An atom is the smallest possible unit of matter that can not be further broken down using any chemical means.
If you are talking about a type of atom or a single atom, then very often the word "element" is used interchangeably with "atom"
The atom is made of protons, neutrons, and electrons
Protons …
1) are found in the nucleus (center) of the atom
2) have a positive charge
3) the number of protons determines the identity of the atom (what type of element/atom it is)
4) are heavy and help make up the mass of the element/atom

Neutrons …
1) are found in the nucleus (center) of the atom
2) have a neutral charge (NOT positive and NOT negative)
3) keeps the nucleus together
4) are heavy and help make up the mass of the element/atom

Electrons …
1) are found circling around the nucleus (center) of the atom
2) have a negative charge
3) responsible for reactivity (the bonding or not) of the atom
4) have soooooooo little mass that they do NOT contribute to the mass of the atom

Periodic Table information contains more information than we need to know right now. The information we DO need to know that is found in the periodic table is....
1) the # in the top, left corner of each atom's / element's square tells how many protons that element/atom has
2) the capital letter or capital letter and small letter is the CHEMICAL SYMBOL for that element/atom
3) the atomic mass usually listed at the bottom of the atom's / element's square is based on an equal number of neutrons and protons in the nucleus BUT DOES NOT tell how many neutrons that atom/element has at any time
4) a neutral (or balanced) atom/element means that that atom/element has the SAME number of PROTONS & ELECTRONS...it does NOT say how many neutrons are present in the atom/element

MOLECULE - TWO or more atoms chemically bonded....the atoms can be the same TYPE of atom bonded together chemically OR the atoms can be different TYPES of atoms bonded together chemically
COMPOUND - TWO or more DIFFERENT kinds of atoms chemically bonded together (Example: an atom of oxygen combines chemically with two atoms of hydrogen to form a new substance that is water.)
(Every compound is a molecule...but every molecule does not have to be a compound - Just like every boy is a human ... but ... every human does not have to a boy.)
ELEMENT - can either be referring to a single atom AND / OR can be referring to a molecule (two or more atoms bonded together) where those 2 or more atoms are the same TYPE of atoms
MIXTURE - can be a liquid (l) or a solid (s) or a gas (g) where the contents (atoms or molecules) are mixed together but are NOT chemically bonded. (Example: lemonade is made of water molecules and lemon molecules and sugar molecules. No matter how much you mix and stir them together, those 3 types of molecules are still separate...not chemically bonded to make a new substance on a molecular/atomic level.)
PURE SUBSTANCE - can be a liquid (l) or a solid (s) or a gas (g) where the contents (atoms or molecules) are all the same. (Example: water would be a pure substance if there are ONLY water molecules in it)
CHEMICAL FORMULA - when two or more chemical symbols are together to show the elements/atoms that make that substance or molecule. A chemical symbol followed by a subscript (small number at bottom of symbol) (remember the chemical symbol can just be one CAPITAL letter alone OR could be a CAPITAL letter followed by a small letter) means that there are more than one of that atom in the molecule....and that subscript (or number AFTER the chemical symbol) tells HOW MANY of that atom is present in that molecule (for example: H2O means that there are TWO HYDROGEN atoms and ONE OXYGEN atom in that water molecule)
A chemical BOND is formed when the electrons in two or more atoms are shared. The negatively-charged electron in one atom feels the pull or attraction from the positively-charged proton in the other atom. So the two atoms chemically bond and wind up sharing the electron(s).
Reactants are the atoms/molecules that you start with (that get mixed together). Reactants are to the left of (in front of) the arrow in a formula.
Products are the atoms/molecules that you end up with in a chemical reactions (after reactants are mixed together). Products are to the right of (behind) the arrow in a formula.

