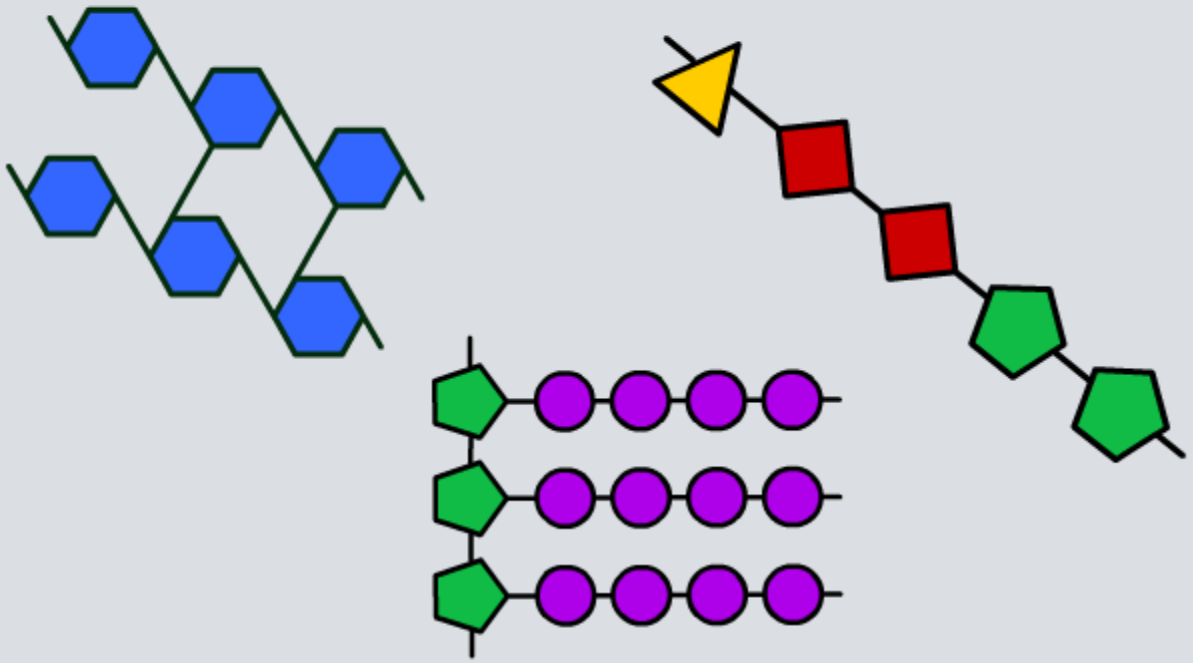
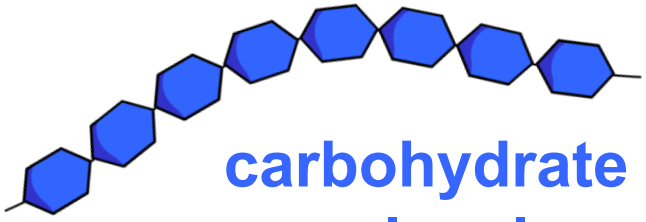
Chemical Digestion

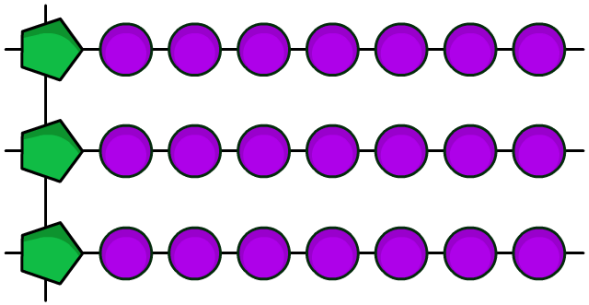


What is digestion?

