

Index

Boldface numbers correspond to boldface text terms; *act* is an activity; *inv* is an investigation and *MP* is a model problem

- Absorption spectrum, 377, 380
AC motors, 317
Acid corrosion, 204
Acid precipitation, **204**, 205, 223, 237
controlling, 207
Acid-base indicators, Science log, 231
Acid-base neutralization, **207**
Acidic, **197**
Acids, **197**
pH, *201–203inv*
properties of, 198
Acorn, John, 80–81
Action/reaction principle, 399
Acute toxicity, **217**
Adaptations
environment, 16
species, 23
Adaptive optics, **386**
Adenine, 47
African violet, 28
Agency for Toxic Substances and Disease Registry, 246
Agriculture
age of, 61
artificial selection, 60
organic, *194–195inv*
pesticides, *193act*
selective breeding, 60
Airborne pollutants, 237
Aldrin, Edwin, 410, 421
Algae, reproduction, 27
Alkali metals, 121
Alkaline earth metals, 121
Alternating current (AC), 313
Altitude, **359**
Altitude-azimuth coordinates, **359**, *360–362inv*
Altman, Sidney, 92
Aluminum, 110, 120, 122
Aluminum hydroxide, 197
American Wire Gauge, 291
Ammeter, **274**
Ammonium nitrate, 150
Amoeba, reproduction, 27
Ampere, Andre-Marie, 310
Amperes, **274**
Anaphase, 51
Angiosperms and Science log, 32
Anik, 406
- Animals, sexual reproduction, 33, 35
Anode, 310
Antacid, 208
Antarctic springtail, 23
Antibiotic resistance, 32
Antibiotics, 7
Apollo Program, 421
Apollo spacecraft, 423
Aquaculture, **54**
Aquatic systems and pollution, 230
Aquifers, **241**
Archaeabacteria, 23
Arcminutes, 389
Arcseconds, 389
Arctic hare, 19
Argentum, 117
Argon, 124
Aristotle, 363, 364, 372
Armstrong, Neil, 410, 421
Arsenic, toxicity, 217
Artificial satellites, 403
Artificial selection, **58**
agriculture, 60
Asexual reproduction, **26**
budding, 30
duckweed, *28act*
plants, 28, 34
Science log, 28
variation, 52
Astatine, 39
Asteroids, 419
Astrolabe, **359**, *360–362inv*
Astrology, 357
Astronauts, 400, 423
space travel, *427inv*
Astronomical units, **389**
Astronomy, 357
spectroscopy, 380
Atom, 113
Atomic mass, **126**, 128
Atomic nucleus, **113**
Atomic structure, *114act*
Atomic theory, 111
Aurora Australis, 409
Aurora Borealis, 409
Aurum, 117
Avogadro, Amedeo, 139
Azimuth, **359**
- B-complex vitamins, 181
Bacillus thuringiensis, 195
Bacon, Sir Francis, 106
Bacteria, 23
soil, *22inv*
Bacterial conjunction, **32**
- Baking soda, 150
Ballard Power Systems, 307
Ballistic missile, **399**
Baltimore Oriole, 10
Banting, Frederick, 92
Bar-Cohen, Joseph, 295
Barium, 110, 121, 122
toxicity, 217
Barton, Betsy, 397
Bases, **197**
pH, *201–203inv*
properties of, 198
Basic, **197**
Battery, 110, **273**, *305act*
building, *306inv*
voltaic pile, *300act*
Bee probes, 224
Beefalo, 60
Behavioural adaptations, **12**
Beryllium, 121
Big Dipper, 358
Billiard ball, 113
Binary code, **322**
Binary compound, 138
molecular, 138
Binary fission, **27**, 52
Bioaccumulates, **188**
Biodegradable, **242**
Biodiversity, 2, 6, 7, 61–64
Galapagos Islands, *63inv*
genetic, 73
genetic engineering, 54
human impact, 67
niches, 20
plants, 75
preservation of, 73, 76, *77act*
Science log, 70, 75
zoos, role of, 73
Bioethics and clones, *29inv*
Bioindicator species, **69**
Biological diversity, **6**, 7, 13
Galapagos Islands, 62
Science log, 36
Biological indicators and water quality, **230**, *232–233inv*
Biological magnification, **190**
Biomagnification, **190**
Biomass, 332
Bioreactors, **252**
Bioremediation, **252**
Biotechnologies, **53**
Biotechnology and medicine, 53
Bird watching, *19act*
- Black Brant, 400
Black hole, 396
Blood type, 38
Bobcat, 10
Bohr, Niels, 113
Bondar, Roberta, 424
Botulism, 218
Boyle, Robert, 106
Brahe, Tycho, 371, 374
Branch circuit, **320**
Breeding, **58**, *59act*
potential, assessing, *74inv*
Bright line spectrum, 377
Broad niche, **19–20**
Brockhouse, Bertram, 92, 128
Bromine, 125, 148
Budding, **30**
Bunsen, Robert, 376, 377, 379, 380
- Cadmium, toxicity, 217
Calcium, 110, 121, 122
concentration in Earth's crust, 182
concentration in humans, 182
concentration in plants, 182
role in human body, 180
Calcium chloride, 150
Callisto, 418
Canada Arm, 425
Canada Food Guide, 180, 181
Canada Hand, 425
Canadarm, 352, 425, 432–433
Canadarm 2, 428
Canadian Space Agency, 424
Canadian Standards Association, 326
Cancer, *43act*
