

**Topic:** Lipid Worksheet

**Summary:** Students learn the structure and properties of lipid molecules.

**Goals & Objectives:** Students will be able to identify properties and structures of triglycerides, phospholipids and cholesterol molecules.

**Time Length:** 20 minutes

**NGSS Standards:** *HS-LS1-6.* Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

**Prerequisite Knowledge:** Students have been introduced to carbon, hydrogen, oxygen atoms, hydrogen bonding, and single double covalent bonds.

**Materials:**

Class notes or textbook or online textbook

- <https://flexbooks.ck12.org/cbook/ck-12-biology-flexbook-2.0/section/1.9/primary/lesson/significance-of-carbon-bio/>
- <https://flexbooks.ck12.org/cbook/ck-12-biology-flexbook-2.0/section/1.12/primary/lesson/lipids-bio/>

**Procedures:**

1. If students are weak on the prerequisite knowledge, review chemistry terms.
2. Gives students the worksheet along with a textbook or chemistry notes.

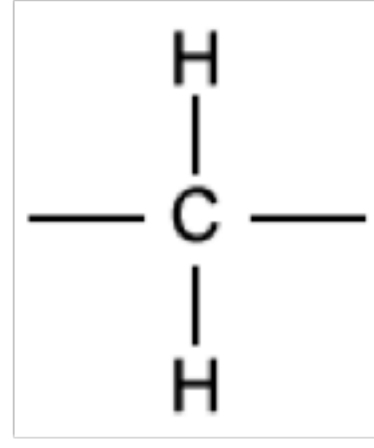
**Accommodations:** Students with an IEP can answer questions 1, 3, 8, and 9. English language learners should have pictures and/or models of each lipid.

**Editable DOCX File and Answer Key:**

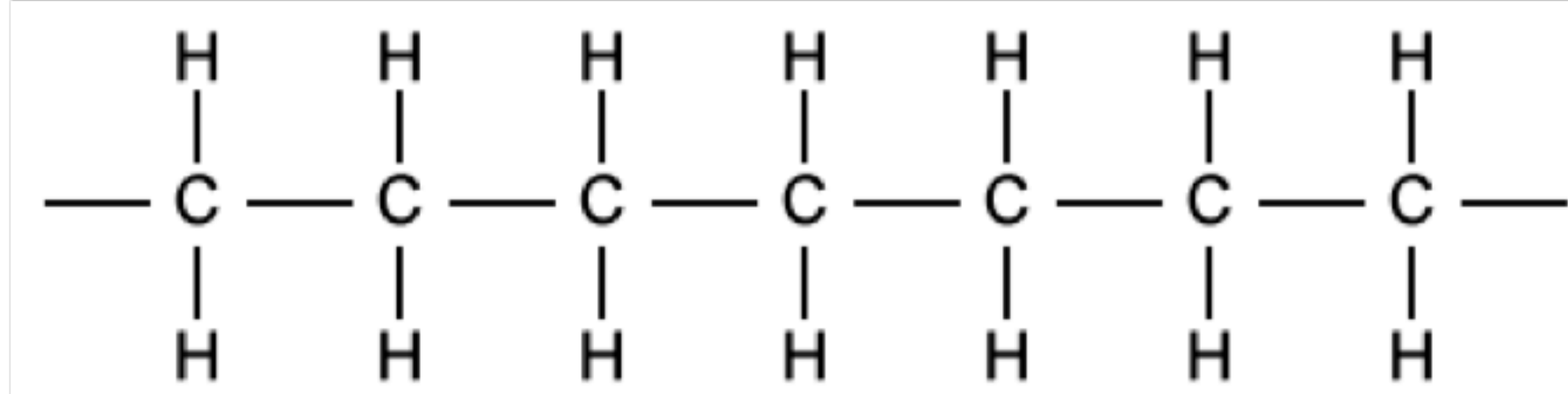
Available at [www.ngsslifescience.com](http://www.ngsslifescience.com)

## Lipid WS

Lipids are fats, including oils, waxes, steroids, and cholesterol. Lipids are made from a hydrocarbon monomer that links to form a hydrocarbon chain.