Physical properties are used to observe & describe matter. These can include appearance, texture, color, and odor.
Physical changes or reactions examples can include:

tearing paper, boiling water, phase changes, hitting crayons, breaking glass, solids melting, dissolving in water and NOT producing gas bubbles

Chemical reactions make products that have new molecules formed from the reactants.
Chemical changes or reactions examples can include:

burning matches, leaves changing color, metals rusting, food decomposing or going bad, temperature changing, heat/energy released or absorbed, new odor/smell is produced, new color change, heat or light emitted (given off), atoms combining to form a GAS molecule, mixing calcium chloride & water, mixing calcium chloride & Phenol red, mixing sodium bicarbonate & water, mixing sodium bicarbonate & Phenol red, mixing sodium bicarbonate & calcium Chloride

Exothermic reactions result in heat/energy being released. The surrounding area's temperature increases.
Some exothermic reaction examples include:

making ice, snow crystals forming in clouds, water vapor condensing to liquid, candle flame burning, iron rusting, burning sugar, atoms combining to form a GAS molecule, mixing calcium chloride & water, mixing calcium chloride & Phenol red, mixing calcium chloride & sodium bicarbonate & water, mixing calcium chloride & sodium bicarbonate & Phenol red & water

Endothermic reactions result in heat/energy being absorbed. The surrounding area's temperature decreases.
Some endothermic reaction examples include:

ice melting, snow crystals becoming water vapor, liquid water evaporating to become a gas, baking bread, cooking an egg, splitting a gas molecule apart, mixing sodium bicarbonate & water, mixing sodium bicarbonate & Phenol red, mixing sodium bicarbonate & Phenol red & water

LAW OF CONSERVATION OF MASS

The **law of conservation of mass** states that matter cannot be created or destroyed. Even when matter goes through a physical or chemical change (Links to an external site.), the total mass of matter always remains the same.

It may seem as though burning destroys matter, but the same amount, or mass, of matter still exists after a campfire as before. When wood burns, it combines with oxygen and changes not only to ashes but also to carbon dioxide and water vapor. The gases float off into the air, leaving behind just the ashes. Suppose you had measured the mass of the wood before it burned and the mass of the ashes after it burned. Also suppose you had been able to measure the oxygen used by the fire and the gases produced by the fire. What would you find? The total mass of matter after the fire would be the same as the total mass of matter before the fire.

If you leave a full glass of water (H2O - water molecule) and then come back to it hours or days later, it will only be half full instead of being completely full. The reason for this is half of the water molecules evaporated (went from being in the liquid state to being in the gas/vapor state). The other half of the water molecules did NOT disappear. They are still there, only now they are water molecules floating in the air in the VAPOR/GAS state of matter! You have liquid water molecules in the glass AND gas/vapor water molecules floating in the air. So the mass (in this case, the water molecules) were not lost or destroyed....they just changed their state of matter.

The formula for Photosynthesis is

$$6\ CO_2 + 6\ H_2O \xrightarrow{\text{Sun's energy}} C_6H_{12}O_6 + 6\ O_2$$

Reactants	Products
6 carbon dioxide molecules (includes 6 carbon atoms and 12 oxygen atoms)	1 glucose/sugar molecule (includes 6 carbon atoms and 12 hydrogen atoms & 6 oxygen atoms)
6 water molecules (includes 12 hydrogen atoms and 6 oxygen atoms)	6 oxygen molecules (includes 12 oxygen atoms)
Reactants = total 36 atoms	Products = total 36 atoms

Photosynthesis happens ONLY in plant cells. It is the process where plants make their own food. Plants react carbon dioxide molecules and water molecules and use the Sun's energy to perform the process of photosynthesis. The reactants are the carbon dioxide and water molecules and the products are the glucose/sugar molecule and oxygen molecules. The Sun's light/energy is needed to perform the photosynthesis process.

Photosynthesis takes place in the chloroplast in PLANT cells only. Chlorophyll is the green pigment that is inside of the plant cells that absorbs the Sun's energy & uses it to react the carbon dioxide molecules (CO_2) & water molecules (H_2O) to create the glucose/sugar molecule ($C_6H_{12}O_6$) & oxygen molecules (O_2). The plants absorb water molecules from the ground through their roots.
Photosynthesis is important because it produces oxygen, which is needed for humans (& other living things to live), AND glucose/sugar molecules, which is needed to make energy for the cells to function.
When humans, and most animals, breathe out, they breathe out CO_2 (carbon dioxide). CO_2 is our waste, but is necessary for plants to live.
Plants take in CO_2 (carbon dioxide gas molecule) AND release O_2 (oxygen gas molecule) through microscopic, tiny pores (openings) in their leaves called stoma. (Stomata is plural)
(NOTE: Stroma is NOT the same as stoma! Stroma is the liquid part inside a chloroplast.)

