



PHYSICS

Principles and Problems

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STANDARDS	PAGE REFERENCES
<p>Science As Inquiry requires students to combine processes and scientific knowledge with scientific reasoning and critical thinking to develop their understanding of science.</p>	
<p>12.2.1 By the end of twelfth grade, students will develop the abilities needed to do scientific inquiry.</p>	
<ul style="list-style-type: none"> Formulate questions and identify concepts that guide scientific investigations. 	<p>Student Edition: 3-10, 12-14, 15-19, 747-759, 760-761, 818-823 <i>Design Your Own Physics Lab</i> 392-393, 532-533, 554-555, 824-825 <i>Problem-Solving Strategies</i> 123, 260, 550</p> <p>Teacher Wraparound Edition: CB 9, 39; HSS 8; IM 172; PP 6, 16, 762; RLP 173, 175; TPK 760</p>
<ul style="list-style-type: none"> Design and conduct scientific investigations. 	<p>Student Edition: 4-7, 11-14 <i>Design Your Own Physics Lab</i> 392-393, 532-533, 554-555, 824-825 <i>Physics Lab</i> 136-137, 332-333, 580-581, 606-607, 790-791 <i>Problem-Solving Strategies</i> 16, 466, 629</p> <p>Teacher Wraparound Edition: CB 9, 39; CH 183; HSS 8; RLP 5; SP 364, 606, 790</p>

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<ul style="list-style-type: none"> Use technology and mathematics to improve investigations and communications. 	<p>Student Edition: 4-5, 11-12, 15-18 <i>Connecting Math to Physics</i> 47, 295 <i>Physics Lab</i> 136-137, 186-187, 274-275, 302-303, 392-393, 420-421, 474-475, 532-533, 580-581, 606-607, 790-791 <i>Problem-Solving Strategies</i> 16, 466, 599</p> <p>Teacher Wraparound Edition: CB 12; CT 14, 18; GF 303; PP 16</p>
<ul style="list-style-type: none"> Formulate and revise scientific explanations and models using logic and evidence. 	<p>Student Edition: 9-10, 53, 737, 747-759, 760-761 <i>Extreme Physics</i> 78, 188, 506, 662 <i>Future Technology</i> 162, 248, 556 <i>MiniLAB</i> 813 <i>Technology and Society</i> 220, 394, 608</p> <p>Teacher Wraparound Edition: A 9; CB 749; CT 18; HSS 754</p>
<ul style="list-style-type: none"> Recognize and analyze alternative explanations and models. 	<p>Student Edition: 9-10, 102-107, 723-729, 735-737, 748-750, 760-761, 818-823 <i>Extreme Physics</i> 78, 366, 506</p> <p>Teacher Wraparound Edition: CB 9, 819; CD 737; IM 9, 61, 729, 736; PP 762</p>
<ul style="list-style-type: none"> Communicate and defend a scientific argument. 	<p>Student Edition: 8-10, 12, 15-18 <i>Connecting Math to Physics</i> 47, 295 <i>Internet Physics Lab</i> 108-109 <i>Physics Lab</i> 186-187, 274-275, 580-581, 790-791 <i>Problem-Solving Strategies</i> 16, 728 <i>Share Your Data</i> 21, 77, 247</p> <p>Teacher Wraparound Edition: A 9; CB 7, 12</p>

