

Index

• A •

- abiotic components, 161, 174
- acetyl molecules, 84, 85
- acetylcholine, 203
- acids and bases, 60–61
- acids, stomach, 211
- ACR (aerobic cellular respiration). *See also* cells,
 - recharging ATP energy
 - versus anaerobic respiration, 88–89
 - chemical reaction, 82
 - defined, 81, 353
 - electron transport chain, 82, 85–87
 - glycolysis, 82–83
 - Krebs cycle, 82, 84–85
 - NADH in, 83, 84–85
 - versus photosynthesis, 90
 - sample questions, 82–84, 87–89
- ACT tests, 23
- actin, 221
- action patterns, fixed, 227–229
- activation energy, 75
- active sites in chemical reactions, 75–76
- active transport in cell membranes, 38–39
- adenine, 69–70
- adenosine triphosphates (ATPs). *See* cells,
 - recharging ATP energy
- adipose tissue, 219
- adrenal glands, 208, 209
- adrenaline rushes, 202, 209
- adrenocorticotropic hormone, 208
- afferent neurons, 226
- afferent signals, 201
- Agnatha class of vertebrates, 154
- alcohol, producing ethyl, 88, 353
- algae, 148–149
- alleles, 108–110
- alternation of generations, 192
- alveoli, 213
- amino acids, 66, 67–69, 358. *See also* proteins
- amoeba, 148
- amphibians, 154, 218
- anaerobic cellular respiration, 88–89, 353
- anaphase in meiosis, 121, 122
- anaphase in mitosis, 48, 49
- anatomical figures
 - cardiovascular system, 216
 - central nervous system, 201–202
 - digestive system, 211
 - eyes, 204–205
 - female reproductive system, 236
 - glandular system, 208
 - skin, 219
- anatomy, comparative, 133–134
- anemia, 215
- angiosperms, 151, 187–192, 193–195, 346
- animal behavior, instinctual
 - circadian rhythm, 228
 - courtship rituals, 229
 - daily cycles of, 228
 - defined, 225
 - fixed action patterns, 227–229
 - hunting and escaping, 228
 - imprinting, 227
 - key stimulus, 227
 - migration, 228
 - reflexes, 226–227
 - sample questions, 229–230
 - seasonal cycles of, 228–229
- animal behavior, learned
 - conditioning, 230–231
 - defined, 230
 - habituation, 230
 - insight learning, 231
 - mimicry, 231
 - sample questions, 231–232
 - trial and error, 230
- animal cardiovascular system
 - blood, 214–215
 - cardiac muscle, 222
 - circulatory system, 215–216
 - defined, 214
 - heart, 216
 - sample questions, 216–217
- animal digestive system
 - acids, 211
 - bile, 212
 - defined, 211
 - digestive enzymes, 212
 - esophagus, 211
 - large intestine, 211, 212
 - liver, 211, 212
 - pancreas, 211, 212
 - peristalsis, 211
 - sample questions, 212–213
 - small intestine, 211, 212
 - stomach, 211
 - vermiform appendix, 211, 212

- animal endocrine system. *See also* hormones
 - adrenal glands, 208, 209
 - defined, 207–208
 - endocrine glands, 207–208
 - failures in, 222
 - gonads, 210
 - ovaries, 208, 210
 - pancreas, 208, 209
 - pituitary gland, 208–209
 - sample questions, 210–211
 - testes, 208, 210
 - thyroid gland, 208, 209
 - thyroid problems, 222
- animal nervous systems
 - afferent signals, 201
 - autonomic system, 202
 - axons, 198, 199
 - central nervous system, 201–202
 - defined, 197
 - dendrites, 198
 - efferent signals, 201
 - excitatory signals, 201
 - inhibitory signals, 201
 - myelin sheaths, 199
 - neuron action potentials, 198–200
 - neuron signaling, 201, 356
 - neurons, 198, 356
 - neurotransmitters, 200–201
 - parasympathetic system, 203
 - peripheral nervous system, 201, 204
 - resting potential, 198–199
 - sample questions, 203–204
 - Schwann cells, 199
 - sodium channels, 198–200
 - somatic system, 202
 - sympathetic system, 202
 - synapses, 198, 200–201
 - threshold potential, 199
 - voltage/electrical potential, 198
 - voltage gated channels, 199
- animal organ systems
 - cardiovascular, 214–217
 - digestive, 211–213
 - endocrine, 207–211, 222
 - excretory/renal, 217–218
 - muscular, 221–223
 - nervous, 197–204
 - respiratory, 213–214
 - sensory, 204–207
 - skeletal, 219–220
 - skin, 218–219
- animal reproduction. *See also* asexual reproduction; sexual reproduction
 - asexual reproduction, 232
 - budding, 232
 - courtship, 232–233
 - external fertilization, 154, 233
 - internal fertilization, 155, 233–234
 - mating, 233–234
 - offspring development, 233, 234, 236–238
 - overview, 232
 - parthenogenesis, 232
 - regeneration, 232
 - reproductive fitness, 137
 - sample questions, 235–236, 237–238
 - sexual reproduction, 232–236
- animal respiratory systems
 - blood pH regulation, 214
 - defined, 213
 - gas exchange process, 213–214
 - gills/lungs, 213
 - sample question, 214
- animal sensory systems
 - balance/vestibular, 205
 - hearing/auditory, 205
 - overview, 204
 - sample questions, 206–207
 - smell/olfactory, 206
 - taste/gustatory, 206
 - touch/somatosensory, 206
 - vision/visual, 204–205
- animal skeletal systems
 - endoskeletons, 219, 220
 - exoskeletons, 219, 220
 - hydrostatic skeletons, 219
 - skeletal muscles, 222
- Animalia kingdom. *See also* animal behavior;
animal organ systems; taxonomy
 - Amphibia class, 154
 - Annelida phylum, 152–153, 347
 - Arthropoda phylum, 152, 153, 347
 - Aves (birds) class, 154, 155
 - Chordata phylum, 152, 153–155, 347
 - Cnidaria phylum, 151, 152
 - defined, 151–152
 - Echinodermata phylum, 152
 - fish, 154
 - insects, 153
 - Mammalia class, 154, 155, 347
 - Mollusca phylum, 152, 153
 - Nematoda phylum, 152–153
 - overview, 143, 144
 - Platyhelminthes phylum, 152–153
 - Porifera phylum, 151, 152
 - Reptilia class, 154, 155
 - sample questions, 156–157
 - sea creatures, 152, 153, 154
 - Vertebrata subphylum, 154–155
 - worms, 152–153