CANDU reactor, 338
Carbohydrates, **178**
nutrition, 179
Carbon, 117, 138
concentration in Earth's crust, 182
concentration in humans, 182
concentration in plants, 182
role in human body, 180

- Carbon dioxide, 162
 dissolved, 229*inv*
 Carbon monoxide, 162
 Careers
 astronomer, 397
 chemists, 109
 electrician, 321
 environmental chemist, 243
 genetics, in, 45
 internship at SPAR
 Aerospace, 428
 interpretive naturalist, 15
 medical clinician, 344–345
 pharmacist, 154
 toxic substances officer, 205
 Caribou, 19, 20
 Carson, Rachel, 190, 220
 Cat, 10
 Catalyst, 155, 209
 Catalytic convertors, 209
 Cathode, 310
 Caustic, 93
 Celestial bodies, 357
 Celestial sphere, 363
 Cells, 273, 301, 305*act*
 Centaurus A, 395
 Cesium, 121
 CFCs, 238
 Chadwick, James, 113
 Challenger, 424
 Characteristics, 38*act*
 Charge coupled devices (CCDs), 402
 Chemical bonds, 149
 energy, 149
 Chemical changes, 88, 99, 100–101*inv*
 mass, 108–109*inv*
 Chemical concentration, 216
 Chemical family, 120*act*
 Chemical formula, 136
 formulas, 139*inv*
 Chemical properties, 103
 combustibility, 104
 reactivity, 104
 stability, 104
 toxicity, 104
 Chemical reaction, 146, 147*act*, 148
 catalyst, 155, 156–157*inv*
 inhibitor, 155
 reaction rate, 153, 154*act*
 Chemical solitaire, 127*act*
 Chemistry, 92
 Chernobyl, 43
 Chlordane, 218
 Chlorine, 125
 concentration in Earth's crust, 182
 concentration in humans, 182
 concentration in plants, 182
 role in human body, 180
 Chlorofluorocarbons, 238
 Chlorophyll, 125, 150
 Chong, Su Ling, 344–345
 Chromium
 role in human body, 180
 toxicity, 217
 Chromosomes, 46, 49
 dance of, 49
 mitosis, 50
 Chronic toxicity, 217
 Circuit, 272
 Circuit breaker, 319
 Circuit components in science log, 273
 Circuit diagrams, 273
 Circuit elements, 273
 Classification of element, 116, 118
 Clones, 28
 bioethics, 29*inv*
 Clostridium botulinum, 218
 Cobalt, role in human body, 180
 COBRA (copper oxide bed regenerable application), 210, 211
 Cogeneration systems, 339
 Coinage metals, 120
 Collins, Michael, 421
 Colloids, 97
 Colour blindness, 45
 Columbia (space shuttle), 424
 Combustion, 159, 163*act*
 products of, 160–161*inv*, 162
 Comet Halley, 392
 Commutator, 314
 Compass, 359, 360–362*inv*
 Competition, 17
 Compounds, 106, 111
 binary, 138
 chemical, 136
 formulas for, 136
 ionic, 136
 molecular, 136
 multimedia models, 144*act*
 Comte, Auguste, 383
 Concentration, 216
 Conductivity, 120, 140
 metals, 118
 Conductors, 269
 Constellations, 357
 Continuous spectrum, 377, 380
 Continuous variation, 37
 Convention on Biodiversity, 76
 Convention on International Trade of Endangered Species, 76
 Copernicus, Nicholas, 364, 367, 371
 Copper, 117, 120, 122
 role in human body, 180
 Corrosion, 93, 158, 168–169
 acid, 204
 preventing, 159
 role of gas, 158*act*
 Cosmonauts, 400, 423
 Cotyledons, 33
 Cougar, 10, 17
 Crick, Francis, 48
 Cross-pollination, 33
 Crustaceans, 231
 CSA, 425
 Cuprum, 117
 Curie, Jacques, 295
 Curie, Marie, 116
 Curie, Pierre, 116, 295
 Curium, 116
 Current and voltage, 276–277*inv*
 Cyclamen mites, 217
 Cytosine, 47
 Dalton, John, 111, 112, 126, 139
 Dark line spectrum, 377
 Darwin, Charles, 11, 62–64
 David Dunlap Observatory, 392
 Davy, Humphrey, 310
 DC motors, 15
 DDT, 213
 invention of, 188
 substitutes for, 192
 DDT in food chain, 189–190*inv*
 de Broglie, Louis, 113
 Defibrillator, 330
 Deoxyribonucleic acid
 See DNA
 Diatomic molecules, 137
 Dieldrin, 188, 218
 Diffraction gratings, 378
 Digital, 322
 Dinosaurs, 66
 Dioxin, 218
 Direct current (DC), 314
 Discharge, 270
 Discovery, 424
 Discrete variation, 38
 Displacement reaction, 122
 Disposable diapers, 249
 Dissolution, 152*act*
 Dittmer, Howard, 182
 Diversity, 7
 Diversity index, 13
 using, 14*inv*
 DNA, 43, 46, 166
 modelling, 48*inv*
 molecule of, 47
 structure of, 47
 DNA fingerprint, 56
 Dolly, 29
 Domestic, 58
 Dominance of trait, 40
 Dominant, 40
 inheritance, 41*inv*
 Doppler effect, 382, 383
 Dose, 214
 Dosimeter, 267
 Dry cells, 301
 Duck-billed platypus, 36
 Ductility
 metals, 118
 Science log, 104
 Dynamo, 314
 Earth, 356, 363, 410
 density, 413
 diameter, 373, 413
 distance from Sun, 373, 413
 mass, 413
 orbital period, 413
 rotation period, 413
 surface temperature, 413
 Earth-centred, 363
