Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_ Group:\_\_\_\_\_\_\_

**Enzymes and digestion**

**Directions:**

* Go to science website –> Human Body systems –> Digestive System –> Digestive System Computer lab from BBC
* Complete the following information
* When done, take the “**Test Bite**” – a short virtual quiz

**Enzymes and digestion**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are important in digestion. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the breakdown of carbohydrates, proteins and fats into small soluble substances that can be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into the \_\_\_\_\_\_\_\_\_\_\_\_.Lipases and proteases are used in biological \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are used in the manufacture of food and drink.

The **digestive system**

Digestion is the breakdown of \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into smaller, soluble molecules that can be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into the body. Digestion happens inside the gut, and relies on enzymes. You learnt about the gut in your Key Stage 3 studies. Visit the section on Diet and digestion if you want to check back.

This interactive diagram will remind you of the main parts of the gut/digestive tract:

**Answer the following questions as you study the diagram**

1. Where is the epiglottis located?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Can you tell which is the largest organ?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. The gallbladder is located\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Once chyme (paste-like consistency of food) leaves the stomach, where does it travel to next?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Why do you think is the small intestine so much longer than the large intestine? (think about what happens there)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Click “**NEXT**”

**Enzymes and digestion**

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ involved in respiration, photosynthesis and protein synthesis work \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_. Other enzymes are produced by specialised cells and released from them; the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ enzymes are like this. They pass out into the gut, where they \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the breakdown of food molecules.

**Different enzymes**

Different enzymes **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** different digestion \_\_\_\_\_\_\_\_\_\_\_\_.

**Enzymes and their reactions catalysed**

| **enzyme** | **reaction catalysed** |
| --- | --- |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | starch    →    \_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| protease | proteins    →    \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_  |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | lipids    →    \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ + glycerol |

Amylase is an example of a carbohydrase. Lipids are \_\_\_\_\_\_\_\_\_\_\_and \_\_\_\_\_\_\_.

***Different parts of the gut***

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ parts of the gut \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ different \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

***Where enzymes are produced***

| **enzyme** | **where produced** |
| --- | --- |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | salivary glands, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, small intestine |
| protease | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, pancreas, small intestine |
| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | pancreas, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**Summary**

Overall, this means that:

Amylase catalyses the breakdown of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into sugars in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_ intestine.

Proteases catalyse the breakdown of proteins into \_\_\_\_\_\_\_\_\_\_\_ acids in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and small intestine.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ catalyse the breakdown of \_\_\_\_\_\_\_\_\_\_\_\_ and oils into fatty acids and glycerol in the small intestine.

Click “**NEXT**”

**Other substances in digestion**

You should recall that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ enzymes work best at different \_\_\_\_\_\_\_\_\_\_\_\_\_\_ values. The digestive enzymes are a good example of this.

**Enzymes in the stomach**

The stomach produces \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ acid. This helps to begin digestion, and it \_\_\_\_\_\_\_\_\_ many harmful \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that might have been swallowed along with the food. The enzymes in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ work \_\_\_\_\_\_\_\_\_\_\_\_ in acidic conditions - in other words, at a \_\_\_\_\_\_\_\_ pH.

**Enzymes in the small intestine**

\_\_\_\_\_\_\_\_\_\_\_\_ the stomach, food travels to the \_\_\_\_\_\_\_\_\_\_\_\_\_ intestine. The enzymes in the small intestine work best in \_\_\_\_\_\_\_\_\_\_\_\_\_ conditions, but the \_\_\_\_\_\_\_\_\_\_\_ is acidic after being in the \_\_\_\_\_\_\_\_\_\_\_\_\_. A substance called \_\_\_\_\_\_\_\_\_\_ neutralizes the acid to provide the \_\_\_\_\_\_\_\_\_\_\_\_\_ conditions needed in the small intestine.

*Bile and enzyme production*

*in the liver and pancreas--🡪>>*

**Click “NEXT”**

Enzymes in industry

**Enzyme names**

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the different types of enzymes usually end in the letters -\_\_\_\_\_\_\_\_. Three of the most common enzymes with their chemical actions are:

* lipase - breaks down \_\_\_\_\_\_\_\_\_\_\_\_\_\_
* protease - breaks down \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* carbohydrase - breaks down \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Enzyme uses**

Enzymes allow certain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ processes to be carried out at normal temperatures and pressures, thereby reducing the amount of \_\_\_\_\_\_\_\_\_\_\_\_\_ and expensive equipment needed. Enzymes are also used in the \_\_\_\_\_\_\_\_\_\_\_, for example, in 'biological' \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The table shows some common enzyme uses you should be familiar with.

**Uses of enzymes**

| **enzyme** | **use** |
| --- | --- |
| **protease** | used to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ proteins during the manufacture of baby foods |
| **\_\_\_\_\_\_\_\_\_\_\_\_\_** | used - together with protease - in biological detergents to break down - digest - the substances in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into smaller, water soluble substances |
| **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | used to convert starch syrup, which is relatively \_\_\_\_\_\_\_\_\_\_\_\_, into sugar syrup, which is more valuable - for example, as an ingredient in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ drinks |
| **isomerase** | used to convert glucose syrup into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ syrup - fructose is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than glucose, so it can be used in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ amounts in slimming foods |

**Now try a Test Bite**

**Enzymes and digestion test - Test**

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**1**.

What type of substances do lipases break down?

fats

proteins

carbohydrates

**2**.

Protease is produced by:

the stomach and small intestine only

the pancreas and small intestine only

the stomach, small intestine and pancreas

**3**.

Amylase catalyses the breakdown of starch into:

amino acids

fatty acids

sugars

**4**.

Proteases are used in some baby foods to:

predigest the proteins

keep the baby's clothes clean

increase the shelf life of the food

**5**.

One job of bile is to:

neutralise the alkali produced by the pancreas

neutralise the acid produced by the stomach

neutralise the acid produced by bacteria in the mouth



**When you are done with the whole packet, hand it in and then you may play educational games….**

Bottom of Form