

ACT SCIENCE

Overview

- Consists of 6 – 7 passages
- Time = 35 minutes to answer 40 questions.
- 5 – 6 questions per passage
- In each passage, questions are in order of difficulty.
- Passages are derived from either Life Science (Biology) or the Physical Sciences (Physics, Chemistry and Earth Science)
- General Question Types:
 - **Factual** – are based on facts or data that are clearly presented in either the introductions to the questions or in tables, charts, and figures.
 - **Inference** – require you to think a little bit more and find an answer that may not be a number in a data table or the main idea. Draw conclusions from an experiment.
 - **Extreme** – are combinations of factual and inference questions. What makes them so difficult is that they often require you to pick conflicting information from different experiments or graphs and then analyze them. One or two in Data and Experiment passages. Two or three in Fighting Scientist passage. Don't waste valuable time on these types of questions.
- General Passage Types:
 - Data Representation (reading charts & graphs)
 - Experimental Summaries (reading charts & graphs and understanding the Experimental process).
 - Fighting Scientist (reading passage)
 - Hybrid (a blend of the above 3 passages)

Suggested Prior Knowledge

pH scale

- Acids have a LOW pH
- Bases have a HIGH pH
- Pure water is right in the middle (pH = 7)

Charges

- Can be + or -
- Opposite charges attract (move toward each other)
- Same charges repel (move away from each other)

Density

- Density is how “packed” a substance is
Ex) Wood is less dense than lead.
- Something with a low density will float in something with a high density.
Ex) Wood floats in water, so wood must be less dense than water.
Lead sinks in water, so lead must be more dense than water.



Energy

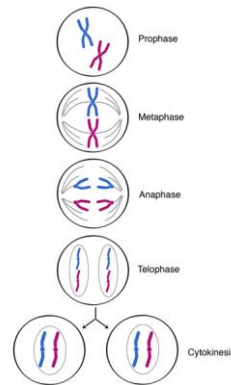
- Potential Energy = energy from your position
The higher you are, the more potential energy you have.
- Kinetic Energy = energy from motion
The faster you're moving, the more kinetic energy you have.
- In general, when one goes up, the other goes down.
Ex) You are sitting at the top of a slide. You have high potential energy, but no kinetic energy. You slide down the slide. Your potential energy goes down, but your kinetic energy goes up.

Genes

- Your 23rd chromosome determines your sex. Women have XX; men have XY.
- A gene with a capital letter dominates (wins) over a gene with a lowercase letter.
*Ex) The gene for brown eyes is *B*. The gene for blue eyes is *b*. If you have *BB* or *Bb*, you will have brown eyes. However, you can have blue eyes if you have *bb*.*

Steps of Mitosis

1. Prophase: Chromosomes condense
2. Metaphase: Chromosomes line up in middle of cell
3. Anaphase: Chromosomes separate and pull apart
4. Telophase: Cells start to divide.



Cytokinesis = The cell divided into 2 daughter cells

★ ACT Science Strategies for Different Passages ★

Data Passages

1. **Skip the reading** and go straight to the first question.
2. **Refer back** to the charts/graphs/passages only as needed.
3. If a question asks about a relationship between two variables, **draw it out with arrows**. Make sure you check the entire column for a consistent relationship. Sometimes the first nine pieces of data will indicate a trend upward but the tenth will ruin that trend. **Be careful!**
4. Often questions require you to “interpolate” or “extrapolate” missing data. This simply means finding values not listed on the chart that are either between two given values or outside of a given value. Look for words like “infer” or “deduce.” These are hints that the data will not be presented directly in the charts. Make sure to mark up the charts where the data would be.



