

INTRODUCTION

Many of the molecules in living cells are so large that they are known as macromolecules, which means "giant molecules." Macromolecules are made from thousands or even hundreds of thousands of smaller molecules. Macromolecules are formed by a process known as polymerization (pah-lih-mur-ih-ZAY-shun), in which large compounds are built by joining smaller ones together. The smaller units, or **monomers**, join together to form **polymers**. The monomers in a polymer may be identical, like the links on a metal watch band; or the monomers may be different, like the beads in a multicolored necklace.

CARBOHYDRATES

Carbohydrates are compounds made up of carbon, hydrogen, and oxygen atoms. Living things use carbohydrates as their main source of energy. Single sugars are called monosaccharides. Glucose is an example. Disaccharides, like table sugar or sucrose, contain two monosaccharides. Polysaccharides are large molecules containing many monosaccharides bonded together. Starch, glycogen, and collagen are examples of polysaccharides.

Carbohydrate Procedure:

1. Color the monosaccharide (glucose) molecules RED.
 2. Cut out the molecules and paste them together in appropriate ways so that you have
 - a. one monosaccharide (just glucose)
 - b. two disaccharides (2 simple sugars bonded together)
 - c. one polysaccharide molecule (many sugars bonded together)
 3. Glue them on your answer sheet in the appropriate place and answer the questions.
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LIPIDS

Lipids are a large and varied group of biological molecules. They are not soluble in water. Lipids can be used to store energy; make up cellular membranes; and as waterproof coverings. A lipid is formed from a glycerol molecule and three fatty acids of different types.

Lipid Procedure:

1. Color the glycerols BLUE and color each of the fatty acid molecules a DIFFERENT color.
 2. Cut them out and paste them together so that one glycerol connects with three fatty acids to form a lipid. Make two lipids.
 3. Glue them on your answer sheet in the appropriate place and answer the questions.
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NUCLEIC ACIDS

Nucleic acids are polymers assembled from individual monomers called nucleotides. Nucleotides consist of three parts: a 5-carbon sugar; a phosphate group; and a nitrogenous base. Nucleic acids store and transmit hereditary or genetic information. There are two kinds of nucleic acids: ribonucleic acid (RNA) which is single stranded and deoxyribonucleic acid (DNA) which is double stranded. They are different in that they contain slightly different sugars and not all of the same nitrogenous bases.

Nucleic acid Procedure:

1. Color each nucleotide, which are made of three parts: Sugar (S), Phosphate (P) and a Base (A, T, C, G or U) one color.
 2. Color all nucleotides with the base A **YELLOW**.
 3. Color all nucleotides with the base T or the base U **GREEN**.
 4. Color all nucleotides with the base G **ORANGE**.
 5. Color all nucleotides with the base C **PURPLE**.
 6. Cut them out and paste them together in appropriate ways so that you have six nucleotides bonding together to form a double stranded DNA molecule. Use A, T, C, and G to build DNA. There should NOT be any U bases in DNA!
 7. Cut and paste three nucleotides together in one single stranded RNA molecule. You may use A, C, G, or U to build this molecule. There should NOT be any T bases in RNA.
 8. Glue them on your answer sheet in the appropriate place and answer the questions.
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PROTEINS

Proteins are macromolecules that contain nitrogen as well as carbon, hydrogen, and oxygen. Proteins are polymers of molecules called amino acids. There are 20 different amino acids. Proteins are formed by joining amino acids together with peptide bonds (a special type of covalent bond). Proteins fold together to make a 3-D structure. A protein will not function properly if not folded into the correct shape.

Protein procedure:

1. Color the amino acids each one a different color.
2. DO NOT Cut them apart, but together in one long chain. Fold and twist the chain into a 3-D shape.
3. Glue the chain on your answer sheet in the appropriate place **so that the 3-D shape is still intact in your model of the protein** and answer the questions.

CARBOHYDRATES			
MONOSACCHARIDE	DISACCARIDE	DISACCARIDE	POLYSACCHARIDE
How are 3 types of molecules different from one another?			

LIPIDS	
How is each lipid different from the other?	

NUCLEIC ACIDS	
DNA	RNA
What are two main differences between DNA and RNA?	

PROTEINS	
Why do you think the protein has to have a 3-D shape in order to function properly?	

MOLECULE SHAPES