Hydrocarbon

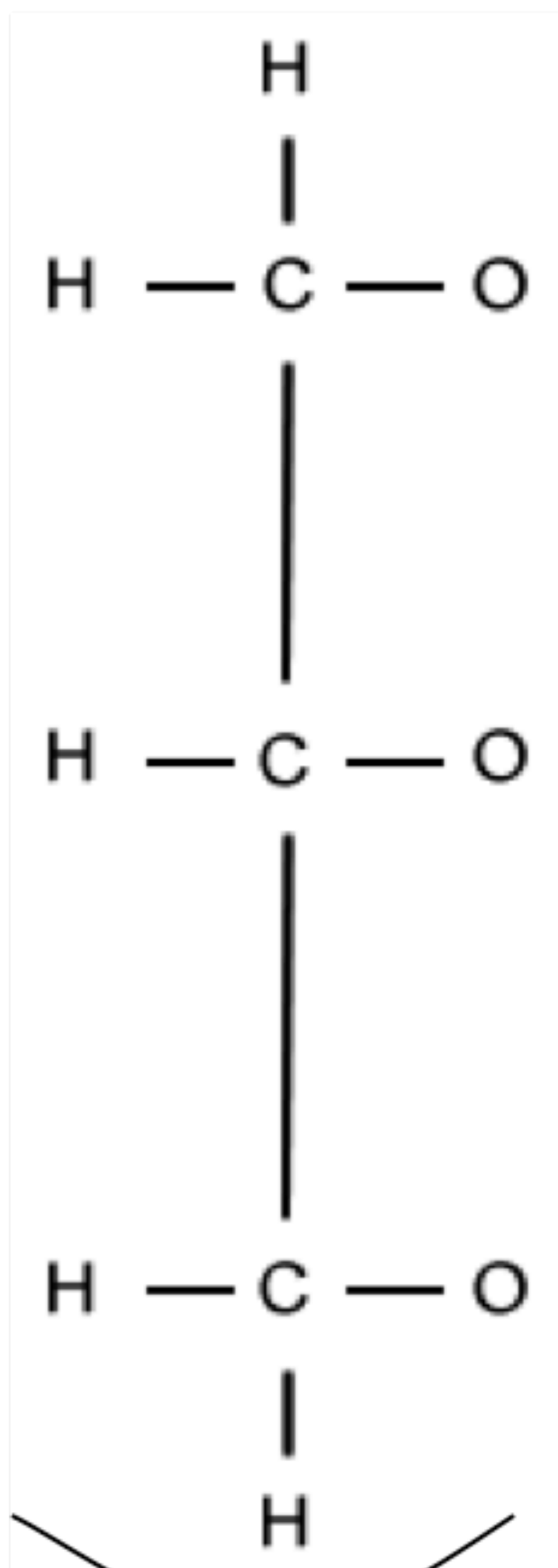


Hydrocarbon Chain

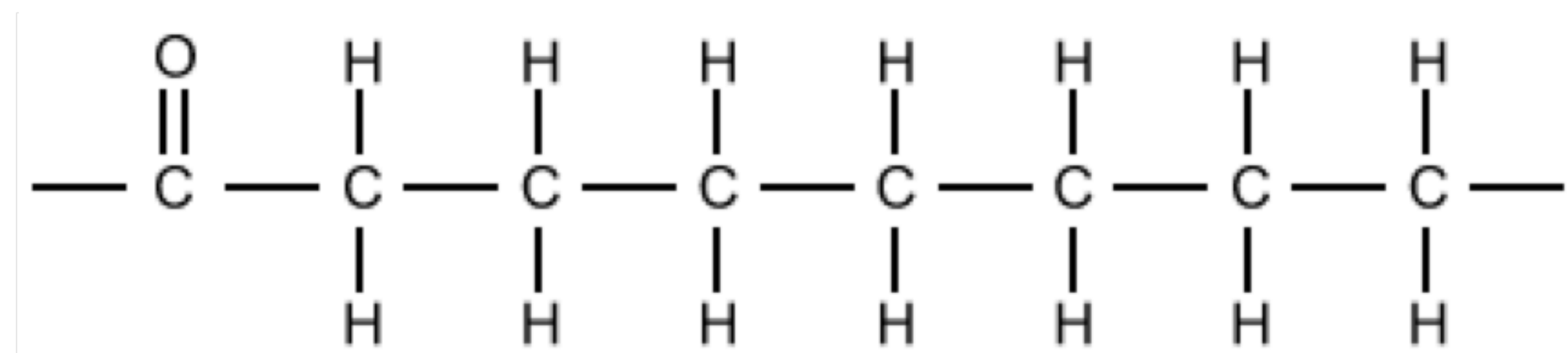
Hydrocarbon chains vary in length and are nonpolar. Nonpolar molecules are hydrophobic, meaning they do not interact or mix with water. The three most common forms of lipids in the human body are triglycerides, phospholipids, and cholesterol. Most of the fats you consume are triglycerides. Your body breaks them down and then stores the fats as new triglycerides.

