Georgia Quality Core Curriculum Standards

Correlated to Student Edition Pages

Physics QCC	Physics: Principles and Problems Student Edition Pages
1. Topic: Science Process Skills and Laboratory Safety	
Standard: Demonstrates proficiency in use of science process skills in laboratory and/or field activities that involve observations, classification, communication, metric measurement, prediction, inference, identifying variables, formulating hypotheses, controlling variables, making operational definitions, designing investigations, experimenting, collecting qualitative and quantitative data, constructing data tables, graphing, analyzing and interpreting data and/or drawing conclusions.	5, 12, 19, 31, 32, 50, 55, 58, 69, 74, 87, 91, 93, 99, 100, 119, 123, 129, 133, 137, 141, 156, 161, 162, 164, 166, 177, 179, 188, 189, 205, 208, 213, 225, 227, 232, 236, 249, 257, 262, 281, 287, 294, 303, 308, 311, 317, 330, 337, 339, 340, 360, 362, 365, 371, 377, 383, 386, 387, 394, 399, 400, 404, 408, 417–420, 425, 432, 433, 435, 446, 447, 450, 455, 467, 471, 472, 484, 496, 512, 516, 518, 521, 522, 534, 539, 545, 557, 559, 562, 564, 585, 588, 593, 595, 607, 612, 614, 617, 627, 630, 634, 656, 659, 661, 675, 682, 684, 698, 700, 706, 719, 727, 728
1.1 Produces written reports of laboratory and/or field activities in accepted formats and uses precise language for presentations of procedure, tables of data, graphs, analytical methods, results and analyses of error.	12, 32, 58, 69, 100, 137, 162, 179, 213, 232, 257, 281, 308, 330, 362, 377, 399, 433, 446, 467, 496, 518, 545, 562, 595, 612, 634, 656, 684, 700, 727
1.2 Conducts safe and accurate laboratory work.	12, 19, 31, 32, 69, 100, 137, 162, 164, 179, 213, 232, 257, 281, 287, 294, 308, 317, 330, 337, 340, 362, 371, 377, 399, 404, 432, 433, 435, 446, 447, 450, 467, 496, 512, 516, 518, 522, 534, 539, 545, 562, 564, 585, 588, 591, 593, 595, 607, 612, 627, 634, 656, 659, 661, 675, 682, 684, 698, 700, 706, 727
1.3 Demonstrates proficiency in the proper use of laboratory equipment.	12, 32, 69, 100, 137, 179, 213, 257, 281, 287, 308, 330, 362, 371, 377, 399, 433, 446, 467, 496, 516, 518, 522, 534, 539, 545, 562, 564, 595, 612, 627, 634, 656, 659, 661, 675, 682, 684, 698, 706, 727
1.4 Identifies safety equipment and demonstrates its proper use.	12, 32, 69, 100, 137, 179, 213, 257, 281, 308, 330, 362, 371, 377, 399, 433, 446, 467, 496, 516, 518, 522, 534, 539, 545, 562, 564, 595, 612, 627, 634, 656, 659, 661, 675, 682, 684, 706, 727
2. Topic: Basic Mechanics	
Standard: Collects time and distance data on objects in motion such as toy cars, air track, ball rolling down an incline, etc.	50, 55, 58, 69, 71, 87, 91, 93, 100, 115
2.1 Distinguishes between vector and scalar quantities.	48, 49, 51, 58, 60, 64–68, 77
2.2 Investigates experimentally and solves problems that relate to time, distance, displacement, speed, velocity, and acceleration.	55, 58, 59, 61, 67, 69, 71, 74–76, 78, 79, 83–89, 92, 93, 95–98, 100–103, 105–115, 119, 122, 124, 128, 129, 132, 133, 137, 145–147, 153, 154, 157–161, 165, 166, 170–173, 177, 179–181, 183, 186–188, 192–197, 748–761, 811–821, 831, 863–871
2.3 Resolves problems that involve motion vectors for direction and size.	65–67, 71, 74–76, 78, 79, 151–154, 171, 172, 749–756, 758, 759, 811
2.4 Performs laboratory investigations of free-fall motion.	188, 189, 811–816
2.5 Explores applications of a microprocessor for the analysis of laboratory data and simulations of mechanical phenomena.	115, 147, 173, 813–816
2.6 Constructs and analyzes graphs of various types of motion.	50, 51, 59, 82–88, 90–97, 99, 100, 108–115, 748, 749, 752, 753, 814–816, 868

Georgia Quality Core Curriculum Standards

Correlated to Student Edition Pages

Physics QCC	Physics: Principles and Problems Student Edition Pages
3. Topic: Newton's Laws	
Standard: Explains and applies Newton's three laws of motion.	119–129, 132, 133, 138–141, 143–147, 754, 755, 757, 821
3.1 States and demonstrates the relationship between unbalanced forces and acceleration.	119–124, 126–129, 132, 133, 754, 755
3.2 Explains Newton's Law of Universal Gravitation.	181–192, 194–197
3.3 Investigates experimentally and solves problems that relate gravitational forces, mass, distance, the Universal Gravitation constant and acceleration due to gravity.	128, 129, 136, 140, 141, 143, 145–147, 153, 154, 184, 187, 188, 192, 194–197, 756, 757, 811, 812
3.4 Makes and analyzes graphs showing direct, inverse, exponential relationships, and other variables.	31–34, 36, 40, 41, 50, 86, 87, 91, 92, 96, 100, 105, 108, 109, 112, 120, 121, 183, 186, 229, 748, 749, 751–753
4. Topic: Forces (Mechanical)	
Standard: Resolves problems involving force vectors for the direction and size of the equilibrant force.	119, 121, 122, 124, 128, 129, 131–133, 135, 137, 139–141, 143, 145–147, 150–154, 157–161, 171, 172, 179, 750, 751, 754, 755, 759, 760, 811, 812, 833–839
4.1 Investigates experimentally and solves problems that involve friction forces and the coefficients of static and sliding friction.	119, 122, 124, 128, 129, 131–133, 137, 140, 141, 143, 145–147, 169, 170, 754, 755, 837–839
4.2 Investigates experimentally and solves problems that involve a system of torque-producing forces acting on an object in equilibrium.	151, 152, 171, 833–839
5. Topic: Motion	
Standard: Analyzes the factors that influence centripetal force when it acts on a body moving in a horizontal or vertical circle.	163–166, 171, 172, 173, 756
5.1 Demonstrates the relationship among and solves problems that involve time, angular displacement, torque, rotational inertia, angular velocity, and angular acceleration for bodies in circular and rotary motion.	163–168, 170–173, 756, 817–824, 826–831
5.2 Investigates experimentally and solves problems involving the motion of a simple pendulum.	55, 135, 136, 754, 755

