

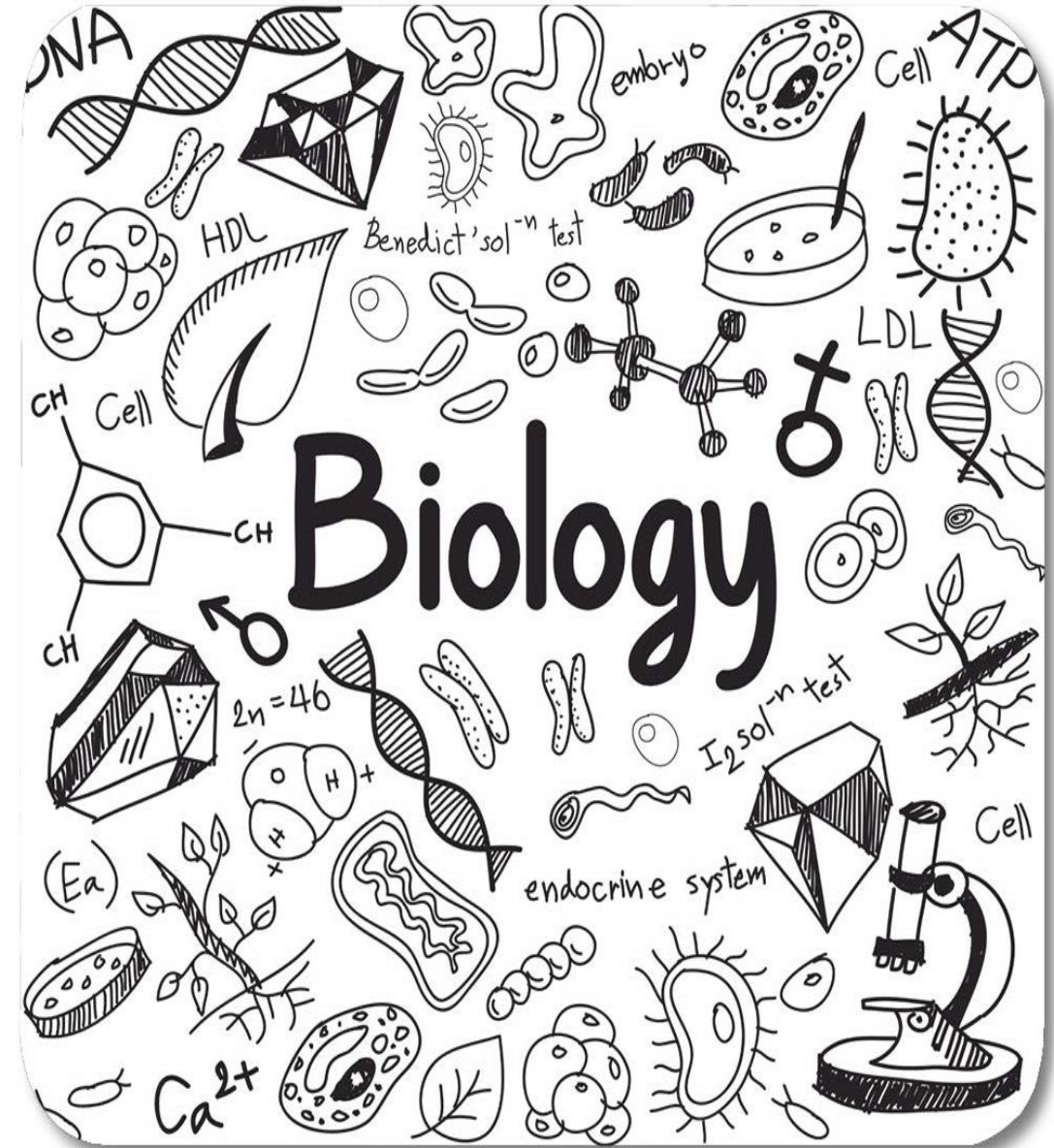


The National
Orthodox School
Shmaisani

Lesson: **Digestion**

Scholastic Year: 2022-2023

Grade: 7CS



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edexcel



Objective : Recognize each part of the alimentary canal and explain its role in digestion
Explain what are enzymes and how do they work .

