



GED Test Prep

SCIENCE & SOCIAL STUDIES

Every science and social studies concept covered on the exam with examples to boost your score



SCIENCE



LIFE SCIENCE

Classes of Molecules Found in Cells

• **Lipids:** Long chains of carbon and hydrogen that generally don't like water

EX: Oils and fats

• **Proteins:** Made up of **amino acids**; carry out most of the functions of the cell

• **Carbohydrates:** Also known as **sugars**; used for energy and storage, as well as for building structures around cells

• **DNA (deoxyribonucleic acid):** Double-stranded hereditary molecule of all cells that twists into a **double helix** and is used to directly make RNA molecules in a process called **transcription**

• **RNA (ribonucleic acid):** Molecules are similar to DNA but are single stranded and make proteins in a process called **translation**

These five substances are used to make up most of what goes into all living organisms.

We eat things such as lipids, proteins, and carbohydrates to use as raw materials to build our cells.

Cells

Cells are the basic unit of life.

Organelles are specialized structures in cells to carry out particular functions.

Prokaryotic Cells

• Lack nuclei and are generally simpler than eukaryotic cells

- **Bacteria** are typical prokaryotic cells.
- Have a single circular **DNA** molecule
- Have a **cell membrane** made up of two layers of lipids with **hydrophilic** (water loving) heads and **hydrophobic** (water fearing) tails
- Reproduce by **fission** where one cell separates into two cells. They do not need any other organism to reproduce.
- Do not have any internal membranes to create separate spaces in the cell
- Have a **cell wall** made up of proteins and carbohydrates that protect the cell

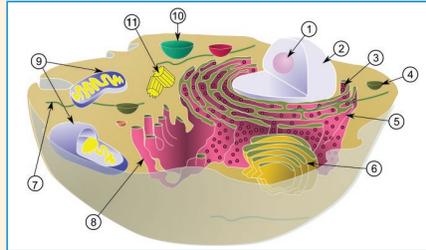
Eukaryotic Cells

- Have nuclei and are often larger and more complex than prokaryotic cells
- Usually have multiple **chromosomes** that are more organized than DNA in prokaryotes
- Have membrane-bound organelles that create specialized environments, increasing efficiency
- Can form multicellular organisms where cells take on specialized functions
- May or may not have cell walls. Animal cells lack cell walls, but plants and yeast cells have them.
- May undergo **sexual reproduction**, which requires two different sexes to produce specialized reproductive cells

Prokaryotic & Eukaryotic Cell Structures

- **Cell walls:** Protective structures surrounding some organisms; made up of carbohydrates and proteins
- **Cilia:** Short, thin projections that help to move a cell or create currents around a cell
- **Flagella:** Long, thin projections that spin and are used to move a cell
- **Basal bodies:** Protein structures that serve as a base for cilia and flagella to move
- **Cell membranes:** Lipid bilayers that form a barrier between the inside and outside of a cell
- **Ribosomes (#3):** Made up of proteins and RNA; used to make proteins; not membrane bound

Eukaryotic Cell Structures



- **Nucleolus (#1):** A specialized region of the nucleus used to make ribosomes
- **Nuclei (#2):** Membrane-bound structures holding the DNA of a cell
- **Vesicles (#4):** Membrane-bound organelles that can trap material inside of the membrane and either bring it into the cell (**endocytosis**) or release it from the cell (**exocytosis**)
- **Rough endoplasmic reticulum (#5):** Used to synthesize membrane proteins and secreted proteins
- **Golgi complex (#6):** Membrane-bound organelle used to sort proteins into their correct locations and to add complex carbohydrates to cells
- **Cytoskeleton (#7):** Internal protein structure that supports the cell and gives molecules tracks on which they can move within a cell
- **Smooth endoplasmic reticulum (ER) (#8):** Used to synthesize lipids
- **Mitochondria (#9):** Membrane-bound structures used to make **ATP**, the main energy molecule of a cell, using membrane folds called **cristae**
- **Vacuoles (#10):** Membrane-bound storage organelles that are very large in plant cells
- **Centrosome (#11):** Serves as a base structure to pull chromosomes apart during cell division
- **Chloroplasts:** Membrane-bound structures that convert light energy into chemical energy through photosynthesis using internal membrane sacks called **thylakoids**
- **Peroxisome:** Membrane-bound organelle that isolates reactions that require hydrogen peroxide, which if not restricted, could kill the cell
- **Lysosome:** Membrane-bound organelle that isolates digestive reactions, which if not restricted, could damage or kill the cell

Viruses

- Use DNA or RNA as their genetic material
- Always have proteins on their surface that determine what type of cell they can infect
- Sometimes have a membrane around them to enclose the rest of the virus
- Always take over the machinery of the infected cell to make more virus particles
- May kill a cell quickly or infect a cell for a long time and make more viruses slowly
- Can often cause disease in humans
- Can infect all types of cells, from bacteria, to plants, to humans, depending on the virus

Cell Metabolism & Energy

- **ATP:** Main energy source of a cell
 - Animals break down sugars, particularly glucose, to make ATP.
- **Aerobic metabolism:** Breakdown of carbohydrates, fat, or proteins in the presence of oxygen; more efficient
 - **Formula:** $C_6H_{12}O_6 + 6O_2 \leftrightarrow 6H_2O + 6CO_2$
- **Fermentation (anaerobic metabolism):** Breakdown of sugar in the absence of oxygen

– Fermentation used in making beer and bread results in the production of alcohol.

Human Body Systems

System	Organs Involved	Major Functions
Circulatory	Heart, blood vessels, and red blood cells	Transport nutrients and waste.
Digestive	Stomach, small intestines, and the gall bladder	Extract nutrients from food.
Endocrine	Pituitary and adrenal glands	Slow control of body systems.
Excretory	Kidneys, large intestines, and the bladder	Remove waste from the body.
Immune	Thymus, spleen, and white blood cells	Protect from infection.
Integumentary	Skin, hair, and nails	Provide outer protection from environment.
Muscular	Skeletal and smooth muscles	Produce voluntary and involuntary movement.
Nervous	Brain, spinal cord, and nerves	Provide rapid control of body systems.
Reproductive	Genitals, womb, and testes	Have children.
Respiratory	Lungs and trachea	Bring oxygen in and expel carbon dioxide.
Skeletal	Bones	Provide structural support and protection.

