1. Digestion: An Overview

Indicate the substances that perform these roles in chemical digestion.

1) Combines with food molecules and splits them into smaller molecules.
   Water

2) Speed up hydrolysis of food molecules.
   Digestive enzymes

2. Alimentary Canal: General Characteristics

   a. Label the parts of the digestive system by placing the numbers of the structures in the spaces by the correct labels.

   15. Anus
   14. Appendix
   13. Cecum
   11. Colon, ascending
   22. Colon, descending
   23. Colon, sigmoid
   21. Colon, transverse
   9. Common bile duct
   10. Duodenum
   6. Esophagus
   8. Gallbladder
   7. Liver
   3. Mouth
   1. Palate
   20. Pancreas
   16. Parotid gland
   17. Pharynx
   24. Rectum
   12. Small intestine
   19. Stomach
   5. Sublingual gland
   18. Submandibular gland
   2. Tongue
   4. Tooth
b. List the layers of the wall of the alimentary canal from inside out.

1) Mucosa
2) Submucosa
3) Muscle layer
4) Serosa

c. What contractions propel food through the canal?

3. Mouth

a. Label the figure by placing the numbers of the structures in the spaces by the correct labels.

b. Write the terms that match the statements in the spaces at the right.

1) Form lateral walls of the mouth.
2) Separates oral and nasal cavities.
3) Manipulates food during chewing.
4) Tiny projections containing taste buds.
5) Number of deciduous and permanent teeth.
6) Teeth used to bite off pieces of food.
7) Teeth used to grasp and tear food.
8) Teeth used to crush and grind food.
9) Three pairs of salivary glands.
10) Cleanses and lubricates mouth.
11) Salivary enzyme acting on starch.
12) End product of digestion in mouth.
13) Saliva secretion is regulated by ______ (neural or hormonal) means.
4. Pharynx and Esophagus

Write the terms that match the statements in the spaces at the right.

1) Tube carrying food to the stomach. ____________________________
   Esophagus

2) Relaxes to let food enter stomach. ____________________________
   Cardiac sphincter

3) Carries food from mouth to esophagus. ____________________________
   Pharynx

4) Covers laryngeal opening in swallowing. ____________________________
   Epiglottis

5. Stomach

Write the terms that match the statements in the spaces at the right.

1) Region of stomach joining esophagus. ____________________________
   Cardiac

2) Region of stomach joining duodenum. ____________________________
   Pyloric

3) Glands of mucosa secreting gastric juice. ____________________________
   Gastric glands

4) Hormone stimulating gastric secretion. ____________________________
   Gastrin

5) Hormones inhibiting gastric secretion. ____________________________
   CCK and secretin

6) Autonomic impulses stimulating gastric secretion. ____________________________
   Parasympathetic

7) Hormone secreted by gastric mucosa. ____________________________
   Hydrochloric acid

8) Acid in gastric juice. ____________________________
   Pepsin

9) Gastric enzyme acting on proteins. ____________________________
   Rennin

10) Gastric enzyme curdling milk. ____________________________
    Peptides

11) Products of gastric protein digestion. ____________________________
    Intrinsic factor

12) Gastric substance enabling absorption of vitamin B₁₂ by small intestine.

6. Pancreas

Write the terms that match the statements in the spaces at the right.

1) Carries pancreatic juice from pancreatic duct to duodenum. ____________________________
   Pancreatic duct

2) Two hormones stimulating secretion of pancreatic juice. ____________________________
   Cholecystokinin and Secretin

3) Source of these hormones. ____________________________
   Intestinal mucosa

4) Pancreatic enzyme acting on starch. ____________________________
   Pancreatic amylase

5) Product of pancreatic starch digestion. ____________________________
   Maltose

6) Pancreatic enzyme acting on fats. ____________________________
   Lipase

7) Products of pancreatic fat digestion. ____________________________
   Monoglycerides and fatty acids

8) Pancreatic enzyme acting on proteins. ____________________________
   Trypsin

9) Products of pancreatic protein digestion. ____________________________
   Peptides
7. Liver

Write the terms that match the statements in the spaces at the right.

1) Removed from amino acids and converted to urea. ________________
   - Amine groups

2) Vessels carrying blood to liver:
   a) carries oxygen-rich blood. ________________
      - Hepatic artery

   b) carries nutrient-rich blood. ________________
      - Hepatic-portal vein

3) Vessel carrying blood from liver. ________________
   - Hepatic vein

4) Carbohydrate stored in liver. ________________
   - Glycogen

5) Secretion formed by liver. ________________
   - Bile

6) Stores excess bile. ________________
   - Gallbladder

7) Carries bile to duodenum. ________________
   - Common bile duct

8) Hormone contracting gallbladder. ________________
   - Cholecystokinin

9) Bile component emulsifying lipids. ________________
   - Bile salts

10) Bile component from hemoglobin breakdown. ________________
    - Bile pigments

8. Small Intestine

a. Write the terms that match the statements in the spaces at the right.