Resources : The process of digestion experiment

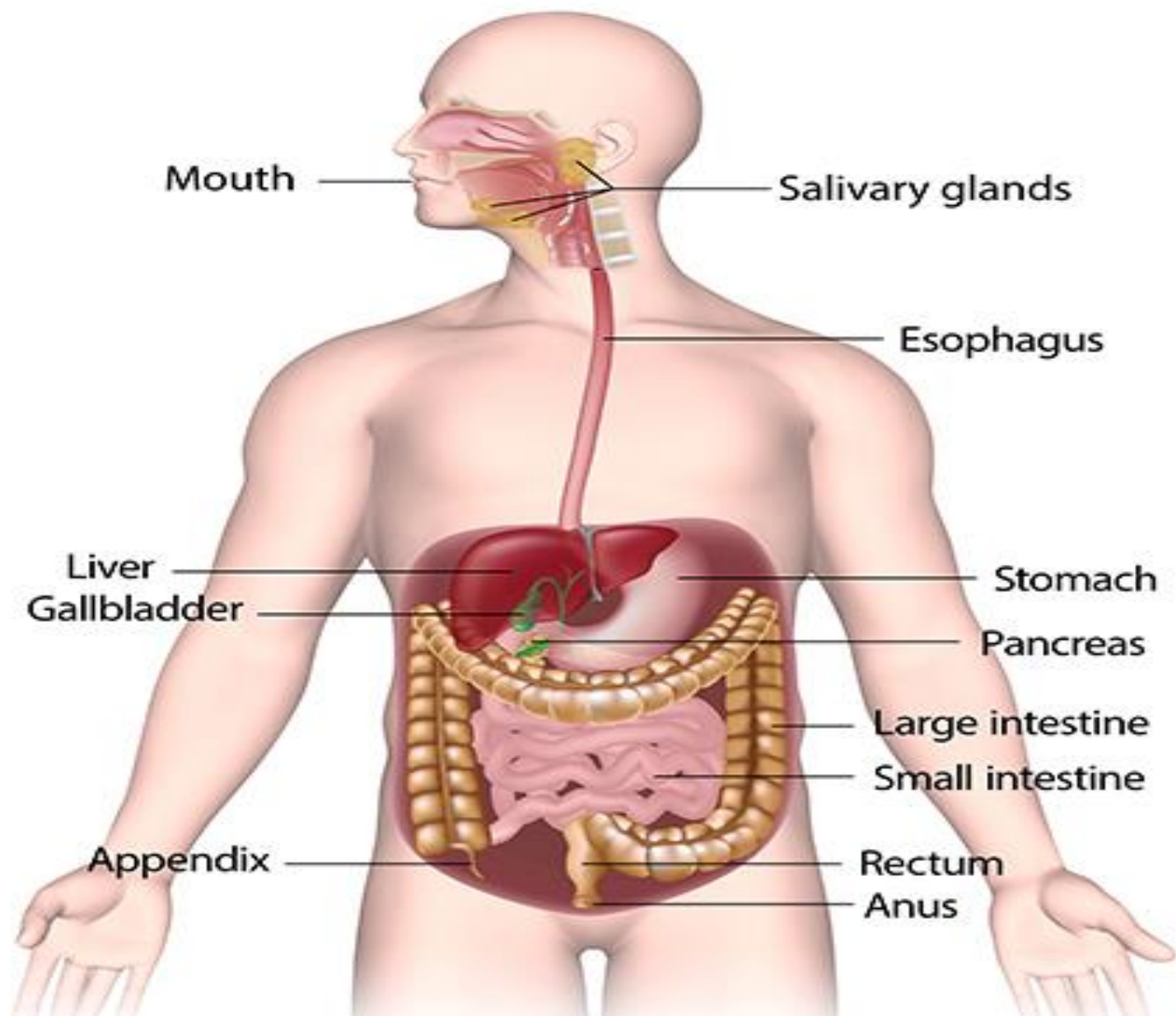
<https://www.youtube.com/watch?v=7av19YhNkhE>

<https://www.youtube.com/watch?v=08VyJOEcDos>

Book pages 104 , 105, 106,107

Workbook page 47 and 48

The Digestive System



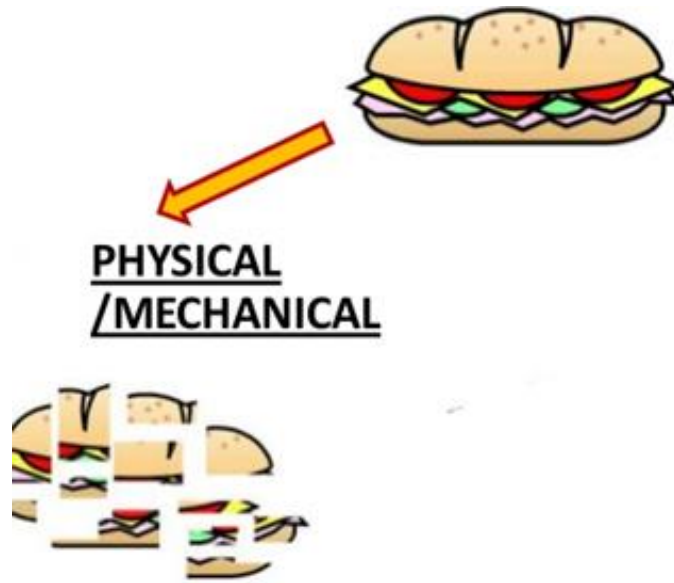
What is digestion ?

