Food and Digestion

Why we need food?

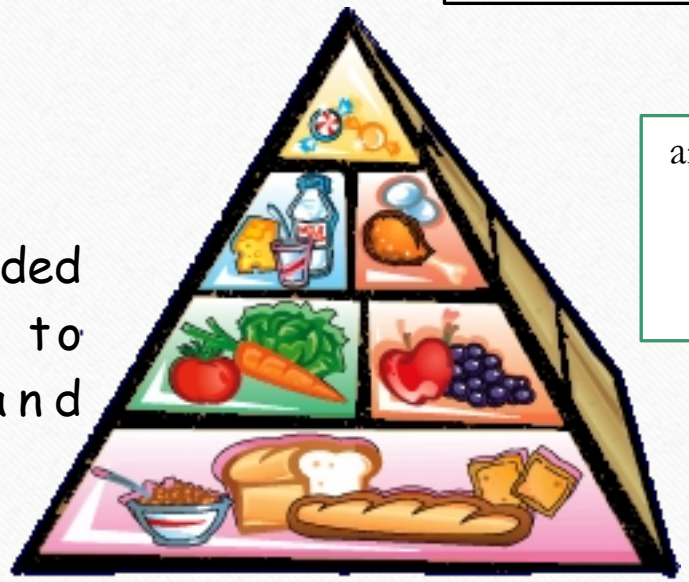
To supply

- Energy needed all the activities of life
- Materials needed to build new cells during growth and repair

We can obtain nutrients from

a substance needed by organisms to stay alive and healthy

We need a balanced diet to stay healthy

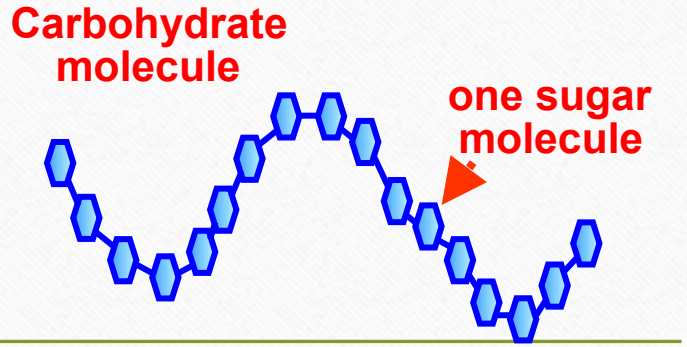


amount of each of seven key types of chemical called nutrients

1. Carbohydrates
2. Fats
3. Proteins
4. Vitamins
5. Minerals
6. dietary fibre
7. water

Carbohydrates

ENERGY



1. Starch
   - not sweet
   - E.g. bread, potatoes, pasta and rice.
   - Test for the presence of starch using iodine solution

2. Sugar
   - Sweet
   - E.g. sweets, cakes, biscuits

Contain long chains of identical small sugar molecules

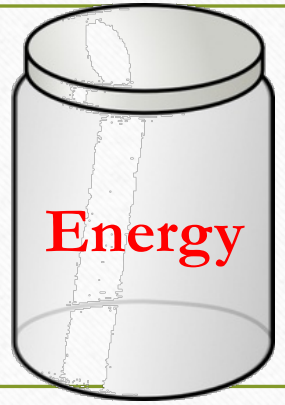
↓ broken down into

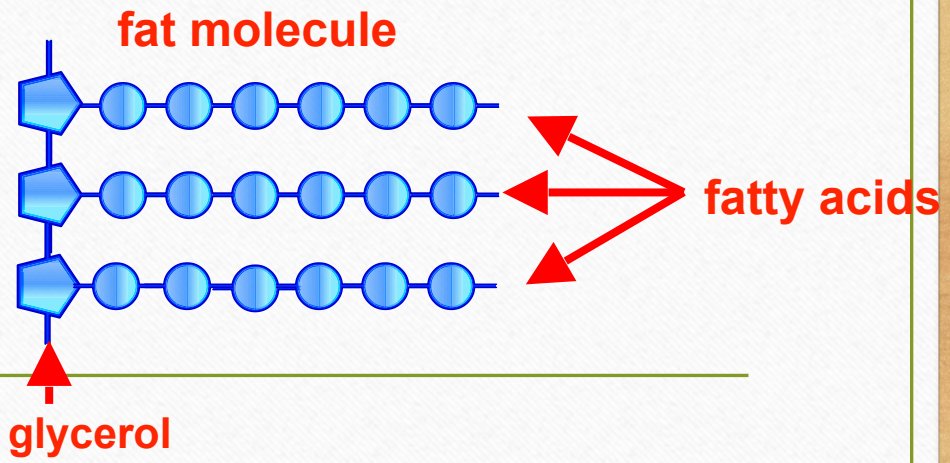
the smaller sugar molecules

↓ Release

ENERGY

Fats (Lipids)