Georgia Quality Core Curriculum Standards

Correlated to Student Edition Pages

Physics QCC	Physics: Principles and Problems Student Edition Pages
6. Topic: Work, Power	
Standard: Investigates experimentally and solves problems relating to work, power, momentum, and impulse.	201–205, 207–221, 225–231, 234, 241–245, 250, 251, 262–265, 270, 271, 758–761, 826–830
6.1 Observes and describes the conservation of momentum for elastic and inelastic collisions.	207–221, 263–265, 270, 271, 758, 759
6.2 Investigates experimentally and solves problems relating to rotary work and power, angular momentum, and impulse.	758, 759, 826–830
6.3 Differentiates between potential and kinetic energy.	224, 249, 251–253, 255, 256, 267, 268, 760, 761
6.4 Calculates the potential and kinetic energy of a body at rest or in motion.	225–227, 250, 251, 255, 257–265, 269–271, 759–761, 829, 830, 867–869, 871
6.5 Identifies simple machines found in the workplace, such as doorknobs, eggbeaters, pencil sharpeners, faucets, pulley systems, etc.	233, 235, 236, 238–240, 244, 245
7. Topic: Applications of Basic Mechanics	
Standard: Analyzes developments of the science and technology of mechanics that affect the quality of life, such as weather satellites, the space program, robots, etc.	8, 11, 35, 52, 70, 178, 202, 266, 334, 486
7.1 Evaluates the impact of technological developments of mechanics on societal beliefs, economic factors and political action.	8, 11, 70, 178, 266, 334, 486
7.2 Examines evidence that the demand of society for more and better products and services is driving technological development.	8, 11, 52, 70, 178, 202, 240, 266, 292, 316, 334, 356, 378, 405, 428, 486, 639
8. Topic: Phases of Matter	
Standard: Performs calculations and laboratory investigations that relate to Hooke's Law, Young's Modulus, and tensile strength.	135, 243
8.1 Observes the effects of pressure, surface tension, and capillary action in a liquid and relate it to natural phenomena, such as water rising in trees, insects on water, soap bubbles, etc.	300, 301, 303–307, 309–312, 323–325, 762, 842
8.2 Develops gas laws demonstrating the relationship of volume, temperature, and pressure of gas in the laboratory and solves gas law problems using ratio and proportions.	842–853

Georgia Quality Core Curriculum Standards

Correlated to Student Edition Pages

Physics QCC	Physics: Principles and Problems Student Edition Pages
9. Topic: Information Retrieval	
Standard: Demonstrates the ability to retrieve information from standards publications of physical constants such as C.R.C. or Lange's tables.	38, 287, 695, 699, 701, 714
9.1 Develops a table of physical constants in the laboratory.	287, 397, 402, 698, 706, 711
10. Topic: Thermodynamics	
Standard: Relates the effects of thermal energy to kinetic molecular theory.	274, 275, 295, 319–321, 841, 845–853
10.1 Distinguishes between heat and temperature.	275, 278
10.2 Investigates experimentally and calculate the quantity of heat needed to produce a specified temperature change in a given substance.	279–281, 283, 284, 296, 297, 761
11. Topic: Energy: Heat and Energy Conservation	
Standard: Determines the heat gain/loss and specific heat of an object in the laboratory using a calorimeter.	283, 284, 296
11.1 Explains phase changes based upon laboratory data and graphs.	281, 286–289, 296, 297
11.2 Relates laws of thermodynamics to the heating/cooling of a building.	291, 294
11.3 Relates potential and kinetic energy to their heat equivalents (measures the heat produced by an object falling a given distance).	761
11.4 Compares and contrasts efficiencies of various types of engines (e.g., gasoline, diesel and steam).	273, 290, ga.science.glencoe.com
12. Topic: Energy: Waves	
Standard: Identifies and diagrams quantities relating to wave velocity, wavelength, and frequency.	330–333, 335, 339, 340, 343, 345–347, 351, 355, 366, 615, 855, 857–860
12.1 Describes types of wave phenomena and modes of propagation, (e.g., electro-magnetic and mechanical, longitudinal, and transverse).	328, 329, 335, 344, 613, 614, 860
12.2 Describes reflection, refraction, diffraction, and interference.	336–339, 341–343, 345–347, 382, 383, 385, 386, 388, 390, 394–404, 406–413, 416–441, 444, 445, 447–459, 763
12.3 Describes standing waves with respect to nodes and antinodes.	340, 359, 360, 363, 614
12.4 Observes and illustrates wave phenomena using various types of equipment, such as ripple tank, slinky, soft rope, signal generator or oscilloscope.	329, 331, 337, 340–343, 394–396, 419, 429, 445, 446, 449, 450, 455, 616, 855, 857–860

