New Mexico Science Content Standards, Benchmarks, and Performance Standards

Publisher Alignment Analyses for Primary Tool of Instruction

This correlation table/matrix is a tool to show alignment with *New Mexico's Content Standards, Benchmarks and Performance Standards* and the proposed instructional material considered for adoption. The purpose is to demonstrate how your material can contribute to student achievement as measured against these Content Standards.
Please submit this alignment analyses for each title you are submitting to the Instructional Material Bureau via e-mail to Marjorie Gillespie at mgillespie@ped.state.nm.us . Please do NOT send paper copies of this document.

Title: PHYSICS IN CONTEXT (FOR PRINCIPLES OF TECHNOLOGY) ISBN: 1-57837-275-5

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Physics

Strand I: Scientific Thinking and Practice

Standard I: Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.

Benchmark	Performance Standards	Publisher Citation		Meets Standard*	
		Introduced	Practiced	Yes	No
Use accepted scientific methods to collect, analyze, and interpret data and observations and to design and conduct scientific investigations and communicate results.	1. Describe the essential components of an investigation, including appropriate methodologies, proper equipment, and safety precautions. 2. Design and conduct scientific investigations that include: • testable hypotheses • controls and variables • methods to collect, analyze, and interpret data • results that address hypotheses being investigated	**Introduced by exploring the concepts with the students in the Lab Manual, Student Journal, Assessment CD & text**	**Embedded in appropriate sections of Student Text, Teachers Guide, Lab Manual, Student Journal, Assessment CD & text**	√	

***Objectives are clearly stated with measurable outcomes at 80% or above.**

	• predictions based on results • re-evaluation of hypotheses and additional experimentation as necessary • error analysis. 3. Use appropriate technologies to collect, analyze, and communicate scientific data (e.g., computers, calculators, balances, microscopes). 4.Convey results of investigations using scientific concepts, methodologies, and expressions, including: • scientific language and symbols • diagrams, charts, and other data displays • mathematical expressions and processes (e.g., mean, median, slope, proportionality) • clear, logical, and concise communication • reasoned arguments. 5. Understand how scientific theories are used to explain and predict natural phenomena (e.g., plate tectonics, ocean currents, structure of atom).	**Web-site. Supported by Student Text and Teacher's Guide**	**web-site**		
Understand that scientific processes produce scientific knowledge that is continually evaluated, validated, revised, or rejected.	1. Understand how scientific processes produce valid, reliable results, including: • consistency of explanations with data and observations • openness to peer review • full disclosure and examination of assumptions • testability of hypotheses • repeatability of experiments and reproducibility of results. 2. Use scientific reasoning and valid logic to recognize: • faulty logic • cause and effect • the difference between observation and unsubstantiated inferences and conclusions	**Introduced by exploring the concepts with the students in the Lab Manual, Student Journal, Assessment CD & text Web-site. Supported by Student Text and**	**Embedded in appropriate sections of Student Text, Teachers Guide, Lab Manual, Student Journal, Assessment CD & text web-site**	√	

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	• potential bias. 3. Understand how new data and observations can result in new scientific knowledge. 4. Critically analyze an accepted explanation by reviewing current scientific knowledge. 5. Examine investigations of current interest in science (e.g., superconductivity, molecular machines, age of the universe). 6. Examine the scientific processes and logic used in investigations of past events (e.g., using data from crime scenes, fossils), investigations that can be planned in advance but are only done once (e.g., expensive or time-consuming experiments such as medical clinical trials), and investigations of phenomena that can be repeated easily and frequently.	**Teacher's Guide**			
Use mathematical concepts, principles, and expressions to analyze data, develop models, understand patterns and relationships, evaluate findings, and draw conclusions.	1. Create multiple displays of data to analyze and explain the relationships in scientific investigations. 2. Use mathematical models to describe, explain, and predict natural phenomena. 3. Use technologies to quantify relationships in scientific hypotheses (e.g., calculators, computer spreadsheets and databases, graphing software, simulations, modeling). 4. Identify and apply measurement techniques and consider possible effects of measurement errors. 5. Use mathematics to express and establish scientific relationships (e.g., scientific notation, vectors, dimensional analysis).	**Introduced by exploring the concepts with the students in the Lab Manual, Student Journal, Assessment CD & text Web-site. Supported by Student Text and Teacher's Guide**	**Embedded in appropriate sections of Student Text, Teachers Guide, Lab Manual, Student Journal, Assessment CD & text web-site**	√	

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Strand II: Content of Science

Standard I (Physical Science): Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy.

