

The digestive system

Revision notes · The organs of the alimentary canal and associated organs, the five processes of nutrition, teeth, and physical digestion in the mouth and stomach.

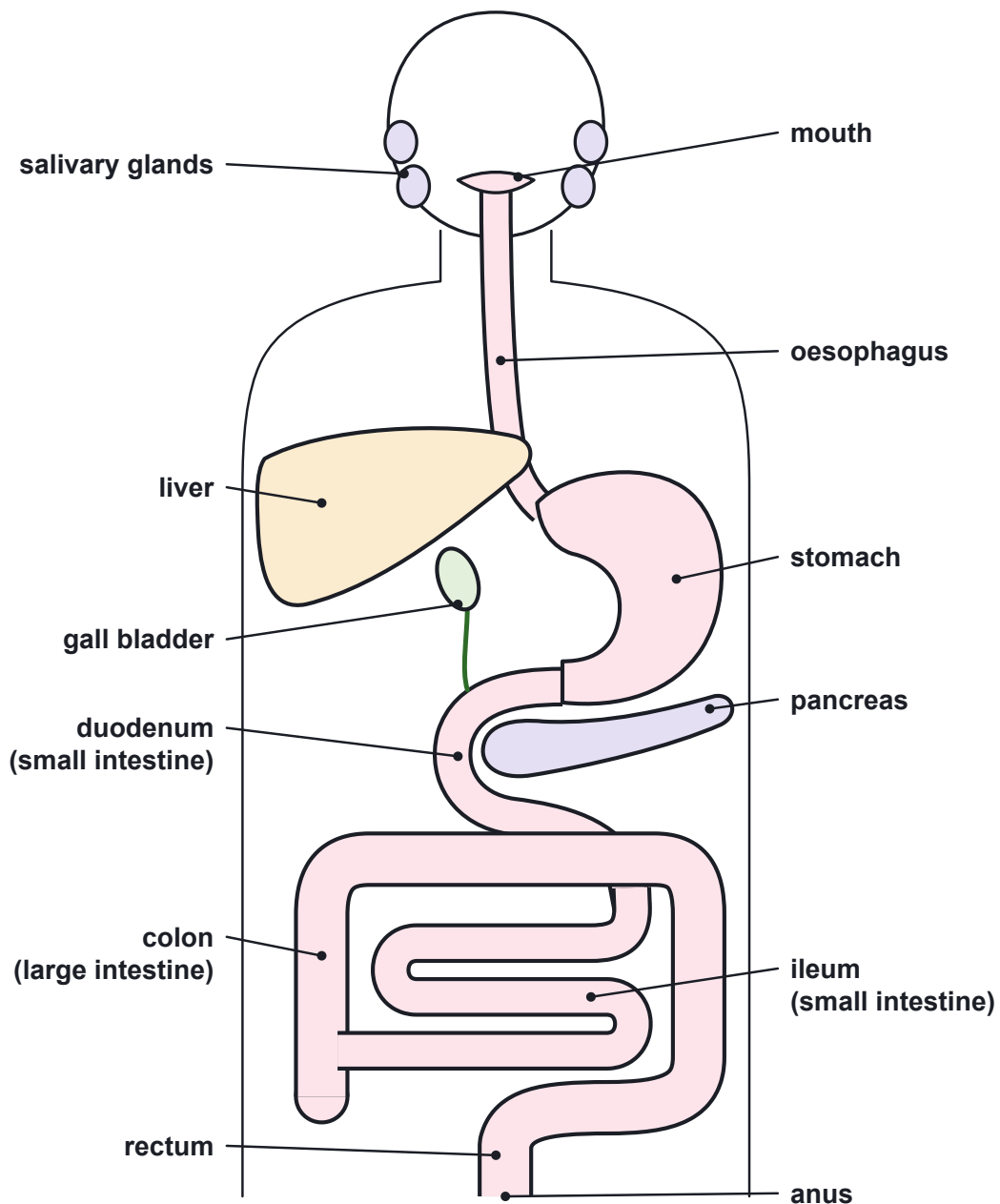
For Cambridge IGCSE Biology 0610 (and 0970, which has the same content). **Supplement** is Extended content, only examined on Papers 2 and 4.

