

**Dedham High School  
MCAS Biology Review Book  
for Students and Parents**

This booklet is designed to help prepare students for the Massachusetts Biology Test.

The MCAS test is designed to measure individual student achievement relative to the standards outlined in the Massachusetts Science Curriculum Framework.

The state uses the results to report student achievement to the public. Parents, teachers, and the school will use the results as one measure of student learning. To meet graduation requirements, students are required to pass the Massachusetts Math, English and Science Test.

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## What can students and parents do at home?

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1. Stress to your child the importance of the science MCAS test as a graduation requirement.
2. Help your child study the science vocabulary identified as words covered on the MCAS tests. (See the list in this booklet)
3. Help your child study the directions words to identify what the questions require. (See the list in this booklet).
4. Have your child practice the sample MCAS tests. Especially have him/her do the open response questions. You and your child can then compare his/her answers to the graded samples.
5. Go over the list of hints to improve your child's MCAS open response scores.
6. Encourage your child to read science articles from the newspaper or magazines (Time, National Geographic, etc.). Discuss the main ideas of the articles with him/her. Articles that include graphs and charts and some analysis of data are especially important.
7. Don't Panic! Stick with it! Some of the material will come more easily for your child than other material. Encourage your child to work steadily and not to be discouraged. Success will build as he/she improves through practice.

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## Chemistry of Life MCAS Vocabulary

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acid	a chemical that releases hydrogen ions $H^+$ in solution with water. The lower the pH the more acid it is.
active site	the specific area of an enzyme that links to the substrate molecule.
adenine	a nitrogenous base found in DNA and RNA molecules  One of the four nitrogen-containing bases occurring in nucleotides, the building blocks of the organic macromolecule group known as nucleic acids (DNA and RNA). Adenine is also the base in the energy carrying molecule ATP (adenosine triphosphate) which is the energy coin of the cell.
adenine	nitrogenous base found in both DNA and RNA
adenosine diphosphate (ADP)	Lower energy form of ATP, having two (instead of the three in ATP) phosphphate groups attached to the adenine base and ribose sugar.
adenosine triphosphate (ATP)	a substance used by cells as an immediate source of chemical energy for the cell.  A common form in which energy is stored in living systems; consists of a nucleotide (with ribose sugar) with three phosphate groups. The energy coin of the cell.
amino acids	organic compound that are the building blocks of proteins.  The subunits (monomers) from which proteins (polymers) are assembled. Each amino acid consists of an amino functional group, and a carboxyl acid group, and differs from other amino acids by the composition of an R group.
amylase	An enzyme that breaks down starch  An enzyme secreted by the salivary glands that begins the breakdown of complex sugars and starches.
atom	the smallest unit of an element that can combine with other elements.  The smallest indivisible particle of matter that can have an independent existence.
atomic number	The number of protons in the nucleus of an atom.

atomic weight	The sum of the weights of an atom's protons and neutrons, the atomic weight differs between isotopes of the same element.
base	a chemical that releases hydroxyl ion (OH <sup>-</sup> ) in solution with water.
biochemical pathway	A series of chemical reactions in living organisms
biochemical reactions	Specific chemical processes that occur in living things.
biochemistry	Chemical processes associated with living things.
bond	Also called a chemical bond. A connection between two atoms either as a result of sharing (covalent bond) or transferring (ionic bond) electrons.
carbohydrates	Organic molecules composed of carbon, hydrogen, and oxygen that serve as energy sources and structural materials for cells
carbon	one of the six most important chemical elements for living things, forms the backbone of nearly all organic compounds.
carbon dioxide	the inorganic compound from which plants get carbon for photosynthesis; waste product of cellular respiration
catalysts / catalyze	substances that increases the rate of a chemical reaction
cellulose	A polysaccharide that is composed of unbranched chains of glucose; the major structural carbohydrate of plants, insoluble in water, and indigestible in the human intestine.
chitin	A polysaccharide substance contained in fungi; also forms part of the hard outer covering of insects.
chemical reaction	process in which one or more substances are changed into others
coenzyme	a chemical substance that helps an enzyme function (vitamins)
complementary nucleotides	The bonding preferences of nucleotides, Adenine with Thymine, and Cytosine with Guanine. Also referred to as complementary base pairing.
compound	A substance formed by two or more different kinds of elements atoms. combined in a fixed ratio.
covalent bond	A chemical bond created by the sharing of electrons between atoms.
cytosine	nitrogenous base found in both DNA and RNA
denature	When a protein or enzyme loses its folded shape. Once the shape is lost, the protein can lose its function. High temperatures, too acidic or too basic conditions can cause a protein or enzyme to lose its shape.

deoxyribonucleic acid (DNA)	<p>The hereditary material of all organisms, which contains the instructions for cellular activities, a nucleic acid molecule.</p> <p>A nucleic acid composed of two polynucleotide strands wound around a central axis to form a double helix; the repository of genetic information. Nucleic acid that functions as the physical carrier of inheritance for 99% of all species. The molecule is double-stranded and composed of two strands in an antiparallel and complementary arrangement. The basic unit, the nucleotide, consists of a molecule of deoxyribose sugar, a phosphate group, and one of four nitrogenous bases</p>
deoxyribose	Five-carbon sugar found in nucleotides of DNA.
disaccharides	<p>Any type of carbohydrate known as a “double sugar”</p> <p>1. Sugars made up of two monosaccharides held together by a covalent bond; e.g., sucrose and lactose. 2. Type of sugar (saccharide) composed of two sugar molecules bonded together with an ester (covalent) bond examples include sucrose, maltose, and lactose.</p>
double helix	The shape of the DNA molecule. Also known as a spiral staircase.
saturated fat	a type of fat molecule in which all available bonding sites on the hydrocarbon chains are taken up with hydrogen atoms. (no double bonds)
element	<p>The simplest form of matter; an element is a substance made up of a single type of atom,</p> <p>A substance composed of atoms with the same atomic number; cannot be broken down in ordinary chemical reactions.</p>
energy	The ability to bring about changes or to do work.
energy of activation	The minimum amount of energy required for a given reaction to occur; varies from reaction to reaction.
enzyme	Protein molecules that act as catalysts in biochemical reactions.
enzyme-substrate complex	an enzyme locked onto the substrate on which it acts.
fats	Also known as lipids. Triglycerides that are solid at room temperature.

gene	<p>the segments of DNA that contain the genetic information for a particular trait or protein.</p> <p>Specific segments of DNA that control cell structure and function; the functional units of inheritance. Sequence of DNA bases usually code for a polypeptide sequence of amino acids.</p>
genetic material	DNA or RNA
glucose	<p>a monosaccharide produced in photosynthesis and used by both plants and animals as a “fuel” in the process of respiration.</p> <p>A six-carbon single sugar; the most common energy source.</p>
glycogen	<p>that lead to reproductive isolation of those populations. made in animals as a means of storing glucose; stored in the liver and in the muscles.</p> <p>that lead to reproductive isolation of those populations, consisting of numerous glucoses linked together. The animal equivalent of starch.</p>
guanine	One of the nitrogenous bases in nucleic acids, found in both DNA and RNA, guanine is one of the two purine bases. Guanine pairs with cytosine.
homeostasis	in the body, the maintenance of a constant internal environment
hydrolysis	the chemical process by which a complex food molecule is split into simpler components through the addition of a molecule of water to the bonds holding it together.
hypothesis	An idea that can be experimentally tested; an idea with the lowest level of confidence.
inorganic molecule	any compound that does not contain carbon and hydrogen. Example: carbon dioxide.
ion	An atom that has lost or gained electrons from its outer shell and therefore has a positive or negative charge, respectively; symbolized by a superscript plus or minus sign and sometimes a number, e.g., H <sup>+</sup> , Na <sup>+1</sup> , Cl <sup>-</sup>
ionic bond	A chemical bond in which atoms of opposite charge are held together by electrostatic attraction.
isotopes	Atoms with the same atomic number but different numbers of neutrons; indicated by adding the mass number to the element's name, e.g., carbon 12 or <sup>12</sup> C.
lipids	the group of organic compounds that includes fats, oils, and waxes.

macromolecules	Large molecules made up of many small organic molecules that are often referred to as monomers; e.g., carbohydrates, lipids, proteins, and nucleic acids. Macromolecules are polymers of monomers.
metabolism	all the chemical reactions that take place in an organism.
molecules	Units of two or more atoms held together by chemical bonds. The combination of atoms by chemical bonds with the component atoms in definite proportions, such as water (two H to one O).
monosaccharides	Simple carbohydrates, usually with a five- or six-carbon skeleton; e.g., glucose and fructose. A carbohydrate composed of a single sugar unit, such as glucose, ribose, deoxyribose, etc.
mutation	Any change in the nucleotide sequence of DNA; can involve substitutions, insertions, or deletions of one or more nucleotides. There can also be chromosomal mutations
nitrogenous base	a chemical unit composed of carbon, hydrogen, and nitrogen that is a component part of a nucleotide unit.
nucleic acids	Polymers composed of nucleotides; e.g., DNA and RNA.
nucleotide sequences	The genetic code encrypted in the sequence of bases along a nucleic acid.
nucleotides	the building blocks or subunits of DNA; they include four types of nitrogen bases, which occur only in pairs.  The subunits of nucleic acids; composed of a phosphate, a sugar, and a nitrogen-containing base. The fundamental structural unit of the nucleic acid group of organic macromolecules. Some nucleotides are involved in information storage (as nucleotides in DNA), protein synthesis (as nucleotides in RNA), and energy transfers (as single nucleotide ATP, GTP, and double nucleotide NADH and NADPH).
organic compound or organic molecule	compounds that contains carbon and hydrogen (in living things)
peptide bond	a type of chemical bond that links the nitrogen atom of one amino acid with the terminal carbon atom of second amino acid in the formation of a peptide bond.

pH	<p>a measure (on a scale of 0 to 14) of how acidic or basic a solution is. Most acidic is a pH of 0, least acidic is 14. a pH of 7 is neutral.</p> <p>The negative logarithm of the H<sup>+</sup> ion concentration. The pH is a measure of the acidity or basic character of a solution. Since it measures a fraction, the larger the pH number, the less H ions are present in a solution.</p>
photosynthesis	<p>The process by which plant cells use the energy of sunlight convert carbon dioxide and water into glucose, with oxygen being released.</p> <p>The conversion of unusable sunlight energy into usable chemical energy, associated with the actions of chlorophyll.</p>
polymer	Organic molecule composed of smaller units known as monomers. A large molecule composed of smaller subunits, for example starch is a polymer of glucose, proteins are polymers of amino acids.
polysaccharides	Long chains of monosaccharide units bonded together; e.g., glycogen, starch, and cellulose.
proteins	<p>the group of organic compounds made up of chains of amino acids.</p> <p>Polymers made up of amino acids that perform a wide variety of cellular functions. One of the classes of organic macromolecules that function as structural and control elements in living systems. Proteins are polymers of amino acids linked together by peptide bonds.</p>
ribonucleic acid (RNA) Nucleic acid containing	ribose sugar and the base Uracil; RNA functions in protein synthesis. The single stranded molecule transcribed from one strand of the DNA. There are three types of RNA, each is involved in protein synthesis. RNA is made up nucleotides containing the sugar ribose, a phosphate group, and one of four nitrogenous bases (adenine, uracil, cytosine or guanine).
ribose	A five-carbon sugar found as a component part of the nucleotides of RNA molecules and in ATP.
simple sugars	single sugars that have six carbon atoms; glucose
solvent	The substance that does the dissolving in a solution. For example, salt dissolved in water. Water is the solvent because it dissolves the salt.
starch	a carbohydrate made up of many glucose molecules; used for energy storage in plants.

