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STUDY GUIDE:
GENERAL SCIENCE

Branches of Science

Astronomy—The study of space.

- Astronomy** – The measurement of celestial bodies.
- Astronautics** – The study of vehicles in outer space.
- Astrophysics** – The study of the behavior and dynamics of celestial phenomena.
- Chronometry** – The study of the measurement of time.
- Cosmology** – The study of the origin of the universe.

Biology—The study of all living things.

- Anatomy** – The study of the structure of living organisms.
- Cytology** – The study of cells.
- Gnotobiosis** – The study of germ-free organisms.
- Histology** – The study of tissues.
- Microbiology** – The study of microscopic organisms.
- Morphology** – The study of structure in organisms.
- Organology** – The study of organs.
- Biochemistry** – The study that deals with the life processes of plants and animals.
- Bioecology**
- Limnology** – The study of freshwater bodies.
- Marine Biology** – The study of saltwater bodies.
- Parasitology** – The study of parasites.
- Synecology** – The study of the relationship between communities and their environment.
- Biometry** – The study of calculating probable human life spans.
- Biophysics** – The branch of physics that deals with living matter.

Ecology—The study of the relationships between living organisms and their environments.

Embryology—The branch that deals with the formation and development of embryos.

Eugenics – The study of ways to improve a species, especially the human species, through the control of hereditary factors.

Evolution—The study of the changes that occur in a species over a long period of time.

Exobiology – The study of potential life in outer space.

Genetics—The branch that deals with human traits, characteristics, and heredity.

Molecular Biology – The study of RNA and DNA.

Physiology—the branch of science that deals with functions and vital processes of living organisms.

Biostatistics - The study of statistics as they are used within the medical and biological fields.

Taxonomy -The classification of living organisms.

Botany – The study of plants.

Agriculture- The science and art of farming.

Algology - The study of algae.

Bacteriology - The study of bacteria.

Bryology -The study of bryophytes.

Dendrology - The study of trees and shrubs.

Forestry- The science of planting and caring for forests.

Hydroponics - The study of growing plants in a liquid, usually water.

Paleobotany- The study of fossil plants.

Pomology - The study of growing fruit.

Pteridology- The study of ferns.

Mycology - The study of fungi.

Medicine-The science and art of diagnosing diseases, relieving pain, and treating and curing health problems.

Anesthesiology- The study of using drugs to reduce or lessen pain.

Cardiology - The study of the heart.

Cytology- The study of cells.

Dentistry- The study of the teeth.

Dermatology - The study of medicine that pertains to the skin.

Endocrinology - The study of medicine that specializes in the endocrine glands.

Epidemiology - The study of epidemics.

Family Practice- A general study of diseases that affect all ages.

Forensic Medicine - The study of medicine as it is applicable to law.

Gastroenterology - The study of the digestive organs.

Geriatrics and Gerontology - The studies of aging and the elderly.
Hematology - The study of blood.
Holistic Medicine (Chiropractic & Homeopathy) The study of unorthodox medicine.

Immunology - The study of the immune system.

Internal Medicine - The study of diseases found in the internal organs.

Medical Jurisprudence - The study of medical law.

Medical Physiology - The study of organisms' process.

Nephrology - The study of kidneys.

Neurology - The study of the nervous system.

Nursing- The art of caring for patients.

Nutrition - The study of proper diet.

Obstetrics & Gynecology - The study of pregnancy and childbirth.

Occupational Medicine - The study of work-related medicine.

Ophthalmology - The study of eye diseases.

Oral Surgery- The study of surgical procedures most often performed on the mouth.

Orthodontics - The study of tooth correction and alignment.

Orthopedics - The study of the skeleton.

Osteopathy - The study of manipulating bones and muscles.

Otolaryngology/Otorhinolaryngology - The study of the ears, nose and throat.

Pathology - The study of diseases.

Pediatrics – The branch of medicine that treats children.

Pharmacology - The study of drugs; their creation, uses, and their effects.

Pharmacy - The study of preparing and dispensing medicines.

Plastic Surgery - The study of cosmetic surgery.

Podiatry – The branch that specializes in the feet.

Psychiatry – The branch of science that deals with the mind, mental processes, desires, feelings, and behavior.

Public Health - The study of community health services.

Radiology - The study of radiation as a treatment; x-rays.

Sports Medicine - The study of medicine for athletes.

Surgery - The branch of science that deals with correcting diseased organs or body parts by manual removal of the affected organ.

Toxicology - The study of poisons.

Urology - The study of the urinary tract.

Zoology-The study of animals.

Arachnology - The study of spiders.

Apiculture - The study of beekeeping.

Conchology - The study of the shells of mollusks.

Embryology- The branch of science that deals with the formation and development of an embryo.

Entomology- The study of insects.

Helminthology - The study of parasitic worms.
Herpetology- The study of reptiles.
Ichthyology- The study of fish.
Marine biology- The study of sea animals.
Ornithology- The study of birds.
Veterinary Medicine- The study of animal health care, disease prevention, and cures.

Chemistry- The study of matter.

