



Active Chemistry Correlation to the Colorado Model Content Standards for Physical Science (Focus: Physics and Chemistry), Grades 9-12

STANDARD 1: Students apply the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations.

Benchmark	Location/Page where Standard is found	
1. ask questions and state hypotheses using prior scientific knowledge to help design and guide their development and implementation of a scientific investigation	Ch 2 Act 4,5 Ch 3 Act 2,5,8 Ch 4 Act 1,4 Ch 5 Act 3,5,8 Ch 6 Act 1,4 Ch 7 Act 1,3 Ch 8 Act 4,5,8 Ch 9 Act 3,7 Ch 10 Act 1,4-7 Ch 11 Act 1,3	119, 125, 131, 143, 151,156, 240, 286, 297, 307,317,328, 343,360, 400, 440, 476, 484, 541, 574, 617, 640, 649, 658, 667, 709, 778, 833, 901, 909,
2. select and use appropriate technologies to gather, process, and analyze data and to report information related to an investigation	Ch 1 Act 2,3,5,7 Ch 2 Act 1-9 Ch 3 Act 2-8 Ch 4 Act 1, 4-8 Ch 5 Act 1, 3-8 Ch 6 Act 1-8 Ch 7 Act 1-8 Ch 8 Act 2-6, 8 Ch 9 Act 1-5, 7 Ch 10 Act 1,3-8 Ch 11 Act 1-8	
3. identify major sources of error or uncertainty within an investigation (<i>for example: particular measuring devices and experimental procedures</i>)	Ch 1 Act 3,8 Ch 2 Act 4,5 Ch 3 Act 6,7 Ch 4 Act 1,4,8 Ch 5 Act 3,5,6 Ch 6 Act 1,4 Ch 7 Act 2,3,4 Ch 8 Act 5,6,8 Ch 11 Act 8	

4. recognize and analyze alternative explanations and models	Ch 1 At 3,4,5,6,7 Ch 2 Act 1,7 Ch 3 Act 1,2 Ch 5 Act 8 Ch 7 Act 7 Ch 8 Act 3,4 Ch 9 Act 4,5 Ch 11 Act 8	19-22, 30, 34, 39-40, 54, 63- 64, 82,
5. construct and revise scientific explanations and models, using evidence, logic, and experiments that include identifying and controlling variables	Ch 2 Act 4,5 Ch 3 Act 2,5,8 Ch 4 Act 1,4 Ch 5 Act 3,5,8 Ch 6 Act 1,4 Ch 7 Act 1,3 Ch 8 Act 4,5,8 Ch 9 Act 3,7 Ch 10 Act 1,4-7 Ch 11 Act 1,3	p 143, 151, 156, 240
6. communicate and evaluate scientific thinking that leads to particular conclusions	Ch 1 Act 2,4,6,7 Ch 2 Act 1- 3,5,6 Ch 3 Act 2-8 Ch 4 Act 1,4,5,6,8 Ch 5 Act 1-6,8 Ch 6 Act 1-8 Ch 7 Act 1- 4,6,8 Ch 8 Act 2-6,8 Ch 9 Act 1-5,7 Ch 10 Act 1,4-8 Ch 11 Act 1-8	

PHYSICAL SCIENCE

STANDARD 2: Students know and understand common properties, forms, and changes in matter and energy. (Focus: Physics and Chemistry.)

Benchmark	Location/Page where Standard is found	
<u>Structure and Properties of Matter</u>		
1. elements can be organized by their physical and chemical properties (Periodic Table)	Ch 1 Act 2-8 Ch 8 Act 1 Ch 11 Act 3	2,3 20-23, 26- 28, 32-34, 42- 44, 48-52, 54 595

