

Alaska Physics Standards Correlation

Content and Performance Standards for Alaska Students

	Physics for Scientists and Engineers	Principles of Physics	Conceptual Physics
CONTENT STANDARDS			
B. Concepts of Physical Science			
A student should understand and be able to apply the concepts, models, theories, universal principles, and facts that explain the physical world.			
A student who meets the content standard should:			
1) develop an understanding of the characteristic properties of matter and the relationship of these properties to their structure and behavior;	Chapters 1, 5, 13, 14, 17, 19 – 25, 27, 30, 34, 35, 39, 40, 42 – 44	Chapters 1, 5, 13, 14, 17, 19 – 25, 27, 30, 34, 38, 39, 41 – 43	Chapters 1, 5, 12, 13, 16, 18 – 25, 28, 30, 34, 36 – 38
2) develop an understanding that energy appears in different forms, can be transformed from one form to another, can be transferred or moved from one place or system to another, may be unavailable for use, and is ultimately conserved;	Chapter 7, 8.11 - 8.21, 13.28 – 13.33, 15.20 – 15.24, 16.19 – 16.21, Chapters 19 – 22 & 25, 27.13 – 27.18, 28.9 – 28.11, 29.3, 32.36 – 32.38, 33.4, 33.33 – 33.34, 35.9 – 35.10, 41.23 – 41.26, Chapters 42 – 44	Chapter 7, 8.10 – 8.19, 13.21 – 13.26, 15.18 – 15.21, Chapters 19 – 22 & 25, 27.8 – 27.13, 28.7 – 28.8, 29.3, 32.29 – 32.30, 33.24 – 33.25, 34.6 – 34.7, 40.16 – 40.19, Chapters 41 – 43	Chapter 6, 7.8 – 7.13, 12.17 – 12.18, Chapters 18 – 21 & 24, 25.7 – 25.11, 26.4 – 26.5, 27.3, 35.12, Chapters 36 – 38
3) develop an understanding of the interactions between matter and energy, including physical, chemical, and nuclear changes, and the effects of these interactions on physical systems; and	Chapter 7, 8.11 - 8.21, 13.28 – 13.33, 15.20 – 15.24, 16.19 – 16.21, Chapters 19 – 22 & 25, 27.13 – 27.18, 28.9 – 28.11, 29.3, 32.36 – 32.38, 33.4, 33.33 – 33.34, 35.9 – 35.10, 41.23 – 41.26, Chapters 42 – 44	Chapter 7, 8.10 – 8.19, 13.21 – 13.26, 15.18 – 15.21, Chapters 19 – 22 & 25, 27.8 – 27.13, 28.7 – 28.8, 29.3, 32.29 – 32.30, 33.24 – 33.25, 34.6 – 34.7, 40.16 – 40.19, Chapters 41 – 43	Chapter 6, 7.8 – 7.13, 12.17 – 12.18, Chapters 18 – 21 & 24, 25.7 – 25.11, 26.4 – 26.5, 27.3, 35.12, Chapters 36 – 38

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4) develop an understanding of motions, forces, their characteristics and relationships, and natural forces and their effects.	Chapters 2 – 6, 9 – 13 & 15 - 18, 23.7, 23.9 – 23.17, Chapters 30 – 32 & 44	Chapters 2 – 6, 9 – 13 & 15 - 18, 23.7, 23.9 – 23.17, Chapters 30 – 32 & 43	Chapters 2 – 5, 8 – 12 & 14 – 17, 22.6, 22.8 – 22.13, Chapters 28 – 29 & 38
D. Concepts of Earth Science			
A student should understand and be able to apply the concepts, processes, theories, models, evidence, and systems of earth and space sciences.			
A student who meets the content standard should:			
3) develop an understanding of the cyclical changes controlled by energy from the sun and by Earth's position and motion in our solar system; and	Chapter 13, 35.11	Chapter 13, 34.8	Chapter 12, 30.6
E. Science and Technology			
A student should understand the relationships among science, technology and society.	11.19, 14.7, 14.22, 21.26, 22.14, 22.16, 23.15, 24.13, 27.18, 28.4, 28.14, 28.19, 29.25, 30.3, 30.5, 30.11, 30.15, 30.27, 32.16, 32.17, 35.27, 38.18, 40.3, 40.17, 40.22, 42.6, 42.18, 42.19, 42.20, 42.21, 42.24, 44.13, 44.20	11.14, 14.7, 14.22, 21.22, 22.13, 22.15, 23.15, 24.13, 27.13, 28.4, 28.11, 28.16, 29.25, 30.3, 30.5, 30.12, 30.16, 30.26, 32.13, 32.14, 34.23, 37.16, 39.3, 39.14, 39.16, 41.6, 41.17, 41.18, 41.19, 41.20, 41.23, 43.13, 43.20	10.7, 13.6, 13.15, 21.9, 21.10, 22.12, 23.10, 25.11, 26.3, 26.6, 26.11, 28.3, 28.5, 28.12, 28.15, 28.19, 30.10, 33.12, 34.10, 36.5, 36.15, 36.16, 36.17, 36.20, 38.13