Triglycerides are three fatty acids bonded to a glycerol. Fatty acids are a hydrocarbon chain with a carboxyl group connecting it to glycerol. Glycerol is a three-carbon alcohol. There are two types of fatty acids, saturated and unsaturated. Saturated fatty acids are straight and are found mostly in animals. Unsaturated fatty acids are bent because of a double bond and are found mostly in plants.

1) Looking at the fatty acid below, copy it into the two remaining rows.



Glycerol



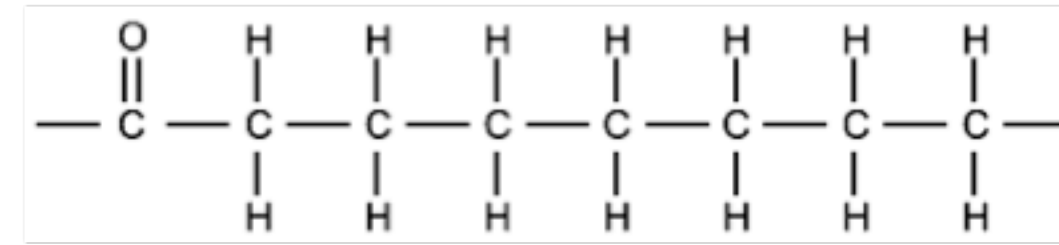
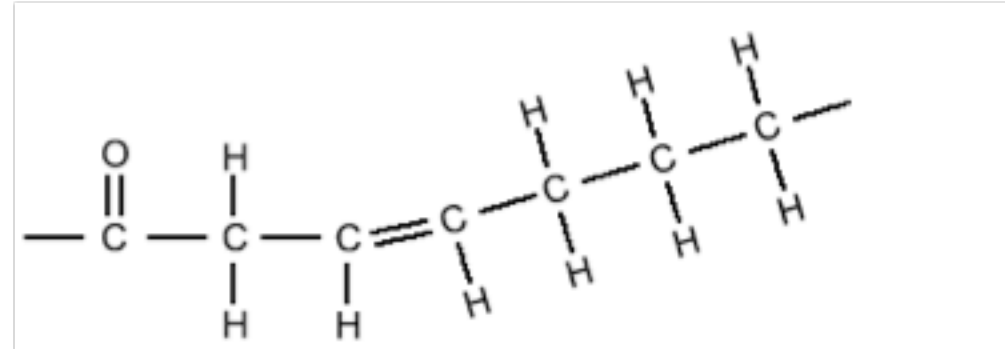
Fatty Acid

2) Fatty acids are composed of a carboxyl group and \_\_\_\_\_.

3) What are the four parts of a triglyceride? \_\_\_\_\_ & 3 \_\_\_\_\_

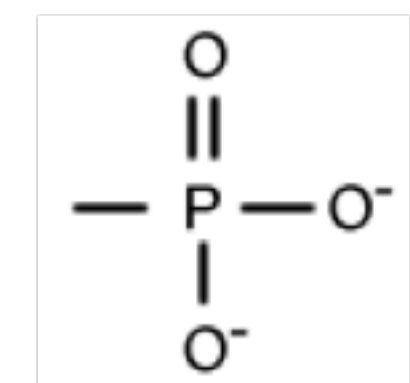
4) The human body stores fats as \_\_\_\_\_.

5) Label the following fatty acids as saturated or unsaturated.