- animals
 cold-blooded animals, 155
 defined, 197
 diurnal animals, 228
 nocturnal animals, 228
 warm-blooded animals, 155
 Annelida phylum, 152–153, 347
 answer choices on tests. *See also* SAT
 debatable words in, 21–22
 most specific answers, 22
 politically correct answers, 22
 wrong, crossing out, 19–20
 wrong, recognizing, 21–24
 answer sheets
 marking carefully, 14, 26
 for practice test 1, 243
 for practice test 2, 295
 answers to practice test 1
 E/M section, 271–272, 277–285
 E section, 273, 285–288
 M section, 274, 288–292
 answers to practice test 2
 E/M section, 320–321, 327–337
 E section, 322, 337–339
 M section, 323, 339–342
 anthers, flower, 194
 anticodons, 101
 antidiuretic hormone, 208
 aorta, 216
 aphotic zone, 164
 apical meristem, 190
 Apicomplexa phylum of Protists, 148
 appendix, vermiform, 211, 212
 Archaeobacteria phylum of Monera, 146
 arteries, 215
 Arthropoda phylum of Animalia, 152, 153, 347
 artificial selection, 137
 artiodactyla order of mammals, 155
 asexual reproduction. *See also* cell cloning;
 mitosis; sexual reproduction
 in animals, 232
 bacteria/viruses and, 101
 at cellular level, 46–49
 defined, 107
 in plants, 192
 association learning, 230–231
 atmosphere, evolution of, 131–132
 atoms, 51–52
 ATP energy. *See* cells, recharging ATP energy
 atriums, 216
 auditory system, 205
 autonomic nervous system, 202
 autotrophs, 79. *See also* plants
 Aves class of vertebrates, 154, 155
 axons, 198, 199
- **B** •
- bacteria. *See also* Monera kingdom
 conjugation of, 101
 cyanobacteria, 146
 in herbivore stomachs, 211
 nitrogen-fixing bacteria, 170
 balance, sense of, 205
 bases, 60–61. *See also* pH
 Bass, Edward, 163
 behavior. *See* animal behavior
 bile, 212
 binary fission, 47
 biological magnification, 168
 biomes. *See also* ecology
 abiotic components, 161
 Biosphere 2, 163
 biotic components, 161
 carrying capacities, 161–164
 defined, 161, 177
 deserts, 162
 forests, 162
 freshwater, 163
 oceans, 164
 sample questions, 165
 savannas, 163
 tundra, 163
 biotic components, 161, 174
 birds class, 154, 155. *See also* Animalia kingdom
 bivalve creatures, 153
 blastula, 234, 236
 blood
 in cardiovascular system, 214–215
 cold-blooded animals, 155
 excretory system and, 217–218
 human blood typing, 110
 pH regulation, 214
 red/white blood cells, 215
 warm-blooded animals, 155
 bonds. *See* chemical bonds
 brain anatomy, 201–202
 bronchi, 213
 budding, 232
- **C** •
- Calvin cycle, 92–93
 capillaries, 215

- carbohydrates. *See also* organic molecules
 - cellulose or fiber, 65, 66
 - chemistry of, 63–65
 - defined, 63
 - dehydration synthesis, 64–65, 67
 - fructose, 64
 - glucose, 63–64, 65, 358
 - glycogen, 65–66
 - saccharides, 64, 65, 358
 - sample questions, 65–66
 - starch, 65, 66
 - sucrose, 64
- carbon-based molecules, 56. *See also* organic molecules
- carbon cycle in food chain, 169
- carbon dioxide, 53, 214, 358
- cardiac muscle, 222
- cardiovascular system. *See* animal cardiovascular system
- carnivora order of mammals, 155
- carnivores as consumers, 167
- carpels, flower, 194
- carrying capacities. *See also* biomes; ecology;
ecosystems; populations
 - of biomes, 161–164
 - of ecosystems, 177–178
 - of populations, 171–173
- catalysts, 75. *See also* enzymes
- cations, 54
- cell cloning. *See also* asexual reproduction;
mitosis
 - via binary fission, 47
 - of eukaryotic cells, 47–49
 - via mitosis, 47–49, 355
 - overview, 46
 - of prokaryotic cells, 47
- cell membrane transport
 - active transport, 38–39
 - concentration gradients, 36, 38
 - diffusion/passive transport, 36–38
 - via endocytosis, 39, 355
 - via exocytosis, 39, 355
 - membranes, defined, 41–42, 349
 - overview, 36
 - sample questions, 39–40
- cell parts
 - cell membranes, 41–42, 349
 - cell walls, 41, 44, 350
 - chloroplasts, 41, 44, 351
 - cilia, 45, 148, 350
 - cytoplasm, 40, 41, 42, 349
 - cytoskeletons, 40, 42
 - endoplasmic reticulum, 41, 43, 351
 - flagellum/flagella, 45, 148, 358
 - Golgi apparatus, 41, 44
 - lysosomes, 44, 351
 - mitochondria, 41, 44, 351
 - nucleus/nucleii, 40, 41, 43, 350
 - organelles, 40, 43–45
 - sample questions, 43, 45–46
 - vacuoles, 41, 44
- cells
 - diploid cells, 120, 121–122
 - discovery of, 33
 - eukaryotic cells, 40–41
 - evolution of, 132
 - germ cells, 120
 - haploid cells, 120, 121–122
 - mesophyll cells, 187, 188
 - microscopes and, 33–35
 - overview, 33, 186
 - prokaryotic cells, 40–41
 - red/white blood cells, 215
 - Schwann cells, 199
 - somatic cells, 120
 - as test topic, 15
 - vesicles in, 39, 44
 - why so small, 36
- cells, recharging ATP energy. *See also* ACR;
photosynthesis
 - adenosine triphosphates, defined, 79–80
 - via aerobic respiration, 81–88
 - via anaerobic respiration, 88–89
 - of autotrophs, 79
 - of heterotrophs, 79
 - overview, 79
 - via photosynthesis, 90–93
 - sample questions, 80–84, 87–89
- cellulose, 44, 65, 66
- central nervous system (CNS), 201–202
- centrioles, 48
- centromere, 48
- cerebellum, 201–202
- cerebral cortex, 202
- cerebrum, 201–202
- cetacea order of mammals, 155
- channels
 - ATP-producing channels, 86
 - defined, 350
 - sodium channels, 198–200
 - voltage gated channels, 199
- chemical bonds
 - cis bonds, 74
 - covalent bonds, 54–55