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PERFORMANCE STANDARDS (Grade Level Expectations)			
B1 – Concepts of Physical Science			
The student demonstrates an understanding of the structure and properties of matter by			
[9] SB1.1 describing atoms and their base components (i.e., protons, neutrons, electrons)	23.1, 42.9, Chapter 44	23.1, 41.9, Chapter 43	22.1, 36.8, Chapter 38
[10] SB1.1 using the periodic table to describe atoms in terms of their base components (i.e., protons, neutrons, electrons)			
[11] SB1.1 predicting the properties of an element (i.e., reactivity, metal, non-metal) using the periodic table and verifying the predictions through experimentation (L)			
The student demonstrates an understanding of how energy can be transformed, transferred, and conserved by			
[9] SB2.1 applying the concepts of heat transfer (i.e., conduction, convection, radiation) to Alaskan dwellings	19.25 – 19.31	19.22 – 19.28	18.17 – 18.20
[9] SB2.2 recognizing simple electrical circuits	Chapter 29	Chapter 29	Chapter 27
[10] SB2.1 examining energy (i.e., nuclear, electromagnetic, chemical, mechanical, thermal) transfers, transformations, and efficiencies by comparing useful energy to total energy	7.21, 7.29 – 7.31, 8.20, Chapters 21 – 22, 27.18, 33.33 – 33.34, 41.23 – 41.26, Chapter 44	7.18, 7.23 – 7.25, 8.18, Chapters 21 – 22, 27.13, 33.24 – 33.25, 40.16 – 40.19, Chapter 43	6.15, 6.20, 7.13, Chapters 20 – 21, 25.11, 35.12, Chapter 38
[11] SB2.1 demonstrating energy (e.g., nuclear, electromagnetic, chemical, mechanical, thermal) transfers and transformations by comparing useful energy to total energy (entropy) (L)	7.21, 7.29 – 7.31, 8.20, Chapters 21 – 22, 27.18, 33.33 – 33.34, 41.23 – 41.26, Chapter 44	7.18, 7.23 – 7.25, 8.18, Chapters 21 – 22, 27.13, 33.24 – 33.25, 40.16 – 40.19, Chapter 43	6.15, 6.20, 7.13, Chapters 20 – 21, 25.11, 35.12, Chapter 38
The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by			
[9] SB3.1 recognizing that a chemical reaction has taken place			

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[9] SB3.2 explaining that in chemical and nuclear reactions, energy (e.g., heat, light, mechanical, and electrical) is transferred into and out of a system	Chapter 44	Chapter 43	Chapter 38
[9] SB3.3 recognizing that atoms emit and absorb electromagnetic radiation	Chapter 42	Chapter 41	Chapter 36
[10] SB3.1 describing the behavior of electrons in chemical bonding			
[10] SB3.2 recognizing that radioactivity is a result of the decay of unstable nuclei	Chapter 44	Chapter 43	Chapter 38
[10] SB3.3 comparing the relative wavelengths and applications of different forms of electromagnetic radiation (i.e., x-ray, visible, infrared, microwaves, radio)	35.1, 35.8, 40.22	34.1, 34.5, 39.16	30.1, 30.5
[11] SB3.1 predicting how an atom can interact with other atoms based on its electron configuration and verifying the results (L)			
[11] SB3.2 researching applications of nuclear reactions in which a small amount of matter is converted directly into a huge amount of energy (i.e. $E = mc^2$) (L)	44.0, 44.13	43.0, 43.13	38.0, 38.13
The student demonstrates an understanding of motions, forces, their characteristics, relationships and effects by			
[9] SB4.1 explaining the relationship of motion to an object's mass and the applied force	Chapters 5 & 6	Chapters 5 & 6	Chapter 5
[9] SB4.2 recognizing that the gravitational attraction between objects is proportional to their masses and decreasing with their distance	Chapter 13	Chapter 13	Chapter 12
[9] SB4.3 describing the interactions of waves (i.e., reflection, refraction, wave addition)	Chapter 18, 37.7 – 37.8, Chapters 39 & 40	Chapter 18, 36.7 – 36.8, Chapters 38 & 39	Chapter 17, 32.6, Chapter 34