Experiment Passages

1. **Read questions first.** Label the questions for Experiment 1, Experiment 2 (or 3, etc.) or both.
2. **Divide and conquer.** Split the experiment like a double passage in the reading section. Read Experiment 1, answer Experiment 1 questions, and then go to Experiment 2 and answer those questions. Make sure you read the experiments first because you might miss specific details if you don't. If possible, jot a one or two word main idea.
3. **Ask yourself key questions:**
 - a) What is being tested?
 - b) Why is it being tested?
 - c) What are the variables?
 - d) What are the factors that stay the same?
4. **Be able to recognize the format of a scientific experiment:**
 - a) Independent variable – What the investigator manipulates/changes
 - b) Dependent variable – What is measured or observed; the “data” collected
 - c) Experimental Group – Participants exposed to the independent variable
 - d) Control Group – Participants treated like experimental group EXCEPT they're not exposed to the independent variable; the group to which the experimental group can be compared
 - e) Assumption – A fact you are depending on for your experiment to work
5. **Watch out for the last question.** This is often extreme, inference and/or doesn't follow the rules of the science section. Skip it if necessary (put down an answer) and come back at the end. Remember, all questions are worth the same!

Fighting Scientists Passages

1. **Read everything up to the end of Scientist 1.** Jot down the main idea of Scientist 1 in 3-5 words. “Deforestation causes severe global warming” is a good example of a main idea.
2. **Answer the questions that deal with Scientist 1 ONLY.** Focus on the main idea. If the answer does not relate to concepts mentioned by Scientist 1, they can be eliminated.
3. **Jot down the main idea of Scientist 2** in 3-5 words. Be prepared, Scientist 2 will offer some criticism or critique of Scientist 1. “*Deforestation affects global warming, but only very slightly.*” This is a critique of the first position that deforestation contributes to severe global warming. After you have read up to the end of Scientist 2, answer only Scientist 2 questions.
4. Repeat this process. There may be up to 4 scientists each with his/her own viewpoint.
5. Once you have answered all questions that deal with ONLY one scientist, you should **move on to the questions that involve more than one scientist.**

★ Complete in the Following Order★

1. Complete all Data Passages first, about 3-4 minutes a passage (for regular-time students)
2. Hybrid Passages next, about 5 minutes a passage (for regular-time students)
3. Experimental Passages 3rd, about 5-6 minutes a passage (for regular-time students)
4. Fighting Scientist is completed last. Use your remaining time here, about 7 minutes (for regular-time students)



★ ACT Science *General Strategy Tips* ★

- **Read Quickly:** Read ACT Science passages quickly, just to get the gist of what the experiment is generally about. Then, glance at the graphs and go to the questions.
- **Not in the Blurb:** Information is often not in the blurb for “hypothesis” or “experiment” questions. These are to be tackled like regular inference questions.
- **Use Italics:** If a term is italicized and defined in the passage, use that definition instead of your own definition.
- **Look at the Paragraphs:** When you see a question that refers to a graph, but you don’t see the terms from the question in the graph, look at the paragraphs.
- **Know Yourself:** If you are a “slow” processor, jump to the questions and avoid the blurb (go back to this if necessary). If you are “fast” processor, skim the blurb, circling key words.
- **Count the Number of Passages:** If there are seven passages, you can apply DEF567 to determine passage type and apply strategies as learned to-date. If there are six (or anything other than seven) passages, it is a tiny bit trickier, so follow the approach detailed below.
- **Be Careful of the Last Passage:** The last passage is often about a high-level topic that seems to have been intentionally written just to throw people off. In reality, even though the topics are quite abstract and unknown, the passages should be quite analyzed as straight-up, data passages.
- **Fighting Scientists are Easy to Spot:** Look for headings such as, “Student”, “Scientist”, “Theory”, or “Hypothesis”... essentially almost any heading OTHER than “Study”, “Experiment”, or “Trial” will mean Fighting Scientists.
- **Divide and Conquer:** Treat an experiment passage like a double passage in the reading section. Read Experiment 1, answer Experiment 1 questions, and then go to Experiment 2 and answer those questions. Finally, answer the comparison questions. If possible, jot a one or two word main idea when you read each experiment to make the comparisons easier.
- **Treat Vocabulary like Vocabulary:** You should study your Science Glossary words as you would study other vocabulary words. Making flash cards or using Quizlet are great ways to learn prior-knowledge terms.
- **What kind of student am I?**
 - Science student – Don’t overthink the passage content.
 - English student – Don’t panic over the numbers and write notes in margins to stay focused.
 - Math student – Don’t recalculate all of the data or get lost in numerical detail; instead, focus on the main idea of the passage.
- **Ask yourself:** What is being tested? Why is it being tested? What are the variables? What are the factors that stay the same?
- **Mark it Up:** Marking up the science passages helps you avoid careless mistake. Draw lines on your graphs and circle numbers in your charts. You should also use your reading strategies (circle/underline key words, italics, specific information, etc.) to annotate important information in the blurb.
- **Scavenger Hunt:** The science section does not test your understanding of science, but rather your ability to read charts and graphs. Look where the questions tell you to look and find what the questions ask you to find! (ACT Science)
- **Save the Fighting Scientist for Last:** If you are a slow reader, save the Conflicting Viewpoints questions to the end. Do them last!



