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Enzymes Review Worksheet

1. a) Fill in the gaps in the following sentences using the words in the box below.

i) Enzymes are biological **catalysts** that speed up chemical reactions in living organisms.

ii) Enzymes are protein molecules, which are made up of long chains of **amino acids**

iii) The sequence and type of amino acids are **different** in each protein, so they produce enzymes with many different shapes and functions.

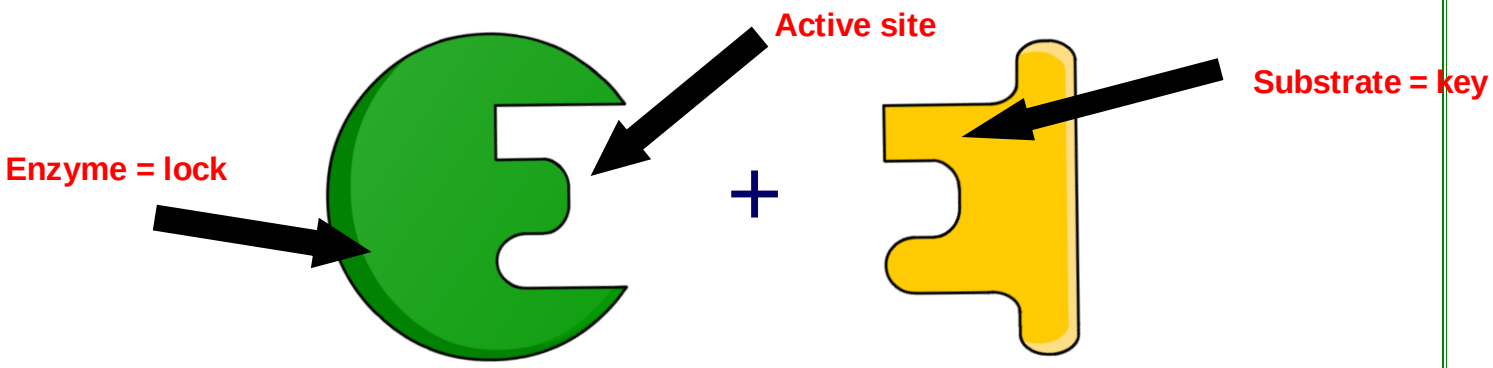
iv) The shape of an enzyme is very important to its **function**

different	catalysts	function	the same	amino acids

b) Enzymes catalyze many important chemical reactions in the human body. Name one of these chemical reactions.

digestion

c) Label the image below with the following terms: active site, substrate, enzyme.



1. a) Enzymes and their substrates are often compared to a lock and key. This is called the Lock and Key Model. Label the lock and key in the image above.

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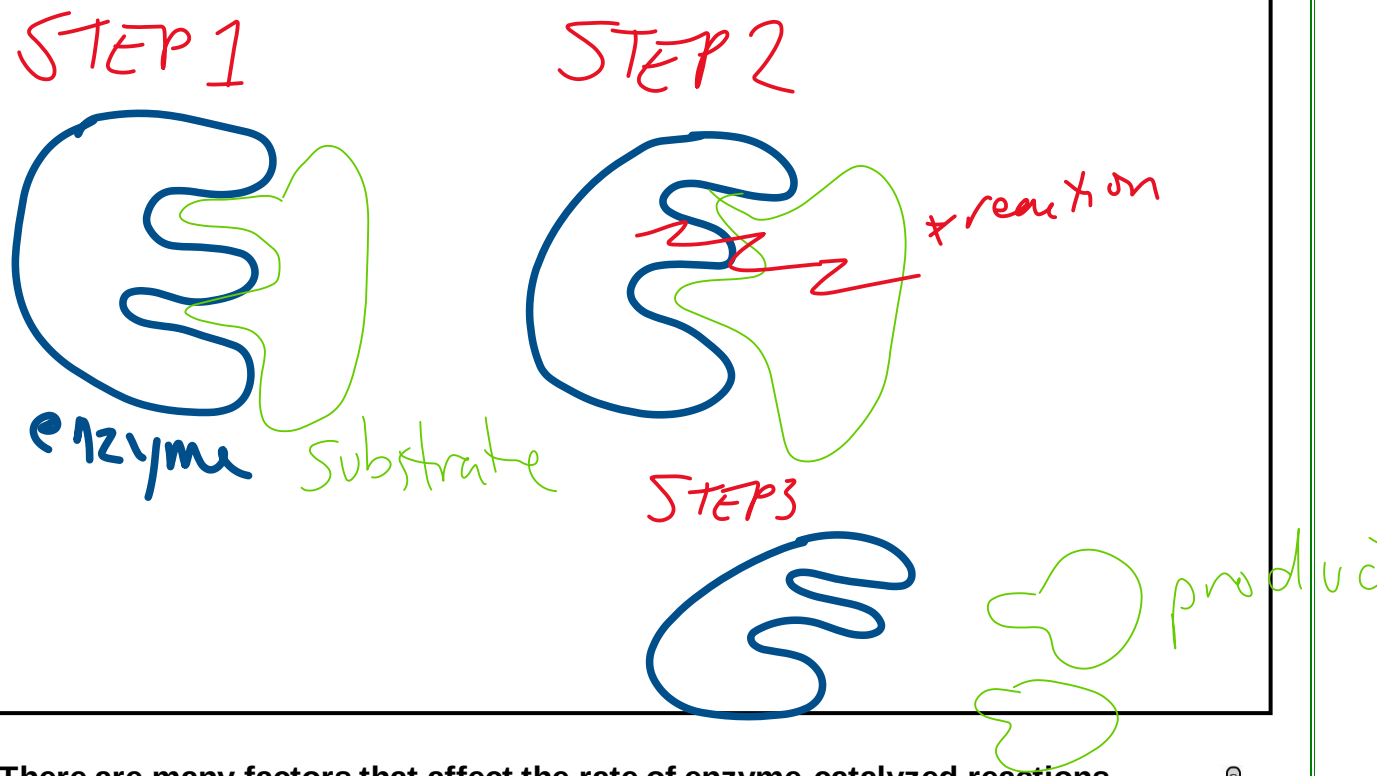
2. b) Explain what would happen if a substrate molecule with a different shape to the enzyme came into contact with the enzyme's active site.

