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## Digestive System

### Answers and Explanations

#### I. Introduction to the Digestive System

##### A. Multiple Choice Questions

1. (a) – Deglutition, or swallowing, involves forming a bolus and then creating sufficient pressure within the oral cavity to force the food into the oropharynx.
2. (d) – Absorption is an essential aspect of digestion because ingested food is not technically within the body until it is absorbed.
3. (b) – The spleen is an organ of the circulatory/lymphatic system.

##### B. True–False Questions

1. True – Much of the food ingested is never within the body and constitutes the bulk of the fecal material.
2. True – Digestion requires both chemical and physical action on the ingested food.
3. True – Molecules of food are absorbed through the mucosa of the small intestine to enter either capillaries of the circulatory system or vessels of the lymphatic system.
4. False – The GI tract begins at the oral cavity and ends at the anus.
5. False – *Gut* refers to the developing GI tract, and *viscera* is used with reference to any of the organs within the thoracic and abdominopelvic cavities.

#### II. Serous Membranes and Tunics of the Gastrointestinal Tract

##### A. Multiple Choice Questions

1. (b) – The parietal peritoneum lines the abdominal wall, and the visceral peritoneum covers abdominal viscera. The peritoneal cavity is the potential space between the two peritoneal membranes.
2. (d) – The small intestine and the large intestine are not individually compartmentalized.
3. (c) – With a few exceptions (modifications), the tunics of the GI tract are the same regardless of the region.
4. (e) – Distinct tissues compose each of the four tunics of the GI tract.

##### B. True–False Questions

1. True – The peritoneum is a large continuous sheet of tissue that lines the abdominal cavity and covers abdominal visceral organs.
2. True – The mesentery is formed as two portions of the parietal peritoneum come together. The vessels and nerves that serve the viscera are sandwiched between the double-layered membrane.
3. False – The lamina propria is the supporting portion of the mucosa, just internal to the submucosa.
4. False – Parasympathetic stimulation of the GI tract through the vagus nerves increases peristalsis and intestinal secretion.

#### III. Mouth, Pharynx, and Associated Structures

##### A. Multiple Choice Questions

1. (e) – The fauces is the opening of the oral cavity into the oropharynx.
2. (c) – The lingual frenulum secures the tongue to the floor of the mouth. If it is too tight, however, movements of the tongue are restricted.
3. (e) – The roughened surface provided by the papillae aids in handling food and is an ideal surface for taste buds.
4. (d) – The epiglottis is a structure of the larynx, deep within the neck region.
5. (d) – Incisors are chisel-shaped for effective shearing of food.
6. (d) – The 32 permanent teeth include 8 incisors, 4 canines, 8 premolars, and 12 molars.
7. (b) – Premolars are present only in permanent dentition.

8. (b) – Enamel covers the dentin and the dentin surrounds the pulp. The cementum surrounds only the root of the tooth.
9. (e) – Adequate saliva is important to initiate digestion, aid in the formation of a bolus, and cleanse the teeth.
10. (b) – Positioned over the masseter muscle, the parotid gland is the largest of the salivary glands.

B. True–False Questions

1. True – The skin lining the mouth and pharynx is protective; it also heals readily because the outer cell layers are alive and have a rich blood supply.
2. True – The superior labial frenulum and the inferior labial frenulum can be readily palpated with the tongue where the lips are joined to the gums.
3. False – The tongue is composed of skeletal muscle fibers.
4. False – The sparse vallate papillae form an inverted V pattern on the back surface of the tongue. Filiform papillae are the most numerous.
5. False – The palatal rugae are stationary structures covering the hard palate.
6. True – Two of the three pairs of tonsils are located within the oral cavity. The pharyngeal tonsils (adenoids) are located in the nasopharynx.
7. True – The last molar in each row of teeth, sometimes referred to as the wisdom tooth, is included in the 32 permanent teeth in the dental arch.
8. False – Serous and mucous cells are found in all salivary glands in various proportions.

