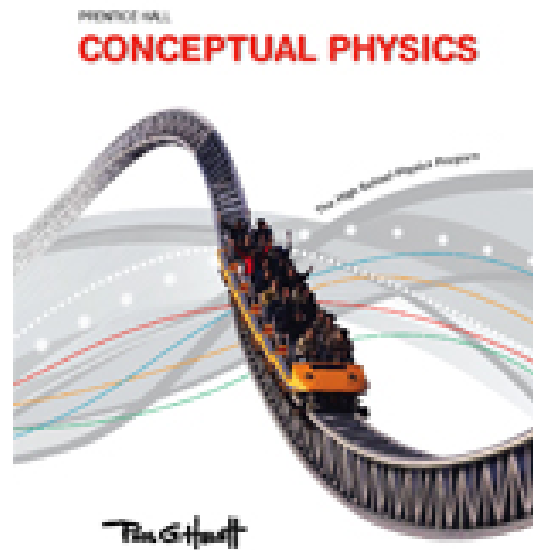


A Correlation of

# Conceptual Physics

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To the

# Nebraska Science Standards

Adopted 10/06/2010

Grades 9-12

**Conceptual Physics (Hewitt) ©2009**  
**Correlated to**  
**Nebraska Science Standards**  
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**Introduction**

This document demonstrates how **Conceptual Physics (Hewitt) ©2009** meets the objectives of the Nebraska Science Standards. Correlation page references are to the Student and Teacher's Editions and are cited at the page level.

Authored by Paul Hewitt, the pioneer of the enormously successful "concepts before computation" approach, **Conceptual Physics** boosts student success by first building a solid conceptual understanding of physics.

The **Three Step Learning Approach** makes physics accessible to today's students.

- **Exploration** - Ignite interest with meaningful examples and hands-on activities.
- **Concept Development** - Expand understanding with engaging narrative and visuals, multimedia presentations, and a wide range of concept-development questions and exercises.
- **Application** - Reinforce and apply key concepts with hands-on laboratory work, critical thinking, and problem solving.

**Features and Benefits**

- A brand new table of contents gets students immediately engaged in scientific activities.
- All new technology helps you plan, teach, and assess even more effectively.
- Even more reading and math support for struggling learners.
- Active learning with fully correlated activities to get your students excited about physics!

**Virtual Physics Lab CD-ROM**, a Pearson exclusive feature, (interactive whiteboard ready) allows students to perform and extend a variety of labs that correspond to the program. Teachers and students can use the simulated lab environment to do virtually any lab they could do in a real lab. Developed by Brigham Young University, a more robust virtual lab can't be found anywhere else.

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Nebraska Science Standards	Conceptual Physics (Hewitt) ©2009
<b>GRADES 9-12</b>	
SC K-12.1 Comprehensive Science Standard – Inquiry, the Nature of Science, and Technology Students will combine scientific processes and knowledge with scientific reasoning and critical thinking to ask questions about phenomena and propose explanations based on gathered evidence.	
1. Inquiry, the Nature of Science, and Technology	
1. Abilities to do Scientific Inquiry	
SC12.1.1 Students will design and conduct investigations that lead to the use of logic and evidence in the formulation of scientific explanations and models.	
Scientific Questioning	
SC12.1.1.a Formulate a testable hypothesis supported by prior knowledge to guide an investigation	<b>Laboratory Manual:</b> 1-2, 18, 82, 332
Scientific Investigations	
SC12.1.1.b Design and conduct logical and sequential scientific investigations with repeated trials and apply findings to new investigations	<b>SE/TE:</b> 46, 86, 88, 97, 144, 173, 212, 215, 302, 326
Scientific Controls and Variables	
SC12.1.1.c Identify and manage variables and constraints	<b>Laboratory Manual:</b> 3-4, 5-6, 11-14, 29-35, 59-65, 67-69, 71-73, 75-77, 79-82, 83-86, 101-102, 111-113, 117-120, 121-126, 135-136, 141-144, 177-179, 181-186, 221-224, 229-232, 259-260, 287-288, 301-304, 305-306, 348
Scientific Tools	
SC12.1.1.d Select and use lab equipment and technology appropriately and accurately	<b>SE/TE:</b> 86, 106, 147, 188, 324, 369, 433, 455, 478, 514, 578, 644, 680, 702, 720, 740
Scientific Observations	
SC12.1.1.e Use tools and technology to make detailed qualitative and quantitative observations	<b>SE/TE:</b> 86, 106, 147, 324, 369, 644, 680, 740
Scientific Data Collection	
SC12.1.1.f Represent and review collected data in a systematic, accurate, and objective manner	<b>Laboratory Manual:</b> 1-2, 3-4, 21-24, 29-35, 37-42, 43-45, 47-54, 71-73, 75-77, 117-120, 171-172, 177-179, 181-186, 221-224, 229-232, 233-236, 253-256, 259-260, 289-292, 301-304, 305-306, 363-364