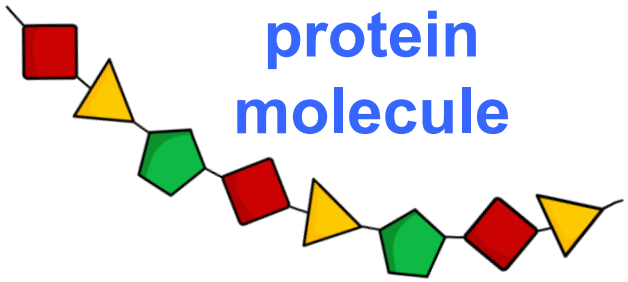
The body carries out **digestion** of food to convert large insoluble food molecules into smaller soluble ones.



carbohydrate molecule



fat molecule

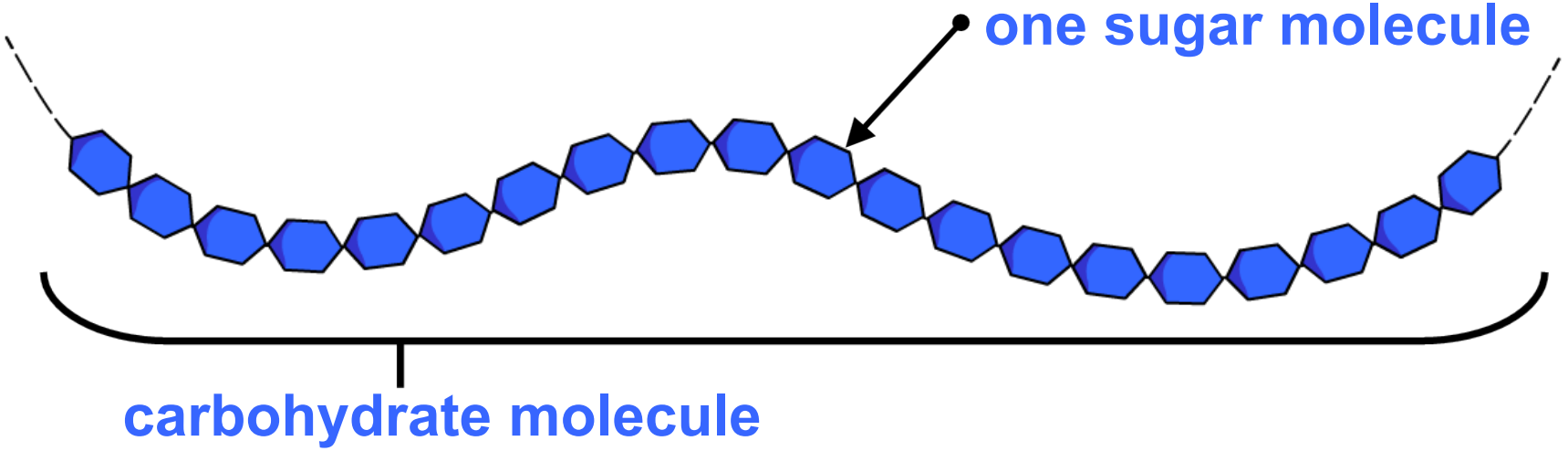


protein molecule

Large food molecules cannot pass through the walls of the small intestine. Small food molecules can do this when dissolved in the bloodstream. Why is this important?

What are carbohydrates?

Starchy foods contain **carbohydrates**, which are made of long chains of identical, small sugar molecules.