#### IV. Esophagus and Stomach

A. Multiple Choice Questions

1. (d) – The esophageal hiatus is the opening in the diaphragm through which the esophagus passes. It is the site at which a hiatal hernia may occur.
2. (c) – It is during the second stage of deglutition that the bolus of food is moved out of the oral cavity.
3. (d) – Fats are absorbed in the small intestine after they are acted upon by chemicals contained within bile.
4. (a) – The antrum is not a structure of the stomach; it is a fluid-filled cavity of an ovarian follicle.
5. (d) – The pyloric sphincter is a thickened specialized portion of the circular layer of the muscularis.

B. True–False Questions

1. True – The esophagus begins at the level of the larynx, where it is continuous with the pharynx.
2. True – Regurgitated gastric juices are irritating to the lining of the esophagus.
3. False – The first stage of deglutition is voluntary, but once started it becomes involuntary.
4. False – Elevation of the uvula during swallowing prevents food or fluid from passing into the nasopharynx.
5. True – An additional oblique layer of the muscularis is found only in the stomach.

#### V. Small Intestine

A. Multiple Choice Questions

1. (d) – The small intestine is pendulously supported by the mesentery, which permits it to move during peristalsis.
2. (d) – *Hepato*– has reference to the liver, and *pancreatic* has reference to the pancreas.
3. (a) – Pepsin is secreted by specialized mucosal cells found in the stomach.
4. (d) – Because of the extensive vascularity within the small intestine, many lymph nodes are present to process lymph.
5. (e) – The microvilli that compose the brush border of the small intestine aid in absorption of nutrients.
6. (b) – Haustra are present only in the large intestine.

B. True–False Questions

1. False – Although the small intestine is largely supplied by the superior mesenteric artery, branches from the celiac trunk and the inferior mesenteric artery supply certain portions.
2. False – There is a common opening into the duodenum from the common bile duct and the pancreatic duct.
3. False – The ileum is the longest portion of the small intestine.

4. True – Within the villi, fats are absorbed into the lymphatic system. All other nutrients are absorbed into the circulatory system.
5. True – By increasing surface area and secreting enzymes, the brush border plays a major role in the digestive process.
6. False – Rhythmic segmentations, pendular movements, and peristalsis are three distinct movements of the small intestine, each of which acts on the chyme.

## VI. Large Intestine

### A. Multiple Choice Questions

1. (e) – All of the statements regarding the structural and functional characteristics of the large intestine are true.
2. (a) – Each region of the large intestine has a specific function in processing undigested food.
3. (d) – The splenic flexure of the large intestine so named because of its proximity to the spleen.
4. (c) – Villi are found only in the small intestine.
5. (b) – Sympathetic innervation depresses GI activity, parasympathetic innervation stimulates GI activity, and visceral afferent monitors GI activity.
6. (a) – Pendular churning occurs only in the small intestine.

### B. True–False Questions

1. True – The appendix is a vestigial structure that plays a limited role in body immunity.
2. False – The internal anal sphincter is composed of smooth muscle fibers.
3. False – The three bands of taeniae coli traverse the large intestine longitudinally.
4. False – Mass movement generally corresponds with feeding.
5. True – A defecation sensation alerts the cerebrum (one’s consciousness) of the need to defecate.
6. True – The defecation reflex causes the rectal muscles to contract and the internal anal sphincter to relax, forcing feces into the anal canal.

## VII. Liver, Gallbladder, and Pancreas

### A. Multiple Choice Questions

1. (b) – The four lobes of the liver are the right lobe, left lobe, caudate lobe, and quadrate lobe.
2. (a) – *Hepato-* has reference to the liver and *-cyte* is a suffix meaning “cell.”
3. (e) – All of the statements regarding the lobule of the liver are true.
4. (b) – No digestive enzymes are secreted by the liver.
5. (a) – Bilirubin is produced from the breakdown of red blood cells.
6. (a) – Glucagon and insulin are the two endocrine products produced by the pancreas, and both are secreted into the bloodstream.
7. (c) – Acini secrete pancreatic juice that travels through the pancreatic duct to the duodenum.
8. (c) – Enterokinase is a digestive enzyme secreted by intestinal glands.