The digestive system Spec 7.2, 7.3

Organs of the digestive system Spec 7.2.1, 7.2.2

The **alimentary canal** is the long tube that food passes through from mouth to anus. The **associated organs** are not part of the tube, but they make and store the juices that digest food.

- Alimentary canal: mouth, oesophagus, stomach, small intestine (duodenum and ileum) and large intestine (colon, rectum and anus).
- Associated organs: salivary glands, pancreas, liver and gall bladder.



The **alimentary canal** (pink) runs from mouth to anus; the **associated organs** (salivary glands, liver, gall bladder, pancreas) are shown in other colours.

Five processes of nutrition

Ingestion	The taking of substances, e.g. food and drink, into the body.
Digestion	The breakdown of food.
Absorption	The movement of nutrients from the intestines into the blood.
Assimilation	Uptake and use of nutrients by cells.
Egestion	The removal of undigested food from the body as faeces.

Functions of the organs		
Organ	Function	Process
Mouth	Food and drink are taken in; teeth break food up; food mixes with saliva	Ingestion; digestion
Salivary glands	Make saliva containing amylase, which starts chemical digestion of starch	Digestion
Oesophagus	Carries food from the mouth to the stomach	(moves food along)
Stomach	Churns food; makes gastric juice containing protease and hydrochloric acid	Digestion
Liver	Makes bile; absorbed nutrients are carried to the liver in the blood, and some are used there, e.g. amino acids to make proteins	Digestion; assimilation
Gall bladder	Stores bile and releases it into the duodenum	Digestion
Pancreas	Makes enzymes (amylase, protease, lipase) and releases them into the duodenum	Digestion
Small intestine: duodenum	Receives bile and pancreatic juice; digestion of food continues	Digestion
Small intestine: ileum	Digestion is completed; nutrients and most of the water are absorbed into the blood	Digestion; absorption
Large intestine: colon	Absorbs some water from the undigested food	Absorption
Rectum	Stores faeces	(before egestion)
Anus	Faeces leave the body	Egestion

Assimilation happens after absorption. The blood carries the absorbed nutrients to the body's cells, which take them up and use them, for example glucose for respiration and amino acids to make proteins.

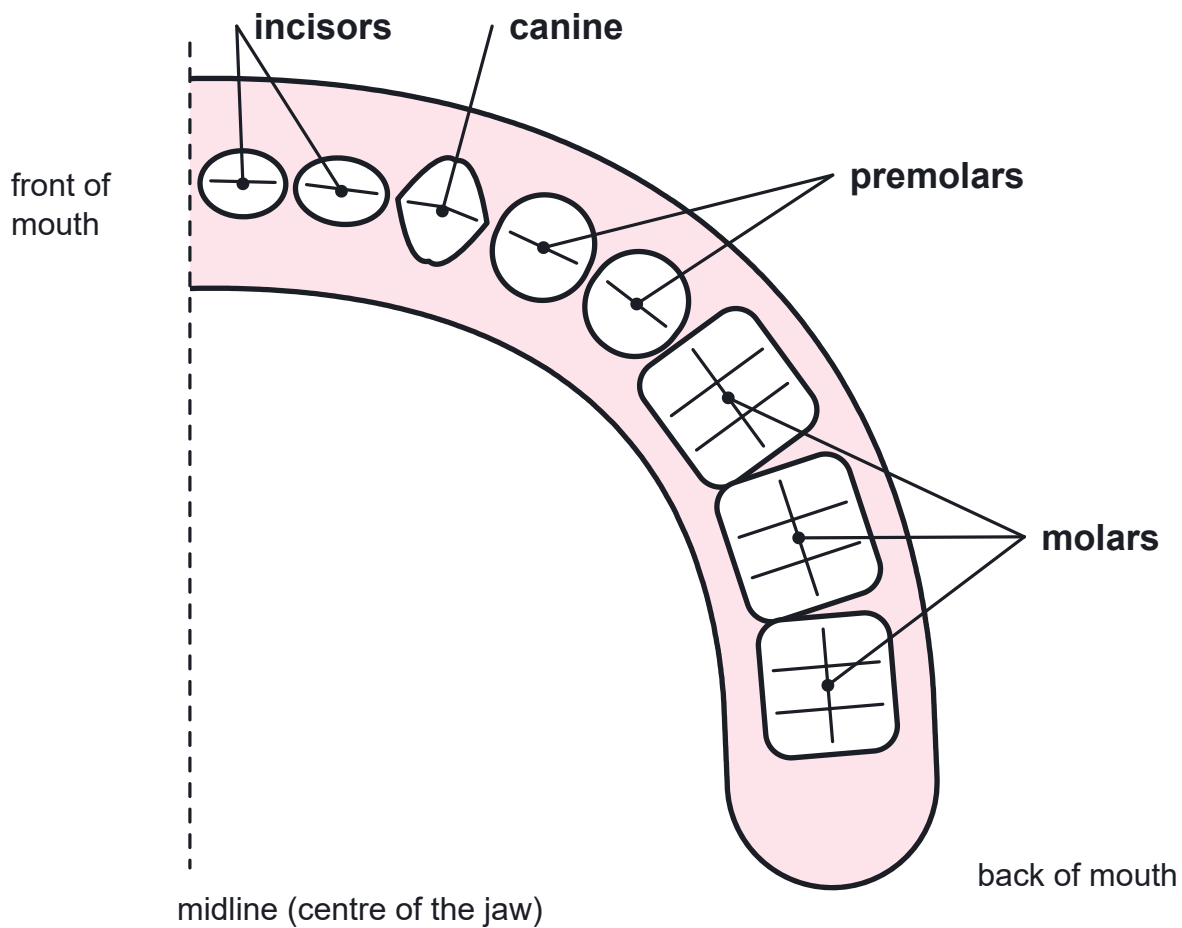
Common mistake: Egestion is the removal of undigested food as faeces. It is not excretion, and it is not the same as absorption.