- defined, 53–54
- forming multiple bonds, 55–56
- ionic bonds, 54
- peptide bonds, 67
- trans bonds, 74
- variable bonds, 67, 68
- chemical reactions. *See also* organic molecules
 - activation energy, 75
 - active sites, 75–76
 - in aerobic respiration, 82
 - balancing, 57
 - catalysts for, 75
 - defined, 56–57
 - endothermic reactions, 74–75
 - enzymes and, 75–76
 - exothermic reactions, 74–75
 - overview, 74
 - products, 57
 - reactants, 57
 - sample questions, 58, 76–77
- chemistry
 - of carbohydrates, 63–65
 - of photosynthesis, 74–75, 90
 - producing alcohol, 88, 353
 - producing lactic acid, 88
 - of proteins, 66, 67–69
- chemistry basics
 - acids, 60–61
 - atoms, 51–52
 - bases, 60–61
 - cations, 54
 - elements, 52
 - ions, 53
 - isotopes, 52–53
 - litmus tests, 60
 - molecules, 53–54
 - sample questions, 57–58
 - subatomic particles, 51
 - water molecules, 58–59, 357
- chitin, 44, 150
- chlorophyll, 90–91
- Chlorophyta phylum of Protists, 148
- chloroplasts, 41, 44, 351
- cholesterol, 72–74
- Chondrichthyes class of vertebrates, 154
- Chordata phylum of Animalia, 152, 153–155, 347
- chorionic gonadotropin, human, 237
- chromatids, sister, 48, 120
- chromosomes. *See also* DNA
 - in cell mitosis, 47–48
 - chromosomal disorders, 121
 - defined, 115
 - homologous pairs of, 119–120
 - sex chromosomes, 115–117
- cilia, 45, 148, 350
- Ciliophora phylum of Protists, 148
- circadian rhythm, 228
- circulatory system of animals, 215–216
- circulatory system of plants, 185, 188
- cis bonds, 74
- classification question strategies, 22, 24
- classifying species. *See* taxonomy
- climax communities, 178
- cloning. *See* asexual reproduction; mitosis
- Cnidaria phylum of Animalia, 151, 152
- CNS (central nervous system), 201–202
- cochlea, 205
- co-dominant genes, 109
- coenzyme A, 84, 85
- co-evolution, 175
- cold-blooded animals, 155
- College Board website, 13
- college use of SAT scores, 9–11
- color-blindness, 115
- commensalistic symbiosis, 175
- communities, climax, 178
- community of populations, 177
- comparative anatomy, 133–134
- competition for niches, 173–174
- complimentarity rule of DNA, 96
- concentration gradients in cells, 36, 38
- condenser lens, 34
- conditioning animal behavior, 230–231
- cone-bearing plants, 151, 184, 193, 346
- cones in vision, 205
- conjugation, 101
- convergent evolution, 134
- corpus luteum, 237
- cortisol, 209
- cotyledons, 346
- courtship rituals, 229, 232–233
- covalent bonds, 54–55
- crossing over process in genetics, 125–126
- crustaceans, 153
- curled tongue trait, 125
- cuticle of leaves, 187–188
- cyanobacteria, 146
- cytochrome oxidase enzyme, 86
- cytokinesis, 48
- cytoplasm, 40, 41, 42, 349
- cytosine, 69–70
- cytoskeletons, 40, 42

• D •

daily cycles of behavior, 228
 Darwin, Charles, 114, 133, 135, 136–137. *See also*
 evolution by natural selection
 dead zones, 177
 debatable words in answer choices, 21–22
 deciduous forest biomes, 162
 decomposers in food chain, 167
 dehydration, 64
 dehydration synthesis, 64–65, 67
 deletions, chromosomal, 121
 dendrites, 198
 density factors, ecosystem, 177–178
 deoxyribose, 69, 70
 dermis, 218, 219
 desert biomes, 162
 diabetes, 222
 diaphragm, 213
 dicots, 184, 187–195, 346. *See also* plants,
 tracheophyte
 diffusion, 36–38, 86, 350
 digestion. *See* animal digestive system
 dimples trait, 125
 Dinoflagellates phylum of Protists, 148
 diploid cells, 120, 121–122
 diploid plants, 192
 directional natural selection, 138
 disaccharides, 64
 disruptive natural selection, 139
 diuretics, 218
 DNA (deoxyribonucleic acid). *See also* genetics;
 nucleotides; RNA
 chromosomes, 115
 complimentarity rule, 96
 defined, 69–70, 95, 359
 double-helix structure, 69, 70, 96–97
 in history, 102
 nucleotide sequences, 96, 116
 overview, 66, 67
 DNA fingerprinting, 116
 DNA polymerase, 75
 DNA replication, 95–98, 354
 dominant alleles, 109
 double-helix structure of DNA, 69, 70, 96–97
 duplication, chromosomal, 121

