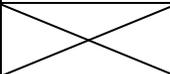
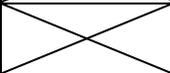


Name _____ Period _____

Chapter 41: Animal Nutrition

Concept 41.1 *An animal's diet must supply chemical energy, organic molecules, and essential nutrients*

- When asked “Why do animals eat?” you might answer something like “in order to live.” However, this would not be a college-level response, so carefully read the first two paragraphs of this concept to pull out what animals must obtain from the food they eat.
- What are *essential amino acids*? What must vegetarians do in order to obtain them?
- Table 41.1 presents a comprehensive list of vitamins, their dietary sources and functions, and the symptoms of deficiency or excess. Are you surprised to see that vitamin overdoses are possible? How could an individual have extreme excess of a vitamin?
- Which category of vitamin, *water-soluble* or *fat-soluble*, is most likely to result in overdose? Why?
- This is not a nutrition course, so you will not have to know this entire chart. But let's pull out a few terms that you are most likely to hear about. Complete this chart.

| Deficiency Disorder | Symptoms | Vitamin Deficient? | Dietary Source? |
|---|--|---------------------------|------------------------|
| <i>beriberi</i> | | | |
| <i>scurvy</i> | | | |
| <i>rickets</i> | | | |
|  | Neural tube defects in babies (see end of concept) | | |
|  | Night blindness | | |

6. Humans also require a number of dietary *minerals*. Complete this chart.

| Mineral | Major Functions | Dietary Source? |
|-------------------|------------------------|------------------------|
| <i>calcium</i> | | |
| <i>iron</i> | | |
| <i>phosphorus</i> | | |
| <i>iodine</i> | | |

7. What is the difference between being *undernourished* and *malnourished*?

Concept 41.2 *The main stages of food processing are ingestion, digestion, absorption, and elimination*

8. Tell what happens in each of these stages of food processing:

ingestion

digestion

absorption

elimination

9. As we progress through a study of human systems, you should also try to develop an evolutionary understanding of the various types of systems in different phyla. To focus on this, describe the major features of digestion in:

sponges (Porifera)

hydra (Cnidarians)

earthworm (Annelids)

bird

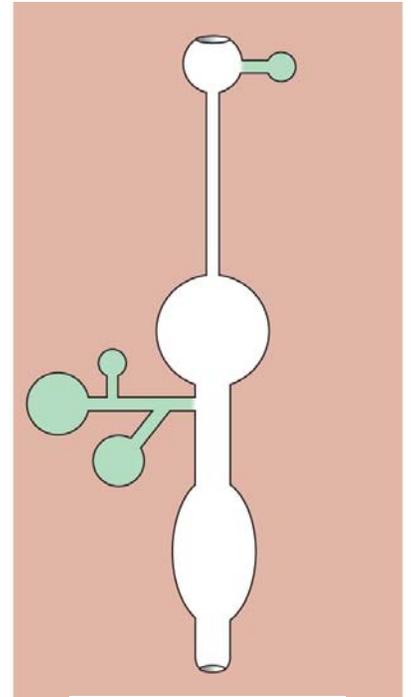
10. What is an *alimentary canal*? Where does it begin? Where does it end?

11. In what sense are nutrients from a recently ingested meal not really “inside” your body before they enter the absorption stage of food processing?

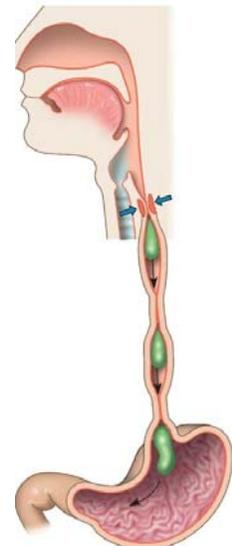
Concept 41.3 Organs specialized for sequential stages of food processing form the mammalian digestive system

12. Food is kept in compartments during digestion by muscular valves called _____.

13. This greatly simplified sketch shows the *alimentary canal* in white. This is where food will actually pass. Off to the side, in green, are the *accessory organs*. These make secretions to lubricate and digest the food, but food is never within them. Label these two regions, and then label the organs of digestion represented by each circle or bulge. Finally, review the definition of *sphincter* in the next question, and label the logical location of four sphincters on the figure at right.