It is the break down of food into smaller molecules and nutrients needed to be used for energy, growth, and cell repair.

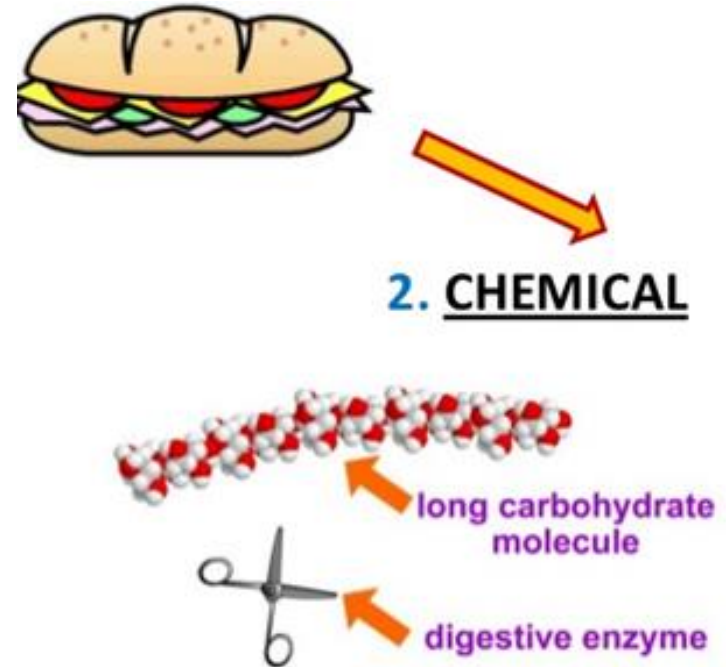
The **digestive** tract (or the alimentary canal) is a long twisting tube that starts at your mouth and ends at your anus.

What are the types of digestion ?

Physical or mechanical digestion



Chemical digestion





Go to interactive

8.1

Objective

- Recognise each part of the alimentary canal and explain its role in digestion

Mechanical

Or physical
Cutting the food
Small pieces

Chemical

break down
small molecules
enzymes

Acid in the stomach :

- Helps protease enzyme to digest protein .
- Kills microbes

The digestive system

Inside your gut

Everything you eat goes into your **gut**, or **alimentary canal**. This long tube winds its way from your mouth to your **rectum**. Food can spend more than a day inside it, but most of your food doesn't get to the end. What happens to it?

The starch, fats, and proteins in your food are made of big complex molecules (see page 92). Your cells can't use them as they are. Inside your gut, these big food molecules are broken down to make small molecules your body can use, such as glucose. These molecules pass into your blood, which carries them to every cell.



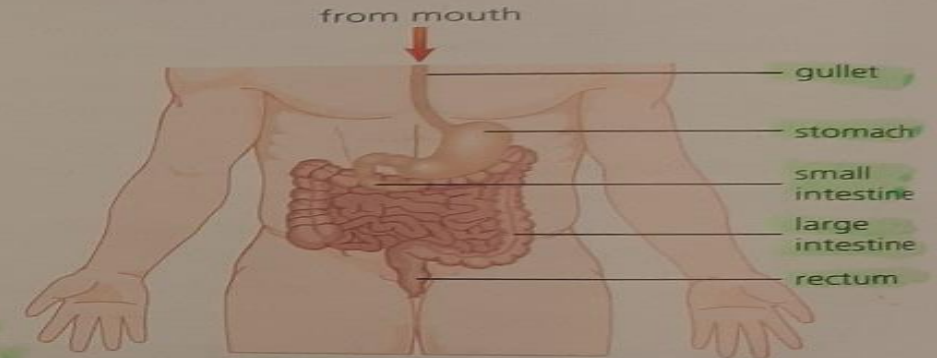
Everything you swallow goes into a long thin tube called your alimentary canal.

Mouth to stomach

Your teeth break up solid lumps of food to make smaller pieces you can swallow. This is **mechanical digestion**. It makes the large molecules in the food easier to break down later.

Your mouth fills with saliva as you chew. Saliva contains an **enzyme**. Enzymes help large molecules break down to form smaller ones. This is **chemical digestion**. The enzyme in saliva helps starch to break down.

