Using Figure 14.1, identify the following:

1) The mouth (oral cavity) is indicated by letter _________.
   Answer: A
   Diff: 2       Page Ref: 470

2) The large intestine is indicated by letter _________.
   Answer: J
   Diff: 2       Page Ref: 470

3) The salivary glands are indicated by letter _________.
   Answer: O
   Diff: 2       Page Ref: 470
4) The small intestine is indicated by letter _________.
   Answer: F
   Diff: 2    Page Ref: 470

5) The liver is indicated by letter _________.
   Answer: D
   Diff: 2    Page Ref: 470

6) The tongue is indicated by letter _________.
   Answer: B
   Diff: 2    Page Ref: 470

7) The stomach is indicated by letter _________.
   Answer: M
   Diff: 2    Page Ref: 470

8) The esophagus is indicated by letter _________.
   Answer: C
   Diff: 2    Page Ref: 470

9) The rectum is indicated by letter _________.
   Answer: I
   Diff: 2    Page Ref: 470

10) The spleen is indicated by letter _________.
    Answer: K
    Diff: 2    Page Ref: 470

11) The pharynx is indicated by letter _________.
    Answer: N
    Diff: 2    Page Ref: 470

12) The anus is indicated by letter _________.
    Answer: G
    Diff: 2    Page Ref: 470

13) The appendix is indicated by letter _________.
    Answer: H
    Diff: 2    Page Ref: 470

14) The pancreas is indicated by letter _________.
    Answer: L
    Diff: 2    Page Ref: 470

15) The gallbladder is indicated by letter _________.
    Answer: E
    Diff: 2    Page Ref: 470

*Fill in the blank or provide a short answer:*

16) The opening on the terminal end of the large intestine is called the _________.
    Answer: anus
    Diff: 1    Page Ref: 471; 478
17) The organ that connects the pharynx to the stomach is the _________.
Answer: esophagus
Diff: 1    Page Ref: 472

18) The innermost layer of the alimentary canal is referred to as the _________.
Answer: mucosa
Diff: 2    Page Ref: 472

19) The serosal membrane lining the abdominopelvic cavity by way of the mesentery is called the _________.
Answer: parietal peritoneum
Diff: 2    Page Ref: 472

20) The upper, expanded part of the stomach lateral to the cardiac region is called the _________.
Answer: fundus
Diff: 1    Page Ref: 472–473

21) Large wrinklelike folds in the stomach lining, present when the stomach is empty, that allow for expansion when the stomach is filling are called _________.
Answer: rugae
Diff: 1    Page Ref: 473

22) Food that resembles heavy cream after being processed in the stomach is called _________.
Answer: chyme
Diff: 2    Page Ref: 475

23) The last subdivision of the small intestine is called the _________.
Answer: ileum
Diff: 2    Page Ref: 476

24) The sphincter that prevents food from leaving the stomach is the ________ sphincter.
Answer: pyloric
Diff: 2    Page Ref: 473; 476

25) Bile is formed by the _________.
Answer: liver
Diff: 2    Page Ref: 481

26) The rich capillary bed and modified lymphatic capillary found within each villus is called a _________.
Answer: lacteal
Diff: 2    Page Ref: 477

27) Cells abundant within the large intestine that produce large amounts of lubricating mucus to aid in the passage of feces to the end of the digestive tract are called _________.
Answer: goblet cells
Diff: 1    Page Ref: 478

28) Milk teeth that begin to erupt at around six months are also called the _________.
Answer: deciduous teeth
Diff: 2    Page Ref: 479
29) The enamel-covered crown of the tooth is exposed just above the _______.  
   Answer: gingiva (or gum)  
   Diff: 1   Page Ref: 480

30) The material on the outermost surface of the root that attaches a tooth to the periodontal membrane (ligament) is called ________.  
   Answer: cementum  
   Diff: 1   Page Ref: 480

31) Bile breaks large fat globules into smaller ones to provide more surface area for fat-digesting enzymes to operate in a process known as ________.  
   Answer: emulsification  
   Diff: 2   Page Ref: 481

32) Segmentation is a type of mechanical digestion that occurs only in the ________.  
   Answer: small intestine  
   Diff: 2   Page Ref: 482

