Pattern Matching: Classifying Organic Molecules

Adapted from Kim Foglia, Explore Biology…at least as far as I can tell
Modified for Honors Biology

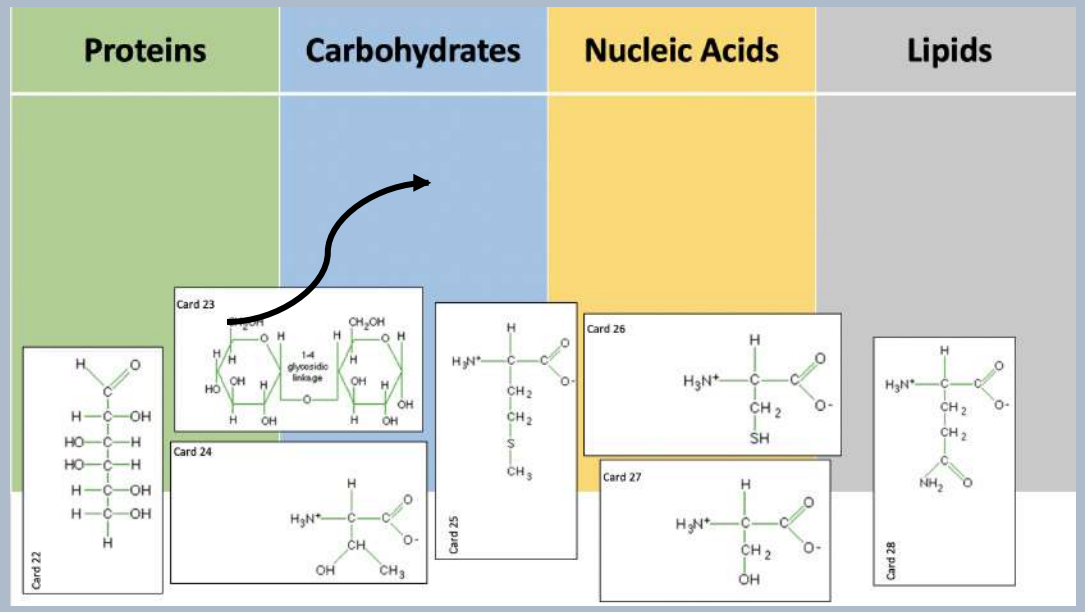
Background: You have previously learned about the four classes of large biological molecules: lipids, nucleic acids, proteins, and carbohydrates. In this activity, you will work with a group to identify the major classes of organic molecules and distinguish the features of each class of molecules. There may be as many as 10,000 different kinds of molecules in a living thing.

In this activity you will examine, distinguish the features of, and classify 14 molecules and 32 descriptions.
Answer the questions that follow.

Which elements are present in each type of molecule?
Start by filling in the table, writing “+” or “-” in each box.

	Carbon	Hydrogen	Nitrogen	Oxygen	Phosphorus
Proteins					
Carbohydrates					
Nucleic Acids					
Lipids					

Sorting Slides



On the next seven slides, you'll find moveable cards with the molecular structure of a macromolecule. Drag and drop each card into the correct category.

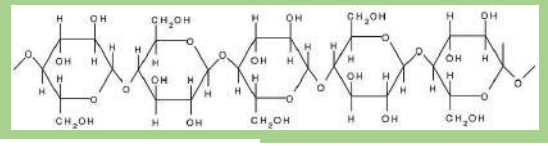
If you are unsure, leave the card at the bottom of the slide as an "Unknown." You'll have a chance later to go back and determine the correct category for that molecule.