synthesis	the process in which organisms manufacture the complex compounds required to sustain life.
thymine	a nitrogenous base found only in DNA. Thymine pairs with adenine.
uracil	nitrogenous base found only in RNA

## Cell Biology MCAS Vocabulary

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active transport	<p>movement of substances across a membrane from an area of lower concentration to an area of higher concentration; requires energy.</p> <p>Transport of molecules against a concentration gradient (from regions of low concentration to regions of high concentration) with the aid of proteins in the cell membrane and energy from ATP.</p>
adenosine diphosphate (ADP)	Lower energy form of ATP, having two (instead of the three in ATP) phosphate groups attached to the adenine base and ribose sugar.
adenosine triphosphate (ATP)	<p>a substance used by cells as an immediate source of chemical energy for the cell.</p> <p>A common form in which energy is stored in living systems; consists of a nucleotide (with ribose sugar) with three phosphate groups. The energy coin of the cell.</p>
amino acids	<p>organic compound that are the building blocks of proteins.</p> <p>The subunits (monomers) from which proteins (polymers) are assembled. Each amino acid consists of an amino functional group, and a carboxyl acid group, and differs from other amino acids by the composition of an R group.</p>
Animalia.	Animal Kingdom. Multicellular eukaryotic group characterized by heterotrophic nutritional mode, usually organ and tissue development, and motility sometime during the organism's life history
Archaea	One of three domains. This domain only has one kingdom, the archeobacteria.
Archaeobacteria	Taxonomic kingdom of ancient (over 3.5 billion years old) group of prokaryotes; These bacteria tend to live in extreme environments (very hot, highly acidic or basic, etc)
asexual reproduction	A method of reproduction in which genetically identical offspring are produced from a single parent; occurs by many mechanisms, including fission, budding, and fragmentation.

autosomes	The chromosomes other than the sex chromosomes. Each member of an autosome pair (in diploid organisms) is of similar length and in the genes it carries.
bacteria	single-celled organisms that have no nuclei. Also called prokaryotes.
benedict's solution	A chemical indicator that tests for the presence of simple sugars. It begins as a blue color. If mixed with a sugar solution and heated, it will turn green, yellow and orange indicating that sugar is present.
binary fission	The method by which bacteria reproduce. The circular DNA molecule is replicated; then the cell splits into two identical cells, each containing an exact copy of the original cell's DNA.
bromthymol blue solution	A chemical indicator that tests for the presence of CO <sub>2</sub> . Useful in cellular respiration experiments. At low levels of CO <sub>2</sub> the liquid is blue. At high levels of CO <sub>2</sub> the liquid is yellow.
carbohydrates	Organic molecules composed of carbon, hydrogen, and oxygen that serve as energy sources and structural materials for cells
carrier protein	a protein molecule in the cell membrane that assist the movement of material across the cell membrane.
cell	the smallest functioning unit of an organisms; all living organism made up of at least one cell. The smallest structural units of living matter capable of functioning independently
cell cycle	The sequence of events from one division of a cell to the next; consists of mitosis (or division) and interphase.
cell membrane	regulated the passage of material into and out of the cell
cell membrane	organelle that encloses the cytoplasm and other cell organelles and regulates the passage of materials into and out of the cell.
cell theory	Has 3 parts; all living things are made of cells, cells are the basic units of structure and function, cells come from other living cells.
cell wall	surrounds the cell and gives structural support to the cell, made of chitin or cellulose  Structure produced by some cells outside their cell membrane; variously composed of chitin, peptidoglycan, or cellulose.
cellular respiration	the process that uses oxygen to create ATP for energy use. the process of releasing chemical energy stored in food (glucose) the process of converting the energy in glucose into a form more easily used by a cell. The transfer of energy from various molecules to produce ATP; occurs in the mitochondria of eukaryotes, the cytoplasm of prokaryotes. In the process, oxygen is consumed and carbon dioxide is generated.

cellulose	A polysaccharide that is composed of unbranched chains of glucose; the major structural carbohydrate of plants, insoluble in water, and indigestible in the human intestine.
central vacuole	A large vacuole found in plant cells that contains mostly water. It helps regulate the rigidity of the plant cell.
centriole	a cell organelle found in animal cells that functions in the process of cell division.
centromere	the area of attachment of two chromatids in a double-stranded chromosome.
chitin	A polysaccharide substance contained in fungi; also forms part of the hard outer covering of insects.
chlorophyll	The pigment in green plants that absorbs solar energy.
chloroplasts	organelle within in plant cells that contain the pigment chlorophyll and carry out photosynthesis  Disk-like organelles with a double membrane found in eukaryotic plant cells; contain thylakoids and are the site of photosynthesis. ATP is generated during photosynthesis by chemiosmosis.
Chordata	a phylum of the Animal Kingdom whose members (chordates) have internal skeletons made of cartilage and/or bone.
chromatid	one strand of a double-stranded chromosome.
chromosomal mutation	an alteration in the structure of a chromosome, involving many genes: nondisjunction, translocation, addition, deletion
chromosome	structures composed of DNA that contain the genetic material.  Structures in the nucleus of a eukaryotic cell that consist of DNA molecules that contain the genes.
cilia	small, hair-like structures in paramecium and other unicellular organisms that aid in nutrition and locomotion. Also, extending from the membrane of many eukaryotic cells.  often function in locomotion (sing.: cilium).
cloning	the production of identical individuals from the cell of another individual.
concentration	# of grams of solute / # mL of solvent;
consumers	organisms that obtain their energy by feeding on other organisms; Heterotrophic organisms  The higher levels in a food pyramid; consist of primary consumers, which feed on the producers, and secondary consumers, which feed on the primary consumers.
cytokinesis	The division of the cytoplasm during cell division.

cytoplasm	<p>the watery fluid that fills a cell, surrounding the organelles.</p> <p>The viscous semi-liquid inside the plasma membrane of a cell; contains various macromolecules and organelles in solution and suspension.</p> <p>Where most of a cell's chemical reactions take place.</p>
cytoskeleton	Network of protein filaments within some cells that helps the cell maintain its shape and is involved in many forms of cell movement.
daughter cell	a cell that results from mitotic cell division (gametes results from meiosis)
daughter nucleus	One of the two nuclei that form as a result of mitosis
dialysis tubing	Plastic tube with tiny holes that allow some molecules to pass through and not others. Used for diffusion and osmosis experiments.
decomposers	Heterotrophic organisms that obtain their energy by feeding on decaying organisms.
deoxyribonucleic acid (DNA)	<p>The hereditary material of all organisms, which contains the instructions for cellular activities, a nucleic acid molecule.</p> <p>A nucleic acid composed of two polynucleotide strands wound around a central axis to form a double helix; the repository of genetic information. Nucleic acid that functions as the physical carrier of inheritance for 99% of all species. The molecule is double-stranded and composed of two strands in an antiparallel and complementary arrangement. The basic unit, the nucleotide, consists of a molecule of deoxyribose sugar, a phosphate group, and one of four nitrogenous bases</p>
diffusion	<p>the movement of molecules from an area of higher concentration to an area of lower concentration. No energy is used, passive transport</p> <p>The spontaneous movement of particles from an area of higher concentration to an area of lower concentration.</p>
diploid	Cells that contain homologous chromosomes. The number of chromosomes in the cells is the diploid number and is equal to $2n$ ( $n$ is the number of homologous pairs).
diploid chromosome number	the number of chromosomes found in the somatic cells of sexually reproducing organisms.
DNA replication	Copying process by which a cell duplicates its DNA. Occurs during the S phase of cell cycle.
double-stranded chromosome	The two-stranded structure that results from chromosomal replication.

egg	the female gamete that supplies half the genetic information to the zygote.
embryo	An organism in the early stage of development: following fertilization and before it is born, or hatched.  Term applied to the zygote after the beginning of mitosis that produces a multicellular structure.
endoplasmic reticulum (ER)	A network of membranous tubules in the cytoplasm of a cell; involved in the production of phospholipids, proteins, and other functions. Rough ER is studded with ribosomes; smooth ER is not.
energy	The ability to bring about changes or to do work.
enzyme	Protein molecules that act as catalysts in biochemical reactions.
Eubacteria	The kingdom that includes the true bacteria such as E. coli.. The eubacteria have cell walls containing peptidoglycan. Belong to the domain, Bacteria.
eukaryote	A type of cell found in many organisms including single-celled protists and multicellular fungi, plants, and animals; characterized by a membrane-bounded nucleus and other membraneous organelles; an organism composed of such cells. The first eukaryotes are encountered in rocks approximately 1.2-1.5 billion years old.
facilitated diffusion	Movement of specific molecules across cell membranes through protein channels. Is a type of passive transport. Energy is not required.
fertilization	in sexual reproduction, the process by which an egg cell and a sperm cell unite to form a zygote.  The fusion of two gametes (sperm and ovum) to produce a zygote that develops into a new individual with a genetic heritage derived from both parents. Strictly speaking, fertilization can be divided into the fusion of the cells (plasmogamy) and the fusion of nuclei (karyogamy).
fetus	in humans, the developing embryo after the first three months of development.
flagella	Microscopic, whiplike structures found on certain cells that aid in locomotion and circulation.  long, whip-like locomotion organelles found in both prokaryotic and eukaryotic cells; sing.: flagellum. Eukaryotic flagella have an internal arrangement of microtubules in a 9 + 2 array.
fraternal twin	in humans, twin offspring that result from the simultaneous fertilization of two ova by two sperms; such twins are not genetically identical.