- **Label your Questions:** For passages with multiple experiments or fighting scientists, label each question for the various experiments and scientists.
- **Reread and Trust the Obvious:** Don't get intimidated. Questions often look trickier than they actually are. If the wording of a question is confusing, reread it a few times and then do the thing that seems most obvious.
- **Finding the Main Idea:** In experiment passages, the main idea is often the last sentence of the experiment. In "fighting scientist" passages, focusing on thought-reversers and the first and last sentences will help you find the main idea.
- **Notice the Little Asterisk:** The asterisks in the ACT Science passages are very important. Asterisks indicate important information that is easily overlooked. Many questions ask about the information presented in the asterisk note.
- **Follow Directions:** If a question refers to more than one chart or table, you really do need to use both of those charts or tables to answer the question. Don't skimp by only looking at one.
- **Eliminate If Not Mentioned:** On vague conceptual questions, especially in the Fighting Scientist passage (conflicting viewpoints), eliminate answer choices that refer to things never mentioned in the passage.
- **Tell a Story:** The charts and graphs tell a story. Figure out the story of the numbers and the questions will be a breeze.
- **Order of Difficulty:** Passages do not go in order of difficulty. However, questions go in order from easiest to hardest within each passage, and the last question is often tricky or extremely difficult.

★ ACT Science General Question-Type Strategy Tips ★

Locators

- The majority of the questions of the different Science passages, all require you to find locators (where to look in the passages)!! You are locating where every part of the question is located in the tables, graphs and/or passages. Many times, you are locating a few different things!
- Circle all the locators (where you are looking in the passage - ex: Figure 1 and Table 2).
- As you are reading the question, you are locating every part the questions are referring to!
- If you cannot find the locators in the tables and graphs, go back and look at the reading!

Matching

- Remember almost all the questions on the Science are matching questions! If it is not a table/graph, then look to match the phrases they are asking about in the given question.
 - Sometimes you may not be able to match "word for word" but you can still look for a similar idea in the passage, to the question, when trying to find answers
- This strategy is especially true in the Fighting Scientist Passages!

"If" or "Suppose" Questions = Draw-In

Sometimes the question asks you to predict another data point or what would happen if you added to a certain experiment. In this case, we add this new data to our graphs or tables (extend graph lines or add to the given table).

Relationship Questions

- Will ask you about one part of the table or graph increasing or decreasing
- Whenever you see this word "relationships" you automatically know it is referring to the arrows you just drew in the tables (or slopes in graphs!)
 - **Direct relationship:** increase or decrease in one variable causes the same change to occur in the second variable (both arrows up, or both arrows down)
 - **Indirect relationship:** the relationship between two variables which move in opposite directions; when one of the variables increases the other variable decreases (one arrow up, one down)
 - **Indirect relationship:** the relationships between the data keeps changing, therefore there is no relationship (no consistent pattern between arrows)
- When given an "IF" question with multiple data values to add into the given table --> relationships (arrows) usually help you figure out where they fit!

Questions Asking to increase/decrease a variable in an Experiment:

- This is a "hidden" relationship question!! The best way to go about answering these questions, is to look at the relationships (arrows) of all the variables the question is referring to!

Questions Direct you to the "reading part" of the passage

"Based on the study", "According to the information", "According to the passage" and "Based on the passage" are key phrases that let you know the information (or part of the information) you are looking will be located in the reading sections (esp in the introduction).

