

Name: \_\_\_\_\_

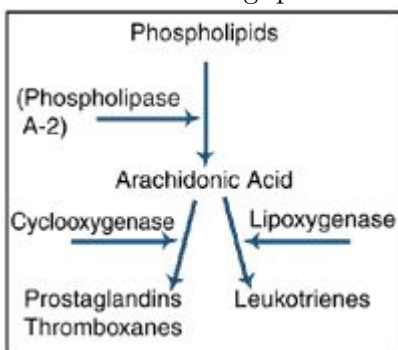
Class: \_\_\_\_\_

Date: \_\_\_\_\_

**Read each question carefully. Some questions have multiple parts. Answer all questions with complete sentences.**

1. Chemically what are the two easiest ways to speed up a chemical reaction?
2. Define Activation Energy **AND** discuss how it controls the rate of a reaction. Draw a reaction/energy diagram for an **Exothermic** reaction illustrating how a catalyst speeds up a reaction. Be sure to label the: (R)eactants, (P)roducts, (T)ransition state, Activation Energy (AE) and the Catalyzed Activation Energy (CAE).
3. What type of reactions do each of the following classes of enzymes catalyze?
  - (a) Oxidoreductase:
  - (b) Transferase:
  - (c) Hydrolase:
  - (d) Lysase:
  - (e) Isomerase:
  - (f) Ligase:
4. What are three common ways to increase a reaction rate? Which method does your body use?
5. Draw a picture showing how the rate of reaction (y-axis) of an enzyme is effected by pH (x-axis). Label the pH value at peak. What happens to an enzyme at very high and very low pH?
6. Draw a picture showing how the rate of reaction (y-axis) of an enzyme is effected by Temperature (x-axis). Label the temperature value at peak. What happens to an enzyme at very high and very low temperature?
7. Define each of the following terms and explain why they enable an enzyme to speed up a reaction:
  - (a) Active Site
  - (b) Proximity Catalyst:
  - (c) Productive Binding
  - (d) Stereospecific
  - (e) Lock and Key hypothesis
  - (f) induce-fit model
  - (g) strain hypothesis

8. For each reaction below what class of enzyme would be most likely to catalyze the reaction. (Choices are: (1) Oxidoreductase (2) Transferase (3) Hydrolase (4) Lysase (5) Isomerase (6) Ligase Explain.
- (a) Aldehyde  $\longrightarrow$  Alcohol (a) \_\_\_\_\_
- (b) Maltose  $\longrightarrow$  Glucose + Glucose (b) \_\_\_\_\_
- (c) cis-oleic acid  $\longrightarrow$  trans-oleic acid (c) \_\_\_\_\_
9. Biologically the easiest way to speed up a reaction is with an enzyme. Explain how an enzyme speeds up a chemical reaction. You may want to include a picture.
10. Explain the physical mechanisms by which enzymes catalyse reactions. In your discussion include the terms: (1) Active Site, (2) Stereospecificity, (3) Induced Fit (4) Proximity catalysis, and (5) Productive binding (6) Transition State. Use complete sentences in your discussion.
11. Define the terms enzyme inhibition and enzyme activation. What do the two processes have in common?
12. What is meant by the term "Limited Catalytic Ability" when applied to enzymes.
13. The following metabolic pathway shows the production of local hormones made from arachidonic acid. Answer the following questions about metabolic pathways.



- (a) Circle the parent molecule. Define the term.
- (b) Put a square around the daughter molecules. Define the term.
- (c) What class of molecules does cyclooxygenase belong too?
- (d) If the production of Leukotrienes interferes with Phospholipase A-2 this is an example of feedforward activation or feedback inhibition? Explain.
- (e) In allosteric regulation if a phospholipid acts as an activator for Lipoxygenase, this would be an example of feedforward activation or feedback inhibition? Explain.
- (f) Define the term Local Hormone and give the name of one molecule that is a local hormone and how local hormones effect the body.
14. Explain the concept of Allosteric Regulation. In your discussion include the terms: (1) Active site, (2) Regulatory Site, (3) Inhibition, (4) Activation. Draw and label a picture illustrating the concept.