33) The voluntary process of placing food into the mouth is referred to as ________.  
   Answer: ingestion  
   Diff: 1   Page Ref: 481

34) The process of eliminating indigestible residues from the GI tract is called ________.  
   Answer: defecation  
   Diff: 2   Page Ref: 483

35) The sphincter found at the distal end of the esophagus is the _______ sphincter.  
   Answer: cardioesophageal  
   Diff: 2   Page Ref: 472; 485

36) The hormone responsible for promoting the release of pepsinogens, mucus, and hydrochloric acid in the stomach is called ________.  
   Answer: gastrin  
   Diff: 3   Page Ref: 485

37) Two items absorbed through the stomach walls are ________ and _________.  
   Answer: alcohol; aspirin  
   Diff: 2   Page Ref: 487

38) The emetic (vomiting) center in the brain is called the _________.  
   Answer: medulla  
   Diff: 1   Page Ref: 487

39) The chemical responsible for about half of protein digestion and all of fat digestion is ________.  
   Answer: pancreatic juice  
   Diff: 3   Page Ref: 489-490

40) When feces are forced into the rectum by mass movements and the wall of the rectum becomes stretched, the ________ is initiated.  
   Answer: defecation reflex  
   Diff: 2   Page Ref: 492
41) The energy value of foods is measured in units called _________.  
   Answer: kilocalories (kcal)  
   Diff: 1    Page Ref: 493

42) Amino acids that cannot be made by human body cells and therefore must be ingested in the diet are said to be _________.  
   Answer: essential  
   Diff: 1    Page Ref: 495

43) A chemical reaction in which substances are broken down into simpler substances is referred to as _________.  
   Answer: catabolism  
   Diff: 2    Page Ref: 495

44) The major fuel for making ATP in most cells of the body is a type of carbohydrate known as _________.  
   Answer: glucose  
   Diff: 1    Page Ref: 496

45) The specific metabolic pathway of cellular respiration in which virtually all carbon dioxide is made is the _________.  
   Answer: Krebs cycle  
   Diff: 2    Page Ref: 496

46) In order for fats to be used for ATP synthesis, they must be broken down to form _________.  
   Answer: acetic acid  
   Diff: 2    Page Ref: 498

47) The polysaccharide, glycogen, is formed from the combination of thousands of glucose molecules during a process called _________.  
   Answer: glycogenesis  
   Diff: 3    Page Ref: 500

48) The lipoprotein that transports cholesterol and other lipids to body cells is called _________.  
   Answer: low-density lipoprotein (LDL)  
   Diff: 2    Page Ref: 502

49) The total amount of kilocalories the body must consume to fuel all ongoing activities, which increases dramatically during physical exertion, is called the _________.  
   Answer: total metabolic rate  
   Diff: 1    Page Ref: 503

50) Chemical substances released by macrophages and white blood cells that cause an upward resetting of the body’s thermostat are called _________.  
   Answer: pyrogens  
   Diff: 3    Page Ref: 506
Multiple Choice

1) Which one of the following is NOT an organ of the alimentary canal:
   A) mouth
   B) teeth
   C) pharynx
   D) esophagus
   E) stomach
   Answer: B
   Diff: 1     Page Ref: 470–471

2) Which one of the following represents the correct order through which food passes in the alimentary canal:
   A) mouth, pharynx, esophagus, stomach, large intestine, small intestine
   B) mouth, esophagus, pharynx, stomach, small intestine, large intestine
   C) pharynx, mouth, esophagus, stomach, large intestine, small intestine
   D) mouth, pharynx, esophagus, stomach, small intestine, large intestine
   E) mouth, pharynx, esophagus, small intestine, stomach, large intestine
   Answer: D
   Diff: 1     Page Ref: 470–471

3) The structure that forms the anterior roof of the mouth is the:
   A) uvula
   B) soft palate
   C) cheek
   D) teeth
   E) hard palate
   Answer: E
   Diff: 2     Page Ref: 471

4) The fold of mucous membrane that secures the tongue to the floor of the mouth and limits its posterior movements is called the:
   A) lingual frenulum
   B) hyoid bone
   C) palatal frenulum
   D) styloid bone
   E) mandibular frenulum
   Answer: A
   Diff: 2     Page Ref: 471

