Section 30–1 The Chordates (pages 767–770)

TEKS FOCUS: 7B Phylogeny; 10A Body systems; TEKS SUPPORT: 7A Change in species using anatomical similarities, embryology; 10B Interrelationships of body systems

This section describes the characteristics shared by all chordates. It also tells about the two groups of nonvertebrate chordates.

What Is a Chordate? (page 767)

1. List the four key characteristics of a chordate.
   a. Dorsal, hollow nerve cord
   b. Notochord
   c. Pharyngeal pouches
   d. Tail that extends beyond the anus

Use the diagram below to match the description of the chordate characteristic with its structure.

Structure

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Connects nerves to internal organs, muscles, and sense organs</td>
</tr>
<tr>
<td>3. Long supporting rod located just below the nerve cord</td>
</tr>
<tr>
<td>4. Paired structures in the throat region</td>
</tr>
<tr>
<td>5. Contains bone and muscle</td>
</tr>
</tbody>
</table>

Most Chordates Are Vertebrates (page 768)

6. What structure do most vertebrates have? 

7. What chordate structure becomes the spinal cord in vertebrates?
8. The backbone is made of individual segments called ____________ that enclose and protect the spinal cord.

9. Circle the letter of each sentence that is true about vertebrates.
   a. A vertebrate’s backbone is part of an endoskeleton.
   b. The endoskeleton supports and protects the animal’s body.
   c. The endoskeleton must be shed as the animal grows.
   d. The endoskeleton is made entirely of nonliving material.

Nonvertebrate Chordates (pages 769–770)

10. How are tunicates and lancelets similar to each other? ________________

11. What evidence indicates that vertebrates and nonvertebrate chordates evolved from a common ancestor? ________________

12. Circle the letter of each characteristic found only in tunicate larvae and not in tunicate adults.
   a. tunic
   b. tail
   c. hollow nerve cord
   d. notochord

13. Is the following sentence true or false? Both larval and adult tunicates are filter feeders. ________________

14. Circle the letter of each characteristic found in lancelets.
   a. definite head region
   b. jaws
   c. notochord
   d. fins

15. Is the following sentence true or false? Lancelets use the pharynx for feeding and gas exchange. ________________

16. How is blood moved through the body of a lancelet? ________________

Reading Skill Practice

A Venn diagram is a useful tool to compare and contrast two things. Construct a Venn diagram to compare and contrast the characteristics of tunicates and lancelets. See Appendix A for more information about Venn diagrams. Do your work on a separate sheet of paper.
Section 30–2 Fishes (pages 771–781)

TEKS FOCUS: 7B Diversity, adaptation; 10A Body systems; 12C Variations and tolerances of animals in different biomes; TEKS SUPPORT: 7A Fossils, anatomical similarities

This section describes the basic characteristics of fishes, their evolutionary history, and how they are adapted for a life in water. It also tells about the three main groups of fishes.

What Is a Fish? (page 771)

1. Write the function of each characteristic of fishes.
   a. Paired fins __________________________
   b. Scales __________________________
   c. Gills __________________________

2. Is the following sentence true or false? The characteristics of living fishes are very uniform and almost no diversity exists among fishes. ________________

Evolution of Fishes (pages 772–773)

3. Circle the letter of each sentence that is true about the evolution of fishes.
   a. Fishes were the first vertebrates to evolve.
   b. Fishes arose directly from tunicates and lancelets.
   c. Fishes changed little during the course of their evolution.
   d. Early fishes were jawless and covered with bony plates.

4. Which period is known as the Age of Fishes?

5. Jawless fishes with little armor of the Devonian Period were the ancestors of modern _______ and _______.

6. Why were jaws an extremely useful adaptation? ____________________________________________

7. A strong tissue that supports the body and is more flexible than bone is ________________.

8. Is the following sentence true or false? Paired fins gave fishes less control over their movement. ________________

Form and Function in Fishes (pages 774–778)

9. Circle the letter of each mode of feeding found in fishes.
   a. herbivore  b. carnivore  c. parasite  d. filter feeder
10. Is the following sentence true or false? A single fish may exhibit only one mode of feeding. _________________

Match the internal organ with its function.