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Nebraska Science Standards	Conceptual Physics (Hewitt) ©2009
Scientific Interpretations, Reflections, and Applications	
SC12.1.1.g Analyze and interpret data, synthesize ideas, formulate and evaluate models, and clarify concepts and explanations	<b>SE/TE:</b> 12, 28, 46, 68, 86, 88, 97, 106, 124, 132, 144, 147, 173, 179, 188, 190, 200, 212, 215, 232, 253, 262, 282, 302, 324, 326, 344, 362, 364, 369, 382, 387, 406, 409, 419, 430, 433, 435, 450, 455, 468, 471, 478, 490, 494, 514, 532, 539, 544, 554, 559, 563, 578, 581, 590, 602, 615, 622, 627, 632, 644, 655, 664, 680, 702, 720, 725, 740, 766, 782, 808
SC12.1.1.h Use results to verify or refute a hypothesis	<b>Laboratory Manual:</b> 18, 42, 49, 82, 324, 371-372
SC12.1.1.i Propose and/or evaluate possible revisions and alternate explanations	<b>Laboratory Manual:</b> 1-2
Scientific Communication	
SC12.1.1.j Share information, procedures, results, conclusions, and defend findings to a scientific community (peers, science fair audience, policy makers)	<b>Laboratory Manual:</b> 73, 207
SC12.1.1.k Evaluate scientific investigations and offer revisions and new ideas as appropriate	<i>Opportunities to address this standard can be found on the following pages:</i> <b>SE/TE:</b> 12, 28, 46, 55, 68, 75, 86, 88, 97, 106, 124, 132, 144, 147, 173, 179, 188, 190, 200, 212, 215, 232, 253, 262, 267, 282, 302, 324, 326, 344, 352, 362, 364, 369, 382, 387, 406, 409, 419, 430, 433, 435, 450, 455, 468, 471, 478, 490, 494, 514, 532, 539, 544, 554, 559, 563, 578, 581, 590, 602, 615, 622, 627, 632, 644, 655, 664, 680, 702, 720, 725, 740, 766, 782, 808
Mathematics	
SC12.1.1.l Use appropriate mathematics in all aspects of scientific inquiry	<b>SE/TE:</b> 282, 344, 782
2. Nature of Science	
SC12.1.2 Students will apply the nature of scientific knowledge to their own investigations and in the evaluation of scientific explanations.	
Scientific Knowledge	
SC12.1.2.a Recognize that scientific explanations must be open to questions, possible modifications, and must be based upon historical and current scientific knowledge	<b>SE/TE:</b> 3, 8-9, 46, 233-238, 782, 808 <b>TE only:</b> 3