Health Issues

- Bacteria and viruses can live on many surfaces, including other people.
- Washing your hands is a good way to keep from picking up diseases.
- Cover your mouth when coughing or sneezing to reduce the spread of germs.
- Vaccines are the best way to prevent a virus from infecting a person.
- Antibiotics can kill most bacteria, but have no effect on viruses.
- Always take a full dose of antibiotics when prescribed by the doctor in order to kill all the bacteria.
- Cover cuts with antibiotic cream and a clean bandage.
- Drugs
 - Overusing any drug, even one prescribed by a doctor, can lead to **addiction**.
 - Addiction is very hard to break—some people never can.
 - Moderation is the best way to use any drug, including alcohol or caffeine.
 - Always take prescribed drugs **only** as described by the doctor.
 - Illegal drugs are never as pure as legal ones; you don't know what is really in them!

Reproduction & Heredity

- **Gamete:** Reproductive cell containing half the genetic information (**haploid**)
 - Male: Sperm
 - Female: Egg
- Each human gamete contains 23 **chromosomes** made up of DNA and proteins.
- The chromosomes contain one copy of every **gene** that provides a blueprint to make a person.
- You have two copies of every gene—one from each parent (**diploid**).

- Mendelian genetics shows how these gametes are passed on.
 - Homozygous:** Both copies (**alleles**) of the gene are the same.
 - Heterozygous:** The two copies of a gene differ.
 - Phenotype:** What an organism looks like
 - Genotype:** What **alleles** (one form of a gene) an individual has
 - Dominant:** One allele of a gene is enough to cause a particular phenotype.
 - Recessive:** Need two of the same allele to cause a phenotype
 - Punnett squares:** Used to predict what kind of offspring two parents might have

	A	a
A	AA	Aa
a	Aa	aa

Note: Single letters represent **gametes**. Possible **zygotes** (fertilized eggs) have two letters.

- Mutations:** Heritable changes in a gene; usually bad
 - May be caused by radiation (including excessive sunlight), chemicals (smoking), or chance
 - Some mutations lead to cancer, which can be fatal if not treated.

Modern Genetics

- Recombinant DNA allows scientists to move genes from one organism to another.
- Genetically modified crops allow farmers to grow crops that may resist drought or disease.
- Yeast and bacteria can be made into biological factories to make some chemicals more easily.
- Doctors can design **antibodies** (proteins that help your immune system target diseases).
- Scientists can go into a cell and change genes from one form into another.
 - This is being used to create **stem cells** that make new proteins to cure a disease.

Evolution & Natural Selection

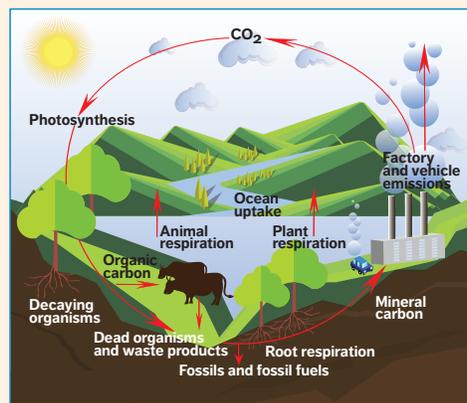
- Charles Darwin developed the theory of evolution.
- Evolution:** Heritable change of an organism over time
 - Change over time takes many generations.
 - Bacteria and viruses reproduce and change much more quickly than people.

- What takes bacteria years takes people thousands to millions of years.
- Random changes in DNA are usually bad, but occasional changes make a gene better.
- Natural selection** allows those who have the “better” gene to survive more frequently.
 - This works by randomly inheriting the more advantageous form of a gene.

EX: One antibiotic kills most bacteria. By chance, one bacterium (singular of bacteria) is mutated so that the antibiotic doesn't kill it. That bacterium survives when all its neighbors die and passes its resistance on to its offspring. All of its offspring are now resistant to that antibiotic. This is good for the bacteria—they survive much better—but it is very bad for us!

Organization of Ecosystems

- Global ecology** covers how organisms and the environment interact over the whole planet.
 - Carbon cycle:** Plants take in carbon dioxide that we exhale and convert it into sugars during photosynthesis while giving off oxygen. We eat the sugars and breathe in the oxygen so we can give off carbon dioxide.



- Water cycle:** Water evaporates from oceans, lakes, etc. and forms clouds as the water vapor rises. The rain falls onto the land to be used by plants and animals or runs

off into streams, then rivers, and then oceans. We breathe out water vapor to help replenish the water cycle.

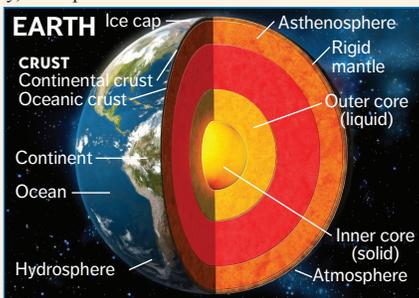
- Global warming:** Steady rise in temperature since the Industrial Revolution. This is changing the coasts as the water level rises and the heat changes where organisms can live.
- Landscape ecology** deals with how various environments and systems interact.
 - Damming a river changes what fish can live in the slow moving water and makes the downstream areas more arid.
 - Cutting down trees and natural grasses can increase erosion and loss of soil.
 - Fertilizers increase plant growth on land, but overuse can cause algae blooms in water downstream.
- Ecosystem ecology** looks at major types of environments and what can live there.
 - Includes both **biotic** (living) and **abiotic** (non-living) components
 - Temperature, water availability, soil quality, and light levels are the major determinants of what plants and animals can grow in an ecosystem.
- Community ecology** looks at how various species interact with one another. It includes:
 - Predator:prey relationships (i.e., animals that eat other animals)
 - What producers (mostly plants) there are to be eaten by animals
 - What animals can live with each other and which animals compete for space
- Population ecology** studies all of one organism in a given area.
 - Population:** Group of individuals in which an organism can find a mate
 - Population density:** How many organisms live in a certain region
 - Population dispersal:** How clumped or evenly distributed an organism lives
 - Includes what strategies an organism uses to reproduce most effectively
- Organismal ecology** looks at what an individual organism needs to survive.
 - What foods does the organism eat? How much water does it need?
 - Is the organism sensitive to a particular disease?
 - How does an organism attract a mate?

