



Introduction to Physical Science

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STANDARDS	PAGE REFERENCES
<p>Standard 5.1 (Scientific Processes) All students will develop problem-solving, decision-making and inquiry skills, reflected by formulating usable questions and hypotheses, planning experiments, conducting systematic observations, interpreting and analyzing data, drawing conclusions, and communicating results.</p> <hr/> <p>Building upon knowledge and skills gained in preceding grades, by the end of Grade 8, students will:</p> <hr/> <p>A. Habits of Mind</p>	
<p>1. Evaluate the strengths and weaknesses of data, claims, and arguments.</p>	<p>Student Edition: 27-30 LAB 31</p> <p>Teacher Wraparound Edition: A 28; D 28, 29; QD 29; R 30; TPK 27</p>
<p>2. Communicate experimental findings to others.</p>	<p>Student Edition: 17, 56-59 <i>Communicating Your Data</i> 55, 61, 115, 181, 299, 355, 500, 511, 561, 573, 661 <i>Math Skill Handbook</i> 710-711 <i>Science Skill Handbook</i> 678 <i>Technology Skill Handbook</i> 695-696</p> <p>Teacher Wraparound Edition: CYD 33, 86, 209, 411</p>
<p>3. Recognize that the results of scientific investigations are seldom exactly the same and that replication is often necessary.</p>	<p>Student Edition: 29 LAB 480-481</p> <p>Teacher Wraparound Edition: D 29</p>

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4. Recognize that curiosity, skepticism, open-mindedness, and honesty are attributes of scientists.	Student Edition: 6-7, 16, 27-30 <i>MiniLAB</i> 23 Teacher Wraparound Edition: CC 15; CD 18; DI 16; IM 10; TPK 27; USW 7, 9; VL 7, 25, 28
B. Inquiry and Problem Solving	
1. Identify questions and make predictions that can be addressed by conducting investigations.	Student Edition: 6-7, 13 <i>Applying Science</i> 89, 111, 229, 266 <i>LAB</i> 31, 32-33, 55, 92-93, 207, 208-209, 386, 450-451 <i>LaunchLAB</i> 5 Teacher Wraparound Edition: R 20; TPK 6; VL 13
2. Design and conduct investigations incorporating the use of a control.	Student Edition: 18 <i>LAB</i> 32-33, 208-209, 450-451 <i>Science Skill Handbook</i> 674
3. Collect, organize, and interpret the data that result from experiments.	Student Edition: 15-16, 28-29 <i>LAB</i> 86, 149, 180-181, 207, 240-241, 261, 411, 450-451, 472-473, 534 <i>Science Skill Handbook</i> 674-678 Teacher Wraparound Edition: AIL 604; LD 114
C. Safety	
1. Know when and how to use appropriate safety equipment with all classroom materials.	Student Edition: 19-20 <i>Science Skill Handbook</i> 679-681 Teacher Wraparound Edition: D 19; VL 19
2. Understand and practice safety procedures for conducting science investigations.	Student Edition: 19-20 <i>LAB</i> 31, 92-93, 149, 207, 208-209, 240-241, 261, 270-271, 603 <i>LaunchLAB</i> 189 Teacher Wraparound Edition: D 19; VL 19

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<p>Standard 5.2 (Science and Society) All students will develop an understanding of how people of various cultures have contributed to the advancement of science and technology, and how major discoveries and events have advanced science and technology.</p>	
<p>Building upon knowledge and skills gained in preceding grades, by the end of Grade 8, students will:</p>	
<p>A. Cultural Contributions</p>	
<p>1. Recognize that scientific theories:</p> <ul style="list-style-type: none"> • develop over time, • depend on the contributions of many people, and • reflect the social and political climate of their time. 	<p>Student Edition: 7, 73-79, 351, 357, 359 <i>Integrate History</i> 73 <i>National Geographic</i> 82 <i>Science and History</i> 94 Teacher Wraparound Edition: CC 15, 73, 312, 353; CD 18; CU 11; D 7; DI 165, 389; VL 7</p>
<p>2. Know that scientists are men and women of many cultures who often work together to solve scientific and technological problems.</p>	<p>Student Edition: 73-79, 312, 357, 359-361, 384-385 <i>Integrate Career</i> 165 <i>Science and History</i> 34, 210, 542 <i>Science and Society</i> 272, 332 Teacher Wraparound Edition: CC 47, 235; DI 78</p>
<p>3. Describe how different people in different cultures have made and continue to make contributions to science and technology.</p>	<p>Student Edition: 73-79, 351, 357, 359 <i>National Geographic</i> 82 <i>Oops! Accidents in Science</i> 302 <i>Science and Society</i> 272 Teacher Wraparound Edition: CC 47, 168, 197; CD 392</p>
<p>B. Historical Perspectives</p>	
<p>1. Describe the impact of major events and people in the history of science and technology, in conjunction with other world events.</p>	<p>Student Edition: <i>Science and History</i> 94, 542 Teacher Wraparound Edition: AIL 124; CC 121, 312; CD 326; DI 389; HS 94</p>

