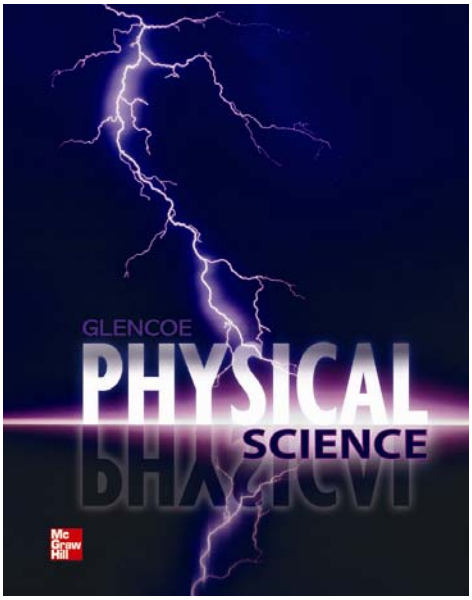
Glencoe

Academic Standards
Physical Science
Grades 9-12

Minnesota



PHYSICAL SCIENCE
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STANDARDS	PAGE REFERENCES
2. Physical Science	
1. Matter	
1. The structure of the atom determines chemical properties of elements.	
9.2.1.1.1 Describe the relative charges, masses, and locations of the protons, neutrons, and electrons in an atom of an element.	**Student Edition:** 488-490, 494-497, 502 *Figure 1* 489 *Figure 2* 774 *Figure 4* 492 *Figure 5* 493 *Figure 7* 497 *Figure 11* 502 *Mini Lab* 503 *Section 1 Review* 493 *Section 2 Review* 497 *Table 4* 495 **Teacher Wraparound Edition:** As 496, 503; BI 487; CU 497; DI 488, 502, 503; Di 495; IM 494; MI 488, 494; Re 493; RS 502; TFYI 496; VL 496, 502

Codes used for Teacher Wraparound Edition pages are the initial caps of headings on that page.

STANDARDS	PAGE REFERENCES
9.2.1.1.2 Describe how experimental evidence led Dalton, Rutherford, Thompson, Chadwick and Bohr to develop increasingly accurate models of the atom.	**Student Edition:** 7, 491, 493 *Figure 2* 7 *Figure 4* 492 *Table 2* 491 **Teacher Wraparound Edition:** A 492; DI 491; Di 491; IH 490; SJ 623; VEAM 492
9.2.1.1.3 Explain the arrangement of the elements on the Periodic Table, including the relationships among elements in a given column or row.	**Student Edition:** 498-499, 502-505, 520-530, 532-536 *Figure 8* 524 *Figure 9* 500-501 *Figure 10* 592 *Figure 12* 503 *Figure 13 & 14* 504 *Figure 15* 505 *Lab* 531 *Section 1 Review* 525 *Section 2 Review* 530 *Section 3 Review* 506 **Teacher Wraparound Edition:** A 500, 504, 523; As 530, 531; BI 487; CU 539; D 501; Di 533; DI 524, 534; IC 551; MI 526, 532; RS 535; TFYI 500, 520; VL 500, 523

STANDARDS	PAGE REFERENCES
9.2.1.1.4 Explain that isotopes of an element have different numbers of neutrons and that some are unstable and emit particles and/or radiation. *For example:* Some rock formations and building materials emit radioactive radon gas. *Another example:* The predictable rate of decay of radioactive isotopes makes it possible to estimate the age of some materials, and makes them useful in some medical procedures.	**Student Edition:** 496-497, 538-539, 621-623, 630-633 *Apply Science* 496 *Figure 6* 620 *Figure 7* 497, 623 *Figure 14* 630 *Figure 15 & 16* 631 *Figure 17* 632 *Figure 18* 633 *Lab* 634-635 *Section 2 Review* 497 *Table 1* 621 *Table 2 & 3* 622 **Teacher Wraparound Edition:** A 538, 630; As 496, 620, 633, 635; DI 496, 631; Di 623, 631; IES 243; ILS 496; IVL 632; PR 633; Re 620; TFYI 496; UA 632; VL 497, 631
2. Chemical reactions involve the rearrangement of atoms as chemical bonds are broken and formed through transferring or sharing of electrons and the absorption or release of energy.	
9.2.1.2.1 Describe the role of valence electrons in the formation of chemical bonds.	**Student Edition:** 558-561 *Figure 3* 554 *Figure 5* 555 *Figure 6* 556 *Figure 8* 559 *Figure 9* 560 *Figure 10 & 11* 561 *Lab* 572-573 *Section 1 Review* 556 *Section 2 Review* 564 **Teacher Wraparound Edition:** A 555, 560, 561; As 564, 573; CU 556; DI 554, 555; Di 533, 559; IL 505; IVL 554; MI 558; MM 592; TFYI 560; VL 554, 555, 559, 561

