Kentucky Core Content for Science Assessment Correlations

Physical Science Standards	Student Edition Pages
STRUCTURE OF ATOMS	
1.1.1:Matter is made of minute particles called atoms, and atoms are composed of even smaller components. The components of an atom have measurable properties such as mass and electrical charge. Each atom has a positively charged nucleus surrounded by negatively charged electrons. The electric force between the nucleus and the electrons holds the atom together.	141, 464, 472, 493-494, 604-606, 621, 647, 665, 691-692, 710-712, 718
1.1.2: The atom's nucleus is composed of protons and neutrons that are much more massive than electrons. When an element has atoms that differ in the number of neutrons, these atoms are called different isotopes of the element.	607, 647, 692-694, 713
1.1.3: The forces that hold the nucleus together, at nuclear distances, are usually stronger than the forces that would make it fly apart. Nuclear reactions convert a fraction of the mass of interacting particles into energy, and they can release much greater amounts of energy than atomic interactions. Fission is the splitting of a large nucleus into smaller pieces. Fusion is the joining of two nuclei at extremely high temperature and pressure. Fusion is the process responsible for the energy of the Sun and other stars.	693, 718, 725-727, 729-730, 733
STRUCTURE AND PROPERTIES OF MATTER	
1.2.1: Atoms interact with each other by transferring or sharing outermost electrons. These outer electrons govern the chemical properties of the element.	658
1.2.2: An element is composed of a single type of atom. When elements are listed according to the number of protons, repeating patterns of physical and chemical properties identify families of elements with similar properties. The periodic table is a consequence of the repeating pattern of outermost electrons.	
1.2.3: Bonds between atoms are created when outer electrons are paired by being transferred or shared. A compound is formed when two or more kinds of atoms bind together chemically.	
1.2.4: The physical properties of compounds reflect the nature of the interactions among molecules. These interactions are determined by the structure of the molecule including the constituent atoms.	
1.2.5: Solids, liquids, and gases differ in the distances between molecules or atoms and therefore the energy that binds them together. In solids, the structure is nearly rigid; in liquids, molecules or atoms move around each other but do not move apart; and in gases, molecules or atoms move almost independently of each other and are relatively far apart.	285-286, 300-301, 314, 322
1.2.6: In conducting materials, electrons flow easily; whereas, in insulating materials, they can hardly flow at all. Semiconducting materials have intermediate behavior. At low temperatures, some materials become superconductors and offer no resistance to the flow of electrons.	465-466, 477, 513, 670, 673, 675
CHEMICAL REACTIONS	
1.3.1: Chemical reactions occur all around us and in every cell in our bodies. These reactions may release or consume energy.	

Kentucky Core Content for Science Assessment Correlations

Physical Science Standards	Student Edition Pages
1.3.2: Rates of chemical reactions vary. Reaction rates depend on concentration, temperature, and properties of reactants. Catalysts speed up chemical reactions.	
MOTIONS AND FORCES	
1.4.1:Objects change their motion only when a net force is applied. Laws of motion are used to describe the effects of forces on the motion of objects.	117-141, 143-147, 150-157, 159, 161, 165-173, 200-201, 207
1.4.2: Gravity is a universal force that each mass exerts on every other mass.	118, 141, 181-184, 191, 193-197
1.4.3: The electric force is a universal force that exists between any two charged objects. Opposite charges attract while like charges repel.	463, 466-468, 470-472, 476-479, 487
1.4.4: Electricity and magnetism are two aspects of a single electromagnetic force. Moving electric charges produce magnetic forces, and moving magnets produce electric forces. This idea underlies the operation of electric motors and generators.	141, 560-563, 571, 575, 582, 586, 588, 595, 598
CONSERVATION OF ENERGY AND INCREASE IN DISORDER	
1.5.1: The total energy of the universe is constant. Energy can be transferred in many ways, but it can neither be created nor destroyed.	258-262, 265, 267-271, 282, 289-291, 327-329, 331, 334, 354-355, 616-617, 619, 621
1.5.2: All energy can be considered to be either kinetic energy, potential energy, or energy contained by a field (e.g., electric, magnetic, gravitational).	224-225, 249-256, 267, 269-270, 488-490, 502-503
1.5.3: Heat is the manifestation of the random motion and vibrations of atoms, molecules, and ions. The greater the atomic or molecular motion, the higher the temperature.	274-275, 281, 295-297, 312-313, 315-322
1.5.4: The universe becomes less orderly and less organized over time. Thus, the overall effect is that the energy is spread out uniformly. For example, in the operation of mechanical systems, the useful energy output is always less than the energy input; the difference appears as heat.	234, 241, 244-245, 291-297, 509, 520, 522-523
INTERACTIONS OF MATTER AND ENERGY	
1.6.1: Waves, including sound and seismic waves, waves on water, and electromagnetic waves, can transfer energy when they interact with matter. Apparent changes in frequency can provide information about relative motion.	327–329, 331, 334, 354–355, 616–617, 619, 621
1.6.2: Electromagnetic waves, including radio waves, microwaves, infrared radiation, visible light, ultraviolet radiation, x-rays, and gamma rays, result when a charged object is accelerated.	604, 613-615, 620-621, 650
Scientific Inquiry Standards	**Student Edition Pages**
SIa: Students will formulate testable hypotheses and demonstrate the logical connections between the scientific concepts guiding a hypothesis and the design of an experiment.	12, 32, 58, 106, 133, 162, 232, 257, 317, 545, 559, 562, 593, 595, 682, 684
SIb: Students will use equipment, tools, techniques, technology, and mathematics to improve scientific investigations and communications.	12, 16-34, 36, 38-41, 44-51, 53-59, 60-61, 64-69, 71-79, 82-103, 105-115, 119, 122, 124-125, 127-129, 131-133, 136-137, 140-141, 144-147,

