Chapter 9 – The Digestive System

Complete using BC Biology 12, page 262 – 293

9.1 The Digestive Tract

1. Put these functions of the digestive system in order from beginning to end: absorb, digest, eliminate, ingest,

   First step of digestion

   __________________________

   __________________________

   __________________________

   Last step of digestion

   __________________________

2. Distinguish between mechanical digestion and chemical digestion.

   Refer to both the process and give an example of a digestive structure that performs that process.

   __________________________

   __________________________

   __________________________

3. Complete the diagram with the following terms:

   A. anus
   B. esophagus
   C. gallbladder
   D. large intestine
   E. liver
   F. pancreas
   G. pharynx
   H. rectum
   I. salivary glands
   J. stomach
   K. small intestine
   L. tongue

4. Labels to add to the diagram:

   M. appendix
   N. diaphragm
   O. cardiac sphincter
   P. pyloric sphincter
5. Match the parts from the last question to their correct functions below

______ referred to by the term “gastric”; begins breakdown of proteins; acidic contents kills most bacteria
______ small, pear-shaped muscular sac attached to liver; storage of bile
______ relaxation of this muscle allows food to enter stomach, constriction reduces chance of heartburn
______ produces sodium bicarbonate (neutralize stomach acid), digestive enzymes, insulin and glucagon
______ elimination of solid wastes from the body
______ manipulates food to create a soft ball called a “bolus”
______ absorption of water, salts and some vitamins
______ passageway for both food and air
______ regulates the passage of partially digested food from stomach to small intestine
______ end of the large intestine; storage of indigestible material
______ absorption of nutrients; inner surface has high surface area due to folds called “villi”
______ tube allowing passage of food from mouth to stomach
______ wormlike projection found at the end of the cecum; thought to have a role in fighting infection
______ sheet of muscle that separates the abdominal and thoracic cavities
______ largest gland in the body; numerous functions including production of bile and detoxifying blood
______ makes food moist for ease of passage; produce a digestive enzyme to begin breakdown of starch

6. **Mouth**: Bound externally by the __________________________ and the __________________________. Sensory receptors called __________________________ are located on the __________________________ which is composed of __________________________ muscle. The roof of the mouth separates the __________________________ from the mouth preventing ingested food from entering that area.

The roof has two parts: an anterior __________________________ and a posterior ________________ ________________. The hard palate consists of several __________________________ but the __________________________ palate is composed of __________________________ and __________________________ tissue. The soft palate ends in a finger-shaped projection called the __________________________.

7. Discuss the **salivary glands** using at least 3 different points.

- __________________________________
- __________________________________
- __________________________________

8. As the pharynx serves as a passageway for both food and air, what process is stopped while swallowing?

- __________________________________

9. Describe the process of swallowing in a minimum of 3 steps.

- __________________________________
- __________________________________
- __________________________________

10. What is an “Adam’s apple”? __________________________________

11. Define **peristalsis**: __________________________________

    What is **reverse peristalsis** more commonly known as? __________________________________
12. When stomach acid comes in contact with the esophagus, the result is called __________________ or __________________. A more serious form of this is __________________________(GERD) which may lead to more problems such as __________________, __________________, or even __________________ cancer.

13. Fill in the table below regarding an adult stomach

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average length</td>
<td></td>
</tr>
<tr>
<td>Diameter</td>
<td></td>
</tr>
<tr>
<td>Maximum volume</td>
<td></td>
</tr>
<tr>
<td>Chemical contents</td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td></td>
</tr>
<tr>
<td># of muscle layers</td>
<td></td>
</tr>
<tr>
<td>Length of time food spends here</td>
<td></td>
</tr>
</tbody>
</table>

14. What is the difference between a bolus and chyme?  

15. Compare the following organs.

<table>
<thead>
<tr>
<th></th>
<th>Small Intestine</th>
<th>Large Intestine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absorbs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16. What is the name of the beginning section of the small intestine?  
What is special about this section?

17. The inner surface of the small intestine contains fingerlike projections.
   On the diagram below, label: artery, lacteal (lymphatic capillary), lymphatic vessel, microvilli, vein, villi
18. Using the terms from the last question, fill in the blanks.
Glycerol and fatty acids are packaged and enter the ________________.
Sugars and amino acids enter the ________________ and ________________.