Benchmark	Performance Standards	Publisher Citation		Meets Standard*	
		Introduced	Practiced	Yes	No
Understand the properties, underlying structure, and reactions of matter.	**Properties of Matter** 1. Classify matter in a variety of ways (e.g., element, compound, mixture; solid, liquid, gas; acidic, basic, neutral). 2. Identify, measure, and use a variety of physical and chemical properties (e.g., electrical conductivity, density, viscosity, chemical reactivity, pH, melting point). 3. Know how to use properties to separate mixtures into pure substances (e.g., distillation, chromatography, solubility). 4. Describe trends in properties (e.g., ionization energy or reactivity as a function of location on the periodic table, boiling point of organic liquids as a function of molecular weight).	**Foundation for introduction in each content element of the Student Text, Teacher's Guide, Lab manuals and support materials such as Assessment CD and Web-site.**	**Student Text pp 4-76; 84-116; 122-164; 170-224. Teacher's Guide pp. T4-76; T84-116; T122-164; T170-224. Lab Manual & Student Journal pp. 1-1-1-36; 2-1-2-34;3-1-3-34; 4-1-4-38 Sections of Assessment CD and web-site:**	√	

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			www.learningincontext.com		
Understand the transformation and transmission of energy and how energy and matter interact.	**Energy Transformation and Transfer** 1. Identify different forms of energy, including kinetic, gravitational (potential), chemical, thermal, nuclear, and electromagnetic. 2. Explain how thermal energy (heat) consists of the random motion and vibrations of atoms and molecules and is measured by temperature. 3. Understand that energy can change from one form to another (e.g., changes in kinetic and potential energy in a gravitational field, heats of reaction, hydroelectric dams) and know that energy is conserved in these changes. 4. Understand how heat can be transferred by conduction, convection, and radiation, and how heat conduction differs in conductors and insulators. 5. Explain how heat flows in terms of the transfer of vibrational motion of atoms and molecules from hotter to colder regions. 6. Understand that the ability of energy to do something useful (work) tends to decrease (and never increases) as energy is converted from one form to another. **Interactions of Energy and Matter** 7. Understand that electromagnetic waves carry energy that can be transferred when they interact with matter. 7. Describe the characteristics of electromagnetic waves (e.g., visible light, radio, microwave, X-ray, ultraviolet, gamma) and other waves (e.g.,	**Foundation for introduction in each content element of the Student Text, Teacher's Guide, Lab manuals and support materials such as Assessment CD and Web-site.**	**Student Text pp. 230-240; 243-258; 262-275; 277-292; 298-321; 326-349; 354-380; 386-421; 426-487.** **Teacher's Guide T230-240; T243-258; T262-275; T277-292; T298-321; T326-349; T354-380; T386-421; T426-487** **Lab Manual & Student Journal pp. 5-1-5-35; 6-1-6-25; 7-1-7-3; 8-1-8-17; 9-1-13; 10-1-10-31** **Sections of Assessment CD and web-site: www.learningincontext.com**	√	