Biochemistry - The study of chemical compounds within organisms.
Inorganic Chemistry-The chemical study and analysis of nonliving matter.
Organic Chemistry- The chemical study and analysis of living matter.

Earth Sciences

Atmospheric Sciences

Aeronomy - The study of planetary atmospheres (including Earth's).
Meteorology - The study of the weather.
Climatology - The study of climates, as opposed to short-term weather.

Geological Sciences

Astrogeology - The study of geology as it applies to the moon and planets.
Geobotany - The study of plants in terms of their geological environment.
Geochemistry - The study of the earth's chemical makeup.
Geochronology (radiometric dating & geochronometry) The study of the timeline of earth history.
Geocosmogony - The study of the Earth's origin.
Geomorphology - The study of the topographic features on Earth and their origin.
Geophysics - The study of Earth and its environments' physics.
Glacial Geology - The study of topography resulting from glacial influences.
Mineralogy - The study of minerals, including rocks and crystals.
Paleontology -The study of fossils.
Petrology - The study of rocks, including their composition, history, and origins.
Seismology - The study of earthquakes.
Stratigraphy - The study of rock strata, or rock layers.
Volcanology - The study of volcanoes and their activities.

Hydrologic Sciences

Glaciology - The study of glaciers.
Hydrology - The study of water bodies on earth.
Limnology - The study of lakes.
Oceanography - The study of oceans.

Physics

Acoustics - The study of sound.

Astrophysics - The study of the physics of stars and nebulae.

Atomic Physics - The study of matter's atomic qualities.

Biophysics - The study of the physics of biological structures.

Electromagnetism - The study of the interplay between magnetism and electricity.

Electronics/solid state physics - The study of electrical charges.

Optics - The study of light.

Geophysics - The study of the physical properties of earth, water, and air.

Mechanics - The study of motion and forces.

Molecular Physics - The study of molecules.

Nuclear Physics - The study of the structure of atomic nuclei.

Particle Physics - The study of the subatomic portions of matter.

Quantum Mechanics - The study of energy and momentum in terms of their atomic and subatomic qualities.

Statistical Mechanics - The behavior of systems.

Thermal Physics (Cryogenics & Thermodynamics) - The study of the effect of temperatures on matter. Cryogenics deals with the production of very low temperatures and their effects on matter. Thermodynamics deals with the relationship between heat and mechanical energy and the heat transfers that occur between the two.

Tribology - The study of friction and wear.

Steps in the Scientific Method

There are five basic steps in the scientific method:

1. Identify a **problem**.
2. State the **hypothesis**.
3. Design a **procedure** to use when performing the test.
4. Collect **data**.
5. Form a **conclusion** or give the **results** of the experiment.

Variables

There are two types of variables that are encountered when applying the scientific method: **independent** and **dependent** variables. The independent variable is the variable that is manipulated by the researcher, and that is expected to effect the dependent variable. Samples of independent variables that can be manipulated are **duration**, (timeline of the experiment,) **pattern** (or frequency/regularity of the experiment,) and its **intensity**.

Theories and Laws

Newton's Laws of Motion

1. An object in motion will remain in motion unless acted upon by an

outside force, and an object at rest will remain at rest unless acted upon by an outside force. This is known as **inertia**.

2. Force equals mass times acceleration. Acceleration will be in the same direction as the force.

3. For every action there is an equal and opposite reaction.

Einstein's Theory of Relativity: Energy equals mass times the speed of light squared. This is expressed by the formula $E = mc^2$ where c represents the speed of light.

Scientific Formulas

Average speed = distance divided by time

Force = mass times acceleration

Acceleration = change in velocity divided by time taken to change

Momentum = mass times velocity

Impulse = force times time.

Work = force times distance moved in the direction of the force

Average power = work divided by time

Efficiency = work output divided by work input times 100

Pressure = force divided by area

Density = mass divided by volume

Parts of a Microscope

Microscopes are basic scientific tools that are used by most scientists. Here are the main parts of any microscope:

Arm - This is the bridge that connects the base to the head.

Base - This is the bottom part of the microscope that sits on the table.

Body Tube (Head) - This holds up the ocular lens and the objective lens system.

Coarse Adjustment Knob- This is the larger of the two knobs that are found on the sides of the scope. It is turned to focus the specimen.

Condenser - This focuses the light from the substage light source onto the specimen.

Eyepiece- This is the top part of the microscope into which the user looks. It contains a lens that usually magnifies 10 times.

Fine Adjustment Knob - This smaller knob is turned to "fine tune" the view of the specimen and to help distinguish smaller details. It is used after the specimen has been focused with the coarse adjustment knob.

Nosepiece - This is the part of the microscope that holds the three objective lenses. It can usually be rotated to switch between lenses or powers.

Objective Lenses - This includes a low-powered lens, a high-powered lens, and an oil-immersion lens, for varying degrees of resolution and magnification. They are mounted on the nosepiece and each contains a different power of magnification.

Stage - This is the platform on which slides are strapped down by **spring clips or stage clips**. The stage contains a hole through which light passes and penetrates the specimen as well.