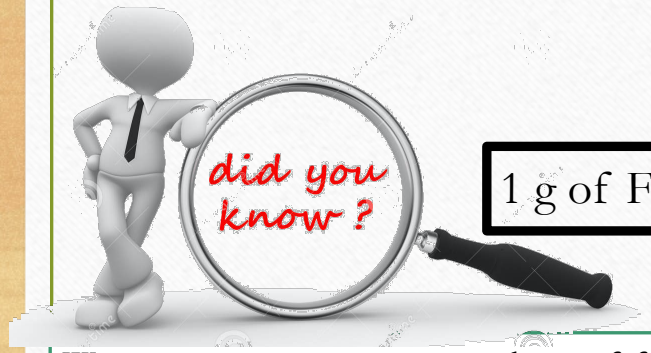




- E.g. Butter, margarine, cooking oil, cheese and red meat.
- Fats/ lipids are needed
  1. Make cell membranes of cells
  2. Supply energy (similar to carbohydrate)

  BUT!!!!

  Fats are a more concentrated form of energy than carbohydrates



1 g of Fat **> 2x** 1 g of carbohydrate

We store our spare energy as a layer of fat under the skin. This fat layer also keeps us warm, and provides padding against knocks. Eating too much fat in the diet (especially fat from animal sources) can cause heart disease, because it encourages layers of fat to clog up our arteries.

Contain fat molecules

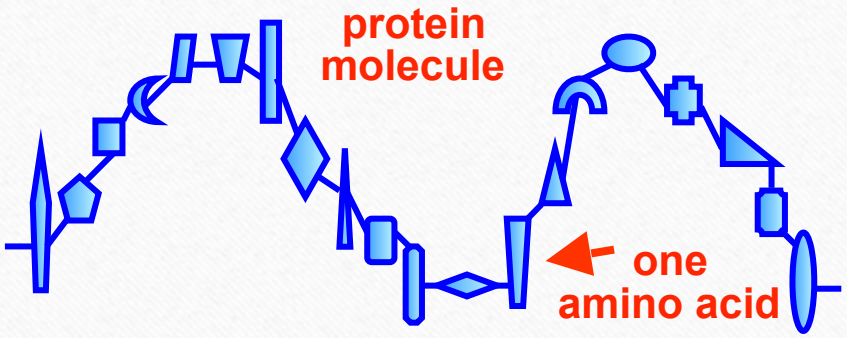
↓ broken down into

fatty acids and glycerol

↓

1. **energy storage.**
2. **Keep body warm**
3. **Make cell membranes.**

Protein



- Cell is made of protein.
- Protein is needed for:
  1. Growth (getting bigger by growing new cells)
  2. Repair (replacing damaged or worn out cells).
- Meat, fish, milk, eggs and beans

Contain long chains of not identical small molecules

↓ broken down into

Amino acids (20 different kinds)

↓

Growth and Repair

Vitamins

Minerals

- Vitamin A - Good vision
- Vitamins B - Cell
- Vitamin C - Wound healing
- Vitamin D - Helps to absorb the amount of calcium
- Vitamin E – Antioxidant/protects your cells and tissues from damage
- Vitamin K – Help to stop the bleeding

- Calcium – Build strong bones
- Iron - Important in the formation of haemoglobin (blood)
- Potassium - Keeps your muscles and nervous system working properly.
- Zinc - Helps your immune system and helps with cell growth and helps heal wounds.

Dietary Fibre

- Mainly from the cell walls of plants (cellulose)
- We are unable to digest dietary fibre, so it comes out unchanged in the faeces.
- Fibre is bulky, and it stretches the walls of the large intestine encouraging it to push back and move the food through quickly.
- This stops us getting constipation (inability to produce faeces), which may be a cause of bowel cancer.