Saliva is also very slippery. It makes food easy to swallow. Then the walls of your gullet squeeze it down to your stomach. This squeezing action of the gut walls is called **peristalsis**.



Your alimentary canal takes food from your mouth to your rectum.

Inside your stomach

Your stomach blends each meal with acid and another enzyme. The acid destroys microbes and the enzyme begins the digestion of proteins.

Once your meal is a smooth paste, your stomach lets it out. It squirts into the small intestine a bit at a time. Now the pieces of food are smaller, enzymes can mix with the large food molecules more easily.

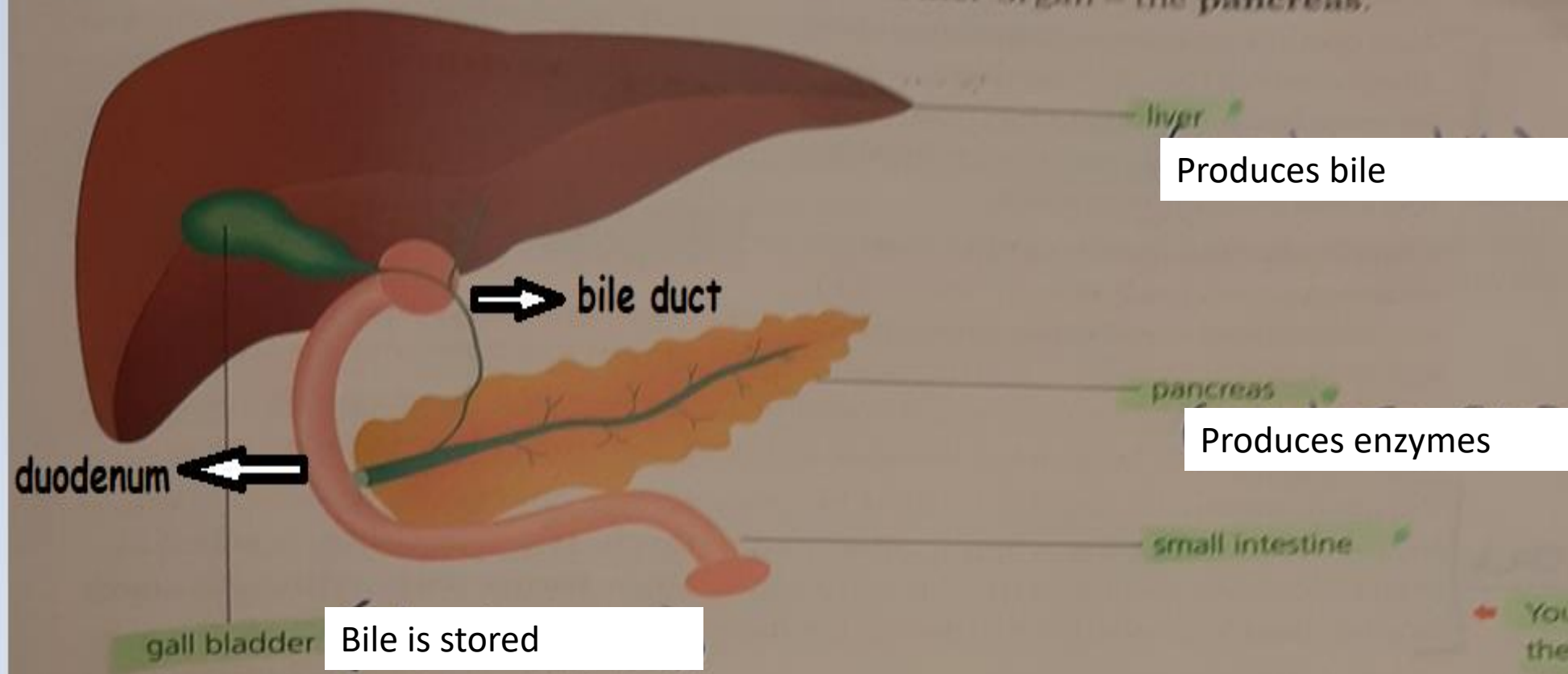


Your stomach stores food and mixes it with acid and enzymes to make a smooth paste.

In the small intestine

Your **small intestine** is the longest part of your gut. This is where most large molecules get broken down. Its walls squeeze food along and mix it with more enzymes. A lot of these enzymes come from another organ - the **pancreas**.

- page 105



Your pancreas pours enzymes into the small intestine to aid digestion.

As food leaves the stomach, enzymes from the pancreas pour onto it. Carbohydrate and protein continue to break down and fat digestion starts. The small intestine makes more enzymes to help finish the job.

