

# KS3 Biology



## 8A Food and Digestion





## 8A Food and Digestion

- **A balanced diet**
- **The digestive system**
- **Digestive enzymes**
- **Summary activities**



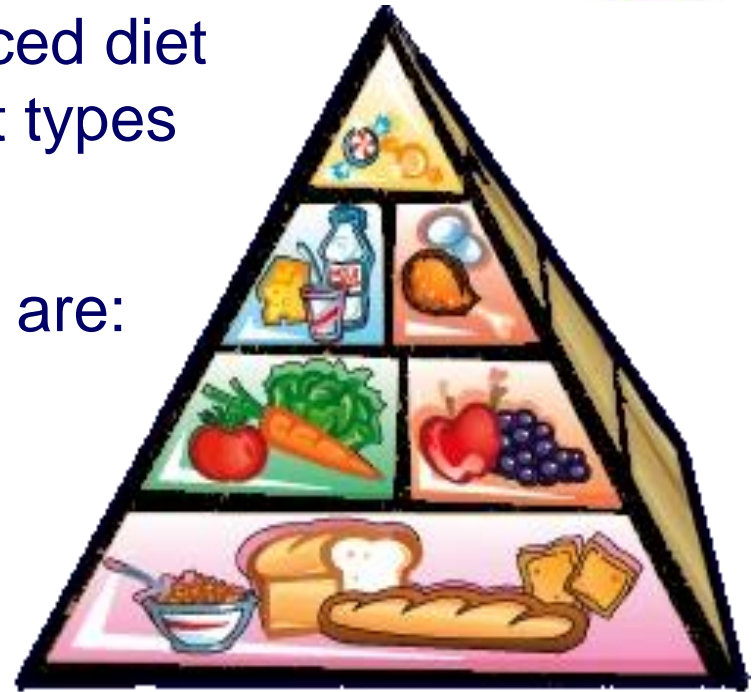


# Why do we need food?

Humans need to consume a balanced diet which contains a variety of different types of food.

The main nutrients the body needs are:

- **carbohydrates** for energy;
- **proteins** for growth and repair;
- **fats** to store energy;
- **vitamins** and **minerals** to keep the body healthy.










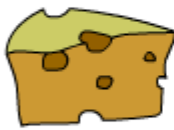








The amount of each food type needed is related to the proportions in the food pyramid.

Which food type does the body need the most of?





## Which foods are rich in each nutrient?






|   |   |  |   |   |  |   |
|---|---|--|---|---|--|---|
| pasta<br>    | butter<br> | fish<br>  | steak<br>         | broccoli<br> | bran cereal<br> | bananas<br>    |
| cheese<br>   | carbohydrates   |  |   |   |  | soya beans<br> |
| carrots<br> | bread<br> | eggs<br> | baked potato<br> | oranges<br> | peanuts<br>    | water<br>     |

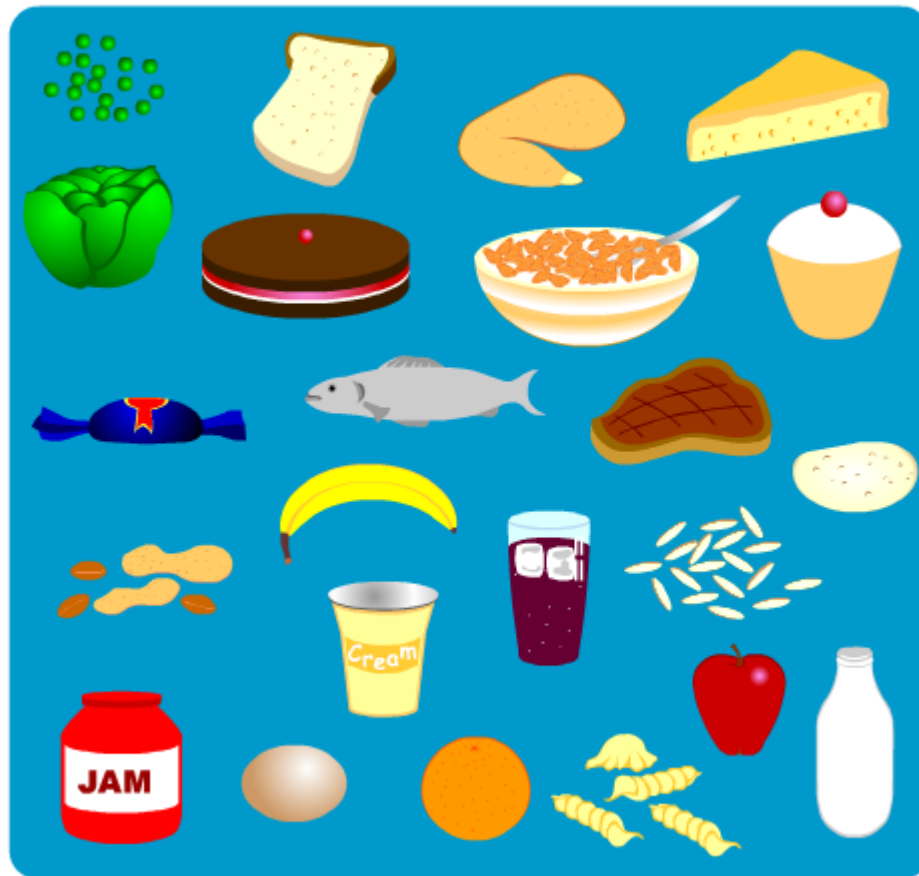
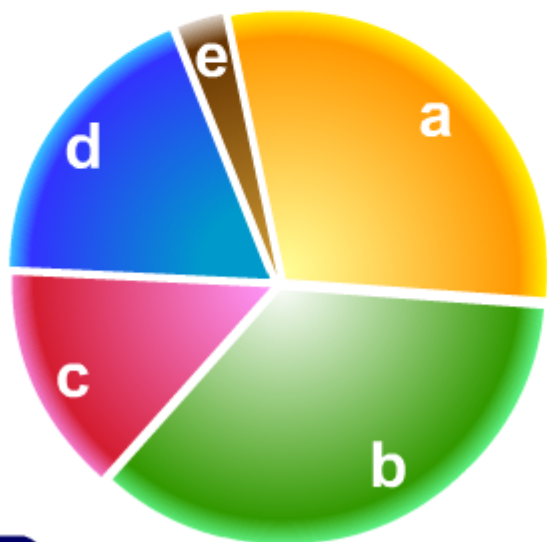