<table>
<thead>
<tr>
<th>Internal Organ</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. Pyloric ceca</td>
<td>a. Short tube connecting the fish's mouth to the stomach</td>
</tr>
<tr>
<td>12. Intestine</td>
<td>b. Where food is first partially broken down</td>
</tr>
<tr>
<td>13. Pancreas</td>
<td>c. Fingerlike pouches in which food is processed and nutrients absorbed</td>
</tr>
<tr>
<td>14. Esophagus</td>
<td>d. Adds digestive enzymes and other substances to food as it moves through the gut</td>
</tr>
<tr>
<td>15. Anus</td>
<td>e. Completes the process of digestion and nutrient absorption</td>
</tr>
<tr>
<td>16. Stomach</td>
<td>f. Opening through which undigested material is eliminated</td>
</tr>
</tbody>
</table>

17. What does the capillary network in each gill filament provide? _________________

18. Describe how fishes with gills exchange gases. _________________

19. The protective bony cover over the gill slit from which water is pumped out of a fish’s body is called a(an) _________________.

20. How do lungfishes survive in oxygen-poor water? _________________

21. Is the following sentence true or false? Fishes have an open circulatory system. _________________.

Match each chamber of the heart in fishes with its function.

<table>
<thead>
<tr>
<th>Heart Chamber</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>22. Ventricle</td>
<td>a. Collects oxygen-poor blood from the veins</td>
</tr>
<tr>
<td>23. Sinus venosus</td>
<td>b. Large muscular cavity that serves as a one-way compartment for blood entering the ventricle</td>
</tr>
<tr>
<td>24. Bulbus arteriosus</td>
<td>c. Thick-walled, muscular chamber that is the actual pumping portion of the heart</td>
</tr>
<tr>
<td>25. Atrium</td>
<td>d. Large, muscular tube that connects to the ventricle and moves blood through the aorta toward the gills</td>
</tr>
</tbody>
</table>
26. Circle the letter of the form of nitrogenous waste that most fishes excrete.
   a. urea
   b. lactic acid
   c. ammonia
   d. nitrate

27. How does the function of kidneys in saltwater fishes differ from their function in freshwater fishes?

28. Match the structures of the fish's brain with their functions.

<table>
<thead>
<tr>
<th>Structure</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>28. Olfactory bulb</td>
<td>a. Controls the functioning of many internal organs</td>
</tr>
<tr>
<td>29. Cerebrum</td>
<td>b. Primarily processes the sense of smell in fishes</td>
</tr>
<tr>
<td>30. Optic lobe</td>
<td>c. Coordinates body movements</td>
</tr>
<tr>
<td>31. Cerebellum</td>
<td>d. Involved with the sense of smell, or olfaction</td>
</tr>
<tr>
<td>32. Medulla oblongata</td>
<td>e. Processes information from the eyes</td>
</tr>
</tbody>
</table>

33. Circle the letter of each sentence that is true about the sense organs of fishes.
   a. Fishes have poorly developed sense organs.
   b. Many fishes have chemoreceptors that sense tastes and smells.
   c. Fishes have a lateral line system used for sensing sounds.
   d. Some fishes can sense low levels of electric current.

34. What are two ways that fins help fish to move?
   a.                                                                 
   b.                                                                 

35. The streamlined body shapes of most fishes help reduce the amount of ________________ as they move through the water.

36. What is the function of the swim bladder?

   ________________

37. In which mode of fish reproduction do the embryos develop inside the mother’s body using the egg yolk for nourishment?
   a. oviparous
   b. ovoviviparous
   c. viviparous
   d. herbivorous

38. Fishes are divided into groups according to ________________ structure.
39. Complete the compare-and-contrast table of groups of fishes.

**GROUPS OF FISHES**

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jawless fishes</td>
<td>No true teeth; skeletons made of fibers and cartilage; keep their notochord as adults</td>
<td>Lampreys and hagfishes</td>
</tr>
<tr>
<td>Cartilaginous fishes</td>
<td>Sharks, rays, skates</td>
<td>Ray-finned fishes, such as flounder, angelfish, and flying fish and lobe-finshed fishes, such as lungfishes and the coelacanth</td>
</tr>
</tbody>
</table>

40. Is the following sentence true or false? Hagfishes are filter feeders as larvae and parasites as adults. ________________

41. Circle the letter of each characteristic of a shark.
   a. torpedo-shaped body
   b. secretes slime
   c. many teeth
   d. winglike fins

42. Is the following sentence true or false? Lobe-finned fishes have fleshy fins supported by bones that are sometimes jointed. ________________

Ecology of Fishes (page 781)

43. Is the following sentence true or false? Anadromous fishes live in fresh water but migrate to the ocean to breed. ________________
Section 30–3 Amphibians (pages 782–79)

TEKS FOCUS: 7B Results of natural selection in adaptation; 10A Body systems; 12C Variations and tolerances of animals in different biomes; TEKS SUPPORT: 2C Evaluate data

This section describes the characteristics of amphibians and how they are adapted for life on land. It also tells about the main groups of living amphibians.