The formula for Cellular Respiration is

$$C_6H_{12}O_6 + 6\,O_2 \rightarrow 6\,CO_2 + 6\,H_2O + \text{ATP Energy}$$

Reactants
1 glucose/sugar molecule
(includes 6 carbon atoms and
12 hydrogen atoms & 6 oxygen atoms)
6 oxygen molecules
(includes 12 oxygen atoms)

Reactants = total 36 atoms

Products
6 carbon dioxide molecules
(includes 6 carbon atoms and
12 oxygen atoms)
6 water molecules
(includes 12 hydrogen atoms and
6 oxygen atoms)
Products = total 36 atoms

Cellular Respiration happens in BOTH animal AND plant cells. Cellular respiration is a 2-part chemical process where animals & plants react glucose/sugar with oxygen in order to produce CO_2 and H_2O. During the first phase/part of cellular respiration, chemical energy breaks apart the glucose/sugar molecule into two smaller molecules. This process (breaking the 1 glucose/sugar molecule into 2 smaller molecules) is called Glycolysis.
Cellular respiration takes place in the mitochondria of plant & animal cells. Animals & plants produce energy during cellular respiration.
ATP energy is released during cellular respiration and the cell uses this energy in order to function (move, grow, heal, etc). Cellular respiration creates a LOT of ATP energy, which is the primary goal/point of cellular respiration.
Photosynthesis and cellular respiration are both processes that are a series of complex chemical reactions. Both are considered to be a CYCLE in nature because the atoms used during both processes are recycled.
We eat (or make) food to get energy...use that energy to work and grow, produce heat during process of making food so some energy is lost as heat...also produce waste so some energy is lost as waste
Trophic is defined as anything relation to eating or food or nutrition. So trophic levels are divisions that plants & animals are placed in according to what they eat.
Producers are living things that make their own food. Examples are phytoplankton and seaweed and plants and grass. They use the sun's light and oxygen & water from the environment in a process called photosynthesis to make their own food, which is glucose.
Consumers are living things that cannot make their own food, so they have to eat other living things. There can be different layers, or levels, of consumers.
Decomposers are living things that only eat the waste or dead bodies of other creatures. Examples are shrimp, bacteria, worms, fungi, some insects, snails. Decomposers get the nutrients they need by eating dead and decaying materials and these organisms keep the ecosystem healthy by ensuring plants get the nutrients they need to survive. Decomposers are found throughout the ENTIRE FOOD CHAIN/ENERGY PYRAMID because EVERYTHING that dies will be eaten by a decomposer, regardless of which trophic level the dead thing used to occupy.
"Producer" is the common name. "Autotroph" is the scientific name for producer. All producers are autotrophs.
"Consumer" is the common name. "Heterotroph" is the scientific name for consumer. All consumers are heterotrophs.
Herbivores only eat plants (the producers). Herbivores are primary/first consumers.
Carnivores eat meat, which means they eat the herbivores AND other carnivores. Carnivores are the second, third, fourth, and/or fifth consumers.
Omnivores eat plants AND/OR meat. Omnivores eat anything.
All are connected by food chains. Food chains show who eats whom in an ecosystem and also show the flow of energy