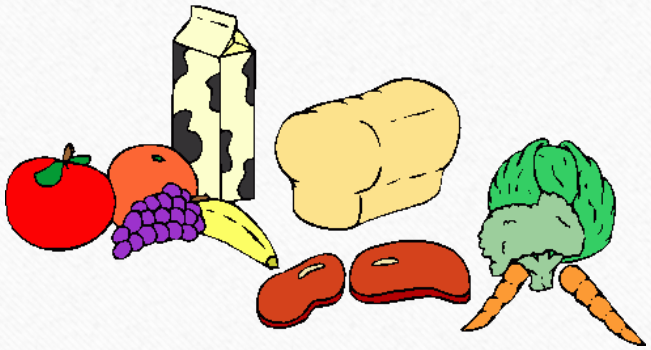
Digestive system

Ingestion : Taking in food at the mouth

Digestion : Break down large insoluble molecule into small soluble molecules

Absorption : Small food molecules can pass through the walls of the small intestine and then dissolve into the blood stream.

Egestion : Removing the faeces at the anus



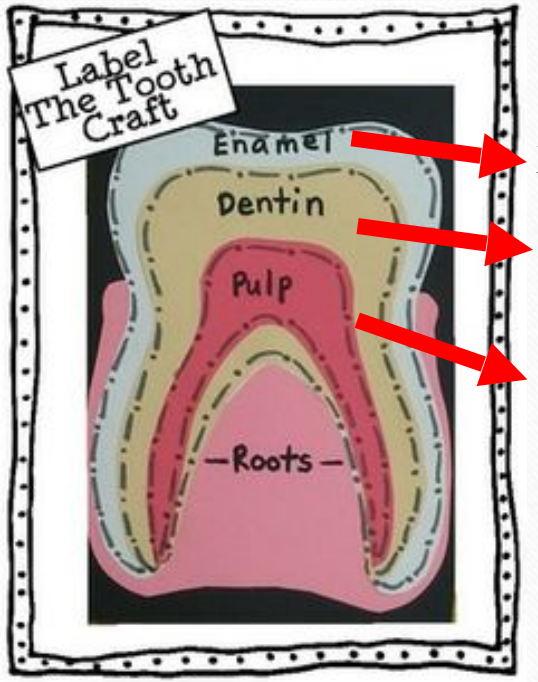
Types of teeth

Sharpest teeth – cut and tear food