STANDARDS	PAGE REFERENCES
9.2.1.2.2 Explain how the rearrangement of atoms in a chemical reaction illustrates the law of conservation of mass.	**Student Edition:** 582-583, 585-586 *Example and Practice Problems* 587 *Figure 1* 582 *Figure 3* 585 *Mini Lab* 584 *Section 1 Review* 589 #6 *Think Critically* 611 #50 **Teacher Wraparound Edition:** Di 585; IVL 585; QD 591; RS 586; UA 585
9.2.1.2.3 Describe a chemical reaction using words and symbolic equations. *For example:* The reaction of hydrogen gas with oxygen gas can be written: $2H_2 + O_2 \rightarrow 2H_2O$.	**Student Edition:** 583-586, 588-593 *Example and Practice Problems* 587 *Figure 3* 585 *Mini Lab* 584 *Section 1 Review* 589 *Section 2 Review* 593 *Think Critically* 611 #49 **Teacher Wraparound Edition:** As 593; DI 587, 592; Di 586; IM 587; QD 591; Re 589; TFYI 586; VL 590
9.2.1.2.4 Relate exothermic and endothermic chemical reactions to temperature and energy changes.	**Student Edition:** 594-597, 598 *Figure 15* 595 *Figure 17* 596 *Section 3 Review* 597 **Teacher Wraparound Edition:** A 595, As 597; D 596; ILS 595; MI 594; Re 597; TFYI 596; TPK 594; VL 595

STANDARDS	PAGE REFERENCES
2. Motion	
2. An object's mass and the forces on it affect the motion of an object.	
9.2.2.2.1 Recognize that inertia is the property of an object that causes it to resist changes in motion.	**Student Edition:** 80-81, 86-87 *Figure 10* 80 *Figure 15* 86 *Mini Lab* 81 *Section 2 Review* 85 *Section 3 Review* 92 **Teacher Wraparound Edition:** FF 81; MM 80
9.2.2.2.2 Explain and calculate the acceleration of an object subjected to a set of forces in one dimension (F=ma).	**Student Edition:** 82-83, 87 *Additional Practice Problems* 801 #4, #8, #10 *Example & Practice Problem* 83 *Figure 16* 87 **Teacher Wraparound Edition:** DI 82; IVL 73
9.2.2.2.3 Demonstrate that whenever one object exerts force on another, a force equal in magnitude and opposite in direction is exerted by the second object back on the first object.	**Student Edition:** 84-85, 91-92 *Figure 13* 84 *Figure 14* 85 *Figure 22 & 23* 91 *Section 2 Review* 85 *Section 3 Review* 92 *Think Critically* 99 **Teacher Wraparound Edition:** CU 85, 92; FF 84; IVL 91; Re 85; QD 84; SJ 84; VL 91

STANDARDS	PAGE REFERENCES
2. Forces and object mass determine the motion of an object.	
9.2.2.2.4 Use Newton's universal law of gravitation to describe and calculate the attraction between massive objects based on the distance between them. *For example:* Calculate the weight of a person on different planets in the solar system.	**Student Edition:** 76-79 *Apply Math* 79, 99 *Example and Practice Problems* 78 *Figure 7* 76 *Figure 8* 77 *Figure 9* 79 *Section 1 Review* 79 #7-#8 **Teacher Wraparound Edition:** A 78; Di 77, 78; QD 77, 78; Re 79; SJ 77; TFYI 77, 78
3. Energy	
2. Energy can be transformed within a system or transferred to other systems or the environment, but is always conserved.	
9.2.3.2.1 Identify the energy forms and explain the transfers of energy involved in the operation of common devices. *For example*: Light bulbs, electric motors, automobiles or bicycles.	**Student Edition:** 114-117, 121, 125, 127, 156-157, 159, 222, 234-235 *Figure 7* 115 *Figure 8* 117 *Figure 15* 125 *Figure 18* 156 *Figure 19* 157 *Figure 21* 159, 219 *Figure 23* 222 *Mini Lab* 117 *Section 3 Review* 127 **Teacher Wraparound Edition:** As 222; IM 121; IVL 121; MI 114, 234; MM 122; SJ 115, 125; VL 127, 157, 222; VMG 219

STANDARDS	PAGE REFERENCES
9.2.3.2.2 Calculate and explain the energy, work and power involved in energy transfers in a mechanical system. *For example:* Compare walking and running up or down steps.	**Student Edition:** 106, 126, 188-190 *Additional Practice Problems Chapter 4* 801-802 *Apply Math* 127, 197 *Example and Practice Problems* 107, 126, 188, 190 *Mini Lab* 126 **Teacher Wraparound Edition:** A 108, 111; As 126; BI 105; QD 108; TFYI 107; SJ 189
9.2.3.2.3 Describe how energy is transferred through sound waves and how pitch and loudness are related to wave properties of frequency and amplitude.	**Student Edition:** 311-315 *Design Your Own Lab* 328-329 *Figure 6* 311 *Figure 8* 313 *Figure 9* 314 *Figure 10* 315 *Launch Lab* 304 *Mini Lab* 312 *WebQuest* 271 **Teacher Wraparound Edition:** A 313; As 312; CU 316; Di 313; LL 304; MI 311; QD 314; RS 313; TFYI 313; TPK 311; VL 314, 315; WQ 271