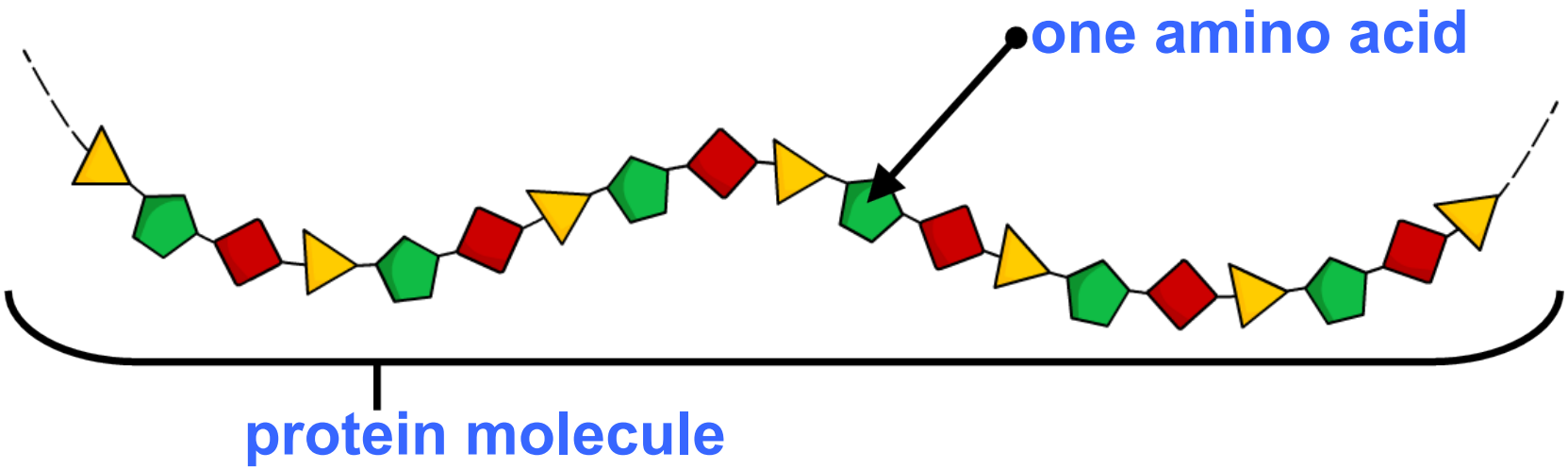


The body breaks down long chains of carbohydrates into the smaller sugar molecules.

These small sugar molecules are used by the body to release **energy** and make the body work.

What are proteins?

Proteins, like carbohydrates, are made of long chains of small molecules. In proteins, these small molecules are **not** identical.

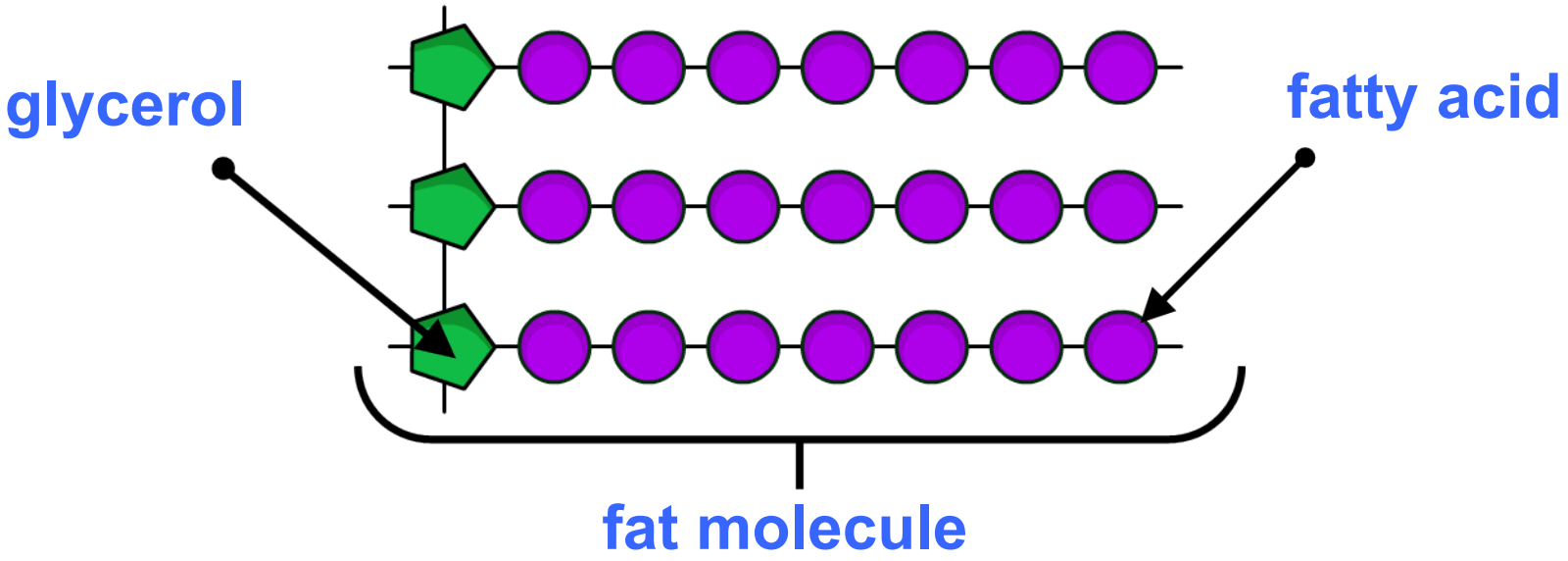


Proteins are made up of chains of small molecules called amino acids. There are over 20 different kinds of amino acid.