Have long roots – grasp and tear food

Flat and big – chew and grind food

Chewing breaks food into small pieces



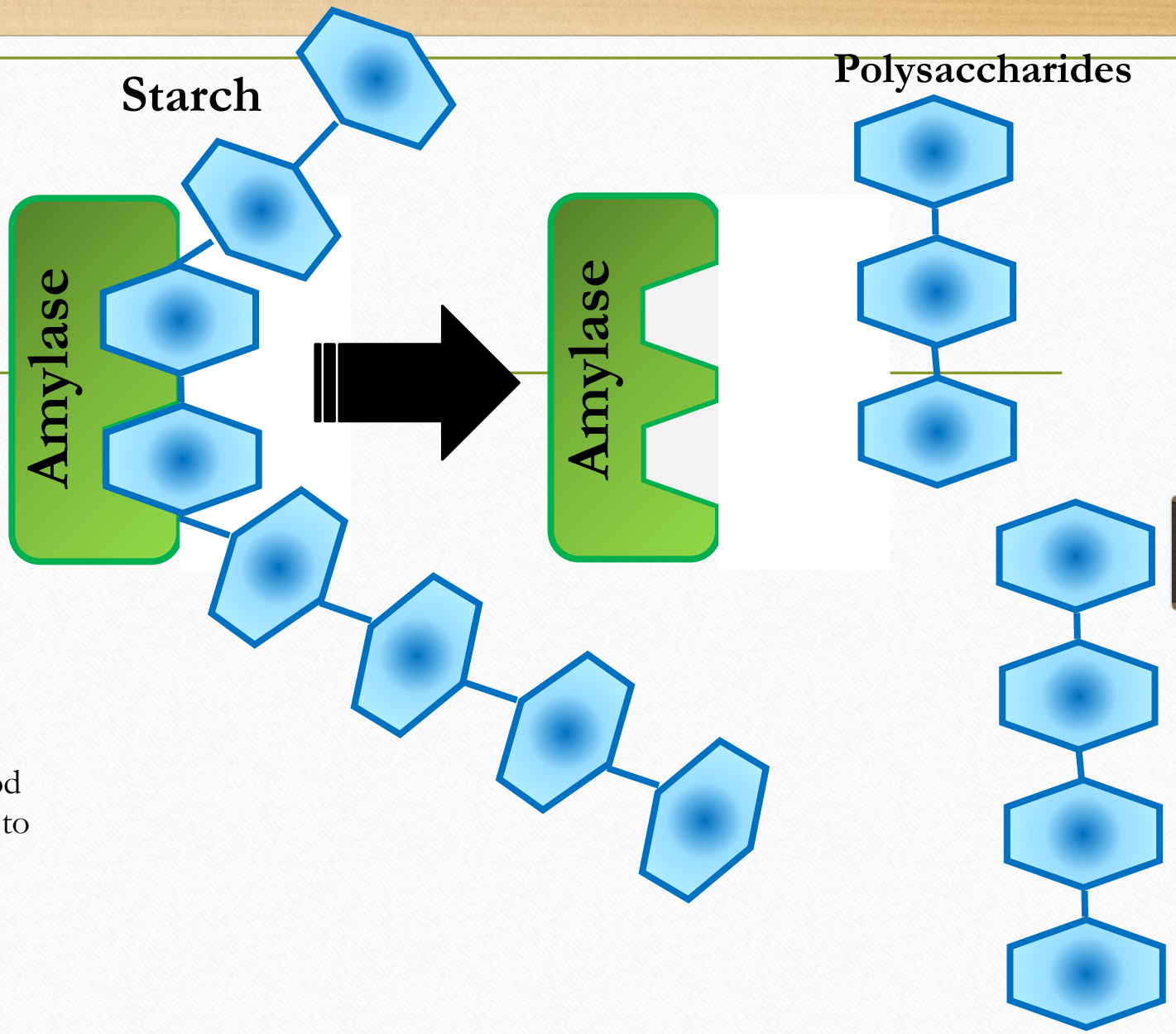
Structure of teeth

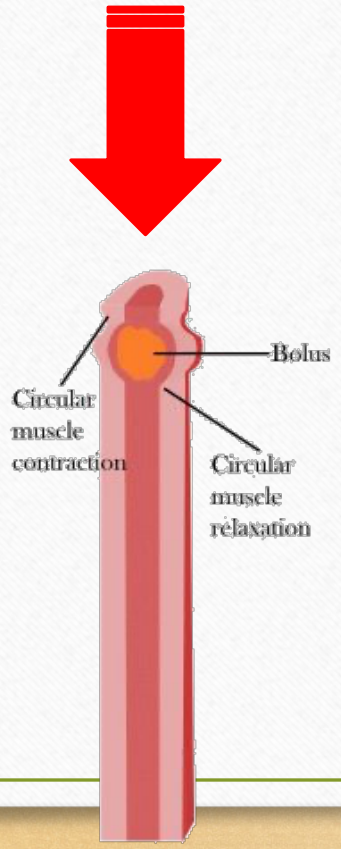
Hardest – contain calcium

Contain living cell, can be sensitive if the protection of the enamel is lost.

Soft tissue - Contain the blood and nerve

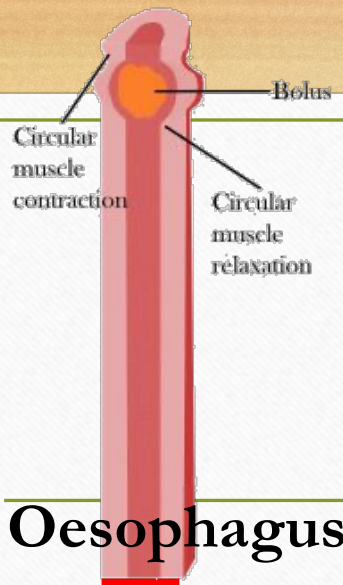
Salivary amylase begins to digest starch into polysaccharides