• E •

earlobe traits, 125
 Echinodermata phylum of Animalia, 152

ecology. *See also individual subentries*
 biomes, 161–165, 177
 ecosystems, 177–179
 importance of, 161
 nutrient cycles, 168–171
 population interactions, 173–176
 populations, 171–173
 as test topic, 15
 trophic levels/food chain, 165–171
 ecosystems
 carrying capacities, 177–178
 climax communities, 178
 dead zones, 177
 defined, 165, 177
 density factors, 177–178
 ecological succession, 178
 healthy ecosystems, 177
 sample questions, 178–179
 ectoderm, 234, 236
 ectothermic animals, 155
 efferent neurons, 226
 efferent signals, 201
 eggs. *See* ova
 electrical potential, 198
 electron microscopes, 34–35
 electron transport chain (ETC), 82, 85–87
 electrons, defined, 51–53
 elements, chemical, 52
 endocrine system. *See* animal endocrine system;
 hormones
 endocytosis, 39, 355
 endoderm, 234, 236
 endoplasmic reticulum, 41, 43, 351
 endoskeletons, 219, 220
 endothermic animals, 155
 endothermic chemical reactions, 74–75
 energy, cell. *See* cells, recharging ATP energy
 enzymes
 chemical reactions and, 75–76, 86
 coenzyme A, 84, 85
 cytochrome oxidase, 86
 digestive enzymes, 212
 epidermis of animal skin, 218, 219
 epidermis of leaves, 187–188
 epinephrine, 202, 209
 escape behavior in animals, 228
 esophagus, 211
 estrogen, 210, 237
 ETC (electron transport chain), 82, 85–87
 ethyl alcohol production, 88, 353
 eugenics movement, 103
 Euglenophyta phylum of Protists, 148

eukaryotes
 defined, 40–41
 mitosis of, 47–49, 120
 organelles, 40, 43–45
 evergreen plants, 193
 evolution by natural selection. *See also* Darwin;
 genetic traits
 versus artificial selection, 137
 comparative anatomy and, 133–134
 defined, 136–137
 directional selection, 138
 disruptive selection, 139
 evidence for, 133–135
 fossil records and, 134
 Hardy-Weinberg equilibrium, 140–141
 molecular similarity and, 133
 overview, 135, 138
 speciation, 139–140
 stabilizing selection, 138
 evolution, theories of
 convergent evolution, 134
 Darwin’s theory, 135, 136–137
 early atmosphere, 131–132
 first cells, 132
 Lamarck’s theory, 135, 136
 by natural selection, 136–141
 overview, 131
 sample questions, 132–135, 137
 for stopping evolution, 140–141
 as test topic, 15
 warning, 134
 exams. *See* ACT; SAT
 excitatory signals, 201
 excretory system in animals, 217–218
 exocrine glands, 207, 218
 exocytosis, 39, 355
 exoskeletons, 219, 220
 exothermic chemical reactions, 74–75
 exponential growth in populations, 172
 external fertilization, 154, 233
 “extremophiles”, 146
 eyes, animal, 204–205

● F ●

facilitated diffusion, 37, 38
 fallopian tubes, 234, 236
 fats. *See* lipids
 fermentation, 88, 353
 fertilization. *See* sexual reproduction
 fiber, 65, 66
 fibrous roots, 189

fight-or-flight response, 202, 209
 filaments, flower, 194
 fish, 37, 154. *See also* Animalia kingdom
 fitness, reproductive, 137
 fixed action patterns of behavior, 227–229
 flagellum/flagella, 45, 148, 350
 flowering plants, 193–195
 fluid mosaic model, 42. *See also* cell membrane
 transport
 follicle stimulating hormone, 209, 237
 follicles in female animals, 234
 follicles, hair, 218, 219
 food chain. *See* nutrient cycles; trophic levels
 forest biomes, 162, 193
 forest fires, 193
 fossil records, 134
 frameshift mutations, 103
 freshwater biome, 163
 freshwater organisms, 37
 fructose, 64
 fruiting body, 150
 fruiting plants, 194–195
 FSH (follicle stimulating hormone), 209, 237
 Fungi kingdom, 149, 150–151, 346. *See also*
 taxonomy

● G ●

gametes, 120, 122–123, 192–193
 ganglia, 153
 gas exchange in respiration, 213–214
 gastrula, 234, 236
 generations, alternation of, 192
 genes
 in asexual reproduction, 107
 co-dominant genes, 109
 gene pools, 140
 overview, 95, 98, 115
 in sexual reproduction, 107–108
 genetic diversity
 via crossing over, 125–126
 overview, 124
 via random chance, 124–125
 sample questions, 126–127
 genetic traits. *See also* evolution
 analogous traits, 134
 defined, 107–111
 examples of, 125
 sex-linked traits, 115–117
 genetic traits, predicting
 color-blindness, 115
 hemophilia, 116

- genetic traits, predicting (*continued*)
 - overview, 111
 - using Punnet squares, 111–113
 - sample questions, 113–114
 - using a test cross, 112–113
- genetics. *See also* DNA; meiosis
 - alleles, defined, 108–110
 - of bacteria, 101
 - defined, 107
 - dominant alleles, 109
 - eugenics movement, 103
 - genotypes, 108–109
 - Gregor Mendel and, 112–114
 - heterozygous alleles, 109
 - homozygous alleles, 109
 - of human blood typing, 110
 - pangensis theory, 114
 - phenotypes, 108–109
 - recessive alleles, 109
 - sample questions, 110–111
 - as test topic, 15
 - of viruses, 101
- germ cells, 120
- gills, 213
- glucagon, 209
- glucose, 63–64, 65, 358
- glycogen, 65–66
- glycolysis stage in ACR, 82–83
- Golgi apparatus, 41, 44
- gonadotropin, human chorionic, 237
- gonads, 208, 210, 232
- Gram negative bacteria, 146
- Gram positive bacteria, 145, 146
- Gram stain, 145
- gravitropism, 191
- green leaf color, 90
- growth of animal offspring, 233, 234, 236–238
- growth, exponential, 172
- growth hormone, 208
- growth hormone problems, 222
- growth process in plants, 190–192
- growth rate of populations, 171–173
- guanine, 69–70
- guessing strategies for SAT tests, 19–21
- gustatory system, 206
- gymnosperms, 151, 184, 193, 346

• H •

- habituation behavior in animals, 230
- hair follicles, 218, 219
- halophiles, 146
- haploid cells, 120, 121–122
- haploid plants, 192