Math (estimation) Questions:

The Science section doesn't allow a calculator; therefore, every time you come across a "Math" on the science section, you can estimate! If you catch yourself doing some time-consuming Math, you are answering the question incorrectly or taking too long to get to the answer!

"Bridge" or "Link" Questions

Every time a question is asking you to look at two things in the passage (ex: Figure 1 & Table 2), You are looking for what the two figures/passages have in common and what is different. This is what will "link" the two figures/passages they are referring to, and help you answer the question.

Cannot be Determined as an Answer Choice

It is ok to pick "Cannot be determined" if you cannot locate the information the question is asking you *anywhere* in the passage.

Mixing & Average Questions

Whenever you see the words mix or mixing in the question, , look for the middle data value between the given ones.

Answer/Reason Questions (most commonly seen as "Yes/Yes/No/No") are all designed the same way.

They give you an answer to the question, and an explanation as to why that is the correct answer.

- **Step 1:** Read the question, and then read the multiple-choice options, ignoring the first part of the multiple-choice options (the answers). It is easier to look at the second half (the explanation) first, because it can be supported by the given data. This part is not the answer to your question;



they are facts that can be found in the passage. See which reason is not supported by the data (that should cancel 2 of your multiple-choice options).

- Sometimes the reason might be a common sense reason (not stated in the passage!)
- **Step 2:** Go back and re-read the question again. Make sure you understand what the question is asking you! Then re-read the 1st part of multiple-choice options (the answers). Pick the right answer to the question.
- Sometimes, the Answers or Reasons may be more "common-sense" types. You can recognize these because the reasons won't be found in the passage.

Last Questions

Expect some sort of "trick". It probably won't be straightforward!

- Remember, the last questions of every passage usually requires 2 steps, expects some outside knowledge, and/or may ask you to draw a logical conclusion from the information presented in the passage.
 - Sometimes the 2 steps might be looking at a graph and finding information in the reading part of the passage, if you cannot locate it in the graphs or tables. The extra information is almost always in the introduction!
- Look for the *italicized* words in the passage when answering last questions!
- Read anything with an *, there will most likely be a question about it, most likely the last.
- Sometimes last questions might require you to find locators that are all over the passage
- Last Questions may also require you to look at the overall purpose of the passage

Outside Knowledge Questions

- Remember, sometimes you might have to know some outside knowledge. You will typically know this is the case if your questioning it, and it's a last question.
- Outside Knowledge questions are obvious because they contain Science terminology that isn't located in the passage! For example, words like: drag force, vegetation, electrons, and protons; acidic, basic, etc are all science words!

Equations as answer choices

- Units can help you solve these question-types, sometimes with no other work!
 - When equations or expressions are answer choices, first look at what unit the answer to the question will be in (located in the question).
 - Then scan the multiple choice options, checking to see which of them will give you the desired unit
- Sometimes these question-types may be answered by examining the relationships of variables (direct/indirect/no relationship).
- You may also pick a point on the figure or a row on the table and plug in those values into the answer choices (use this strategy if the above 2 don't work, as this option takes the longest).

Scatterplot Questions

- On a scatterplot, each point represents the data that was obtained while conducting the experiment. A line of best fit will go through the points.
- These Questions will ask you to find how many times the experimenter obtained results. You can find your answer by identifying the time axis and then counting how frequently the points are plotted in the figure.



ACT Science Glossary of Terms

This glossary is meant as a tool to prepare you for the ACT Science Reasoning Test. You will not be asked any vocabulary questions on the ACT Science Reasoning Test, so there is no need to memorize any of these terms or definitions. However, reading through this list will familiarize you with general science words and concepts, as well as terms you may have encountered in the practice questions. These terms come from all the areas of science found on the ACT (Biology, Chemistry, Earth and Space Science, and Physics), but it is not guaranteed that any of the terms below will be included on an official ACT Science Reasoning Test.