Oesophagus

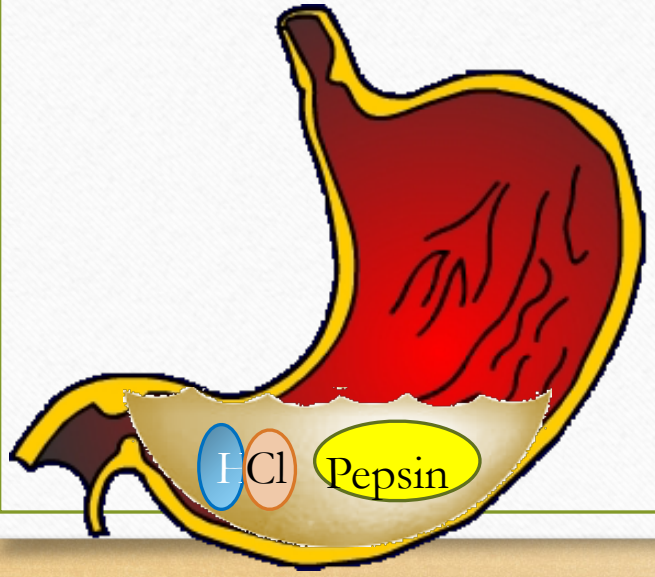
To carry chewed food (bolus) from mouth to stomach