Proteins are used by the body for growth and repair.

What are fats?

Fats are made up of fat molecules, which contain fatty acids and glycerol.

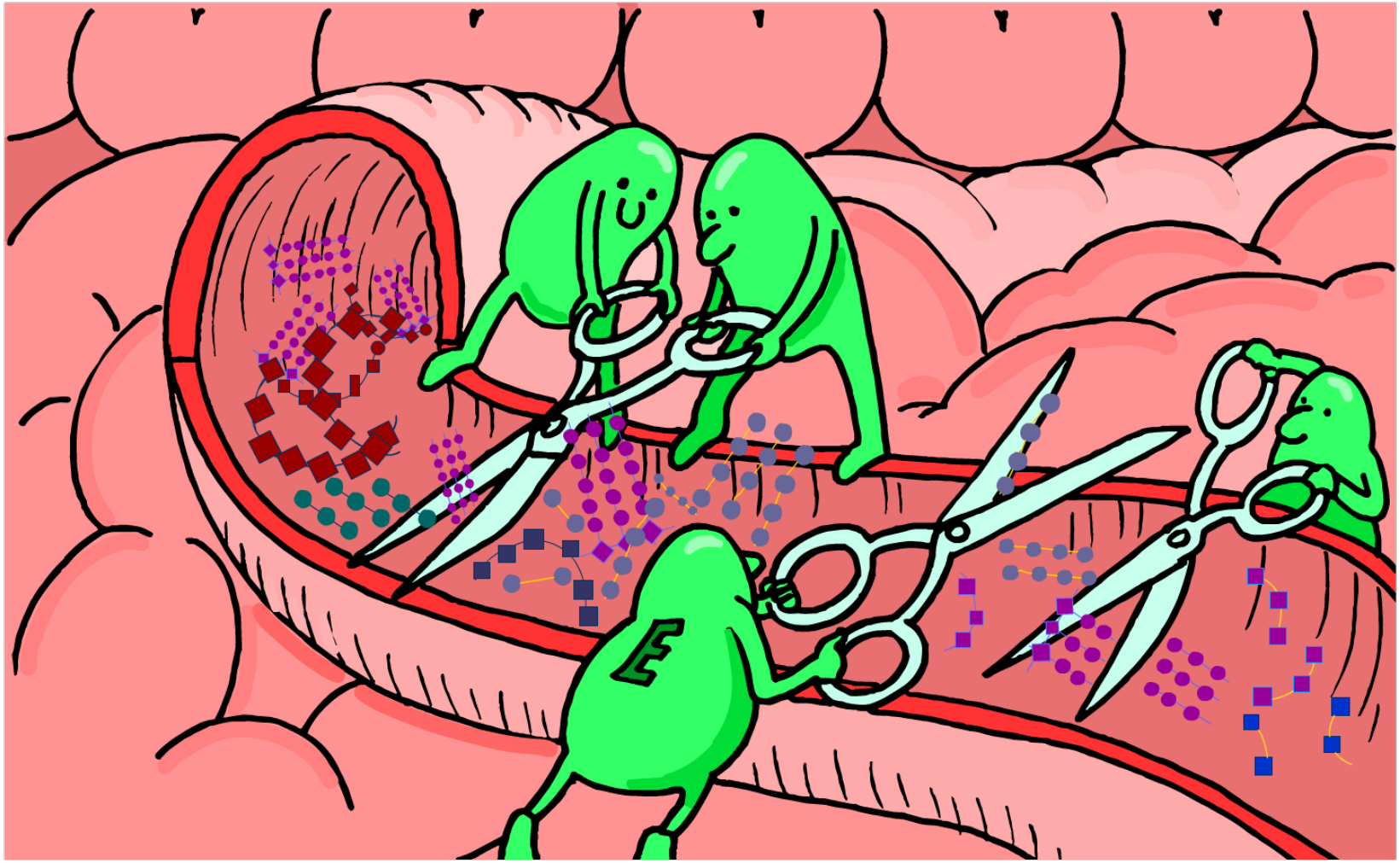


Fat molecules have to be broken down by the body so that they can be used for energy storage.