 Eastern Slopes Grizzly Bear Project, 76
 Echinda, 36
 Ecology
 pH, 209
 population, 71*inv*
 Ecosystems, 12, 21*act*, 187
 human impact on, 69
 pesticides, 190
 rain forest, 69
 Science log, 69, 72, 73
 spacecraft, 416*inv*
 Efficiency and electric energy, 328, 329*MP*
 Einstein, Albert, 116
 Einsteinium, 116
 Electric charge, 266
 conductor, 269
 insulator, 269
 negative, 268
 positive, 268

- producing, 267
 rules for, 266*act*
 semiconductor, 269
 superconductor, 269
 unbalanced, 268
Electric circuits
 parallel, 286,
 287–288*inv*
 resistance, 290*inv*
 Science log, 273
 series, 286, 287–288*inv*
 types of, 286
Electric current
 resistance, 279,
 284–285*inv*
 voltage, 276–277*inv*,
 284–285*inv*
Electric energy
 conversion, 293*act*
 cost, 325*MP*
 efficiency, 328, 329*MP*
 paying for, 324
Electric generator, 309
 current generating
 tube, 309*act*
Electric motor, 315, 316*inv*
Electrical charge and light, 272*act*
Electrical code, 320
Electrical conductivity in Science log, 269
Electricity, 262
 alternate sources of, 342*act*
 efficiency from coal plants, 334–335*inv*
 environment, 332
 from flowing rivers, 337
 from nuclear reactors, 338
 production, 333*act*
Electricity-generating solar array, 297
Electrochemical cell, 300, 301
Electrode, 301, 310
Electrogenic, 299
Electrolysis, 110, 164
Electrolyte, 301
Electromagnet, 310, 311*inv*
Electromagnetic radiation, 393
Electronic devices, 272
Electrons, 113
 Science log, 268
Electrophoresis, 164
Electroreceptive, 299
Electroscope, 267
Electrostatics, 271*act*
Element symbols, 116, 117*act*
Elements, 106, 110*act*, 111
 atomic mass, 127
 classification, 116, 118
 formulas, 139*inv*
 group, 130*inv*
 identification of, 134*act*
 multimedia models, 144*act*
 period, 131*inv*
 symbols, 116
Elk, 21
Ellipse, 371
 drawing, 371*act*
Embryo, 33
Emission spectrum, 377, 380
Emissions, controlling, 209
Emulsifying agent, 97, 98*act*
Emulsion, 97
Endothermic, 150, 152*act*
EnerGuide, 326
Energy, 293
 chemical bonds, 149
 resistance, 280*act*
Environment, 16, 222
 adaptations, 16
 electricity, 332
 fertilizers, 186
 hazardous wastes, 242
 monitoring, 223
 thermal pollution, 339
Environmental chemist, 254
Enviropig, 53
 Science log, 53
Enzymes, 155, 179
Epicycles, 364, 371
Eros, 419
Europa, 418
European Space Agency, 425, 426
Events, predicting, 372*act*
Evolution and Science log, 64
Exhaust velocity, 399
Exothermic, 152*act*, 159, 162
Exothermic reaction, 149
Experiments, 112
Extinction, 66
 human activity, 72
 species, 66, 68*inv*
Extirpation, 68
Eyepiece, 366
Farad, 310
Faraday, Michael, 310, 312
Fast, Hans, 239
Fauna, 8
Fedoruk, Dr. Sylvia, 114
Feral horses, 71*inv*
Feral parakeets, 24
Ferrum, 117
Fertile crescent, 61
Fertilization, 33, 35
Fertilizers, 185
 environment, 186
 nitrogen, 185*act*
 phosphorus, 185
 potassium, 185
 seeds, 183–184*inv*
Finches, 64
 Galapagos Islands, 11*inv*
Fingerprints, 39*act*
Firmament of fixed stars, 363
Flagella, 27
Flare gas, 332
Flora, 8
Fluorescent bulbs, 328
Fluoridation and science log, 179
Fluorine, 124, 125, 128
 role in human body, 180
Food chain and DDT, 189–190*inv*
Forensic technician, 166
Forster-Clegg, Lori, 205
Fossil fuels, 211, 336
4 Rs, 234, 247
Frames of reference, 356
 Science log, 356
 stars as a, 363
Francium, 121
Franklin, Benjamin, 268
Fresh water supply, 213
Fuel cells, 307
Fuller, Merle, 166
Fungi, 21
 reproduction, 27
Fungicides, 187
Fuse, 319
Gagarin, Yuri, 420
Galapagos Islands
 biodiversity, 63*inv*
 biological diversity, 62
 finches, 11*inv*
Galilei, Galileo, 364, 366, 367, 371, 374, 376, 409, 410, 418, 420
Eyepiece, 366
Gall bladders, 76
Gallium, 127
Galvani, Luigi, 274, 300
Galvanometer, 274
Gametes, 35
 meiosis, 51
 variations, 51
Gamma rays, 393
Ganymede, 418
Garneau, Marc, 424
Gaseous planets, 410
Gastropods, 36, 231
Geckos, 12
Gene, 49
Gene gun, 54
Generalists, 20, 21*act*
Generator, 313
Generators, 309
Genetic code, 49
Genetic engineering, 53, 54
 biodiversity, 54
 crops, of, 54
 fish, of, 54
 foods, 55*inv*
 Science log, 56
Genetic material, 46
Genetic modification, 53
Genetic trait, 38
Genetics, 26, 37, 38*act*, 39*act*
 biodiversity, 73
Geocentric, 363
Geosynchronous orbit, 404, 406
Geosynchronous satellites, 404
Geothermal energy, 341
Germanium, 127