- **Acceleration**—The rate that velocity changes per unit time and the direction it changes in. Computed from the change in velocity divided by the change in time. Common units are meters per second squared (m/s^2)
- **Acceleration due to gravity**—The acceleration of an object that is only acted on by the force of the Earth's gravity. This value is given the symbol g and near the surface of the Earth it has a value of approximately $9.8 m/s^2$. The direction of the acceleration due to gravity is vertically downward.
- **Accuracy**—The closeness of an experimental measurement to the accepted or theoretical value.
- **Acid**—A substance that is a proton donor. The pH of an acid is less than 7.
- **Aqueous solution**—A solution in which the solvent is water.
- **Astronomy**—The study of planets, stars, and space.
- **Atom**—The smallest structure that has the properties of an element. Atoms contain positively charged protons and uncharged neutrons in the nucleus. Negatively charged electrons orbit around the nucleus.
- **ATP**—(Adenosine Triphosphate)—A chemical that is considered to be the “fuel” or energy source for an organism.
- **Base**—A substance that is a proton acceptor. The pH of a base is greater than 7.
- **Calibration**—The examination of the performance of an instrument in an experiment whose outcomes are known, for the purpose of accounting for the inaccuracies inherent in the instrument in future experiments whose outcomes are not known.
- **Catalyst**—An agent that changes the rate of reaction, without itself being altered by the reaction.
- **Cell membrane**—An organelle found in all cells that acts as the passageway through which materials can pass in and out. This organelle is highly selectively permeable, only allowing materials to pass through that it “chooses” chemically.
- **Cell wall**—An organelle found primarily in plant cells and fungi cells, and also some bacteria. The cell wall is strong structure that provides protection, support, and allows materials to pass in and out without being selectively permeable.
- **Centripetal force**—The net force that acts to result in the centripetal acceleration. It is not an individual force, but the sum of the forces in the radial direction. It is directed toward the center of the circular motion.
- **Chemical change**—A process that involves the formation or breaking of chemical bonds.



- **Chromosomes**—An organelle that contains the entire DNA of the organism.
- **Component**—The part of a vector that lies in the horizontal or vertical direction.
- **Compound**—A substance composed of more than one element that has a definite composition and distinct physical and chemical properties.
- **Concentration**—A measure of the amount of solute that is present in a solution. A solution that contains very little solute is called dilute. A solution that contains a relatively large amount of solute is said to be concentrated.
- **Conclusion**—The last stage of the scientific method where explanations are made about why the patterns identified in the analysis section occurred.
- **Constellation**—An apparent grouping of stars in the sky that is used for identification purposes. These stars are not necessarily near each other in space since they are not necessarily the same distance from the Earth.
- **Continental rift**—The region on a continent where new crust is being created, and the plates on either side of the rift are moving apart.
- **Convergent boundary**—A boundary between two of the Earth's plates that are moving toward each other.
- **Cosmology**—The study of the formation of the universe.
- **Crystal**—A solid in which atoms or molecules have a regular repeated arrangement.
- **Current**—The flow of charge past a point per unit time; it is measured in Amperes (A).
- **Cytoplasm**—A jelly-like substance located in the cell where all of the internal organelles can be found. The **cytoplasm** consists primarily of water and supports the cell and its organelles.
- **Cytoskeleton**—Organelles that are the internal “bones” of the cell. They exist in thick and thin tubules.
- **Decibel**—A unit of measure for the relative intensity of sounds.
- **Declination**—The celestial coordinate similar to that of latitude on the Earth. Declination measures how many degrees, minutes, and seconds north or south of the celestial equator an object is.
- **Delta**—A fan shaped deposit of material at the mouth of a river.
- **Density**—The mass of a substance for a given unit volume. A common unit of density is grams per millimeter (g/ml).
- **Displacement**—The change in position of an object. Computed from the final position minus the initial position. Common units of measure are meters (m).
- **Divergent boundary**—A boundary between two of the Earth's plates that are moving away from each other.
- **DNA**—Contains all genetic material for an organism. The smallest units of DNA are called *nucleotides*.
- **Ecliptic**—The apparent path of the Sun across the sky over the course of a year.
- **Electric potential energy**—The energy due to an object's position within an electric field.
- **Electromagnetic wave**—A light wave that has an electric field component and a magnetic field component. An electromagnetic wave does not require a medium to travel through.
- **Electrostatic force**—The force that exists between particles due to their charge. Particles of like charge repel, particles of unlike charge attract.
- **Element**—The smallest entity that has distinct chemical properties. It can not be decomposed by ordinary chemical reactions.



