

# Index

- accelerate, 82, 114  
acid, 60, 114  
active volcano, 70, 114  
air, 82, 114  
alkali, 60, 114  
amorphous solid, 52, 114  
angiosperm, 38, 114  
anion, 48, 114  
anther, 38, 114  
aperture, 13, 114  
Aristotle:  
  geocentric view, 4  
asterism:  
  Big Dipper, 19  
  definition of, 19, 114  
asteroid, 4, 114  
athensphere, 68, 114  
atmosphere, 5, 114  
atom:  
  definition of, 48, 114  
  models of, 49–51  
attracted, 89, 114  
autumn, 64, 114  
autumn equinox, 65, 114  
average kinetic energy, 44, 114  
axis, 4, 114  
backboards:  
  box, 104  
  three-paneled, 100–101  
bacteria, 28, 29, 114  
balance, 59, 114  
ball-and-socket, 35, 114  
Barringer Meteorite  
  Crater, 20  
base:  
  concentration of, 60  
  definition of, 60, 114  
  strength of, 62  
battery, 89, 114  
biceps, 34, 114  
Big Dipper, 19  
blood, 28, 114  
blood vessels, 28, 114  
boiling point, 47, 54, 114  
bronchi, 29, 114  
butterfly:  
  metamorphosis model,  
  15–27  
cardiac muscles, 32, 114  
carpel, 38, 114  
cartilage, 35, 114  
Cassiopeia, 19  
cation, 48, 114  
celestial bodies:  
  definition of, 4, 114  
  moons, 4, 118  
  planets, 4, 118  
  solar system, 4–8  
  stars, 4, 120  
cell:  
  blood, 28  
  definition of, 28, 114  
  discovered, 29  
  eukaryotic, 28, 116  
  model of, 29–31  
  muscle, 28  
  prokaryotic, 28, 118  
  size, 29  
  types, 28  
cell membrane:  
  definition of, 28, 114  
  description of, 31  
cemented, 74, 114  
Cepheus, 19  
charge, 89, 114  
chrysalis, 24, 114  
cinder cone volcano, 70, 114  
circle:  
  drawing, 112  
circuit:  
  closed, 89, 115  
  electric, 89, 115  
  open, 89, 118  
  parallel, 89, 118  
  series, 89, 119  
circulatory system, 28, 114  
climatic seasons, 64, 114  
closed circuit, 89, 114  
cocoon, 24, 114  
comet, 4, 114  
compact, 74, 114  
compass, 92, 115  
complete flower, 41, 115  
complete metamorphosis:  
  definition of, 24, 115  
  model of, 25–27  
composite volcano, 71, 115  
compound:  
  definition of, 48, 115  
  ionic, 48, 117  
  molecular, 48, 118  
compound joints, 35, 115  
compress, 21, 115  
compression, 77, 115  
concave, 12, 115  
concentration, 60, 115  
condense, 53, 115  
conductor, 89, 115  
connective tissue, 35, 115  
constellations:  
  Cassiopeia, 19  
  Cepheus, 19  
  definitions of, 16, 115  
  model of, 17–19  
  Ursa Major, 19  
  Ursa Minor, 19  
contract, 32, 115  
convex, 12, 115  
Copernicus, Nicolaus:  
  heliocentric view, 4, 5  
core:  
  definition of, 67, 115  
  inner, 67, 117  
  outer, 67, 118  
crater:  
  definition of, 22, 70, 115  
  impact, 20, 21, 116  
crescent phase, 9, 115  
crust:  
  definition of, 67, 115  
  model of, 68–69, 111  
crystal lattice, 52, 115  
crystalline solid, 52, 115  
cubic, 56, 115  
cubic centimeter (cm<sup>3</sup>), 56, 115  
cubit, 56, 115  
current electricity, 89, 115  
cushioning, 36, 115  
cyanobacteria, 28, 115  
cytoplasm, 28, 31, 115  
debris, 20, 115  
density, 70, 115  
diatomic molecule, 48, 115  
dilute, 60, 115  
diorama, 66, 115  
dip-slip fault, 77, 115  
domains, 92, 115  
dormant, 70, 115  
Earth, 4, 5  
  layer model, 67–69, 111  
Earth day, 5, 115  
earthquake, 78, 115  
Earth year, 5, 115  
effort distance ( $d_e$ ), 96, 115  
effort force ( $F_e$ ), 96, 115  