1) Segment continuous with the stomach. ________________
   - Duodenum

2) Segment continuous with the cecum. ________________
   - Ileum

3) Membranes supporting small intestine. ________________
   - Mesentery

4) Relaxes to allow chyme to enter the small intestine. ________________
   - Pyloric sphincter

5) Secretion of intestinal glands. ________________
   - Intestinal juice

6) Fingerlike projections of the mucosa. ________________
   - Villi

7) Microscopic folds of exposed epithelial cell membranes. ________________
   - Microvilli

8) Hormone released by mucosa due to presence of fat-laden chyme. ________________
   - Cholecystokinin

9) Hormone released by mucosa due to presence of acid chyme. ________________
   - Secretin

10) Mechanism (neural or hormonal) that stimulates secretion of intestinal juice. ________________
    - Neural

11) Enzyme acting on sucrose. ________________
    - Sucrase

12) End products of sucrose digestion. ________________
    - Glucose; fructose

13) Enzyme acting on lactose. ________________
    - Lactase

14) Enzyme acting on maltose. ________________
    - Maltase

15) End product of maltose digestion. ________________
    - Glucose

16) End products of lactose digestion. ________________
    - Glucose; galactose

17) Enzyme acting on fats. ________________
    - Lipase

18) End products of fat digestion. ________________
    - Monoglycerides

19) Enzyme acting on peptides. ________________
    - Fatty acids

20) End products of peptide digestion. ________________
    - Peptidase

    - Amino acids
b. Write the terms that complete the sentences in the spaces at the right.

Monosaccharides and amino acids are absorbed into the ____1____ networks of ____2____. Monoglycerides and fatty acids are absorbed into ____3____ cells, where they reunite to form ____4____. Clusters of triglycerides are coated with protein, forming ____5____ that enter the ____6____ of the ____7____.

9. Large Intestine

Write the terms that match the statements in the spaces at the right.

1) Pouchlike first part of large intestine.  
   _____________
   
2) External opening of large intestine.  
   _____________
   
3) Colon segment along left side of abdomen.  
   _____________
   
4) Colon segment along right side of abdomen.  
   _____________
   
5) Colon segment continuous with rectum.  
   _____________
   
6) Wormlike extension of cecum.  
   _____________
   
7) Involuntary controlled anal sphincter.  
   _____________
   
8) Voluntarily controlled anal sphincter.  
   _____________
   
9) Decompose undigested materials.  
   _____________
   
10) Fluid absorbed by large intestine.  
    _____________
    
11) Relaxes, allowing chyme to enter cecum.  
    _____________
    
12) Reflex activated by filling of rectum with feces.  
    _____________
    
10. Nutrients: Sources and Uses

Write the terms that match the statements in the spaces at the right.

1) Dietary source of most carbohydrates.  
   _____________
   
2) Plant polysaccharide providing fiber.  
   _____________
   
3) Preferred energy source for body cells.  
   _____________
   
4) Organs regulating blood glucose levels.  
   _____________
   
5) Most common lipids in the diet.  
   _____________
   
6) Type of fats common in animal foods.  
   _____________
   
7) Type of fats common in plant foods.  
   _____________
   
8) Lipid abundant in egg yolks.  
   _____________
   
9) Lipid used to form steroid hormones.  
   _____________
   
10) Lipid forming much of plasma membranes.  
    _____________
    
11) Molecules transporting lipids in blood.  
    _____________
    
12) Organ helping to regulate blood levels of triglycerides and cholesterol.  
    _____________
    
13) Amino acids that cannot be made by liver.  
    _____________
11. Disorders of the Digestive System

Write the names of the disorders that match the statements.

1) Inflammation of the large intestine. ________________________________
   Colitis

2) Self-induced starvation due to an abnormal concern about weight-control.
   Anorexia nervosa

3) Decay of the teeth due to acids formed by certain oral microorganisms.
   Dental caries

4) Dry, hard feces making defecation difficult.
   Constipation

5) Crystallization of cholesterol in bile within the gallbladder.
   Gallstones

6) Replacement of destroyed liver cells by connective tissue.
   Cirrhosis

7) Repeated overeating and purging.
   Bulimia

8) Inflammation of the liver.
   Hepatitis

9) Digestion of stomach mucosa by gastric juice.
   Gastric ulcers

10) Inflammation, bleeding, and degeneration of the gingivae and alveolar bone.
    Peridontal disease

11) Watery feces due to excessive peristalsis.
    Diarrhea

12) Enlarged and inflamed veins in anal canal.
    Hemorrhoids

13) Inflammation of the appendix.
    Appendicitis

14) Inflammation of the peritoneum.
    Peritonitis

15) Inflammation of colon diverticula.
    Diverticulitis

12. Clinical Applications

a. Severe diarrhea in infants or small children can be a life-threatening event. Explain why.

   The relatively small quantity of body fluids can quickly be depleted resulting in severe dehydration that could be fatal without treatment.

b. A patient is found to have a gastric ulcer. Antibiotics and a drug to reduce the secretion of gastric juice are prescribed. Explain the basis for the prescriptions. Antibiotics are used to kill the bacterium eroding the stomach lining. Reducing the secretion of gastric juice helps curtail the digestion of the stomach wall at the ulcer site.

   What serious results may occur with an untreated ulcer? Blood vessels of the stomach wall may be damaged resulting in a bleeding ulcer. Excessive bleeding can result in death.

c. A patient is admitted to the emergency room complaining of severe and spasmodic pain in the epigastric region, and the whites of his eyes are yellowish. He informs the physician that he has had similar, but milder, pains after meals for four to six weeks. What is the likely problem and the likely solution? Gallstones are probably blocking the release of bile from the gallbladder. If this is so, surgical removal of the gallbladder is the usual treatment.