Fungi	<p>Heterotrophic organisms that obtain their energy by feeding on decaying organisms; yeast mushrooms</p> <p>Non-mobile, heterotrophic, mostly multicellular eukaryotes, including yeasts and mushrooms.</p> <p>One of the four kingdoms in the domain, Eukarya.</p>
gametes	<p>the male and female sex cells that combine to form a zygote during fertilization</p> <p>a specialized, haploid, reproductive cell produced by sexually reproducing organisms.</p> <p>Haploid reproductive cells (ovum and sperm).</p>
gametogenesis	the process of cell division by which gametes are produced.
gene	<p>the segments of DNA that contain the genetic information for a particular trait or protein.</p> <p>Specific segments of DNA that control cell structure and function; the functional units of inheritance. Sequence of DNA bases usually code for a polypeptide sequence of amino acids.</p>
germ cells	Collective term for cells in the reproductive organs of multicellular organisms that divide by meiosis to produce gametes.
gestation	the period of prenatal development of a placental mammal; human gestation requires approximately 9 months.
glucose	<p>a monosaccharide produced in photosynthesis and used by both plants and animals as a “fuel” in the process of respiration.</p> <p>A six-carbon single sugar; the most common energy source.</p>
Golgi complex or Golgi apparatus or Golgi body	<p>cell organelles that package cell products and move them to the cell membrane for secretion.</p> <p>Organelles in animal cells composed of a series of fattened sacs that sort, chemically modify, and package proteins produced on the rough endoplasmic reticulum.</p>
haploid	Cells that contain only one member of each homologous pair of chromosomes (haploid number = $n$ ). At fertilization, two haploid gametes fuse to form a single cell with a diploid number of chromosomes.
haploid number of chromosomes	the number of chromosomes found in gametes of sexually reproducing organisms.
hypertonic	The concentration of a solution in one area is higher than the concentration of the solution in another area.
hypotonic	The concentration of a solution in one area is lower than the concentration of the solution in another area.

identical twins	in humans, twin offspring resulting from the separation of the embryonic cell mass of a single fertilization into two separate masses, such as twins are genetically identical.
iodine	A chemical indicator that turns midnight blue when starch is present. It starts out as a yellow/gold color.
ion	An atom that has lost or gained electrons from its outer shell and therefore has a positive or negative charge, respectively; symbolized by a superscript plus or minus sign and sometimes a number, e.g., H <sup>+</sup> , Na <sup>+1</sup> , Cl <sup>-</sup>
isotonic	The concentration of a solution in one area is equal to the concentration of the solution in another area.
kingdoms	a major taxonomic groupings into which all living things are categorized.  six broad taxonomic categories (Archeabacteria, Eubacteria, Protista, Plantae, Fungi, Animalia) into which organisms are grouped, based on common characteristics.
lysosomes	an organelle containing digestive enzymes used by the cell for chemical digestion.  The lysosomes fuse with food vacuoles and enzymes contained within the lysosome chemically breakdown and/or digest the food vacuole's contents.
meiosis	the division of one parent cell into four daughter cells; reduces the number of chromosomes to one-half the normal number.  Cell division in which the chromosomes replicate, followed by two nuclear divisions. Each of the resulting gametes (in animals, spores in plants) receives a haploid set of chromosomes. Reduction/division by which ploidy, the number of sets of homologous chromosomes, is reduced in the formation of haploid cells that become gametes (or gametophytes in plants).
metabolism	all the chemical reactions that take place in an organism.
micrometer	equal to one-millionth of a meter 0.00001 m; used for measuring cells and organelles. (µm)
mitochondria	the organelle that makes ATP; a substance used by cells as an immediate source of chemical energy for the cell.  Self-replicating membrane-bound cytoplasmic organelles in most eukaryotic cells that complete the breakdown of glucose, producing NADH and ATP (singular term: mitochondrion). The powerhouse of the cell. Organelles within eukaryotes that generate (by chemiosmosis) most of the ATP the cell needs to function and stay alive.

mitosis	<p>The division of the cell's nucleus into two identical daughter cell nuclei.</p> <p>The division of the cell's nucleus and nuclear material of a cell; consists of four stages: prophase, metaphase, anaphase, and telophase. Cell Xeroxing. Mitosis occurs only in eukaryotes. The DNA of the cell is replicated during interphase of the cell cycle and then segregated during the four phases of mitosis.</p>
mitotic cell division (vs. meiotic cell division)	a type of cell division that results in the production of two daughter cells identical to each other and to the parent cell.
monohybrid cross	In genetics, a cross that involves only one trait.
multicellular	<p>Organisms made up of more than one cell, and having specialization of cells.</p> <p>Organisms composed of multiple cells and exhibiting some division of labor and specialization of cell structure and function.</p>
mutation	Any change in the nucleotide sequence of DNA; can involve substitutions, insertions, or deletions of one or more nucleotides. There can also be chromosomal mutations
nuclear envelope	A double membrane that surrounds the nucleus of a cell.
nucleolus	organelle located within the nucleus that is involved in making ribosomes
nucleus (cell)	<p>an organelle that contains the cell's genetic information in the form of chromosomes.</p> <p>The largest, most prominent organelle in eukaryotic cells; a round or oval body that is surrounded by the nuclear envelope and contains the genetic information necessary for control of cell structure and function.</p>
nutrients	important molecules in food, such as lipids, proteins, and vitamins.
oogenesis	a type of meiotic division in which one ovum and three polar bodies are produced from each primary sex cell.
organ	structure made up of similar tissues that work together to perform the same task
organelles	<p>structures within a that perform a particular task; e.g., the vacuole</p> <p>Cell components that carry out individual functions; e.g., the cell nucleus and the endoplasmic reticulum. Subcellular structures (usually membrane-bound and unique to eukaryotes) that perform some function, e.g. chloroplast, mitochondrion, nucleus.</p>

organism	An individual, composed of organ systems (if multicellular). Multiple organisms make up a population.
osmosis	Diffusion of water molecules across a membrane in response to differences in solute concentration. Water moves from areas of high-water/low-solute concentration to areas of low-water/high-solute concentration. Diffusion of water across a semi-permeable barrier such as a cell membrane, from high water potential (concentration) to lower water potential (concentration).
ovary	the female reproductive organs that produce the ova, the mature egg cell.
ovum	a type of gamete produced as a result of oogenesis in female animals; the egg, the female sex cell.
passive transport	movement of substances across a membrane; requires no use of energy.  Diffusion across a plasma membrane in which the cell expends no energy.
phagocytosis	the process by which ameba surrounds and ingests large food particles for intracellular digestion.
photosynthesis	The process by which plant cells use the energy of sunlight convert carbon dioxide and water into glucose, with oxygen being released.  The conversion of unusable sunlight energy into usable chemical energy, associated with the actions of chlorophyll.
Plantae	The plant kingdom; nonmobile, autotrophic, multicellular eukaryotes. Kingdom of the plants, autotrophic eukaryotes with cellulose in their cell walls and starch as a carbohydrate storage product, with chlorophylls a and b as photosynthesis pigments.  One of the four kingdoms in the domain Eukarya.
plasma membrane	Same as the cell membrane that controls what enters and leaves a cell. Made of a phospholipid bilayer.
Products	What is made in a chemical reaction. The items listed in a chemical equation on the right hand side of the arrow.
prokaryote	Type of cell that lacks a membrane-bound nucleus and has no membrane organelles; a bacterium. Prokaryotes are more primitive than eukaryotes. Cells lacking membrane-bound organelles and having a single circular chromosome, and ribosomes surrounded by a cell membrane. Prokaryotes were the first forms of life on earth, evolving over 3.5 billion years ago.

proteins	<p>the group of organic compounds made up of chains of amino acids.</p> <p>Polymers made up of amino acids that perform a wide variety of cellular functions. One of the classes of organic macromolecules that function as structural and control elements in living systems. Proteins are polymers of amino acids linked together by peptide bonds.</p>
Protista	<p>Kingdom that includes unicellular organisms with nuclei.</p> <p>The taxonomic Kingdom from which the other three eukaryotic kingdoms (Fungi, Animalia and Plantae) are thought to have evolved. The earliest eukaryotes were single-celled organisms that would today be placed in this admittedly not monophyletic group. The endosymbiosis theory suggests that eukaryotes may have evolved independently several times.</p> <p>One of the four kingdoms that is part of the domain, Eukarya.</p>
psuedopod	False foot; A feature of the amoeba (protist) that helps the amoeba move and engulf food through phagocytosis.
reactants	What goes into the chemical reaction. The items listed in a chemical equation on the left hand side of the arrow.
reproduction	the production of offspring by either sexual or asexual means.
ribonucleic acid (RNA) Nucleic acid containing	ribose sugar and the base Uracil; RNA functions in protein synthesis. The single stranded molecule transcribed from one strand of the DNA. There are three types of RNA, each is involved in protein synthesis. RNA is made up nucleotides containing the sugar ribose, a phosphate group, and one of four nitrogenous bases (adenine, uracil, cytosine or guanine).
ribosome	<p>organelle where protein synthesis occurs.</p> <p>Small organelles made of rRNA and protein in the cytoplasm of prokaryotic and eukaryotic cells; aid in the production of proteins on the rough endoplasmic reticulum and ribosome complexes. The site of protein synthesis. The ribosome is composed of two subunits that attach to the mRNA at the beginning of protein synthesis and detach when the polypeptide has been translated.</p>
S phase	That period of interphase when new DNA is synthesized as part of replication of the chromatin.
selectively permeable	Term describing a barrier that allows some chemicals to pass but not others. The cell membrane is such a barrier sometimes called a semipermeable membrane
sex cell	the male of female gamete; it has one-half the normal chromosome number as a result of meiosis.

sex chromosomes	<p>a pair of homologous chromosomes carrying genes that determine the sex of an individual; these chromosomes are designated as X and Y</p> <p>The chromosomes that determine the sex of an organism. In humans, females have two X chromosomes, and males have one X chromosome and one Y chromosome. Chromosome that determines the gender (sex) of the individual. Human males have a large X and a smaller Y sex chromosomes, while human females have two X sex chromosomes.</p>
sexual reproduction	<p>reproduction that requires two parents to pass on genetic information.</p> <p>A system of reproduction in which two haploid sex cells (gametes) fuse to produce a diploid zygote.</p>
sperm	The male gamete that supplies half of the genetic information to the zygote
spermatogenesis	a type of meiotic cell division in which four sperm cells are produced for each primary sex cell.
spindle apparatus	a network of fibers that form during cell division and to which centromeres attach during the separation of chromosomes.
Synthesis	To make
succession	the gradual replacement of one ecological community by another until it reaches a point of stability.
synthesis	the process in which organisms manufacture the complex compounds required to sustain life.
testes	the pair of male reproductive organs that produce sperm cells
tetrad	a grouping of chromatids that results from a synapsis
tissues	groups of similar cells that work together to perform the same function,; e.g., muscle tissue
turgor pressure	Pressure placed on the cell wall of a plant cell. If a plant cell swells because water is moving in, the turgor pressure is high. If the turgor pressure is low, the plant cell is not filled with water and it may appear as wilted.
unicellular	Single-celled
uterus	in female mammals, the reproductive organ that holds the developing embryo
vacuoles	<p>organelle that store materials; e.g.,</p> <p>Membrane-bound fluid-filled spaces in plant and animal cells that remove waste products and store ingested food.</p>
vesicles	Small membrane-bound spaces in most plant and animal cells that transport macromolecules into and out of the cell and carry materials between organelles in the cell.
virus	a particle of genetic material that can replicate only within a living host cell, where it usually causes harm.