- Hardy-Weinberg equilibrium, 140–141
- heart in animals, 216, 222
- helicase, 75
- helix structure of DNA, 69, 70, 96–97
- helix structure of proteins, 67–68
- hemoglobin, 215
- hemophilia, 116
- herbivore stomachs, 211
- herbivores as primary consumers, 166
- heterotrophs, 79. *See also* Animalia kingdom; Fungi kingdom
- heterozygous alleles, 109
- “hitchhiker thumb” trait, 125
- homologous pairs of chromosomes, 119–120
- homologous structures in anatomy, 133
- homozygous alleles, 109
- hormones. *See also* animal endocrine system
 - adrenocorticotrophic hormone, 208
 - antidiuretic hormone, 208
 - cortisol, 209
 - estrogen, 210, 237
 - follicle stimulating hormone, 209, 237
 - glucagon, 209
 - growth hormone, 208
 - growth hormone problems, 222
 - human chorionic gonadotropin, 237
 - insulin, 209
 - luteinizing hormone, 208
 - oxytocin, 208
 - progesterone, 237
 - prolactin, 209
 - testosterone, 210, 237
 - thyroid hormone, 209
 - thyroid problems, 222
 - thyroid stimulating hormone, 208
- human chorionic gonadotropin, 237
- humans. *See* animal behavior; animal organ systems; primates order
- hunting behavior in animals, 228
- hydrocarbon molecules, 71
- hydrophilic molecules, 41, 42, 59
- hydrophobic molecules, 41, 42, 59
- hydrostatic skeletons, 219
- hypertonic state, 36
- hyphae, 150, 346
- hypodermis, 219
- hypothalamus, 201–202, 208, 214
- hypotonic state, 37

• I •

- imprinting behavior, 227
- incomplete dominance, 109
- inhibitory signals, 201

insect circulatory system, 215
 insect phyla, 153
 insight learning, 231
 instinctual behavior. *See also* animal behavior
 circadian rhythm, 228
 courtship rituals, 229
 daily cycles of, 228
 defined, 225
 fixed action patterns, 227–229
 hunting and escaping, 228
 imprinting, 227
 key stimulus in, 227
 migration, 228
 reflexes, 226–227
 sample questions, 229–230
 seasonal cycles of, 228–229
 insulin, 209
 intermembrane space, 44, 85–86
 internal fertilization, 233–234
 interphase, 47
 interspecific competition, 174
 intertidal zone, 164
 intestines, animal, 211, 212
 intraspecific competition, 174
 inversion, chromosomal, 121
 ionic bonds, 54
 ions, 53
 iris of eyes, 204, 205
 iron deficiency anemia, 215
 isotonic state, 38
 isotopes, 52–53

• J •

jellyfish, 152

• K •

key stimulus in instinct, 227
 kidneys, 217
 Krebs cycle, 82, 84–85
 K-selected species, 172

• L •

lactase, 75
 lactic acid production, 88, 353
 Lamarck, Jean-Baptiste, 135
 large intestine, 211, 212
 larvae of amphibians, 154
 learned behavior. *See also* animal behavior
 conditioning, 230–231
 defined, 230

habituation, 230
 insight learning, 231
 mimicry, 231
 sample questions, 231–232
 trial and error, 230
 leaves, green color of, 90
 leaves, structure of, 187–188
 Leeuwenhoek, Antoine van, 33, 34
 lens of animal eyes, 205
 lens of microscopes, 34
 leukocytes, 215
 light energy source. *See* photosynthesis
 light microscopes, 34, 35
 lipids. *See also* organic molecules
 cholesterol, 72–74
 defined, 38, 71
 in foods, 74
 oils, 74
 phospholipids, 41–42, 72–74
 saturated fats, 74
 trans fats, 74
 triglycerides/fatty acids, 71–72, 74
 unsaturated fats, 74
 litmus tests, 60
 liver, animal, 211, 212
 lungs, 213
 luteal phase in menstruation, 237
 luteinizing hormone, 208
 lysosomes, 44, 351

• M •

M phase. *See* mitosis
 Mammalia class of Animalia, 154, 155, 347
 mammary glands, 218
 marsupial subclass, 155
 mating, 233–234. *See also* sexual reproduction
 matrix of mitochondria, 44, 85, 86
 meiosis. *See also* genetics
 defined, 120, 355
 diploid cells, 120, 121–122
 gametes, 120, 122–123
 genetic diversity, 124–127
 haploid cells, 120, 121–122
 homologous pairs, 119–120
 versus mitosis, 120
 overview, 119
 phases in, 121–123
 sample questions, 123–124
 sister chromatids, 120
 membrane, cell. *See* cell membrane transport
 membrane space, inter, 44, 85–86
 membrane, tympanic, 205

- Mendel, Gregor, 112–114
- menstruation, 237
- mesoderm, 234, 236
- mesophyll cells, 187, 188
- metabolism, 166
- metaphase in meiosis, 121, 122, 124–125
- metaphase in mitosis, 47, 48, 49
- methionine, 101
- microscopes, 33–35
- microtubules, 48
- migration behavior, 228
- mimicry behavior, 231
- missense mutations, 103
- mitochondria
 - aerobic respiration in, 65–66, 84
 - defined, 41, 44, 351
 - matrix of, 44, 85, 86
- mitosis. *See also* cell cloning
 - anaphase, 48, 49
 - centrioles, 48
 - cytokinesis, 48
 - defined, 47, 355
 - interphase and, 47
 - versus meiosis, 120
 - metaphase, 47, 48, 49
 - microtubules, 48
 - overview, 46–47
 - phases in, 47–49
 - prophase, 47–48
 - sample questions, 49
 - sister chromatids, 48
 - telophase, 48–49
- molds, 149, 150
- molecules, 53. *See also* organic molecules
- Mollusca phylum of Animalia, 152, 153
- Monera kingdom. *See also* bacteria; taxonomy
 - Archaeobacteria, 146
 - bacteria with no cell walls, 146
 - defined, 145, 345
 - Eubacteria, 345
 - Gram negative bacteria, 146
 - Gram positive bacteria, 145, 146
 - overview, 143, 144
 - sample questions, 146–147
- monocots, 184, 187–195, 346. *See also* plants, tracheophyte
- monomers, 66
- monosaccharides, 64. *See also* glucose
- Monotremes subclass of mammals, 155
- morula, 234, 236
- mosses, 184
- mRNA. *See* protein synthesis; RNA
- muscle reflexes, 226
- muscular system, 221–223
- mushrooms, 150
- mutations. *See also* protein synthesis
 - consequences of, 103–104
 - defined, 102
 - frameshift mutations, 103
 - missense mutations, 103
 - nonsense mutations, 103
 - overview, 95
 - point mutations, 102–103
 - sample questions, 104–105
 - silent mutations, 103
- mutualistic symbiosis, 170, 175, 211
- myelin sheaths, 199
- myosin, 221