EARTH & SPACE SCIENCE

Structure of Earth

Lithosphere

Rocky, solid portions of the Earth



- Crust:** Outer solid layer of the Earth made up of plates floating on the liquid mantle
 - Plate tectonics:** Study of how these plates move over time
 - Pangaea:** Supercontinent millions of years ago that broke up through plate tectonics
 - Volcanoes:** Occur where plates are spreading apart and magma from the mantle can reach the surface as **lava**
 - Earthquakes:** Occur mostly where plates are sliding past one another (**faults**) or one is moving under another (**subduction**)
- Mantle:** Thick middle layer of liquefied rock (**magma**) composed mostly of silicates
- Core:** Central region of the inner Earth; mostly nickel-iron alloy that is partially liquefied by heat and pressure

Hydrosphere

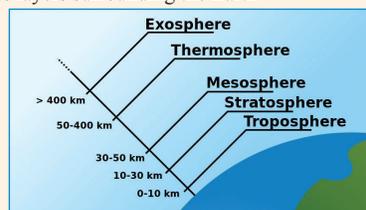
Watery parts of the Earth

- Oceans:** Largest bodies of water; collect minerals and salts eroded from the land

- Hadalpelagic zone:** Deepest part of the ocean found in valleys and trenches; very difficult to explore
- Abyssal zone:** Ocean floor; roughly 75% of the ocean bottom is in this range.
- Bathypelagic zone:** Deep area where sunlight does not penetrate but organisms make their own light
- Mesopelagic zone:** Faint sunlight reaches this region starting roughly 200 m deep.
- Epipelagic zone:** Surface regions with lots of light. Most human activity takes place in this region.
- Salinity:** Amount of ions dissolved in water
- Fresh water:** Low salinity water fit for human consumption
 - Lakes/Ponds:** Freestanding bodies of water with relatively slow flowing movement
 - Rivers/Streams:** Stretches of flowing water moving down toward sea level
 - Aquifer:** Underground reservoir of water that may be accessed using wells
- Clouds:** Water vapor that has condensed as particles in the atmosphere
 - Stratus:** Sheet-like clouds
 - Cirrus:** String-like wispy clouds
 - Cumulus:** Puffy, often tall tufts of clouds

Atmosphere

Gaseous layers surrounding the Earth



- Exosphere:** Outermost layers of the atmosphere; very thin with no weather

- Thermosphere:** Also called the **exobase**, it is still quite thin and has no weather (includes low Earth orbit)
- Mesosphere:** Middle layer of the atmosphere where meteors often burn up
- Stratosphere:** Layer above almost all clouds. It contains the ozone layer and is the highest layer jet aircraft can reach
- Troposphere:** Layer closest to the earth. Densest layer with the most weather; has almost all atmospheric water vapor and all but the highest clouds
- Ionosphere:** Area of the atmosphere where solar radiation ionizes atoms causing auroras. Affects radio wave propagation and includes the lower exosphere, thermosphere, and upper mesosphere
- Ozone layer:** Rich in ozone (O_3), which absorbs UV radiation from the sun. It is damaged by chlorofluorocarbons but is recovering.

Earth's Resources

- Resource:** Part of the Earth used by humans for our society; limited by the confines of Earth
- Ore:** Economically important chemical generally removed by mining
- Potable water:** Water that is fit to drink. Most of the Earth's water is too salty to use.
- Agricultural land:** Land used for producing food; requires a good climate, water, and soil to grow well
 - Poor practices lead to **erosion** (loss of soil).
 - Fertilizer:** Minerals used to support the growth of plants
- Fossil fuel:** Remains of long dead organisms that are decomposed to hydrocarbons
 - Hydrocarbon:** Compounds composed mostly of carbon and hydrogen
 - Natural gas:** Methane (CH_4), an economical and mostly clean burning fuel

- **Oil:** Liquefied organic remains composed of long-chain hydrocarbons. It is refined to form different grades of fuel including jet fuel, gasoline, diesel, and heating oil.
- **Coal:** Solidified organic remains typically produced by mining. It often has higher sulfur content, leading to worse pollution.
- **Renewables:** Resources of the Earth that are being produced/regenerated
- **Biofuels:** Ethanol and biodiesel, fuels produced by newly growing plants
- **Solar:** Energy from the sun converted to electricity
- **Wind:** Captured by windmills and wind turbines, which convert wind into electricity
- **Hydroelectric:** Using flowing water to turn turbines to create electricity

Weather & Climate

There are four major determinants of climate.

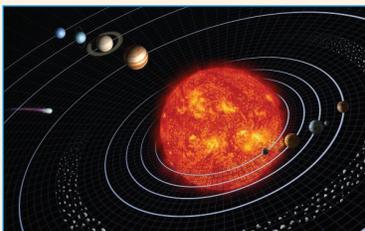
- **Winds** are caused by the uneven heating of Earth's atmosphere by the Sun and the rotation of Earth.
- **Water** includes water on the surface and the amount of precipitation.
 - Large bodies of water (oceans and great lakes) make temperature changes smaller.
- **Temperature** affects what can grow in an area and often varies seasonally.
- **Latitude** (nearness to the Equator) determines the amount of sunlight received and how direct it is.
 - Light strikes near the equator most directly and passes through more atmosphere near the poles.

- Higher latitudes (near the poles) magnify seasonal changes in temperature.
- Weather:** Local and temporary variation in wind, sunlight, precipitation, and temperature
- Weather patterns:** Typical movements of weather systems around the globe; vary by location
- In the US, most weather systems travel west to east because of high-level winds (**jet stream**).
- Tropical storms start in the Atlantic Ocean and move westward toward Texas and Florida before swinging northeast.