egg:  
  definition of, 24, 38, 115  
  flower, 38  
  insect, 24  
ejecta blanket, 21, 115  
elbow, 34, 115  
electric charge, 89, 115  
electric circuit, 89, 115  
electricity, 89, 115  
electron, 89, 115  
element, 48, 115  
endoplasmic reticulum, 31, 115  
energy:  
  conversion, 86–87  
  definition of, 86, 115  
  electric, 89–91  
  gravitational potential,  
  86, 116  
  kinetic, 86, 117  
  magnetic, 92–94  
  mechanical, 86–88, 117  
  potential, 86, 118  
energy conversion:  
  definition of, 87, 88, 115  
  model of, 87–89  
equator, 16, 115  
eukaryotic cell, 28, 116  
evaporation, 53, 116  
exoskeleton, 24, 116  
extensor, 34, 116  
extinct, 70, 116  
eyepiece, 12, 116  
fault, 77, 116  
fault block, 77, 116  
fault plane, 77, 116  
fertilization, 38, 116  
filament, 38, 91, 116  
first quarter phase, 9, 116  
fixed joints, 35, 116  
fixed pulley:  
  definition of, 97, 116  
  model of, 98–99  
flap book, 105  
flexor, 34, 116  
flower:  
  definition of, 38, 116  
  model of, 39–42  
focal point, 14, 116  
foot, 56, 116  
footwall, 77, 116  
forearm, 33, 116  
formula, 48, 116  
fracture, 21, 116  
freeze, 47, 53, 116  
freezing point, 47, 55, 116  
friction, 20, 116  
fulcrum, 97, 116  
full moon, 9, 116  
galaxy, 5, 116  
Galileo, Galilie, 4–5, 12, 86  
Galle, Johann, 5  
gas, 53, 116  
geocentric, 4, 116  
gibbous phase, 9, 116  
gliding joints, 35, 37, 116  
golgi bodies, 31, 116  
goose bump, 32, 116  
gram (g), 56, 116  
gravitational acceleration,  
  82, 116  
gravitational potential  
  energy, 86, 116  
gravity, 59, 82, 116  
gravity rate (GR):  
  definition of, 84, 116  
  planets, 85  
hanging wall, 77, 116  
heat, 44, 116  
heliocentric, 4, 116  
hinge joint, 35, 37, 116  
Hooke, Robert, 29  
horizon, 16, 116  
hydrogen ions, 60  
hydrodium ion, 60, 116  
hydroxide ions, 60, 116  
igneous rock, 74, 75, 116  
image, 12, 116  
impact crater:  
  definition of, 20, 116  
  formation of, 21  
  model of, 20–22  
imperial system, 56, 116  
inch, 56, 116  
inclined plane, 96, 116  
incomplete flower, 41, 116  
incomplete metamorphosis:  
  definition of, 24, 116  
  model of, 27  
indicator, 61, 116  
inferior planets, 5, 116  
inner core, 67, 116  
inorganic, 74, 116  
involuntary muscles, 32, 116  
ion, 48, 116  
ionic compound, 48, 117  
joint:  
  ball-and-socket, 36,  
  36–37, 114  
  compound, 35, 115  
  definition of, 34, 7, 117  
  elbow, 34, 115  
  fault, 77  
  fixed, 35, 116  
  gliding, 35, 37, 116  
  hinge, 35, 37, 116  
  moveable, 35, 118  
  pivot, 35, 37, 118  
  slightly moveable, 35,  
  119  
Jupiter, 4, 5, 7  
Kepler, Johannes, 12  
kinetic energy, 44  
larva, 24, 117  
lateral fault:  
  definition of, 77, 117  
  diagram of, 77  
latitude, 16, 117  
larva, 24, 117  
lava, 70, 117  
layered book, 102  
Leeuwenhoek, Anton van,  
  29  
left lateral fault, 77, 117  
length, 56, 58, 117  
lever:  
  classes of, 97  
  definition of, 96, 117  
lifter, 108  
ligament, 35, 117  
Lippershey, Hans, 12  
liquid, 52, 117  
liter (L):  
  definition of, 56, 117  
  model of, 57–59  
lithosphere:  
  definition of, 68, 117  
  model of, 69  
Little Dipper, 19  
lodestone, 92, 117

- Lowell, Percival, 5  
lubricant, 36, 117  
lunar month, 9, 117  
lungs, 29, 117  
lysosomes, 31, 117
