt, rotation and revolution on the seasons, day length and tides.</p>	<p>Student Edition: 190-195 <i>Lab</i> 196 <i>MiniLAB</i> 195</p> <p>Teacher Wraparound Edition: AC 193; D 191; FF 192; FYI 191, 194; LD 193; PR 194; RC 190, 194; RP 190; UA 192</p>
<p>4. The student will identify, predict and investigate the factors that influence the quality of water and how it can be reused, recycled and conserved.</p>	<p>Student Edition: 522, 663-668 <i>Applying Math</i> 665 <i>National Geographic</i> 666 <i>Science and Society</i> 678</p> <p>Teacher Wraparound Edition: AC 678; AS 668; CA 668; CC 667; IE 667; RC 664, 668; SJ 667</p>
<p>5. The student will discuss the impact of the use of natural resources and other human activities on the Earth's climate.</p>	<p>Student Edition: 40-45, 46-50, 52-57, 492-493 <i>Applying Science</i> 49 <i>MiniLAB</i> 47 <i>National Geographic</i> 44</p> <p>Teacher Wraparound Edition: AC 492; CA 43; D 49, 53, 492; DLI 493; PR 493; QD 41; RC 42; SJ 55</p>
<p>C. The Universe The student will relate the formation and components of our solar system to the conditions necessary for life.</p>	
<p>1. The student will explain how the sun, Earth and solar system formed.</p>	<p>Student Edition: 203-207, 220-222, 831-839 <i>Lab</i> 208-209, 840-841 <i>National Geographic</i> 205</p> <p>Teacher Wraparound Edition: AC 206; CB 204; D 221, 833, 838; IP 220; PR 222; UA 833; VL 206, 221</p>

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<p>2. The student will compare the characteristics of Earth with the characteristics and movement patterns of the other planets, their satellites and other objects in our solar system.</p>	<p>Student Edition: 218-222, 223-229, 231-237 <i>Applying Math</i> 220 <i>Lab</i> 230 <i>MiniLAB</i> 219, 235 <i>National Geographic</i> 233 <i>Science Stats</i> 244 Teacher Wraparound Edition: AC 232; D 221, 234; RP 218; SC 216E-216F; SJ 224</p>
<p>3. The student will compare and contrast the environmental parameters that make life possible on Earth with conditions found on the other planets of our solar system.</p>	<p>Student Edition: 224-226, 238-241, 466, 518-522 <i>Lab</i> 242-243 <i>Science Stats</i> 244 Teacher Wraparound Edition: D 239, 520; FF 520; MM 225; RC 241, 466; RP 238; RS 225; SJ 224; VL 224</p>
<p>The student will use astronomical data to reveal the structure, scale, and changes in the stars, galaxies and universe over time.</p>	
<p>1. The student will identify different types of stars and galaxies and describe how stars, galaxies and the universe change over time.</p>	<p>Student Edition: 823-829, 831-835 <i>Lab</i> 830 <i>MiniLAB</i> 824 <i>National Geographic</i> 826 Teacher Wraparound Edition: AS 835; D 833; DI 826; PR 834; RP 823; SJ 824; UA 833; US 825; VL 824, 832, 834</p>
<p>2. The student will explain how nuclear fusion produces energy and other elements.</p>	<p>Student Edition: 141, 803, 823, 827 <i>National Geographic</i> 826 Teacher Wraparound Edition: FYI 803; MM 803; RP 823; RS 803; US 141, 803; VL 221</p>
<p>3. The student will describe the evidence from current technologies that has been used to understand the composition and the early history of the universe.</p>	<p>Student Edition: 821; 836-839 <i>Applying Math</i> 839 Teacher Wraparound Edition: AS 839; CA 837; DLI 839; RC 821; RP 836</p>

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<p>4. The student will explain how Doppler evidence indicates our universe is expanding in all directions.</p>	<p>Student Edition: 836-839 <i>Lab</i> 840-841</p> <p>Teacher Wraparound Edition: AC 838; AS 839; FF 840; FYI 838; PR 839; QD 838; RS 837</p>