Georgia Quality Core Curriculum Standards

Correlated to Student Edition Pages

Physics QCC	Physics: Principles and Problems Student Edition Pages
13. Topic: Energy: Sound	
Standard: Investigates loudness, sound intensity, and frequency using graphs and calculations.	351, 352, 355, 361, 369–371, 763, 764, 855, 856
13.1 Makes calculations of sound wave velocity, wavelength, frequency, and period.	351, 352, 360, 361, 363, 364, 366, 369–371, 763, 764
13.2 Demonstrates and solves problems of apparent frequency changes due to the Doppler Effect.	354, 355, 368, 370, 371, 763
13.3 Calculates and verifies the time for an echo.	369, 763
13.4 Demonstrates the descriptive terms that can be applied to sound waves on a musical instrument such as pitch, amplitude, loudness, and quality.	352–354, 364, 365, 856
13.5 Explains the relationship of the speed of sound to temperature and density of a medium.	351, 355, 363
13.6 Makes drawings to illustrate interference of sound waves to produce harmonics and resonances in various types of musical instruments (stringed, open and closed pipes, and percussion).	359–361, 364–366, 763
14. Topic: Energy: Light	
Standard: Labels the eight sections of a chart of the electromagnetic spectrum.	374, 615
14.1 Makes calculations relating the speed of light to distance and time.	376, 390, 622, 764, 765
14.2 Describes the dual nature of light.	384, 385, 626, 628–633, 639, 640
14.3 Investigates with laboratory activities and calculations the inverse square relationship between light intensity and distance from the light source.	380, 381, 390, 391
14.4 Makes calculations that relate intensity, flux, and illumination (normal and inclined).	379–381, 390, 391, 764
14.5 Investigates the measurement of light intensity using a photometer.	727
14.6 Investigates reflection with plane and spherical (concave and convex) mirrors in the laboratory.	377, 417–420
14.7 Investigates refraction of light in relation to the speed of light in a medium, index of refraction, and angles of incidence and refraction (Snell's Law).	395–404, 409–413, 764, 765
14.8 Constructs ray diagrams and makes calculations relating to focal length, image distance, object distance, and image magnification for curved mirrors and lenses.	421–428, 430–438, 440, 441, 766

Georgia Quality Core Curriculum Standards

Correlated to Student Edition Pages

Physics QCC	Physics: Principles and Problems Student Edition Pages
14.9 Conducts laboratory investigations and calculations of the wavelength of light using a diffraction grating and light source.	446, 447, 458, 459, 767
14.10 Investigates polarized light using various polarizing filters and substances.	386–388
14.11 Demonstrates dispersion of white light into a color spectrum and the addition of primary colors to form white light.	382, 383, 390, 407–409, 413
14.12 Demonstrates the subtraction of primary and secondary colors of light from white light by resonance absorption in pigments.	383, 390
15. Topic: Energy: Waves Mechanics Applications	
Standard: Analyzes the use of technology of the laser, microwave, and fiber optics by governments, industry, medicine, art, and entertainment in terms of political and economic competition.	378, 405, 618
15.1 Evaluates development of the science and technology of wave mechanics that affect the quality of life.	334, 356, 378, 405, 453, 618
16. Topic: Electricity	
Standard: Investigates electrostatic attraction/repulsion and charge transfer in the laboratory.	467, 471, 472, 484, 496
16.1 Relates principles of electrostatic forces, charge, distance and field intensity by making calculations.	467, 471, 472, 474–476, 478, 479, 482–484, 487, 488, 490–496, 500, 501, 503–505, 768, 769
17. Topic: Energy: Electricity, Direct Current	
Standard: Infer Ohm's Law through laboratory investigation and making calculations.	510–512, 514–518, 521, 522, 524, 525, 527–529, 533–541, 543–548, 551–553, 769–771
17.1 Investigates resistance and current flow in series and parallel circuits and branches in the laboratory and perform related calculations.	508–518, 520–522, 524, 525, 527–529, 533–541, 543–548, 550–553, 684, 688, 689, 769–771
17.2 Draws diagrams of simple electric circuits and uses electronic components to build simple circuits.	511–519, 521, 522, 526–529, 533–541, 545–548, 551–553, 562, 564, 588, 591, 675, 682, 684, 770, 771
17.3 Relates electric potential to cells in series and parallel.	ga.science.glencoe.com
17.4 Determines the value of an unknown resistor through laboratory investigation.	518
17.5 Relates power expended in a circuit to resistance and current.	520–525, 527–529, 770
17.6 Analyzes complex circuits using Ohm's Law and Kirchoff's Law.	534–541, 543–547, 551–553, 571, 681, 687–689, 727, 770, 771

Georgia Quality Core Curriculum Standards

Correlated to Student Edition Pages

Physics QCC	Physics: Principles and Problems Student Edition Pages
18. Topic: Energy: Magnetism	
Standard: Demonstrates the N-S conventions in diagrams describing magnets and magnetic flux lines.	559, 573, 575, 577, 578, 582–584, 590, 599, 772, 773
18.1 Quantitatively relate magnetic flux density near a straight conductor to current flow and distance from the conductor.	561, 579, 591, 772
18.2 Uses the "left-hand" rule to describe the magnetic field for straight conductors and solenoids.	ga.science.glencoe.com
18.3 Calculates the strength of an electromagnet related to current flow and number of turns.	594, 773
18.4 Describes the operation of an AC transformer and a DC induction coil and quantifies the relationship of primary and secondary voltages to numbers of turns.	594, 596, 597, 600, 601, 773
19. Topic: Energy: Electricity, Alternating Current	
Standard: Analyzes effective voltage, effective current, phased current, inductance, power angle, and impedance as they relate to alternating current circuits.	588, 589, 600, 601, 773
20. Topic: Energy: Applications of Electricity (STS)	
Standard: Evaluates the impact of technological developments of high-technology electronics, such as computers, calculators, integrated circuit silicon chips, superconductors, magnetic resonance imaging (MRI), Maglev trains, etc. on societal beliefs, economic factors, and political action.	486, 519, 565, 587, 639, 669, 675, 678, 679, 683
20.1 Analyzes development of the science and technology of high technology electronics that affect the quality of life.	486, 519, 549, 565, 587, 618, 639, 669, 678, 683
20.2 Appraises evidence that the demand of society and government for more and better high-technology electronics is driving technological research.	486, 519, 639, 669, 678, 683
21. Topic: Energy: Particle Theory	
Standard: Distinguishes major aspects of quantum theory.	626, 636, 637, 640, 641, 646, 647, 650–653, 657–659, 665, 667
21.1 Analyzes the development of the quantum theory beginning with the Bohr Model, including the relationship of spectra and atomic structure.	636, 645–653, 655, 657–659, 664, 665, 667, 775

