



PHYSICS

Principles and Problems

© 2009

STANDARDS	PAGE REFERENCES
Physical Science Content Standards	
H.1 <u>Structure and Function</u>: A system's characteristics, form, and function are attributed to the quantity, type, and nature of its components.	
<p>H.1P.1 Explain how atomic structure is related to the properties of elements and their position in the Periodic Table. Explain how the composition of the nucleus is related to isotopes and radioactivity.</p>	<p>Student Edition: 701, 759, 800-801, 806-808 <i>Chemistry Connection</i> 704 Teacher Wraparound Edition: A 781; CD 777; IM 801</p>
<p>H.1P.2 Describe how different types and strengths of bonds affect the physical and chemical properties of compounds.</p>	<p>This physical science standards falls outside the scope of this text.</p>
H.2 <u>Interaction and Change</u>: The components in a system can interact in dynamic ways that may result in change. In systems, changes occur with a flow of energy and/or transfer of matter.	
<p>H.2P.1 Explain how chemical reactions result from the making and breaking of bonds in a process that absorbs or releases energy. Explain how the rate of a chemical reaction is affected by temperature, pressure, and concentration.</p>	<p>This physical science standards falls outside the scope of this text.</p>

STANDARDS	PAGE REFERENCES
H.2P.2 Explain how physical and chemical changes demonstrate the law of conservation of mass.	This physical science standards falls outside the scope of this text.
H.2P.3 Describe the interactions of energy and matter including the law of conservation of energy.	<p>Student Edition: 258-263, 286-289, 293-295, 314-315, 317-320 <i>Launch Lab</i> 257, 285 <i>Physics Lab</i> 302-303 <i>Technology and Society</i> 304</p> <p>Teacher Wraparound Edition: BA 293; CB 318; QD 287, 295</p>
H.2P.4 Apply the laws of motion and gravitation to describe the interaction of forces acting on an object and the resultant motion.	<p>Student Edition: 72-75, 87-95, 96-101, 131-135, 147-159, 175-176, 179-185 <i>Internet Physics Lab</i> 108-109 <i>Physics Lab</i> 76-77, 136-137 <i>Problem-Solving Strategies</i> 98</p> <p>Teacher Wraparound Edition: CB 91; CD 176; ICE 134; RLP 93</p>
<p>H.3 Scientific inquiry is the investigation of the natural world by a systematic process that includes proposing a testable question or hypothesis and developing procedures for questioning, collecting, analyzing, and interpreting multiple forms of accurate and relevant data to produce justifiable evidence-based explanations and new explorations.</p>	
H.3S.1 Based on observations and science principles formulate a question or hypothesis that can be investigated through the collection and analysis of relevant information.	<p>Student Edition: 8-10 <i>Design Your Own Physics Lab</i> 392-393, 532-533 <i>Launch Lab</i> 31, 171, 341, 431, 775 <i>Physics Lab</i> 332-333, 364-365 <i>Problem-Solving Strategies</i> 260, 550, 629</p> <p>Teacher Wraparound Edition: HSS 8</p>
H.3S.2 Design and conduct a controlled experiment, field study, or other investigation to make systematic observations about the natural world, including the collection of sufficient and appropriate data.	<p>Student Edition: 8-10, 11-14 <i>Design Your Own Physics Lab</i> 160-161, 392-393, 532-533, 554-555, 660-661, 824-825 <i>MiniLab</i> 135, 324, 441, 788</p> <p>Teacher Wraparound Edition: IM 9</p>