5) Which one of the following is continuous with the esophagus:
   A) nasopharynx
   B) oropharynx
   C) linguopharynx
   D) laryngopharynx
   E) esophagopharynx
   Answer: D
   Diff: 1     Page Ref: 472
6) Which one of the following is NOT a layer of the alimentary canal:
   A) mucosa
   B) submucosa
   C) muscularis interna
   D) muscularis externa
   E) serosa
   Answer: C
   Diff: 2   Page Ref: 472

7) The submucosal and myenteric nerve plexuses that help regulate the mobility and secretory activity of the GI tract organs are both part of the:
   A) somatic nervous system
   B) autonomic nervous system
   C) sympathetic nervous system
   D) fight-or-flight mechanism
   E) central nervous system
   Answer: B
   Diff: 3   Page Ref: 472

8) When full, the average adult stomach can hold approximately:
   A) 1 liter of food
   B) 2 liters of food
   C) 3 liters of food
   D) 4 liters of food
   E) 2 gallons of food
   Answer: D
   Diff: 1   Page Ref: 473

9) The release of food from the stomach into the small intestine is regulated by the:
   A) cardioesophageal sphincter
   B) pyloric sphincter (valve)
   C) ileocecal valve
   D) internal anal sphincter
   E) hepatopancreatic ampulla
   Answer: B
   Diff: 2   Page Ref: 476

10) Protein digestion begins in the:
    A) mouth
    B) esophagus
    C) stomach
    D) small intestine
    E) large intestine
    Answer: C
    Diff: 2   Page Ref: 473
11) Intrinsic factor in digestion is a stomach secretion needed for absorption of _________ from the small intestine.
   A) vitamin A
   B) vitamin B12
   C) vitamin C
   D) vitamin D
   E) vitamin K
Answer: B
Diff: 3 Page Ref: 475

12) The small intestine extends from the:
   A) cardioesophageal sphincter to the pyloric sphincter
   B) pyloric sphincter to the ileocecal valve
   C) ileocecal valve to the appendix
   D) appendix to the sigmoid colon
   E) cardioesophageal sphincter to ileocecal valve
Answer: B
Diff: 2 Page Ref: 475–476

13) Which one of the following is the middle section of the small intestine:
   A) duodenum
   B) ascending colon
   C) jejunum
   D) descending colon
   E) ileum
Answer: C
Diff: 1 Page Ref: 476

14) Enzymes and bile are carried by the pancreatic duct and bile duct into the:
   A) duodenum
   B) jejunum
   C) ileocecal valve
   D) ileum
   E) large intestine
Answer: A
Diff: 3 Page Ref: 476

15) The primary function of the small intestine is:
   A) absorption of nutrients
   B) absorption of water
   C) waste secretion
   D) vitamin conversion
   E) mineral secretion
Answer: A
Diff: 1 Page Ref: 476
16) Which one of the following is NOT a modification (which is designed to increase surface area for absorption) within the small intestine:
   A) microvilli
   B) villi
   C) Peyer’s patches
   D) circular folds
   E) plicae circulares
Answer: C  
Diff: 2  Page Ref: 475–477

17) Which one of the following is NOT a subdivision of the large intestine:
   A) cecum
   B) appendix
   C) duodenum
   D) colon
   E) rectum
Answer: C  
Diff: 1  Page Ref: 477

18) The organ responsible for drying out indigestible food residue through water absorption and the elimination of feces is the:
   A) stomach
   B) large intestine
   C) small intestine
   D) pancreas
   E) liver
Answer: B  
Diff: 2  Page Ref: 477

19) The opening of the large intestine is called the:
   A) cecum
   B) sigmoid colon
   C) rectum
   D) anus
   E) ileum
Answer: D  
Diff: 1  Page Ref: 478

20) Amylase is an enzyme that is only able to digest:
   A) protein
   B) starch
   C) fat
   D) vitamins
   E) minerals
Answer: B  
Diff: 2  Page Ref: 485, 490
21) The number of permanent teeth within a full set of adult teeth is:
   A) 20  
   B) 24  
   C) 28  
   D) 32  
   E) 36  
   Answer: D  
   Diff: 1   Page Ref: 479