Physical digestion and teeth Spec 7.3.1, 7.3.2, 7.3.3, 7.3.4, 7.3.5

Physical digestion is the breakdown of food into smaller pieces without chemical change to the food molecules. It increases the **surface area** of the food, so enzymes in chemical digestion can act on more of it at once.

Types of human teeth

Human teeth and their functions		
Type	Shape	Function in physical digestion
Incisors	Flat, chisel-shaped edge	Biting and cutting food
Canines	Pointed	Tearing and gripping food
Premolars	Broad with a ridged surface	Crushing and grinding food
Molars	Large and broad with a ridged surface	Crushing and grinding food

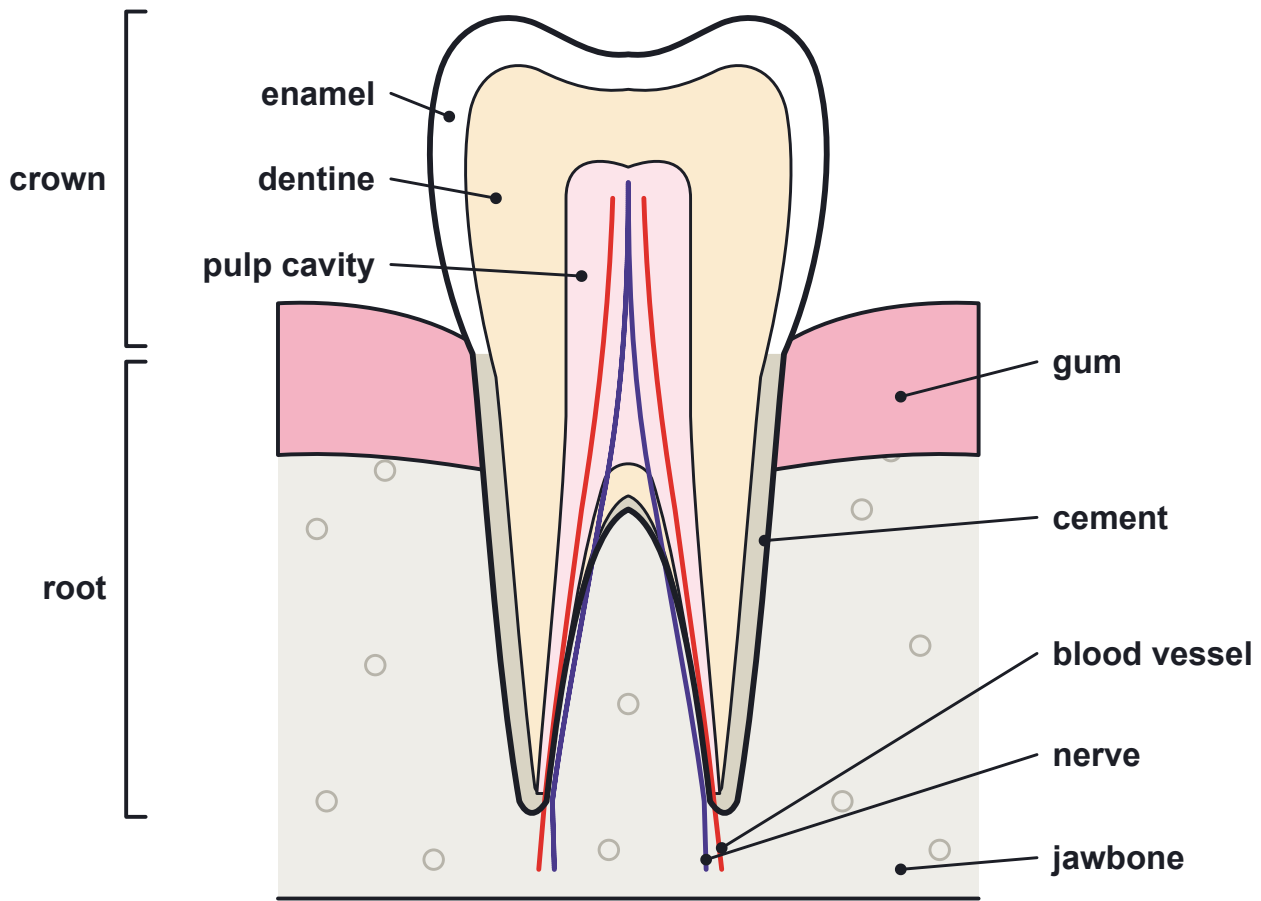


Half of the lower jaw: **incisors** cut, **canines** tear, **premolars** and **molars** crush and grind.

Structure of a tooth

Parts of a tooth	
Part	Description and function
Enamel	The hard outer covering of the crown; protects the tooth
Dentine	Hard, bone-like material under the enamel
Pulp	The soft centre of the tooth, containing nerves and blood vessels
Nerves and blood vessels	Nerves sense pain, temperature and pressure; blood vessels supply the living cells of the tooth
Cement	Covers the root and fixes the tooth in the jawbone

Teeth are **embedded in bone** (the jawbone) and in the **gums**, which hold them firmly in place.



Section through a molar: the root is fixed in the **jawbone** by **cement** and held by the **gum**.

Exam tip: Match each tooth to its job: incisors cut, canines tear, premolars and molars crush and grind. Use those exact verbs.

The stomach, acid and bile Spec 7.3.6, 7.3.7, 7.4.5, 7.4.8

The stomach