● N ●

- natural selection. *See* evolution
- nectar, flower, 194
- Nematoda phylum of Animalia, 152–153
- nephrons, 217
- neritic zone in oceans, 164
- nervous systems. *See* animal nervous systems
- neuron action potentials, 198–200
- neuron signaling, 201, 356
- neurons, 198, 226
- neurotransmitters, 200–201
- neutrons, 51–53
- nitrogen cycle in food chain, 169–170
- nitrogen fixation, 170
- nodes of Ranvier, 199
- nonpolar covalent bonds, 54–55
- nonsense mutations, 103
- nontracheophytes, 151, 183–184, 192
- nonvascular plants. *See* nontracheophytes
- nuclear envelopes, 43
- nucleic acids. *See also* DNA; nucleotides; RNA
- nucleotides
 - codons, 100–101
 - defined, 66, 69–70, 359
 - in protein synthesis, 99–101
 - sequences of in DNA, 96, 116
- nucleus/nucleii of atoms, 51–52
- nucleus/nucleii of cells, 40, 41, 43, 350
- nutrient cycles in food chain. *See also* ecology; trophic levels
 - carbon cycle, 169
 - defined, 168
 - nitrogen cycle, 169–170

overview, 168
 sample questions, 170–171
 water and oxygen cycles, 169

• O •

objective/ocular lenses in microscopes, 34
 ocean biomes, 164
 ocular/visual system, 204–205
 oils in foods, 74
 olfactory system, 206
 omnivores, 167
 open circulatory system, 215
 operant learning, 230–231
 optic nerve, 205
 organelles, 40, 43–45
 organic chemistry. *See* chemistry
 organic molecules. *See also* carbohydrates;
 chemical reactions; proteins
 acetyl molecules, 84, 85
 amino acid molecule, 56
 carbohydrates, 63–66
 carbon dioxide molecules, 53
 in chemical reactions, 57, 74–77
 defined, 53–54, 56, 63
 glucose molecules, 53–54, 56
 hydrocarbon molecules, 71
 hydrophilic molecules, 41, 42, 59
 hydrophobic molecules, 41, 42, 59
 lipids, 71–74
 nucleic acids, 69–71
 nucleotides, 69–70, 359
 in nutrient cycles, 168–171
 oxygen molecules, 53, 357
 polymers/monomers, 66
 proteins/amino acids, 66, 67–69, 358
 pyruvate molecules, 83, 84
 similarity of, 133
 as test topic, 15
 water molecules, 53, 58–59, 357
 organismal biology, 15. *See also* animals; plants
 osmosis, 37
 Osteichthyes class of vertebrates, 154
 ova/ovum, animal, 232, 234
 ova/ovum, plant, 193
 ovaries, 208, 210, 232, 236
 ovulation, 234, 237
 oxygen cycles in food chain, water and, 169
 oxygen molecules, 357
 oxytocin, 208

• P •

paleontologists, 134
 pancreas, 208, 209, 211, 212
 pangenesis theory, 114
 parasitic symbiosis, 175
 parasympathetic nervous system, 203
 parthenogenesis, 232
 passive transport in cell membranes, 36–38
 Pavlov, 230
 pelagic zone in oceans, 164
 peptide bonds, 67
 peripheral nervous system (PNS), 201, 204
 peripheral vision, 205
 peristalsis, 211
 pernicious anemia, 215
 petals, flower, 194
 pH regulation in blood, 214
 pH scale, 60
 Phaeophyta phylum of Protists, 149
 phagocytosis. *See* endocytosis
 pharynx, 213
 phenotypes, 108–109
 phloem tubes, 185, 188
 phosphate groups, 72
 phospholipids, 41–42, 72–74, 359. *See also* lipids
 photic zone in oceans, 164
 photoperiodism, 191
 photoreceptors, 205
 photosynthesis. *See also* cells, recharging ATP
 energy
 versus ACR, 90
 Calvin cycle, 92–93
 chemistry of, 74–75, 90
 chlorophyll, 90–91
 defined, 90, 354
 green color and, 90
 leaf structure and, 187–188
 light-dependent reactions, 90–91
 light-independent reactions, 92–93
 overview, 166
 sample questions, 91–93
 phototropism, 191
 pituitary gland, 208–209
 placenta, 237
 placental subclass of mammals, 155
 plankton, 148
 Plantae kingdom, 143, 144, 151. *See also* plants;
 taxonomy
 plants
 nontracheophytes, 151, 183–184, 192
 overview, 183
 as primary producers, 166