- **Ellipse**—A geometric shape that is formed when a plane is intersected with a cone. In this case the plane intersects the cone at an angle so that a shape similar to a circle but stretched in one direction is formed. The orbits of the planets around the sun represent ellipses.
- **Endoplasmic reticulum**—An organelle that is used to transport proteins throughout the cell.
- **Energy**—The ability to do work or undergo change. Kinetic energy is the energy of motion, while potential energy is stored energy.
- **Equilibrium**—A state at which the forward and reverse reaction proceed at the same rate.
- **Force**—That which acts on an object to change its motion; a push or pull exerted on one object by another. Common units are Newtons (N).
- **Freefall**—An object in one-directional motion that is only acted on by the force of the Earth's gravity. In this case its acceleration will be $-g$ or g downward.
- **Frequency**—The number of cycles or repetitions per second. Frequency is also often measured as the number of revolutions per second. The common units of frequency are Hertz (Hz) where one Hertz equals 1/second.
- **Functional group**—A group of atoms that give a molecule a certain characteristic or property.
- **Gel electrophoresis**—A process used in laboratories to determine the genetic make up of DNA strands. This process involves the movement of chromosomes through a gel from one pole to the other. Magnetism is used to pull the chromosomes through the gel.
- **Geology**—The study of rocks and minerals.
- **Glacier**—A large mass of snow-covered ice.
- **Golgi apparatus**—An organelle that packages proteins so that they can be sent out of the cell.
- **Gravitational force**—The attractive force that exists between all particles with mass.
- **Heliocentric model**—The model of the solar system that places the Sun at the center with the planets orbiting around.
- **Heterogeneous**—A mixture that is not uniform in composition.
- **Homogeneous**—A mixture in which the components are uniformly distributed.
- **Hydrate**—A crystal of a molecule that also contains water in the crystal structure. If the water evaporates, the crystal becomes anhydrous.
- **Hydrology**—The study of the Earth's water and water system.
- **Hypothesis**—A step in the scientific method where a prediction is made about the end result of an experiment. A hypothesis is generally based on research of related data.
- **Igneous rock**—A rock formed through the cooling of magma.
- **Image distance**—The distance from an image to a mirror or lens.
- **Inertia**—The tendency of an object to follow Newton's First Law, the law of inertia. That is the tendency of an object to remain at rest or in motion with constant velocity unless acted upon by a force.
- **Inorganic**—A material that is neither plant nor animal in origin.
- **Intensity**—The power per unit of area of a wave; measured in Watts/m^2 .
- **Ion**—An atom that has either lost electrons to become a positively charged cation, or has gained electrons to become a negatively charged anion.
- **Isomers**—Substances that have the same molecular formula (same number of elements) in different arrangements.
- **Isotopes**—Atoms of the same element, with different numbers of neutrons, and hence a different atomic mass.