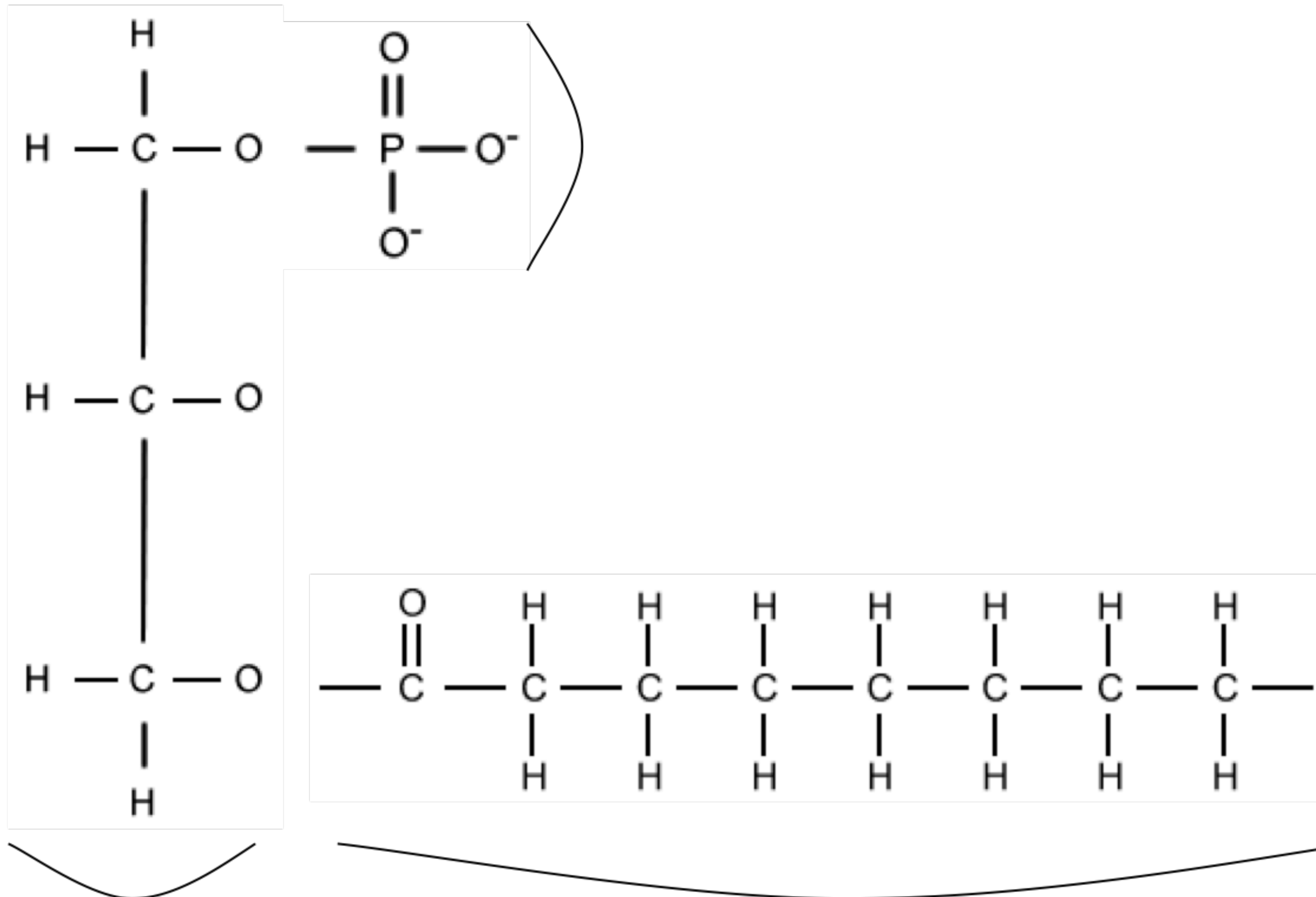
6) When a hydrocarbon chain is bent, it is called \_\_\_\_\_.

Phospholipids are similar to triglycerides except that a phosphate group replaces one of the fatty acids. The phosphate group is a polar molecule. Polar molecules are hydrophilic and interact with water.



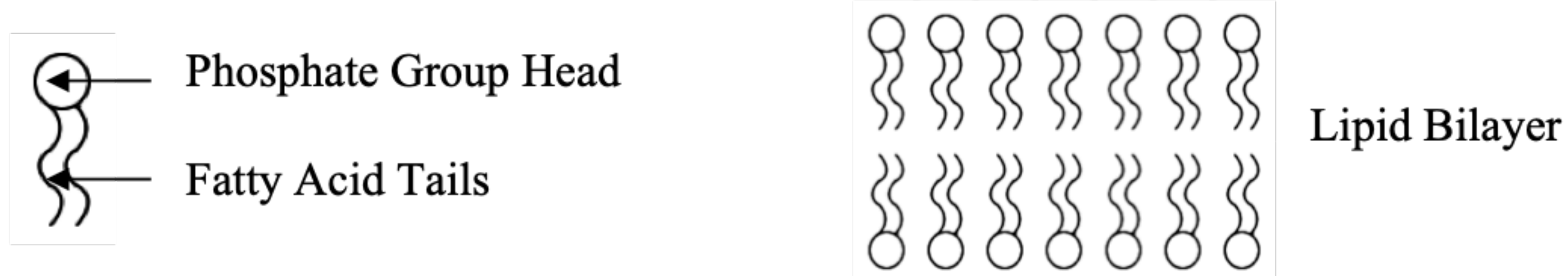
Phosphate Group

7) Fill in one of the remaining fatty acids below. Label all the parts.