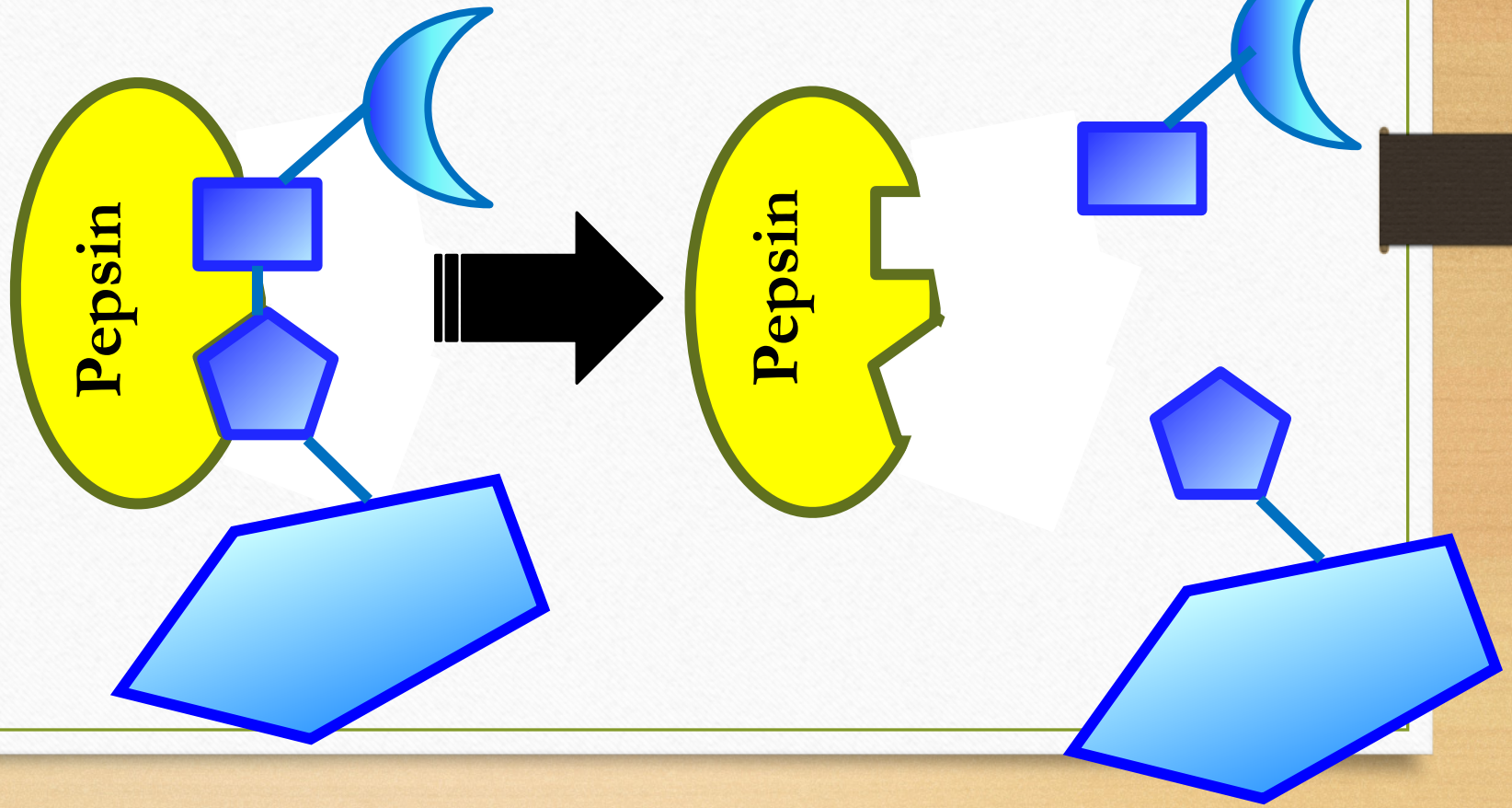


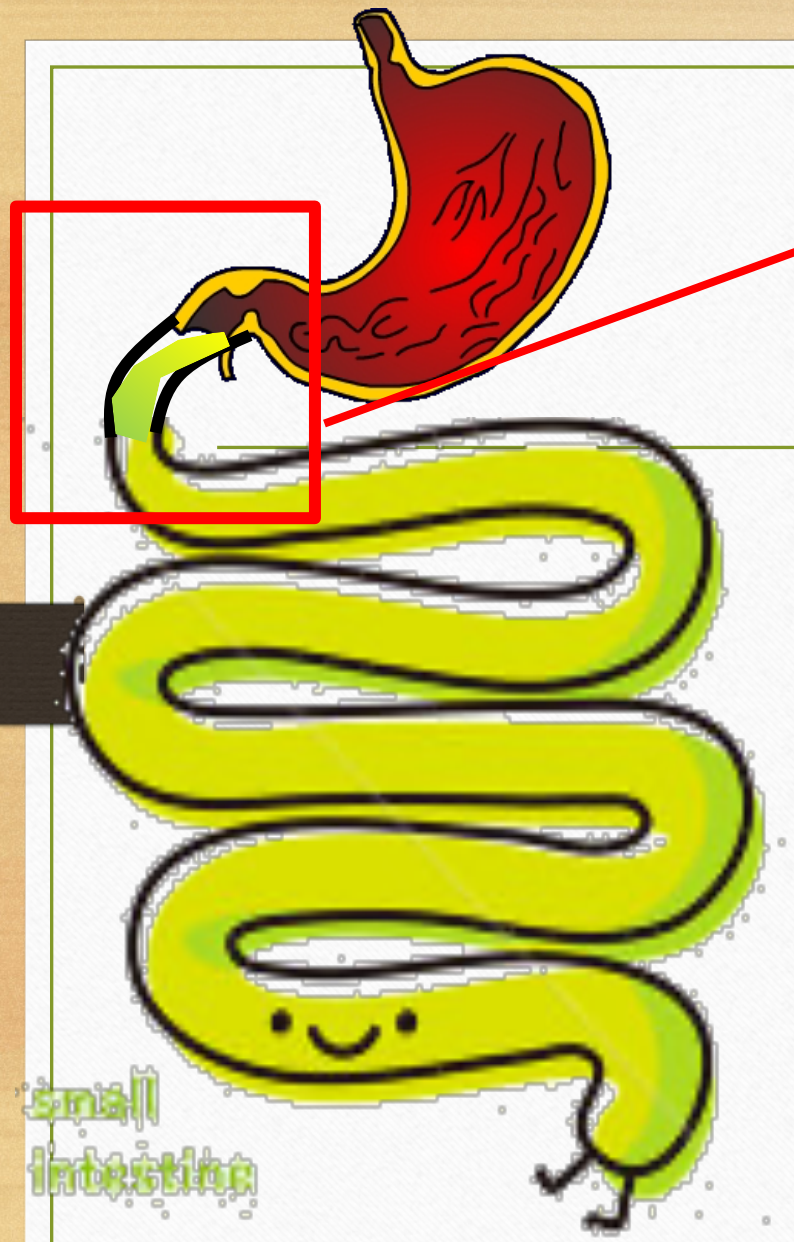
Oesophagus

2 things happen to food in the stomach:

- HCl increase the acidity of bolus to pH 2.0
  - Deactivate amylase (stop digestion of carbohydrate)
  - Kill bacteria
- The chemical breakdown of protein started







The small intestine has three parts:

1. Duodenum (Pancreatic amylase, lipase & protease)

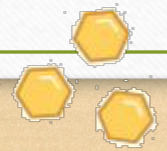
- To complete the first phase of digestion.
- Food from the stomach is mixed with enzymes from the pancreas and bile (emulsifies fats) from the gallbladder.