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	sound, seismic waves, water waves), including: • origin and potential hazards of various forms of electromagnetic radiation • energy of electromagnetic waves carried in discrete energy packets (photons) whose energy is inversely proportional to wavelength. 8. Know that each kind of atom or molecule can gain or lose energy only in discrete amounts. 9. Explain how wavelengths of electromagnetic radiation can be used to identify atoms, molecules, and the composition of stars. 10. Understand the concept of equilibrium (i.e., thermal, mechanical, and chemical).				
Understand the motion of objects and waves, and the forces that cause them.	**Forces** 1. Know that there are four fundamental forces in nature: gravitation, electromagnetism, weak nuclear force, and strong nuclear force. 2. Know that every object exerts gravitational force on every other object, and how this force depends on the masses of the objects and the distance between them. 3. Know that materials containing equal amounts of positive and negative charges are electrically neutral, but that a small excess or deficit of negative charges produces significant electrical forces. 4. Understand the relationship between force and pressure, and how the pressure of a volume of gas depends on the temperature and the amount of gas. 5. Explain how electric currents cause magnetism and how changing magnetic fields produce	**Foundation for introduction in each content element of the Student Text, Teacher's Guide, Lab manuals and support materials such as Assessment CD and Web-site.**	**Student Text pp. 4-23; 27-43; 47-76; 84-93; 95-103; 106-116; 122-135; 138-145; 149-155; 157-163; 170-180; 184-195; 201-212; 216-223; Teachers Guide T-4-23; T27-43; T47-76; T84-93; T95-103; T106-116; T122-135; T138-145; T149-155; T 157-163; T170-**	√	

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	electricity (e.g., electric motors, generators). 6. Represent the magnitude and direction of forces by vector diagrams. 7. Know that when one object exerts a force on a second object, the second object exerts a force of equal magnitude and in the opposite direction on the first object (i.e., Newton's Third Law). **Motion** 8. Apply Newton's Laws to describe and analyze the behavior of moving objects, including: • displacement, velocity, and acceleration of a moving object • Newton's Second Law, $F = ma$ (e.g., momentum and its conservation, the motion of an object falling under gravity, the independence of a falling object's motion on mass) • circular motion and centripetal force. 9. Describe relative motion using frames of reference. 10. Describe wave propagation using amplitude, wavelength, frequency, and speed. 11. Explain how the interactions of waves can result in interference, reflection, and refraction. 12. Describe how waves are used for practical purposes (e.g., seismic data, acoustic effects, Doppler effect).		**180; T184-195; T201-212; T216-223. Lab Manual & Student Journal pp. 1-1- 1-31; 2-1 -2-27; 3-1-3-29; 4-1 – 4-33. Sections of Assessment CD and web-site: www.learningincontext.com**		

Strand III: Science and Society

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Standard I: Understand how scientific discoveries, inventions, practices, and knowledge influence, and are influenced by, individuals and societies.

Benchmark	Performance Standards	Publisher Citation		Meets Standard*	
		Introduced	Practiced	Yes	No
Examine and analyze how scientific discoveries and their applications affect the world, and explain how societies influence scientific investigations and applications.	**Science and Technology** 1. Know how science enables technology but also constrains it, and recognize the difference between real technology and science fiction 2. Understand how advances in technology enable further advances in science (e.g., microscopes and cellular structure; telescopes and understanding of the universe). 3. Evaluate the influences of technology on society (e.g., communications, petroleum, transportation, nuclear energy, computers, medicine, genetic engineering) including both desired and undesired effects, and including some historical examples (e.g., the wheel, the plow, the printing press, the lightning rod). 4. Understand the scientific foundations of common technologies. **Science and Society** 5. Describe major historical changes in scientific perspectives (e.g., atomic theory, germs, cosmology, relativity, plate tectonics, evolution) and the experimental observations that triggered them. 6. Describe how environmental, economic, and political interests impact resource management and use in New Mexico. **Science and Individuals**	**Foundation for introduction in each content element of the Student Text, Teacher's Guide, Lab manuals and support materials such as Assessment CD and Web-site.**	**This is embedded and intergraded in each chapter of the Student Text, Teacher's Guide; Lab Manual, Student Journal and Sections of Assessment CD and web-site: www.learningincontext.com**	√	

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	7. Identify how science has produced knowledge that is relevant to individual health and material prosperity. 8. Understand that reasonable people may disagree about some issues that are of interest to both science and religion (e.g., the origin of life on Earth, the cause of the Big Bang, the future of Earth). 9. Understand that scientists have characteristics in common with other individuals (e.g., employment and career needs, curiosity, desire to perform public service, greed, preconceptions and biases, temptation to be unethical, core values including honesty and openness). 10. Know that science plays a role in many different kinds of careers and activities.				

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