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<p>Physical Science focuses on science facts, concepts, principles, theories, and models that are important for all students to know, understand, and use.</p>	
<p>12.3.1 By the end of twelfth grade, students will develop an understanding of the structure of the atom.</p>	
<ul style="list-style-type: none"> Investigate and describe the structure of atoms, focusing on properties of subatomic particles. 	<p>Student Edition: 726-731, 747-749, 752-756, 760-761, 776-781, 815-823</p> <p><i>Extreme Physics</i> 366 <i>Future Technology</i> 768 <i>Physics Lab</i> 766-767</p> <p>Teacher Wraparound Edition: A 761; AML 748; CB 818; CD 733; CU 759; RLP 822; TPK 747; UM 753</p>
<ul style="list-style-type: none"> Investigate and explain the types of nuclear reactions. 	<p>Student Edition: 806-814, 821-822</p> <p><i>Design Your Own Physics Lab</i> 824-825 <i>Future Technology</i> 826 <i>MiniLAB</i> 813</p> <p>Teacher Wraparound Edition: CD 822; CU 814</p>
<ul style="list-style-type: none"> Investigate and describe the effect of electrical and nuclear forces which hold atoms together. 	<p>Student Edition: 802-805, 818-823</p> <p>Teacher Wraparound Edition: CT 543; CU 805; D 819; ICE 804; PP 802</p>
<p>12.3.2 By the end of twelfth grade, students will develop an understanding of the structure and properties of matter.</p>	
<ul style="list-style-type: none"> Investigate and understand that atoms interact with one another by transferring or sharing electrons. 	<p>See Glencoe's <i>Chemistry: Matter and Change</i> © 2005.</p>
<ul style="list-style-type: none"> Investigate and explain the periodic table of elements in terms of repeating patterns of physical and chemical properties. 	<p>Student Edition: <i>Appendix D</i> 916</p> <p>Also see Glencoe's <i>Chemistry: Matter and Change</i> © 2005.</p>
<ul style="list-style-type: none"> Investigate and describe how the structure of an atom determines the chemical properties of an element. 	<p>See Glencoe's <i>Chemistry: Matter and Change</i> © 2005.</p>

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<ul style="list-style-type: none"> Investigate and explain how the interactions among the molecules of a compound determine its physical and chemical properties. 	See Glencoe's <i>Chemistry: Matter and Change</i> © 2005.
<ul style="list-style-type: none"> Investigate and use changes in energy to explain the differences among the states of matter. 	Student Edition: 323-324, 341-343, 349-351, 359-360 <i>Physics Lab</i> 364-365 Teacher Wraparound Edition: TPK 349; UA 348; UM 324
<ul style="list-style-type: none"> Investigate and describe the bonding of carbon atoms in chains and rings to produce compounds essential to life. 	See Glencoe's <i>Chemistry: Matter and Change</i> © 2005.
12.3.3 By the end of twelfth grade, students will develop an understanding of chemical reactions.	
<ul style="list-style-type: none"> Investigate and describe common chemical reactions. 	See Glencoe's <i>Chemistry: Matter and Change</i> © 2005.
<ul style="list-style-type: none"> Investigate and describe the change of energy as a result of chemical reactions. 	See Glencoe's <i>Chemistry: Matter and Change</i> © 2005.
<ul style="list-style-type: none"> Investigate and describe how electrons are involved in bond formation during chemical reactions. 	See Glencoe's <i>Chemistry: Matter and Change</i> © 2005.
<ul style="list-style-type: none"> Investigate and describe the factors influencing the rates of chemical reactions, including catalysts. 	See Glencoe's <i>Chemistry: Matter and Change</i> © 2005.
12.3.4 By the end of twelfth grade, students will develop an understanding of motions and forces.	
<ul style="list-style-type: none"> Investigate and understand the effect of forces on the motion of objects. 	Student Edition: 87-95, 96-101, 102-106, 147-152, 153-156, 182-185, 354-356, 573-574, 698-700 <i>Design Your Own Physics Lab</i> 392-393 <i>Internet Physics Lab</i> 20-21, 76-77 <i>Physics Lab</i> 48-49, 136-137 Teacher Wraparound Edition: BA 179; CU 95; HSS 89; R 95, 107; TPK 102; UM 103