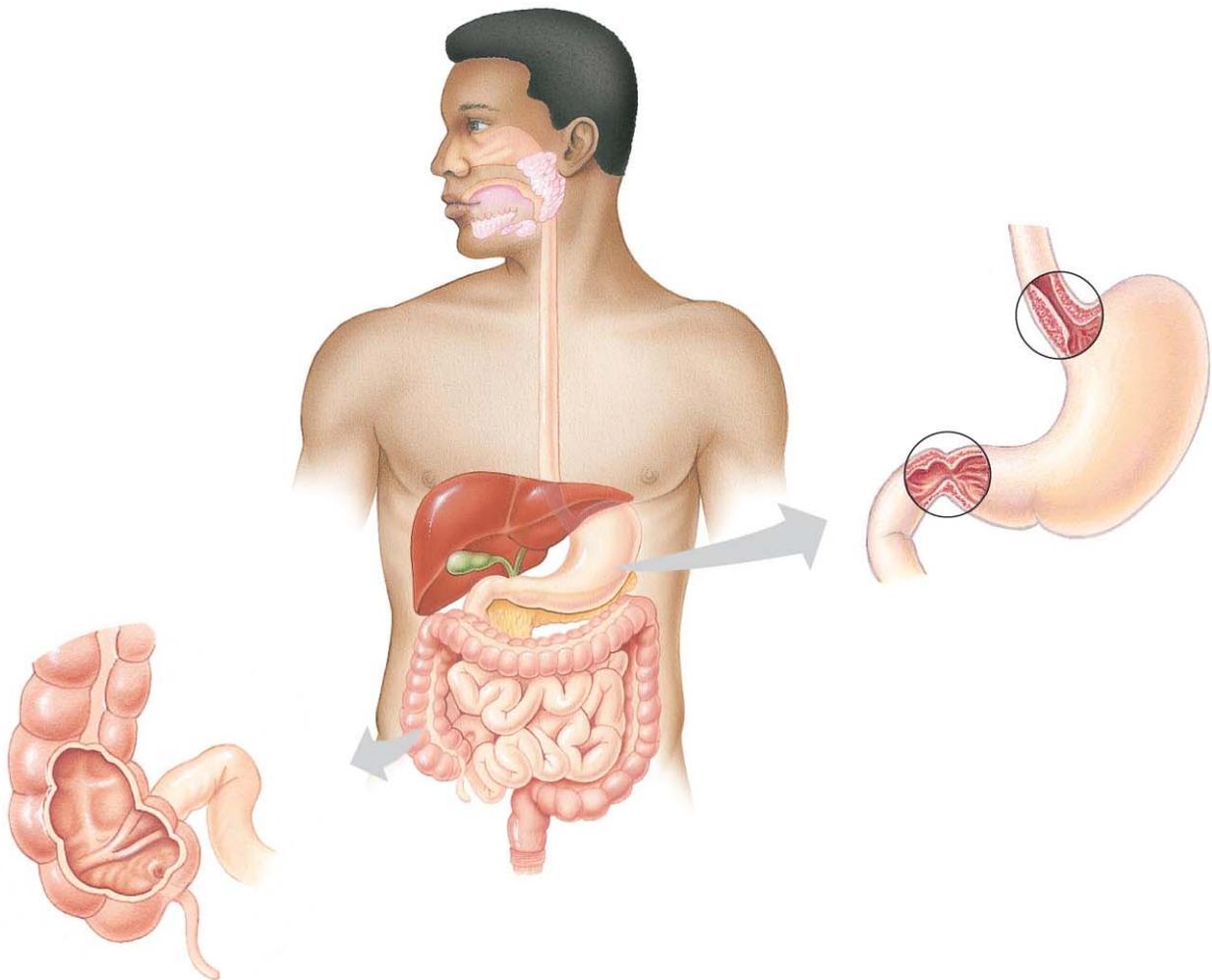


14. Digestion begins in the mouth. Label this sketch to show the *bolus* of food, the *glottis*, *epiglottis*, *trachea*, *pharynx*, *esophagus*, and two *sphincters*.