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2. Describe the development and exponential growth of scientific knowledge and technological innovations.	Student Edition: 11, 389-395, 535-539, 567-571, 642-647, 649-656, 658 <i>Applying Science</i> 496 <i>LAB</i> 396-397 <i>National Geographic</i> 657 <i>Oops! Accidents in Science</i> 574 <i>Science and History</i> 34, 210, 542 <i>Science and Society</i> 332, 426, 662
<p>Standard 5.3 (Mathematical Applications) All students will integrate mathematics as a tool for problem-solving in science, and as a means of expressing and/or modeling scientific theories.</p> <hr/> <p>Building upon knowledge and skills gained in preceding grades, by the end of Grade 8, students will:</p> <hr/> <p>A. Numerical Operations</p>	
1. Express quantities using appropriate number formats, such as: <ul style="list-style-type: none"> • decimals. • percents. • scientific notation. 	Student Edition: 47-49 <i>Math Skill Handbook</i> 700-702, 709 Teacher Wraparound Edition: DI 57; QD 47; VL 58
<p>B. Geometry and Measurement</p>	
1. Perform mathematical computations using labeled quantities and express answers in correctly derived units.	Student Edition: 50-54 <i>Applying Math</i> 290, 294, 319, 341, 408, 409, 413, 600 <i>Math Skill Handbook</i> 707-708 <i>MiniLAB</i> 283 Teacher Wraparound Edition: A 284; DI 290
<p>C. Patterns and Algebra</p>	
1. Express physical relationships in terms of mathematical equations derived from collected data.	Student Edition: 284, 290, 294, 316, 408-409, 413, 597 <i>LAB</i> 355, 424-425 Teacher Wraparound Edition: DI 408; SJ 319

STANDARDS	PAGE REFERENCES
D. Data Analysis and Probability	
1. Represent and describe mathematical relationships among variables using: <ul style="list-style-type: none"> • graphs. • tables. 	Student Edition: 57-59, 286, 292 <i>LAB</i> 60-61, 208-209, 270-271, 450-451, 480-481 <i>Math Skill Handbook</i> 710-711 Teacher Wraparound Edition: LD 57
2. Analyze experimental data sets using measures of central tendency: <ul style="list-style-type: none"> • mean. • mode. • median. 	Student Edition: <i>Math Skill Handbook</i> 703
3. Construct and use a graph of experimental data to draw a line of best fit and identify a linear relationship between variables.	Student Edition: 57-59, 286, 292 <i>LAB</i> 60-61, 115, 444, 450-451, 604-605 Teacher Wraparound Edition: CC 286; CU 292; CYD 231; DI 58, 286; LD 57; QD 58
4. Use computer spreadsheets, graphing and database applications to assist in quantitative analysis of data.	Student Edition: <i>LAB</i> 362-363, 396-397, 660-661 <i>Technology Skill Handbook</i> 693-695 Teacher Wraparound Edition: CYD 125, 151, 209, 231, 271, 444, 451, 603
Standard 5.4 (Nature and Process of Technology) All students will understand the interrelationships between science and technology and develop a conceptual understanding of the nature and process of technology.	
Building upon knowledge and skills gained in preceding grades, by the end of Grade 8, students will:	
A. Science and Technology	
1. Compare and contrast science with technology, illustrating similarities and differences between these two human endeavors.	Applications of science to technology: Student Edition: 11, 205, 347, 357, 360, 391-395, 446, 448-449, 626-631 <i>LAB</i> 411, 424-425, 632-633 <i>National Geographic</i> 447 <i>Science and Society</i> 426 Teacher Wraparound Edition: DI 446; VL 360

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B. Nature of Technology	
1. Analyze a product or system to determine the problem it was designed to solve, the design constraints, trade-offs and risks involved in using the product or system, how the product or system might fail, and how the product or system might be improved.	Student Edition: 389-395 <i>LAB</i> 300-301, 411, 450-451, 632-633 <i>MiniLAB</i> 391 Teacher Wraparound Edition: AIL 424; D 392, 393; IL 627; SJ 393; TFYI 392; VL 391
C. Technological Design	
1. Recognize how feedback loops are used to control systems.	The instructor can lead a discussion of examples, such as a governor on a steam engine or feedback in biochemical reactions.
Standard 5.6 (Chemistry) All students will gain an understanding of the structure and behavior of matter.	
Building upon knowledge and skills gained in preceding grades, by the end of Grade 8, students will:	
A. Structure and Properties of Matter	
1. Know that all matter is composed of atoms that may join together to form molecules.	Student Edition: 72-79, 87-88, 162-165, 170-175 <i>LAB</i> 179 <i>MiniLAB</i> 173 <i>National Geographic</i> 176 Teacher Wraparound Edition: A 73; IL 77, 174; LD 174; QD 175
2. Recognize that the phase of matter is determined by the arrangement and motion of atoms and molecules and that the motion of these particles is related to the energy of the system.	Student Edition: 102-106, 107-109, 111-114 <i>Applying Science</i> 111 <i>MiniLAB</i> 112 <i>National Geographic</i> 110 Teacher Wraparound Edition: A 110; D 111; IM 109; LD 105; QD 106; VL 105
3. Know that there are groups of elements that have similar properties, including highly reactive metals, less reactive metals, highly reactive non-metals, and some almost completely non-reactive gases.	Student Edition: 80-81, 83-85, 166-167 <i>Applying Science</i> 167 <i>LAB</i> 86 <i>National Geographic</i> 82 Teacher Wraparound Edition: A 82, 84, 166; QD 84; UA 81