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<ul style="list-style-type: none"> Investigate and understand gravity as an attractive force that each mass exerts on any other mass. 	<p>Student Edition: 72-73, 175-176, 179-185 <i>Extreme Physics</i> 188, 506</p> <p>Teacher Wraparound Edition: CB 177; CD 176; ICE 181; QD 175</p>
<ul style="list-style-type: none"> Investigate and understand electrical force as a force that exists between any two charged objects. 	<p>Student Edition: 549-553, 564-566 <i>Design Your Own Physics Lab</i> 554-555 <i>Launch Lab</i> 563</p> <p>Teacher Wraparound Edition: ICE 565; IM 552; QD 551; R 550</p>
<ul style="list-style-type: none"> Investigate and describe an electric field, a magnetic field, and the interaction between them. 	<p>Student Edition: 564-568, 576-577, 643-647, 648-649, 652-658, 672-678, 679-685, 697-700, 705-713 <i>Design Your Own Physics Lab</i> 660-661 <i>Extreme Physics</i> 662 <i>How It Works</i> 582, 688 <i>Launch Lab</i> 671 <i>MiniLAB</i> 573 <i>Physics Lab</i> 686-687</p> <p>Teacher Wraparound Edition: CD 675; CH 680; CT 656; CU 678; E 659; IM 655; R 649; RLP 648</p>
<p>12.3.5 By the end of twelfth grade, students will develop an understanding of the conservation of energy and increase in disorder.</p>	
<ul style="list-style-type: none"> Understand that the total energy in the universe is constant and can never be destroyed. 	<p>Student Edition: 293-295, 297-301, 319-320 <i>Physics Lab</i> 302-303</p> <p>Teacher Wraparound Edition: AIL 303; BA 283; CB 298; CD 294; HSS 296; QD 295; R 731, 734</p>

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<ul style="list-style-type: none"> Investigate and distinguish between kinetic energy and potential energy. 	<p>Student Edition: 258-259, 287-290, 293-295, 376-380, 726-732 <i>Launch Lab</i> 285 <i>Physics Lab</i> 302-303</p> <p>Teacher Wraparound Edition: HSS 288, 296; R 299</p>
<ul style="list-style-type: none"> Investigate and describe heat transfer in terms of conduction, convection, and radiation. 	<p>Student Edition: 315, 317-318, 327-328 <i>How It Works</i> 334</p> <p>Teacher Wraparound Edition: AP 317; PP 330; QD 315; RLP 327; TPK 314; TT 317</p>
<ul style="list-style-type: none"> Investigate and give examples of how systems tend to become more disorderly over time. 	<p>Student Edition: 328-331</p> <p>Teacher Wraparound Edition: A 330; E 331; RLP 329</p>
<p>12.3.6 By the end of twelfth grade, students will develop an understanding of the interactions of energy and matter.</p>	
<ul style="list-style-type: none"> Investigate and understand that all waves possess and transfer energy. 	<p>Student Edition: 381-386, 404-405, 705-708, 726-731, 735-737</p> <p>Teacher Wraparound Edition: BA 403; CD 729, 735; CT 383; R 706; RLP 389; UA 404</p>
<ul style="list-style-type: none"> Understand that electromagnetic waves result when a charged object accelerates. 	<p>Student Edition: 705-708, 709-711</p> <p>Teacher Wraparound Edition: AML 699; CB 710; RLC 708</p>
<p>Investigate and illustrate how wavelength and frequency of waves are inversely related.</p>	<p>Student Edition: 384-385, 706</p> <p>Teacher Wraparound Edition: CD 385; R 706; TPK 387</p>

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<ul style="list-style-type: none"> Investigate and understand that the energy of waves can be changed into other forms of energy, just as other forms of energy can be transformed into wave energy. 	<p>Student Edition: 317, 382-383, 710-711 <i>Biology Connection</i> 442</p> <p>Teacher Wraparound Edition: CH 785; CT 383; QD 5</p>
<ul style="list-style-type: none"> Investigate and understand that atoms or molecules can be identified by spectral analysis. 	<p>Student Edition: 749-752 <i>MiniLAB</i> 755</p> <p>Teacher Wraparound Edition: R 751; RLP 753</p>
<ul style="list-style-type: none"> Investigate and describe how the composition and temperature of a material affect electron flow. 	<p>Student Edition: 544-545, 605, 777-781 <i>Applying Physics</i> 544 <i>Physics Lab</i> 606-607</p> <p>Teacher Wraparound Edition: CB 778; D 779; E 545; IM 776, 778; PP 603; R 777; RLP 781</p>