Topics to Consider

1. Organic Molecules

There are four groups of organic molecules. They are proteins, carbohydrates, nucleic acids and lipids.
All of these organic molecules are found in living things and are made up of Carbon.
-**Proteins**- PHENOTYPE- carry out the genetic expression of our cells. There are many molecules we could use to exemplify proteins, some are: enzymes (catalase, amylase, polymerase, and helicase); antibodes; gluten (the protein in wheat); actin and myosin are muscle proteins required for movement; transport proteins, in the cell membrane and help assist in transport. Proteins are made by the process of protein synthesis (transcription and translation) during G1 phase of interphase. Proteins are made up of chains of amino acids held together by peptide bonds. Examples: Polymerase, Helicase, Catalase, Casein, Gluten
-**Carbohydrates** - QUICK ENERGY- are made by plants in the process of photosynthesis. Photosynthesis specifically makes glucose, a very simple carbohydrate. Carbohydrates can be simple (monosaccharides) or complex (polysaccharides). These simple and complex sugars get stored in the body and later broken down by the process of cellular respiration for ATP energy. Examples: Glucose, Fructose, Cellulose, Glycogen
-**Lipids** -LONG TERM ENERGY- are fats and are used in the body for long term energy, they provide insulation for the body AND they are the main component of all of our cell membranes. The cell membrane is specifically comprised of a double layer of lipids. These lipids have hydrophobic and hydrophilic parts. Lipids are made up of Glycerol and fatty acids. Examples: Wax, Phospholipid Bilayer, Butter
-**Nucleic Acids** - GENETIC INFORMATION - nucleic acids carry genetic information. There are two types of nucleic acids: DNA and RNA. Both are involved in the creation of proteins from this genetic information. Both are made up of nucleotides. Nucleotides consist of sugar, phosphate and a nitrogen base. The four nitrogen bases in DNA are A, T, G and C. The four nitrogen bases in RNA are A, U, G and C. These bases bond together ONLY in DNA, by hydrogen bonds, to create a double stranded helix.

2. Photosynthesis v Cellular Respiration

Photosynthesis is the key to all food chains/webs. Photosynthesis is the process in which plants harvest energy from the sun to make food (glucose). They do this by reacting water, sunlight and carbon dioxide in the chloroplast of their cells. The products of this reaction are glucose and oxygen. Both glucose and oxygen can be used by the cell for cellular respiration. Cellular respiration is how our cells get a usable cellular energy molecule: ATP. Cellular respiration occurs in the mitochondria of plants and animal cells. Both photosynthesis and cellular respiration are opposite equations. The products of one are the reactants of the other.

It is important that these two reactions are opposite processes. This allows the two processes to cycle nutrients through the ecosystem.

3.Proteins and Protein Synthesis

Proteins are the macromolecule in our bodies that carry out genetic expression. The chains of amino acids held together by peptide bonds (polypeptide chain of amino acids). Some examples of proteins: enzymes (helicase, catylase, polymerase, amylase), antibodies, hormones, mucles, gluten, casein

Proteins are made by protein synthesis during G1 phase of interphase. They are made at the ribosome, but the instructions needed to make the protein come from the DNA in the nucleus:

Transcription and Translation are the two parts of protein synthesis. Transcription when an mRNA transcript is made from DNA. DNA unravels and gets split by the enzyme helicase. mRNA is made by RNA polymerase. Polymerase adds complimentary base pairs A- U, G- C. These nucleotides leave the nucleus and go to the ribosome.

Translation is the second part of protein synthesis. Every triplet base pair on the mRNA (codons) are read by tRNA. These codons code for an amino acid. tRNA goes and gets the amino acids that correspond with each codon. End up with a chain of amino acids at the end held together by peptide bonds.

4. Mitosis v Meiosis

Mitosis and Meiosis are both forms of cell replication. They occur in plants and in animals. They both have Prophase, Metaphase, Anaphase, and Telophase. Cytokiniesis happens at the end of both.

Mitosis = cellular replication for the purpose of growth, repair and asexual reproduction. It makes identical diploid cells that are just like the parent. Diploid means (double) full number of chromosomes. It occurs in body or somatic cells.

NOTE: GO BACK AND LEARN THE STAGES

Meiosis = cellular replication for the purpose of making gametes

NOTE: GO BACK AND LEARN THE STAGES

5. Asexual v Sexual Reproduction

Asexual reproduction occurs in some plants and animals. This occurs via mitosis. The pro's to reproducing asexually is the organism reproduces quickly and easily (low cost of energy).

Organisms that reproduce via sexual reproduction however, have an evolutionary advantage. The sex cells (gametes) involved in sexual reproduction are produced by meiosis. Meiosis produces unique gametes that are haploid in number. Each gamete is unique due to the crossing over (synapsis) of chromosomes during prophase I. This jumbles up the DNA yielding a unique combination. In addition, the chromosomes assort independently of one another during gamete formation. Meiosis thus produces 4 unique haploid sex cells (sperm or egg) that then can go on to be used for sexual reproduction. Sexual reproduction is the process that unites an egg and a sperm to produce a zygote. The egg and sperm that come together are unique and combine independently of one another (another reason why offspring are unique).

Populations that reproduce sexually display genetically unique individuals. This diversity gives this population an upper hand when trying to survive in an always changing environment.

6. DNA Replication

Semi conservative replication occurs during S phase of interphase. This process produces two identical copies of DNA that each have a new and an old part.

7. Cell Transport

Molecules enter and exit a cell via passive and active transport. Passive transport occurs without the expenditure of energy. This includes the movement of water (osmosis) , oxygen, carbon dioxide (diffusion) from high to low concentration in to or out of the cell. This continues until equilibrium is reached.

Active transport is the movement of a molecule in to or out of a cell against the concentration gradient (from low to high concentration). This requires energy.

345 today thurs at3