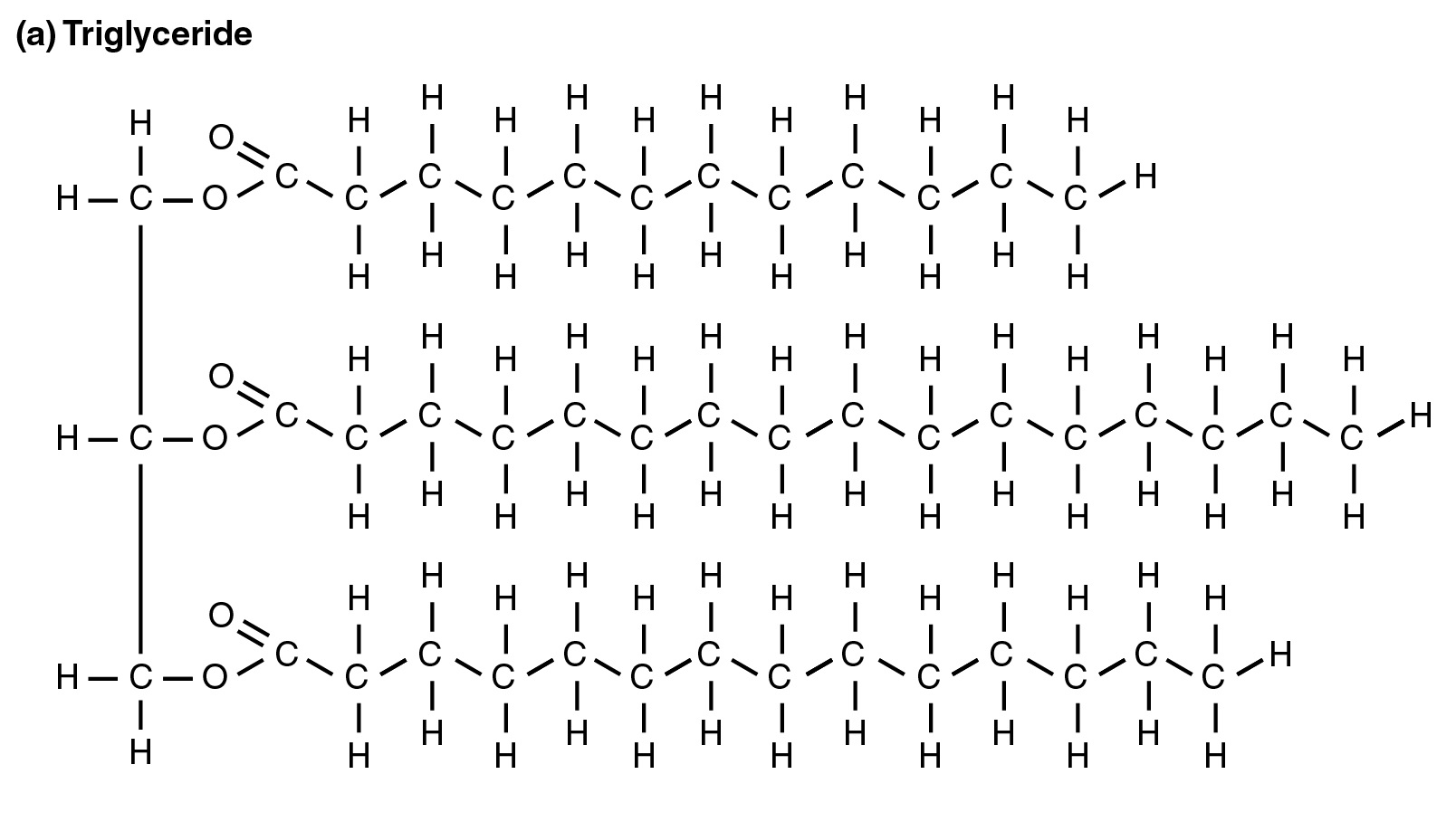
**Lipids Biochemistry lab (make tallow soap & study lipids)**

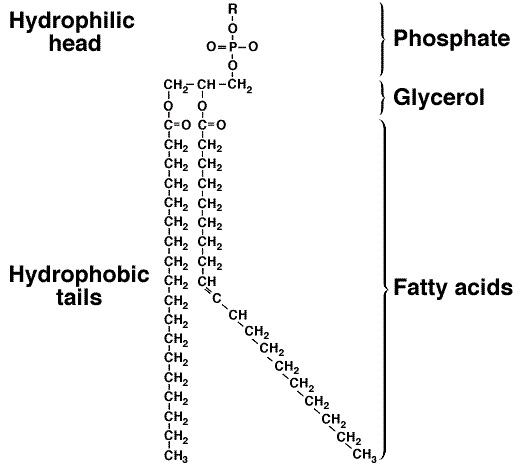
The soap reaction is called “saponification”, or “Alkaline hydrolysis of triglycerides”