22) The anterior chisel-shaped teeth that are adapted for cutting are called:
   A) incisors  
   B) canines  
   C) premolars  
   D) molars  
   E) wisdom teeth  
   Answer: A  
   Diff: 1   Page Ref: 479

23) The accessory digestive organ that produces enzymes that break down all food groups is the:
   A) liver  
   B) gallbladder  
   C) salivary glands  
   D) pancreas  
   E) liver and gallbladder  
   Answer: D  
   Diff: 3   Page Ref: 480

24) Bile is produced by the ________ but stored in the ________.  
   A) liver; pancreas  
   B) gallbladder; liver  
   C) liver; gallbladder  
   D) small intestine; pancreas  
   E) gallbladder; pancreas  
   Answer: C  
   Diff: 3   Page Ref: 481

25) Buildup of bile within the liver leading to bile pigments circulating through the body could cause tissues to turn yellow and a condition called:  
   A) cyanosis  
   B) erythematosis  
   C) jaundice  
   D) hepatitis  
   E) cirrhosis  
   Answer: C  
   Diff: 1   Page Ref: 481
26) The sequence of steps by which large food molecules are broken down into their respective building blocks by catalytic enzymes within hydrolysis reactions is called:
   A) ingestion
   B) propulsion
   C) mechanical digestion
   D) chemical digestion
   E) absorption
Answer: D
Diff: 1   Page Ref: 483

27) The propulsive process that moves food from one organ to the next is called:
   A) ingestion
   B) peristalsis
   C) chemical digestion
   D) mastication
   E) absorption
Answer: B
Diff: 2   Page Ref: 481–482

28) The process by which food within the small intestine is mixed with digestive juices by backward and forward movement across the internal wall of the organ is called:
   A) peristalsis
   B) segmentation
   C) defecation
   D) chemical digestion
   E) absorption
Answer: B
Diff: 1   Page Ref: 482

29) Which one of the following is NOT one of the carbohydrates that the human digestive system is able to break down to simple sugars:
   A) cellulose
   B) sucrose
   C) lactose
   D) maltose
   E) starch
Answer: A
Diff: 2   Page Ref: 483

30) Proteins are digested to their building blocks which are called:
   A) peptides
   B) amino acids
   C) polypeptides
   D) fatty acids
   E) glycerol
Answer: B
Diff: 1   Page Ref: 483
31) Transport of digested end products from the lumen GI tract into the bloodstream or lymphatic fluid is called:
   A) ingestion  
   B) propulsion  
   C) digestion  
   D) absorption  
   E) defecation  
   Answer: D  
   Diff: 2  Page Ref: 483

32) Digestion is primarily controlled by the:
   A) sympathetic division of the autonomic nervous system  
   B) medulla oblongata  
   C) somatic nervous system  
   D) enterogastric reflex  
   E) parasympathetic division of the autonomic nervous system  
   Answer: E  
   Diff: 1  Page Ref: 483

33) Which one of the following is NOT true of the sensors involved in digestive reflexes:
   A) they activate or inhibit lacteal absorption  
   B) they respond to stretch of the organ by the volume of food within its lumen  
   C) they start reflexes that either activate or inhibit digestive glands  
   D) they respond to the relative pH content within that particular digestive organ  
   E) they respond to the presence of breakdown products of digestion  
   Answer: A  
   Diff: 3  Page Ref: 483

34) The first nutrient to be chemically digested is:
   A) starch  
   B) protein  
   C) fat  
   D) minerals  
   E) vitamins  
   Answer: A  
   Diff: 2  Page Ref: 485

35) The process of swallowing is also known as:
   A) mastication  
   B) segmentation  
   C) deglutition  
   D) defecation  
   E) absorption  
   Answer: C  
   Diff: 1  Page Ref: 485
36) Which one of the following alimentary segments has no digestive function:
   A) stomach
   B) ascending colon
   C) ileum
   D) esophagus
   E) duodenum
   Answer: D
   Diff: 1   Page Ref: 485

37) Which one of the following is NOT involved in the swallowing reflex:
   A) tongue
   B) soft palate
   C) larynx
   D) pharynx
   E) esophagus
   Answer: C
   Diff: 2   Page Ref: 485