As food is digested, small molecules are produced. They pass through the small intestine's walls and into your bloodstream. Now you can use them.

Digestion and absorption

Beyond the small intestine

When a meal gets to the **large intestine** there is nothing left but fibre. This part of the gut is full of bacteria. They live off the fibre and make important vitamins that we can absorb.

The walls of the large intestine absorb water into the bloodstream. This turns the mixture of fibre and bacteria into a solid waste called faeces. It is stored in your **rectum** until you are ready to go to the toilet. Then it squeezes out through your **anus**.

- Digestion breaks down food into small molecules that can enter your blood.
- Digestion happens in the gut (alimentary canal).
- Teeth crush food into smaller

Questions 1,2,3,4,5,6,7 page 105

Q1. Digestion breaks large molecules down into smaller molecules that can be absorbed by the small intestine to the blood .

Q2. mouth ----- gullet ----- stomach -----duodenum----- small intestine ----- large intestine -----rectum ----- anus

Q3. Mechanical digestion to cut solid food into smaller pieces .

Chemical digestion uses enzymes to break large food molecules into smaller ones .

Q4. 1. Saliva contains an enzyme that begins the breakdown of starch.

2. It also makes food slippery and soft so it is easier to swallow.

Q5. It mixes with protease enzyme to digest protein in the presence of hydrochloric acid , hydrochloric acid also kills microbes .

Q6. 1. Most large molecules are **digested** in the small intestine using enzymes.

2. These small molecules are **absorbed** into the bloodstream.

Q7. Small food molecules are absorbed by the walls of the small intestine and pass into the blood. The blood carries them to cells all over the body.

8.2

Enzymes

Catalysts

Life could not exist without enzymes. They control the chemical reactions in your body. Without enzymes, most of these chemical reactions would be too slow to keep you alive.

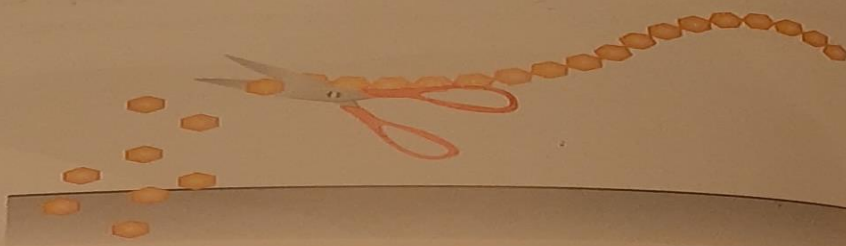
Chemicals that speed up chemical reactions are **catalysts**, so enzymes are **biological catalysts** – catalysts made by living things. Enzymes can speed up chemical reactions without being changed or used up. The enzymes in your gut make large food molecules break down to form smaller ones.

We can't see the molecules in food but we can use chemicals to detect them. Iodine turns dark blue when it mixes with starch. If warm saliva is added to starch, and left for a few minutes, no blue colour forms with iodine. No starch can be detected because its molecules have broken down.

Different enzymes for different jobs

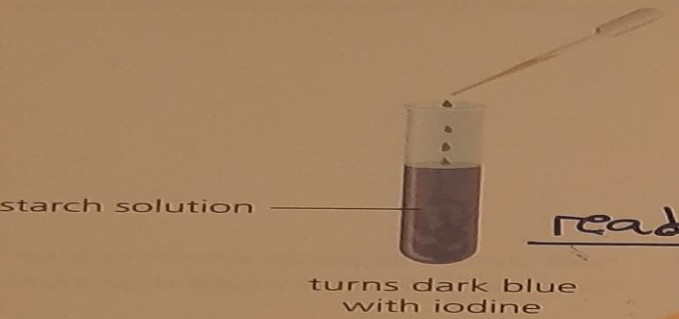
Scissors can cut anything, but enzymes are specialised. Each of the enzymes in your gut can only make one type of molecule break down. The enzyme in saliva is called amylase. It's a type of **carbohydrase** because it breaks down starch – a carbohydrate.

The enzyme produced in the stomach is a **protease** – it makes proteins split into smaller molecules.

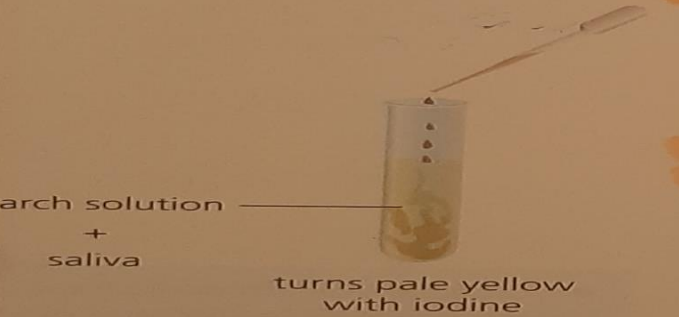


The enzyme in saliva digests starch by helping it to break into glucose molecules.