Kentucky Core Content for Science Assessment Correlations

Scientific Inquiry Standards	Student Edition Pages
	151-154, 156-162, 165-166, 168, 170-173, 179-181, 187-188, 192, 194-197, 203-206, 208-210, 212-216, 218-221, 226-232, 237-239, 242-245, 250-251, 254-257, 260-262, 264-265, 269-271, 277-278, 280-281, 283-284, 287-289, 296-297, 302-304, 307-309, 318-319, 324-325, 330, 333-335, 337, 346-347, 351-352, 361-363, 366-367, 369-371, 376-377, 380-381, 390-391, 397-402, 411-413, 420, 422-425, 428, 431-435, 440-441, 446, 448, 451, 458-459, 467, 474-476, 478-479, 483-484, 491-496, 500-501, 503-505, 511-512, 514-518, 521-522, 524-525, 527-529, 534, 536-541, 544-547, 551-553, 562-563, 569, 573-574, 576-579, 584-585, 589, 595-597, 600-601, 606-607, 610-612, 622-623, 631-634, 638, 642-643, 654-657, 666-667, 672, 674-675, 677, 681, 684, 688-689, 694, 697-700, 708, 714-715, 720-721, 724, 727, 731, 734-735
SIc: Students will use evidence, logic, and scientific knowledge to develop and revise scientific explanations and models	5, 12, 32, 38-40, 46, 51, 55, 61, 69, 71, 74, 76, 78, 89, 91, 93, 100, 108-109, 115, 123, 125, 127, 129, 133, 136-137, 141, 143, 145, 154, 156, 161-162, 164, 166, 168, 170-171, 173, 177, 179-181, 184, 189, 192-197, 205-206, 208, 213, 216, 218, 221, 225, 227, 231-232, 236, 239, 241-242, 249, 256-257, 262, 265, 268-269, 271, 281, 284, 294, 296, 308, 311, 313, 321, 323-325, 330, 335, 340, 343, 345, 355, 362, 365, 367, 369, 371, 377, 381, 386, 388, 390-391, 394, 399-400, 402, 404, 409, 411, 413, 428, 432, 438, 440-441, 446, 450-451, 453, 455-456, 458-459, 466-467, 471-473, 476-479, 487, 496, 501, 503, 505, 512, 516, 518-519, 521-522, 525, 527, 529, 541, 545, 548-549, 551, 553, 557, 562, 564-566, 574, 576, 589, 595, 597, 599, 601, 607, 611-612, 620, 622-623, 634, 636, 640, 642, 652, 657, 659, 661, 664, 666-667, 678, 682, 684, 686-688, 698-700, 712, 714, 719, 721, 727, 732-734
SId: Students will design and conduct different kinds of scientific investigations.	12, 32, 58, 100, 133, 141, 162, 221, 232, 257, 330, 339, 505, 512, 518, 545, 559, 562, 595, 684
SIe: Students will communicate and defend the designs, procedures, observations, and results of scientific investigation	5, 12, 32, 50, 55, 58, 69, 91, 99-100, 129, 133, 137, 141, 156, 162, 164, 177, 179, 189, 205, 208, 213, 221, 232, 236, 257, 262, 281, 284, 287, 294, 308, 311, 330, 339, 340, 362, 365, 377, 380, 383, 386-387, 399-400, 404, 408, 413, 417-420, 425, 432-433, 435, 446-447, 450, 467, 471-472, 484, 496, 505, 512, 518, 534, 539, 545, 547, 562, 564, 585, 588, 591, 595, 612, 614, 627, 630, 634, 659, 661, 675, 682, 684, 700, 706
SIf: Students will review and analyze scientific investigations and explanations of other investigators, including peers.	5, 13, 119, 126, 192, 257, 505, 643