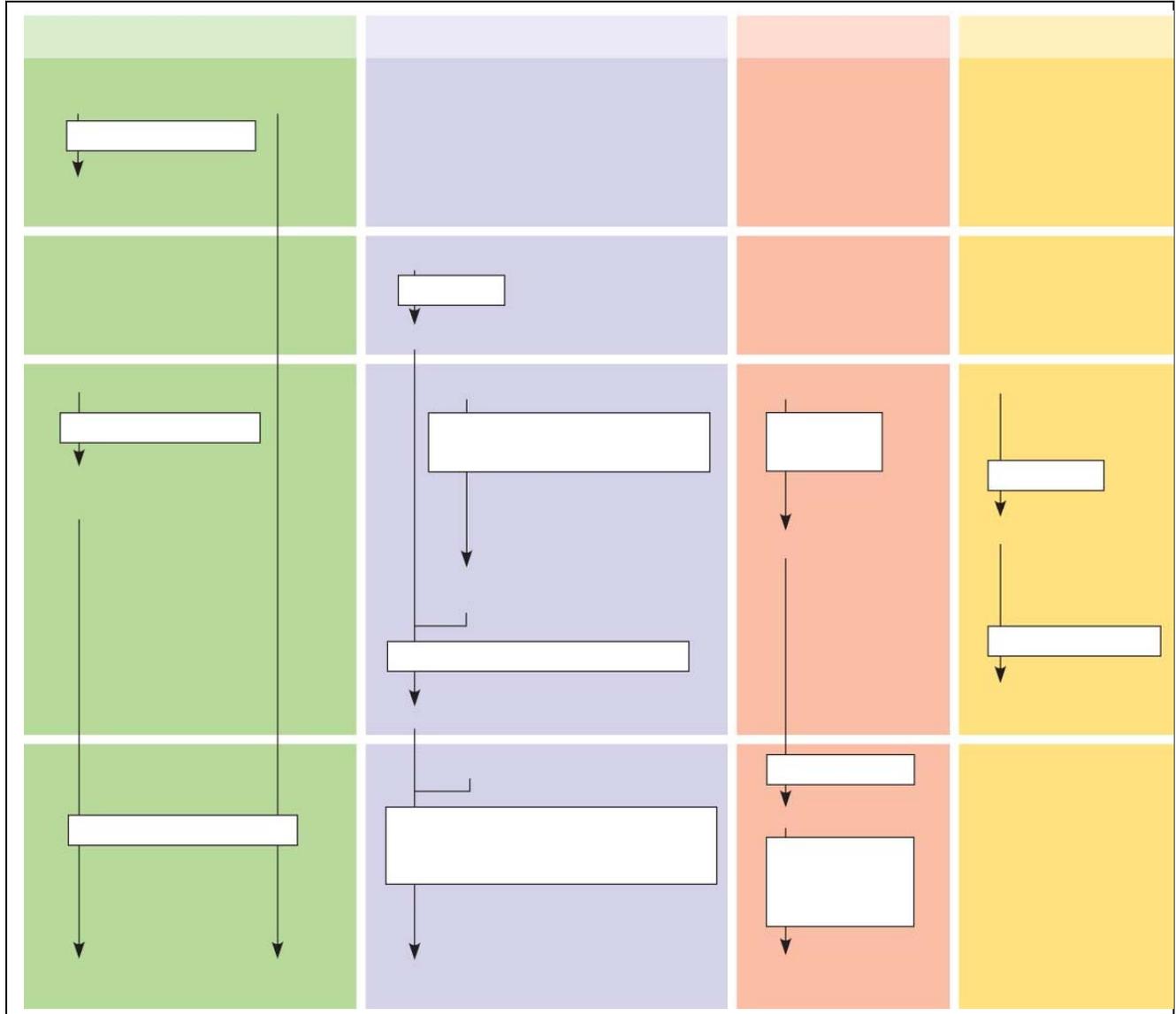


15. Is the person in question 14 able to breathe?

16. What keeps food from entering the lungs when we swallow?
17. What is the term for the wavelike muscular contractions that are moving the bolus to the stomach?
18. There are two types of digestion, *mechanical* and *chemical*. What type involves *enzymes*?
19. What type of digestion is accomplished by the chomping of the teeth and the churning activity of the stomach?
20. Use this diagram to learn the details in this section. As you read about what happens in each organ, label it to show its name and what it produces or does. This page should be filled!