- **Latitude**—The coordinate used to measure positions on the Earth north or south of the Earth's equator. Latitude is measured in degrees, minutes, and seconds. Zero-degrees latitude is the Earth's equator.
- **Longitude**—The coordinate used to measure positions on the Earth east or west of the prime meridian, which goes through Greenwich, England. Longitude is measured in degrees, minutes, and seconds.
- **Longitudinal wave**—A wave that has the direction of motion of the particles in the medium parallel to the direction of motion of the wave. Sound is an example of longitudinal wave.
- **Mass**—The amount of matter in an object; also a measure of the amount of inertia of an object. Common units are Kilograms (kg).
- **Meander**—A broad curve in a river.
- **Meiosis**—A process of cellular reproduction where the daughter cells have half the amount of chromosomes. This is used for purposes of sexual reproduction to produce sex cells that will be able to form offspring with a complete set of chromosomes with different DNA than the parents.
- **Meniscus**—The curved surface of a liquid in a container, caused by surface tension.
- **Metamorphic rock**—A rock whose crystal structure has been changed through heat and/or pressure.
- **Meteorology**—The study of the Earth's atmosphere and weather.
- **Mineral**—A naturally occurring element or compound found in the Earth's crust.
- **Mitochondria**—An organelle that produces ATP.
- **Mitosis**—A process in which cells produce genetically identical offspring.
- **Mixture**—A physical combination of different substances.
- **Mole**—The amount of substance that contains as many particles as there are atoms in 12 grams of the carbon 12 isotope (6.022×10^{23} particles).
- **Molecular mass**—The sum of the atomic masses in a molecule.
- **Molecule**—A substance formed by a chemical bond between two or more atoms.
- **Net force**—The vector sum of all the forces acting on an object.
- **Newton**—The metric and System International unit of force. One Newton equals one kg/s^2 .
- **Non-renewable resource**—A resource that is not replaced in nature as quickly as it is used. In many cases it is not replaced or re-formed at all.
- **Normal force**—This force acts between any two surfaces in contact. It is the part of the contact force that acts normal or perpendicular to the surfaces in contact.
- **Nucleolus**—An organelle found inside a nucleus that is responsible for the production of ribosomes.
- **Nucleotide**—The smallest unit of DNA. There are five types of nucleotides: adenine, guanine, thymine, cytosine, and uracil. The arrangement of genes is based directly on the specific arrangement of nucleotides.
- **Nucleus**—An organelle in a cell that contains all of the DNA and controls the functions of the cell.
- **Object distance**—The distance from an object to a mirror or lens.
- **Oceanography**—The study of the Earth's oceans.
- **Orbit**—The path an object takes as it travels around another in space.
- **Organic**—A material that is plant or animal in origin.



- **Oxidation**—The loss of electrons by a substance in a chemical reaction.
- **Parallel circuit**—A circuit with more than one path for current to flow.
- **Period**—The time, often measured in seconds, for one complete repetition or rotation.
- **Phloem**—Vascular tissue found in plants that transports mostly sugar and water; can travel either “shoot to root” or “root to shoot.”
- **Photon**—A particle of light. A discrete amount of light energy where a single photon of light is the smallest unit of light energy possible.
- **Photosynthesis**—A process by which the sunlight's energy, water, and carbon dioxide are transformed into sugar and oxygen.
- **Physical property**—A property that can be observed without performing a chemical transformation to that substance.
- **Plate tectonics**—The theory in which Earth's crust is made up of many plates that float on the mantle. This theory explains the movement of the continents, the formation of mountains, earthquakes, volcanoes, and the existence of mid-oceanic ridges.
- **Polymer**—A large molecule made up of repeating units of one or more small molecules (monomers).
- **Position**—The location of an object in a coordinate system. Common units of measure are meters (m).
- **Potential difference**—The difference in electric potential energy per unit charge between two points. This is commonly called voltage. The common unit of measure for potential difference is called Volts.
- **Potential energy**—The energy due to an object's position or state.
- **Precession**—The process by which the Earth's axis traces out of a circle on the celestial sphere.
- **Precision**—The measurement of the closeness of measurements obtained from two or more experimental runs.
- **Pressure**—Force per unit area. Units used to measure pressure are torr, atmosphere (atm), and Pascal (Pa).
- **Procedure**—A logical list of steps that explain the exact actions taken to perform an experiment.
- **Projectile**—An object in two-dimensional motion that has a vertical acceleration equal to $-g$ (or g downward) and a horizontal acceleration of zero.
- **Protein synthesis**—A process by which DNA will transport its information by way of RNA to the ribosomes where proteins will be assembled.
- **Qualitative observation**—An observation that includes characteristics other than amounts or measurements; may include shapes, colors, actions, and odors.
- **Quantitative observation**—An observation that includes characteristics of measurements or amounts.
- **Radiation**—The emission of energy.
- **Reactant**—A substance that is consumed in a chemical reaction to form products.
- **Reduction**—The gain of electrons by a substance in a chemical reaction.
- **Renewable resource**—A renewable resource is replaced in nature as quickly as it is used.
- **Resistance**—The resistance to the flow of electrons through a circuit. The resistance is dependent on the current flowing through the circuit element and the voltage across the circuit element; resistance is measured in Ohms.