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Nebraska Science Standards	Conceptual Physics (Hewitt) ©2009
Science and Society	
SC12.1.2.b Describe how society influences the work of scientists and how science, technology, and current scientific discoveries influence and change society	<b>SE/TE:</b> 5, 30
Science as a Human Endeavor	
SC12.1.2.c Recognize that the work of science results in incremental advances, almost always building on prior knowledge, in our understanding of the world	<b>SE/TE:</b> 3, 29-33, 41, 236, 238, 533-534, 629, 767-768, 770, 772, 775
SC12.1.2.d Research and describe the difficulties experienced by scientific innovators who had to overcome commonly held beliefs of their times to reach conclusions that we now take for granted	<b>SE/TE:</b> 30, 32
3. Technology	
SC12.1.3 Students will solve a complex design problem.	
Abilities to do Technical Design	
SC12.1.3.a Propose designs and choose between alternative solutions of a problem	<b>TE only:</b> 128
SC12.1.3.b Assess the limits of a technological design	<b>TE only:</b> 128
SC12.1.3.c Implement the selected solution	<b>TE only:</b> 128
SC12.1.3.d Evaluate the solution and its consequences	<b>TE only:</b> 128
SC12.1.3.e Communicate the problem, process, and solution	<b>TE only:</b> 128
Understanding of Technical Design	
SC12.1.3.f Compare and contrast the reasons for the pursuit of science and the pursuit of technology	<b>SE/TE:</b> 5, 8-9
SC12.1.3.g Explain how science advances with the introduction of new technology	<b>SE/TE:</b> 328-329
SC12.1.3.h Recognize creativity, imagination, and a good knowledge base are all needed to advance the work of science and engineering	<i>Opportunities to address this standard can be found on the following pages:</i> <b>SE/TE:</b> 2-3

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SC K-12.2 Comprehensive Science Standard – Physical Science Students will integrate and communicate the information, concepts, principles, processes, theories, and models of the Physical Sciences to make connections with the natural and engineered world.	
2. Physical Science	
1. Matter	
SC12.2.1 Students will investigate and describe matter in terms of its structure, composition and conservation.	
Properties and Structure of Matter	
SC12.2.1.a Recognize bonding occurs when outer electrons are transferred (ionic) or shared (covalent)	<b>SE/TE:</b> 334
States of Matter	
SC12.2.1.b Describe the energy transfer associated with phase changes between solids, liquids, and gasses	<b>SE/TE:</b> 337, 343, 450-453, 456, 458-461, 462-466 <b>TE only:</b> 451, 454, 459-460
SC12.2.1.c Describe the three normal states of matter (solid, liquid, gas) in terms of energy, particle arrangement, particle motion, and strength of bond between molecules	<b>SE/TE:</b> 337, 362, 382 <b>TE only:</b> 337
Physical and Chemical Changes	
SC12.2.1.d Recognize a large number of chemical reactions involve the transfer of either electrons (oxidation/reduction) or hydrogen ions (acid/base) between reacting ions, molecules, or atoms	<i>Chapter 17, The Atomic Nature of Matter can be supplemented and this standard addressed in <u>Pearson Chemistry (Wilbraham, et al) © 2012</u></i>
SC12.2.1.e Identify factors affecting rates of chemical reactions (temperature, particle size, surface area)	<i>Chapter 17, The Atomic Nature of Matter can be supplemented and this standard addressed in <u>Pearson Chemistry (Wilbraham, et al) © 2012</u></i>
Atomic Structure	
SC12.2.1.f Recognize the charges and relative locations of subatomic particles (neutrons, protons, electrons)	<b>SE/TE:</b> 332-334, 645, 659
SC12.2.1.g Describe properties of atoms, ions, and isotopes	<b>SE/TE:</b> 327-329, 333-334, 338-343 <b>TE only:</b> 327-329
Classification of Matter	
SC12.2.1.h Describe the organization of the periodic table of elements with respect to patterns of physical and chemical properties	<b>SE/TE:</b> 335-336, 340 <b>TE only:</b> 336