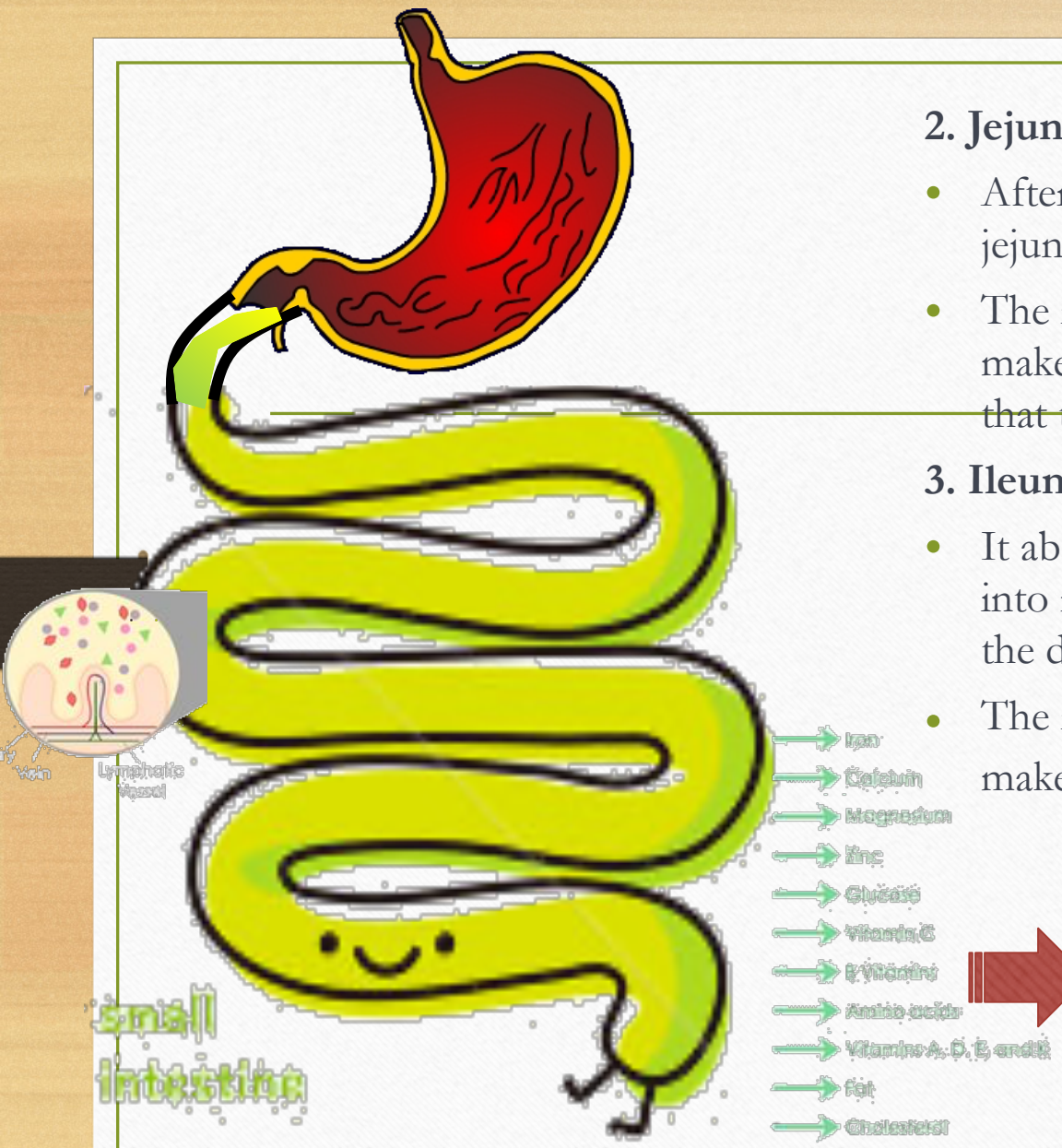
- Amylase breaks down carbohydrates (starch) into sugars which are more easily absorbed by the body. This enzyme is also found in saliva.
- Proteases break down proteins. They help keep the intestine free of parasites such as bacteria, yeast and protozoa.
- Lipase works with bile from the liver to break down fat molecules so they can be absorbed and used by the body