- **Respiration**—A process by which sugar is converted to ATP and carbon dioxide; may include oxygen which is called *aerobic respiration*.
- **Retrograde motion**—The apparent westward motion of objects in the sky from one night to another.
- **Reversible reaction**—A reaction in which products can revert back into reactants.
- **Ribosome**—An organelle where protein synthesis occurs; can be found floating freely in the cytoplasm or attached to the outside of endoplasmic reticulum.
- **Right ascension**—The celestial coordinate similar to that of longitude to the Earth. Right ascension is measured in hours, minutes, and seconds with 24 hours making up 360° around the celestial sphere.
- **RNA**—(Ribonucleic Acid)—Responsible for transmitting genetic information from the DNA to the ribosomes for protein synthesis.
- **Scientific Method**—A process by which data is collected to answer an integral question. The major steps are problem, hypothesis, research, procedure, observations and data collection, analysis of data, and conclusion.
- **Sedimentary rock**—A rock made up of sediments that have been deposited, compacted and cemented over time.
- **Series circuit**—A circuit with only one path for the current to flow. The current in each element in a series circuit is the same.
- **Solubility**—The amount of solute that can be dissolved completely in a solvent at a given temperature. **Solution**—A homogeneous mixture of solute (usually solid, but sometimes liquid or gas) in a solvent (usually a liquid, but sometimes a solid or gas).
- **Speed**—The magnitude of velocity. It measures the rate position changes with time without regard to the direction of motion; common unit are meters per second (m/s).
- **Speed of light**—The speed of light in a vacuum is the fastest speed possible. As light travels in other materials it will change speed. The speed of light in any material is still the fastest speed possible in that material; commonly denoted by the symbol c .
- **Spindle fiber**—An organelle used during mitosis and meiosis that separates and “pulls” chromosomes towards the opposite poles of the cell.
- **Spontaneous reaction**—A reaction that does not require an external source of energy to proceed.
- **Star**—A body composed mostly of hydrogen and helium that radiates energy and that has fusion actively occurring in the core.
- **States of matter**—Solid, liquid, and gas. In solids, atoms or molecules are held in place. The shape and volume of a solid usually do not vary much. In liquids atoms or molecules can move, but their motion is constrained by other molecules. Liquids assume the shape of their container. In gases the motion of atoms or molecules is unrestricted. Gases assume both the volume and the shape of their containers and they are easily compressible.
- **Temperature**—The measure of the average kinetic energy of the molecules of a substance.
- **Tension**—The force that acts and is transferred along ropes, strings, and chains.
- **Topography**—The study of the surface features of the planet primarily through mapping.
- **Transverse wave**—A wave that has the direction of motion of the particles in the medium perpendicular to the direction of motion of the wave.



- **Uniform circular motion**—Motion with constant speed in the circle. Since the direction of the velocity changes in this case, there is acceleration even though the speed is constant.
- **Valence electrons**—Electrons that are in the outer atomic shell and can participate in a chemical reaction.
- **Vector**—A quantity that has both magnitude (an amount) and a direction. In one-dimensional motion, direction can be represented by a positive or negative sign. In two-dimensional motion, the direction is represented as an angle in a coordinate system.
- **Veins**—In plants, found in the leaves; sometimes called the vascular bundle that contains the xylem and phloem. In animals, tube-like tissue that usually transports blood.
- **Velocity**—The rate that a position changes per unit time and the direction it changes in. Common units are meters per second (m/s).
- **Ventricles**—Chambers found in animal hearts that pump blood away from the heart.
- **Voltage**—Another name for potential difference.
- **Voltmeter**—A device used to measure voltage in a circuit.
- **Water cycle**—The movement of water between the land, oceans, and atmosphere.
- **Weight**—The force of the Earth's gravity on an object. Near the surface of the Earth the weight is equal to the object's mass times the acceleration due to gravity ($W = mg$).
- **Xylem**—Vascular tissue found in plants that transports water in one direction; “root to shoot.” This is the water that will be sent to the photosynthetic cells in order to perform photosynthesis.