### B. True–False Questions

1. False – The ligamentum teres (round ligament) extends from the falciform ligament to the umbilicus. The falciform ligament attaches the liver to the diaphragm.
2. True – The hepatocytes and the surrounding sinusoids are the functional units of the liver.
3. False – The drainage of bile from the liver is through bile canaliculi, bile ducts, and then hepatic ducts.
4. False – The gallbladder stores and concentrates bile.
5. False – Bile is forced into the gallbladder through the cystic duct and bile flows from the gallbladder through the cystic duct.
6. False – The pancreas serves both the endocrine and digestive system and is therefore a mixed gland. The liver serves only the digestive system and is not a mixed gland.
7. True – The bulk of the pancreas lies behind the parietal peritoneum (is retroperitoneal).

## VIII. Developmental Exposition of the Digestive System

### A. Multiple Choice Questions

1. (d) – The gut and the accessory digestive glands of the abdominal cavity are derived from endoderm.
2. (d) – The cecum is derived from the midgut.
3. (b) – The structures composing the distal portion of the small intestine and the proximal portion of the large intestine are derived from the midgut.

### B. True–False Questions

1. False – *Gut* refers to the developing GI tract.
2. False – The oral cavity, pharynx, anus, and anal canal are derived from ectoderm.
3. True – Before the bone marrow matures, blood cells are formed in the liver. The liver is the largest visceral organ in an adult and accounts for about 10% of the weight of a 9-week-old fetus.

### C. Matching Questions

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|--------|--------|--------|
| 1. (b) | 3. (a) | 5. (a) |
| 2. (c) | 4. (c) | 6. (b) |

## IX. Clinical Considerations

### A. Multiple Choice Questions

1. (d) – Hepatomas are malignant tumors that originate in or secondarily invade the liver. A hepatoma is an acquired disease, not a congenital disorder.
2. (b) – Botulism is a type of food poisoning caused by the bacterium *Clostridium botulinum*. Foods that have been improperly prepared may contain the spores for this organism. The poison from *C. botulinum* is a neurotoxin that is readily absorbed into the blood.
3. (d) – Hepatitis is inflammation of the liver and is generally caused by infectious viral agents that may be transmitted in blood plasma during transfusions or by improperly sterilized needles and syringes.
4. (a) – The sphincter of ampulla regulates the flow of bile and pancreatic juice into the duodenum. A stenosis is a constriction that inhibits proper flow.
5. (a) – Peritonitis can affect only those organs within the peritoneal cavity, which is below the level of the diaphragm. The esophagus traverses the thoracic cavity and is not located within the peritoneal cavity.

### B. Matching Questions

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|--------|--------|---------|
| 1. (h) | 5. (a) | 8. (f)  |
| 2. (j) | 6. (e) | 9. (g)  |
| 3. (c) | 7. (i) | 10. (d) |
| 4. (b) |        |         |

## X. Chapter Review

### A. Completion Questions

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|----------------------------|--------------------------|
| 1. Peristalsis             | 11. myenteric plexus     |
| 2. absorption              | 12. fauces               |
| 3. Mastication/deglutition | 13. heterodont           |
| 4. gut                     | 14. gastric rugae        |
| 5. ectodermal/endodermal   | 15. sphincter of ampulla |
| 6. cloaca                  | 16. superior mesenteric  |
| 7. mesentery               | 17. ileum                |
| 8. parietal peritoneum     | 18. villi                |
| 9. retroperitoneal         | 19. taeniae coli         |
| 10. mucosa                 | 20. mesocolon            |

### B. Matching Questions

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|-----------------|--------------|
| 1. B, (a)       | 5. C, (b)    |
| 2. A, B, D, (c) | 6. D, (a)    |
| 3. B, (d)       | 7. D, E, (f) |
| 4. D, E, (e)    | 8. E, (c)    |