Ginkgo, 32
Glenn, John, 421
Global positioning system (GPS), 69, 407
 triangulation, 407
Global treaties, 76
Global village, 404
Globular clusters, 392
Goddard, Robert, 399
Goitre, 178
Gold, 117, 120, 122
Goulet, Ginette, 154
Gravitational assist, 402
Gravity, 372
 escaping Earth's, 420
 zero, 425
Green Energy, 340
Green parrots, 24
Green product, 242
Greenhouse gas, 336
Grizzlies, 68, 76

- Ground fault circuit interrupter, 330
 Ground water, **241**
 water pollution, 241
 Ground wire, **320**
 Grounding, **270**
 Grounding strap, 270
 Growth hormone genes, 54
 Guanine, 47
 Gymnosperms and science log, 32
- Habitat, 16
 Hadfield, Chris, 424
 Hale reflecting telescope, 385
 Halley, Sir Edmund, 374
 Halogen bulbs, 328
 Halogens, 124
 Hawks, 17
 Hazardous wastes, 242, **244**, 250
 household, 245–246*inv*
- Health care system and Science log, 179
 Heartburn, 208
 Heat, 294
 Heavy metals, 205, 217
 Heliocentric, **364**
 Helium, 124
 colour, 103
 combustibility, 103
 density, 103
 Henry, Joseph, 312
 Herbicides, 187
 Heredity, 37
 Heritable, **26**
 Hermaphrodites, 36
 Herschel, Sir William, 385
 Herzberg, Gerhard, 92
 Heterogeneous, **96**
 Hipparcos satellite, 389
 Hogg, Dr. Frank S., 392
 Holograms, 378
 Holographic, 378
 Home electric safety, 330
 Home wiring, 320, *321act*
 Homogeneous, **96**
 Hot wire, **320**
 House wiring, 289
 Hubble space telescope, 352
 Hubble telescope, 403
 Hubble, Edwin, 403
 Hubel, David, 92
 Human genome, 49
- Huygens, Christian, 369, 387
 Hydragrum, 117
 Hydro-electric plants, **337**
 Hydrogen, 107, 110, 117, 122, 136
 colour, 103
 combustibility, 103
 concentration in Earth's crust, 182
 concentration in humans, 182
 concentration in plants, 182
 role in human body, 180
- Hydrogen peroxide, 107, *151inv*, 152
 Hydrophilic, 97
 Hydrophobic, 97
 Hyphae, 31
- Incandescent bulbs, 328
 Indicator, **198**
 Influenza, 13
 Infrared waves, 393
 Inheritance, 37–38, *41inv*, 42
 dominant, *41inv*
 human, *44inv*
 organisms, 26
 Science log, 26
- Inhibitor, **155**
 Inner planets, **410**
 Inorganic wastes, 250
 Insecticides, **187**
 Insects, 231
 Insulators, **269**
 Insulin, 53
 Interferometry, **396**
 Internal combustion, 159
 Internal fertilization, 35
 International Space Station, 297, 425, 426, 432–433
 International Union of Pure and Applied Chemistry (IUPAC), 138
- Introduced species, *21act*
 Invisible ink, 166
 Io, 418
 Iodine, 125
 role in human body, 180
- Ion, **140**, 310
 Ionic compounds, **136**, 140
 conductivity, *142–143inv*
 formulas for, *141act*
- naming, 141
 properties, *142–143inv*
 solubility, *142–143inv*
- Ionization, 270
 Iron, 110, 117, 118, 120, 122
 concentration in Earth's crust, 182
 concentration in humans, 182
 concentration in plants, 182
 role in human body, 180
- Iron oxide, 158, 168
 Irwin, James, 180
- Jansky, Karl, 394
 Joules and science log, 323
- Jupiter, 357, 358, 363, 367, 410
 density, 414
 diameter, 373, 414
 distance from Sun, 373, 414
 mass, 414
 orbital period, 414
 rotation period, 414
 surface temperature, 414
- Keck telescopes, 385
 Kepler, Johannes, 371, 372, 373
 Kermode bear, 40
 Kinetic energy, 293
 Kirchoff, Gustav, 376, 377, 379, 380
 Korolev, Sergei, 400
 Krypton, 124
 Kuiper, Gerald, 385
- Lagoon nebula, 352
 Landfill construction and design, 249
 Landfill gas, 336
 LANDSAT, 405
 Latitude, 356, 366
 Lavoisier, Anne-Marie, 107
 Lavoisier, Antoine, 106, 107, 111
 Law of conservation of mass, 107, 148
 Law of definite composition, **107**, 136
- Laws, 112
 Laws of Charges, **268**
 Leachate, **249**
 Leached, 205
- Lead, 117, 122
 toxicity, 217
 Legumes and symbiosis, *22inv*
 Lemmings, 24
 Lethal dose 50, **218**, 220
 Levi, Primo, 131
 Lichens, 231
 Life, **171**
 Life support compatibility, 423
 Lifestyle, 16
 Light pollution, *386act*
 Light waves, 378
 Light-emitting diodes (LEDs), 297
 Light-year, **389**
 Lightning, 266
 Limestone, 141
 Limeys, 180
 Liming, **207**
 Linnaeus, Carl, 7
 Lipids, **178**
 nutrition, 179
 Lippershey, Hans, 366
 Lithium, 121, 122, 127
 Litmus, **198**
 Loads, **273**
 Lodgepole pine, 13
 Longitude, 356
 Lovell radio telescope, 395
 Low Earth orbit, **404**
 Lustre of metals, 118
 Lye, 141
 Lynx, 10, 17
- MacKay, Mike, 424
 MacLean, Steve, 424
 Macroinvertebrates, **231**