Kentucky Core Content for Science Assessment Correlations

Applications/Connections Standards	Student Edition Pages
SCIENCE AND TECHNOLOGY:	
ACa: Students will apply scientific theory and conceptual understandings to solve problems of technological design and examine the interaction between science and technology.	3, 6-7, 10, 13, 35, 52, 95, 115, 142, 147, 167, 178, 201-202, 221, 240, 292, 310, 312, 316, 320, 325, 355, 378, 405, 428, 437-438, 441, 443, 453, 455-456, 473, 499, 508-509, 513-514, 519-520, 542-543, 549, 565, 570-571, 603, 613, 617, 620, 625, 639, 649, 662-664, 702-705, 709, 722-724, 726, 728-729, 732
SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES:	
ACb: Students will explore the impact of scientific knowledge and discoveries on personal and community health; recognize how science influences human population growth, use science to analyze the use of natural resources by an increasing human population; investigate how science can be used to solve environmental quality problems, use science to investigate natural and human-induced hazards; and analyze how science and technology are necessary but not sufficient for solving local, national, and global issues.	8, 11, 13, 70, 211, 245, 266, 334, 356, 378, 405, 437, 456, 486, 579, 587, 618, 620, 683, 717, 722-724, 735
HISTORY AND NATURE OF SCIENCE:	
ACc: Students will analyze the role science plays in everyday life and compare different careers in science; recognize that scientific knowledge comes from empirical standards, logical arguments, and skepticism, and is subject to change as new evidence becomes available; and investigate advances in science and technology that have important and long-lasting effects on science and society.	5-7, 9, 11, 13, 15, 26, 32, 63, 68, 70, 81, 98, 104, 122, 126, 133, 137, 156, 165, 175-177, 179, 186, 191-192, 197, 205, 213-214, 233-236, 245, 255, 257, 266, 273, 281, 286, 319, 332, 334, 352, 356, 362, 375-377, 381-383, 399, 402, 421, 437, 444-445, 454, 461, 464, 471, 479, 489, 505, 507, 510, 543, 555, 560, 562, 567, 574, 579, 582, 589, 604-606, 629, 646-647, 649, 662, 667, 673, 692, 694, 711, 717, 735

Kentucky Core Content for Science Assessment Correlations Correlated to Chapter and Section