- plants, tracheophyte
 - angiosperms, 151, 184, 187–192, 193–195
 - asexual reproduction, 192
 - cells, 186
 - circulatory system, 185, 188
 - cones, 151, 184, 193, 346
 - defined, 183, 184–185
 - dicots, 184, 187–195, 346
 - flowers, 193–195
 - fruits, 194–195
 - growth process, 190–192
 - gymnosperms, 151, 184, 193, 346
 - leaves, 187–188
 - monocots, 184, 187–195, 346
 - overview, 151
 - ovum/ova, 193
 - phloem tubes, 185, 188
 - pollen, 193
 - primary growth, 190–191
 - roots, 189
 - sample questions, 186, 189–192, 195
 - seed plants, 184, 187–195
 - seedless plants, 184, 192
 - sexual reproduction, 192–195
 - stems, 188
 - transpiration, 185, 188
 - tropisms, 191
 - xylem tubes, 185, 188
- plasma, 214
- platelets, 215
- Platyhelminthes phylum of Animalia, 152–153
- platypus, 155
- pleated sheets of proteins, 67
- PNS (peripheral nervous system), 201, 204
- point mutations, 102–103
- polar covalent bonds, 54–55
- politically correct answers, 22
- pollen, 124, 193
- pollinators, 193–194
- polymers, 66
- polysaccharides, 65, 358
- population interactions. *See also* ecology
 - co-evolution, 175
 - commensalistic symbiosis, 175
 - competition for niches, 173–174
 - mutualistic symbiosis, 170, 175, 211
 - overview, 173
 - parasitic symbiosis, 175
 - predator-prey interactions, 174–175
 - sample questions, 176
 - symbiosis, defined, 175
- populations. *See also* ecology
 - carrying capacities, 171–173
 - community of, 177
 - defined, 171, 177
 - exponential growth, 172
 - growth rate, 171
 - K-selected species, 172
 - r-selected species, 172–173
 - sample question, 176
- Porifera phylum of Animalia, 151, 152
- practice tests. *See* SAT II
- prebiotic, 133
- predator-prey interactions, 174–175
- pregnancy, 234, 236–237
- primary consumers/producers in food chain, 166
- primary growth of plants, 190–191
- primary structure of proteins, 67
- primates order of mammals, 155
- primordial soup, 132
- products of chemical reactions, 57
- progesterone, 237
- prokaryotes. *See also* bacteria; Monera kingdom
 - binary fission of, 47
 - defined, 40–41
 - sample question, 147
- prolactin, 209
- prophase in meiosis, 121, 122
- prophase in mitosis, 47–48
- protein synthesis. *See also* mutations
 - copying RNA, 98–99
 - DNA replication, 95–98, 354
 - mRNA, overview, 95
 - mRNA transcription, 99–100, 354
 - mRNA translation by tRNAs, 100–102, 354–355
 - mutations in, 102–105
 - overview, 95
 - rRNA in, 102
 - template strands in, 99
- proteins
 - amino acids, 66, 67–69
 - chemistry of, 66, 67–69
 - defined, 67, 358
 - in enzymes, 75–76
 - helix/helices of, 67–68
 - overview, 66
 - peptide bonds, 67
 - pleated sheets in, 67
 - primary structure of, 67
 - sample questions, 68–69, 77
 - secondary structure of, 67, 68
 - shape of, 76, 77
 - tertiary structure of, 67–68
 - variable bonds, 67, 68

Protists kingdom. *See also* taxonomy

- algae, 148–149
- Apicomplexa phylum, 148
- Chlorophyta phylum, 148
- Ciliophora phylum, 148
- defined, 147, 345–346
- Dinoflagellates phylum, 148
- Euglenophyta phylum, 148
- overview, 143, 144, 149
- Phaeophyta phylum, 149
- protozoans, 147–148
- Rhizipoda phylum, 148
- sample questions, 149–150
- slime molds, 149
- protons, 51–53
- protozoans, 147–148
- pseudopods, 148
- puberty problems, 222
- pulmonary circulation, 215, 216
- pumps in cells, 350
- Punnet squares, 111–113
- pupils of eyes, 204, 205
- pyruvate molecules, 83, 84

• Q •

quaternary consumers in food chain, 167

• R •

- r-selected species, 172–173
- random chances in genetics, 124–125
- reactants, 57
- reactions. *See* chemical reactions
- recessive alleles, 109
- red blood cells, 215
- reflexes, animal, 226–227
- regeneration, 232
- registering for SAT tests, 12–13
- relaxation techniques, 27–29
- renal system, 217–218
- replication, DNA, 95–98, 354
- reproduction. *See* asexual reproduction; protein synthesis; sexual reproduction
- Reptilia class of vertebrates, 154, 155
- RER (rough endoplasmic reticulum), 41, 43, 102 351
- respiration, aerobic. *See* ACR
- respiration, anaerobic, 88–89, 353
- respiratory systems, animal, 213–214
- resting potential, 198–199
- retina, 205

- Rhizipoda phylum of Protists, 148
- ribose, 69, 70
- ribosomes, 41, 43, 102
- rings, chromosomal, 121
- RNA (ribonucleic acid). *See also* DNA; nucleotides; protein synthesis
- defined, 69, 359
- nucleotides, 66, 69–70, 99–101
- overview, 66, 70
- rRNA (ribosomal RNA), 102
- sample question, 71
- rods in vision, 205
- roots of plants, 189

• S •

- saccharides, 64, 65, 358
- saltwater organisms, 37
- sarcomeres, 221
- SAT I tests, 23
- SAT II Biology E/M tests
- format of, 13–14
- managing answer sheets, 14
- question types, 14
- taking E or M, 11–12
- topics covered, 14–15
- SAT II Biology practice test 1
- answer sheet, 243
- E/M section answers, 271–272, 277–285
- E/M section questions, 245–259
- E section answers, 273, 285–288
- E section questions, 260–263
- instructions, 241
- M section answers, 274, 288–292
- M section questions, 264–270
- scoring, 275–276
- tips, 277
- SAT II Biology practice test 2
- answer sheet, 295
- E/M section answers, 320–321, 327–337
- E/M section questions, 297–309
- E section answers, 322, 337–339
- E section questions, 310–313
- instructions, 293
- M section answers, 323, 339–342
- M section questions, 314–319
- scoring, 324–326
- tips, 327
- SAT II test-taking strategies
- breathing, 28
- classification questions, 22, 24
- common sense, 21