## What foods make up a balanced diet?

## Key

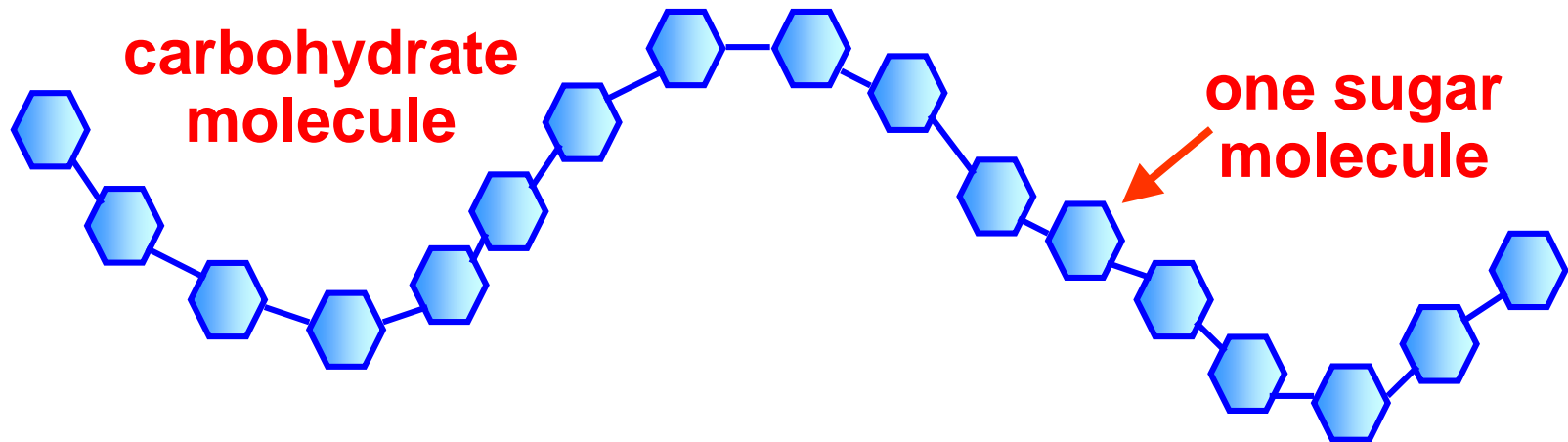
- a  Food for energy
- b  Fruit and vegetables
- c  Dairy foods
- d  Food for growth
- e  High energy foods





# What are carbohydrates?

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



The long chains of carbohydrates are broken down into the smaller sugar molecules by the body.

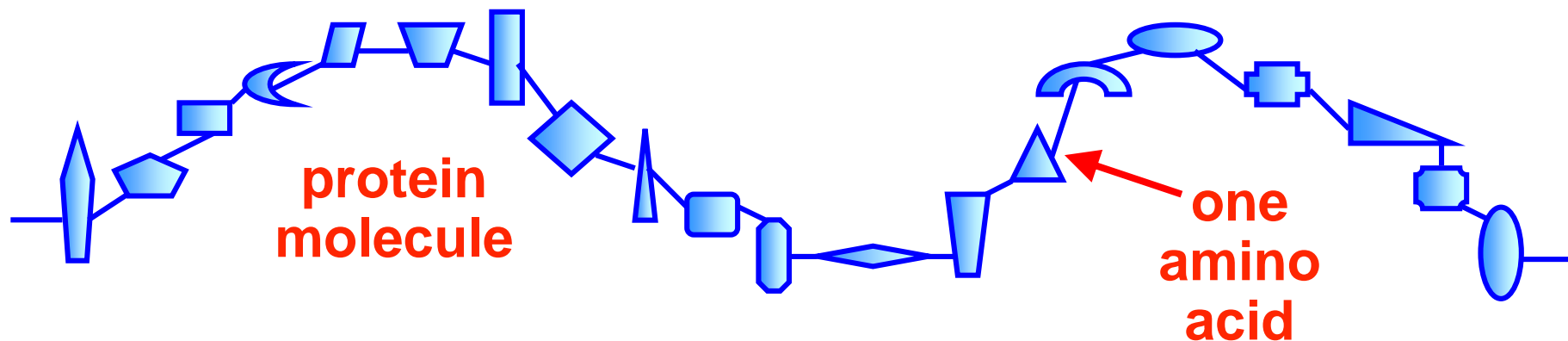
The small molecules from carbohydrates are used by the body to release **energy** and make the body work.