Contents	Student Edition Pages	Physics CATS
CHAPTER 1 What is physics?		
Physics: The Search for Understanding	1–13	SIa, SIb, SIc, SId, SIe, SIf; ACa, ACb, ACc
CHAPTER 2 A Mathematical Toolkit		
2.1 The Measures of Science	14–23	SIb
2.2 Measurement Uncertainties	24–29	SIb; ACc
2.3 Visualizing Data	30–41	SIa, SIb, SIc, SId, SIe; ACa, ACc
CHAPTER 3 Describing Motion		
3.1 Picturing Motion	42–46	SIb; SIc
3.2 Where and When?	47–52	SIb, SIc, SIe; Aca
3.3 Velocity and Acceleration	53–61	SIa, SIb, SIc, SId, SIe
CHAPTER 4 Vector Addition		
4.1 Properties of Vectors	62–71	SIb, SIc, SIe; ACb, ACc
4.2 Components of Vectors	72–79	SIb, SIc
CHAPTER 5 A Mathematical Model of Motion		
5.1 Graphing Motion in One Dimension	80–89	SIb, SIc
5.2 Graphing Velocity in One Dimension	90–93	SIb, SIc, SIe
5.3 Acceleration	94–103	SIb, SIc, SId, SIe; ACa, ACc
5.4 Free Fall	104–115	SIa, SIb, SIc; ACa, ACc
CHAPTER 6 Forces		
6.1 Force and Motion	116–125	1.41, 1.42; SIb, SIc, SIf; ACa
6.2 Using Newton's Laws	126–137	1.4.1; SIa, SIb, SIc, SId, SIe, SIf; ACc
6.3 Interaction Forces	138–147	1.1.1, 1.4.1, 1.4.2, 1.4.4; SIb, SIc, SId, SIe; ACa
CHAPTER 7 Forces and Motion in Two Dimensions		
7.1 Forces in Two Dimensions	148–154	1.4.1; SIb, SIc
7.2 Projectile Motion	155–162	1.4.1; SIa, SIb, SIc, SId, SIe; ACc
7.3 Circular Motion	163–173	1.4.1; SIb, SIc, SIe; ACc
CHAPTER 8 Universal Gravitation		
8.1 Motion in the Heavens and on Earth	174–184	1.4.2; SIb, SIc, SIe; ACa, ACc
8.2 Using the Law of Universal Gravitation	185–197	1.4.2; SIb, SIc, SIe, SIf; ACc
CHAPTER 9 Momentum and Its Conservation		
9.1 Impulse and Momentum	198–206	1.4.1; SIb, SIc, SIe; ACa, ACc
9.2 The Conservation of Momentum	207–221	1.4.1; SIb, SIc, SId, SIe; ACa, ACb, ACc
CHAPTER 10 Energy, Work, and Simple Machines		
10.1 Energy and Work	222–232	1.5.2; SIa, SIb, SIc, SId, SIe
10.2 Machines	233–245	1.5.4; SIb, SIc, SIe; ACa, ACb, ACc

Kentucky Core Content for Science Assessment Correlations Correlated to Chapter and Section

Contents	Student Edition Pages	Physics CATS
CHAPTER 11 Energy		
11.1 The Many Forms of Energy	246–257	1.5.4; SIa, SIb, SIc, SIe, SIf; ACc
11.2 Conservation of Energy	258–271	1.5.1, 1.5.2; SIb, SIc, SIe; ACb, ACc
CHAPTER 12 Thermal Energy		
12.1 Temperature and Thermal Energy	272–284	1.5.1, 1.5.3; SIb, SIc, SIe; ACc
12.2 Change of State and Laws of	285–297	1.2.5, 1.5.1, 1.5.3, 1.5.4; SIb, SIc, SIe; ACa, ACc
CHAPTER 13 States of Matter		
13.1 The Fluid States	298–313	1.2.5, 1.5.3; SIb, SIc, SIe; ACa
13.2 The Solid State	314–325	1.2.5, 1.5.3; SIa, SIb, SIc; ACa, ACc
CHAPTER 14 Waves and Energy Transfer		
14.1 Wave Properties	326–335	1.6.1; SIb, SIc, SId, SIe; ACb, ACc
14.2 Wave Behavior	336–347	SIb, SIc, SId, SIe
CHAPTER 15 Sound		
15.1 Properties of Sound	348–356	1.6.1; SIb, SIc; ACa, ACb, ACc
15.2 The Physics of Music	357–371	SIb, SIc, SIe; ACc
CHAPTER 16 Light		
16.1 Light Fundamentals	372–381	SIb, SIc, SIe; ACa, ACb, ACc
16.2 Light and Matter	382–391	SIb, SIc, SIe; ACc
CHAPTER 17 Reflection and Refraction		
17.1 How Light Behaves at a Boundary	392–402	SIb, SIc, SIe; ACc
17.2 Applications of Reflected and Refracted Light	403–413	SIb, SIc, SIe; ACc
CHAPTER 18 Mirrors and Lenses		
18.1 Mirrors	414–428	SIb, SIc, SIe; ACa, ACc
18.2 Lenses	429–441	SIb, SIc, SIe; ACa, ACb, ACc
CHAPTER 19 Diffraction and Interference of Light		
19.1 When Light Waves Interfere	442–451	SIb, SIc, SIe; ACc
19.2 Applications of Diffraction	452–459	SIb, SIc; ACa, ACb, ACc
CHAPTER 20 Static Electricity		
20.1 Electrical Charge	460–467	SIb, SIc; ACa, ACb, ACc
20.2 Electrical Force	468–479	1.1.1, 1.2.6, 1.4.3; SIb, SIc, SIe; ACa, ACc

