

1. The molecule you have just built is a type of carbohydrate. What is the function of carbohydrates in your body?

Energy Storage

2. Compare and contrast the following terms:

- monosaccharide vs. disaccharide vs. polysaccharide

↓  
one carbohydrate  
monomer → glucose

↓  
2 carbohydrates  
linked together  
ex. sucrose

→ Many carbohydrates  
linked together  
ex. glycogen

- simple carbohydrate vs. complex carbohydrate

↓  
small monomers  
or dimers

→ long polymers

Collaboration time! With the help of at least the 2 lab tables closest to you, can you build a polysaccharide? HINT.....You need to use all 3 of your glucose models and you need to know what role **DEHYDRATION SYNTHESIS** plays in this process.

- What molecule do you produce when linking two monosaccharides together?

a disaccharide → sucrose,  $H_2O$

- Do you know what the macromolecule you have just formed is called? After naming this molecule, discuss how its function differs from the function of glucose in the space below. Do the structures of glucose and your new molecule complement their functions? If yes, explain why in the space below.

Sucrose.

- What if you wanted to break your polysaccharide apart? What molecule do you need to have present in order to break apart monosaccharides which are linked together? What is this process called?

you must have  $H_2O$  present. This process is called  
hydrolysis.

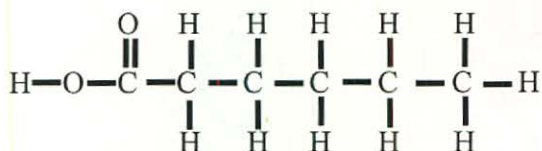
# LIPIDS

Materials:

- 6- Carbon Atoms
- 2- Oxygen Atoms
- 12- Hydrogen Atoms
- 19- Covalent Bonds

After gathering your materials, you will begin construction of a saturated fatty acid. Using your book, other resources, and your own intelligence complete the construction of the fatty acid. Finally, use your model and other resources in order to complete the questions listed below.

Your Blueprint:



Single lines again represent a single covalent bond.

Double lines represent a double bond.

What is a Carboxyl group? Can you circle an example on your blueprint?

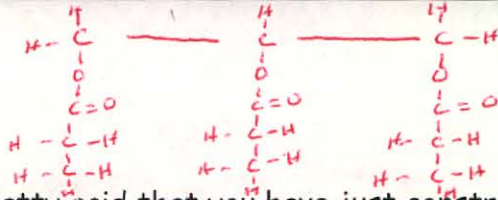
1. What is the difference between a saturated fatty acid and an unsaturated fatty acid? Can you draw an unsaturated fatty acid in the space below? Hint.....there's only one difference between the unsaturated fatty acid and your blueprint above! (Your book can help with this!!)

*Saturated fatty acids have contain the maximum # of hydrogens. after the C=O*  
*Unsaturated fatty acids do not contain the maximum # of hydrogens because at least one double bond exists in the carbon chain of a fatty acid.*

2. What function do fats serve in the human body? Why are fats referred to as Lipids?

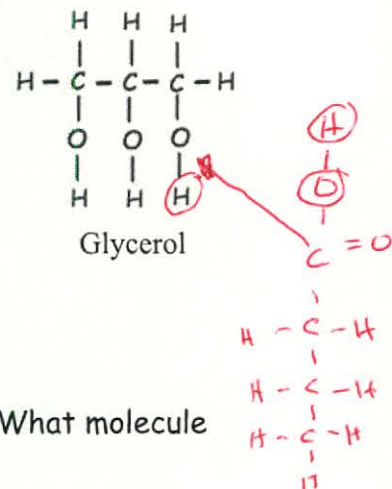
*long-term energy storage.*

*↳ They are not soluble in H<sub>2</sub>O.*



Collaboration Time! Using the fatty acid that you have just constructed and the fatty acids from two other lab groups, can you form a triglyceride (also known as triacylglycerol)? Hint.....You'll need to build a new molecule called glycerol and you'll end up with 3 water molecules when your done. See page 57 in your book if you're still stumped!

Sketch a "skeleton" diagram here:



- What process helped you combine three fatty acids to glycerol? What molecule was also produced besides the triglyceride?

*dehydration synthesis*

- Explain the difference in function between fatty acids and triglycerides. Do the structures of fatty acids and triglycerides complement their different functions? Explain how in the space below.

*Fatty acids are the building blocks for triglycerides. The function of these macromolecules is to store energy. Because their structure is composed of many C-H bonds, their structure does complement function.*

- What molecule will you need in order to breakdown your triglyceride into glycerol and three fatty acids? What is this process referred to as?

