

Chapter 30 Study Guide

Study Tip

Students can review the chapter by rereading each section and taking notes about the Key Concepts. Students should also write definitions for each Vocabulary term.

Thinking Visually

1. Jawless fishes
2. Cartilaginous fishes
3. Bony fishes
4. Sharks and their relatives
5. Lobe-finned fishes

Chapter 30 Assessment

Reviewing Content

1. c 5. d 9. c
2. b 6. a 10. d
3. c 7. c
4. a 8. a

Understanding Concepts

11. The backbone replaces the notochord in most developing vertebrates.
12. As water passes through the lancelet's pharynx, mucus catches food particles. The lancelet swallows the mucus into the digestive tract.
13. Cartilaginous fishes, which include sharks and rays, and bony fishes
14. Every mode of feeding is seen in fishes. They are herbivores, carnivores, parasites, filter feeders, and detritus feeders. A single fish may exhibit more than one mode of feeding, depending upon what is available.
15. Oxygen-poor blood is pumped from the body into the sinus venosus. Blood then flows into the atrium, then into the ventricle. The ventricle pumps blood into the bulbus arteriosus, which connects to the aorta, through which blood moves to the gills.
16. In the form of ammonia
17. The lateral line system is a motion-sensing organ. Fishes use the system to sense motion of other fishes, potential predators, and potential prey.

Chapter 30 Study Guide

30-1 The Chordates

Key Concepts

- A chordate is an animal that has, for at least some stage of its life, a dorsal, hollow nerve cord; a notochord; pharyngeal pouches; and a tail that extends beyond the anus.
- The two groups of nonvertebrate chordates are tunicates and lancelets.

Vocabulary

chordate, p. 767
notochord, p. 767
pharyngeal pouch, p. 767
vertebra, p. 768

30-2 Fishes

Key Concepts

- Fishes are aquatic vertebrates; most fishes have paired fins, scales, and gills.
- The evolution of jaws and the evolution of paired fins were important developments during the rise of fishes.
- Fishes' adaptations to aquatic life include various modes of feeding, specialized structures for gas exchange, and paired fins for locomotion.
- On the basis of their basic internal structure, all living fishes can be classified into three groups: jawless fishes, cartilaginous fishes, and bony fishes.

Vocabulary

cartilage, p. 773
atrium, p. 776
ventricle, p. 776
cerebrum, p. 777
cerebellum, p. 777
medulla oblongata, p. 777
lateral line system, p. 777
swim bladder, p. 777
oviparous, p. 778
ovoviviparous, p. 778
viviparous, p. 778



30-3 Amphibians

Key Concepts

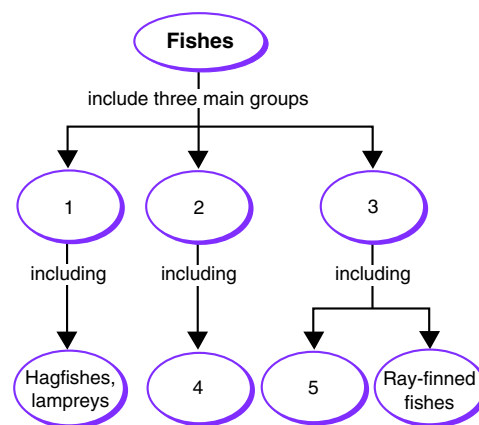
- An amphibian is a vertebrate that, with some exceptions, lives in water as a larva and on land as an adult, breathes with lungs as an adult, has moist skin that contains mucous glands, and lacks scales and claws.
- Early amphibians evolved several adaptations that helped them live at least part of their lives out of water. Bones in the limbs and limb girdles of amphibians became stronger, permitting more-efficient movement. A set of lungs and breathing tubes enabled them to breathe air. Their sternum formed a bony shield that supports and protects the internal organs, especially the lungs.
- The three groups of living amphibians are salamanders, frogs and toads, and caecilians.