Kentucky Core Content for Science Assessment Correlations Correlated to Chapter and Section

Contents	Student Edition Pages	Physics CATS
CHAPTER 21 Electric Fields		
21.1 Creating and Measuring Electric Fields	480–487	1.4.3; SIb, SIc, SIe; ACb
21.2 Applications of Electric Fields	488–505	1.1.1, 1.5.2; SIb, SIc, SId, SIe, SIf; ACa, ACc
CHAPTER 22 Current Electricity		
22.1 Current and Circuits	506–519	1.1.1, 1.5.2; SIb, SIc, SId, SIe, SIf; ACa, ACc
22.2 Using Electric Energy	520–529	1.5.4; SIb, SIc; ACa
CHAPTER 23 Series and Parallel Circuits		
23.1 Simple Circuits	530–541	SIb, SIc, SIe
23.2 Applications of Circuits	542–553	SIa, SIb, SIc, SId, SIe; ACa, ACc
CHAPTER 24 Magnetic Fields		
24.1 Magnets: Permanent and Temporary	554–566	SIa, SIb, SIc, SId, SIe; ACa, ACc
24.2 Forces Caused by Magnetic Fields	567–579	1.4.4; SIb, SIc; ACa, ACb, ACc
CHAPTER 25 Electromagnetic Induction		
25.1 Creating Electric Current from Changing Magnetic Fields	580–589	1.4.4; SIb, SIc, SIe; ACb, ACc
25.2 Changing Magnetic Fields Induce *EMF*	590–601	1.4.4; SIa, SIb, SIc, SId, SIe
CHAPTER 26 Electromagnetism		
26.1 Interaction Between Electric and Magnetic Fields and Matter	602–612	1.1.1, 1.1.2, 1.6.2; SIb, SIc, SIe; ACc
26.2 Electric and Magnetic Fields in Space	613–623	1.1.1, 1.5.1, 1.6.1, 1.6.2; SIb, SIc, SIe; ACa, ACb
CHAPTER 27 Quantum Theory		
27.1 Waves Behave Like Particles	624–636	SIb, SIc, SIe; ACc
27.2 Particles Behave Like Waves	637–643	SIb, SIc, SIf; ACa
CHAPTER 28 The Atom		
28.1 The Bohr Model of the Atom	644–657	1.1.1, 1.1.2, 1.6.2; SIb, SIc; ACa, ACc
28.2 The Quantum Model of the Atom	658–667	1.1.1, 1.2.1; SIb, SIc, SIe; ACa, ACc

Kentucky Core Content for Science Assessment Correlations Correlated to Chapter and Section

Contents	Student Edition Pages	Physics CATS
CHAPTER 29 Solid State Electronics		
29.1 Conduction in Solids	668–678	1.2.6; SIb, SIc, SIe; ACc
29.2 Electronic Devices	679–689	SIa, SIb, SIc, SId, SIe; ACb
CHAPTER 30 The Nucleus		
30.1 Radioactivity	690–700	1.1.1, 1.1.2, 1.1.3; SIb, SIc, SIe; ACc
30.2 The Building Blocks of Matter	701–715	1.1.1, 1.1.2; SIb, SIc, SIe; ACa, ACc
CHAPTER 31 Nuclear Applications		
31.1 Holding the Nucleus Together	716–721	1.1.1, 1.1.3; SIb, SIc
31.2 Using Nuclear Energy	722–735	1.1.3; SIb, SIc; ACa, ACb, ACc
APPENDICES		
Appendix B Extra Practice Problems	748–777	3(B), 4(A), 4(B), 4(D), 4(E), 5(A), 5(B), 5(C), 5(D), 6(A), 6(C), 6(E), 7(A), 8(A), 8(B)
Appendix D Additional Topics in Physics	811–871	2(A), 2(D), 2(E), 3(B), 4(A), 4(B), 4(D), 4(E), 5(B), 6(E), 8(B), 8(C)