**Topic 6.1: Digestion and Absorption**

**Essential Idea: The structure of the wall of the small intestine allows it to move, digest and absorb food.**

**Statements & Objectives:**

**6.1.U1 The contraction of circular and longitudinal muscle of the small intestine mixes the food with enzymes and moves it along the gut.**

Outline the role of peristalsis in the digestive process.

(**Outline** Give a brief account or summary.)

**6.1.U2 The pancreas secretes enzymes into the lumen of the small intestine.**

List the name and substrate of the three major classes of enzymes secreted by the pancreas.

**(List**: Give a sequence of brief answers with no explanation.)

**6.1.U3 Enzymes digest most macromolecules in food into monomers in the small intestine.**

List the name, substrate and product of four pancreatic enzymes that hydrolyze food in the small intestine.

**(List**: Give a sequence of brief answers with no explanation.)

List the name, substrate and product of six enzymes produced by gland cells in the small intestine wall.

**(List**: Give a sequence of brief answers with no explanation.)

Describe why enzymes produced by gland cells in the small intestine wall often remain immobilized in the cell membrane.

**(Describe**: Give a detailed account)

**6.1.U4 Villi increase the surface area of epithelium over which absorption is carried out.**

List three adaptations that increase the surface area for absorption on the small intestine.

**(List**: Give a sequence of brief answers with no explanation.)

Draw the villi as viewed in cross section.

(**Draw** :Represent by means of a labeled, accurate diagram or graph, using a pencil. A ruler(straight edge) should be used for straight lines. Diagrams should be drawn to scale. Graphs should have points correctly plotted(if appropriate) and joined in a smooth curve.)

Label the following on a diagram of a villi: capillary, epithelial cell, lacteal, and goblet cell.

(**Label** Add title, labels or brief explanation(s) to a diagram or graph.)

State the function of the following villi structures: capillary, epithelial cell, lacteal, and goblet cell.

**(State**: Give a specific name, value or other brief answer without explanation or calculation)

**6.1.U5 Villi absorb monomers formed by digestion as well as mineral ions and vitamins.**

Define absorption.

(**Define** Give the precise meaning of a word, phrase, concept or physical quantity.)

List materials absorbed by the villi cells of the small intestine.

**(List**: Give a sequence of brief answers with no explanation.)

**6.1.U6 Different methods of membrane transport are required to absorb different nutrients.**

List four methods of membrane transport required to absorb nutrients.

**(List**: Give a sequence of brief answers with no explanation.)

Describe the absorption of triglycerides.

**(Describe**: Give a detailed account)

Describe the absorption of glucose.

**(Describe**: Give a detailed account)

**6.1.A1 Processes occurring in the small intestine that results in the digestion of starch and transport of the products of digestion to the liver.**

Describe the structure of starch.

**(Describe**: Give a detailed account)

Outline the source, function and specificity of amylase.

(**Outline** Give a brief account or summary.)

Outline the digestion of maltose, maltotriose and dextrins into glucose.

(**Outline** Give a brief account or summary.)

Describe absorption of glucose by villus epithelial cells.

**(Describe**: Give a detailed account)

Describe transport of glucose into and through villi capillaries.

**(Describe**: Give a detailed account)

**6.1.A2 Use of dialysis tubing to model absorption of digested food in the intestine.**

Explain the use of dialysis tubing as a model for the small intestine.

(**Explain**: Give a detailed account including reasons or causes)

**6.1.S1 Production of an annotated diagram of the digestive system.**

State the role of the digestive system.

**(State**: Give a specific name, value or other brief answer without explanation or calculation)

Draw a diagram of the human digestive system.

(**Draw** :Represent by means of a labeled, accurate diagram or graph, using a pencil. A ruler(straight edge) should be used for straight lines. Diagrams should be drawn to scale. Graphs should have points correctly plotted(if appropriate) and joined in a smooth curve.)

Outline the function of the following digestive system structures: mouth, esophagus, stomach, small intestine, pancreas, liver, gall bladder, and large intestine.

(**Outline** Give a brief account or summary.)

**6.1.S2 Identification of tissue layers in transverse sections of the small**

**intestine viewed with a microscope or in a micrograph.**

Outline the function of the four layers of tissue found in the wall of the small intestine.

(**Outline** Give a brief account or summary.)

Label the four layers of tissue found in the wall of the small intestine as viewed with a microscope or in a micrograph.

(**Label** Add title, labels or brief explanation(s) to a diagram or graph.)

**6.1.NOS Use models as representations of the real world-dialysis tubing can be used to model absorption in the intestine.**

Explain the use of models in physiology research.

(**Explain**: Give a detailed account including reasons or causes)

State two examples of model systems used to study digestion.

**(State**: Give a specific name, value or other brief answer without explanation or calculation)

State limitations of using model systems in physiology research.

**(State**: Give a specific name, value or other brief answer without explanation or calculation)

**Key Terms**

Mouth

Saliva

Esophagus

Peristalsis

Stomach

absorption of water

absorption of nutrients

villi

feces

duodenum

ileum

circular muscles

capillary

chime

liver

pancreas

small intestine

large intestine

bile

gallbladder

fiber

lacteal

catalyze

lumen

​hydrolyze

goblet cell

​maltotriose

rectum

anus

protease

pepsin

salivary amylase

hydrolysis

macromolecule

polysaccharide

ingestion

digestion

longitudinal muscle

​substrate

ions

pancreatic

lipase

starch

glucose

carbohydrates

proteins

transport

egestion

assimilation

triglycerides

glycerol

epithelium

​dextrins

​dialysis tubing

lipids

maltose

simple sugars

amino acids

fatty acids

monosaccharide

disaccharide

alimentary canal

enzyme

nucleic acid

duodenum

​surface area

amylase