Biology 309/310

Name: Answer Key.

Unit 3: Enzymes & Digestion

Review Guide

LEARNING TARGETS

Place a checkmark next to the learning targets you feel confident on. Then go back and focus on the learning targets that are not checked .

Enzymes

- ❑ Describe the relationship between enzyme, substrate, and active site. (2.1.3.A)
- ❑ Predict the effect of factors on enzymatic activity. (2.1.3.B)
- ❑ Explain the importance of enzymes to metabolism. (2.1.3.C)

Resources:
Textbook Section 2.4
Student Glossary
Enzyme Notes
Toothpickase Lab
Catalase Lab
~~Lab Summaries Worksheet~~

Digestion

- ❑ Identify and describe the structure and function of the human digestive system. (2.1.4.A)

Resources:
Textbook Section 30.3
Student Glossary
Digestion Notes

Biology 309/310

Name:_____

LT 2.1.3.A: Describe the relationship between enzyme, substrate, and active site.

1. What is an enzyme?

   Protein that speeds up biochemical reactions by lowering the energy needed for a reaction to happen.

2. What is the relationship between enzymes and catalysts?

   Enzymes are a type of catalyst.

3. What type of proteins (in terms of structure) make up enzymes?

   Globular protein.

4. Describe how enzymes "work".

   1) Attract and hold the substrates.
   2) Substrate fits perfectly into the active site.
   3) Enzymes decrease the amount of activation energy.
   4) Enzyme does its "job" and releases product.
   5) Enzyme can be used over and over again.

5. What is a substrate? What is another name for a substrate?

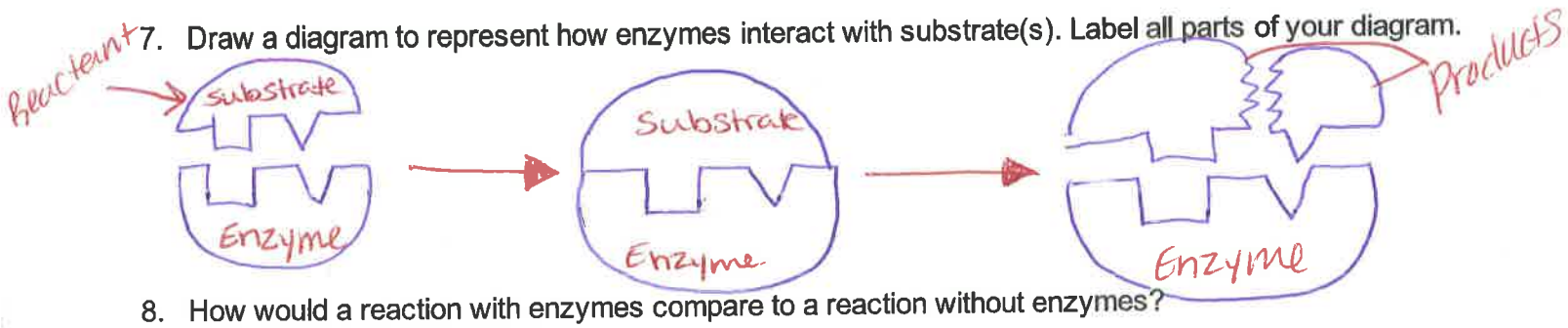
   Reactant of an enzyme - catalyzed reaction.

   Another name = reactant.

6. What is an active site?

   Place on an enzyme where the substrate bind.

7. Draw a diagram to represent how enzymes interact with substrate(s). Label all parts of your diagram.



8. How would a reaction with enzymes compare to a reaction without enzymes?

   Reactions with enzymes will occur quicker than the same reaction without an enzyme.

Name:_____

9. Can a reaction occur without enzymes? Explain your thinking (do not give a simple "yes" or "no" answer).

yes; however, most biological reactions require an enzyme.

10. What is the difference between an active site and activation energy?

Active Site - Place on an enzyme where the substrate binds.