Georgia Quality Core Curriculum Standards

Correlated to Student Edition Pages

Physics QCC	Physics: Principles and Problems Student Edition Pages
21.2 Calculates the relationship between frequency and energy of lightwaves.	629, 631, 633, 635, 636, 642, 643, 651–655, 657, 666, 667, 775, 776
21.3 Explains the photoelectric effect and uses it to find the work function for a metal.	628–633, 636, 641, 642, 775
22. Topic: Atomic Structure	
Standard: Explains the roles of some fundamental particles of the atom, such as the mesons, quarks, tachyons, and baryons.	692–694, 705–707, 710, 712
22.1 Balances selected nuclear equations with respect to mass and charge.	694, 696–698, 701, 702, 707, 708, 710, 713–715, 722, 724, 725, 731, 734, 735, 776, 777
22.2 Calculates the half-life of selected radioactive substances.	699, 700, 714, 715, 735, 776
22.3 Identifies three types of radiation and explains transmutation by beta and alpha decay and the role of gamma radiation.	694–699, 706, 707, 713, 714, 724, 734
22.4 Distinguishes between natural and artificial radioactivity and identifies positrons and neutrinos.	694, 695, 707, 722–724, 733
22.5 Diagrams the cyclotron and describes its operation.	ga.science.glencoe.com
22.6 Describes linear acceleration in terms of potential difference.	702, 715
22.7 Differentiates fission and fusion and analyzes their present and potential roles in nuclear reactors.	725, 726, 728–735
23. Topic: Energy: Nuclear (STS)	
Standard: Evaluates the impact of technological developments of particle physics, (nuclear power plants, nuclear weapons, medical radiation, etc.) on societal beliefs, economic factors, and political action.	709, 717, 722–724, 728, 730–732
23.1 Analyzes the development of the science and technology of particle physics that affect the quality of life.	709, 717, 722–724, 726, 730–732
23.2 Describes areas of current research in particle physics, such as particle accelerators, cosmology, relativity, superconductivity, nuclear reactors, and the social, economic, and political pressures on this research.	711, 717, 730–732
23.3 Analyzes a situation such as the use of nuclear weapons as deterrents to war, as an example where the maintenance and protection of society requires philosophical advancement along with scientific and technological advancement.	722–724, 732

Georgia Quality Core Curriculum Standards

Correlated to Student Edition Pages

Physics QCC	Physics: Principles and Problems Student Edition Pages
24. Topic: Reference and Research Skills	
Standard: Analyzes a scientific question to determine specific topic, subtopics, and amount of information needed.	8, 12, 13, 32, 58, 70, 100, 115, 125, 143, 147, 162, 192, 197, 221, 232, 257, 266, 292, 313, 325, 334, 356, 381, 405, 441, 451, 456, 479, 486, 505, 545, 548, 562, 579, 587, 595, 618, 636, 664, 667, 683, 732
24.1 Formulates a precise problem.	8, 12, 32, 58, 69, 70, 100, 115, 137, 147, 162, 179, 213, 221, 232, 257, 266, 281, 308, 325, 330, 334, 356, 362, 377, 399, 433, 446, 467, 479, 486, 496, 518, 545, 562, 587, 595, 612, 634, 656, 683, 684, 700, 727
24.2 Identifies criteria and alternative approaches to solving the problem.	12, 20, 31, 32, 57, 58, 70, 100, 115, 127, 137, 140, 147, 156, 162, 221, 228, 232, 257, 260, 266, 325, 330, 334, 356, 397, 420, 474, 479, 486, 516, 544, 545, 562, 587, 595, 631, 683
24.3 Identifies multiple types of sources (e.g., scientific journals, newspapers, directories, audiovisuals, government publications and yearbooks, computer data bases, online resources, and other electronic media) for information on a specific topic.	3, 8, 13, 15, 41, 43, 61, 63, 70, 79, 81, 115, 117, 147, 149, 175, 197, 199, 221, 223, 245, 247, 266, 271, 273, 297, 299, 313, 325, 327, 334, 347, 356, 371, 373, 378, 381, 391, 393, 405, 413, 441, 443, 451, 456, 459, 461, 479, 481, 486, 505, 507, 529, 531, 548, 553, 555, 579, 581, 587, 601, 603, 618, 623, 625, 636, 643, 645, 664, 667, 669, 683, 689, 691, 715, 717, 732, 735
24.4 Uses appropriate and available retrieval systems (e.g., periodical index, computer resources, glossary, appendix, bibliography, and graphic data) to locate sources.	3, 8, 13, 15, 43, 63, 70, 81, 117, 149, 175, 199, 223, 247, 266, 273, 299, 313, 327, 334, 356, 373, 381, 393, 405, 415, 443, 451, 456, 461, 481, 486, 507, 531, 548, 555, 581, 587, 603, 618, 625, 636, 645, 664, 669, 683, 691, 717, 732
24.5 Distinguishes between essential and nonessential information on a topic.	8, 70, 125, 143, 197, 266, 313, 334, 356, 381, 405, 441, 451, 456, 479, 486, 505, 548, 579, 587, 618, 636, 664, 667, 683, 732
24.6 Distinguishes between fact and opinion.	8, 70, 125, 143, 197, 266, 313, 316, 334, 356, 378, 381, 405, 441, 451, 456, 479, 486, 505, 519, 525, 548, 579, 587, 618, 636, 640, 664, 667, 678, 683, 732
24.7 Distinguishes between informational, persuasive, and artistic uses of language in sources.	8, 70, 125, 143, 197, 266, 313, 334, 356, 381, 405, 441, 451, 456, 479, 486, 505, 548, 579, 587, 618, 636, 664, 667, 683, 732
24.8 Determines the need for currency of data as a criteria in evaluating information.	8, 70, 266, 334, 356, 378, 405, 486, 579, 587, 683
24.9 Quotes, paraphrases, or summarizes information with plagiarizing.	8, 13, 70, 106, 125, 143, 197, 266, 313, 334, 356, 378, 381, 405, 441, 451, 456, 479, 486, 505, 548, 579, 587, 618, 636, 664, 667, 683, 732
24.10 Compares and synthesizes information obtained from multiple types of sources.	8, 13, 70, 106, 125, 143, 197, 266, 313, 334, 356, 378, 381, 405, 441, 451, 456, 479, 486, 505, 548, 579, 587, 618, 636, 664, 667, 683, 732