- SAT II test-taking strategies (*continued*)
- crossing out wrong answers, 19–20
 - debatable words and, 21–22
 - guessing strategies, 19–21
 - hard questions, 26
 - managing time, 24–25, 27
 - marking answer grids, 26
 - mini massages, 28
 - most specific answers and, 22
 - overview, 19
 - using own watch, 13, 25
 - political correctness, 22
 - recognizing wrong answers, 21–24
 - relaxation techniques, 27–29
 - relying on what you know, 21
 - staying focused, 26
 - stretching, 28
 - things not to do, 25–27
 - thinking positively, 29
 - warnings, 22, 26, 28
- SAT II tests
- versus ACT tests, 23
 - canceling scores, 16
 - in college admission, 9–10
 - in college placement, 10–11
 - defined, 23
 - registering for, 12–13
 - reporting scores, 17
 - retaking, 17
 - versus SAT I tests, 23
 - scoring, 15–17
 - subject categories, 10
 - University of California and, 10
 - warning, 13
 - what to take to, 13
 - when to take, 12
 - which ones to take, 10
- saturated fats, 74
- savanna biome, 163
- Schwann cells, 199
- scoring SAT II tests
- canceling scores, 16
 - overview, 15–17
 - practice test 1, 275–276
 - practice test 2, 324–326
 - reporting scores, 17
- sea creature taxonomy, 151–152, 153–154, 155.
See also Animalia kingdom
- seasonal cycles of behavior, 228–229
- sebaceous glands, 218
- secondary consumers in food chain, 167
- secondary structure of proteins, 67, 68
- seed plants, 151, 184, 187–195. *See also* plants, tracheophyte
- seedless plants, 151, 184, 192
- sensory receptors, 226
- sensory systems. *See* animal sensory systems
- sepals, flower, 194
- SER (smooth endoplasmic reticulum), 41, 43, 351
- sex-linked traits, 115–117
- sexual reproduction. *See also* asexual reproduction; genetics; meiosis
- alternation of generations, 192
 - in animals, 232–236
 - bacteria/viruses and, 101
 - courtship, 229, 232–233
 - defined, 107–108
 - external fertilization, 154, 233
 - internal fertilization, 155, 233–234
 - mating, 233–234
 - offspring development, 233, 234, 236–238
 - in plants, 192–195
 - reproductive fitness, 137
 - sample questions, 235–236, 237–238
- silent mutations, 103
- simple diffusion, 37, 38
- sister chromatids, 48, 120
- skeletal muscles, 222
- skeletal systems
- cytoskeletons, 40, 42
 - endoskeletons, 219, 220
 - exoskeletons, 219, 220
 - hydrostatic skeletons, 219
- skin, animal, 218–219
- slime molds, 149
- small intestine, 211, 212
- smell, sense of, 206
- sodium channels, 198–200
- solutes, 36, 59
- solutions, 59
- solvents, 59
- somatic cells, 120
- somatic nervous systems, 202
- somatosensory system, 206
- sound waves, 205
- species. *See also* populations
- defined, 143
 - K-selected species, 172
 - r-selected species, 172–173
 - speciation, 139–140
- species classification. *See* taxonomy
- sperm, 232, 234
- spiders, 153
- spinal cord, 201
- sponges, 152

spores, 192
 stabilizing natural selection, 138
 stamens, flower, 194
 starch, 65, 66
 starfish, 152
 stems, plant, 188
 stigmas, flower, 194
 stomachs, animal, 211
 stomata, leaf, 188
 striations, muscle, 222
 styles, flower, 194
 subatomic particles, 51
 succession, ecological, 178
 sucrose, 64
 survival of the fittest, 137
 sweat glands, 218, 219
 symbiosis. *See also* population interactions
 commensalistic symbiosis, 175
 defined, 175
 mutualistic symbiosis, 170, 175, 211
 parasitic symbiosis, 175
 sympathetic nervous system, 202
 synapses, 198, 200–201
 synthesis, dehydration, 64–65, 67. *See also*
 photosynthesis; protein synthesis
 systemic circulation, 215, 216

● T ●

taiga biomes, 162
 taproots, 189
 taste, sense of, 206
 taxonomy. *See also* animals; plants
 Animalia kingdom, 151–157
 classification levels, 143, 144–145
 defined, 143
 Fungi kingdom, 149, 150–151, 346
 kingdoms, overview, 143, 144
 Monera kingdom, 145–147
 Plantae kingdom, 151
 Protists kingdom, 147–150
 viruses and, 158–159
 telophase in meiosis, 121, 122, 123
 telophase in mitosis, 48–49
 temperate deciduous forest biome, 162
 tendons, muscle, 222
 tertiary consumers in food chain, 167
 tertiary structure of proteins, 67–68
 test cross, 112–113
 testes, 208, 210, 232
 testosterone, 210, 237
 tests. *See* SAT

thalamus, 201–202
 thalamus, hypo, 201–202, 208, 214
 thermic, 75
 Thermoacidophiles, 146
 threshold potential, 199
 thumb traits, 125
 thylakoids, 44
 thymine, 69–70
 thyroid gland, 208, 209
 thyroid hormone, 209
 thyroid problems, 222
 thyroid stimulating hormone, 208
 toe trait, long second, 125
 tongue trait, curled, 125
 touch, sense of, 206
 trachea, 213
 traits. *See* genetic traits
 trans fats, 74
 transcription, mRNA, 99–100, 354
 translation, mRNA, 100–102, 354–355
 translocation, chromosomal, 121
 transpiration, 169, 185, 188
 trial and error behavior, 230
 triglycerides, 71–72, 74
 tRNAs (transfer RNAs), 100–102
 trophic levels/food chain. *See also* ecology;
 nutrient cycles
 biological magnification in, 168
 decomposers, 167
 defined, 166
 nutrient cycles, 168–171
 omnivores, 167
 primary consumers, 166
 primary producers, 166
 quaternary consumers, 167
 sample questions, 167–168
 secondary consumers, 167
 tertiary consumers, 167
 tropical rainforest biome, 162
 tropisms, 191
 tundra biome, 163
 tympanic membrane, 205

● U ●

University of California, 10
 unsaturated fats, 74
 uracil, 69–70
 urine, 217–218
 uterus, 236, 237

• U •

vacuoles in cells, 41, 44
vagina, 236, 237
van Leeuwenhoek, Antoine, 33, 34
variable chemical bonds, 67, 68
vascular plants. *See* plants, tracheophyte
vasoconstriction, 202, 215
vasodilation, 202, 212, 215
veins, 215
ventricles, 216
vermiform appendix, 211, 212
Vertebrata subphylum of Animalia, 154–155
vesicles, 39, 44
vestibular sensory system, 205
vestigial structures in anatomy, 134, 212
viruses, 101, 158–159
visual system, 204–205
voltage/electrical potential, 198
voltage gated channels, 199
“Vulcan hands” trait, 125

• W •

warm-blooded animals, 155
watches, using own, 13, 25
water
 cell production of, 86
 dehydration, 64
 freshwater biome, 163
 ocean biomes, 164
 and oxygen cycles in food chain, 169
 as solvent, 59

water creature taxonomy, 151–152, 153–154, 155.

See also Animalia kingdom

water molecules

 chemistry of, 58–59

 defined, 53–54, 357

 hydrophilic molecules, 41, 42, 59

 hydrophobic molecules, 41, 42, 59

white blood cells, 215

worms, phyla of, 152–153

• X •

xylem tubes, 185, 188

• Z •

zygotes

 in animal reproduction, 233, 234, 236–238

 in meiosis, 120, 123

 in plant reproduction, 193

