

B7 - Human Nutrition

B7.1 – Diet

- ✓ **Balanced diet** — A balanced diet contains all of the nutrients needed in the right proportions to stay healthy

B7.1.2

	Principal dietary sources	Role
Proteins	Eggs, milk, dairy (cheese, yoghurt), meat, fish , legumes (peas, beans), nuts and seeds	Broken down to make amino acids ; used to form other proteins needed by cells, including enzymes
Carbohydrates	Rice, bread, potatoes, pasta	Broken down to simple sugars for use in respiration ; releases energy in cells and enables life processes
Fats and oils	Meat, oil, dairy , (butter, cheese), nuts, avocado, oily fish	Deposited in many parts of the body, including just below the skin; some helps maintain body temperature; store of energy to supply molecules of respiration if the diet does not contain enough energy
Fibre (roughage)	Leafy vegetables (cabbage, wholegrain wheat)	Adds bulk to food so that it can be easily moved along the digestive system by peristalsis; prevents constipation and bowel cancer
Water	-	Subtopic 1

- ★ Vitamins and mineral ions (needed in tiny amounts for correct functioning of the body)

	Principal dietary sources	Role	Deficiency disease
Vitamin C	Raw fruit and vegetables; citrus fruit, green vegetables, potatoes	For healthy skin, teeth and gums , and keeps lining of blood vessels healthy	Scurvy (bleeding gums and wounds do not heal properly)
Vitamin D	Fish, egg , liver, cheese and milk	For strong bones and teeth	Rickets (softening of the bones)
Calcium	Milk and eggs	Needed for strong teeth and bones , and involved in the clotting of blood	Rickets (softening of the bones)
Iron	Red meats , liver and kidneys, leafy green vegetables (spinach)	Needed to make haemoglobin in red blood cells	Anaemia (reduction in number of red blood cells, person soon becomes tired and short of breath)

B7.3 Digestion

- 1 Describe physical digestion as the breakdown of food into smaller pieces without chemical change to the food molecules
- 2 State that physical digestion increases the surface area of food for the action of enzymes in chemical digestion
- 3 Describe chemical digestion as the breakdown of large insoluble molecules into small soluble molecules
- 4 State the role of chemical digestion in producing small soluble molecules that can be absorbed

Physical digestion

Increases **surface area** (smaller pieces) of molecules, important for **enzyme action** in chemical digestion

Breakdown of food into smaller pieces without chemical change to the food molecules

mouth stomach

Chemical digestion

Produces small soluble molecules that **can be absorbed**

The breakdown of large insoluble molecules to small soluble molecules

★ Functions of enzymes

chemical

Enzyme	Where produced	Where it acts	Substrate	Products
Amylase 	Salivary glands (mouth) Pancreas	Mouth Small intestine (duodenum)	Starch	Simple reducing sugars
Protease 	Stomach wall Pancreas	Stomach	Proteins	Amino acids
Lipase 	Pancreas	Small intestine (duodenum)	Fats and oils (lipids)	Fatty acids and glycerol