Fats are also used by the body to keep heat in and to make cell membranes.

Digestive enzymes

How do digestive enzymes help the process of digestion?

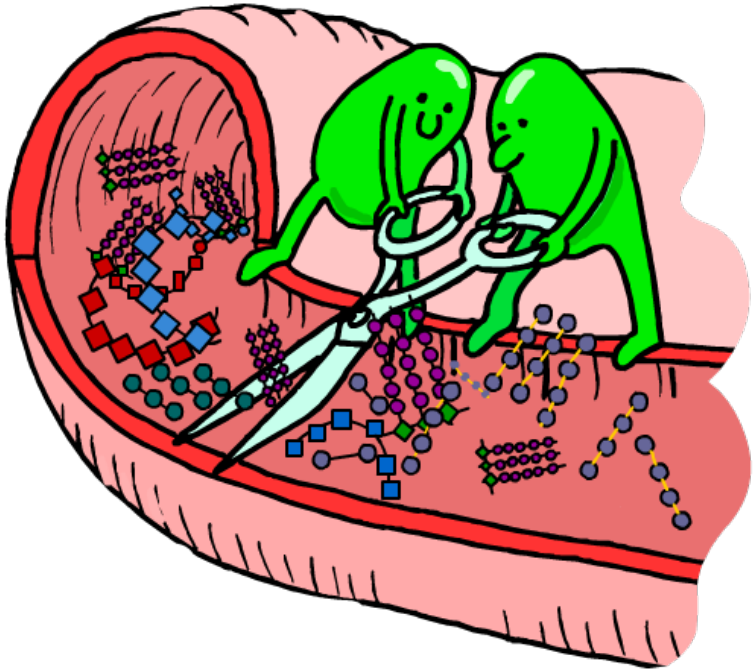


Different types of digestive enzymes

Digestive enzymes are the chemicals that break large insoluble food molecules into smaller soluble molecules.

Digestive enzymes are classified by the type of food that they affect; there are three main types:

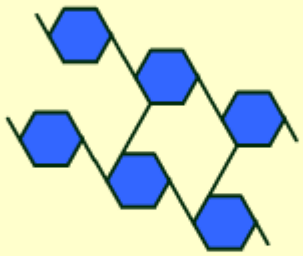
- **carbohydrase** – breaks carbohydrate into smaller sugars
- **protease** – breaks protein into amino acids
- **lipase** – breaks fat into fatty acids and glycerol.

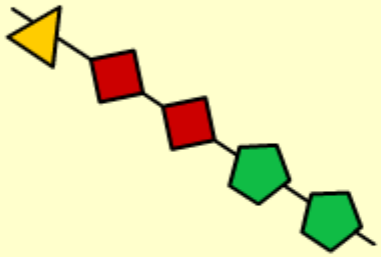


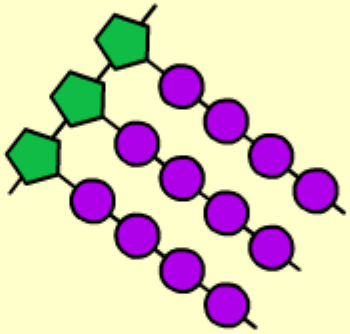
How do enzymes work?

Which enzymes break down each nutrient?

Carbohydrates, proteins and fats are broken down by different enzymes during digestion.