Georgia Quality Core Curriculum Standards

Correlated to Chapter and Section

Contents	Student Edition Pages	Physics QCC
Chapter 1 What is physics?		
Physics: The Search for Understanding	2–13	1, 1.1, 1.2, 1.3, 1.4, 7, 7.1, 7.2, 24, 24.1, 24.2, 24.3, 24.4, 24.5, 24.6, 24.7, 24.8, 24.9, 24.10
Chapter 2 A Mathematical Toolkit		
2.1 The Measures of Science	14–23	1, 1.2, 24.2, 24.3, 24.4
2.2 Measurement Uncertainties	24–29	
2.3 Visualizing Data	30–41	1, 1.1, 1.2, 1.3, 1.4, 3.4, 7, 9, 24, 24.1, 24.2, 24.3
Chapter 3 Describing Motion		
3.1 Picturing Motion	42–46	24.3, 24.4
3.2 Where and When?	47–52	1, 2, 2.1, 2.6, 3.4, 7, 7.2
3.3 Velocity and Acceleration	53–61	1, 1.1, 2, 2.1, 2.2, 5.2, 24, 24.1, 24.2, 24.3
Chapter 4 Vector Addition		
4.1 Properties of Vectors	62–71	1, 1.1, 1.2, 1.3, 1.4, 2, 2.1, 2.2, 2.3, 2.6, 7, 7.1, 7.2, 24, 24.1, 24.2, 24.3, 24.4, 24.5, 24.6, 24.7, 24.8, 24.9, 24.10
4.2 Components of Vectors	72–79	1, 2.1, 2.2, 2.3, 24.3
Chapter 5 A Mathematical Model of Motion		
5.1 Graphing Motion in One Dimension	80–89	1, 2, 2.2, 2.6, 3.4, 24.3, 24.4
5.2 Graphing Velocity in One Dimension	90–93	1, 2, 2.2, 2.6, 3.4
5.3 Acceleration	94–103	1, 1.1, 1.2, 1.3, 1.4, 2, 2.2, 2.6, 3.4, 24, 24.1, 24.2
5.4 Free Fall	104–115	2, 2.2, 2.5, 2.6, 3.4, 24, 24.1, 24.2, 24.3, 24.9, 24.10
Chapter 6 Forces		
6.1 Force and Motion	116–125	1, 2.2, 3, 3.1, 3.4, 4, 4.1, 24, 24.3, 24.4, 24.5, 24.6, 24.7, 24.9, 24.10
6.2 Using Newton's Laws	126–137	1, 1.1, 1.2, 1.3, 1.4, 2.2, 3, 3.1, 3.3, 4, 4.1, 5.2, 8, 24.1, 24.2
6.3 Interaction Forces	138–147	1, 2.2, 2.5, 3, 3.3, 4, 4.1, 24, 24.1, 24.2, 24.3, 24.5, 24.6, 24.7, 24.9, 24.10
Chapter 7 Forces and Motion in Two Dimensions		
7.1 Forces in Two Dimensions	148–154	2.2, 2.3, 3.3, 4, 4.2, 24.3, 24.4
7.2 Projectile Motion	155–162	1, 1.1, 1.2, 2.2, 4, 24, 24.1, 24.2
7.3 Circular Motion	163–173	1, 1.2, 2.2, 2.3, 2.5, 4, 4.1, 4.2, 5, 5.1
Chapter 8 Universal Gravitation		
8.1 Motion in the Heavens and on Earth	174–184	1, 1.1, 1.2, 1.3, 1.4, 2.2, 3.2, 3.3, 3.4, 4, 7, 7.1, 7.2, 24.1, 24.3, 24.4
8.2 Using the Law of Universal Gravitation	185–197	1, 2.2, 2.4, 3.2, 3.3, 24, 24.3, 24.5, 24.6, 24.7, 24.9, 24.10
Chapter 9 Momentum and Its Conservation		
9.1 Impulse and Momentum	198–206	1, 6, 7, 7.2, 24.3, 24.4
9.2 The Conservation of Momentum	207–221	1, 1.1, 1.2, 1.3, 1.4, 6, 6.1, 24, 24.1, 24.2, 24.3
Chapter 10 Energy, Work, and Simple Machines		
10.1 Energy and Work	222–232	1, 1.1, 1.2, 3.4, 6, 6.3, 6.4, 24, 24.1, 24.2, 24.3, 24.4
10.2 Machines	233–245	1, 6, 6.5, 7.2, 8, 24.3

Georgia Quality Core Curriculum Standards

Correlated to Chapter and Section

Contents	Student Edition Pages	Physics QCC
Chapter 11 Energy		
11.1 The Many Forms of Energy	246–257	1, 1.1, 1.2, 1.3, 1.4, 6, 6.3, 6.4, 24, 24.1, 24.2, 24.3, 24.4
11.2 Conservation of Energy	258–271	1, 6, 6.1, 6.3, 6.4, 7, 7.2, 24, 24.1, 24.2, 24.3, 24.4, 24.5, 24.6, 24.7, 24.8, 24.9, 24.10
Chapter 12 Thermal Energy		
12.1 Temperature and Thermal Energy	272–284	1, 1.1, 1.2, 1.3, 1.4, 10, 10.1, 10.2, 11, 11.1, 11.4, 24.1, 24.3, 24.4
12.2 Change of State and Laws of Thermodynamics	285–297	1, 1.2, 1.3, 3.4, 7.2, 9.1, 10, 10.2, 11, 11.1, 11.2, 11.4, 24, 24.3
Chapter 13 States of Matter		
13.1 The Fluid States	298–313	1, 1.1, 1.2, 1.3, 1.4, 8.1, 24.1, 24.3, 24.4, 24.5, 24.6, 24.7, 24.9, 24.10
13.2 The Solid State	314–325	1, 1.2, 7.2, 8.1, 10, 24, 24.1, 24.2, 24.3, 24.6
Chapter 14 Waves and Energy Transfer		
14.1 Wave Properties	326–335	1, 1.1, 1.2, 1.3, 1.4, 7, 7.1, 7.2, 12, 12.1, 12.4, 15.1, 24, 24.1, 24.2, 24.3, 24.4, 24.5, 24.6, 24.7, 24.8, 24.9, 24.10
14.2 Wave Behavior	336–347	1, 1.2, 12, 12.1, 12.2, 12.3, 12.4, 24.3
Chapter 15 Sound		
15.1 Properties of Sound	348–356	7.2, 12, 13, 13.1, 13.2, 13.4, 13.5, 15.1, 24, 24.1, 24.2, 24.3, 24.4, 24.5, 24.6, 24.7, 24.8, 24.9, 24.10
15.2 The Physics of Music	357–371	1, 1.1, 1.2, 1.3, 1.4, 12, 12.3, 13, 13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 24.1, 24.3
Chapter 16 Light		
16.1 Light Fundamentals	372–381	1, 1.1, 1.2, 1.3, 1.4, 7.2, 14, 14.1, 14.3, 14.4, 14.6, 15, 15.1, 24, 24.3, 24.4, 24.5, 24.6, 24.7, 24.8, 24.9, 24.10
16.2 Light and Matter	382–391	1, 12.2, 14.1, 14.2, 14.3, 14.4, 14.10, 14.11, 14.12, 24.3
Chapter 17 Reflection and Refraction		
17.1 How Light Behaves at a Boundary	392–402	1, 1.1, 1.2, 1.3, 1.4, 9.1, 12.2, 12.4, 14.7, 24.1, 24.2, 24.3, 24.4
17.2 Applications of Reflected and Refracted Light	403–413	1, 1.2, 7.2, 12.2, 14.7, 14.11, 15, 15.1, 24, 24.3, 24.4, 24.5, 24.6, 24.7, 24.8, 24.9, 24.10
Chapter 18 Mirrors and Lenses		
18.1 Mirrors	414–428	1, 7.2, 12.2, 12.4, 14.6, 14.8, 24.2, 24.3, 24.4
18.2 Lenses	429–441	1, 1.1, 1.2, 1.3, 1.4, 12.2, 12.4, 14.8, 24, 24.1, 24.3, 24.5, 24.6, 24.7, 24.9, 24.10
Chapter 19 Diffraction and Interference of Light		
19.1 When Light Waves Interfere	442–451	1, 1.1, 1.2, 1.3, 1.4, 12.2, 12.4, 14.9, 24, 24.1, 24.3, 24.4, 24.5, 24.6, 24.7, 24.9, 24.10
19.2 Applications of Diffraction	452–459	1, 12.2, 12.4, 14.9, 15.1, 24, 24.3, 24.4, 24.5, 24.6, 24.7, 24.9, 24.10
Chapter 20 Static Electricity		
20.1 Electrical Charge	460–467	1, 1.1, 1.2, 1.3, 1.4, 16, 16.1, 24.1
20.2 Electrical Force	468–479	1, 16, 16.1, 24, 24.1, 24.2, 24.3, 24.5, 24.6, 24.7, 24.9, 24.10