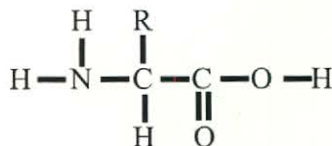
*You would need 3 H<sub>2</sub>O's. This process is hydrolysis.*

## PROTEINS

Materials:

- 1- Nitrogen Atom
- 2- Carbon Atoms
- 1- Functional Group (Also known as an R Group)
- 2- Oxygen Atoms
- 3- Hydrogen Atoms
- 9- Covalent Bonds

Your Blueprint:



Single lines represent single covalent bonds.

Double lines represent double bonds.

There are 20 different functional groups. Thus, there are twenty different amino acids. The structure of all 20 amino acids is identical except for the functional group. The Functional group is abbreviated as R in this activity. See the attached sheet for the various different R groups!!

After gathering your materials, construct an amino acid. Use your book, other resources, and your own intelligence to help you construct the molecule. After constructing your amino acid, use the model and other resources to answer the questions listed below.

1. You have just constructed an amino acid. What is the difference between an amino acid and a protein? Explain in the space below.

An amino acid is the monomer, or building block, of proteins.  
Many A.A.'s are put together to create a protein.

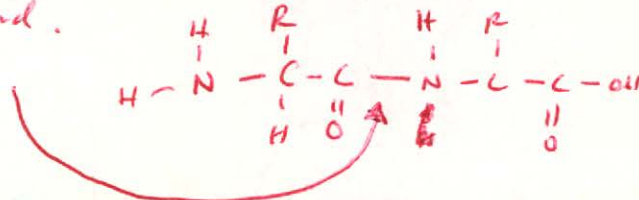
Collaboration Time! Using your own amino acid and at least two other groups' amino acids, build a protein. Hint.....view page 58 in your book to help construct your new protein. You'll end up with water again!

2. What process did you need in order to turn two or more amino acids into a protein?

Because we end up with  $H_2O$ , the process is dehydration synthesis.

3. What is the bond which holds two amino acids together called? Draw a protein two amino acids in length and circle the bond which holds the amino acids together.

peptide bond.



4. What is a polypeptide? Would a protein be considered a polypeptide?

Molecule w/ many peptide bonds  $\rightarrow$  protein

Yes. There are multiple peptide bonds in a protein.

5. What function do proteins serve in the body?

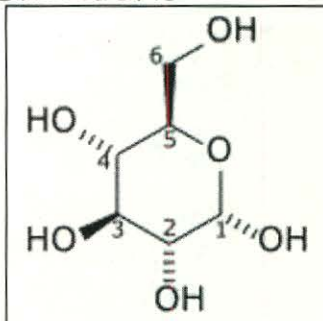
Proteins do many things in the body. They act as enzymes, have structural roles, and can act as chemical messengers.

6. If you wanted to break your protein down into individual amino acids, what molecule would you need to have present? What is this process referred to as?

$H_2O$

hydrolysis

## ABBREVIATIONS



SCIENTISTS HAVE A HABIT OF ABBREVIATING THE STRUCTURES OF CERTAIN MOLECULES. FOR EXAMPLE, THIS IS GLUCOSE. ANSWER THE QUESTIONS WHICH FOLLOW ABOUT THIS ABBREVIATED STRUCTURE.

- The points of the diagram labeled 1,2,3,4,5, and 6 all represent which atom?  
*Carbons*
- What atoms are not even shown in the diagram? Hint..... there are seven of this atom missing from the diagram!!  
*Hydrogen*
- Bond lines between what two atoms have not been drawn in this abbreviated diagram?  
*Oxygen & Hydrogen*

## SYNTHESIS TIME!

Compare and Contrast Carbohydrates (Glycogen in particular), Fats (triglycerides), and Proteins for the following categories:

	CARBOHYDRATES	FATS	PROTEINS
STRUCTURE	Composed of: H, C, O 5C, 10x. ring	Composed of: 1 glycerol + 3 fatty acids	Composed of: C, O, N, H and a functional group
FUNCTION IN THE BODY	energy storage	long-term energy storage	enzymes, chemical messenger, structural properties
SOURCE (WHERE DO THEY COME FROM?)	pasta	<del>meat</del> most foods. ex. dairy products, meat	meat, nuts
BUILDING BLOCKS (monomers)	monosaccharides ex. glucose	Fatty acid + glycerol = triglyceride	Amino acids