STANDARDS	PAGE REFERENCES
9.2.3.2.4 Explain and calculate current, voltage and resistance, and describe energy transfers in simple electric circuits.	**Student Edition:** 178-183, 185-186 *Apply Math* 191, 197 *Design Your Own Lab* 192-193 *Example & Practice Problems* 182 *Figure 13* 179 *Figure 14* 180 *Figure 15* 181 *Figure 19* 186 *Mini Lab* 181 *Section 2 Review* 183 *Section 3 Review* 191 **Teacher Wraparound Edition:** A 186, 187; AIL 192; As 181, 183; D 186; IM 179; IVL 182; MI 178; Re 183; SJ 189; TFYI 181, 187; VB 178; VL 179, 180
9.2.3.2.5 Describe how an electric current produces a magnetic force, and how this interaction is used in motors and electromagnets to produce mechanical energy.	**Student Edition:** 209-218, 220-222 *Figure 9* 209 *Figure 10* 210 *Figure 11* 211 *Figure 12* 212 *Figure 13 & 14* 213 *Figure 15* 214 *Figure 16* 215 *Figure 19* 217 *Figure 21* 291 *Figure 22* 220 *Mini Lab* 211 *Section 2 Review* 215 *Science & Technology* 226 **Teacher Wraparound Edition:** A 219; As 211, 215; CU 215; DI 214, 219; I 215; IL 214; IM 217; IVL 217, 220; MI 209, 216; MM 214; QD 210, 218; Re 215, 222; TPK 209; TS 226; VL 212, 214, 222; VVL 209

STANDARDS	PAGE REFERENCES
9.2.3.2.6 Compare fission and fusion in terms of the reactants, the products and the conversion from matter into energy. *For example:* The fusion of hydrogen produces energy in the sun. *Another example:* The use of chain reactions in nuclear reactors.	**Student Edition:** 241, 243, 624-626 *Example and Practice Problems* 327 *Figure 9* 624 *Figure 10* 241, 625 *Figure 11* 625 *Figure 12* 626 *Figure 13* 243 *Section 2 Review* 627 #1 **Teacher Wraparound Edition:** As 247; CU 247; FF 241; ISS 244; QD 624; TFYI 625; VB 241, 624; VL 243, 244
9.2.3.2.7 Describe the properties and uses of forms of electromagnetic radiation from radio frequencies through gamma radiation. *For example:* Compare the energy of microwaves and X-rays.	**Student Edition:** 345-357, 630-631 *Chapter Review* 362-363 *Figure 7* 345 *Figure 8 & 9* 346 *Figure 10* 347 *Figure 11 & 12* 348 *Figure 13 & 14* 349 *Figure 15* 631 *Figure 19* 353 *How Science Works* 360 *Mini Lab* 347 *Section 2 Review* 351 *Section 3 Review* 357 **Teacher Wraparound Edition:** ABK 345; As 347, 351, 357, 633; CB 360; D 349; DI 348, 631; Di 350; FF 346; IL 348; IVL 345; MI 352; Re 351, 357; SJ 346; SUP 271; TFYI 348; TS 360; VL 346, 347, 357, 631

STANDARDS	PAGE REFERENCES
4. Human Interaction with Physical Systems	
1. There are benefits, costs and risks to different means of generating and using energy.	
9.2.4.1.1 Compare local and global environmental and economic advantages and disadvantages of generating electricity using various sources or energy. *For example:* Fossil fuels, nuclear fission, wind, sun or tidal energy.	**Student Edition:** 235-240, 244-253 *Figure 9* 240 *Figure 15* 245 *Figure 18* 249 *In the Field* 698 *Lab* 254 *Section 1 Review* 240 *Section 2 Review* 247 *Section 3 Review* 253 **Teacher Wraparound Edition:** A 237, 244, 246; B 698; CD 236; CU 253; DI 245, 250; EO 698; FF 251; IH 236; IM 250; ISS 244, 245; IVL 235; MI 241; PR 247; Re 240; SJ 625; TPK 248; TFYI 242; VL 249

STANDARDS	PAGE REFERENCES
9.2.4.1.2 Describe the trade-offs involved when technological developments impact the way we use energy, natural resources, or synthetic materials. *For example:* Fluorescent light bulbs use less energy than incandescent lights, but contain toxic mercury.	**Student Edition:** 238-240, 244-247, 249-253, 256-261, 695, 744-745 *Apply Science* 246 *Figure 4* 743 *Figure 8* 239 *Figure 9* 240 *Figure 15* 245, 350 *Figure 19* 695 *Figure 32* 260 *In the Field* 698, 762 *Lab* 262-263 *Section 1 Review* 745 *Section 2 Review* 247 *Section 4 Review* 261 *Science & History* 264, 636 *Science & Technology* 574 **Teacher Wraparound Edition:** A 246, 257; DI 245, 249, 743; Di 239, 250, 252, 256, 257, 259, 264; EO 574, 762; IE 350, 754; IM 250, 259; ISS 244, 245; IVL 235; MI 241; PR 757; SJ 625; TFYI 245, 744; TS 636, 698; VL 249, 350, 743