19. Name the hormones that promote the secretion of various digestive juices.
____________________ stimulated after eating a protein rich meal
____________________ stimulated by acid present in chyme
____________________ stimulated by partially digested protein and fat

20. Give the four components of the large intestine:
• ________________
• ________________

9.2 Accessory Organs of Digestion

21. Along with the salivary glands, the ________________, ________________, and ________________ are considered to be accessory digestive organs. What do you think the term “accessory” means in this context? ________________

22. Briefly describe the endocrine and exocrine functions of the pancreas.
• Endocrine: ________________
• Exocrine: ________________

23. Draw a diagram to explain the role of insulin and glucagon. See Figure 9.9 on page 272 for guidance.

24. List seven functions of the liver (there are actually hundreds of known functions!)
1. ________________
2. ________________
3. ________________
4. ________________
5. ________________
6. ________________
7. ________________
25. Bile is produced by the liver and stored in the gall bladder. The yellowish-green colour is due to the presence of __________ derived from the breakdown of __________. Bile also contains __________ derived from __________. Bile is responsible for __________ fat in the small intestine allowing it to be acted upon by digestive enzymes.

26. Why can we survive without a gallbladder but not without our liver?

27. The clues describe what is brought broken down, the site of action and the optimum pH for the enzyme.

### Across

3. Starch to maltose; small intestine; basic pH  
7. RNA & DNA to nucleotides; small intestine; basic pH  
9. Peptides to amino acids; small intestine; basic pH  
10. Fat droplet to glycerol and fatty acids; small intestine; basic pH

### Down

1. Protein to peptides; stomach; acidic pH  
2. Starch to maltose; mouth; neutral pH  
4. Protein to peptides; small intestine; basic pH  
5. Maltose to glucose; small intestine; basic pH  
6. Nucleotides to base, sugar and phosphate; small intestine; basic pH  
8. Precursor to pepsin

28. What is the role of each of the following in digestion?

- sodium bicarbonate: ________________
- hydrochloric acid: ________________
- mucus: ________________
- water: ________________
29. These are scattered through the previous sections. Match the term with the description.
   A. cleft palate ______ swelling of the salivary glands caused by a viral infection
   B. tonsillitis ______ bones of hard palate are not fused together, leaving a gap (1 in 700 newborns)
   C. mumps ______ inflammation of lining of abdominal cavity
   D. peritonitis ______ inflammation of the lymphatic glands found at the back of the mouth

30. Complete the table. Your knowledge of the disorders will not be tested but rather is provided for interest.

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Description</th>
</tr>
</thead>
</table>
| Digestive Tract | Damage of stomach wall by hydrochloric acid due to the protective layer of mucus lining stomach being broken down. What are the possible causes?  
  • (most common) |
| | Loose, watery feces caused by inability of large intestine to absorb sufficient amounts of water. Can lead to dehydration and disturbances in the heart. |
| | Chronic diarrhea. Genetic predisposition is a factor, as are several environmental factors. |
| | Feces are hard and dry. |
| | Chronic constipation can lead to this. |
| | Small growths arising from epithelial lining. Can be benign (harmless) or cancerous. |
| Accessory Organs | Inflammation of pancreas. Can be caused by excessive alcohol consumption, gallstones, or other unknown factors. |
| | Almost always fatal (20% survival one year after diagnosis) |
| | In 2009, 2.4 million Canadians had this condition. Distinguish between type 1 and type 2. |
| | Yellowish colouring in whites of eyes as well as in skin. What is it caused by? |
| | Inflammation of the liver, most commonly caused by viruses |
| | Chronic disease often seen in alcoholics. Preferred treatment is a liver transfer but supply is insufficient to meet the demand for them! |
| | Crystals form in the gallbladder and may block the common bile duct. Particularly common in people who have lost a lot of weight in a short period of time or have undergone gastric bypass procedure |
Chapter 9 Questions

1. _____ 13. _____ 25. _____ 37. _____
2. _____ 14. _____ 26. _____ 38. _____
3. _____ 15. _____ 27. _____ 39. _____
4. _____ 16. _____ 28. _____ 40. _____
5. _____ 17. _____ 29. _____ 41. _____
6. _____ 18. _____ 30. _____ 42. _____
7. _____ 19. _____ 31. _____ 43. _____
8. _____ 20. _____ 32. _____ 44. _____
9. _____ 21. _____ 33. _____ 45. _____
10. _____ 22. _____ 34. _____ 46. Match the descriptions to the part.
   a. _____ f. _____ k. _____ p. _____
   b. _____ g. _____ l. _____ q. _____
   c. _____ h. _____ m. _____ r. _____
   d. _____ i. _____ n. _____ s. _____
   e. _____ j. _____ o. _____ t. _____
49. ________________________________
50. ________________________________
52. ________________________________
53. ________________________________
56. ________________________________
65. Diagram of control of blood glucose level
   a. _____ e. _____
   b. _____ f. _____
   c. _____ g. _____
   d. _____ h. _____
68. (X) ___________________________ (Y) ___________________________ (Z) ___________________________
69. (X) ___________________________ (Y) ___________________________ (Z) ___________________________

Mark the review questions using the answer key on pages 541 - 543