Climate: Long-term (decades to centuries) average conditions in a location

Earth in the Solar System

- **Sun:** Center of the solar system and the eventual source of nearly all Earth's energy



- **Mercury:** Innermost planet; small, rocky, and very hot
- **Venus:** Second planet from the Sun; very hot with a high pressure carbon dioxide atmosphere and sulfuric acid clouds
- **Earth:** Third planet from the Sun (150 million kilometers or 93 million miles away)
 - **Moon:** Relatively large satellite that orbits the Earth every 28 days

- **Largest natural satellite** by size ratio to the parent planet
- Has a major effect on Earth's tides and causes a measurable wobble in Earth's rotation
- **Solar eclipse:** When the moon passes between the Earth and the Sun
- **Lunar eclipse:** When the Earth passes between the Sun and the Moon
- **Mars:** Outermost, rocky inner planet; likely had liquid water once and may have had living organisms; dry and very cold now
- **Jupiter:** Largest planet in the solar system; made up mostly of hydrogen and helium (**gas giant**); has swirling bands of clouds with some giant storms (**Great Red Spot**) and many moons, mostly quite small
- **Saturn:** Ringed planet; similar in atmosphere and the number of moons but smaller in size than Jupiter
- **Uranus:** Smaller, mostly gaseous planet; has more methane and ammonia than Jupiter or Saturn (**ice giant**)
- **Neptune:** Outermost planet; similar in size and structure to Uranus
- **Dwarf planets:** Spherical bodies that orbit the sun but are smaller than planets

EX: Eris, Pluto, and some asteroids

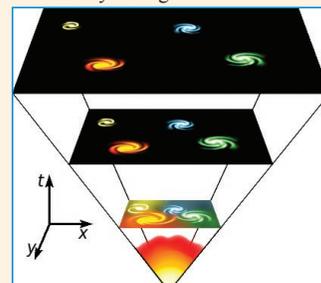
- **Asteroid:** Small, irregularly shaped rocky or metallic body that orbits the sun; mostly found between Mars and Jupiter
- **Orbit:** Elliptical motion of an orbiting body around its primary
- **Ecliptic:** Approximate plane in which bodies orbit their primary
- **Period:** Time it takes a body to make one complete orbit around its primary. (The period of the Earth around the sun is one

year; the period of the moon around the Earth is 28 days.)

- **Rotation:** Time it takes for a planet to spin once on its own axis. (The rotation of the Earth is 24 hours.)

The Expanding Universe

- **Big bang:** Origin of the universe where the fundamental rules governing existence were set in a colossal explosion roughly 13.8 billion years ago

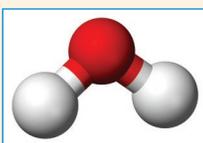
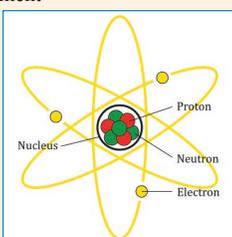


- Matter and existence are expanding outward similar to blowing up a balloon—the more air goes in, the larger the volume and surface area become.
- Distant objects are moving away from us at a faster rate.
- **Red shift:** Increase in wavelength (usually of light) when something is moving away from you
 - Ambulances sound higher in pitch coming toward you and lower in pitch moving away from you.
- **Galaxy:** Group of billions of stars held together by gravity
- **Black hole:** Body so dense that gravity prevents even light from escaping; often at the center of galaxies

PHYSICAL SCIENCE

Atoms & Molecules

- **Element:** Type of chemical that cannot be broken down into smaller parts
- **Atom:** Smallest unit of an element
 - **Nucleus:** Central unit of an atom composed of uncharged neutrons and positively charged protons
 - **Atomic number:** Number of protons in a nucleus; identifies the element
 - **Electrons:** Very small negatively charged particles that circle the nucleus in a cloud
 - **Isotope:** Type of atoms with different numbers of neutrons in the nucleus
 - **Atomic mass:** Average weight of an element based on the ratios of its isotopes
 - **Ion:** Charged form of a molecule that has too many (negatively charged) or too few (positively charged) electrons
 - **Periodic table:** Tool used to group elements based on their structure and characteristics
- **Molecule:** Chemical that can be broken down into smaller parts
- **Bond:** Attractive force holding two atoms together
- **Covalent bonds:** Two atoms stuck together by sharing electrons
- **Ionic bonds:** Two oppositely charged ions stuck together
- **Radioactive decay:** Change of one isotope into another element or isotope by losing a proton or neutron from the nucleus
- **Mole: Avogadro's number** (6.022×10^{23}): Number of atoms it takes to relate the atomic mass of an element or molecule to the number of grams that it weighs



Properties & States of Matter

- **Solid:** Densest form of matter; atoms have very little room to move
 - **Crystal:** Solid three-dimensional array of molecules bound together in a repeating unit
 - **Aggregate:** Different types of solid materials stuck together randomly
 - **Liquid:** Fluid form of matter; molecules are bound together but can move freely relative to one another
 - **Gas:** Vaporous form of matter; molecules are not bound to one another and move to fill up space
- Solids **melt** to form liquids that can then **evaporate** to form a gas. Gasses **condense** to form liquids that can then **freeze** to form a solid.
- **Density:** Unit of mass in a given volume; often given in grams per milliliter
 - **Concentration:** Number of molecules in a given volume
 - **Molar:** (M) moles per liter
 - **Percentage (%):** 1 gram per 100 mL (based on 1 gram of water weighing 1 mL)
 - **Ppm (parts per million):** One millionth of a gram (microgram) per gram of liquid or gas
 - Used for small quantities of often poisonous substances contaminating something

Chemical Reactions

- **Chemical reaction:** A change in the way two atoms share electrons; the formation or breaking of bonds
- **Balanced equation:** Description of a chemical reaction that has the same number of each atom on both sides of an equation
- Chemical reactions rearrange bonds but do not alter the elements that make up the molecule.

The Nature of Energy

- **Energy:** Quantitative property that must be transferred to an object to exert a force upon it
 - **Kinetic:** Energy of motion (e.g., wind or waves)
 - **Potential:** Energy stored within a substance based on its position in a field (e.g., a waterfall)

- **Elastic:** Energy stored in a stretched object (e.g., a spring or rubber band)
 - **Chemical:** Energy stored in the chemical bonds of a substance (e.g., fossil fuel or food)
 - **Radiant:** Energy of light (e.g., photosynthesis or solar cells)
 - **Thermal:** Energy of heat (e.g., geothermal energy or a steam engine)
 - **Electrical:** Energy of charged particles
 - **Nuclear:** Energy stored inside the nucleus of an atom (e.g., a nuclear reactor or nuclear bomb)
- Energy can neither be created nor destroyed, only changed in form.

$$E = m \times c^2, \text{ where } c = \text{speed of light}$$

Motion & Forces

Fundamental Forces

- **Strong nuclear force:** Holds neutrons to protons in the nucleus and holds all matter together
- **Weak nuclear force:** Short-range interaction that allows radioactive elements to decay
- **Electromagnetic force:** Attraction between positively and negatively charged particles
- **Gravity:** Long-range attraction formed between any two masses

Newton's Laws of Motion

1. An object in motion tends to remain in motion unless an outside force acts upon it (i.e., things keep moving in the same direction unless something stops them).
2. Force = Mass \times Acceleration (i.e., it takes energy to make something start moving or change direction).
3. When body one exerts a force on body two, body two exerts an equal and opposite force on body one (i.e., push against something and it pushes back with an opposite force).