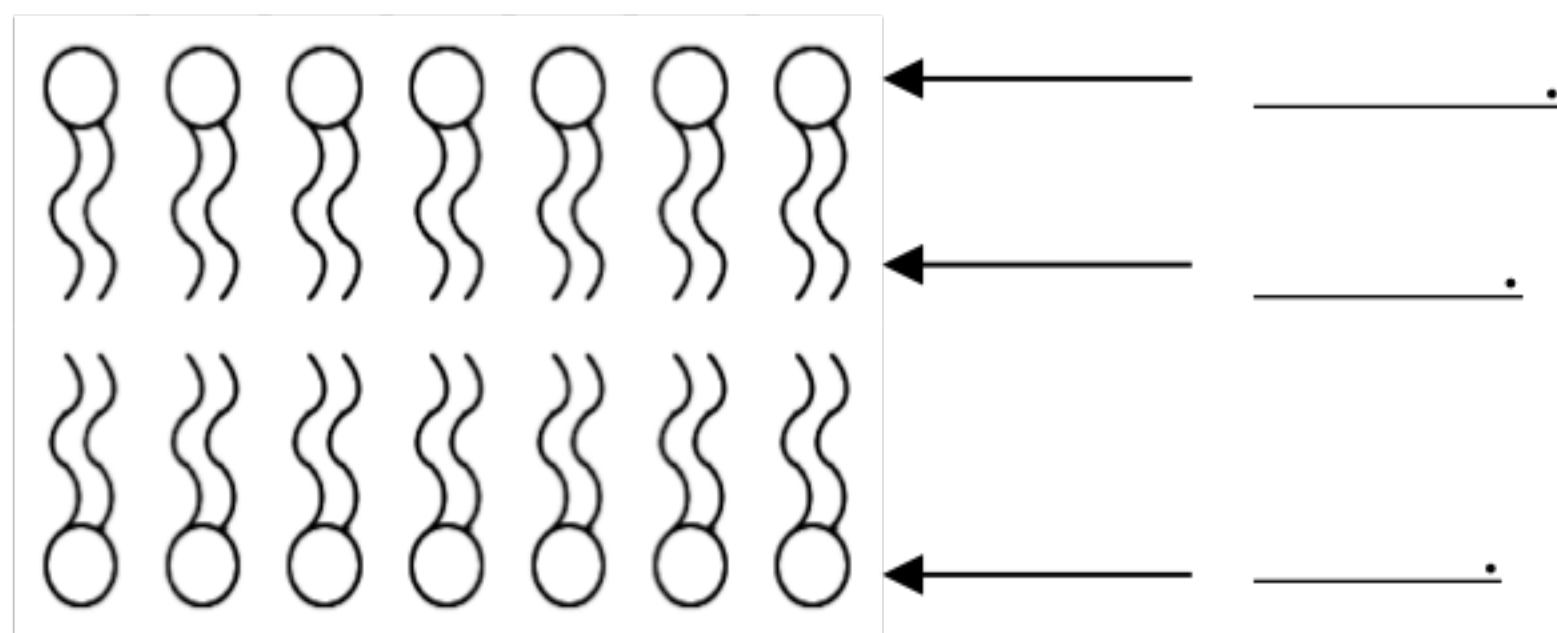




The standard form of a phospholipid looks like a circle with two tails. Phospholipids are polar on the phosphate group side and nonpolar on the fatty acid side. When one phospholipid is next to another phospholipid, they line up with the heads on one side and the tails on the other side. Two rows of phospholipids is called lipid bilayer, and they make up the membranes of all cells.



8) Below, label which parts are polar and nonpolar.



9) Where would you find the lipid bilayer in a cell? \_\_\_\_\_

Cholesterol has a different shape in that it forms rings instead of hydrocarbon chains. Cholesterol is found only in animals in body tissues, cell membranes, and blood. All steroid hormones (testosterone, estrogen, and progesterone) are derived from cholesterol.

10) What lipid do animal cells have inside their cell membranes? \_\_\_\_\_

11) What does hydrophobic mean? \_\_\_\_\_

12) What are steroid hormones made from? \_\_\_\_\_