Georgia Quality Core Curriculum Standards

Correlated to Chapter and Section

Contents	Student Edition Pages	Physics QCC
Chapter 21 Electric Fields		
21.1 Creating and Measuring Electric Fields	480–487	1, 7, 7.1, 7.2, 16, 16.1, 20, 20.1, 20.2, 24, 24.1, 24.2, 24.3, 24.4, 24.5, 24.6, 24.7, 24.8, 24.9, 24.10
21.2 Applications of Electric Fields	488–505	1, 1.1, 1.2, 1.3, 1.4, 16, 16.1, 24, 24.1, 24.3, 24.5, 24.6, 24.7, 24.9, 24.10
Chapter 22 Current Electricity		
22.1 Current and Circuits	506–519	1, 1.1, 1.2, 1.3, 1.4, 17, 17.1, 17.2, 20, 20.1, 20.2, 24.1, 24.2, 24.3, 24.4, 24.6
22.2 Using Electric Energy	520–529	1, 1.2, 1.3, 1.4, 17, 17.1, 17.2, 17.5, 24.3, 24.6
Chapter 23 Series and Parallel Circuits		
23.1 Simple Circuits	530–541	1, 1.2, 1.3, 1.4, 17, 17.1, 17.2, 17.6, 24.3, 24.4
23.2 Applications of Circuits	542–553	1, 1.1, 1.2, 1.3, 1.4, 17, 17.1, 17.2, 17.6, 20.1, 24, 24.1, 24.2, 24.3, 24.4, 24.5, 24.6, 24.7, 24.9, 24.10
Chapter 24 Magnetic Fields		
24.1 Magnets: Permanent and Temporary	554–566	1, 1.1, 1.2, 1.3, 1.4, 17.2, 18, 18.1, 20, 20.1, 24, 24.1, 24.2, 24.3, 24.4
24.2 Forces Caused by Magnetic Fields	567–579	17.6, 18, 18.1, 24, 24.3, 24.5, 24.6, 24.7, 24.8, 24.9, 24.10
Chapter 25 Electromagnetic Induction		
25.1 Creating Electric Current from Changing Magnetic Fields	580–589	1, 1.2, 17.2, 18, 19, 20, 20.1, 24, 24.1, 24.2, 24.3, 24.4, 24.5, 24.6, 24.7, 24.8, 24.9, 24.10
25.2 Changing Magnetic Field Induce *EMF*	590–601	1, 1.1, 1.2, 1.3, 1.4, 17.2, 18, 18.1, 18.3, 18.4, 19, 24, 24.1, 24.2, 24.3
Chapter 26 Electromagnetism		
26.1 Interaction Between Electric and Magnetic Fields and Matter	602–612	1, 1.1, 1.2, 1.3, 1.4, 24.1, 24.3, 24.4
26.2 Electric and Magnetic Fields in Space	613–623	1, 12, 12.1, 12.4, 14.1, 15, 15.1, 20.1, 24, 24.3, 24.4, 24.5, 24.6, 24.7, 24.9, 24.10
Chapter 27 Quantum Theory		
27.1 Waves Behave Like Particles	624–636	1, 1.1, 1.2, 1.3, 1.4, 14.2, 21, 21.1, 21.2, 21.3, 24, 24.1, 24.2, 24.3, 24.4, 24.5, 24.6, 24.7, 24.9, 24.10
27.2 Particles Behave Like Waves	637–643	7.2, 14.2, 20, 20.1, 20.2, 21, 21.2, 21.3, 24.3, 24.6
Chapter 28 The Atom		
28.1 The Bohr Model of the Atom	644–657	1, 1.1, 1.2, 1.3, 1.4, 21, 21.1, 21.2, 24.1, 24.3, 24.4
28.2 The Quantum Model of the Atom	658–667	1, 1.2, 1.3, 1.4, 20, 20.1, 20.2, 21, 21.1, 21.2, 24, 24.3, 24.4, 24.5, 24.6, 24.7, 24.9, 24.10

