Study Tip -

Nucleophilic Attack! (Theme: complementarity)
Nucleophile = nucleus loving. Therefore, a nucleophile must be at least partially _____ (+ or -) charged, because the nucleus of an atom is ____ (+ or -). The atom that the nucleophile attacks (a.k.a electrophile - electron loving) is at least partially ____ (+ or -) because electrons are ____ (+ or -).
Define a nucleophile: _______________________________________________________

List some functional groups that have the potential to be nucleophiles:

List some functional groups that have the potential to be electrophiles:

Identify and circle the nucleophile in each pair, then draw the arrows indicating the flow of electrons in a nucleophilic attack (hint: the intermediate is a tetrahedral intermediate)

Which is a better nucleophile? CH₃CH₂OH or CH₃CH₂O⁻

List the catalytic triad: ____________, ___________, and ___________
Which one is the best nucleophile?

How does the catalytic triad activate its nucleophile?
Draw an energy diagram for a reaction with AND without the catalysis of an enzyme

Be sure to include the following states: (S, ES, intermediate, EP, P)

How does an enzyme catalyze a reaction enthalpically? How does an enzyme catalyze a reaction entropically? Give an example for both in a serine protease.
Enzyme kinetics: Factory and workers analogy
Imagine you have a factory with 10 machines; each has to be operated by a skillful CMU graduate. During the first week of the operation, you only have $ (because CMU is a prestigious yet blood-sucking university) to hire one CMU graduate. During the 2\text{nd} week, due to your superior managing skills, you’re able to hire 2. 3\text{rd} week $\rightarrow$ 3 graduates... The company size increases every week by 1, by the 15\text{th} week, you have 15 CMU graduates working for you.

Graph the relationship between production level and number of CMU graduates (hint: the production from machine with no CMU graduate operating on it gives 0 units per week; a machine with a CMU graduate operating on it gives 1 unit per week)