# 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.

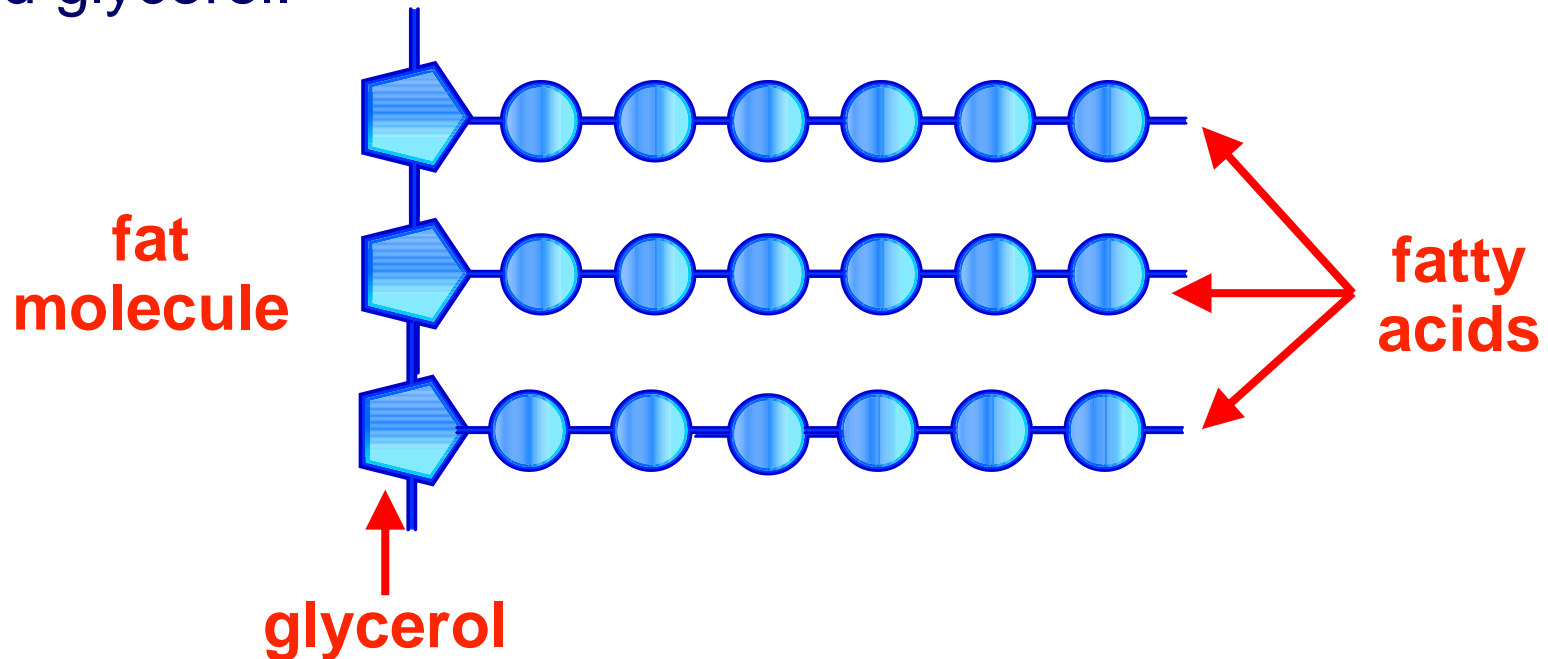
Proteins are used by the body for **growth and repair**.





# 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.







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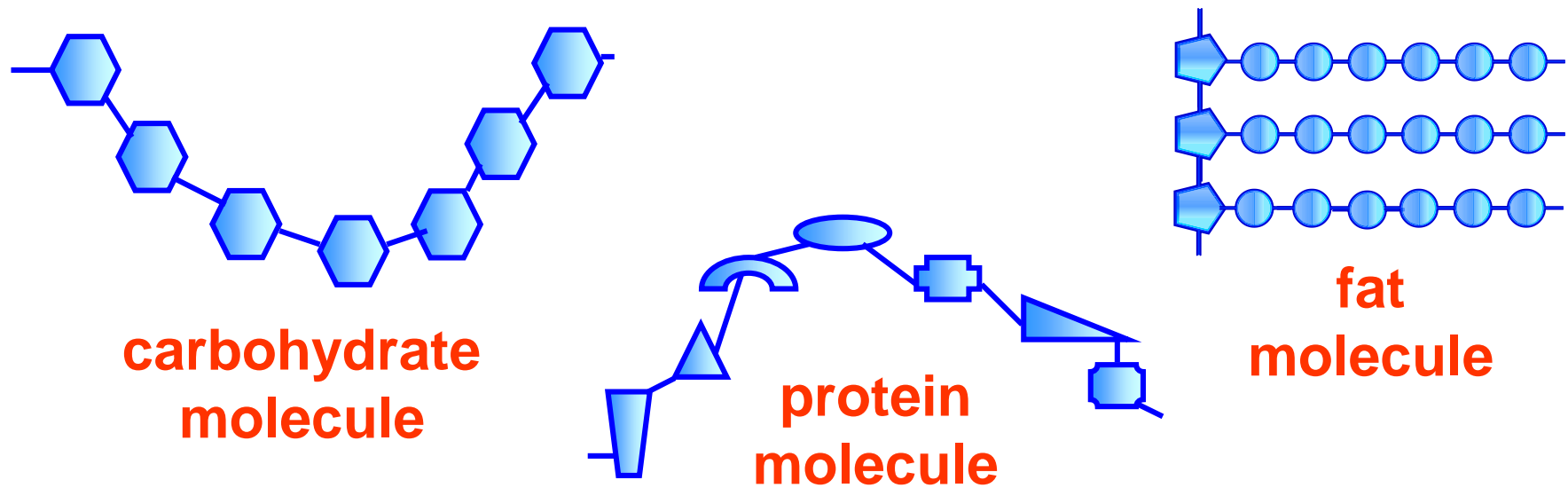
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# What is digestion?