Objective
Understand the function of enzymes

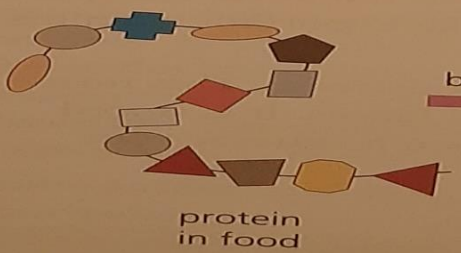


starch solution
turns dark blue with iodine



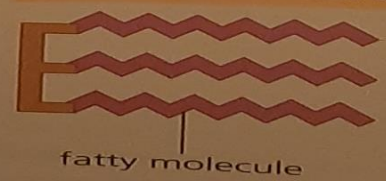
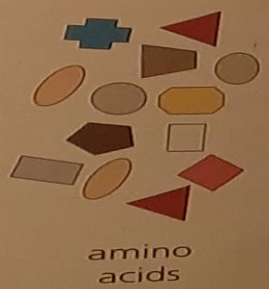
starch solution + saliva
turns pale yellow with iodine

When starch breaks down it no longer turns blue with iodine.



Other enzymes from the pancreas and small intestine complete starch and protein digestion. The pancreas also makes a **lipase** enzyme to make fat

breakdown catalysed by a protease enzyme



breakdown catalysed by a lipase enzyme



Helping our enzymes

In large chunks of food most of the molecules are in the middle. Enzymes can only work on the molecules on the surface of the food. Chewing food breaks it into smaller pieces to give enzymes a **large surface area** to work on. But fat molecules stick together in large globules.

As food enters the small intestine it mixes with **bile** from the **gall bladder** (see page 105). This **emulsifies** fats, which means it breaks them into smaller droplets. The large surface area of the droplets makes it easier for lipase enzymes to break them down.

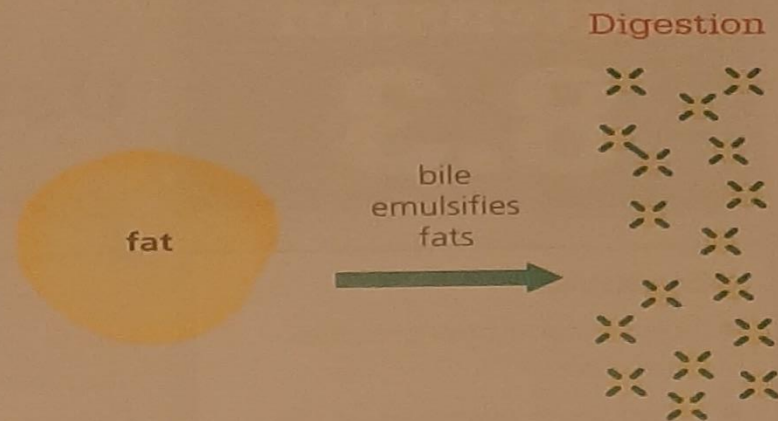
Providing the right conditions for enzymes :-

Enzymes are giant molecules made from protein. They have to be just the right shape to do their job. Each chemical reaction needs a different enzyme.

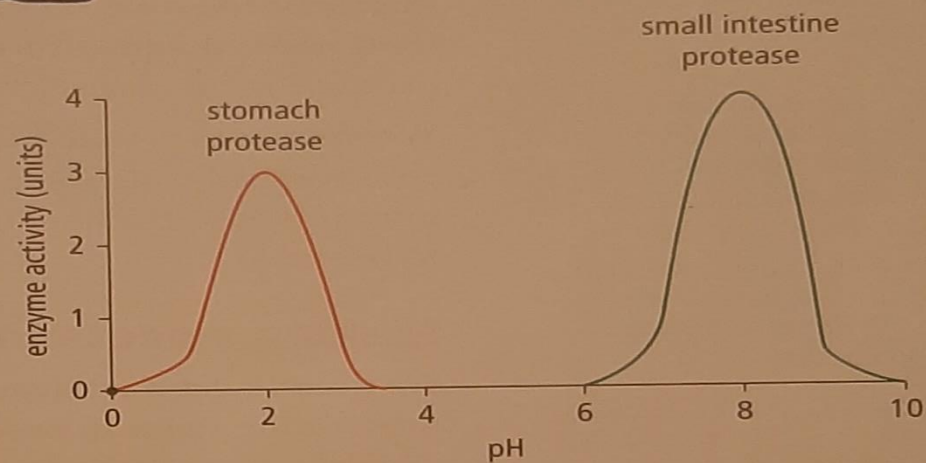
① If the **pH** around an enzyme changes, its shape can change. The enzyme becomes **denatured** and stops working. Each enzyme has an **optimum pH** at which the acidity of its surroundings lets it work as fast as it can.