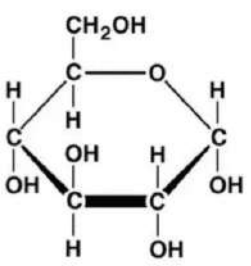
Proteins

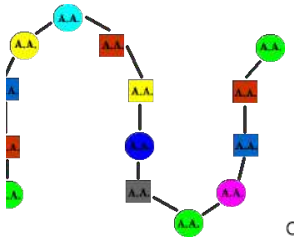
Carbohydrates

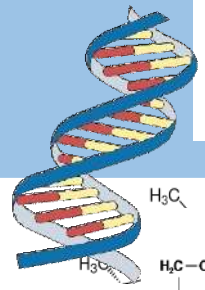
Nucleic Acids

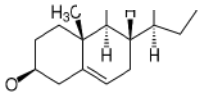
Lipids

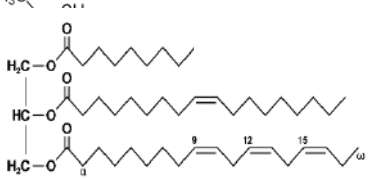


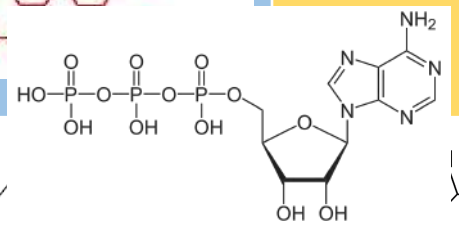


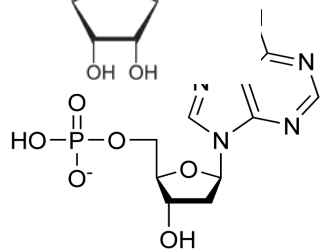


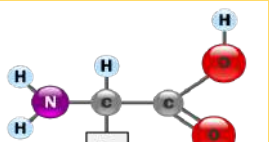


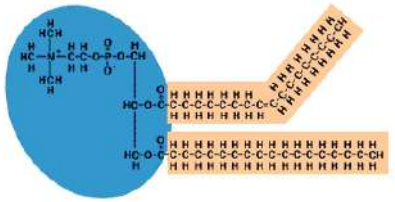


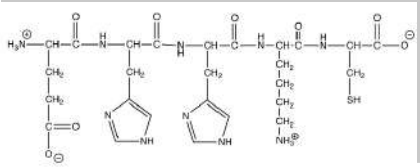


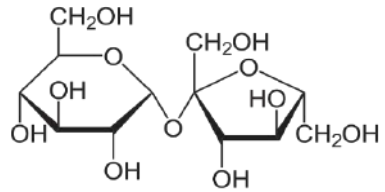












Proteins	Carbohydrates	Nucleic Acids	Lipids

Greatest diversity of functio

monosaccharide

Glucose, galacto fructose

Genetic Informat

DNA, RNA

Amino grou

Keratin and emoglobin

Fatty Acid and

Fats, Waxe

steroids

Hydrophobic

Primary function is energy storage

Polypeptide

polynucleotide

saccharides

Proteins	Carbohydrates	Nucleic Acids	Lipids

Primary component of cell membranes

Four levels of organization

R-Groups

Stored in the

Nitrogen base, phosphate group, 5-

Plant cell

Cytosine, Guanine

Glycogen, cellulose, starch

triglycerides

Saturated or unsaturated

Adenine,

Once all the cards have been sorted, describe the patterns, shapes, and/or functional groups you noticed that led you to sort the cards as you did.

	Things We Noticed…
Proteins	
Carbohydrates	
Nucleic Acids	
Lipids	

Proteins – **Copy and paste all the cards identified as proteins.** You should have 12 items.

PROTEINS

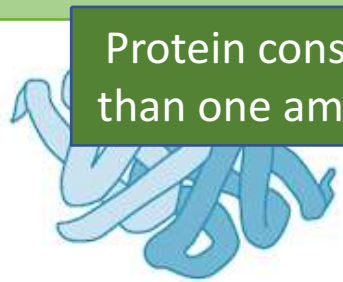
Proteins have four levels of organization. Drag the description and image to the correct category.

Primary	Secondary	Tertiary	Quartenary

Three-dimensional folding pattern of a protein due to side-chain interactions.

Sequence of a c of amino acids

Hydrogen bonding of the peptide backbone causes the amino acids to fold into a repeating pattern.



Protein consisting of more than one amino acid chain.

Carbohydrates -- Copy and paste all carbohydrate cards. You should have 12 items. If you don't, sort through your pile of unknowns to search for more. Remember, carbohydrates only contain carbon, oxygen, and hydrogen in a very specific 1 carbon: 2 hydrogen : 1 oxygen ratio.

Carbohydrates – Type in the name of the carbohydrate to its function/description. Terms in the word bank or used once.

Carbohydrate Name	Description/ Function
	Primary energy storing compound for ALL organisms.
	Simple sugar commonly found in fruits.
	Simple sugar commonly found in milk and dairy products.
	Polymer, stores energy in plants.
	Polymer, stores energy in animal muscle.
	Polymer, provides structure and rigidity to the plant cell wall.