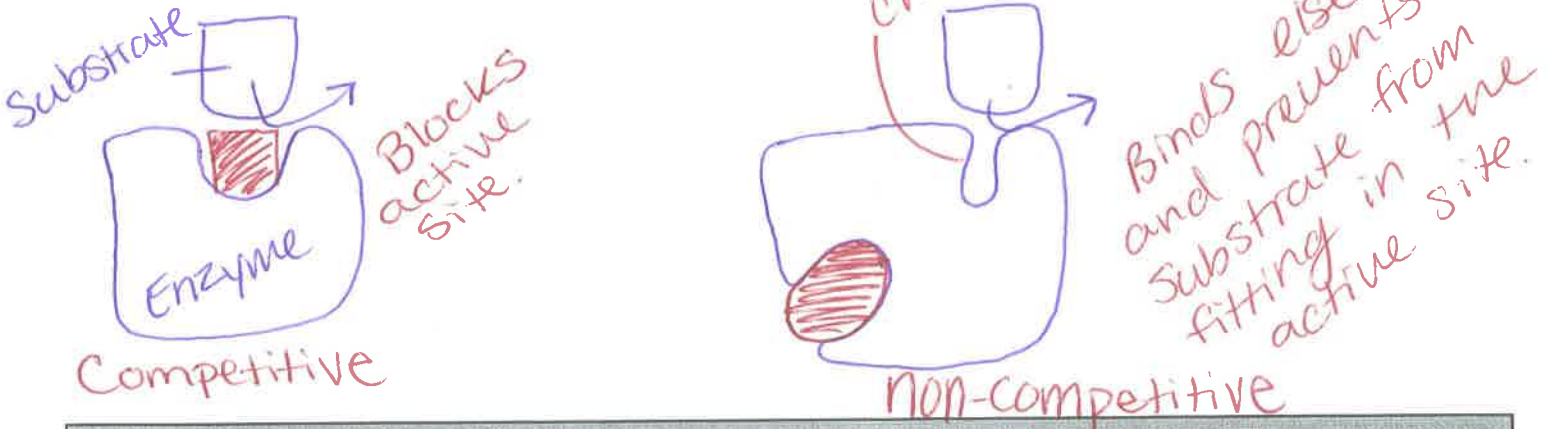
Activation Energy - the amount of energy required in order to start a reaction.

11. What are the different types of inhibitors?

Competitive Inhibitor

non-competitive Inhibitor.

12. Draw a picture to represent each type of inhibitor.



LT 2.1.3.B: Predict the effect of factors on enzymatic activity.

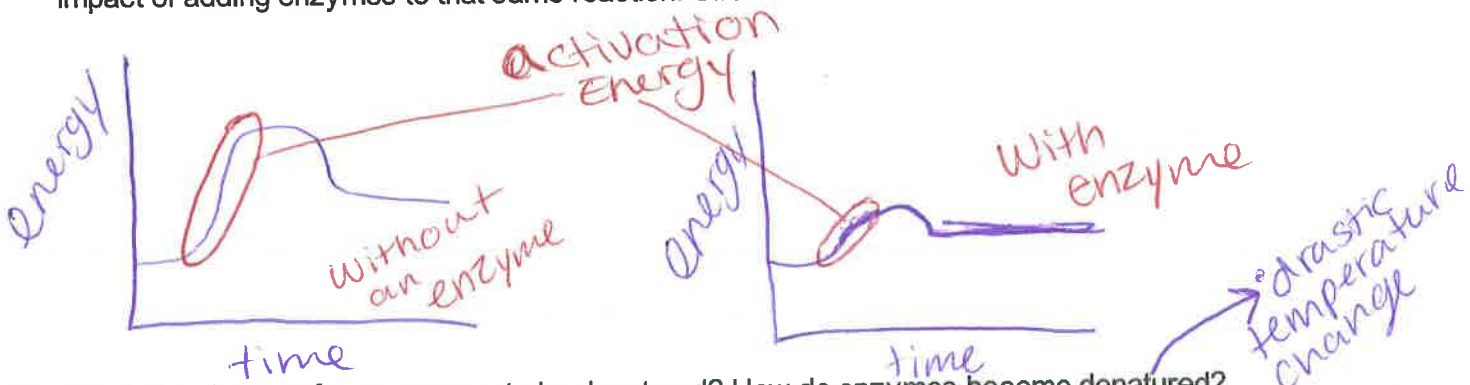
11. What is activation energy? How does it relate to enzymes?