The fluids inside your stomach are very acidic (pH 2) but the inside of your small intestine is slightly alkaline (pH 8). Chemicals from the pancreas, and the chemicals in bile, neutralise food as it leaves your stomach. These differences allow different enzymes to work in each organ.

② High **temperatures** can also denature enzymes. The enzymes in our bodies work best at 37 °C, but the enzymes in other living things can be very different. Microbes that grow in extreme conditions can have enzymes with optimum temperatures as high as 100 °C or as low as 2 °C.

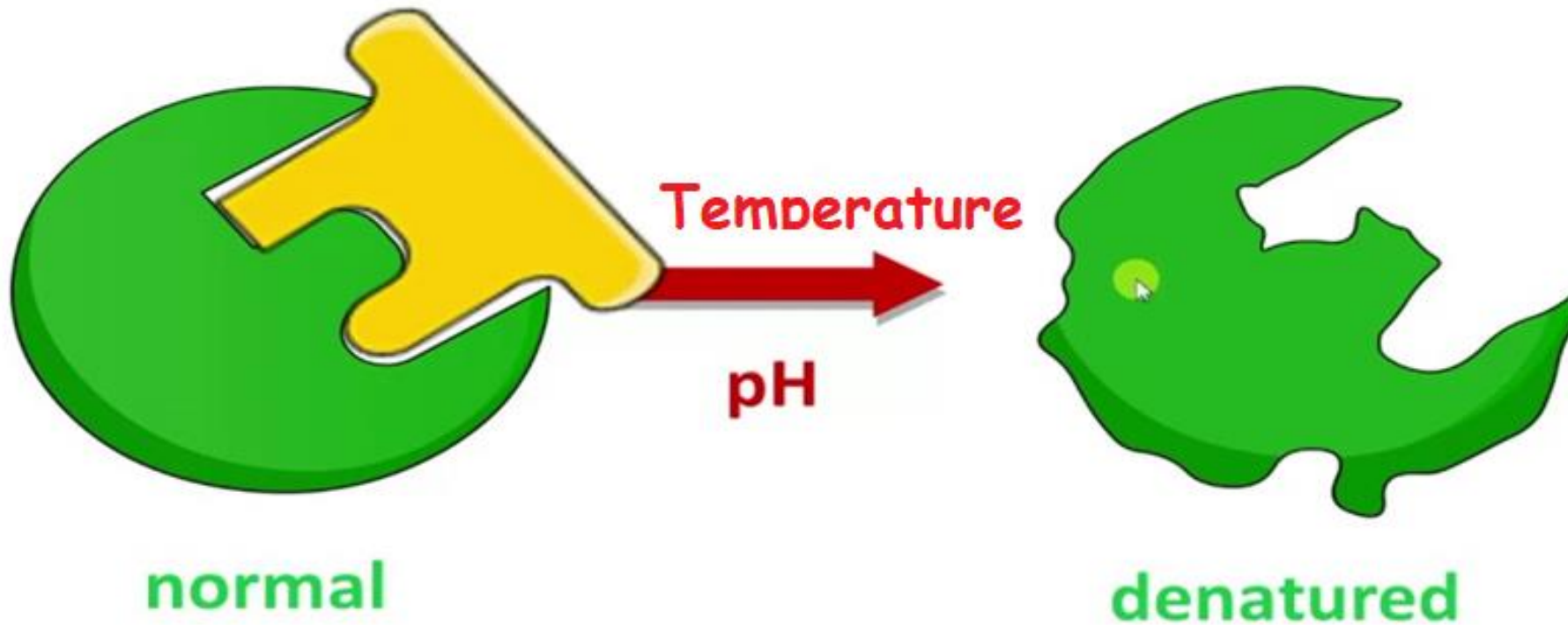


↑ Lipases work faster with emulsified fats because they have a greater surface area.



↑ The proteases that work in your stomach and small intestine work best at different pH values.

What will happen to the enzyme if the temperature increases or the PH changes ?



Page 107 / questions 1,3,4 text book

Q1. The term 'biological' means they are made by living cells. The term 'catalysts' means that they speed up the rate of chemical reactions.