X-chromosome	One of the sex chromosomes. (XX=female, XY = male)
zygote	the fertilized egg that is formed when the nuclei of two gametes (a male and a female) fuse. A fertilized egg. A diploid cell resulting from fertilization of an egg by a sperm cell.
Y-chromosome	One of the sex chromosomes. (XX=female, XY = male)

## Genetics MCAS Vocabulary

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adenine	a nitrogenous base found in DNA and RNA molecules  One of the four nitrogen-containing bases occurring in nucleotides, the building blocks of the organic macromolecule group known as nucleic acids (DNA and RNA). Adenine is also the base in the energy carrying molecule ATP (adenosine triphosphate) which is the energy coin of the cell.
alleles	different versions of a gene for a particular trait.
amino acids	organic compound that are the building blocks of proteins.  The subunits (monomers) from which proteins (polymers) are assembled. Each amino acid consists of an amino functional group, and a carboxyl acid group, and differs from other amino acids by the composition of an R group.
autosomes	The chromosomes other than the sex chromosomes. Each member of an autosome pair (in diploid organisms) is of similar length and in the genes it carries.
base pairs	A pair of complementary nucleotides in DNA. A (adenine) pairs with T (thymine) and G (guanine) pairs with C (cytosine).
blood	fluid that functions to transport nutrients and gases to all parts of the body.
blood group or type	One of the classes into which blood can be separated on the basis of the presence or absence of certain antigens; notably, the ABO types and the Rh blood group.  Blood types, A, AB, B and O is a genetic example of multiple alleles.
centromere	the area of attachment of two chromatids in a double-stranded chromosome.
chemical reaction	process in which one or more substances are changed into others
chromatid	one strand of a double-stranded chromosome.
chromosomal mutation	an alteration in the structure of a chromosome, involving many genes: nondisjunction, translocation, addition, deletion

chromosome	structures composed of DNA that contain the genetic material.  Structures in the nucleus of a eukaryotic cell that consist of DNA molecules that contain the genes.
cloning	the production of identical individuals from the cell of another individual.
codominance	a type of intermediate inheritance that results from the simultaneous expression of two dominant alleles with contrasting effects. White and Red → Pink  A type of inheritance in which heterozygotes express both alleles.
codon	A sequence of three nucleotides in messenger RNA that codes for a single amino acid. Three-base sequence of mRNA that codes for a specific amino acid or termination.
color blindness	inability to distinguish one or several colors  gene is on the X chromosome therefore color blindness represents a sex-linked trait. Females are not as likely to be affected because females have 2 X chromosomes. Males are more likely to be affected because they have XY.
complementary nucleotides	The bonding preferences of nucleotides, Adenine with Thymine, and Cytosine with Guanine. Also referred to as complementary base pairing.
cytosine	nitrogenous base found in both DNA and RNA
daughter cell	a cell that results from mitotic cell division (gametes results from meiosis)
deoxyribonucleic acid (DNA)	The hereditary material of all organisms, which contains the instructions for cellular activities, a nucleic acid molecule.  A nucleic acid composed of two polynucleotide strands wound around a central axis to form a double helix; the repository of genetic information. Nucleic acid that functions as the physical carrier of inheritance for 99% of all species. The molecule is double-stranded and composed of two strands in an antiparallel and complementary arrangement. The basic unit, the nucleotide, consists of a molecule of deoxyribose sugar, a phosphate group, and one of four nitrogenous bases
deoxyribose	Five-carbon sugar found in nucleotides of DNA.

dihybrid cross	<p>In genetics, a cross that involves two sets of characteristics.</p> <p>AaBb x AaBb; refers to two traits (di=two) and the genotype for each of the traits is hybrid or heterozygous.</p> <p>The phenotypic ratio is 9:3:3:1; 9 will show the dominant phenotype for both traits, 3 will show the dominant phenotype for trait A and the recessive phenotype for trait B, 3 will show the recessive phenotype for trait A and the dominant phenotype for trait B and 1 will show the recessive phenotype for both traits.</p>
diploid	Cells that contain homologous chromosomes. The number of chromosomes in the cells is the diploid number and is equal to 2n (n is the number of homologous pairs).
diploid chromosome number	the number of chromosomes found in the somatic cells of sexually reproducing organisms.
DNA replication	Copying process by which a cell duplicates its DNA. Occurs during the S phase of cell cycle.
DNA template	in DNA replication, the original molecule that is used to make copies
dominance	<p>a pattern of genetic inheritance in which the effects of a dominant allele mask those of a recessive allele.</p> <p>The property of one of a pair of alleles that suppresses the expression of the other member of the pair in heterozygotes.</p>
dominant allele	<p>An allele (gene) whose effect masks that of the recessive allele.</p> <p>Refers to an allele of a gene that is always expressed in heterozygotes.</p>
double helix	The shape of the DNA molecule. Also known as a spiral staircase.
double-stranded chromosome	The two-stranded structure that results from chromosomal replication.
egg	the female gamete that supplies half the genetic information to the zygote.
embryo	<p>An organism in the early stage of development: following fertilization and before it is born, or hatched.</p> <p>Term applied to the zygote after the beginning of mitosis that produces a multicellular structure.</p>
expression	<p>In relation to genes, the phenotypic manifestation of a trait.</p> <p>Expression may be age-dependent (e.g., Huntington disease) or affected by environmental factors (e.g., dark fur on Siamese cats).</p>
F1 generation	The first generation of offspring that the parents produce.

fertilization	<p>in sexual reproduction, the process by which an egg cell and a sperm cell unite to form a zygote.</p> <p>The fusion of two gametes (sperm and ovum) to produce a zygote that develops into a new individual with a genetic heritage derived from both parents. Strictly speaking, fertilization can be divided into the fusion of the cells (plasmogamy) and the fusion of nuclei (karyogamy).</p>
fetus	in humans, the developing embryo after the first three months of development.
frameshift mutation	Mutation that shifts the “reading” frame of the genetic message by inserting or deleting a nucleotide
fraternal twin	in humans, twin offspring that result from the simultaneous fertilization of two ova by two sperms; such twins are not genetically identical.
gametes	<p>the male and female sex cells that combine to form a zygote during fertilization</p> <p>a specialized, haploid, reproductive cell produced by sexually reproducing organisms.</p> <p>Haploid reproductive cells (ovum and sperm).</p>
gene	<p>the segments of DNA that contain the genetic information for a particular trait or protein.</p> <p>Specific segments of DNA that control cell structure and function; the functional units of inheritance. Sequence of DNA bases usually code for a polypeptide sequence of amino acids.</p>
genetic code	The linear series of nucleotides, read as triplets, that specifies the sequence of amino acids in proteins. Each triplet specifies an amino acid, and the same codons are used for the same amino acids in almost all life-forms, an indication of the universal nature of the code.
genetics	The study of the structure and function of genes and the transmission of genes from parents to offspring.
genome	1. The set of genes carried by an individual. 2. The set of genes shared by members of a reproductive unit such as a population or species.
genotype	<p>The particular combination of genes in an allele pair.</p> <p>The genetic (allelic) makeup of an organism with regard to an observed trait.</p>
guanine	nitrogenous base found in both DNA and RNA

hemophilia	A sex-linked recessive genetic disorder that results in failure of the blood to clot.  a condition caused when a zygote receives an X chromosome with a particular recessive allele. Males are more likely to be affected than females because males have only one X chromosome.
hereditary	describes the genetic information that is passed from parents to offspring.
heterozygous	Having two different alleles (one dominant, one recessive) of a gene pair.
homologous chromosomes	a pair of chromosomes that carry corresponding genes for the same traits.
homozygous	Having identical alleles for a given gene.
Huntington's disease	A dominant genetic disorder that doesn't show symptoms until the individual is in his 50s. Nerve cells die and do not work.  a condition caused when a zygote receives a mutated dominant allele
identical twins	in humans, twin offspring resulting from the separation of the embryonic cell mass of a single fertilization into two separate masses, such as twins are genetically identical.
incomplete dominance	Situation in which one allele is not completely dominant over another. Results in a blended phenotype. Example: some flowers produce pink flowers when white and red plants are crossed.
independent assortment	Mendel's second law; holds that during gamete formation, alleles in one gene pair segregate into gametes independently of the alleles of other gene pairs. As a result, the gametes will contain all combinations of alleles possible for that organism.
inheritance	the process by which traits are passed from one generation to the next.
meiosis	the division of one parent cell into four daughter cells; reduces the number of chromosomes to one-half the normal number.  Cell division in which the chromosomes replicate, followed by two nuclear divisions. Each of the resulting gametes (in animals, spores in plants) receives a haploid set of chromosomes. Reduction/division by which ploidy, the number of sets of homologous chromosomes, is reduced in the formation of haploid cells that become gametes (or gametophytes in plants).
monohybrid cross	In genetics, a cross that involves only one trait.
mRNA (messenger RNA)	RNA molecule that carries copies of instructions for the assembly of amino acids into proteins from DNA to the rest of the cell.
multiple alleles	Three or more alleles of the same gene. Example – blood type

mutagenic agent	any environmental condition that initiates or accelerates genetic mutation
mutation	Any change in the nucleotide sequence of DNA; can involve substitutions, insertions, or deletions of one or more nucleotides. There can also be chromosomal mutations
nitrogenous base	a chemical unit composed of carbon, hydrogen, and nitrogen that is a component part of a nucleotide unit.
nucleic acids	Polymers composed of nucleotides; e.g., DNA and RNA.
nucleotide	Monomer of nucleic acids made up of a 5-carbon sugar, a phosphate group, and a nitrogenous base
nucleotide sequences	The genetic code encrypted in the sequence of bases along a nucleic acid.
nucleotides	the building blocks or subunits of DNA; they include four types of nitrogen bases, which occur only in pairs.  The subunits of nucleic acids; composed of a phosphate, a sugar, and a nitrogen-containing base. The fundamental structural unit of the nucleic acid group of organic macromolecules. Some nucleotides are involved in information storage (as nucleotides in DNA), protein synthesis (as nucleotides in RNA), and energy transfers (as single nucleotide ATP, GTP, and double nucleotide NADH and NADPH).
nucleus (cell)	an organelle that contains the cell's genetic information in the form of chromosomes.  The largest, most prominent organelle in eukaryotic cells; a round or oval body that is surrounded by the nuclear envelope and contains the genetic information necessary for control of cell structure and function.
offspring	The children of a parental cross
pedigree analysis	A type of genetic analysis in which a trait is traced through several generations of a family to determine how the trait is inherited. The information is displayed in a pedigree chart using standard symbols.
phenotype	The observed properties or outward appearance of a trait. The physical expression of the alleles possessed by an organism.
point mutation	Mutation that affects a single nucleotide, usually by substituting one nucleotide for another.
polygenic inheritance	Occurs when a trait is controlled by several gene pairs; usually results in continuous variation.
principle of independent assortment	Mendel's second law; holds that during gamete formation, alleles in one gene pair segregate into gametes independently of the alleles of other gene pairs. As a result, if enough gametes are produced, the collective group of gametes will contain all combinations of alleles possible for that organism.