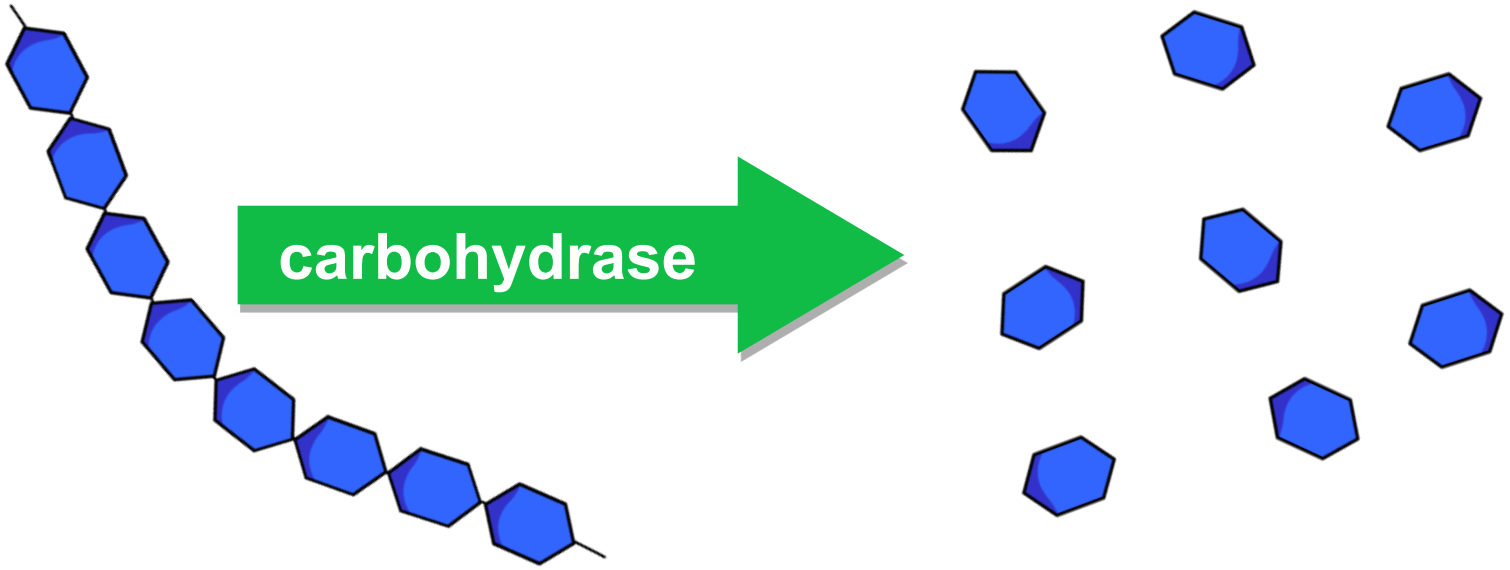
Choose a nutrient to see how its digestive enzyme works.

starch | protein | fat

Carbohydrate digestion

Carbohydrates are chains of identical sugar molecules.

The digestive enzyme called **carbohydrase** breaks the chemical bonds between the individual sugar molecules in each carbohydrate chain.