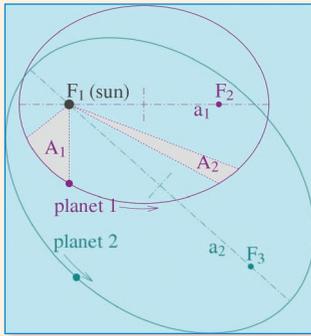
QuickStudy

Newton's Law of Universal Gravitation

Any two bodies attract each other with a force proportional to their mass and inversely related to the square of their distance (i.e., $F = G(m_1 \times m_2)/r^2$).

Kepler's Laws of Planetary Motion

1. The orbit of a planet is an ellipse with the Sun at one of the foci.
2. A line drawn from a planet to the Sun sweeps out equal areas in

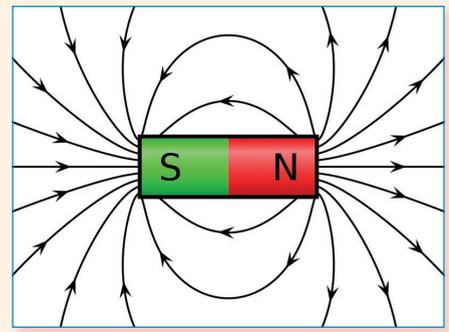


equal amounts of time (i.e., planets in orbit move faster the closer they are to the Sun).

3. The square of the orbital period is proportional to the cube of the semi-major axis of the orbit.

Electricity & Magnetism

- **Electromagnetic force:** Interaction of charged particles
 - Like charges repel (+ repels +, north repels north)
 - Unlike charges attract (– attracts +, south attracts north)
 - The force between two charges is proportional to the square of the distance between them.
- **Electricity:** Flow of electrons through a circuit
- **Magnetism:** Alignment of charged particles in a material; caused by the parallel movement of electrons
- **Electromagnetism:** Magnetic field generated by flowing electrons; only exists while the electrons flow
- **Ferromagnetism:** Property of some metals to form permanently aligned electric fields, giving rise to permanent magnets



- **Motors** convert electromagnetic energy into kinetic energy. **Generators** convert kinetic or thermal energy into electricity.
- The Earth generates a magnetic field due to the thermal flow of molten metals in the mantle and core.



SOCIAL STUDIES



CIVICS & GOVERNMENT

Key Terms

- **Civics:** Rights and duties of citizens
- **Government:** Political unit that exercises authority and performs functions for its people
- **Politics:** Process of governing
- **Nation:** Group bound together by unified characteristics

EX: Sikhs in India

- **State:** Clearly defined geographic area in which the people who live there permanently have given their elected leaders the right to rule them

EX: Vatican City

- **Nation-state:** A clearly defined nation that most people who live there consider their homeland

EX: Germany

Types of Governments

- **Democracy:** Translates to “rule by the people.” Can come in many forms
- **Direct democracy:** Also called “pure democracy.” Citizens participate directly in government, voting on all decisions themselves.

EX: Ancient Greece

- **Representative democracy:** All major government decisions are made by popularly elected officials, who are accountable to the people who elected them.

EX: United States

- **Parliamentary democracy:** The party (or a coalition of parties) with the greatest representation in the parliament forms the government.

EX: Germany

- **Constitutional monarchy:** The king or queen is primarily just a figurehead. The government functions as a parliamentary democracy.

EX: United Kingdom

- **Monarchy:** Undivided sovereignty or rule by a single person, such as a king

EX: Saudi Arabia

- **Dictatorship:** One person or a small group possesses absolute power without effective constitutional limits.

EX: North Korea

- **Aristocracy:** Rule by the elite class
- **Theocracy:** Rule by the church
- **Anarchy:** Also called “rule of the mob.” Arguably not a form of government at all

U.S. Constitution

Written document that organizes and guides all principles of the U.S. political state

- **Preamble:** Introduction to the Constitution that begins “We the People...”
- **Articles:** Outline seven powers or limitations of the government and its people.
- **Amendment:** Any change to the Constitution. Must

be approved by two-thirds of Congress and agreed to—or **ratified**—by three-fourths of the states. There are currently 27 amendments, including those that abolished slavery and gave women the right to vote.

- **Bill of Rights:** First 10 amendments to the U.S. Constitution:

1. Freedom of religion, press, speech, and assembly; freedom to petition the government
2. Right to keep and bear arms
3. No forced quartering of troops
4. No unreasonable search or seizure
5. Right against self-incrimination
6. Right to a speedy and fair trial
7. Right to a trial in front of a jury of peers
8. Freedom from cruel and unusual punishment
9. Citizens have rights beyond the Constitution.
10. Laws not outlined by the Constitution may be made by states.

Electoral System

- **Electoral College:** System in which the president and vice president of the U.S. are chosen. Each state is assigned a number of points or “electors” based on its population. A candidate must earn a majority of the 538 available electors to become president.
- **Popular vote:** A straight count of total ballots. Four U.S. presidents have been elected by winning the Electoral College, yet losing the popular vote: Rutherford B. Hayes (1876), Benjamin Harrison (1888), George W. Bush (2000), and Donald Trump (2016).
- **Democrat:** One of the two major U.S. political parties. Tends to favor more government intervention, as well as organized labor, civil rights of minorities, and progressive reform
- **Republican:** The other of the two major U.S. political parties. Tends to favor less government intervention, as well as lower taxes and conservative social policies
- **Independent:** Voter who chooses not to align with a political party
- **Political action committee (PAC):** Organization that raises and distributes campaign funds to candidates seeking political office

Democracy

Role of the citizen

- **Immigration:** Moving from one country to another
- **Naturalization:** Process by which people who move to the U.S. from other countries become U.S. citizens. Children are naturalized along with their parents.
- **Jury system:** All citizens are guaranteed the right to a fair and speedy trial by a jury of their peers. Citizens are obligated to serve as a member of a jury or as a **witness**, if called.