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<p>4. Recognize that a mixture often can be separated into the original substances using one of more of their characteristic physical properties.</p>	<p>Student Edition: 89-91, 219-220 <i>Applying Science</i> 89 <i>LAB</i> 92-93 Teacher Wraparound Edition: DI 89, 90; MM 219; QD 90; VL 219</p>
<p>B. Chemical Reactions</p>	
<p>1. Show how substances can chemically react with each other to form new substances having properties different from those of the original substances.</p>	<p>Student Edition: 190, 192-195 <i>LAB</i> 207 <i>National Geographic</i> 191 <i>Science and History</i> 210 Teacher Wraparound Edition: A 191; DI 195; IM 188F</p>
<p>2. Show that in most chemical reactions energy is transferred into or out of a system.</p>	<p>Student Edition: 196-199, 200-206 <i>LAB</i> 208-209 Teacher Wraparound Edition: AIL 208; D 198; DI 201; TFYI 197; UA 201</p>
<p>3. Demonstrate that regardless how substances within a simple closed system interact, the total mass of the system remains the same.</p>	<p>Student Edition: 194-195 <i>Applying Math</i> 196 <i>MiniLAB</i> 194 Teacher Wraparound Edition: A 195; DI 195; VL 194</p>
<p>4. Illustrate how atoms are rearranged when substances react, but that the total number of atoms and the total mass of the products remain the same as the original substances.</p>	<p>Student Edition: 194-195 <i>Applying Math</i> 196 <i>MiniLAB</i> 194 Teacher Wraparound Edition: A 195; CC 194; DI 195; VL 194</p>

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<p>Standard 5.7 (Physics) All students will gain an understanding of natural laws as they apply to motion, forces, and energy transformations.</p>	
<p>Building upon knowledge and skills gained in preceding grades, by the end of Grade 8, students will:</p>	
<p>A. Motion and Forces</p>	
<p>1. Use quantitative data to show that when more than one force acts on an object at the same time, the forces can reinforce or cancel each other producing a net (unbalanced) force that will change speed and/or direction of the object.</p>	<p>Student Edition: 310-315, 316-319 <i>Applying Math</i> 319 <i>LAB</i> 329, 330-331 Teacher Wraparound Edition: CC 311; D 318; DI 321; USW 311; VL 318</p>
<p>2. Recognize that every object exerts a gravitational force on every other object, and that the force depends on how much mass the objects have and how far apart they are.</p>	<p>Student Edition: 317-318, 321, 521 <i>Integrate History</i> 317</p>
<p>B. Energy Transformations</p>	
<p>1. Recognize that the sun is a major source of the Earth's energy and that solar energy includes visible, infrared, and ultraviolet radiation.</p>	<p>Student Edition: 391-392, 466, 527-529 <i>National Geographic</i> 532 <i>Science Stats</i> 398 Teacher Wraparound Edition: D 197, 529; TFYI 553; UA 530</p>
<p>2. Describe the nature of various forms of energy, including heat, light, sound, chemical, mechanical, and electrical, and trace energy transformations from one form to another.</p>	<p>Student Edition: 374-378, 379-381, 383-385 <i>LAB</i> 386 <i>MiniLAB</i> 381 <i>National Geographic</i> 381 Teacher Wraparound Edition: A 376; D 377; DI 377; IL 375; IM 383; LD 380; SJ 377; VL 376</p>
<p>3. Describe how heat can be conducted through materials or transferred across space by radiation and know that if the material is a fluid, convection currents may aid the transfer of heat.</p>	<p>Student Edition: 438-443, 448-449 <i>LAB</i> 444 <i>MiniLAB</i> 440, 441 Teacher Wraparound Edition: CA 444; LD 442; MM 442</p>

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<p>4. Show that light is reflected, refracted, or absorbed when it interacts with matter and that colors may appear as a result of this interaction.</p>	<p>Student Edition: 540-554, 555-558, 562-566 <i>LAB</i> 561, 572-573 <i>LaunchLAB</i> 549</p> <p>Teacher Wraparound Edition: A 552, 565; D 553; IL 558; LD 564; QD 552, 563</p>