Team members: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

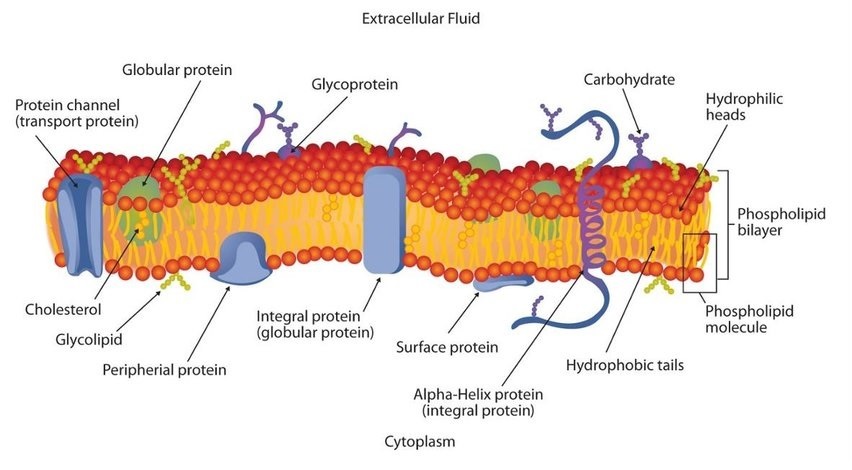
1. List the four (4) groups of biomolecules
2. Triglyceride molecule:
   1. Where do we find this molecule in the body?
   2. Circle and label the glycerol group
   3. Circle and label the 3 carboxylic acid groups
   4. Circle and label the 3 lipid (fatty) tails



1. Why is this called a “fatty acid”?



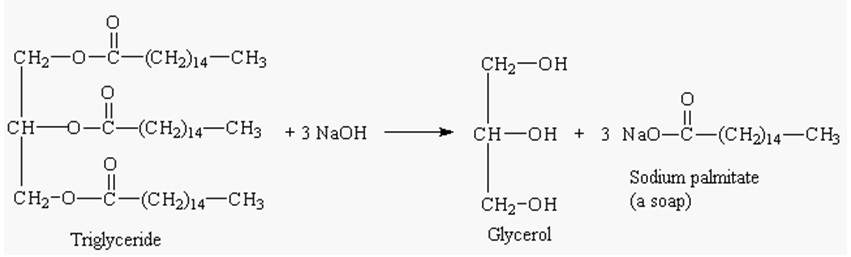
1. Phospholipid molecule:
   1. Where do we find this molecule in a cell?
   2. How does this differ from a triglyceride?
   3. Which end is polar?
   4. Which end is non-polar?
   5. What do we call the cell membrane? Phospho\_\_\_\_\_\_\_\_\_\_ Bi\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Cell membrane:
   1. Circle a single phospholipid molecule.
   2. Label the ‘inside’ of the cell, and the ‘outside’ of the cell.
   3. What is meant by “extracellular fluid”?
   4. What is meant by “cytoplasm”?
   5. Circle a cholesterol molecule.
   6. Circle 4 proteins.



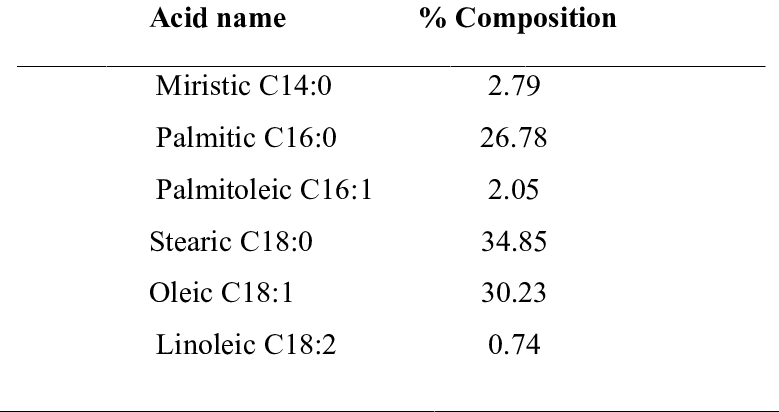
1. Saponification reaction:
   1. Identify this triglyceride with 16-carbons (including the carboxylic acid).

Stearic acid? Palmitic acid? Linoleic acid?

* 1. What is the NaOH called?



1. Beef tallow:
2. List the 3 main fatty acids in tallow, in order:



1. Procedure:
   * 1. Put on safety glasses and lab coats!
     2. Pre-heat a large pan of water to 40-50⁰C
     3. Measure 7 g tallow, 3 g vegetable oil, and 1/8 tsp stearic acid into 250 ml beaker. The amounts are not “precise”, and you can experiment with different fats, oils, and waxes.
     4. Fill a larger, 500 ml beaker ¼-full with 40⁰C water. Carefully insert the 250 ml beaker into the larger beaker to make a hot water bath. Heat the fats gently, stirring SLOWLY, until the mixture has a smooth consistency.
     5. Add 6 ml of 25% NaOH. (6ml of 25% NaOH = 7.8 g) (25% NaOH = 6M).
     6. Continue heating at 40⁰C and stirring SLOWLY for 5 minutes to let the reaction run its course. Change-out the hot water as necessary. DO NOT OVER-WHIP THE MIXTURE. Stir very slowly! You should have a slightly-thickened paste now.
     7. (Optional): This would be the time to add fragrance or color.
     8. Remove the 250ml beaker to cool down. Add 1 ice cube directly to the paste. Stir SLOWLY for a few minutes to thicken the soap curds. DON’T OVER-STIR. This is very important! Add another ice cube if needed. The melted water won’t hurt anything.
     9. Rinse the curds 2-3 times with distilled water until pH comes down to 6-10. Move-around the curds GENTLY, like making butter. Do not whip them around! Decant-off each batch of distilled water into a waste beaker. The curds should increasingly agglomerate together.
     10. Pour the soap into molds. Cover with cheese cloth to keep away insects. Dry for several days.
     11. Perform soap tests using grease, hard water, etc.