21. Many enzymes are involved in the process of digestion. Begin by labeling the columns *carbohydrates*, *proteins*, *nucleic acids*, and *fats* and the rows *mouth*, *stomach*, *lumen of small intestine*, and *epithelium of small intestine*. You need to know where each enzyme is produced and what its substrates and products are. This will require careful study of the following sketch. Review this sketch until you can complete it from memory.



22. Here are some digestive secretions that are not enzymes. What is the function of each?

mucus

bile

bicarbonate

hydrochloric acid

23. In this chart, list the three types of gastric glands, the secretion of each, and the function of the secretion.

| Type of Gastric Gland | Secretion | Function of Secretion |
|-----------------------|-----------|-----------------------|
| | | |
| | | |
| | | |
| | | |

24. Does stress cause ulcers? Discuss the finding that received the 2005 Nobel Prize.
25. What is the pH of the stomach? _____ Of the small intestine? _____
26. Explain, based on tertiary structure, why *pepsin* does not function in the small intestine.
27. What is the function of *bile*?
28. Where is *bile* produced? _____ Where is it stored? _____
29. Remember the mantra: *Structure fits function*. How is that true for the *villi* of the small intestine?
30. Digestive enzymes are not constantly produced. Explain the role of each of these *hormones* in regulating digestion:
- gastrin**
 - secretin**
 - cholecystokinin (CCK)**

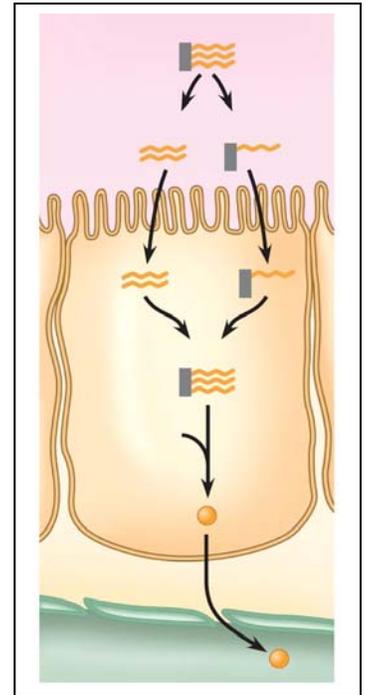
31. *Triglycerides* are digested by lipase, diffuse into epithelial cells of the villi, and are packed into *chylomicrons*. Where do these chylomicrons go?

32. Use the sketch at right to explain the absorption of fats.

33. What are the *lacteals*?

34. Monosaccharides and amino acid move directly into capillaries in the villi and then travel to the liver via the *hepatic portal vein*. What two major functions does this arrangement serve?

35. Summarize here: What are the two functions of the small intestine?



36. The small intestine connects to the *large intestine* at a T-shaped junction. One arm forms a blind pouch called the *cecum*. What is the role of the cecum in grazing animals?

37. What is the human *appendix*? What is its role?

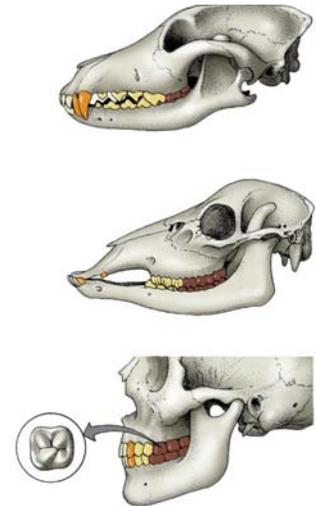
38. What is a major function of the colon?

39. What makes up the *feces*?

40. Your colon is inhabited by an immense number of bacteria. Although they produce sometimes embarrassing gases and odors, they are actually your friends. What do your *symbiotic bacteria* do for you?

Concept 41.4 Evolutionary adaptations of vertebrate digestive systems correlate with diet

41. From a study of the *dentition* of a mammal's skull, you should be able to determine its diet. Explain. The sketch at right may be helpful in your explanation.



42. Why do *herbivores* have longer alimentary canals than those of *carnivores*?

Testing Your Knowledge: Self-Quiz Answers

Now you should be ready to test your knowledge. Place your answers here:

1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____