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



Small food molecules can pass through the walls of the small intestine and then dissolve into the blood stream. Large food molecules cannot do this.

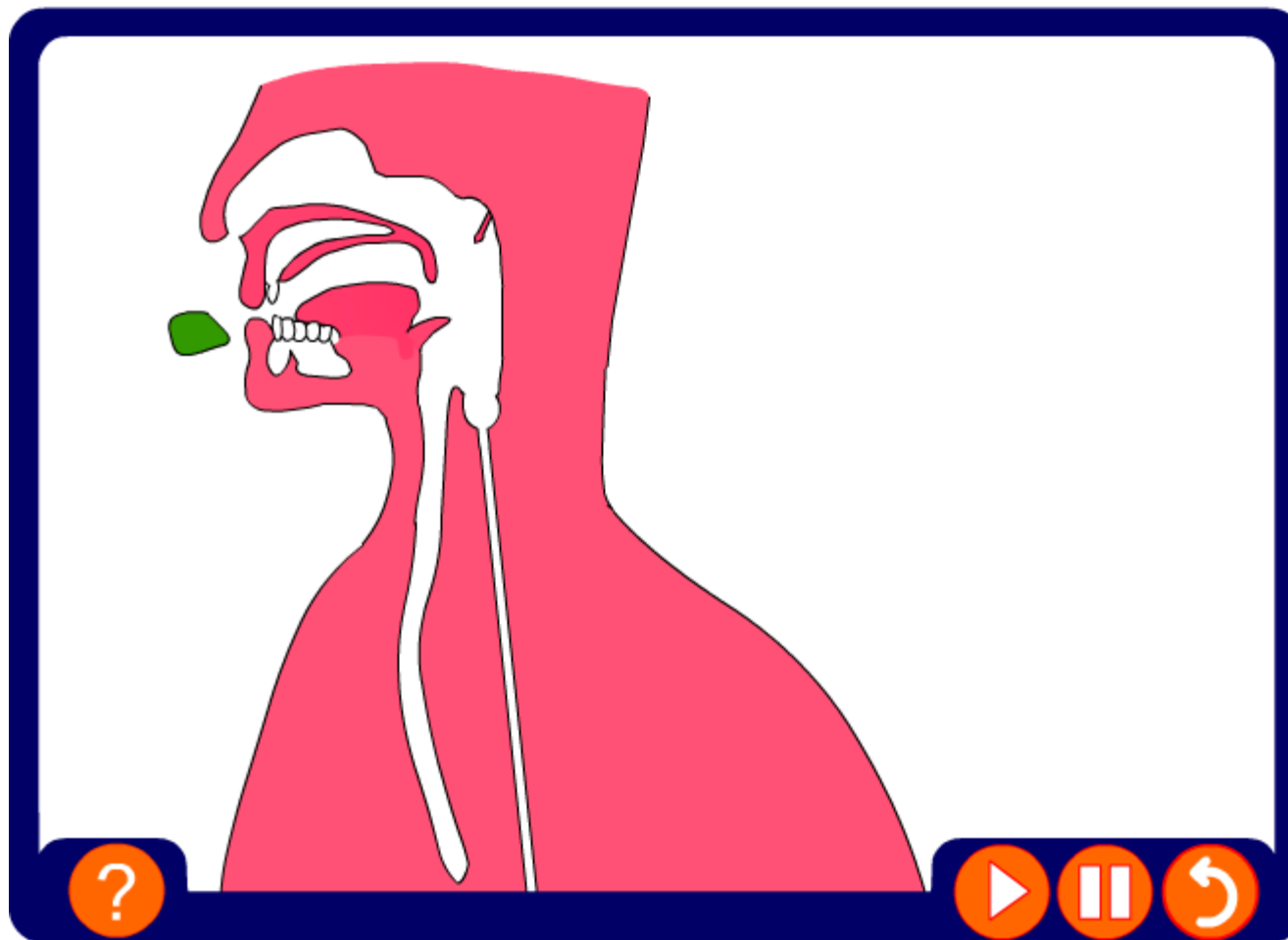


# Mechanical digestion



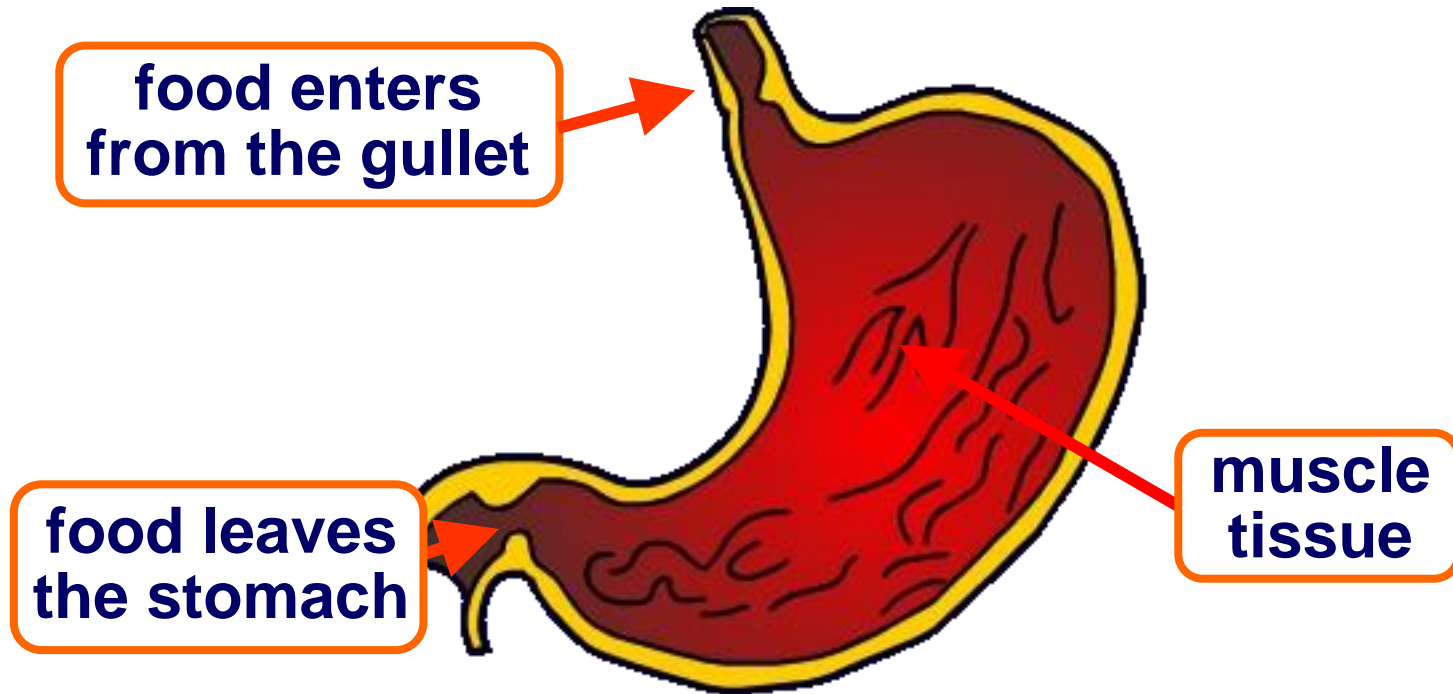
board  
works

Digestion begins in the mouth where food is broken down by the teeth. This is called **mechanical breakdown**. The small parts of food are mixed with saliva and swallowed.





After food is swallowed it enters the stomach, which is basically a muscular bag filled with hydrochloric acid.



Two things happen to food in the stomach:

- the chemical breakdown of food begins;
- microbes are destroyed.