38) The amount of gastric juice produced every day by an average-sized adult is:
   A) 1–2 liters
   B) 2–3 liters
   C) 3–4 liters
   D) 1–2 gallons
   E) 2–3 gallons
   Answer: B
   Diff: 2   Page Ref: 485

39) The hormone responsible for causing the stomach to release pepsinogens, mucus, and hydrochloric acid is:
   A) rennin
   B) bile
   C) gastrin
   D) pepsin
   E) amylase
   Answer: C
   Diff: 3   Page Ref: 485

40) The enzyme responsible for converting milk protein in the stomach to a substance that looks like sour milk in infants is:
   A) pepsin
   B) salivary amylase
   C) pancreatic amylase
   D) bile
   E) rennin
   Answer: E
   Diff: 2   Page Ref: 486
41) The journey of chyme through the small intestine takes:
   A) 2–4 hours
   B) 3–6 hours
   C) 6–8 hours
   D) 8–10 hours
   E) 10–12 hours
   Answer: B
   Diff: 1     Page Ref: 487

42) Enzyme–rich pancreatic juice contains all the following EXCEPT:
   A) amylase
   B) trypsin
   C) nuclease
   D) pancreatase
   E) lipase
   Answer: D
   Diff: 2     Page Ref: 490

43) Which of the following influence the release of pancreatic juice and bile:
   A) rennin and cholecystokinin
   B) gastrin and rennin
   C) cholecystokinin and gastrin
   D) secretin and gastrin
   E) cholecystokinin and secretin
   Answer: E
   Diff: 3     Page Ref: 491

44) Which one of the following is NOT absorbed by the human large intestine:
   A) water
   B) vitamin K
   C) some of the B vitamins
   D) ions
   E) protein
   Answer: E
   Diff: 1     Page Ref: 492

45) The energy value of foods commonly counted by dieters is measured in units called:
   A) ATP
   B) calories
   C) kilocalories
   D) coenzymes
   E) carb units
   Answer: C
   Diff: 1     Page Ref: 493
46) Inorganic substances necessary to body functioning that must be ingested through the diet are:
   A) vitamins
   B) coenzymes
   C) carbon
   D) minerals
   E) complete proteins
Answer: D
Diff: 2 Page Ref: 495

47) The process by which larger molecules or structures are built up from smaller ones is called:
   A) anabolism
   B) catabolism
   C) metabolism
   D) carbolysis
   E) glycolysis
Answer: A
Diff: 1 Page Ref: 495

48) Adenosine triphosphate (ATP) is produced in greatest quantity during:
   A) glycolysis
   B) the Krebs cycle
   C) protein metabolism
   D) the electron transport chain
   E) fat metabolism
Answer: D
Diff: 2 Page Ref: 496

49) The liver metabolizes fats for all of the following reasons EXCEPT:
   A) ATP production
   B) synthesis of lipoproteins
   C) synthesis of thromboplastin
   D) synthesis of vitamin K
   E) synthesis of cholesterol
Answer: D
Diff: 3 Page Ref: 500-502

50) Acidosis (ketoacidosis) occurs when __________ is digested.
   A) fat
   B) glycogen
   C) glucose
   D) protein
   E) glycogen or glucose
Answer: A
Diff: 3 Page Ref: 498
51) Which one of the following is NOT a main role of the liver:
   A) to detoxify drugs and alcohol
   B) to degrade hormones
   C) to make cholesterol
   D) to process nutrients during digestion
   E) to add ammonia to the blood
Answer: E
Diff: 1 Page Ref: 500-502

52) Nutrients detour through the liver via the:
   A) circle of Willis
   B) hepatic portal circulation
   C) Bowman’s capsule
   D) electron transport chain
   E) glycogenesis
Answer: B
Diff: 1 Page Ref: 500

53) Which one of the following is NOT true of cholesterol:
   A) it provides energy fuel for muscle contraction
   B) it serves as the structural basis of steroid hormones
   C) it serves as the structural basis of vitamin D
   D) it is a major building block of plasma membranes
   E) only about 15 percent comes from the diet
Answer: A
Diff: 3 Page Ref: 501-502

54) The hereditary inability of tissue cells to metabolize the amino acid phenylalanine, which can result in brain damage and retardation unless a special diet low in phenylalanine is followed, is called:
   A) cystic fibrosis
   B) cleft lip
   C) cleft palate
   D) phenylketonuria
   E) tracheoesophageal fistula
Answer: D
Diff: 2 Page Ref: 506-507