 water quality, *232–233inv*
- Macrominerals, **179**
 Madagascar, 12
 Magnesium, 110, 121, 122, 148
 concentration in Earth's crust, 182
 concentration in humans, 182
 concentration in plants, 182
 role in human body, 180
- Magnetic domains, 310
 Magnetic resonance imaging, 312
 Malaria, 188, 192
 Malleability, 120
 metals, 118
 Science log, 104

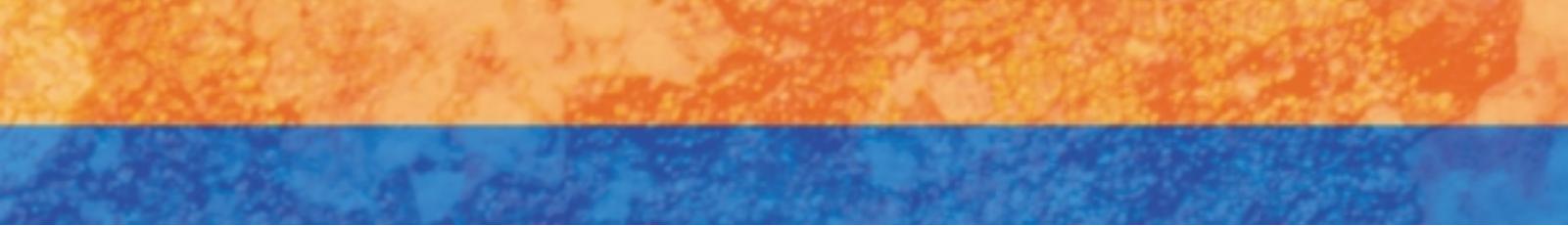
- Mammals, sexual reproduction, 35
- Manganese concentration in Earth's crust, 182
- concentration in humans, 182
- concentration in plants, 182
- role in human body, 180
- Maples, 32
- Marcus, Rudolph, 92
- Mars, 357, 363, 410 colonization of, 417*inv*
- density, 413
- diameter, 373, 413
- distance from Sun, 373, 413
- mass, 413
- orbital period, 413
- rotation period, 413
- surface temperature, 413
- Mass, 107
- chemical change, 108–109*inv*
- law of conservation of, 107
- Mass number, 128
- Matter, 88
- changes in, 99, 102*act*
- classification, 95–96*act*
- mixtures, 97
- particle model of, 95
- Mechanical energy, 293, 309
- Mechanical mixtures, 97
- Medicine and biotechnology, 53
- Meiosis, 51
- Melanoma, 43*act*
- Mendeleev, Dmitri Ivanovich, 126, 127, 128
- Mercury, 117, 122, 357, 410
- density, 412
- diameter, 373, 412
- distance from Sun, 373, 412
- mass, 412
- orbital period, 412
- rotation period, 412
- surface temperature, 412
- toxicity, 217
- Meristem, 28
- Metalloids, 118
- Metals, 118
- activity, 122–123*inv*
- conductivity, 118
- ductility, 118
- identifying, 119*act*
- lustre, 118
- malleability, 118
- reactivity, 122–123*inv*
- Metaphase II, 51
- Methane, 336
- Methicillin, 65
- Mexican whiptail lizard, 30
- Microgravity, 423, 425
- Micrometeorites, 426
- Miescher, Johann, 46
- Milky Way, 383, 392, 394
- Milliammeter, 274
- Mir, 426
- Miscibility, 97
- Mitosis, 50
- Mixtures
- colloids, 97
 - emulsions, 97
 - heterogeneous, 96, 97
 - homogeneous, 96, 97
 - matter, 97
 - mechanical, 97
 - solutions, 97
 - suspension, 97
- Moehrenschlager, Axel, 74
- Molecular compounds, 136, 137
- conductivity, 142–143*inv*
 - formulas, 139*inv*
 - properties, 142–143*inv*
 - solubility, 142–143*inv*
- Molecular elements and formulas, 139*inv*
- Molecules, 137, 139
- attraction, 137
 - bonding, 137
- Molluscs, 231
- Molybdenum, role in human body, 180
- Money, Ken, 424
- Moon, 357, 363, 410
- diameter, 373
 - distance from Earth, 373
- Morrison, Warren, 296
- Motors, 309, 315, 316*inv*
- Mould, making, 31*inv*
- Mountain pine beetle, 13
- MRI, 312
- Muller, Paul Hermann, 188
- Multimeter, 281
- Mummification, 105
- Musgrave, Story, 352
- Mushrooms, Science log, 27
- Mutagens, 43
- Mutations, 43
- Mutualism, 21
- Mycorrhizae, 21, 23
- Myths, 358
- Narrow niches, 20
- NASA, 352, 425
- National Parks, burning of, 82–83
- Natural selection, 64
- Science log, 67
- Nature versus nurture, 42
- NAVSTAR, 407
- Neem, 195
- Neon, 124
- Neptune, 410, 418
- density, 415
 - diameter, 373, 415
 - distance from Sun, 373, 415
 - mass, 415
 - orbital period, 415
 - rotation period, 415
 - surface temperature, 415
- Neutral wire, 320
- Neutralization, 208*inv*
- Neutralized, 270
- Neutron spectrometer, 128
- Neutrons, 113
- New Technology telescope, 386
- Newton, Sir Isaac, 370, 372, 373, 374, 376, 387, 399
- Niches, 16
- biodiversity, 20
 - broad, 19
 - generalists, 21*act*
 - narrow, 20
 - science log, 16
 - specialized, 20
 - species, 17
- Nickel, 122
- Nicotine, 218
- Nitrates in water supply, 225–227*inv*
- Nitrogen, 117
- concentration in Earth's crust, 182
- concentration in humans, 182
- concentration in plants, 182
- dissolved, 228–229*inv*
- role in human body, 180
- Ozone depletion, 238, 239
- stratospheric, 238

- Pacific yew tree, 7
 Pandemic, 13
 Parallax, 383, 389
 Parallel, 286, 287–288*inv*
 Science log, 289
 Parathion, 217
 Parke's radio telescope, 395
 Particle accelerator, 135
 Particle model of
 matter, 95
 Passenger pigeon, 72
 Patents, 53
 Payette, Julie, 424
 Payload, 399
 PCBs, 237, 339
 Peppered moth, 65
 Period, 131
 element, 131*inv*
 Periodic table, 126–135
 modern, 129–131*inv*
 Persistent, 223
 Pesticides, 187, 221
 agriculture, 193*act*
 ecosystem, 190
 potential of, 196
 resistance, 192
 pH
 acids, 201–203*inv*
 bases, 201–203*inv*
 ecology, 209
 growth of yeast culture,