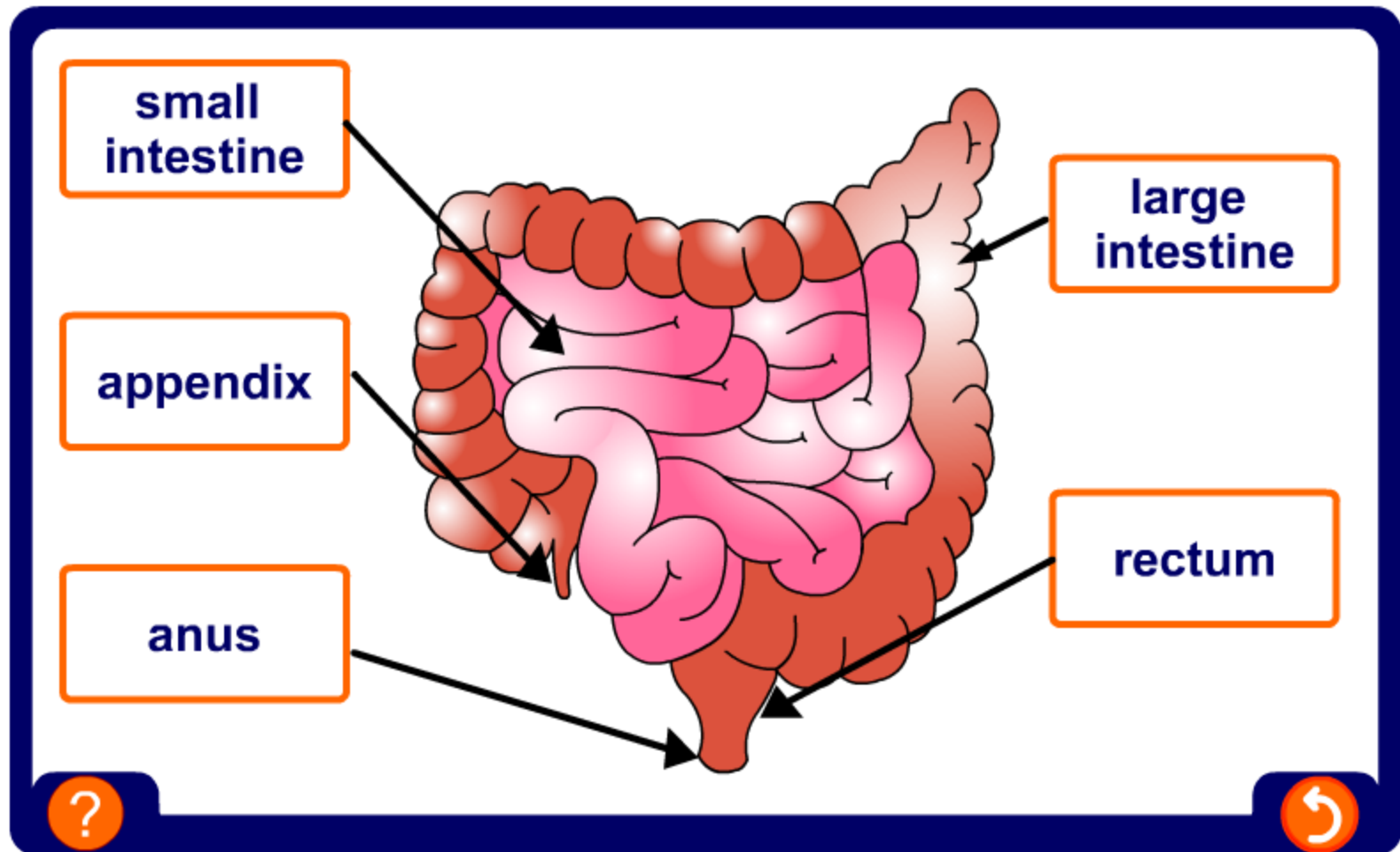




# The small intestine



From the stomach, food enters the small intestine where digestion is completed and the small digested food molecules are absorbed into the bloodstream.

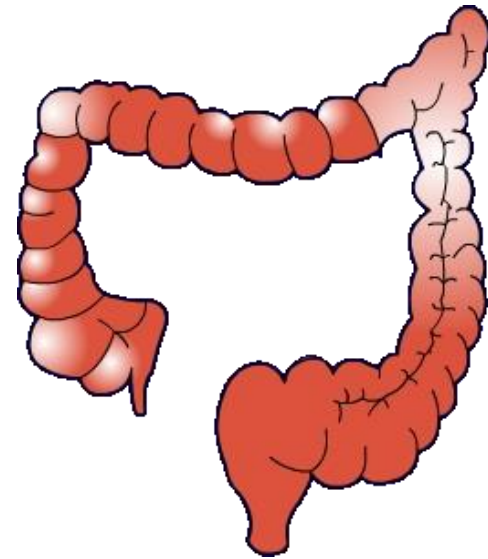




# The large intestine

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.





# Digestion summary



molecules of food into small molecules of food.