55) The reflex that helps an infant hold on to the nipple and swallow is called the:
   A) rooting reflex
   B) nursing reflex
   C) sucking reflex
   D) peristaltic reflex
   E) fetal reflex
Answer: C
Diff: 1 Page Ref: 507
True/False

1) Another name for the alimentary canal is the gastrointestinal (GI) tract.
   Answer: TRUE
   Diff: 1       Page Ref: 470

2) The rhythmic, wavelike propelling mechanism of the alimentary canal is called peristalsis.
   Answer: TRUE
   Diff: 1       Page Ref: 472

3) The process of mastication is simply known as chewing.
   Answer: TRUE
   Diff: 1       Page Ref: 472

4) The innermost layer of the serosa is called the parietal peritoneum.
   Answer: FALSE
   Diff: 2       Page Ref: 472

5) The lacy apron of the peritoneum that covers the abdominal organs is called the lesser omentum.
   Answer: FALSE
   Diff: 2       Page Ref: 473

6) The chief cells produce hydrochloric acid, which activates stomach enzymes.
   Answer: FALSE
   Diff: 2       Page Ref: 475

7) The small intestine runs from the pyloric sphincter to the ileocecal valve.
   Answer: TRUE
   Diff: 2       Page Ref: 475-476

8) The first portion of the small intestine is the jejunum.
   Answer: FALSE
   Diff: 1       Page Ref: 476

9) Bile enters the duodenum of the small intestine through the pancreatic duct.
   Answer: FALSE
   Diff: 3       Page Ref: 476

10) Villi are projections of the mucosa of the stomach.
    Answer: FALSE
             Diff: 2       Page Ref: 476-477

11) The ascending colon is found on the left side of the abdominal cavity.
    Answer: FALSE
             Diff: 2       Page Ref: 478

12) The segment of the colon to which the appendix is attached is the cecum.
    Answer: TRUE
             Diff: 1       Page Ref: 477-478
13) The anal canal has a voluntary sphincter formed by smooth muscle only.
   Answer: FALSE
   Diff: 1    Page Ref: 478

14) Small pocketlike sacs within the large intestine that most often are partially contracted are called haustra.
   Answer: TRUE
   Diff: 2    Page Ref: 479

15) The enamel found on teeth is heavily mineralized with calcium salts and comprises the hardest substance within the entire body.
   Answer: TRUE
   Diff: 2    Page Ref: 480

16) The bicuspid are also called wisdom teeth.
   Answer: FALSE
   Diff: 1    Page Ref: 479

17) Pancreatic enzymes are released into the stomach to break down all categories of digestible foods.
   Answer: FALSE
   Diff: 2    Page Ref: 480

18) Bile is produced by the liver but stored in the gallbladder.
   Answer: TRUE
   Diff: 2    Page Ref: 481

19) Food within the lumen of the alimentary canal is considered to be outside the body.
   Answer: TRUE
   Diff: 2    Page Ref: 483

20) The involuntary phase of swallowing is called the buccal phase.
   Answer: FALSE
   Diff: 2    Page Ref: 485

21) Diverticulosis occurs when mucosa become inflamed and protrude through the wall of the small intestine.
   Answer: FALSE
   Diff: 3    Page Ref: 492

22) Enzymes of the microvilli are called brush border enzymes.
   Answer: TRUE
   Diff: 2    Page Ref: 489

23) Absence of either bile or pancreatic juice indicates that no fat digestion or absorption is occurring. This can lead to blood-clotting problems because the liver needs vitamin K to make prothrombin.
   Answer: TRUE
   Diff: 3    Page Ref: 491
24) Secretin and cholecystokinin influence the release of both pancreatic juice and bile.
   Answer: TRUE
   Diff: 2   Page Ref: 491

25) Fats are absorbed by active transport in the small intestine.
   Answer: FALSE
   Diff: 2   Page Ref: 492

26) Mass movements are slow-moving contractile waves that move over large areas of the colon three or four times each day.
   Answer: TRUE
   Diff: 2   Page Ref: 492

27) Sugars and starches are classified as lipids.
   Answer: FALSE
   Diff: 1   Page Ref: 494