principle of segregation	Mendel's First law; holds that each pair of factors of heredity separate during gamete formation so that each gamete receives one member of a pair.
probability	Likelihood that a particular event will occur
proteins	the group of organic compounds made up of chains of amino acids.  Polymers made up of amino acids that perform a wide variety of cellular functions. One of the classes of organic macromolecules that function as structural and control elements in living systems. Proteins are polymers of amino acids linked together by peptide bonds.
Punnett square	Diagram showing the gene combinations that might result from a genetic cross
radiation	a form of energy that can cause genetic mutations in sex cells and body cells.
recessive	Refers to an allele of a gene that is expressed when the dominant allele is not present. An allele expressed only in homozygous form, when the dominant allele is absent.
recessive allele	an allele (gene) whose effect is masked by that of its dominant allele.
replication	Process by which DNA is duplicated prior to cell division.
reproduction	the production of offspring by either sexual or asexual means.
ribonucleic acid (RNA) Nucleic acid containing	ribose sugar and the base Uracil; RNA functions in protein synthesis. The single stranded molecule transcribed from one strand of the DNA. There are three types of RNA, each is involved in protein synthesis. RNA is made up nucleotides containing the sugar ribose, a phosphate group, and one of four nitrogenous bases (adenine, uracil, cytosine or guanine).
ribose	Sugar found in nucleotides of RNA and in ATP.
ribosome	organelle where protein synthesis occurs.  Small organelles made of rRNA and protein in the cytoplasm of prokaryotic and eukaryotic cells; aid in the production of proteins on the rough endoplasmic reticulum and ribosome complexes. The site of protein synthesis. The ribosome is composed of two subunits that attach to the mRNA at the beginning of protein synthesis and detach when the polypeptide has been translated.
rRNA (ribosomal RNA)	Type of RNA that makes up the major part of ribosomes.
selective breeding	the process by which humans encourage the development of specific traits by breeding only the plants or animals that have those traits. HOW WOULD YOU AS A DOG BREEDER CREATE A DOG THAT LOOKS REALLY DIFFERENT?
sex cell	the male or female gamete; it has one-half the normal chromosome number as a result of meiosis.

sex chromosomes	<p>a pair of homologous chromosomes carrying genes that determine the sex of an individual; these chromosomes are designated as X and Y</p> <p>The chromosomes that determine the sex of an organism. In humans, females have two X chromosomes, and males have one X chromosome and one Y chromosome. Chromosome that determines the gender (sex) of the individual. Human males have a large X and a smaller Y sex chromosomes, while human females have two X sex chromosomes.</p>
sex linkage	a pattern of inheritance in which certain nonsex genes are located on the X chromosomes, but have no corresponding alleles on the Y sex chromosome.
sex-linked trait	a genetic trait whose inheritance is controlled by the genetic patterns of sex linkage, such as color blindness.
sexual reproduction	<p>reproduction that requires two parents to pass on genetic information.</p> <p>A system of reproduction in which two haploid sex cells (gametes) fuse to produce a diploid zygote.</p>
Sickle cell anemia	<p>a condition caused when a zygote receives a recessive allele for hemoglobin from each parent</p> <p>individuals that are heterozygous are resistant to malaria</p>
sperm	The male gamete that supplies half of the genetic information to the zygote
spermatogenesis	a type of meiotic cell division in which four sperm cells are produced for each primary sex cell.
Sugar/phosphate backbone	The DNA double helix is made of two strands of DNA. The sides of the DNA ladder are made of alternating sugar and phosphate groups. The rungs of the ladder are made of the nitrogen base pairs.
Synthesis	To make
test cross	a genetic cross accomplished for the purpose of determining the genotype of an organism expressing a dominant phenotype: the unknown is crossed with a homozygous recessive.
Thymine	a nitrogenous base found only in DNA
transcription	The synthesis of RNA from a DNA template. The making of RNA from one strand of the DNA molecule.
translation	The synthesis of protein on a template of messenger RNA; consists of three steps: initiation, elongation, and termination. Making of a polypeptide sequence by translating the genetic code of an mRNA molecule associated with a ribosome.
translocation	a type of chromosome mutation in which a section of a chromosome is transferred to a nonhomologous chromosome
triplet codon	a group of three nitrogenous bases that provide information for the placement of amino acids in the synthesis of proteins.

Trisomy 16	a condition caused when a zygote receives three copies of chromosome 16  Trisomy means 3 copies of a chromosome. Other examples are trisomy 18 and trisomy 21. Trisomy 21 is also called Down's Syndrome.
tRNA (transfer RNA)	Type of RNA molecule that transfers amino acids to ribosomes during protein synthesis
uracil	nitrogenous base found only in RNA
variability	the differences that exist among offspring in their genetic makeup
X-chromosome	One of the sex chromosomes. (XX=female, XY = male)
Y-chromosome	One of the sex chromosomes. (XX=female, XY = male)
zygote	the fertilized egg that is formed when the nuclei of two gametes (a male and a female) fuse. A fertilized egg. A diploid cell resulting from fertilization of an egg by a sperm cell.

## Anatomy and Physiology MCAS Vocabulary

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alveoli	Tiny air sac at the end of a bronchiole in the lungs that provides surface area for gas exchange to occur
arteries	Large blood vessel that carries blood from the heart to the tissues of the body
bone	A hard tissue that makes up the skeletal system. Blood cells are made inside some bones.
brain	Control center of your body made up of a mass of nervous tissues that receives, interprets and reacts to messages.. The brain and spinal cord are part of the central nervous system.
capillaries	Smallest blood vessel; brings nutrients and oxygen to the tissues and absorbs carbon dioxide and waste products.
carbon dioxide	the inorganic compound from which plants get carbon for photosynthesis; waste product of cellular respiration
cardiac muscle	Heart muscle tissue
cartilage	Strong connective tissue that supports the body and is softer and more flexible than bone
cell	Collection of living matter enclosed by a barrier that separates the cell from its surroundings; basic unit of all forms of life
cell communication	is required for coordination of body functions. The nerves communicate with electrochemical signals, hormones circulate through the blood, and some cells produce signals to communicate only with nearby cells.
circulatory system	Transports nutrients and oxygen to cells and removes cell wastes.

digestive system	converts macromolecules from food into smaller molecules that can be used by cells for energy and for repair and growth.
energy	The ability to bring about changes or to do work.
esophagus	Food tube connecting the mouth to the stomach
excretory system	Is closely associated with the circulatory system as the kidneys and liver perform the excretory function of removing waste from the blood. Kidneys remove nitrogenous wastes, and the liver removes many toxic compounds from blood.
feedback loop	Process in which the product or result stops, limits or starts the next step in the process.
heart	The central organ of the circulatory system. It is a muscular organ that pumps blood. The atria receive blood and the ventricles pump blood out of the heart.
hemoglobin	Iron-containing protein in red blood cells that transports oxygen from the lungs to the tissues of the body
homeostasis	Process by which organisms maintain a relatively stable internal environment.
kidney	Organ that removes urea, excess water, and other waste products from the blood and passes them to the ureter.
large intestine	Colon; organ that removes water from the undigested materials that pass through it
larynx	Structure in the throat containing the vocal cords
ligaments	Strip of tough connective tissue that holds bones together at a joint
liver	Large organ just above the stomach that produces bile, a fluid loaded with lipids and salts.
lungs	Main organs of the respiratory system where the gases oxygen and carbon dioxide are exchanged.
macromolecules	Large molecules that make up living organisms; carbohydrates, lipids, proteins, and nucleic acids
motor neurons	Carry impulses from the brain and the spinal cord to muscles and glands
mouth	Where food enters the digestive system. Here food is chewed (mechanical digestion) and mixed with saliva (chemical digestion).
muscular/skeletal system	works with other systems to support the body and allow for movement. Bones produce blood cells.
nervous system	Mediates communication among different parts of the body and mediates the body's interactions with the environment. Basic unit of the nervous system is the neuron.
neuron	Cell that carries messages throughout the nervous system
nitrogenous waste	Waste that is found in the blood and filter out by the kidneys, specifically urea with contains a lot of nitrogen
nose	The sense organ for smell. It is also the location in which air can enter the respiratory system.
nutrients	Chemical substance that an organism requires to live

organ	Group of tissues that work together to perform closely related functions
pharynx	Muscular tube at the end of the gastrovascular cavity, or throat, that connects the mouth with the rest of the digestive tract and serves as a passageway for air and food.
rectum	Where solid waste is stored before it leaves the body as feces.
red blood cells	Blood cell that carries oxygen
reproductive system	allows organisms to produce offspring that receive half of their genetic information from their mother and half from their father, and that sexually produced offspring resemble, but are not identical to, either of their parents.
respiratory system	Provides exchange of oxygen and carbon dioxide.
sensory neurons	Neuron that reacts to a specific stimulus, such as light or sound, by sending impulses to other neurons and eventually to the central nervous system.  Carry impulses from the sense organs to the spinal cord and brain
skeletal muscle	Muscle attached to the skeleton; makes movement possible
small intestine	Digestive organ in which most chemical digestion takes place
smooth muscle	Muscle that causes movements that you cannot control
spinal cord	Made up of many nerves that extend down your back and is protected by the backbone. The brain and spinal cord make up the central nervous system.
stomach	Large muscular sac that continues the mechanical and chemical digestion of food
tendons	Tough connective tissue that joins skeletal muscles to bones
tissue	Group of similar cells that perform a particular function
trachea	Windpipe; tube through which air moves
veins	A blood vessel that returns blood to the heart

## Evolution and Biodiversity MCAS Vocabulary

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adaptation	<p>special characteristics that make an organism well suited for its environment, helping to make that organism survive and reproduce, may be a structural; adaptation, biochemical, or behavioral.</p> <p>Tendency of an organism to suit its environment; one of the major points of Charles Darwin's theory of evolution by natural selection: organisms adapt to their environment. Those organisms best adapted will have a greater chance of surviving and passing their genes on to the next generation.</p>
adaptive radiation	<p>The development of a variety of species from a single ancestral form; occurs when a new habitat becomes available to a population. Evolutionary pattern of divergence of a great many taxa from a common ancestral species as a result of novel adaptations or a recent mass extinction. Examples: mammals during the Cenozoic Era after the extinction of dinosaurs at the close of the Mesozoic Era flowering plants during the Cretaceous Period diversified because of their reproductive advantages over gymnosperm and non-seed plants that dominated the floras of the world at that time.</p>
analogous structures	<p>Body parts that serve the same function in different organisms, but differ in structure and embryological development; e. g., the wings of insects and birds.</p>
ancestor	<p>The organism from which from which later kinds evolved.</p>
Animalia.	<p>Animal Kingdom. Multicellular eukaryotic group characterized by heterotrophic nutritional mode, usually organ and tissue development, and motility sometime during the organism's life history</p>
antibiotic resistance	<p>Tendency of certain bacteria to develop a resistance to commonly over-used antibiotics.</p>
antibiotics	<p>chemicals that kill specific bacteria, used to combat infection</p>
Archaea	<p>One of three domains. This domain only has one kingdom, the archeabacteria.</p>
Archaeobacteria	<p>Taxonomic kingdom of ancient (over 3.5 billion years old) group of prokaryotes; These bacteria tend to live in extreme environments (very hot, highly acidic or basic, etc)</p>

artificial selection	The process in which breeders choose the variants to be used to produce succeeding generations.
asexual reproduction	A method of reproduction in which genetically identical offspring are produced from a single parent; occurs by many mechanisms, including fission, budding, and fragmentation.
biodiversity	the variety of different species in an ecosystem
biological control	the use of natural enemies of various agricultural pests for pest control, eliminating the use of pesticides.
classes	Taxonomic subcategories of phyla.
classification	categorizing organisms, the sorting, grouping and naming of organisms for easier study.
common ancestry	an important concept of evolutionary theory that all organisms share a common ancestor whose closeness varies with the degree of similarity.
common descent	Principle that all living things have a common ancestor
comparative anatomy	the study of similarities in the anatomical structures of organisms, and their use as an indicator of common ancestry and as evidence of organic evolution
comparative biochemistry	the study of similarities in the biochemical makeup of organisms, and their use as an indicator of common ancestry and as evidence of organic evolution
comparative cytology	the study of similarities in the cell structures of organisms, and their use as an indicator of common ancestry and as evidence of organic evolution
comparative embryology	the study of similarities in the embryological development of organisms, and their use as an indicator of common ancestry and as evidence of organic evolution
convergent evolution	The development of similar structures in distantly related organisms as a result of adapting to similar environments and/or strategies of life. Example: wings of birds and insects, the body shape of dolphins, sharks, and the extinct marine reptiles known as ichthyosaurs.
descend	To come from an ancestor.