 206*inv*
 rain, 200*act*
 soils, 203*inv*
 pH paper, 199
 pH scale, 199
 Phosphates in water
 supply, 225–227*inv*
 Phosphoric acid, 197
 Phosphorus
 concentration in
 Earth's crust, 182
 concentration in
 humans, 182
 concentration in
 plants, 182
 fertilizers, 185
 role in human
 body, 180
 Photosynthesis, 150
 Photovoltaic cell, 297
 electricity production,
 298*act*
 Physical changes, 99,
 100–101*inv*
 Physical properties, 103
 boiling temperature,
 104
 colour, 104
 crystal shape, 104
 density, 104
 ductility, 104
 electrical conductivity,
 104
 heat conductivity, 104
 malleability, 104
 melting temperature,
 104
 smell, 104
 solubility, 104
 state, 104
 taste, 104
 texture, 104
 viscosity, 104
 Piezoelectric effect, 295,
 296*act*
 Pioneer 10, 418
 Pioneer 11, 418
 Pistol, 33
 Pitcher plant, 12
 Planets, 357, 410
 profiles of, 411*act*
 Plants
 asexual reproduction,
 28, 34
 biodiversity, 75
 reproduction, 28
 sexual reproduction,
 32, 33, 34
 Pleiades, 358*act*
 Plum pudding, 113
 Plumbum, 117
 Pluto, 418
 density, 415
 diameter, 373, 415
 distance from sun, 373
 distance from Sun, 415
 mass, 415
 orbital period, 415
 rotation period, 415
 surface temperature,
 415
 Point sources, 234
 Poison, 194, 218
 Polanyi, John, 92
 Polar bears, 19, 20
 Pole Star, 366
 Pollen tube, 33
 Pollination and
 Science log, 33
 Pollutants, 213
 non-persistent, 223
 persistent, 223
 point versus non-point
 sources, 234
 Pollution, 162, 213, 217
 acid precipitation, 205
 aquatic systems, 230
 beginning, 214–215*inv*
 not-in-my-backyard,
 236
 Science log 231
 Polychlorinated biphenyls,
 237, 339
 Polydactyly, 40
 Poplar tree, 16
 Population
 ecology, 71*inv*
 explosion, 70
 human, 70*act*
 Science log, 70
 Portmanteau word, 6
 Potassium, 110, 121,
 122, 127
 concentration in
 Earth's crust, 182
 concentration in
 humans, 182
 concentration in
 plants, 182
 fertilizers, 185
 role in human
 body, 180
 Potassium iodide, 216
 Potential difference, 275
 science log, 275
 Power, 198, 323, 327*inv*
 cost, 325*MP*
 current, 323*MP*
 rating, 326
 science log, 323
 Priestly, Frances, 392
 Priestly, Joseph, 111
 Primary cell, 301
 Products, 146
 Project Gemini, 421
 Project Mercury, 421
 Propane, 162
 Prophase II, 51
 Protected areas, 77
 Proteins, 178
 nutrition, 179
 Proton, 113, 128
 Proton exchange mem-
 brane fuel cells, 307
 Proxima Centauri, 389
 Ptolemy, 364, 367, 371
 Pyrethrum, 195
 Quarks, 114
 Ra, 358
 Radar, 394
 Radar gun, 382
 RADARSAT, 405
 Radio astronomy, 393, 395
 Radio objects, 394
 Radio telescopes, 394, 395
 baseline, 396
 resolving power, 394
 Radio waves, 393, 395
 Radioactivity, 116
 Radium, 116, 121
 Radon, 124
 Rain, pH, 200*act*
 Rain forest and eco-
 systems, 69
 Raisin bun, 113
 Reactants, 146
 Reaction rate, 153, 154*act*
 catalyst, 155,
 156–157*inv*
 inhibitor, 155
 Reaction time, 156–157*inv*
 Reber, Grote, 394
 Recessive, 40
 Red shifted, 383
 Reduce, Reuse, Recycle,
 Recover, 234
 Reflecting, 370
 Refracting, 370
 Remote manipulator
 technology, 432–433
 Remote manipulators,
 365
 Remote sensing, 405
 Renewable energy
 source, 332
 Reproduction
 algae, 27
 amoeba, 27
 fungi, 27
 plants, 28
 Reproductive strategies, 26
 Reptiles, sexual
 reproduction, 35
 Resistance, 279
 calculating, 281, 282*MP*
 electric current,
 284–285*inv*
 energy, 280*act*
 Science log, 281
 voltage, 284–285*inv*
 Resistors, 273, 283
 variable, 283
 Resolving power, 370
 radio telescopes, 394
 Retrograde motion, 363
 Rheostats, 283
 Rhizobia, 22*inv*
 Rhizopus, 30, 31
 Risk
 evaluation of, 220
 toxic chemicals, 219
 Rocket, 399
 using gravity, 402
 water, 401*inv*

- Rotenone, 195
 Rotor, **317**
 RSA, 425
 Rubidium, 121
 Rufous hummingbird, 12
 Rumen, 21
Rust, 158
 Rutherford, Ernest, 113

Safety, 92, *93act*, *94act*
 home electric, 330
 outdoor electric, 331
Saint-Fort, Roger, 243
Salt, 141
Salyut, 426
Sanitary landfill, **249**
 model, *251act*
Sao la, 66
Satellites, 352
 artificial, 403
 communication, 404
 geosynchronous, 404
 images, *408act*
 interpreting photographs, *406act*
 radio, 404
 remote sensing, 405
 television, 404
Saturn, 357, 363, 385, 410, 418
 density, 414
 diameter, 373, 414
 distance from sun, 373
 distance from Sun, 414
 mass, 414
 orbital period, 414
 rings of, 369