Activation energy = energy needed to get a reaction started.

Enzymes lower the activation energy.

Name: _____

12. Draw two graphs: one that represents a generic reaction over time and a second one that shows the impact of adding enzymes to that same reaction. Circle the main difference between your two graphs.



13. What does it mean for an enzyme to be denatured? How do enzymes become denatured?

protein changes its shape due to outside stress on the molecule and stops it from working.

14. How does temperature affect enzymes?

Enzymes will work faster as temperature increases up until a certain point, then the enzyme will become denatured.

15. How does pH affect enzymes?

Extremely high or low pH will denature enzymes.

16. How does the amount of enzymes present affect the number of products made?

The more enzymes that are present the faster the products can be made.

17. How does the amount of substrate present affect the number of products made?

The more substrate that is present, the faster the products can be made up until a certain point.

18. What is an inhibitor? Does it increase or decrease enzymatic activity?

Inhibitor = substance that blocks or distorts the active site.

Inhibitors decrease enzymatic activity.

Name: _____

19. Temperature, pH, and inhibitors all affect enzymes. In what way does the impact of temperature and pH affect enzymes compared to inhibitors?

Temperature & pH can slow down the enzyme as well as denature the enzyme.

Inhibitors completely prevents an enzyme from doing its job.

20. Use the following clusters of terms to write a sentence:

a. enzyme/substrate/active site

b. temperature/pH/denature

c. enzyme/reaction/activation energy

d. inhibitor/active site/denature

These sentences will vary.

LT 2.1.3.C: Explain the importance of enzymes to metabolism.

21. What two types of reactions have been discussed in class that can be facilitated by enzymes?

1: Dehydration Synthesis

2: Hydrolysis.

22. Define metabolism in your own words.

The combination of chemical reactions through which an organism builds up or breaks down materials.

Name:_____

23. How does metabolism relate to enzymes and digestion?

Enzymatic activities are a part of our metabolism, metabolism is all of the chemical reactions that break down food for digestion to occur.