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2. Force and Motion	
SC12.2.2 Students will investigate and describe the nature of field forces and their interactions with matter.	
Motion	
SC12.2.2.a Describe motion with respect to displacement and acceleration	<b>SE/TE:</b> 51-52, 61-67 <b>TE only:</b> 51-52
Inertia/Newton's 1st law	
SC12.2.2.b Describe how the law of inertia (Newton's 1st law) is evident in a real-world event	<b>SE/TE:</b> 33-34, 42-44 <b>TE only:</b> 33-34
Forces/Newton's 2nd law	
SC12.2.2.c Make predictions based on relationships among net force, mass, and acceleration (Newton's 2nd law)	<b>SE/TE:</b> 88-89, 98, 100-105
Newton's 3rd law	
SC12.2.2.d Recognize that all forces occur in equal and opposite pairs (Newton's 3rd law)	<b>SE/TE:</b> 107-108, 117-120 <b>TE only:</b> 107-108
SC12.2.2.e Describe how Newton's 3rd law of motion is evident in a real-world event	<b>SE/TE:</b> 108-116, 118-123 <b>TE only:</b> 108-110, 113-115
Universal Forces	
SC12.2.2.f Describe gravity as a force that each mass exerts on another mass, which is proportional to the masses and the distance between them	<b>SE/TE:</b> 237-241, 256-261 <b>TE only:</b> 237, 240-241
SC12.2.2.g Recognize that an attractive or repulsive electric force exists between two charged particles and that this force is proportional to the magnitude of the charges and the distance between them	<b>SE/TE:</b> 645-646, 658-659 <b>TE only:</b> 645
3. Energy	
SC12.2.3 Students will describe and investigate energy systems relating to the conservation and interaction of energy and matter.	
Sound/Mechanical Waves	
SC12.2.3.a Describe mechanical wave properties (speed, wavelength, frequency, amplitude) and how waves travel through a medium	<b>SE/TE:</b> 492-496, 507-508, 510-511, 513 <b>TE only:</b> 492-493, 495
SC12.2.3.b Recognize that the energy in waves can be changed into other forms of energy	<b>SE/TE:</b> 436-438

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Light	
SC12.2.3.c Recognize that light can behave as a wave (diffraction and interference)	<b>SE/TE:</b> 625-632, 637-641 <b>TE only:</b> 625-632
Heat	
SC12.2.3.d Distinguish between temperature (a measure of the average kinetic energy of atomic or molecular motion) and heat (the quantity of thermal energy that transfers due to a change in temperature)	<b>SE/TE:</b> 407-409, 424 <b>TE only:</b> 407, 409
SC12.2.3.e Compare and contrast methods of heat transfer and the interaction of heat with matter via conduction, convection, and radiation	<b>SE/TE:</b> 431-436, 444-449 <b>TE only:</b> 431-436
Electricity/Magnetism	
SC12.2.3.f Recognize that the production of electromagnetic waves is a result of changes in the motion of charges or by a changing magnetic field	<b>SE/TE:</b> 753, 757, 761
SC12.2.3.g Compare and contrast segments of the electromagnetic spectrum (radio, micro, infrared, visible, ultraviolet, x-rays, gamma) based on frequency and wavelength	<b>SE/TE:</b> 436, 536, 548-549
Nuclear	
SC12.2.3.h Recognize that nuclear reactions (fission, fusion, radioactive decay) convert a fraction of the mass of interacting particles into energy, and this amount of energy is much greater than the energy in chemical interactions	<b>SE/TE:</b> 785-786, 792, 808-809, 817-818, 820-822, 825, 827-828 <b>TE only:</b> 821
Conservation	
SC12.2.3.i Interpret the law of conservation of energy to make predictions for the outcome of an event	<b>SE/TE:</b> 153-154, 165, 169 <b>TE only:</b> 153
Mechanical Energy	
SC12.2.3.j Identify that all energy can be considered to be either kinetic, potential, or energy contained by a field (e.g. electromagnetic waves)	<b>SE/TE:</b> 148-150, 164 <b>TE only:</b> 150
Chemical Energy	
SC12.2.3.k Identify endothermic and exothermic reactions	<i>Lesson 9.4, Potential Energy, can be supplemented and this standard addressed in <u>Pearson Chemistry (Wilbraham, et al) © 2012.</u></i>