 rotation period, 414
 surface temperature, 414
Sawyer Hogg, Helen, 392
Sawyer, Helen, 392
Scheele, Karl Wilhelm, 111
Schindler, David, 204
Schrodinger, Erwin, 113
Science log
 acid-base indicators, 231
 alien species, 7
 angiosperms, 32
 asexual reproduction, 28
 biodiversity, 70, 75
 biological diversity, 36
 circuit components, 273
 diversity of life, 7
 ductility, 104
 ecosystems, 69, 72, 73
 electric circuits, 273
 electrical conductivity, 269
 electrons, 268
enviropig, 53
 evolution, 64
 fluoridation, 179
 frame of reference, 356
 genetic engineering, 56
 GPS unit, 407
 gymnosperms, 32
 health care system, 179
 inheritance 26
 joules, 323
 lichens, 231
 malleability, 104
 mushrooms, 27
 natural selection, 67
 niches, 16
 ohm, 281
 parallel, 289
 particle model of matter, 95
 pollution, 231
 population, 70
 potential difference, 275
 power, 323
 replacement organs, 50
 reproductive success, 36
 resistance, 281
 series, 289
 space travel, 437
 specialized niches, 20
 spore-bearing plants, 34
 spruce tree, 18
Sputnik, 406
 symbols, 274
 tips in keeping, 356
 triangulation, 391
 units, 274
 viscosity, 104
 voltage, 275
 warblers, 18
 watts, 323
 wildflowers, 58
 Scientific model, 95, 112
 Scientific notation, 198
 Scott, David, 180
 Scrubbers, **210**, 211
 Scurvy, 180
 Secondary cell, **301**
 Secure landfills, **250**
 Seebeck Effect, 294
 Seebeck, Thomas Johann, 294
 Seed banks, **75**
 Seeds and fertilizers, *183–184inv*
 Selective breeding, **60**, *61act*
Selenium
 role in human body, 180
 toxicity, 217
 Self-pollination, **33**
 Semiconductors, 269
 Sequential hermaphrodites, 36
Series, **286**, *287–288inv*
 Science log, 289
Setae, 12
Sewage, 239–240
Sex cells, variations, 51
Sexual reproduction, **30**
 animals, 33, 35
 mammals, 35
 plants, 32, 33, 34
 reptiles, 35
 variation, 52
Shepard, Alan B. Jr., 421
Short circuit, **330**
Shull, C.G., 128
Sickle cells, 43
Silica gel, 157
Silicon, 110, 118, 126
 concentration in Earth's crust, 182
 concentration in humans, 182
 concentration in plants, 182
Silver, 117, 120, 122, 148
 toxicity, 217
Simultaneous hermaphrodites, 36
Sirius, 387
Skin cancer, *43act*
Skylab, 426
Smith, Michael, 92
Smog, 162
Snow algae, 23
Sodium, 110, 121, 122, 127
 concentration in Earth's crust, 182
 concentration in humans, 182
 concentration in plants, 182
 role in human body, 180
Sodium chloride, 140, 216
Sodium hydroxide, 197
Soil bacteria, *22inv*
Soils, pH, *203inv*
Solanine, 193, 218
Solar cell, 297
 electricity production, *298act*
Solar farms, 340
Solar filter, 409
Solar spectrum, 376, 380
Solar system, scale of, *373inv*
Solar wind, **409**
Solutions, 97
Solvent, **244**
Somatic cells, **50**
Sorbent, **210**
Sounding rocket, 400
Soyuz spacecraft, 423
Space capsule, designing, *422inv*
Space missions, 180
Space shuttle, 420, 424
Space station remote manipulator system (SSRMS), 425, 428
Space Transport System, 424
Space travel
 astronauts, *427inv*
 Science log, 437
Spacecraft as ecosystem, *416inv*
SPAR Aerospace, 428
Special purpose dexterous manipulator (SPDM), 425
Specialists, **20**
Specialization, **20**
 trap of, 20
Specialized niches and Science log, 20
Speciation, **10**
Species, **8**
 adaptations, 23
 bioindicator, 69
 dependencies between, 21
 dominant, 17
 extinction, 66, *68inv*
 generalists, 20
 introduced, *21act*
 mutualism, 21
 niches, 17
 specialists, 20
 symbiotic, 21
 variation, 10
Spectral analysis, **380**
 star composition, *381inv*
Spectral lines, **376**
Spectroscope, **376**, 383

- Spectroscopy, 377
 astronomy, 380
 Spectrum, 376
 absorption, 377, 380
 bright line, 377
 continuous, 377, 380
 dark line, 377
 electromagnetic
 radiation, 393
 emission, 377, 380
 identification, 379*inv*
 Speed of light, 404
 Sporangium, 30
 Spore case, 30
 Spore-bearing plants and
 Science log, 34
 Spores, 27
 Spruce tree and
 Science log, 18
 Sputnik, 406, 420
 Science log, 406
 Staged rocket, 399
 Stamen, 33
 Stannum, 117
 Star composition, spectral
 analysis, 381*inv*
 Starch, 150
 Static, 393*act*
 Static cling, 270
 Static electricity, 268
 Stator, 317
 Step down transformer,
 318
 Step up transformer, 318
 Stone circle technology,
 357
 Stonehenge, 357
 Stratospheric ozone, 238
 Strontium, 110, 121, 122
 Structural adaptation, 12