- machine, 96, 117  
magma chamber, 70, 117  
magnet, 92, 117  
magnetic field, 92, 117  
magnetic force, 92, 117  
magnetic lines of force, 93, 117  
magnetic north pole, 92, 117  
magnetic pole:  
  definition of, 92, 117  
  north pole, 92, 118  
  south pole, 92, 119  
magnetic south pole, 93, 117  
magnetism, 92, 117  
magnetite, 92, 117  
mantle, 67, 117  
Mars, 4, 5, 6  
mass, 48, 59, 117  
matter, 48, 117  
matting, 107  
mechanical advantage  
  (MA), 96, 117  
mechanical energy, 86, 117  
melt, 53, 117  
melting point, 54, 117  
Mercury, 4, 5, 6  
mesosphere:  
  definition of, 67, 117  
  model of, 69  
metamorphic rock:  
  definition of, 74, 75, 117  
  formation diagram, 74  
metamorphosis, complete:  
  definition of, 24, 117  
  model of, 25–27  
metamorphosis, incomplete:  
  definition of, 24, 117  
meteor, 20, 117  
meteorite, 20, 117  
meteoroids, 20, 117  
meter (m), 56, 117  
Milky Way, 5  
mineral, 74, 117  
mitochondria, 31, 117  
model, 1, 117  
molecular compound, 48, 117  
molecule, 48, 49–51, 117  
molting, 24, 117  
moon:  
  definition of, 4, 117  
  model of, 9–11  
  phases 9–11  
moon phases, 9–11, 118  
moveable joints, 35, 118  
moveable pulley, 97, 118  
multicellular, 28, 118  
muscle, 32–34, 118
- natural elements, 48, 118
- nectar, 27, 118  
Neptune, 4, 5, 7  
neutral, 61, 118  
new moon, 9, 118  
newton, 59, 118  
Newton, Isaac, 13  
Newtonian telescope, 13, 118  
noncrystalline solid, 52, 118  
normal fault:  
  definition of, 77, 118  
  diagram, 77, 79  
  model of, 78–79  
northern circumpolar constellations 16, 118  
northern circumpolar stars, 16, 118  
Northern Hemisphere, 16, 118  
North Pole, 16, 118  
north pole, 92, 118  
North Star, 16, 118  
nose, 29, 118  
nucleus:  
  definition of, 28, 89, 118  
  description of, 31  
nymph, 24, 118
- objective lens, 12, 118  
open circuit, 89, 118  
orbit:  
  definition of, 4, 118  
organs, 28, 29, 118  
organelles, 31, 118  
organism, 28, 118  
organ systems, 28, 118  
outer core, 67, 118  
ovary, 38, 118  
ovules, 38, 118
- parallel circuit, 89, 118  
pedicel, 38, 118  
pendulum, 88, 118  
petals, 38, 118  
pH scale, 61–62, 118  
physical changes, 53, 118  
physical properties, 52, 118  
pistil, 38, 118  
pitch, 97, 118  
pivot, 35, 118  
pivot joint, 35, 37, 118  
planet:  
  definition of, 4, 118  
  major, 4, 117  
  minor, 4, 117  
plasma, 28, 118  
plasticity, 68  
Pluto, 4, 5, 6  
Polaris, 16, 19, 118  
pollen grains, 38, 118  
pollen tube, 38, 118  
pollination, 38, 118  
positive terminal, 89, 118  
potential energy, 86, 118  
prokaryotic cells, 28, 118  
protein, 31, 118  
proton, 89, 118
- Ptolemy:  
  geocentric view, 4  
pulley:  
  definition of, 97, 118  
  fixed, 97, 116  
  model of, 98–99  
  moveable, 97, 118  
pupa, 24, 119  
pyramid, 108  
pyramid backboard, 117–110
- qualitative, 44, 118
- receptacle, 38, 118  
reflecting telescope:  
  definition of, 12, 119  
  model of, 13–15  
refract, 14, 119  
refracting telescope:  
  definition of, 12, 119  
  Galilean telescope, 12  
  Keplerian telescope, 12  
  model of, 13–15  
relax, 32, 119  
repel, 92, 119  
reproduction, 38, 119  
reproductive system, 38, 119  
resistance distance, 96, 119  
resistance force, 96, 119  
respiratory system, 28, 119  