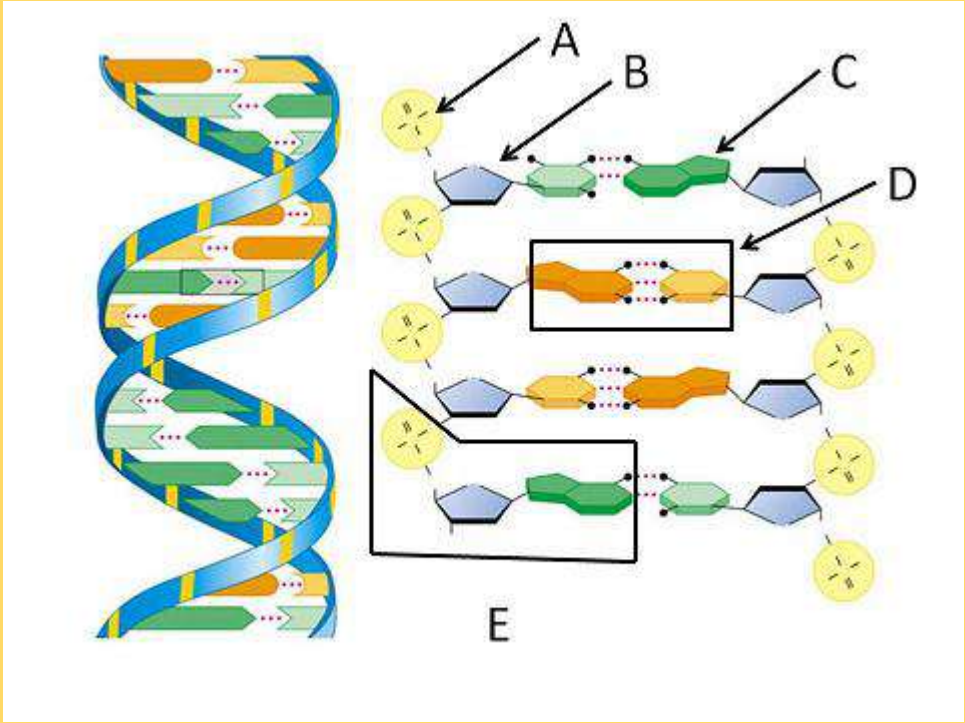
Word Bank

Cellulose
Fructose
Glucose
Glycogen
Lactose
Starch

Nucleic Acids - Nucleic Acids store, transmit, and help express hereditary information. You should have 12 items. Copy and paste them below.

Nucleic Acids

Now examine this molecule:



Which letter represents the 5-carbon sugar?

Which letter represents the phosphate group?

Which letter represents the nitrogenous base?

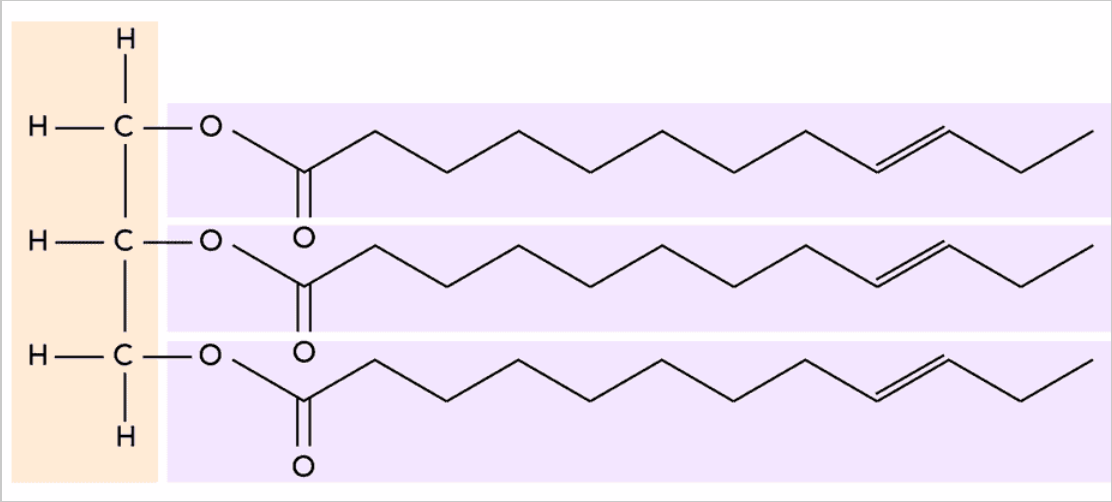
Which letter represents one nucleotide?

Lipids – **copy and paste the lipid cards here.** You should have 12 items.

Lipids – answer the questions below.

How are unsaturated fats and saturated fats different?

Label the parts of the triglyceride below by dragging the labels to the parts of the picture.



glycerol

Hydrophobic

Fatty acid

Fatty acid

Polar

Hydrophilic

Non-polar

Fatty acid