Nothing will happen, the reaction cannot be completed (like putting the wrong key into a lock)

c) Explain what would happen to a substrate molecule if it came into contact with an enzyme's active site that matched its specific shape. Use the space below to draw and explain what would happen. Use the following terms in your answer: products, enzyme, substrate, active site.

Step 1: the enzyme attaches to the substrate at the active site
Step 2: the enzyme breaks the substrate apart into its products (its starts a reaction that breaks bonds in the substrate)
Step 3: the enzyme detaches from the products.



d) There are many factors that affect the rate of enzyme-catalyzed reactions, including temperature. Name two other factors.

pH, concentrations of enzymes or substrates

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e) i) What would happen to an enzyme if the temperature and pH changed significantly beyond the enzyme's optimum level?

Enzymes denature (lose shape) and then they can't function properly

ii) How would this affect enzyme activity?

Slow down, or all together stop the enzyme from working (catalysing reactions)

3. A group of students decided to carry out an investigation to find out how enzyme activity is affected by temperature changes. They put samples of salivary amylase and starch into two test tubes. Salivary amylase is an enzyme that breaks down starch into maltose. Its optimum temperature for activity is around 37°C.

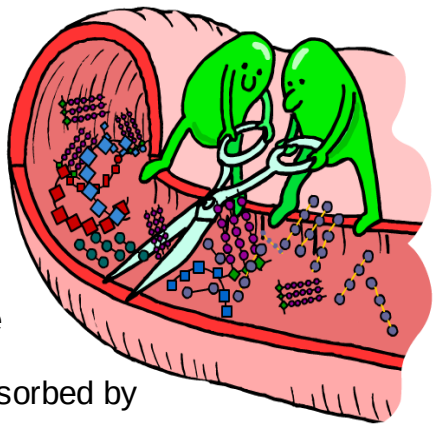
a) What do you think happened to the rate of reaction when they increased the temperature of the first test tube to 37°C?

the temperature is for optimum activity, so the reaction took place as expected (normal)

b) What do you think happened to the enzyme activity when the students decreased the temperature of the second test tube to O°C?

slowed the reaction down, potentially even stopped it.

4. a) Fill in the missing words in the following text about enzymes and digestion, using the words in the box below



Not all enzymes work inside cells in the body.

digestive enzymes are produced by specialized cells in the pancreas and digestive tract. From there, the enzymes pass out of the cells, into the **large** and small intestine where they come into contact with food molecules. Here, they catalyze the **breakdown** of large molecules, which are then more easily absorbed by the body.

Large	**Breakdown**	**Digestive**

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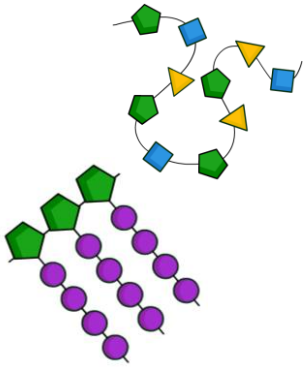
b) Write down the name of the nutrient next to the enzyme that breaks it down. Use the words in the box below.



i) Sucrase is an enzyme that breaks down **… sucrose**

ii) Protease is an enzyme that breaks down **proteins**

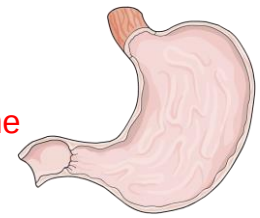
iii) Lipase is an enzyme that breaks down **fats**

iv) Amylase is an enzyme that breaks down **starch**

fats **sucrose** **starch** **proteins**

c) The stomach produces hydrochloric acid which increases the acidity of the stomach to the optimum pH for stomach enzymes to digest the food. However, digestive enzymes found in the small intestine are damaged by strongly acidic conditions. How does the body avoid damaging the digestive enzymes in the small intestine with this strongly acidic pH as the food passes out of the stomach?

1. pyloric sphincter ensures only **chyme** (digested food mixed with stomach acid) comes out of the stomach (not pure acid)
2. Small intestine (duodenum) is designed to decrease the pH of the chyme (there are a variety of secretions that do this)



5. a) Biological washing powders contain protein-, fat- and carbohydrate-digesting enzymes to help remove stains. Name one other use for enzymes in the home or industry.

Yogurt, alcohol production, bread (yeast), detergents

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