STANDARDS	PAGE REFERENCES
<p>H.3S.3 Analyze data and identify uncertainties. Draw a valid conclusion, explain how it is supported by the evidence, and communicate the findings of a scientific investigation.</p>	<p>Student Edition: 8-10, 15-19 <i>Design Your Own Physics Lab</i> 392-393, 532-533 <i>Internet Physics Lab</i> 76-77 <i>Physics Lab</i> 186-187, 274-275, 420-421, 474-475, 606-607, 790-791 <i>Share Your Data</i> 21, 77, 109, 247 Teacher Wraparound Edition: CT 18; HSS 8</p>
<p>H.3S.4 Identify examples from the history of science that illustrate modification of scientific knowledge in light of challenges to prevailing explanations.</p>	<p>Student Edition: 9-10, 72, 93-95, 171-176, 184-185, 344-345, 354-357, 724-731, 735-737, 748-751, 752-759, 760-761 <i>Extreme Physics</i> 50, 78, 366, 506 <i>Geology Connection</i> 355 Teacher Wraparound Edition: CB 9, 184, 321, 344, 354, 446; IM 172; PP 762; RLP 175</p>
<p>H.3S.5 Explain how technological problems and advances create a demand for new scientific knowledge and how new knowledge enables the creation of new technologies</p>	<p>Student Edition: 9-10, 179-180, 358, 552-553, 671-678, 811-813 <i>Extreme Physics</i> 662, 792 <i>Future Technology</i> 22, 476, 768 <i>How It Works</i> 534, 582 <i>Technology and Society</i> 220, 394, 450, 716 Teacher Wraparound Edition: CB 671, 809; E 10; RLP 175, 701, 816</p>
<p>H.4 Engineering design is a process of formulating problem statements, identifying criteria and constraints, proposing and testing possible solutions, incorporating modifications based on test data, and communicating the recommendations.</p>	
<p>H.4D.1 Define a problem and specify criteria for a solution within specific constraints or limits based on science principles. Generate several possible solutions to a problem and use the concept of trade-offs to compare them in terms of criteria and constraints.</p>	<p>Student Edition: 9-10 <i>Design Your Own Physics Lab</i> 160-161, 392-393, 532-533, 554-555, 660-661, 824-825 <i>Technology and Society</i> 220, 394 Teacher Wraparound Edition: HSS 8</p>
<p>H.4D.2 Create and test or otherwise analyze at least one of the more promising solutions. Collect and process relevant data. Incorporate modifications based on data from testing or other analysis.</p>	<p>Student Edition: 11-14 <i>Design Your Own Physics Lab</i> 160-161, 392-393, 532-533, 554-555, 660-661, 824-825 <i>Internet Physics Lab</i> 20-21, 108-109, 246-247 Teacher Wraparound Edition: BA 11</p>

STANDARDS	PAGE REFERENCES
<p>H.4D.3 Analyze data, identify uncertainties, and display data so that the implications for the solution being tested are clear.</p>	<p>Student Edition: 9-10, 11-19 <i>Design Your Own Physics Lab</i> 392-393, 532-533 <i>Internet Physics Lab</i> 76-77 <i>Physics Lab</i> 186-187, 274-275, 420-421, 474-475, 606-607 <i>Share Your Data</i> 21, 77, 109, 247 Teacher Wraparound Edition: BA 15; CT 14; TPK 11</p>
<p>H.4D.4 Recommend a proposed solution, identify its strengths and weaknesses, and describe how it is better than alternative designs. Identify further engineering that might be done to refine the recommendations.</p>	<p>Student Edition: 9-10 <i>Design Your Own Physics Lab</i> 392-393, 532-533 <i>Internet Physics Lab</i> 20-21, 76-77, 108-109, 246-247 <i>Share Your Data</i> 21, 77, 109, 247 Teacher Wraparound Edition: HSS 8</p>
<p>H.4D.5 Describe how new technologies enable new lines of scientific inquiry and are largely responsible for changes in how people live and work.</p>	<p>Student Edition: 656, 659, 675-678, 705-708, 713, 761-765, 776-783, 812-813 <i>Extreme Physics</i> 792 <i>Future Technology</i> 22 <i>How It Works</i> 334, 534, 582, 634, 688 <i>Technology and Society</i> 220, 304, 394, 450, 608, 716 Teacher Wraparound Edition: CB 809; RLC 657, 708</p>
<p>H.4D.6 Evaluate ways that ethics, public opinion, and government policy influence the work of engineers and scientists, and how the results of their work impact human society and the environment.</p>	<p>Student Edition: 14, 552-553, 764-765, 812-813 <i>Applying Physics</i> 95, 180 <i>Future Technology</i> 22, 162, 556, 826 <i>Geology Connection</i> 180 <i>Technology and Society</i> 220, 394, 608 Teacher Wraparound Edition: C 300; CB 684; CT 602; DI 181; IM 172; R 713; RLC 241, 289, 360, 811; RLP 630, 701</p>