 Strychnine, 218
 Suborbital, 421
 Suffield horses, 71*inv*
 Sugar, 150
 Sulfur, 118
 concentration in
 Earth's crust, 182
 concentration in
 humans, 182
 concentration in
 plants, 182
 role in human
 body, 180
 Sulfuric acid, 197
 Summer solstice, 357
 Sumner, Heather, 254
 Sun, 357, 358, 363, 409
 composition, 409
 gravity, 409
 surface, 409
 Sun-centred, 364, 371
 Superconductors, 269
 Surge suppressors, 322
 Survival, 6, 52*act*
 variation, 12
 Suspension, 97
 Switch, 273
 Symbiotic, 21
 legumes, 22*inv*
 Symbols of element, 116
 Taube, Henry, 92
 Taxol, 7
 Taxonomists, 10, 56
 Taylor, Richard E., 92, 114
 Telescopes, 366
 adaptive optics, 386
 combining, 385
 computer technology
 enhancing, 402
 constructing,
 368–369*inv*
 Hubble, 403
 objective lens, 370
 optical, 370
 reflecting, 370
 refracting, 370
 resolving power, 370
 Telophase I, 51
 Telophase II, 51
 Terakita, Craig, 321
 Tereshkova, Valentina, 420
 Terrestrial planets, 410
 Thalidomide, 219
 Thermopile, 295
 Theories, 112
 Thermal pollution, 339
 Thermistor, 283
 Thermo-electric generating
 plants, 332
 Thermo-electric generator,
 295
 Thermocouple, 294
 Thermonuclear electric
 generation, 338
 Thirsk, Robert, 424,
 430–431
 Thomson, J.J., 113
 Thymine, 47
 Tidal electricity generating
 stations, 341
 Tin, 117, 122
 Tokamak nuclear fusion
 chamber, 312
 Tongue rolling, 38, 40
 Toxic wastes, 250
 Toxicity, 217
 Toxin, 194, 221
 Trace elements, 179
 Trait, 38*act*
 dominance, 40
 frequency, 40
 heritable, 26
 Transformers, 318
 building, 318*act*
 Transgenic, 53
 Transporters, 54
 Trap of specialization, 20
 Triangulation, 387–389,
 390–391*inv*
 baseline, 390
 global positioning
 system (GPS), 407
 long baseline, 391
 Science log, 391
 Tryggvason, Bjarni, 424
 Tungsten, 124
 Turbogenerators, 332
 Typhus, 188
 Ultraviolet waves, 393
 Unbalanced charges, 268
 neutralizing, 270
 Universal docking
 module, 423
 Universal gravitation, 372
 Uranium, 116
 Uranus, 385, 410, 418
 density, 415
 diameter, 373, 415
 distance from sun, 373
 distance from Sun, 415
 mass, 415
 orbital period, 415
 rotation period, 415
 surface temperature,
 415
 Ursa Major, 357, 358
 Van de Graaff generator,
 268
 Variable stars, 392
 Variation, 6
 asexual reproduction,
 52
 benefits of, 52
 competition, 17
 continuous, 37
 discrete, 38
 exploring, 8*act*
 gametes, 51
 human, 44*inv*
 investigation, 9*act*
 sex cells, 51
 sexual reproduction, 52
 species, 10
 survival, 12
 technology, 53
 value of, 13
 Varistor, 283
 Vectors, 54
 Venus, 357, 410
 density, 412
 diameter, 373, 412
 distance from Sun,
 373, 412
 mass, 412
 orbital period, 412
 rotation period, 412
 surface temperature,
 412
 Very Large Array radio
 telescope, 396
 Very long baseline
 interferometry, 396
 Virtual reality, 164
 Viscosity in science
 log, 104
 Vitamin B, 181
 Vitamin C, 180
 Vitamins, 178, 179
 Volta, Alessandro, 300
 Voltage, 275
 current, 276–277*inv*
 electric current,
 276–277*inv*,
 284–285*inv*
 measuring, 275
 resistance, 284–285*inv*
 Science log, 275
 Voltaic cell, 302–303*inv*
 Voltaic pile, 110
 battery, 300*act*
 Voltmeter, 275
 von Braun, Werner,
 399, 400
 von Fraunhofer, Joseph,
 376, 377, 380
 Vostok, 420
 Voyager 1, 418
 Voyager 2, 418
 Wallace, Alfred, 64
 Warblers, Science log, 18
 Waste management, 247
 Water, 107, 136
 role in human
 body, 180
 Water pollution
 ground water, 241
 surface waters, 239
 Water quality
 biological indicators,
 230, 232–233*inv*
 macroinvertebrates,
 232–233*inv*
 testing, 228–229*inv*
 Water rocket, 401*inv*

- 
- Water softeners, 227
Water supply
 nitrates, 225–227*inv*
 phosphates, 225–227*inv*
Watson, James, 48
Watt, James, 323, 324
Watts and Science log, 323
Weathering, 100–101*inv*
Weightlessness, 426
Wet cells, 301
Wheat, 60
WHMIS, 93–94, 244
Wild cats, 10
Wildflowers and Science
 log, 58
Williams, David, 424
Wilson, Deborah, 24
Wilson, E.O., 2
Wind turbines, 340
Wolves, 19, 20
Woolly mammoth, 72
Workplace Hazardous
Materials Information
System (WHMIS), 93*act*
World Health
Organization, 188,
192, 232
- X chromosome, 51
X rays, 393
Xenon, 124
- Y chromosome, 51
Yerkes observatory, 385
- Zero gravity, 425
Zinc, 122, 168
 role in human
 body, 180
Zoospores, 27
Zygosporangium, 30, 31
Zygote, 33, 35, 51