The wall of the stomach is muscular. It contracts and relaxes to **churn** the food. This is physical digestion: it breaks the food into smaller pieces and mixes it with **gastric juice**, which contains protease and hydrochloric acid.

Hydrochloric acid in gastric juice has two functions:

- It kills harmful microorganisms in food.
- It provides an acidic pH, which is the optimum pH for the protease enzyme in the stomach to work.

Bile

Bile is made in the liver, stored in the gall bladder and released into the duodenum.

Supplement

- Bile **emulsifies** fats and oils. It breaks large drops into many tiny droplets, which increases the surface area for lipase to act on (physical digestion, so there is no chemical change).
- Bile is **alkaline**. It neutralises the acidic mixture of food and gastric juice that enters the duodenum from the stomach. This provides a suitable pH for the enzymes in the small intestine to work.

Supplement

Common mistake: Bile is not an enzyme and does not chemically digest fat. It emulsifies fat so that lipase can work faster.

Quick check

1. Name the process: the removal of undigested food as faeces.
2. Which type of tooth is used for tearing food?
3. What part of a tooth contains nerves and blood vessels?
4. Give two functions of hydrochloric acid in the stomach.
5. **Supplement** How does bile help the digestion of fats?

Quick check answers

The digestive system

1. Egestion.
2. Canine.
3. The pulp.
4. It kills harmful microorganisms in food and provides an acidic pH for optimum enzyme activity.
5. It emulsifies them, which increases the surface area for lipase.