Sample questions 1 and 2—interpreting a table

Branch of Government	Consists of	Role/Checks & Balances
Executive	<ul style="list-style-type: none"> • President • Vice President • President's Cabinet 	<ul style="list-style-type: none"> • Enforces laws • Vetoes laws from Congress (House of Representatives and Senate)
Judicial	<ul style="list-style-type: none"> • Supreme Court (9 justices with lifetime appointments) • Federal courts across the country 	<ul style="list-style-type: none"> • Interprets laws and the Constitution • Overturns laws it interprets as unconstitutional
Legislative	<ul style="list-style-type: none"> • House of Representatives (435 representatives) • Senate (100 senators) 	<ul style="list-style-type: none"> • Makes laws • Overrides presidential vetoes

1. According to this chart, what would happen if Congress passed a law that was unconstitutional?

- A. The president would likely enforce it.
- B. The Supreme Court would likely overturn it.
- C. The legislative branch would likely override it.
- D. The Constitution would likely be amended.

2. Which choice correctly completes the following sentence?

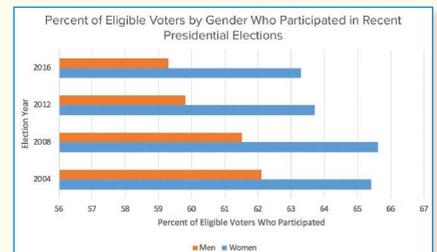
Congress has _____ members, including _____ senators and _____ representatives.

- A. 100, 535, 435
- B. 535, 435, 100
- C. 435, 535, 100
- D. 535, 100, 435

TEST TIPS: READING A TABLE

- Read all information in the table before looking at the questions.
- Make sure every part of a response is correct before selecting it.
- Focus only on the information in the table. Do not rely on outside knowledge.

Sample question 3—interpreting a graph



3. Which of the following is a conclusion based on the graph?

- A. Less than half of eligible male voters voted in 2016.
- B. Overall voter turnout has gone down consistently since 2004.
- C. 2008 had the highest percent of female voter turnout.
- D. 2004 had the highest percent of female voter turnout.

TEST TIPS: PARTS OF A GRAPH

- **Title:** Theme or purpose of the graph. This graph is about voter turnout in recent presidential elections.
- **Axes:** Most graphs have two—*x* (bottom) and *y* (side) axes. In this graph, the *x*-axis represents the percent of eligible voters who participated in the election, and the *y*-axis represents the election year.
- **Legend:** Color-coded (or shaded) indicator of what each bar represents. On this graph, men are orange and women are blue.
- **Plot area:** Where all the data is displayed
- **Fine print:** Read each graph carefully, even those that seem simple. This graph's *x*-axis starts at 56. If you assumed it started at zero, you may have chosen an incorrect answer.

Sample question 4 and 5—reading and responding to a passage

“Voting in Local Elections”

More people than ever before are running for office. But most of them aren't running for Congress or a higher office. They are running for their city councils, school boards, and other local positions. While it's great that so many more people are getting involved, it's even more important that people vote in those elections. Many

voters only turn out to the polls when it's a big election year, not realizing that local politics actually have more of an impact on their everyday lives. So how do you know who's running for office in your city or town? Ballots can vary greatly from one state or city to the next. You can check with a local elections clerk in your city or county, or you can contact your state's Secretary of State. You can also visit online resources, such as Ballotpedia or the League of Women Voters to see a sample ballot. Bring your sample ballot with you when you go vote on Election Day, no matter who is on your ballot.

4. Which of the following is assumed—but not stated—in this article?
 - A. Finding out when to vote in a local election is extremely complicated.
 - B. Voting for local city council members is just as important as voting for president.
 - C. Online sample ballots can tell you when you should be voting.
 - D. Sample ballots are not a useful tool for local elections.
5. According to this article, all of the following are true about voting in local elections EXCEPT:
 - A. More people are running for local office.
 - B. Sample ballots are available online.

- C. Local elections look pretty much the same everywhere.
- D. Local government officials can help determine when you should vote.

TEST TIPS: READING & RESPONDING TO A PASSAGE

- Read the entire passage carefully before attempting to answer the questions.
 - Read all four answer options thoroughly.
 - Look for key words. In question 4, the word “assumed” means that you're looking for information that was not explicitly stated, but implied by the author.
 - Understand what the question is asking. In question 5, you are asked to find the one item that is NOT true.
1. Answer: B. The Supreme Court overturns laws it interprets as unconstitutional.
 2. Answer: D. Congress has 535 members, 100 senators, and 435 representatives.
 3. Answer: C. The blue “women” bar was greatest in 2008.
 4. Answer: B. The comparison to voting for president is assumed, not stated. The other choices are either stated in the article or are not true, according to the article.
 5. Answer: C. This is the only answer that is not true.

U.S. HISTORY

Exploration to Revolution

- **Native Americans:** Populated North America before European settlers. Many were **nomadic**, or traveled from place to place. Others lived in huge cities of up to 40,000 people. Settlers took their land and forced native peoples onto **reservations**. The largest removal was called the **Trail of Tears**, forcing 100,000 people from five major tribes to travel over 5,000 miles on foot.
- **Colonies:** European nations—Spain, France, England, Netherlands, and others—settled in modern-day North America in the 1500s and 1600s. The first North American settlement was **Jamestown**, Virginia, in 1607. **Pilgrims** sailed the **Mayflower** and established a second colony in present-day Massachusetts in 1620. Colonists started importing slaves by 1675. There were 13 colonies by the Revolutionary War.
- **Revolution:** Unfair British practices, including “taxation without representation,” led to the **Declaration of Independence**, written by **Thomas Jefferson** on July 4, 1776. The Declaration declared that “All men are created equal” and were owed “life, liberty, and the pursuit of happiness.” The **Second Continental Congress** appointed George Washington leader of the **Continental Army**. Britain's enemy, France, supplied colonists with money and supplies. Many who were loyal to Britain—**loyalists**—fled back to England or to Canada after the colonists won and established the United States.