The large molecules that we start with are insoluble which means they cannot dissolve in water.

The small molecules produced by digestion are soluble which means they can dissolve in water. These molecules need to be small and soluble so that they can pass through the lining of the small intestine and into the blood.



Well done!







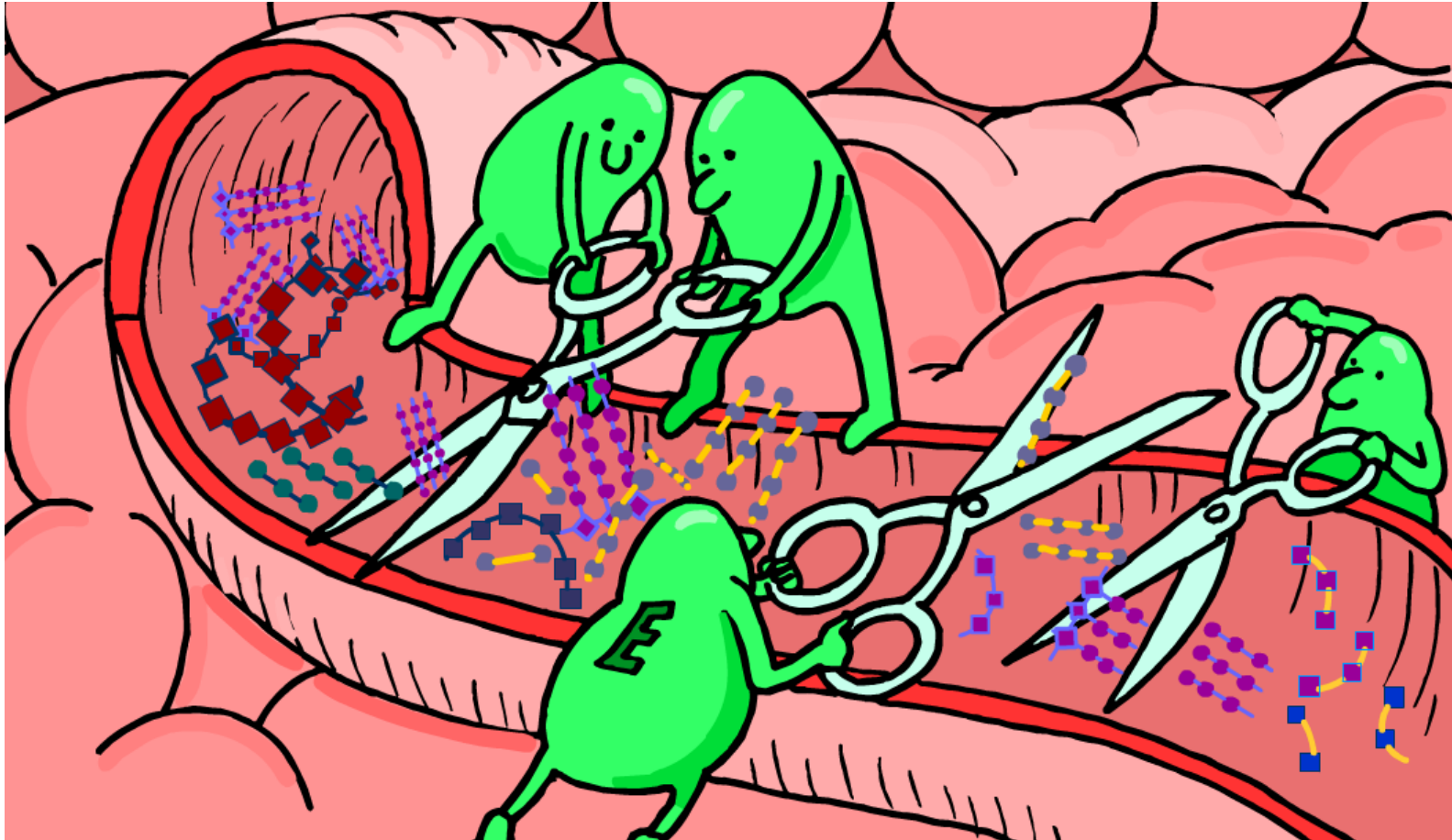
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How do **digestive enzymes** help the process of digestion?