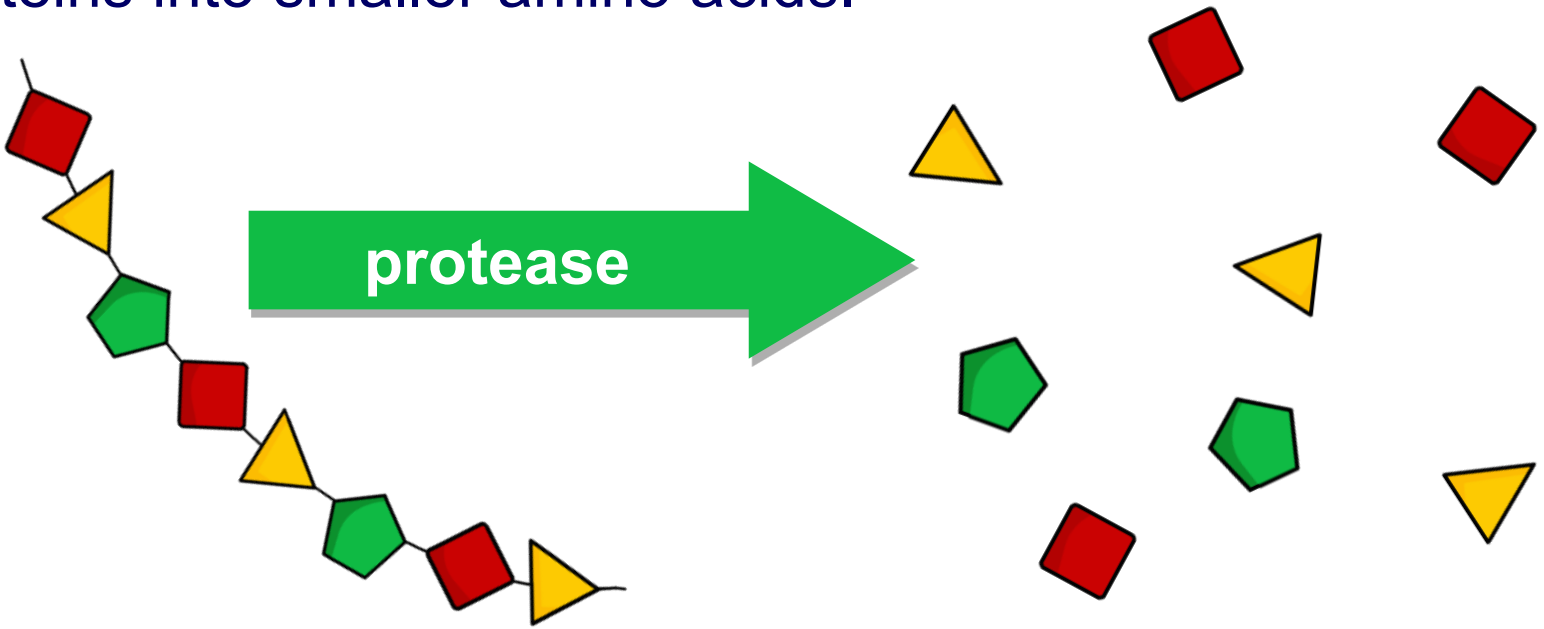
long carbohydrate molecule

sugar molecules

Protein digestion

Proteins are made up of amino acids. There are over 20 different types of amino acids.

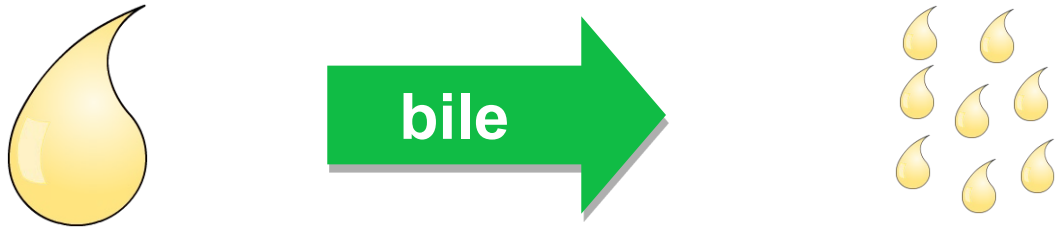
Proteins are digested by digestive enzymes called **proteases**. These enzymes work in an acidic environment to break proteins into smaller amino acids.



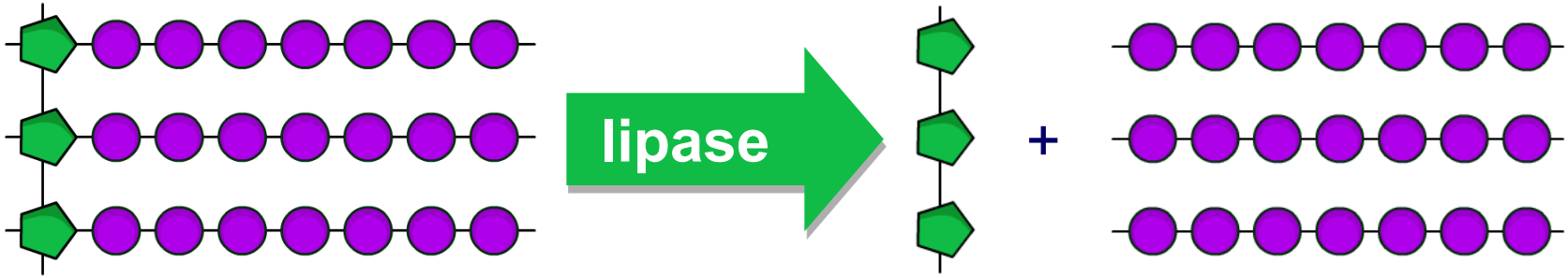
Fat digestion

Fats are digested in two stages.

First, **bile** (released by the gall bladder) allows the fat to 'mix' with water by breaking the fat into smaller droplets. This is called **emulsification**.



Second, the digestive enzyme **lipase** breaks each fat molecule into the smaller glycerol and fatty acid molecules.



fat molecule glycerol fatty acids

Which enzyme?

Match each type of digestive enzyme to its action

carbohydrase	breaks protein into amino acids
protease	breaks fat into glycerol and fatty acids
lipase	breaks carbohydrate into sugar molecules

?

solve