Georgia Quality Core Curriculum Standards

Correlated to Chapter and Section

Contents	Student Edition Pages	Physics QCC
Chapter 29 Solid State Electronics		
29.1 Conduction in Solids	668–678	1, 1.2, 1.3, 1.4, 17.2, 20, 20.1, 20.2, 24.6
29.2 Electronic Devices	679–689	1, 1.1, 1.2, 1.3, 1.4, 17.1, 17.2, 17.6, 20, 20.1, 20.2, 24, 24.1, 24.2, 24.3, 24.4, 24.5, 24.6, 24.7, 24.8, 24.9, 24.10
Chapter 30 The Nucleus		
30.1 Radioactivity	690–700	1, 1.1, 1.2, 1.3, 9, 9.1, 22, 22.1, 22.2, 22.3, 22.4, 24.1, 24.3, 24.4
30.2 The Building Blocks of Matter	701–715	1, 1.2, 1.3, 1.4, 9, 9.1, 22, 22.1, 22.3, 22.4, 22.6, 23, 23.1, 23.2, 24.3
Chapter 31 Nuclear Applications		
31.1 Holding the Nucleus Together	716–721	1, 23, 23.1, 23.2, 24.3, 24.4
31.2 Using Nuclear Energy	722–735	1, 1.1, 1.2, 1.3, 1.4, 14.5, 17.6, 22.1, 22.3, 22.4, 22.7, 23, 23.1, 23.2, 23.3, 24, 24.1, 24.3, 24.4, 24.5, 24.6, 24.7, 24.9, 24.10
Appendices		
Appendix B Extra Practice Problems	748–777	2.2, 2.3, 2.6, 3, 3.3, 3.4, 4, 4.1, 5, 5.1, 5.2, 6, 6.1, 6.2, 6.3, 6.4, 8.1, 10.2, 11.3, 12.2, 13, 13.1, 13.2, 13.3, 13.6, 14.1, 14.4, 14.7, 14.8, 14.9, 16.1, 17, 17.1, 17.2, 17.5, 17.6, 18, 18.1, 18.3, 18.4, 19, 21.1, 21.2, 21.3, 22.1, 22.2
Appendix D Additional Topics in Physics	811–871	2.2, 2.3, 2.4, 2.5, 2.6, 3, 3.3, 4, 4.1, 4.2, 5.1, 6, 6.2, 6.4, 8.1, 8.2, 10, 12, 12.1, 12.4, 13, 13.4

National Science Content Standards

The National Science Content Standards for Grades 9–12 have been correlated to each section of *Physics: Principles and Problems.* You will find these correlations at the top of every page in this *Lesson Plans* book and on the interleaf pages of the Teacher Wraparound Edition. Correlations are designated according to the numbering system in the table of science content standards shown here.

Unifying Concepts and Processes

UCP.1 Systems, order, and organization
UCP.2 Evidence, models, and explanation
UCP.3 Change, constancy, and measurement
UCP.4 Evolution and equilibrium
UCP.5 Form and function

Science as Inquiry

A.1 Abilities necessary to do scientific inquiry
A.2 Understandings about scientific inquiry

Physical Science

B.1 Structure of atoms
B.2 Structure and properties of matter
B.3 Chemical reactions
B.4 Motions and forces
B.5 Conservation of energy and increase in disorder
B.6 Interactions of energy and matter

Life Science

C.1 The cell
C.2 Molecular basis of heredity
C.3 Biological evolution
C.4 Interdependence of organisms
C.5 Matter, energy, and organization in living systems
C.6 Behavior of organisms

Earth and Space Science

D.1 Energy in the earth system
D.2 Geochemical cycles
D.3 Origin and evolution of the earth system
D.4 Origin and evolution of the universe

Science and Technology

E.1 Abilities of technological design
E.2 Understandings about science and technology

Science in Personal and Social Perspectives

F.1 Personal and community health
F.2 Population growth
F.3 Natural Resources
F.4 Environmental quality
F.5 Natural and human-induced hazards
F.6 Science and technology in local, national, and global challenges

History and Nature of Science

G.1 Science as a human endeavor
G.2 Nature of scientific knowledge
G.3 Historical perspectives

About Block Scheduling

Single-class and block scheduling each have their own set of advantages and disadvantages. Teachers and schools ultimately choose the option that works better for them. In this section, block scheduling is discussed in greater detail.

To build flexibility into the curriculum, many schools are introducing a block scheduling approach. This type of approach allows curriculum supervisors and teachers to tailor the curriculum to meet students' needs while achieving local and/or state curriculum goals.

Block scheduling can afford many advantages. For students, longer, concentrated periods of study can facilitate the learning of complex material. Furthermore, students may be able to take a wider variety of course work under a block scheduling plan than under a traditional full-year plan, thus enriching their high school experience and giving them a broader foundation of college-level work. Students also benefit by a variety of classroom and instructional experiences—for example, additional student-directed activities and cooperative learning in small groups.

For teachers, the advantages are also balanced with challenges. Block scheduling affords flexibility in your instructional approach, but it also requires extensive up-front planning and imagination. Many teachers are concerned with how to fill 90-minute periods. You may begin class by having students work in pairs on a student-directed activity for 10–15 minutes. The next 10–15 minutes may be teacher directed, followed by 10 minutes of a second student-directed activity, 20 minutes of instruction, and closing with a third student-directed activity. Clearly, this plan requires creative arrangements and plans.

Block scheduling also affords teachers the opportunity to explore interdisciplinary activities. For example, with a 90-minute block, you might collect data for 45 minutes and have a math teacher perform and explain the mathematical analysis of the data for the remaining 45 minutes. You might work with teachers to incorporate other subjects. Again, these arrangements require commitment from and consensus among teachers, curriculum supervisors, and so forth.

If you follow a block schedule, you may want to consider either combining lessons or eliminating certain topics and spending more time on the topics you do cover. **Physics: Principles and Problems** provides the flexibility that allows you to tailor the program to your needs. **Physics: Principles and Problems** also provides a variety of support materials in the *Teacher Classroom Resources* that will help you and your students, whether you follow a block schedule or single-class schedule.

In the planning guides that follow, it is assumed that for block scheduling, the course will be taught for one semester and include 90 periods of approximately 90 minutes each.

Please remember that planning guides are provided as aids in planning the best course for your students. Use the planning guide that relates to your curriculum and the ability levels of the classes you teach, the materials available for activities, and the time allotted for teaching. The planning guide will assist you in developing and following a schedule that will enable you to complete your goals for the school year or semester.