2. the spatial configuration of atoms and the structure of the atoms in a molecule determine the chemical properties of the substance	Ch 1 Act 7 Ch 8 Act 1	20-23, 26-28, 32-34, 42-44, 48-52, 54, 104- 107, 139, 148, 164-165
3. there are observable and measurable physical and chemical properties that allow you to compare, contrast, and separate substances (<i>for example: pH, melting point, conductivity, magnetic attraction</i>)	Ch 1 Act 2 Ch 2 Act 4 Ch 3 Act 3,4,6,8 Ch 8 Act 2	12, 49-56, 58, 65, 70, 96, 96, 112, 126-128, 141, 146-147, 159-161, 204, 292, 339, 476, 595-596, 599, 602-604, 606, 654, 672
4. word and chemical equations are used to relate observed changes in matter to its composition and structure (for example: conservation of matter (4))	Ch 2 Act 9 Ch 4 Act 1,2,4 Ch 5 Act 5,7 Ch 6 Act 4 Ch 7 Act 2 Ch 9 Act 2 Ch 10 Act 2,5 Ch 11 Act 4	p. 166, 267, 270-272, 280- 282, 286, 348, 436, 444-445, 477, 480, 524- 524, 613, 623
<u>Forms and Transfer of Energy</u>		
5. quantitative relationships involved with thermal energy can be identified, measured, calculated and analyzed (<i>for example: heat transfer in a system involving mass, specific heat, and change in temperature of matter</i>)	Ch 2 Act 2 Ch 4 Act 7 Ch 6 Act 5 Ch 7 Act 1	118, 259-263, 333-38, 470- 476, 514-520, 524-527
6. energy can be transferred through a variety of mechanisms and in any change some energy is lost as heat (<i>for example: conduction, convection, radiation, motion, electricity, chemical bonding changes</i>)	Ch 4 Act 7 Ch 6 Act 5 Ch 7 Act 3	259-263, 321- 325, 327, 470- 476, 514-520, 524-527
7. light and sound waves have distinct properties; frequency, wavelengths and amplitude	Ch 1 Act 5 Ch 4 Act 5 Ch 8 Act 3	35, 39-40, 43, 77, 122, 159, 196, 300-303, 517
8. quantities that demonstrate conservation of mass and conservation of energy in physical interactions can be measured and calculated	Ch 3 Act 5,6 Ch 4 Act 1,2,3,4 Ch 11 Act 3,4,6,7	215-221, 272- 273, 279-282, 284-285, 293- 297, 313, 317, 322-323, 393- 399, 611-612, 622-629, 639, 644-649, 688, 817-819, 830, 870-875, 882- 889, 905-907, 914-917
<u>Forces and Motion</u>		

9. Newton's Three Laws of Motion explain the relationship between the forces acting on an object, the object's mass, and changes in its motion	
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STANDARD 5: Students understand that the nature of science involves a particular way of building knowledge and making meaning of the natural world.

Benchmark	Location/Page where Standard is found	
1. print and visual media can be evaluated for scientific evidence, bias, or opinion	Ch 1 Act 3,8 Ch 2 Act 4,5 Ch 3 Act 6,7 Ch 4 Act 1,4,8 Ch 5 Act 3,5,6 Ch 6 Act 1,4 Ch 7 Act 2,3,4 Ch 8 Act 5,6,8 Ch 11 Act 8	
2. the scientific way of knowing uses a critique and consensus process (<i>for example: peer review, openness to criticism, logical arguments, skepticism</i>)	Ch 1 Act 2-7 Ch 3 Act 2	p 39, 53, 63, 186
3. graphs, equations or other models are used to analyze systems involving change and constancy (<i>for example: comparing the geologic time scale to shorter time frame, exponential growth, a mathematical expression for gas behavior; constructing a closed ecosystem such as an aquarium</i>)	Ch 1 Act 2,4,6,7 Ch 2 Act 1-3,5,6 Ch 3 Act 2-8 Ch 4 Act 1,4,5,6,8 Ch 5 Act 1-6,8 Ch 6 Act 1-8 Ch 7 Act 1-4,6,8 Ch 8 Act 2-6,8 Ch 9 Act 1-5,7 Ch 10 Act 1,4-8 Ch 11 Act 1-8	
4. there are cause-effect relationships within systems (<i>for example: the effect of temperature on gas volume, effect of carbon dioxide level on the greenhouse effect, effects of changing nutrients at the base of a food pyramid</i>)	Ch 5 Act 3,4,6 Ch 7 Act 8 Ch 9 Act 1,3,5 Ch 11 Act 5	p. 166, 266, 272, 321, 335, 341, 348,373, 383-387, 393, 403-405, 412, 413, 428, 457-462, 480-481, 506, 525, 577, 578, 580, 698-700, 714-718,706, 860
5. scientific knowledge changes and accumulates over time; usually the changes that take place are small modifications of prior knowledge but major shifts in the scientific view of how the world works do occur		p 76, 109, 119, 131, 161, 169, 181, 192, 200, 209, 221, 232, 307, 328, 378, 400, 501, 574, 598, 607, 617, 629, 658, 684,

		692, 702, 726, 733, 750, 778, 798, 833, 856, 866, 901, 909, 918, 927,
6. interrelationships among science, technology and human activity lead to further discoveries that impact the world in positive and negative ways	Ch 1 Act 2,4,6,7 Ch 2 Act 1-3,5,6 Ch 3 Act 2-8 Ch 4 Act 1,4,5,6,8 Ch 5 Act 1-6,8 Ch 6 Act 1-8 Ch 7 Act 1-4,6,8 Ch 8 Act 2-6,8 Ch 9 Act 1-5,7 Ch 10 Act 1,4-8 Ch 11 Act 1-8	
7. there is a difference between a scientific theory and a scientific hypothesis	Ch 1 Act 2-7 Ch 3 Act 2	p 20, 22, 24, 34, 53, 63, 186, 712, 715, 738