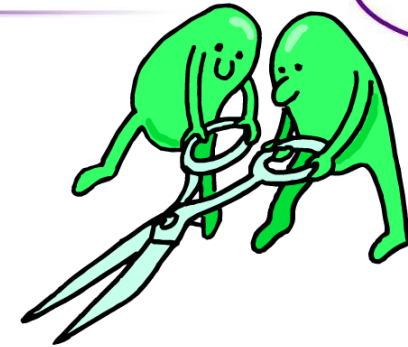
**Digestive enzymes** are the chemicals that **break** large insoluble food molecules into smaller soluble molecules.





# 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, so 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 does a digestive enzyme work?



..."cuts" off one of the sugar molecules  
that the carbohydrate is made of.

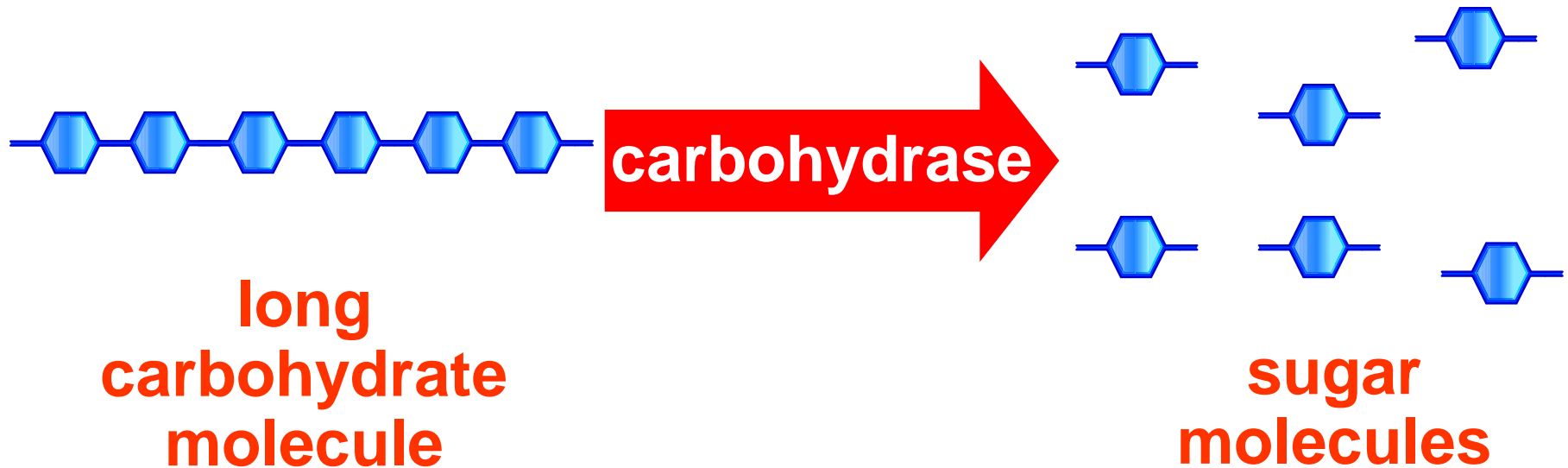




# Enzymes and carbohydrate digestion

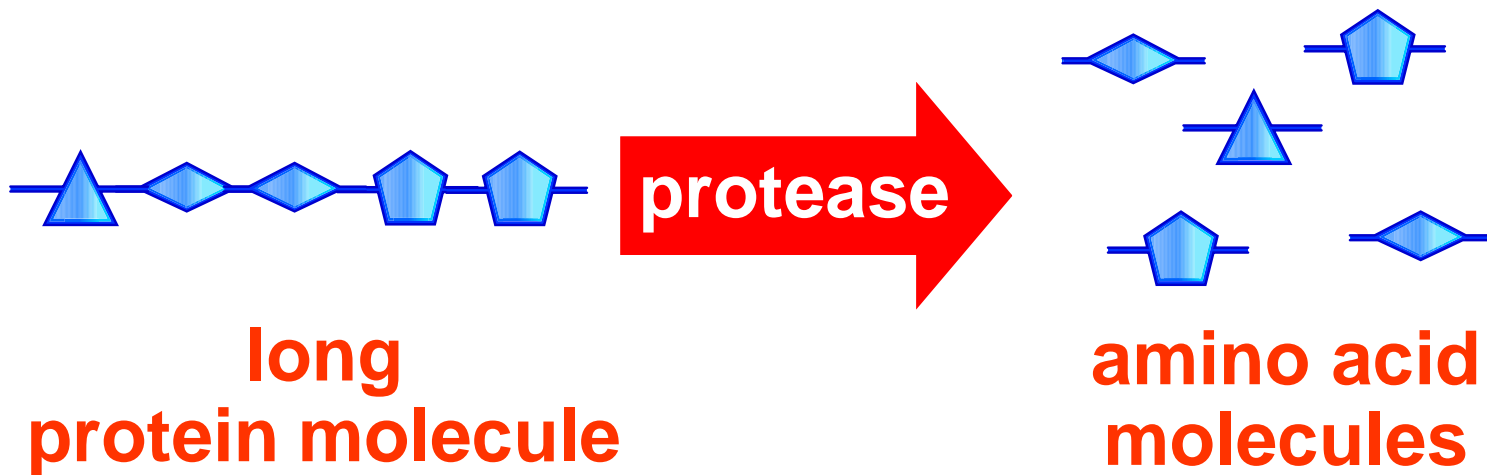
Carbohydrates are chains of **identical** sugar molecules.

The digestive enzymes called **carbohydrases** break the chemical bonds between the individual sugar molecules in each carbohydrate chain.



Proteins are made up of **amino acids**. There are 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.



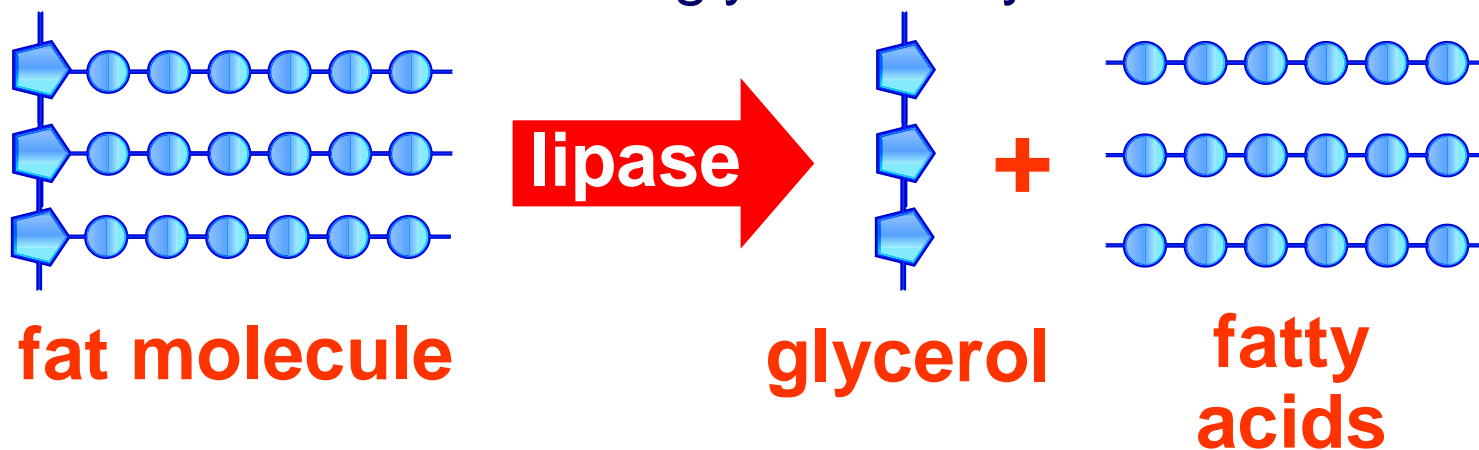


Fats are digested in two stages:

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



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







What does each type of digestive enzyme do?

**carbohydrase** =

breaks carbohydrate  
into  
sugar molecules

**lipase** =

breaks fat  
into glycerol and  
fatty acids

**protease** =

breaks protein  
into  
amino acids



**solve**





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- **carbohydrate** – A nutrient in food that provides energy.
- **enzyme** – A chemical that helps digestion by breaking large molecules into smaller ones.
- **fat** – A nutrient in food that provides a store of energy.
- **large intestine** – The organ where water is removed from undigested food.
- **minerals** – Compounds in food that provide the elements needed in small amounts for a healthy diet.
- **protein** – A nutrient in food needed for growth and repair.
- **small intestine** – The organ where digestion is completed and digested food molecules are absorbed.
- **stomach** – The organ where food is mixed with acid and enzymes.
- **vitamins** – Substances found in food that are needed in small amounts for health.





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**12)** What type of chemicals are involved in **fat digestion**?

**A)** protease and lipase

**B)** carbohydrase and lipase

**C)** bile and protease

**D)** bile and lipase



**Well done!**

