Names: _____

Enzymes called phospholipases cleave phospholipids and play key roles in regulating membrane structure, function, and cell signaling. There are several different classes of phospholipases that cleave at different positions.

1. Draw a structure of a phospholipid with a glycerol scaffold (a phosphoglyceride).
   - Include a saturated and an unsaturated fatty acid of your choice.
   - You can just indicate the variable alcohol group (eg, serine, choline, etc.) with the word "alcohol group" in a box.

Using your structure above, indicate where the following phospholipases would cleave:

- Phospholipase A1: cleaves off FA1 (after oxygen on carbon 1 of the glycerol scaffold)
- Phospholipase A2: cleaves off FA2 (after oxygen on carbon 2 of the glycerol scaffold)
- Phospholipase C: cleaves before the phosphate (after oxygen on carbon 3 of the glycerol scaffold)

See other side!

2. Phospholipases A1/A2 are often found in snake venom and contribute to cell lysis. Draw a schematic of a membrane after phospholipase A1 and A2 have acted on it. Propose what effect these enzymes would have on cell membranes.

Note: This one can be challenging. Students often ask questions about this in class. Remember: you are not graded on getting the right answer for these activities. If you give a good-faith effort, you receive participation points!

3. Phospholipase C is an important enzyme in cell signaling that we will meet in Chpt 13. Draw a schematic of a membrane after phospholipase C has acted on it. Suggest what effect this enzyme would have on cell membranes.

4. The bond between a fatty acid and the glycerol scaffold is an ester bond. It turns out that many esterases (like phospholipases and acetylcholinesterase) have a very similar catalytic mechanism to proteases like chymotrypsin.

Draw an ester bond and next to it a peptide bond.

What do you predict the electrophile is in each? By analogy with chymotrypsin, what amino acids might be involved in the active site of a phospholipase?