24. For each type of organic molecule, describe which enzyme(s) break it down and the products that form as a result:

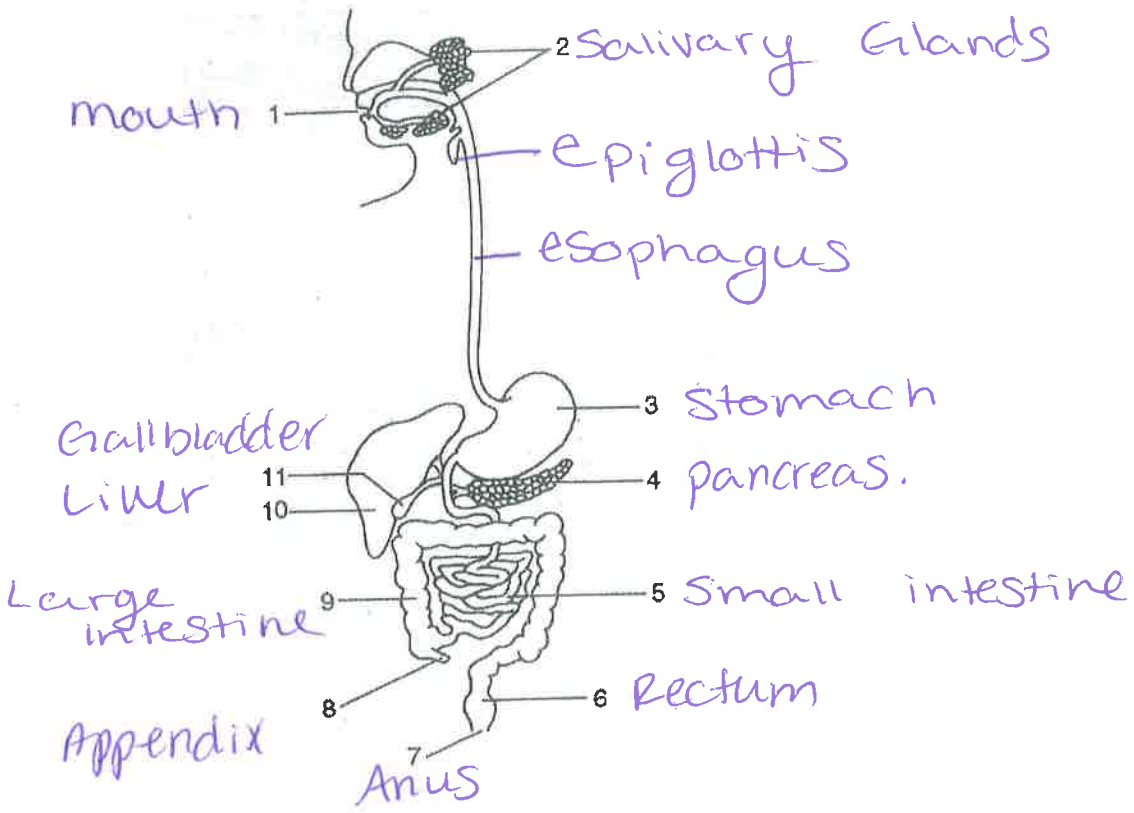
	Enzyme(s)	Resulting Products
Carbohydrates	Amylase	monosaccharides
Lipids	Lipase	Glycerol Fatty Acids
Proteins	Trypsin	Amino Acids.

Biology 309/310

Name: _____

LT 2.1.4.A: Identify and describe the structure and function of the human digestive system.

25. Label the following diagram:



26. Complete the following table summarizing the digestive system in terms of structure and function:

Structure	Function
Anus	Feces passes through the anus to be eliminated
Esophagus	move / transport food from the mouth to the stomach.
Gallbladder	store bile

Name: _____

Large intestine	Removes water from solid waste.
Liver	- produces bile - stores glucose.
Mouth	Break down food ↳ mechanical digestion chemical digestion Site of ingestion.
Pancreas	produces digestive enzymes that are released into duodenum
Rectum	stores feces until peristalsis eliminates it through the anus.
Small intestine	most chemical digestion and all absorption
Stomach	churns and mixes food with enzymes (chemical + mechanical digestion).

27. Which organs (in order) does food pass through on its journey through the digestive system?

mouth → esophagus → stomach → small intestine → large intestine → rectum → anus.

Biology 309/310

Name:_____

28. Some organs play a vital role in the digestive system but food does not necessarily pass through them. These organs are referred to as accessory organs. List three accessory organs discussed in class and what they do.

1. Salivary Glands - produce saliva
2. Liver - produces bile, stores glucose
3. Gallbladder - stores bile
4. Pancreas - produces digestive enzymes

29. What is bile and why is it important?

A chemical that breaks down lipid globules into droplets. Bile also neutralizes stomach acid as it passes through the duodenum.

30. How is it possible that we are able to swallow food even if we are in outer space (without gravity) or upside down in a headstand?

Peristalsis moves food, not gravity!

31. Why is the epiglottis important?

It prevents food from entering the Trachea.

32. What is the most important organ in the digestive system? Why?

Small intestine - most of the chemical digestion of food and all of absorption occurs in the small intestine.

33. What is the second most important organ in the digestive system? Why?

Pancreas - produces digestive enzymes.

* As long as you justify your answer you could have multiple answers.