Q4. Note : starch is digested by the amylase enzyme in the mouth and the small intestine

Nutrient	Enzyme used to digest it	Organ/s where digestion takes place
carbohydrate	carbohydrase	Small intestine
protein	protease	stomach, small intestine
fat	lipase	small intestine

Q

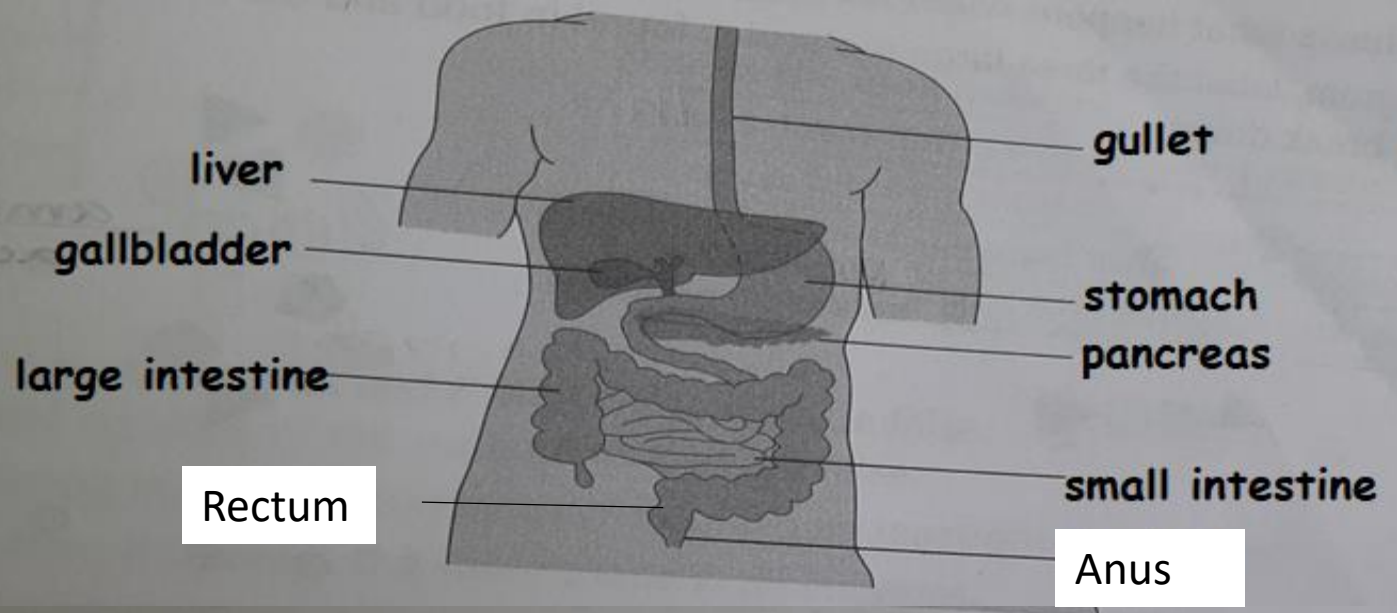
- 1 Explain why enzymes are called biological catalysts.
- 2 Foods need to be broken into smaller pieces before chemical digestion takes place. Why is this?
- 3 Bile is a green substance which is secreted from your gall bladder. What is its main function?
- 4 Copy and complete this table:

Nutrient	Enzyme used to digest it	Organ(s) where digestion takes place
carbohydrate		
protein		
fat		

Questions 3 page 107

Q3. Bile emulsifies fat .

digestive system.



2 Read the following paragraph and fill in the gaps with words from the box below.

Digestion breaks down food into small **molecules** that can enter your **blood**. It happens in your gut (**alimentary canal**). Teeth begin the process. They crush food into smaller **pieces**. Then **enzymes** help the large molecules in food to **break** down. These enzymes are produced in your mouth, stomach, **pancreas**, and **small intestine** intestine. The small intestine **absorbs** digested food and the large **intestine** removes **water** from the waste products left behind.

- | | | | | |
|-------|------------------|----------|-----------|-----------|
| water | alimentary canal | blood | intestine | molecules |
| small | enzymes | pancreas | break | absorbs |

3 Decide whether statements a–f refer to **mechanical digestion**, **chemical digestion** or **both**.

a Digestion begins in your mouth.

..... **both**

b Teeth chew food to break up large pieces.

..... **mechanical**

c Chewing increases the surface area of solid foods.

..... **Mechanical**

d Enzymes help large molecules to break down.

..... **chemical**

e Saliva contains an enzyme which breaks down starch.

..... **chemical**

f Digestion ends in your small intestine.

..... **chemical**

4 We cannot digest fibre. Explain why we still need to eat it.

.....
fibre prevents constipation

Question 1 / page 48 Workbook

1