28) Anabolism is the process in which larger molecules are built from smaller ones.
   Answer: TRUE
   Diff: 2   Page Ref: 495

29) Fat metabolism can result in acidosis (ketoacidosis).
   Answer: TRUE
   Diff: 2   Page Ref: 498

30) Optimal health of tissues is achieved when HDL and LDL are present in equal amounts within the bloodstream.
   Answer: FALSE
   Diff: 2   Page Ref: 502

31) The body's thermostat, which constantly regulates body temperature, is located within the hypothalamus.
   Answer: TRUE
   Diff: 1   Page Ref: 504

32) Watery stools that result when food residue is rushed through the large intestine before sufficient water has been reabsorbed, causing dehydration and electrolyte imbalance, is called constipation.
   Answer: FALSE
   Diff: 1   Page Ref: 493
Matching

*Match the following nutrients with their associated digestive enzymes:*

1) Proteins
   - Diff: 2
   - Page Ref: 485
   - A) bile
     - B) pepsinogen

2) Lactose
   - Diff: 2
   - Page Ref: 484
     - C) pepsinogens

3) Starch
   - Diff: 2
   - Page Ref: 485
     - D) nuclease
     - E) hydrochloric acid

4) Fat
   - Diff: 2
   - Page Ref: 490
     - F) lipase

5) Nucleic acids
   - Diff: 2
   - Page Ref: 490
     - G) lactase
     - H) amylase

1) C  2) G  3) H  4) F  5) D
Identify the digestive organ that is primarily associated with the following digestive function:

6) Primary site of water absorption
   A) anus
   B) ileum

7) Site where starch digestion begins
   C) small intestine
   D) large intestine

8) Tube through which food is propelled but no digestion takes place
   E) mouth
   F) esophagus
   G) stomach

9) Site where the beginning of protein digestion occurs
   H) rectum
   I) duodenum

10) Site where pancreatic enzymes and bile enter the alimentary canal
    Diff: 2   Page Ref: 476

11) Site of vitamin K synthesis by bacteria
    Diff: 2   Page Ref: 492

12) Site of initiation of the defecation reflex
    Diff: 2   Page Ref: 492

Match the following terms or phrases with the appropriate nutrient:

13) Glucose and glycogen
   Diff: 1  Page Ref: 496; 500
   A) carbohydrates
   B) proteins

14) Amino acids
   Diff: 1  Page Ref: 494–495
   C) minerals

15) Coenzymes
   Diff: 1  Page Ref: 495
   D) vitamins
   E) lipids

16) Calcium, phosphorus, potassium
   Diff: 1  Page Ref: 495

17) Triglycerides
   Diff: 1  Page Ref: 494

18) Fiber
   Diff: 1  Page Ref: 494


Essay

1) Describe the four layers of the GI tract.
   Answer: 1. Mucosa is the moist innermost layer; it lines the cavity of the organ.
            2. The submucosa is found beneath the mucosa layer. It contains blood vessels, nerve endings, lymph nodules, and lymphatic vessels.
            3. The muscular externis is the next layer, which is typically made up of a circular and a longitudinal layer of smooth muscle.
            4. The outermost layer is the serosa, which consists of two single layers of cells. The innermost serosa is the visceral peritoneum while the outermost layer is the parietal peritoneum. Between these layers is serous fluid.
   Diff: 1  Page Ref: 472