Pancreatic Amylase

Pancreatic Protease

Pancreatic lipase & bile





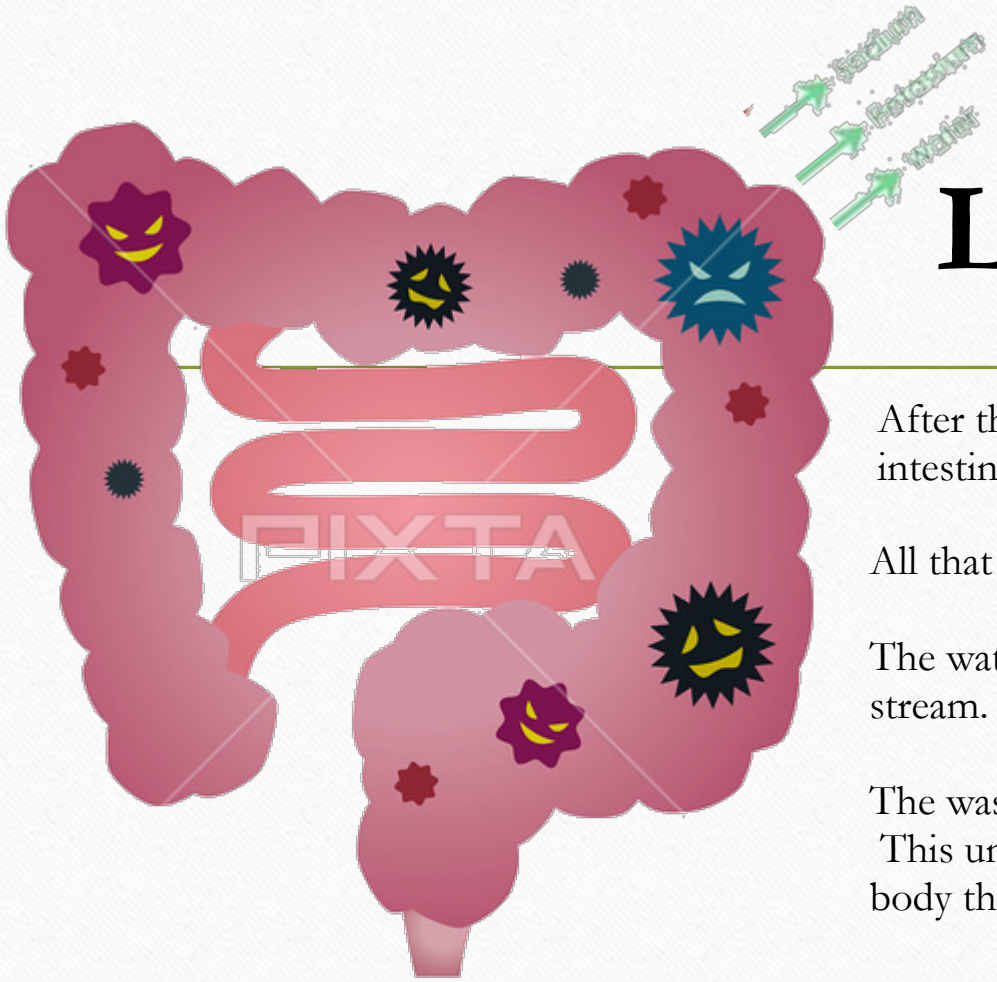
2. Jejunum

- After food is broken down in the duodenum, it moves to the jejunum, where the inside walls absorb the food's nutrients.
- The inside walls of the jejunum have many circular folds, which make its surface area large enough to absorb all of the nutrients that the body needs.

3. Ileum

- It absorbs bile acids, which are returned to the liver to be made into more bile, then stored in the gallbladder for future use in the duodenum.
- The ileum also absorbs vitamin B_{12}, which the body uses to make nerve cells and red blood cells.

1. Completes the digestion of all the large molecules (starch, proteins and fats) to small molecules.
2. Absorbs the nutrients into the bloodstream..



Large intestine (colon)

After the small intestine, the remains of any undigested food travel to the large intestine.

All that is left of the food is water and waste material.

The water is valuable and so is absorbed in the large intestine into the blood stream.

The waste material cannot be digested or used by the body.
This undigested waste travels to the rectum where it is stored until leaving the body through the anus.