deoxyribonucleic acid (DNA)	<p>The hereditary material of all organisms, which contains the instructions for cellular activities, a nucleic acid molecule.</p> <p>A nucleic acid composed of two polynucleotide strands wound around a central axis to form a double helix; the repository of genetic information. Nucleic acid that functions as the physical carrier of inheritance for 99% of all species. The molecule is double-stranded and composed of two strands in an antiparallel and complementary arrangement. The basic unit, the nucleotide, consists of a molecule of deoxyribose sugar, a phosphate group, and one of four nitrogenous bases</p>
divergent evolution	The divergence of a single interbreeding population or species into two or more descendant species.
diversity	The different types of organisms that live in an ecosystem.
Domain	Most inclusive taxonomic category; larger than a kingdom. There are three domains, Bacteria, Archea, Eukarya
embryo	<p>An organism in the early stage of development: following fertilization and before it is born, or hatched.</p> <p>Term applied to the zygote after the beginning of mitosis that produces a multicellular structure.</p>
Eubacteria	The kingdom that includes the true bacteria such as E. coli.. The eubacteria have cell walls containing peptidoglycan. Belong to the domain, Bacteria.
Eukarya	Domain of all organisms whose cells have nuclei, including protists, plants, fungi and animals.
eukaryote	A type of cell found in many organisms including single-celled protists and multicellular fungi, plants, and animals; characterized by a membrane-bounded nucleus and other membraneous organelles; an organism composed of such cells. The first eukaryotes are encountered in rocks approximately 1.2-1.5 billion years old.

evolution	<p>the change in organisms over time due to natural selection acting on genetic variations that enable them (the organisms) to adapt to changing environments.</p> <p>The change in life over time by adaptation, variation, over-reproduction, and differential survival/reproduction, a process referred to by Charles Darwin and Alfred Wallace as natural selection. 2) Descent with modification.</p>
extinction	the death of all living members of a species
fitness	A measure of an individual's ability to survive and reproduce; the chance that an individual will leave more offspring in the next generation than other individuals.
fossil	<p>traces or remains of dead organisms preserved by natural processes (e.g., in rocks, amber, etc)</p> <p>The remains or traces of prehistoric life preserved in rocks of the Earth's crust. 2. Any evidence of past life.</p>
fossil record	The observed remains of once-living organisms taken as a whole.
Fungi	<p>Heterotrophic organisms that obtain their energy by feeding on decaying organisms; yeast mushrooms</p> <p>Non-mobile, heterotrophic, mostly multicellular eukaryotes, including yeasts and mushrooms.</p>
gene pool	The sum of all the genetic information carried by members of a population.
genera	Taxonomic subcategories within families (sing.: genus), composed of one or more species.
genetic diversity or genetic variation	Sum total of all the different forms of genetic information carried by all organisms living on Earth today.
geographic isolation	Separation of populations of a species by geographic barriers (distance, mountains, rivers, oceans, etc.), that lead to reproductive isolation of those population - facilitating the evolutionary process.

homologous structures	<p>Body parts in different species that have a common evolutionary origin, but may not serve the same function, e.g., the flipper of a whale and the forelimb of a horse.</p> <p>Body parts in different organisms that have similar bones and similar arrangements of muscles, blood vessels, and nerves and undergo similar embryological development, but do not necessarily serve the same function; e.g., the flipper of a whale and the forelimb of a horse.</p>
insecticide	A substance used to kill insects.
interbreed	To breed or cause to breed within a narrow range.
kingdoms	<p>a major taxonomic groupings into which all living things are categorized.</p> <p>six broad taxonomic categories (Archeabacteria, Eubacteria, Protista, Plantae, Fungi, Animalia) into which organisms are grouped, based on common characteristics.</p>
mutation	Any change in the nucleotide sequence of DNA; can involve substitutions, insertions, or deletions of one or more nucleotides. There can also be chromosomal mutations
natural selection	<p>a concept central to Darwin's theory of evolution: the individuals best adapted to their environment tend to survive and pass their favorable traits on to the next generation.</p> <p>the process by which organisms having the most adaptive traits for an environment are more likely to survive and reproduce</p> <p>The process of differential survival and reproduction of fitter genotypes; can be stabilizing, directional, or disruptive. Better adapted individuals are more likely to survive to reproductive age and thus leave more offspring and make a larger contribution to the gene pool than do less fit individuals. The differential survival and reproductive successes of individuals in a variable population that powers the evolutionary process. When all individuals survive and reproduce (except for chance occurrences) natural selection works at a lower rate, if at all.</p>
orders	Taxonomic subcategories of classes.

pesticide	chemical used to kill agricultural pests, mainly insects.
phylum	a level of biological classification that is a major subdivision of the kingdom level.
Plantae	The plant kingdom; nonmobile, autotrophic, multicellular eukaryotes. Kingdom of the plants, autotrophic eukaryotes with cellulose in their cell walls and starch as a carbohydrate storage product, with chlorophylls a and b as photosynthesis pigments.
population	all the individuals of the same species that live in the same area.  A group of individuals of the same species living in the same area at the same time and sharing a common gene pool. A group of potentially interbreeding organisms in a geographic area.
Protista	one of the five kingdoms; it includes unicellular organisms with nuclei.  The taxonomic Kingdom from which the other three eukaryotic kingdoms (Fungi, Animalia and Plantae) are thought to have evolved. The earliest eukaryotes were single-celled organisms that would today be placed in this admittedly not monophyletic group. The endosymbiosis theory suggests that eukaryotes may have evolved independently several times.
reproductive isolation	the inability of species varieties to interbreed and produce fertile offspring, because of variations in behavior or chromosomes.
resistant	To work against
selective breeding	the process by which humans encourage the development of specific traits by breeding only the plants or animals that have those traits. HOW COULD YOU AS A DOG BREEDER CREATE A DOG THAT LOOKS REALLY DIFFERENT?
species	a group of related organisms that can breed and produce fertile offspring  One or more populations of interbreeding or potentially interbreeding organisms that are reproductively isolated in nature from all other organisms. Populations of individuals capable of interbreeding and producing viable, fertile offspring. The least inclusive taxonomic category commonly used.
speciation	the process by which new species arise form previously existing species.

subspecies	A taxonomic subdivision of a species; a population of a particular region genetically distinguishable from other such populations and capable of interbreeding with them.
taxonomy	A systematic method of classifying plants and animals. Classification of organisms based on degrees of similarity purportedly representing evolutionary (phylogenetic) relatedness.
variability	the differences that exist among offspring in their genetic makeup
vestigial organ	Organ that serves no useful function in an organism

## Ecology MCAS Vocabulary

[\(click here to return to table of contents\)](#)

abiotic factor	nonliving parts of an organism's environment.
algae	single-celled plant-like organism that carry out photosynthesis
atmosphere	The blanket of gases that cover the Earth; commonly called  The envelope of gases that surrounds the Earth; consists largely of nitrogen (78%) and oxygen (21%).
atom	the smallest unit of an element that can combine with other elements.  The smallest indivisible particle of matter that can have an independent existence.
autotroph	A type of nutrition in which organism can manufacture their own organic foods from inorganic materials, an organism that obtains its food from inorganic sources  Organisms that make their own food; include some bacteria that are able to synthesize organic molecules from simpler inorganic compounds.
bacteria	single-celled organisms that have no nuclei
biochemical cycle	The flow of an element through the living tissue and physical environment of an ecosystem; e. g., the carbon, hydrogen, oxygen, nitrogen, sulfur, and phosphorus cycles.
biodiversity	the variety of different species in an ecosystem
biological control	the use of natural enemies of various agricultural pests for pest control, eliminating the use of pesticides.
biomass	the total mass of the organisms at a trophic level
biome	a very large area characterized by certain climate and types of plants and animals

biosphere	The portion of the earth in which living things exist, including all land and water environments.
biotic factor	living parts of an organism's environment.
birth rate	The number of offspring born in a particular amount of time. If the birth rate increases, the population size will increase over time. If the birth rate decreases, the population size will decrease over time.
carbon	one of the six most important chemical elements for living things, forms the backbone of nearly all organic compounds.
carbon cycle	Carbon is in the form of CO <sub>2</sub> in the atmosphere, it is taken in by producers for photosynthesis and turned into sugars, and it is then passed to consumers and decomposers in a food chain. Carbon is returned to the atmosphere as CO <sub>2</sub> when organisms breathe out or fossil fuels are burned.
carbon dioxide	the inorganic compound from which plants get carbon for photosynthesis; waste product of cellular respiration CO <sub>2</sub>
carnivores	an animal that obtain energy by eating other animals. Carnivores function as secondary, tertiary, or top consumers in food chains and food webs.
carrying capacity	Largest number of individuals of a population that a given environment can support
cellular respiration	the process that uses oxygen to create ATP for energy use. the process of releasing chemical energy stored in food (glucose) the process of converting the energy in glucose into a form more easily used by a cell. The transfer of energy from various molecules to produce ATP; occurs in the mitochondria of eukaryotes, the cytoplasm of prokaryotes. In the process, oxygen is consumed and carbon dioxide is generated.
climate	Average, year-after-year conditions of temperature and precipitation in a particular region
commensalisms	Symbiotic relationship in which one member of the association benefits and the other is neither helped nor harmed.
community	populations of different species that interact within an area. All species or populations living in the same area.
community succession	The sequential replacement of species in a community by immigration of new species and by local extinction of old ones.
competition	the struggle between organisms for limited resources such as food and space.
condensation	When a substance changes from a gas to a liquid. Example; water vapor turning into water droplets on a mirror.

