The Digestive System

What do you know?

What do you want to learn?

<table>
<thead>
<tr>
<th>KNOW</th>
<th>WANT TO LEARN</th>
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<tbody>
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</table>
**Digestion is the chemical breakdown of food into simpler compounds that are usable by the body.**

There are 4 steps to digestion:

<table>
<thead>
<tr>
<th>Ingestion</th>
<th>taking food in (eating, chewing, swallowing)</th>
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</thead>
<tbody>
<tr>
<td>Digestion</td>
<td>breaking down the food into smaller compounds</td>
</tr>
<tr>
<td>Absorption</td>
<td>transporting the small particles into the rest of the body</td>
</tr>
<tr>
<td>Elimination</td>
<td>getting rid of wastes</td>
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**Two Types of Digestion**

**Mechanical Digestion (Physical)** - takes place when the food is chewed, mixed and churned. Food molecules are broken down

**Chemical Digestion** - occurs when chemical reactions occur that break down large molecules of food into smaller ones. Food molecules changed to a new form
Enzymes are chemicals that speed up the rate of chemical change.

Saliva, for example, contains the enzyme amylase which helps break down carbohydrates in your mouth.
Read section 10:1 in the text on pages 204-206. Answer the following questions.

1. Why does food need to be digested?
2. How is the digestive system related to a factory? Draw a diagram or flow chart to help explain.
3. Explain how an enzyme can help chemical changes take place.
4. Create a Venn Diagram comparing and contrasting physical and chemical digestion.
5. Why must bread (carbohydrates) be digested and not used directly by the body? Do you think that the other nutrients need to be broken down as well? Which ones?

Your digestive system has two parts - the digestive tract and accessory organs.

**Digestive Tract**
- Mouth (Oral Cavity)
- Pharynx (throat)
- Esophagus
- Stomach
- Small intestine
- Large intestine
- Rectum
- Anus

**Accessory Organs**
- Tongue
- Salivary glands
- Liver
- Gall bladder
- Pancreas
Digestive Tract

Mouth (Oral Cavity) - mechanical digestion and chemical digestion
Pharynx (throat)
Esophagus
Stomach
Small intestine
Large intestine
Rectum
Anus
What happens in the mouth / oral cavity?

1. **Mechanical digestion** of all food
   - teeth chewing and grinding
   - tongue mixes and shapes)

2. **Chemical digestion** begins with saliva secreted from three pairs of salivary glands.
   a) Saliva wets the food to help it pass along the esophagus, and also causes the food particles to stick together to form a food mass or **BOLUS**.
   b) Saliva contains the enzyme **AMYLASE** which helps break down carbohydrates (sugars and starch)
3. Once food is chewed the tongue pushes it to the back of the throat or pharynx. This starts the automatic swallowing reflex.
**Esophagus**

The tube connecting mouth to stomach

**Peristalsis** (Muscles push the food to the stomach)

Takes about 1 minute for food to get to stomach

**Digestive Tract**

Mouth (Oral Cavity)  
Pharynx (throat)  
Esophagus  
**Stomach**  
Small intestine  
Large intestine  
Rectum  
Anus
Stomach

A bag-like muscular organ.
Holds about 1 litre of liquid and food.

Mechanical Digestion - food is mixed together

Chemical Digestion - The lining of the stomach secretes gastric juice. This contains the enzyme PEPSIN and HYDROCHLORIC ACID which begin the breakdown of protein.

Food stays in the stomach for about 4 hours

The stomach lining also produces a mucous lining which protects it against the hydrochloric acid.

If the mucous lining is damaged the hydrochloric acid can eat away at the stomach causing an ulcer.
Digestive Tract

Mouth (Oral Cavity)  
Pharynx (throat)  
Eosophagus  
Stomach  
**Small intestine**  
Large intestine  
Rectum  
Anus

Small Intestine

Most **chemical digestion** occurs here as well as some **physical digestion**.

A long, hollow tube. Called "small" because of its diameter, it is very long (about 7m)
• pancreas: makes enzymes that help to break down nutrients
• liver: makes bile (a green liquid that breaks large fat droplets into small fat droplets)
• gallbladder: stores the bile that the liver made until the small intestine needs it

Oct 4-8:30 AM

Small Intestine

Absorption of nutrients occurs in the small intestine.
• Our food is now in the proper broken down (digested) form for our body to use.
• The circulatory system can now jump in and deliver the nutrients to the rest of our bodies cells.

Food spends about 12 hours inside the small intestine.
The inside of the small intestine has small finger-like projections on it called **villi**.

These increase the surface area, so that much more digested food can pass through the wall of the small intestine into the bloodstream.

There are very tiny blood vessels called **capillaries** inside these villi.

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**How is digestion taking place in the small intestine?**

<table>
<thead>
<tr>
<th>Chemical Digestion</th>
<th>Physical Digestion</th>
</tr>
</thead>
<tbody>
<tr>
<td>fats: enzyme lipase</td>
<td>bile emulsifies fat (breaks large molecules into smaller molecules)</td>
</tr>
<tr>
<td>protein: enzyme protease</td>
<td></td>
</tr>
<tr>
<td>carbohydrates: enzyme amylase</td>
<td></td>
</tr>
</tbody>
</table>
**Digestive Tract**

Mouth (Oral Cavity)  
Pharynx (throat)  
Esophagus  
Stomach  
Small intestine  
**Large intestine**  
Rectum  
Anus

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**Large Intestine**

Food spends about 5 hours in the large intestine.

- Another tube, also called the **colon**.
- Called large because of it's diameter.
- It is only about 1.5m long (much shorter than the small intestine).
The main job is not chemical or mechanical digestion, but to remove water from undigested food and return it to the bloodstream.

Elimination is the last stage in digestion

- The last section of the large intestine is called the rectum.
- Undigested food leaves here as solid waste through the anus

The Magic School Bus: Digestion
Read pages 208 - 212 and 214 - 217 (Omit the section on digestion in other animals). Answer the following questions:

1. Explain the path food must take before it reaches the stomach. Tell what chemical and physical digestion takes place.
2. If the accessory organs were to stop functioning how effective do you think the digestive system would be?
3. Why must food spend so much time in the small intestine?
4. How does increased surface area make absorption more efficient?
5. Using a full sheet of paper, create the Idea Map on page 212 for use as a study guide. Be neat and incorporate colour!