Civil War

- **Slavery:** Abolished from northern states by the early 1800s. Abraham Lincoln was elected president in 1860 and vowed to end slavery. Southern slave states formally left—**seceded from**—the U.S. to establish a new government (the **Confederacy**), which was at war with the U.S. (the **Union**) by 1861.
- **Outcome:** The Confederacy was better trained, had more soldiers, and won early battles. But the Union had more weapons, food, and other supplies. Confederate General Robert E. Lee surrendered to Union General Ulysses S. Grant on April 9, 1865.
- **Reconstruction:** Effort by federal troops to rebuild the south for 12 years after the war. All slaves were freed and schools were established. Southern whites tried to limit black Americans' rights in other ways, leading to the **Civil Rights Movement** of the 1960s.

Industrialization & World Power

- **Industrialization:** American industries grew quickly in the mid-1800s. Immigration to the U.S. rose because of demand for work. This became an era of social

inequality, or the **Gilded Age**, which led to **labor unions**, or organized workers demanding better working conditions and more pay. Factories were in cities, so people moved from farms to urban areas in record numbers.

- **World War I:** Began in 1914 with the assassination of Franz Ferdinand of Austria. It eventually turned Germany and Austria-Hungary against Britain, France, and Russia. President Woodrow Wilson tried to keep the U.S. neutral, but joined in 1918 after two battles that killed Americans. Germany was forced to sign the **Treaty of Versailles** at the end of the war, accepting all blame and paying significant reparations.
- **World War II:** Germany was humiliated and bankrupt after WWI, so Nazi Adolf Hitler was able to take power. Germany invaded Poland in 1939 and started WWII. President Franklin Roosevelt kept the U.S. neutral until German ally Japan dropped a bomb on Pearl Harbor in 1941. American troops helped recapture territory lost to the Nazis and liberate concentration camps, where millions of European Jews and political prisoners were killed. The U.S. emerged as a major world power.
- **Cold War:** After WWII, U.S. ally Russia felt excluded, especially after the U.S. dropped atomic bombs on Japan. Both the U.S. and Russia worried that the other was developing more atomic weapons. This led to several indirect conflicts between the U.S. and Russia, which became the communist Union of Soviet Socialist Republics (**USSR**) in 1949. The Cold War ended when the USSR fell in 1989.

Sample question 1—interpreting a map



1. Some states were loyal to the Union, but still allowed slavery. These states were also called:
 - A. Border states
 - B. Nearly free states
 - C. Seceded states
 - D. Territories

TEST TIPS: INTERPRETING A MAP

- Always read the title of the map first.
- Look closely at the legend (information in the box) to determine what the map is showing.
- Look for any other details not explained by the title or legend. In this case, “Federal Territory” and “Indian Territory” are also labeled.

Sample questions 2 and 3—reading and responding to a passage

Excerpt of an exchange between author Pearl S. Buck and First Lady Eleanor Roosevelt:

I am writing to you as one American woman to another about the plight of the Japanese-Americans in the western part of our country. I do not doubt that you are receiving, as I am, many letters from Americans, not Japanese, protesting against the inhuman and cruel treatment of the Japanese-Americans. It is not only what is being done to the Japanese but it is the effect upon our own people that is so evil. I want to do anything I can but I write to ask your advice as to what can be done. It seems to me that the way that these people are being treated is so much more German that it is American.

—Pearl S. Buck, 1942

I regret the need to relocate, but I recognize it has to be done. I have heard high praise for the Army's handling of the complicated process. The resettlement is being as well done as could be expected.

—Eleanor Roosevelt, 1942

2. When Pearl S. Buck said that the treatment of Japanese-Americans was “more German that it is American,” she was:

- A. Complaining that Japanese-Americans are eating too much German food.
- B. Suggesting that Germans were superior to Americans.
- C. Comparing Japanese internment camps to German concentration camps.
- D. Implying that President Roosevelt should be impeached.

3. What are two words to describe Mrs. Roosevelt's response?

- A. Understanding and patient
- B. Angry and disbelieving
- C. Brief but caring
- D. Dismissive and untrue

1. Answer: A. “Loyal slave states” were on the border, between the Union and the Confederacy. They remained neutral during the war.

2. Answer: C. Germans forced Jews to relocate to extermination camps, and Americans forced Japanese-Americans to relocate to internment camps.

3. Answer: D. The tone was dismissive and the information was untrue. Be aware of the difference made by small words like “and” and “but.”

QuickStudy ECONOMICS

Analysis of the production, distribution, and consumption of wealth

Microeconomics

Economic behavior of individuals or firms; small in scale

• There are two types of economies:

- **Planned economies:** Government determines market prices of goods and services, as well as what is being produced and the quality of production.
 - Advantages: Large number of shared goods (transportation, schools, hospitals)
 - Disadvantages: Wastefulness of resources

EX: North Korea, former Soviet Union

- **Market economy:** Privately owned businesses providing goods or services based on demand. Production (supply) is based on demand.

EX: United States

- Market economies are one of two markets:

Competitive Market	Free Market
<ul style="list-style-type: none"> • Large number of buyers and sellers • Individual buyers or sellers can't control market or price 	<ul style="list-style-type: none"> • Private trades between buyers and sellers • Prices determined without government intervention or monopolies

• **Supply and demand:** Most important concept in a market economy. Combination of price and consumer desire. Affects both quantity of production and cost of product:

- High supply + High demand = Reasonable price
- High supply + Low demand = Low price
- Low supply + High demand = Very high price
- Low supply + Low demand = Very low price and unsustainable
- Limited resources + High demand = **Scarcity**

• **There are four factors of production:**

- **Land:** Renewable and nonrenewable resources

- **Labor:** Effort by people to produce goods and services
- **Capital:** Tools to create goods and services
- **Entrepreneurship:** Combines land, labor, and capital to create new goods and services

• **Purpose of taxes, subsidies, and price controls:**

Taxes	Subsidies	Price Controls
<ul style="list-style-type: none"> • Government revenue • Discourage "bad" products such as cigarettes. 	<ul style="list-style-type: none"> • Lower price of goods and services • Reassure supply of goods and services. • Opportunities to compete overseas 	<ul style="list-style-type: none"> • Emergency measures when government intervention is necessary. • Set minimum or maximum price for goods and services.