reverse fault:  
  definition of, 77, 119  
  diagram of, 77, 79  
revolve:  
  definition of, 4, 119  
ribosomes, 31, 119  
right lateral fault, 77, 119  
rock:  
  definition of, 74, 119  
  igneous, 74, 116  
  metamorphic, 74, 117  
  sedimentary, 74, 119  
rock cycle:  
  definition of, 74, 119  
  diagram, 74, 75  
  model of, 74–76  
rotate, 5, 16, 119  
rumple, 77, 120
- Saturn, 4, 5, 7  
scale, 69, 119  
scale model, 69, 111, 119  
scapula, 37, 119  
screw, 97, 119  
season. *See* climatic season  
sediment, 74, 119  
sedimentary rock, 74, 75, 119  
seed, 38, 119  
sepals, 38, 119  
series circuit:  
  definition of, 89, 119  
  diagram of, 89  
  model of, 90–91  
sexual reproduction, 38, 119
- shear, 77, 119  
shield volcano, 70, 119  
shiver, 32, 119  
shooting star, 20, 119  
SI, 57, 119  
silicates, 67, 119  
simple machine, 96, 119  
skeletal muscles:  
  definition of, 32, 119  
  model of, 32–34  
slightly moveable joints, 35, 119  
smooth muscle, 32, 119  
solar system:  
  definition of, 4, 119  
  model of planet order, 6–8  
solid:  
  amorphous, 52, 114  
  crystalline, 52, 115  
  definition of, 52, 119  
  model of, 53–55  
solution, 60, 119  
Southern Hemisphere, 16, 119  
South Pole, 16, 119  
south pole, 92, 119  
span, 56, 119  
sperm, 38, 119  
spine, 35, 119  
spring, 64, 119  
spring equinox, 65, 119  
spring scale:  
  definition of, 82, 119  
  model of, 83–85  
stamen, 38, 119  
stand:  
  circle, 113  
  tent, 107  
stars, 4, 119  
states of matter, 52, 119  
static electricity, 89, 119  
stigma, 38, 119  
stony meteorites, 20, 119  
stress:  
  compression, 77, 115  
  definition of, 77, 119  
  shear, 77, 119  
  tension, 77, 120  
strike-slip fault, 77, 119  
style, 38, 119  
substance, 48, 119  
summer, 64, 120  
summer solstice:  
  definition of, 64, 120  
  model of, 65–66  
sun, 4, 120  
superior planets, 5, 120  
symbol, 48, 120  
synovial fluid, 36, 120  
synthetic elements, 48, 120  
tab book, 103  
telescope:  
  definition of, 12, 120  
  Galilean, 12  
  Hubble Space, 13  
  Keck, 13  
  Keplerian, 12
- model of, 13–15  
  parts of, 12, 13  
  reflective, 13, 119  
  refracting, 12, 119  
temperate zones, 64, 120  
temperature, 44, 120  
tendon, 34, 120  
tension, 77, 120  
terminal:  
  definition, 89, 120  
  negative, 89, 118  
  positive, 89, 118  
thermal energy, 44, 120  
thermometer, 44, 45–47, 120  
thermoscope, 44  
tissue:  
  blood, 28, 114  
  definition of, 28, 120  
  muscle, 28  
Tombaugh, Clyde William, 5  
triceps, 34, 120
- unica, 56, 120  
unicellular, 28, 120  
universe, 4, 120  
Uranus, 4, 5, 7  
Ursa Major, 19  
Ursa Minor, 19
- vapor, 53, 120  
vaporizes, 20, 120  
Venus, 4, 5, 6  
vertebra, 35, 120  
vertebrate, 28, 120  
viscosity, 52, 120  
volcanic bombs, 70, 120  
volcanic eruption, 70, 120  
volcanic vents, 70, 120  
volcano:  
  bombs, 70, 120  
  cinder cone, 70, 114  
  composite, 70, 115  
  definition of, 70, 120  
  shield, 70, 119  
volume, 56, 58, 120  
voluntary muscles, 32, 120
- waning, 9, 120  
waxing, 9, 120  
weathering, 75, 120  
wedge, 96, 120  
weight, 59, 82, 83–85, 120  
wheel and axle, 97, 120  
wing pads, 25, 120  
winter, 64, 120  
winter solstice, 65, 120  
work, 86, 120  
wrist, 34, 120
- Young, Thomas, 86