• Functions of hydrochloric acid in gastric juices

Providing an acidic pH for optimum enzyme action in the small intestine

To provide a suitable pH for enzyme action in the small intestine

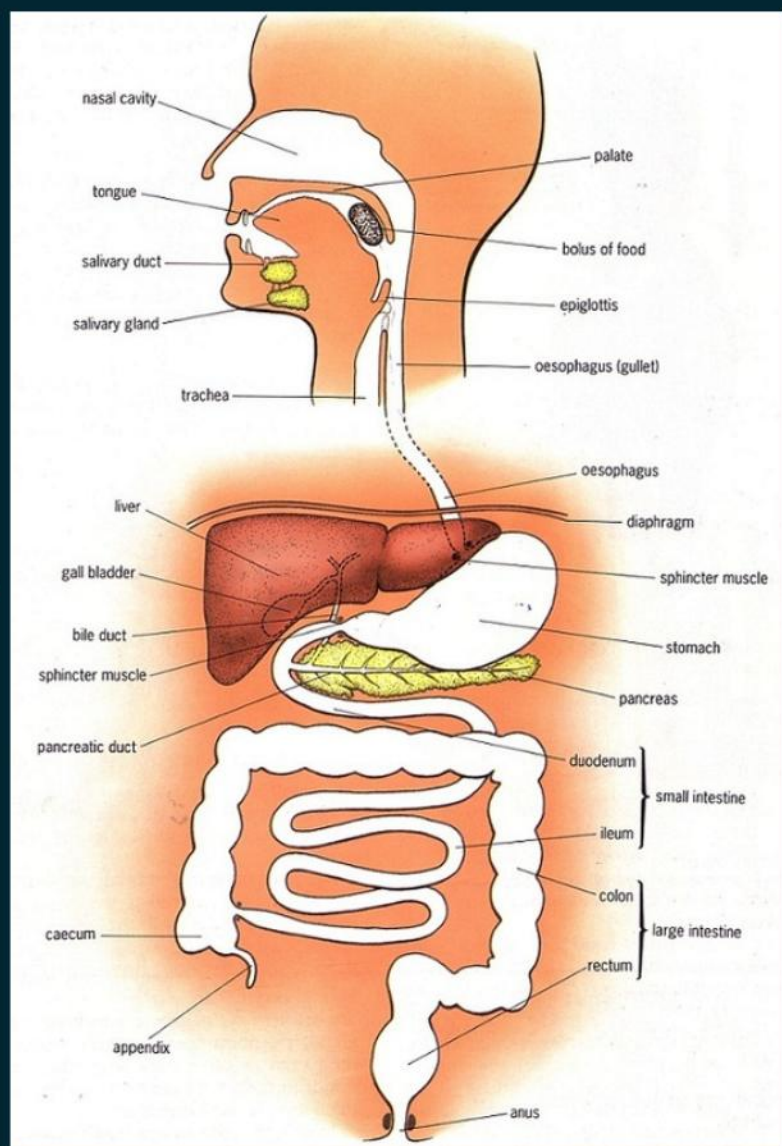
An alkaline mixture that **neutralises** the acidic mixture of food and gastric juices entering the duodenum from the stomach

Bile

Emulsifies fats and oils to increase surface area for chemical digestion

- 5 Describe the functions of enzymes as follows:
 - (a) amylase breaks down starch to simple reducing sugars
 - (b) proteases break down protein to amino acids
 - (c) lipase breaks down fats and oils to fatty acids and glycerol
- 6 State where, in the digestive system, amylase, protease and lipase are secreted and where they act
- 7 Describe the functions of hydrochloric acid in gastric juice, limited to killing harmful microorganisms in food and providing an acidic pH for optimum enzyme activity of proteases in the stomach
- 8 Explain that bile is an alkaline mixture that neutralises the acidic mixture of food and gastric juices entering the duodenum from the stomach, to provide a suitable pH for enzyme action in the small intestine
- 9 Outline the role of bile in emulsifying fats and oils to increase the surface area for chemical digestion

B7.2 - Digestive system



B7.2 Digestive system

Core

- 1 Identify in diagrams and images the main organs of the digestive system, limited to:
 - (a) alimentary canal: mouth, oesophagus, stomach, small intestine (duodenum and ileum) and large intestine (colon, rectum and anus)
 - (b) associated organs: salivary glands, pancreas, liver and gall bladder
- 2 Describe the functions of the organs of the digestive system listed in 7.2.1, in relation to:
 - (a) ingestion – the taking of substances, e.g. food and drink, into the body
 - (b) digestion – the breakdown of food
 - (c) absorption – the movement of nutrients from the intestines into the blood
 - (d) assimilation – uptake and use of nutrients by cells
 - (e) egestion – the removal of undigested food from the body as faeces

Processes

- | | | |
|---------------------|------|--|
| Ingestion | ———— | Taking substances into the body |
| Digestion | ———— | The breakdown of food |
| Absorption | ———— | The movement of nutrients from the intestines into the blood |
| Assimilation | ———— | The uptake and use of nutrients by cells |
| Egestion | ———— | The removal of undigested food (waste products) from the body as <i>faeces</i> |

Functions of organs

Alimentary canal	Mouth	Teeth and tongue break down food into smaller pieces	
	Oesophagus	Bolus moved from mouth to stomach by waves of muscle contraction known as peristalsis	
	Stomach	Enzymes are secreted to start protein digestion; movements of muscular wall churn up food into liquid	
	Small intestine	Duodenum	Secretions from the gall bladder and pancreas enter to complete digestion process
		Ileum	Digested food molecules and water absorbed
	Large intestine	Colon	Water is absorbed from remaining material
		Rectum	Remaining unabsorbed material (faeces) plus dead cells from lining of alimentary canal, and bacteria are compacted and stored
		Anus	Faeces are egested through a sphincter
Associated organs		Salivary glands	Produce liquid saliva; moistens food so it is easily swallowed; contains enzymes to breakdown starch
	Pancreas	Secretes digestive enzymes in an alkaline fluid (bile) into the duodenum	
	Gall bladder	Stores bile to be released into the small intestine	