Macroeconomics

Economic behavior of a society or nation; large in scale

• **Gross domestic product (GDP):** Total market value of goods and services produced by a country's economy during a specified period of time. This is the main indicator of a country's economic performance. GDP does not measure **income distribution**—how money is divided—quality of life, or natural disaster losses. It does include unemployment rates, savings, **deficit spending**—governments spending more than they take in—and **inflation**, or the rise in the general level of prices over time.

• **Monetary policy:** Controlled by the **central bank** of a country, which regulates a nation's money supply, availability and cost of credit, and the foreign-exchange value of currency.

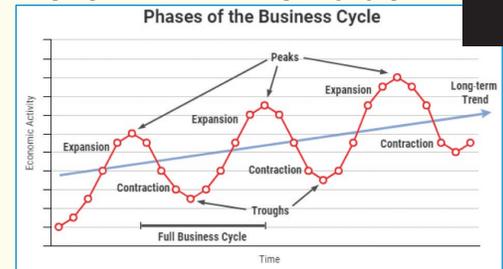
EX: U.S. Federal Reserve System

- There are three main features of a monetary policy:
 - Make sure banks have enough money in reserves.
 - Adjust **interest rates**—a percentage added to an amount of a loan.
 - Buy and sell government funds in the open market to control the amount of money in the banking system. This is called **open market operations**.

U.S. System

• **Economic development:** Based on **free enterprise**—anyone is free to start a business—and **competition**. Individuals and businesses are the main factors in the health and growth of the U.S. economy.

Sample question 1 and 2—interpreting a graph



- One full business cycle includes:
 - At least three troughs
 - A long-term trend
 - A peak, a contraction, and another peak
 - At least three peaks
 - Which of the following conclusions is supported by this graph?
 - Governments must intervene when an economy contracts.
 - Periods of expansion are typically followed by periods of contraction.
 - Repeated cycles of peaks and troughs will weaken an economy long term.
 - The pattern of business activity is impossible to predict.
1. Answer: C. A full cycle peaks, contracts, and peaks again. Study all parts of a graph before answering the question.
2. Answer: B. In the graph, contraction immediately follows expansion.

GEOGRAPHY & THE WORLD

Key Terms: Maps & Globes

- **Latitude:** Distance of locations either north or south of the **equator**—an imaginary east/west line drawn around the middle of the Earth
- **Longitude:** Distance of locations either east or west of the **prime meridian**—an imaginary north/south line around the Earth that starts at Greenwich, England

Early Civilizations

- **Ancient Egypt:** One of the earliest civilizations. It started with people who lived along the **Nile River** in 5000 BCE. Kings called **pharaohs** were ruling by 3000 BCE. Egyptians built their famous pyramids as tombs for their pharaohs.
- **Ancient Greece:** Not a unified country, but city-states fighting for control. City-state Sparta was warlike and took over many others. City-state Athens was the birthplace of **democracy**. Ancient Greece lasted only a few hundred years, but its ideals still persist.
- **Ancient Rome:** Conquered ancient Greece and other countries—as far north as England and into Asia. Employed a set of laws still used by countries such as the U.S. (e.g., innocent until proven guilty). Built roads that still exist, as well as a tax system, schools, hospitals, and an army.

Middle Ages

- **Feudalism:** Emerged during the Middle Ages (CE 500 to 1500) after the fall of

Charlemagne, who unified much of Europe after the Roman Empire. Kings controlled all land and gifted portions to nobles. Knights protected the nobles' land and peasants farmed it. Nobles paid taxes to kings, and peasants paid taxes to nobles. Feudalism lasted in Europe for several hundred years and helped keep peace.

- **Islam:** Founded further to the east during the early Middle Ages by prophet Muhammad (born 570 CE). Followers were called **Muslims**, who conquered much of Middle East and northern Africa. The empire did not last, but the Islamic religion did.
- **Crusades:** Series of holy wars in the late Middle Ages in which Christians and Muslim Turks fought over Jerusalem. Christians won, but only held it for 90 years. The true impact was the trade route that was opened from Europe through the Middle East to China. Feudalism eventually declined as merchants and commerce increased.

Humans & the Environment

• **Conservation:** The sustainable use of natural resources so humans don't exhaust them. Current use of certain resources means that they may soon run out. Conservationists warn that this may affect Earth's **ecosystems**, or organisms interacting with their physical environment (e.g., deserts, tropics, oceans). When natural resources become threatened, populations

are negatively affected, especially those who live near the resources.

• **Demographics:** The study of human population. Affected by **migration**—movement of people from one area to another—and **settlement**. Migration is governed by two primary causes:

- **Push factors:** Reasons to leave a place.
- **Pull factors:** Reasons to go to another place.

 Demographics also considers **ethnicity**—a group of people with a common language, society, culture, or heritage—and **linguistics**—the study of language.

Sample question 1—applying a definition
Renewable resources are resources that can be replaced or replenished in the same or less amount of time as it takes to use them. **Nonrenewable resources** are materials that humans use and then cannot replace.

- Which of the following is an example of a nonrenewable resource?
 - Solar panels on the roof of a house
 - Wind turbines in an open field
 - Water turbines in a fast-moving river
 - Oil fields mining for fossil fuels

TEST TIPS: APPLYING A DEFINITION

- Understand the definition before reading the responses.
- Often, one choice will stand out as different from the others.

Sample question 2—finding the average, median, and mode

In a town with constant push and pull migration, the population over a five-year period also changed:

Year	Population
2017	22,325
2016	20,100
2015	22,325
2014	18,100
2013	18,175

- What is the average population?
 - 18,175
 - 20,100
 - 20,205
 - 22,325

TEST TIP: FINDING THE AVERAGE, MEDIAN & MODE

Don't be intimidated by large numbers. The process is always the same.

- Answer: D. All the resources except oil can be replenished.
- Answer: C. To find the **average**, add all numbers and divide by how many there are (in this case, divide by 5). To find the **median**, put all the numbers in order and choose the one in the middle (20,100). To find the **mode**, choose the number that appears most often (22,325).

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