from the food that is eaten.
Food chains always starts with a producer cuz they can make their own food. The producers are eaten by the first/primary consumer, who gets eaten by the second/secondary consumer. There can be a third consumer (that eats the 2nd consumer) and sometimes a fourth consumer, and rarely, a fifth consumer. Arrows points from the organism being eaten to the organism that eats it.
Energy pyramid shows the flow of energy from one organism eating another organism in a food chain. Each group in the food chain or trophic level in the energy pyramid is dependent upon the one below it. If there is a disease or other thing that decreases its population, then the population above it is also affected...AND the populations below the diseased organisms are also affected. The organisms in the trophic level directly below the diseased organisms will BENEFIT from the reduction of those diseased organisms because those organisms will not be around to eat them.
Apex consumers are at the top of the food chain and usually do not have predators (things that eat/hunt them). The TOP/last consumer in a food chain is **sometimes** called the tertiary (pronounced TER-she-air-ree) consumer (but not in OUR class). In our class, tertiary is third-level consumer.
Example of a food chain can be seaweed (producer), eaten by a sea urchin (primary/first consumer), eaten by a sea otter (secondary/second consumer), eaten by a shark (third consumer or tertiary consumer). Some energy pyramids call a fourth level of consumer a quaternary consumer. The quaternary consumer would typically be the apex (very top) consumer in an energy pyramid since there are not *usually* more than four consumers because of the loss of energy transferred the higher you go in a food chain/energy pyramid.
Another example of a food chain can be grass (producer), eaten by a grasshopper (primary/first consumer), eaten by a frog second/secondary consumer), eaten by a snake (third consumer), eaten by an eagle (fourth consumer).
Food chains also show the flow of energy from the food that is eaten.
All energy in the food chain starts from the producer's energy. Energy is used to grow, work, and produces heat & waste. Only the energy used for growth is available to transfer through the food chain since that is what is eaten by the consumers. (The rest of the energy was already used or lost to the environment by the previous trophic level/group in the food chain.)
Only about 10% of energy that an organism gets from the food it makes or eats is transferred from one trophic level to the level above. That continuous loss of energy for each group/trophic level in the food chain can form a pyramid. The producers are always at the base/bottom of the pyramid. 90% of the energy that an organism gets from the food it makes or eats is used by that organism to grow & work or lost as heat & waste.
An example of a typical energy pyramid states that if the bottom layer, the producers, has 1000 calories, the primary consumers that eat the producers will only get 10% of that energy (because 90% was either used by the producer or lost to the environment as heat and waste). So the primary consumer has 100 calories. The second consumer (that eats the first consumer) will only get 10% of that energy (because 90% was either used by the first consumer or lost to the environment as heat and waste). So the second consumer will get 10 calories. A third consumer will only get 1 calorie. IF there is a fourth consumer in this example, it would only get .1 calorie. IF there is a fifth consumer in this example, it would only get .01 calorie.

(1000 → 100 → 10 → 1 → .1 → .01)

Animals NEED energy, and because there is a 90% LOSS of energy in each trophic level as you climb up the pyramid, then this LIMITS the number of consumers that there will be in a food chain/energy pyramid. This is why there is usually only 3 or 4 consumers in a food chain (in addition to the producers) **AND** why there are less and less consumers the higher up the food chain/energy pyramid that you go. Even though the top consumer is better able to hunt & eat the lower consumers, the number of that top consumer is smaller because of the loss of energy that happens as you climb higher up the food chain/energy pyramid.
Energy must constantly flow through an ecosystem for the system to remain stable. In order for the energy to flow, organisms must eat other organisms.
Native Species - are found in an area as a result of natural processes ONLY. They have developed naturally in an area over time. Some native species found in the Mojave Desert (Las Vegas is part of Mojave Desert) can include the desert tortoise, sage brush, and Pear Cactus.
Invasive Species - Non-native (not naturally from here) species which are added to an area naturally (the invasive species migrated due to habitat loss or range extension) OR can be a result of human activity.
Different ways that invasive species can be brought to a new area could be when pets escape (for example, lionfish escapes from home aquarium during a hurricane), humans spread them on purpose (an attempt to biologically control a species), or humans and animals spread the invasive species accidentally.

Some examples of invasive species are cane toads, kudzu vines, Starling birds, and mongoose in Hawaii.

Invasive species pose or create 4 major threats:

1) They alter or change the ecosystem
2) They destroy forests, crops, and producers
3) They reduce the beauty or use of the land
4) They introduce diseases or cause other negative health effects

Biological Control - bringing in a species (from another location) that can be used to hunt & kill the invasive species

Mechanical Control - creating barriers (fences) to prevent the movement of the invasive species, cutting down trees, hunting and trapping the invasive species, or destroying land to prevent them from spreading

Chemical Control - the use of chemicals or pesticides. These can leach (soak into) the waterways and soil.