Planning Guides for *Physics: Principles and Problems*

Chapter/Section	Single-Class (180 days)	Block (90 days)
The Science of Matter and Energy		
1 What is physics?	**1**	**1**
Physics: The Search for Understanding	1/2	1/2
Chapter Review	1/2	1/2
2 A Mathematical Toolkit	**6**	**3 1/2**
2.1 The Measures of Science	1	1/2
2.2 Measurement Uncertainties	2	1 1/2
2.3 Visualizing Data	2	1
Chapter Review	1	1/2
Mechanics		
3 Describing Motion	**6**	**3 1/2**
3.1 Picturing Motion	2	1
3.2 Where and When?	1	1/2
3.3 Velocity and Acceleration	2	1 1/2
Chapter Review	1	1/2
4 Vector Addition	**6**	**4**
4.1 Properties of Vectors	2	1 1/2
4.2 Components of Vectors	3	2
Chapter Review	1	1/2
5 A Mathematical Model of Motion	**8**	**5**
5.1 Graphing Motion in One Dimension	1	1
5.2 Graphing Velocity in One Dimension	2	1 1/2
5.3 Acceleration	2	1
5.4 Free Fall	2	1
Chapter Review	1	1/2
6 Forces	**8**	**4 1/2**
6.1 Force and Motion	2	1
6.2 Using Newton's Laws	3	2
6.3 Interaction Forces	2	1
Chapter Review	1	1/2
7 Forces and Motion in Two Dimensions	**8**	**4 1/2**
7.1 Forces in Two Dimensions	2	1
7.2 Projectile Motion	3	2
7.3 Circular Motion	2	1
Chapter Review	1	1/2

Chapter/Section	Single-Class (180 days)	Block (90 days)
8 Universal Gravitation	**6**	**3 1/2**
8.1 Motion in the Heavens and on Earth	2	1
8.2 Using the Law of Universal Gravitation	3	2
Chapter Review	1	1/2
9 Momentum and Its Conservation	**6**	**3 1/2**
9.1 Impulse and Momentum	1	1
9.2 The Conservation of Momentum	4	2
Chapter Review	1	1/2
10 Energy, Work, and Simple Machines	**5**	**3**
10.1 Energy and Work	2	1
10.2 Machines	2	1 1/2
Chapter Review	1	1/2
11 Energy	**6**	**3 1/2**
11.1 The Many Forms of Energy	2	1
11.2 Conservation of Energy	3	2
Chapter Review	1	1/2
States of Matter		
12 Thermal Energy	**6**	**3 1/2**
12.1 Temperature and Thermal Energy	2	1
12.2 Change of State and Laws of Thermodynamics	3	2
Chapter Review	1	1/2
13 States of Matter	**6**	**3 1/2**
13.1 The Fluid States	3	2
13.2 The Solid State	2	1
Chapter Review	1	1/2
Waves and Light		
14 Waves and Energy Transfer	**6**	**3 1/2**
14.1 Wave Properties	2	1
14.2 Wave Behavior	3	2
Chapter Review	1	1/2
15 Sound	**5**	**3**
15.1 Properties of Sound	2	1 1/2
15.2 The Physics of Music	2	1
Chapter Review	1	1/2

Chapter/Section	Single-Class (180 days)	Block (90 days)
16 Light	**5**	**3**
16.1 Light Fundamentals	2	1 1/2
16.2 Light and Matter	2	1
Chapter Review	1	1/2
17 Reflection and Refraction	**6**	**3 1/2**
17.1 How Light Behaves at a Boundary	3	2
17.2 Applications of Reflected and Refracted Light	2	1
Chapter Review	1	1/2
18 Mirrors and Lenses	**6**	**3 1/2**
18.1 Mirrors	2	1
18.2 Lenses	3	2
Chapter Review	1	1/2
19 Diffraction and Interference of Light	**4**	**2 1/2**
19.1 When Light Waves Interfere	2	1
19.2 Applications of Diffraction	1	1
Chapter Review	1	1/2
Electricity		
20 Static Electricity	**6**	**3 1/2**
20.1 Electrical Charge	2	1
20.2 Electrical Force	3	2
Chapter Review	1	1/2
21 Electric Fields	**5**	**3**
21.1 Creating and Measuring Electric Fields	2	1
21.2 Applications of Electric Fields	2	1 1/2
Chapter Review	1	1/2
22 Current Electricity	**6**	**3 1/2**
22.1 Current and Circuits	3	2
22.2 Using Electric Energy	2	1/12
Chapter Review	1	1/2
23 Series and Parallel Circuits	**7**	**4**
23.1 Simple Circuits	3	1 1/2
23.2 Applications of Circuits	3	2
Chapter Review	1	1/2

Chapter/Section	Single-Class (180 days)	Block (90 days)
24 Magnetic Fields	**7**	**4**
24.1 Magnets: Permanent and Temporary	3	2
24.2 Forces Caused by Magnetic Fields	3	1 1/2
Chapter Review	1	1/2
25 Electromagnetic Induction	**6**	**3 1/2**
25.1 Creating Electric Current from Changing Magnetic Fields	3	2
25.2 Changing Magnetic Fields Induce *EMF*	2	1
Chapter Review	1	1/2
26 Electromagnetism	**5**	**3**
26.1 Interaction Between Electric and Magnetic Fields an Matter	3	2
26.2 Electric and Magnetic Fields in Space	1	1/2
Chapter Review	1	1/2
Modern Physics		
27 Quantum Theory	**5**	
27.1 Waves Behave Like Particles	2	
27.2 Particles Behave Like Waves	2	
Chapter Review	1	
28 The Atom	**6**	
28.1 The Bohr Model of the Atom	3	
28.2 The Quantum Model of the Atom	2	
Chapter Review	1	
29 Solid State Electronics	**5**	
29.1 Conduction in Solids	2	
29.2 Electronic Devices	2	
Chapter Review	1	
30 The Nucleus	**6**	
30.1 Radioactivity	3	
30.2 The Building Blocks of Matter	2	
Chapter Review	1	
31 Nuclear Applications	**6**	
31.1 Holding the Nucleus Together	2	
31.2 Using Nuclear Energy	3	
Chapter Review	1	