Digestion is a process that allows us to break down the food we eat into smaller nutrients that can be used by the body.

The three types of nutrients involved in the digestive process are:

1. **Carbohydrates**
2. **Proteins**
3. **Fats (lipids)**

Digestion can occur **mechanically or chemically**.

Mechanical digestion is the process of **physically breaking down** the food we eat into smaller pieces.

* Mechanical digestion occurs in the mouth by the process of chewing (mastication). This process uses the teeth to tear and grind food.
* The stomach performs mechanical digestion by the process of churning. This process occurs because of the smooth muscle in the stomach walls.
* The liver produces bile which contains bile salts which physically break down (emulsify) fats in the small intestine.

Chemical digestion is the process of using **chemicals (biological enzymes)** to alter the composition of molecules so that they are able to be absorbed.

Some common enzymes include:

|  |  |
| --- | --- |
| **Enzyme Type** | **Nutrient group it acts on** |
| Amylase | Carbohydrates |
| Protease | Proteins |
| Lipase | Fat/lipids |

Enzymes break down molecules into their simplest form before absorption can occur:

|  |  |
| --- | --- |
| **Nutrient** | **Simplest form** |
| Carbohydrate | Glucose |
| Protein | Amino acid |
| Fats | Fatty acid and glycerol |

**Carbohydrates** are broken down into glucose in the flowing places:

|  |  |
| --- | --- |
| **Location** | **Enzyme present** |
| Mouth | Salivary amylase |
| Small intestine | Pancreatic and Intestinal amylase |

**Proteins** are broken down into amino acids in the following places:

|  |  |
| --- | --- |
| **Location** | **Enzyme present** |
| Stomach | Gastric protease |
| Small intestine | Pancreatic and Intestinal protease |

**Fats/lipids** are broken down into fatty acids and glycerol in the following places:

|  |  |
| --- | --- |
| **Location** | **Enzyme present** |
| Small intestine | Pancreatic and Intestinal lipase |

1. Join each enzyme to the nutrient it breaks down. Then join each nutrient to the simplest form it breaks down into.

(breaks down ->) (to become ->)

Amylase Fats Amino Acids

Protease Protein Fatty Acids

Lipase Carbohydrates Glucose

1. Classify each of the organs as being involved with mechanical digestion, chemical digestion, both types of digestion or neither type of digestion.
   1. Mouth
   2. Oesophagus
   3. Stomach
   4. Small Intestine
   5. Liver
   6. Pancreas
   7. Large Intestine
   8. Rectum
2. Describe the structure and features of the mouth that make it effective at mechanical digestion.
3. Foods of different nutrient type are digested in different organs of the digestive tract.
   1. Where would a piece of bread begin to break down due to chemical digestion? Explain your choice.
   2. Where would a lean (fat free) piece of chicken begin to break down due to chemical digestion? Explain your choice.
   3. Where would butter begin to break down due to chemical digestion? Explain your choice.
4. Taking your time to chew food can aid in digestion. Describe two reasons why.
5. Chewing a piece of bread for 3 minutes changes its taste, it becomes sweeter. Why?
6. Ibuprofen is the main ingredient in Nurofen, a pain relief medication. Ibuprofen is known to cause irritation in the lining of the stomach. Nurofen has a carbohydrate coating around the ibuprofen. Explain why a carbohydrate coating helps avoid irritation in the stomach.
7. Medicines like Panadol and Nurofen offer pain relief for 4-6 hours. The tablets are filled with many smaller pellets. Each pellet has a different thickness of outer coating, with the active ingredient held inside.

Outer coating

Active ingredient

Suggest a reason why the coatings need to have different thicknesses.