consumers	organisms that obtain their energy by feeding on other organisms; Heterotrophic organisms  The higher levels in a food pyramid; consist of primary consumers, which feed on the producers, and secondary consumers, which feed on the primary consumers.
crop rotation	When farmers plant corn in a field one year, beans the next year and alternate back a forth each year. (corn and beans are just an example)
death rate	The number of organisms in a population that die in a particular amount of time.
DDT	A pesticide that kills a lot of different insects. It is used to protect crops and kill disease-carrying mosquitoes. DDT was banned in the US during the 1970s because of its harm to fish-eating birds like the osprey, brown pelican and bald eagle.
decomposers	Heterotrophic organisms that obtain their energy by feeding on decaying organisms.
density	Number of living organisms in a specific area
diversity	The different types of organisms that live in an ecosystem.
ecology	The study of how organisms interact with each other and with their physical environment.
ecosystem	The area that contains all the living and nonliving parts that interact.
element	The simplest form of matter; an element is a substance made up of a single type of atom,  A substance composed of atoms with the same atomic number; cannot be broken down in ordinary chemical reactions.
emigration	Movement of individuals out of a population.
energy	The ability to bring about changes or to do work.
energy flow	The movement of energy through a community via feeding relationships.
energy pyramid	describes the flow of energy through an ecosystem; more energy is at the base (producers) and decreases at each higher level (consumers). 10% rule
environment	An area that contains the living and nonliving parts that interact.
evaporation	The part of the hydrologic cycle in which liquid water is converted to vapor and enters the atmosphere.
extinction	the death of all living members of a species
fertilizer	Any of a large number of natural and man-made materials, including manure and nitrogen, phosphorus, and potassium compounds, spread on or worked into soil to increase its capacity to support plant growth.
flora	the plant species in an ecological community

	the direct transfer of energy from one organism to the next, a segment of a food web.
food chain	The simplest representation of energy flow in a community. At the base is energy stored in plants, which are eaten by small organisms, which in turn are eaten by progressively larger organisms; the food chain is an oversimplification in that most animals do not eat only one type of organism.
food pyramid	A way of depicting energy flow in an ecosystem; shows producers (mostly plants or other phototrophs) on the First level and consumers on the higher levels.
food web	the interconnecting food chains in an ecosystem.  A complex network of feeding interrelations among species in a natural ecosystem; more accurate and more complex depiction of energy flow than a food chain.
fossil fuels	Fuels that are formed in the Earth from plant or animal remains; e.g., coal, petroleum, and natural gas.
Fungi	Heterotrophic organisms that obtain their energy by feeding on decaying organisms; yeast mushrooms  Non-mobile, heterotrophic, mostly multicellular eukaryotes, including yeasts and mushrooms.
habitat	the place where an organism lives.; a specific environment that has an interacting community of organisms.
herbivores	animals that obtain their energy by eating plants.  Term pertaining to a heterotrophs, usually an animal, that eats plants or algae. Herbivores function in food chains and food webs as primary consumers.
heterotroph	Organisms that obtain their nutrition by breaking down organic molecules in foods; include animals and fungi.  an organism that obtains its energy by feeding on other living things, e/g consumers  Refers to organisms, such as animals, that depend on preformed organic molecules from the environment (or another organism) as a source of nutrients/energy.
immigration	Movement of individuals into an area occupied by an existing population
invasive species	Plants and animals that have migrated to places where they are not native
invertebrate animals	Animal that does not have a backbone or vertebral column

legumes	A type of plant (bean, clover, alfalfa) that is important in the nitrogen cycle.  Bacteria live in nodules on the roots of legume plants and convert atmospheric nitrogen into nitrates the plant can use.
mutualism	a type of symbiosis that is beneficial to both organisms in the relationship
niche	the role an organism plays in its environment  an organism's role in, or interaction with its habitat and ecosystem.
nitrate	$\text{NO}_3^-$ ; a compound that plants and animals can use to get the nitrogen to make proteins and nucleic acids.
nitrifying bacteria	in the nitrogen cycle, bacteria that absorb ammonia and convert it to nitrate.
nitrogen	An element important in proteins and nucleic acids.  Atmospheric nitrogen ( $\text{N}_2$ ) cannot be taken in by plants or animals and used. Bacteria in nodules on legume plants change $\text{N}_2$ into ammonia during nitrogen fixation
nitrogen cycle	the process by which nitrogen is recycled and made available for use by other organisms.
nitrogen fixation	Bacteria in nodules on legume plants change $\text{N}_2$ into ammonia
nutrients	important molecules in food, such as lipids, proteins, and vitamins.
omnivore	organisms (animals) that eat both plants and animals
organic compound	compounds that contain carbon and hydrogen (in living things)
organism	An individual, composed of organ systems (if multicellular). Multiple organisms make up a population.
over-harvesting	The process of removing a lot of organisms from an environment at a time. Example; fishermen can over-harvest tuna by removing a lot of tuna from the ocean at any one time.
oxygen cycle	$\text{O}_2$ gas is in the air. Animals take in $\text{O}_2$ for cellular respiration and release $\text{CO}_2$ as a waste product. Many producers take in $\text{CO}_2$ for photosynthesis and release $\text{O}_2$ as a waste product.
parasite	an organism that lives in or on another organism (the host), deriving nutrients from it and usually causing it harm.
parasitism	a type of symbiosis from which one organism in the relationship benefits, while the other (the host) is harmed, but not ordinarily killed.
pesticide	chemical used to kill agricultural pests, mainly insects.

photosynthesis	<p>The process by which plant cells use the energy of sunlight convert carbon dioxide and water into glucose, with oxygen being released.</p> <p>The conversion of unusable sunlight energy into usable chemical energy, associated with the actions of chlorophyll.</p>
population	<p>all the individuals of the same species that live in the same area.</p> <p>A group of individuals of the same species living in the same area at the same time and sharing a common gene pool. A group of potentially interbreeding organisms in a geographic area.</p>
precipitation	The part of the hydrologic cycle in which the water vapor in the atmosphere falls to Earth as rain or snow.
predator	an organism that feeds on other living organisms
prey	an organism that is eaten by another organism (the predator)
primary consumer	any herbivorous organism that receives food energy from the producer level; the second stage of the food chain.
producers	<p>organisms on the first trophic level, which obtain their energy from inorganic sources; (i.e., photosynthesis); autotrophic life-forms such as plants and algae.</p> <p>The first level in a food pyramid; consist of organisms that generate the food used by all other organisms in the ecosystem; usually consist of plants making food by photosynthesis.</p>
proteins	<p>the group of organic compounds made up of chains of amino acids.</p> <p>Polymers made up of amino acids that perform a wide variety of cellular functions. One of the classes of organic macromolecules that function as structural and control elements in living systems. Proteins are polymers of amino acids linked together by peptide bonds.</p>
protists	Single-celled organisms; a type of eukaryote. Protista
protozoa.	Single-celled protists grouped by their method of locomotion. This group includes Paramecium, Amoeba, and many other commonly observed protists
pyramid of biomass	illustrates that the total biomass available in each stage of a food chain diminishes from producer level to consumer level.
pyramid of energy	illustrates that energy is lost at each trophic level in a food chain, being most abundant at the producer level.
runoff	Rainfall not absorbed by soil that drains or flows off, as rain that flows off from the land in streams
scavengers	animals that eat the remains of kill, rather than hunt the living animals.
simple sugars	single sugars that have six carbon atoms; glucose

species	<p>a group of related organisms that can breed and produce fertile offspring</p> <p>One or more populations of interbreeding or potentially interbreeding organisms that are reproductively isolated in nature from all other organisms. Populations of individuals capable of interbreeding and producing viable, fertile offspring. The least inclusive taxonomic category commonly used.</p>
speciation	the process by which new species arise from previously existing species.
subspecies	A taxonomic subdivision of a species; a population of a particular region genetically distinguishable from other such populations and capable of interbreeding with them.
succession	the gradual replacement of one ecological community by another until it reaches a point of stability.
symbiosis	a close relationship between two or more different organisms that live together, which is often but not always beneficial.
taiga	a terrestrial biome characterized by long, severe winters and climax flora that include coniferous trees.
temperate deciduous forest	a terrestrial biome characterized by moderate climatic conditions and climax flora that includes deciduous trees.
terrestrial	the land (aquatic is water)
transpiration	The loss of water molecules from the leaves of a plant; creates an osmotic gradient; producing tension that pulls water upward from the roots.
trophic level	Step in a food chain or food web
tundra	a terrestrial biome characterized by permanently frozen soil and climax flora that includes lichens and mosses.
water cycle	Water moving between the ocean, atmosphere and land. Water enters the atmosphere through evaporation and transpiration. The water vapor condenses into clouds and the water returns to Earth through a form of precipitation. Water flows into the ground or ocean and the process starts over.

## How can studying Latin roots help a student with vocabulary mastery?

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a, an (G)--not; without; negative: asexual, abiogenesis, atrophy  
ab (L)-off; from; away: abduct  
ad, af (L)-to; toward: adductor, adrenal, adhere, afferent  
ana (G)-through: anaphase, anatomy, anabolic  
ante (L)-before; the front: anterior  
anti (G)-opposite; against: antigen, antifreeze, anti-parallel  
archae (G)-ancient: archenteron, archaeology, archaic, archeabacteria  
ase (?) -enzyme: lactase, maltase, dehydrogenase  
auto (G)-self: autonomic, autosome, autograph, automobile  
bi (L)-two: bisexual, binary, biweekly, biennial, bicycle  
bio (G)-life; live: biology, biogenetic, biography, biometry  
capil (L)-hair: capillary  
cardio (G)--heart: cardiac, cardiovascular  
carn (L)-flesh; meat: carnivore, chili con carne  
cata (G)-downward; inferior:, catalyst  
centa (G)--1/100: centimeter  
cerv (L)-neck: cervix, cervical  
chlor (G)-green: chlorine, chloroplast, chlorophyll, chlorotic  
chrom (G)--color: chromatin, chromatic, chromium, chromosome  
cilio (L)--hair: cilium, ciliate, ciliophoran  
circa (L)-around; approximately: circle, circumnavigate, circa  
cyt (G)-cell: cytology, erythrocyte, chondrocyte, osteocyte, cytoplasm  
deca (G)--ten: decimal, decameter, decathalon  
dendr (G)-tree: dendrite, dendrology  
derm (G)-skin: dermis, ectoderm, hypodermic  
di (G)-two, second, or double: dihybrid, dimer, diploid, diencephalon (but not dissect)  
dis (L)-separating from or parting from: dissect, dismiss, discover, disaster  
dorm (L)-sleep: dormant, dormatory  
dorso (L)--the back: dorsal, dorsum  
ect (G)-outer: ectoderm, ectoplasm  
ef, ex (L)-away; from; outward: efferent, exoskeleton, excretion  
end (G)-inner: endoderm, endoplasm, endopodite  
eu (G)-good; well; real; true: eukaryotic, euchromatin, eugenic, eutherian,  
eutrophic  
fer (L)-bearing; carrying; possessing: seminiferous,  
gam (G)--marriage: polygamy, gamete, gametogenesis  
gaster (G)--stomach: gastric, gastrula, gastropod, gastrin  
gen, gem (L)-be born; create; produce: gene, genetics, progenitor,  
heme (G)--blood: hemocoel, hematology, hemoglobin