What Is an Amphibian? (page 782)
1. Is the following sentence true or false? Amphibian adults are fishlike aquatic animals that respire using gills. 

2. Circle the letter of each characteristic of amphibians.
   a. scales  b. claws  c. moist skin  d. mucous glands

Evolution of Amphibians (pages 782–783)
3. List three challenges that had to be overcome by vertebrates colonizing land habitats.
   a. 
   b. 
   c. 

4. List three adaptations that evolved in amphibians that helped them live at least part of their lives out of water.
   a. 
   b. 
   c. 

5. Amphibians became the dominant form of animal life during the __________________ Period, also known as the Age of Amphibians.

6. Why did most amphibian groups become extinct by the end of the Permian Period?
   
7. What three orders of amphibians survive today?
   a. 
   b. 
   c. 

Form and Function in Amphibians (pages 784–787)
8. Circle the letter of each characteristic of a tadpole.
   a. carnivore
   b. herbivore
   c. long intestines
   d. short intestines
9. Circle the letter of each characteristic of an adult amphibian.
   a. carnivore  
   b. herbivore  
   c. sticky tongue  
   d. long intestines

10. Briefly describe the path of food in a frog’s digestive system.

11. Circle the letter of each sentence that is true about respiration.
   a. In tadpoles, gas exchange occurs only through the skin.
   b. Lungs replace gills when an amphibian becomes an adult.
   c. Gas exchange in adults can also occur through the skin.
   d. All adult amphibians have lungs.

12. Amphibians have ____________ that filter wastes from the blood.

13. Complete the captions in the diagram about the stages in the life cycle of a frog.
14. How is the first loop in the circulatory system of an adult amphibian different from the second loop? 

The first loop carries blood between the heart and the lungs. The second loop carries blood between the heart and the rest of the body.

Match the type of amphibian with its method of movement.

<table>
<thead>
<tr>
<th>Amphibian</th>
<th>Method of Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. Tadpoles</td>
<td>a. Flattened tail for propulsion</td>
</tr>
<tr>
<td>16. Adult salamanders</td>
<td>b. Well-developed hind limbs for jumping</td>
</tr>
<tr>
<td>17. Frogs and toads</td>
<td>c. Legs push backward against the ground</td>
</tr>
</tbody>
</table>

18. Circle the letter of each sentence that is true about response in amphibians.
   a. An amphibian’s brain is structured very differently from a fish’s.
   b. An amphibian’s eye is protected from damage and kept moist by the nictitating membrane.
   c. Frogs probably do not see color as well as fishes.
   d. Amphibians hear through tympanic membranes, or eardrums.

Groups of Amphibians (page 788)

19. Circle the letter of each characteristic of salamanders.
   a. tail
   b. carnivore
   c. herbivore
   d. short body

20. Circle the letter of each characteristic of frogs and toads.
   a. tail
   b. no tail
   c. able to jump
   d. adults have gills

21. Circle the letter of each characteristic of caecilians.
   a. legless
   b. long legs
   c. able to jump
   d. some scales

Ecology of Amphibians (page 789)

22. What are two ways in which amphibians protect themselves from predators?
   a. 
   b. 

23. Is the following sentence true or false? For the past several decades the number of living species of amphibians has been growing. 

false
24. Circle the letter of each environmental threat to amphibians.
   a. decreasing habitat
   b. water pollution
   c. fungal infections
   d. acid rain

WordWise
Use the clues to help you identify the vocabulary terms from Chapter 30. Then, put the numbered letters in order to answer the riddle.

Clues
It’s at the end of the large intestine in amphibians.  __     __     __     __     __     __  1
It often develops into the backbone.  __     __     __     __     __     __     __  2
It’s an animal with a notochord.  __     __     __     __     __     __     __  3
It’s softer and more flexible than bone.  __     __     __     __     __     __     __  4
It’s responsible for all voluntary activities of the body.  __     __     __     __     __     __  5
It’s the amphibian membrane for hearing.  __     __     __     __     __     __     __  6

Riddle: What heart chamber holds blood that will enter the ventricle?
Answer:  __     __     __     __     __     __