2) Identify and describe the six major processes involved in gastrointestinal activity.
   Answer: Ingestion is the active, voluntary process of placing food into the mouth. Propulsion involves all of the actions involved in moving food along the alimentary canal from the mouth to the anus, including swallowing, peristalsis, segmentation, and mass movements. Mechanical digestion involves all of the activities that break food down into smaller pieces to prepare them for further degradation by enzymes. Chemical digesting, the next step of food breakdown, involves the sequence of steps by which large food molecules are broken down to their building blocks by enzymes. Absorption is the mechanism by which digested end products are moved from the lumen of the GI tract into the blood or lymph. The final process is defecation, which is the elimination of indigestible substances from the body via the anus as feces.
   Diff: 2  Page Ref: 481–484
3) Explain the various processes of food propulsion.
   Answer: Deglutition (swallowing) includes two phases, one voluntary and one involuntary. The voluntary phase is called the buccal phase, and it involves movement of the food bolus by the tongue into the pharynx. The involuntary phase is called the pharyngeal-esophageal phase, and it involves blockage of all routes except the esophageal route while the bolus is moved through the pharynx and into the esophagus. This reflex is regulated by the parasympathetic nervous system. Peristalsis is the rhythmic, wavelike motion of the stomach and intestines. It involves waves of contraction that move chyme along, followed by waves of relaxation. Another mechanism of food propulsion is segmentation of the small intestine. Although its chief function is mixing chyme with digestive juices, it also assists in propulsion. Mass movements are another mechanism by which food is moved through the GI tract, which occur three to four times a day, typically just after eating. They are powerful contractions that move over the colon and force contents toward the rectum to be stored until defecation. The presence of feces in the rectum initiates the defecation reflex, which causes the walls of the sigmoid colon and rectum to contract while relaxing the anal sphincters.
   Diff: 2  Page Ref: 481-482

4) Explain the role of the hormones cholecystokinin and secretin in regulating the release of bile and pancreatic juices.
   Answer: When chyme enters the small intestine, it stimulates the mucosa cells to produce the hormones cholecystokinin and secretin. These hormones travel in the bloodstream to their target organs: the pancreas, liver, and gallbladder. The pancreas responds to cholecystokinin by releasing enzyme-rich pancreatic juice and secretin causes the secretion of bicarbonate-rich pancreatic juice. The liver responds to secretin by releasing bile while cholecystokinin stimulates the gallbladder to release stored bile.
   Diff: 3  Page Ref: 491

5) Explain what vitamins and minerals are and identify their importance to the body.
   Answer: Vitamins are water-soluble, fat-soluble, or organic nutrients that the body requires in small amounts. Most function as coenzymes that enable an enzyme to accomplish a particular type of catalysis. Vitamins are found in all major food groups, and a balanced diet is the best way to ensure a full vitamin complement. Minerals are inorganic substances, such as calcium, potassium, and sodium, that the body also requires in adequate supply. The foods highest in mineral content are vegetables, legumes, milk, and some meats.
   Diff: 2  Page Ref: 495
6) Discuss the anaerobic and aerobic mechanisms by which body cells generate adenosine triphosphate (ATP).

Answer: Cellular respiration includes all of the oxygen-dependent processes by which energy from the breakdown of glucose is captured within chemical bonds which unite adenosine diphosphate (ADP) and inorganic phosphate into the body’s preferred metabolic fuel, adenosine triphosphate (ATP). One process, glycolysis, energizes each glucose molecule so that it can be split into two pyruvic acid molecules to yield ATP. The Krebs cycle, located within the mitochondria, produces all the carbon dioxide and water that results during cellular respiration, and it yields a small amount of ATP as well. The electron transport chain, also located within the mitochondria, is the primary producer of ATP. Hydrogen atoms removed during glycolysis and the Krebs cycle are delivered to the protein carriers of the electron transport chain, which form part of the mitochondrial cristae membranes. There the hydrogen atoms are split into their positive ions and negative electrons. The electrons then travel from carrier to carrier in a series of steps that enable phosphate to attach to ADP to form ATP.

Diff: 3  Page Ref: 496

7) Explain why there is really no such thing as "good" or "bad" lipoprotein cholesterol.

Answer: Lipoproteins transport cholesterol and fatty acids. Low-density lipoproteins (LDLs) transport cholesterol and other lipids to body cells for use in a variety of ways. If there are large amounts of circulating LDLs, some fatty substances may be deposited on arterial walls, which is the reason they are associated with heart disease risk and have sometimes been labeled "bad." However, they are a necessary transport substance, so the key is to have LDLs in the acceptable range. High-density lipoproteins (HDLs) transport cholesterol from the tissue cells or arteries to the liver for disposal in bile. Because they transport cholesterol away from the arteries, they have sometimes been labeled "good." Again, they are a necessary transport substance, and the key is to have HDLs in the proper ratio with LDLs, so that whatever excess cholesterol is moved in by the LDLs can be moved out again by the HDLs. It is their relative ratio that is important. Both are necessary, and neither should be considered "good" nor "bad."

Diff: 2  Page Ref: 502