herb (L)-grass; soft plant; plant: herbivore, herbaceous  
 hetero (G)-different; other: heterochromatin, heterozygous, heterosexual  
 hexa (G)-six: hexose, hexagon  
 homo (L)-human; man: Homo sapiens  
 homo (G)--same; like; similar: homogeneous; homologous; homosexual  
 hydro (G)-water: hydrology, dehydration, hydration, hydrogen, hydrophilic,  
 hyper (G)--over; beyond: hyperosmotic, hyperthyroidic, hyperactive  
 hypo (G)--under; less than: hypodermis, hypodermic, hypomere, hyposmotic  
 karyo, caryo (G)-nucleus, kernel, nut: eukaryotic, megakaryocyte, karyotype  
 kilo (G)--thousand: kilometer, kilogram  
 infra (L)--below. infrared, inferior, infrastructure  
 inter (L)--between; among: intercellular, interphase, interim  
 intra (L)-inside; within: intracellular, intravascular  
 Iso (G)--equal: isometric, isogamy, isoptera, isosmotic, isotonic  
 latus (L)--the side: lateral  
 leuc, leuk (G)--white; bright: leucocyte, leukemia  
 ling (L)--tongue: lingual, linguistic  
 log (G)--study; discourse: biology, geology, zoology  
 lys (G)-losing; dissolving, breaking: hydrolysis, catalysis, plasmolysis, glycolysis  
 macro (G)--large: macromolecule, macroscopic, macroeconomics, macronucleus  
 medi (L)-middle: medial, mediate, intermedial  
 mega (L)-great: megakaryocyte, megawatt  
 micro (G)--small; tiny; 1/1,000,000: microscope, micrometer, microcomputer  
 milli (L)--1/1,000: millimeter  
 mito (G)-thread: mitosis, mitochondrion  
 mono (G)-one; single: monosaccharide, monocular, mononuclear leucocyte  
 myo (G)-muscle: myosin, myofibril, myotome, myocardium  
 nephro (G)--kidney: nepric, epinephrine, pronephros  
 nom (L)--name: taxonomy, innominate, nomenclature  
 noto (G)--dorsal; back: notochord, pronotum  
 oid (L)-like; resembling: diploid, humanoid, anthropoid  
 oo (G)-egg: oocyte, oogenesis, ootid (pronounced two long o's in sequence, as in "oh, oh")  
 ose (?)-sugar: glucose, sucrose, lactose, fructose, ribose  
 ov (L)-egg: ovum, oviparous, oviduct  
 para (G)--near; beside: parathyroid, parapodia, paragraph  
 peri (G)-around: pericardium, perichondrium, perimeter  
 phag (G)-eat: phagocyte, phagocytosis, euphagic  
 phil (G)-attraction for; love for: neutrophil, philanthropy, hydrophilic  
 photo (G)--light: photosynthesis, photophosphorylation, photograph, photon  
 phyll (G)-leaf: chlorophyll, phyllotaxy  
 plasma (G)-something formed; a fluid: cytoplasm, nucleoplasm, protoplasm  
 ped (L)--leg, stock, or stem: milliped, pedicellaria, pedicle, pedestrian  
 penta (G)--five: pentose, pentagon, pentamer  
 pod (G)-leg; appendage: arthropod, endopodite, podiatry, pseudopod  
 poly (G)-many: polymer, polysaccharide, polypeptide, polymorphonuclear

post (L)-behind; after; rear: posterior, postmortem  
pro, proto (G)--first, for: protein, protoplasm, proton, prophase, proponent, promote  
pseudo (G)-false; fake: pseudopod, pseudocoel, pseudonym, pseudostratified  
ren (L)-kidney: renal, adrenalin, renin  
sacchar (G)--sugar; sweet: monosaccharide, disaccharide, polysaccharide, saccharine  
semi, hemi (L)-half: semicircle, semi-annual, hemisphere  
soma (G)--body: somatic, somite, chromosome  
stom (G)--mouth: stomadeum, nephrostome, stomate  
syn, sym (G)-together: symbiosis, syncytium, synapse, synchrony, synthesis, symphony  
tax (G)-arrangement: taxon, taxonomy, ataxia  
tel (G)-end; far; distant: telencephalon, telophase, telephone, telomere, television  
tetra (G)-four: tetrose, tetramer  
therm (G)-heat; temperature; ectothermic, heterothermic, thermometer, thermostat  
tri (L)-three: triose, tripeptide, triploid, tricycle  
troph (G)--food: eutrophic, stenotrophic, autotrophic, heterotrophic, trophoblast  
trop (G)--to turn toward; to go to: gonadotropin, tropism  
ultra (L)-beyond: ultraviolet, ultracentrifuge, ultramarine, ultrasound  
vas (L)--vessel: vascular, vas deferens  
vivi (L)-alive: viviparous, vivid, vivisection, vivaceous  
vor (L)--eat: voracious, carnivore, omnivore, herbivore  
zo (G)--animal: zoology, protozoon, zoological garden (pronounced 2 long o's in succession)  
zyg (g)--united; tied together: zygote, heterozygous, homozygous

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## How can a student best study science vocabulary words?

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To truly understand the concepts in science you must know the vocabulary.

How do you learn science vocabulary?

Learning science vocabulary requires specific strategies and real effort. The key is practice, practice and practice.

Vocabulary is learned by:

- Hearing the word read to you
- Saying it out loud and practicing its pronunciation
- Knowing Latin prefixes, suffixes and root words.
- Knowing its definition
- Reading the word in its proper context
- Practice using the word correctly in sentences
- Linking related vocabulary words together by concepts

How can you practice vocabulary?

- Make flash cards or a power point to learn definitions include the Latin roots, prefixes and suffixes used
- Write fill-in the blank sentences that correctly use the word in context. Practice reading these sentences out loud.
- Review vocabulary words before and after your read your textbook.
- Write graphic organizers to show how words are related.

A complete copy of the NRP report Teaching Children to Read: An Evidence Based Assessment of the Scientific Research Literature on Reading and Its Implications for Reading Instruction-Reports of the sub groups is available on line at [www.nationalreadingpanel.org](http://www.nationalreadingpanel.org).

# How can a student get a better score on an open response question?

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Things to remember:

1. Each open response question (4 pts.) counts four times more than any one multiple-choice question.
2. Never leave an open response question blank. The scorers are really trying to give you as many points as your answer will allow.
3. Open response questions in science do not always require an answer in complete sentences. Your answer could be a chart, graph, diagram, picture or a list.
4. Use the simplest format for your answer. Your writing should not hide or obscure your answer to the question. Spelling, neat writing and complete sentences do make a difference in your score.

Steps to Follow:

1. Read the question through three times.
  - a. First Time: Carefully read the question to identify the topic of the question and what the question wants you to do.
    - i. Topic = \_\_\_\_\_.
  - b. Second time: Reread the question and underline all the science key words; write them down.
    - i. Key words: \_\_\_\_\_.
    - ii. Brainstorm: Write down words that go with the key words \_\_\_\_\_
  - c. Third Time: Reread the question and circle the direction words. (Diagram, compare / contrast, list, explain, classify, describe, differences / similarities, what, where, how and when)
    - i. The question wants me to \_\_\_\_\_ (direction word)
2. Decide if the answer should be bulleted or written in paragraph form.
  - a. If list, compare/contrast, similarities/ differences, classify, group → Bullet
    - i. Do not use one-word answers. Use either complete sentences or descriptive phrases.
  - b. If describe, explain, tell the process, how → Paragraph; or why --→ paragraph.
    - i. Begin the paragraph with a topic sentence that rephrases questions.
    - ii. Use facts to support your answer.
    - iii. End the paragraph with a concluding sentence.
3. When writing your answer...
  - a. Use complete sentences or phrases.
  - b. Use correct punctuation, especially periods.
  - c. Use science vocabulary from the brainstorm list.
  - d. Incorporate the definitions of the science vocabulary into the response.
  - e. Use specific number data rather than large, small, fast, slow, medium
  - f. Use specific words rather than this, that, it, they, thing, them.

4. Reread as if you were the teacher by silently talking to yourself.
  - a. Fill in any missing words
  - b. Check for capitalization and periods.
  - c. Replace any words such as; this, that, it, they, thing, them with specific words
5. Reread the question and make sure that all parts of the question have been answered.
  - a. Letter or number the responses, if necessary.

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## How do direction words give students clues for writing open response answers?

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If you are asked to:	You should do the following	Examples
Analyze	Draw a conclusion, make a judgment, or make clear a relationship	What is the relationship between time and distance traveled?
Classify	Place items in related groups, then name or title each group	Listed below are ten organisms, classify them into the 5 kingdoms and name the kingdoms.
Compare	Tell how things are alike, use concrete examples.	How are the bat and the human structurally similar?
Contrast	Tell how things are different, use supporting examples.	How is the process of respiration and photosynthesis different.
Defend	Give enough details to prove the statement	The cell is the unit of structure and function in all-living things.
Define	Give the meaning	Define plankton
Describe	Give an account in words, trace the outline or present a picture.	Describe the process by which food is digested in our digestive tract.
Diagram	Use pictures, graphs, charts and graphic organizers to show the relationship between key ideas.	Diagram a typical food web found in the marine environment.
Discuss	Present all the sides to an issue	Explain the arguments for and against stem cell research
Distinguish	Tell how this is different from others similar to it.	Distinguish between the process of mitosis and meiosis

If you are asked to:	You should do the following	Examples
Explain	Make clear, give the reason or cause	Explain how a forest fire can be good for the environment.
List	Write in a numbered fashion	List the 206 bones of the human body.
Outline	Use a shortened form to organize main ideas supporting details and examples.	Outline the flow of blood through the human body.
Paraphrase	Put in your own words	Paraphrase the first paragraph of the article on heart disease.
Predict	Present solutions that could happen if certain variables were present or being tested.	What would you expect from an experiment that tested if plants need light to grow?
Review	Examine the information below and analyze the reliability of the conclusion	Review the effects of gravity on the growing of the roots of pea plant.

Teachers<sup>21</sup> Reshaping the profession of teaching”. Teachers21.org.

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## What are the hints for taking multiple-choice tests?

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1. Read all directions carefully before beginning.
2. There is no penalty for guessing on the science MCAS test. Do not leave a multiple-choice question unanswered. You should always make the best possible guess.
3. Think about the answer to the question before you look at the answers. However, be sure to read all answers before selecting one. Sometimes two answers will be similar, but only one will be correct.
4. Here are some guidelines that will help you correctly answer multiple-choice items.
  - a. *Circle or underline important words in the item.* This will help you focus on the information most needed to identify the correct answer choice.
  - b. *Read all the answer choices before selecting one.* It is just as likely for the last answer choice to be correct as the first.
  - c. *Cross out answer choices you are certain are not correct.* This will help you narrow down the correct answer choice.
  - d. *Look for two answer choices that are opposites.* One of these two choices is likely to be correct.
  - e. *Look for hints about the correct answer choice in other items on the test.* The correct answer choice may be part of another item on the test.
  - f. *Look for answer choices that contain language used by your teacher or found in your textbooks.* An answer choice that contains such language is usually correct.
  - g. *Do not change your initial answer unless you are sure another answer choice is correct.* More often than not, your first choice is correct.
  - h. *Choose “all of the above” if you are certain all other answer choices in the item are correct.* Do not choose “all of the above” if even just one of the other answer choices is not correct.
  - i. *Choose “none of the above” if you are certain all other answer choices in the item are incorrect.* Do not choose “none of the above” if even just one of the other answer choices is correct.

<http://www.testtakingtips.com/>

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## Where can students and parents access sample biology MCAS tests?

Sample biology MCAS tests are available on Blackboard under the course “HS Students”. Students may select practice questions by topic or they may select comprehensive sample tests.

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