Vocabulary

cloaca, p. 784
nictitating membrane, p. 787
tympanic membrane, p. 787

Thinking Visually

Using information from this chapter, complete the following concept map:



CHAPTER RESOURCES

Print:

- **Teaching Resources**, Chapter Vocabulary Review, Graphic Organizer
- **Chapter Tests: Levels A and B**, Chapter 30 Test

Technology:

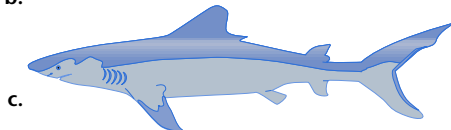
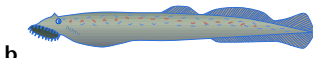
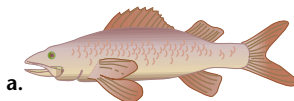
- **Computer Test Bank**, Chapter 30 Test
- **iText**, Chapter 30 Assessment

Chapter 30 Assessment

Reviewing Content

Choose the letter that best answers the question or completes the statement.

- Which of the following is NOT characteristic of all chordates?
a. hollow nerve cord c. fins
b. pharyngeal pouches d. notochord
- The term LEAST closely related to the others is
a. chordate. c. invertebrate.
b. cerebrum. d. lancelet.
- The evolution of jaws and paired fins was an important development during the rise of
a. tunicates. c. fishes.
b. lancelets. d. amphibians.
- Most fishes exchange gases by pumping water from their mouths
a. over the gill filaments.
b. through the pyloric ceca.
c. over the atrium.
d. through the esophagus.
- In fishes, the part of the brain that coordinates body movements is the
a. olfactory lobe. c. cerebrum.
b. optic lobe. d. cerebellum.
- A species that lays eggs that develop outside of the mother's body is
a. oviparous. c. ovoviviparous.
b. viviparous. d. nonviviparous.
- Examine the diagrams below. Which of these is a jawed cartilaginous fish?



- At the end of the large intestine of a frog is a muscular cavity called the
a. cloaca. c. gallbladder.
b. pancreas. d. esophagus.

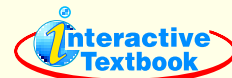
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- An adult amphibian's heart typically has
a. one chamber.
b. two chambers.
c. three chambers.
d. four chambers.
- Each of the following serves as an organ of gas exchange in frogs, toads, and many salamanders EXCEPT the
a. skin. c. lungs.
b. mouth cavity. d. nictitating membrane.

Understanding Concepts

- Describe what happens to the notochord in most developing vertebrates.
- How does a lancelet obtain food?
- Which two major groups of fishes evolved from the early jawed fishes and still survive today?
- Identify three feeding modes that are observed in fishes.
- Describe the flow of blood through the heart of a typical fish, naming the four structures.
- In what form is nitrogenous waste excreted from the bodies of most fishes?
- What is a lateral line system? What does it enable a fish to do?
- What is the function of a fish's swim bladder?
- How do a fish's muscles function in swimming?
- How are lampreys and sharks similar? How are they different?
- List some of the challenges that early vertebrates faced as they moved from water to land habitats during the course of evolution.
- How are tadpoles and adult frogs adapted for their specific feeding behaviors?
- What adaptation do many adult amphibians have to carry out respiration?
- Discuss how blood flows through the heart of an adult frog.
- Many amphibians have specialized structures that aid in movement. Describe two of these structures.
- Why are most amphibians unable to tolerate living in desert biomes?



If your class subscribes to the iText, your students can go online to access an interactive version of the Student Edition and a self-test.

(Continued from page 792)

- The swim bladder adjusts the fish's buoyancy.
- Paired sets of muscles on either side of the backbone are alternately contracted. This creates a series of S-shaped curves that move down the fish's body.
- Lampreys and sharks are similar in that both are fishes with skeletons that are at least partially made of cartilage. Unlike lampreys, sharks have jaws, true teeth, paired fins, and scales.
- Breathing air, protecting themselves and their eggs from drying out, and supporting their bodies against the pull of gravity
- Tadpoles are filter feeders or herbivores that feed on algae. Their long, coiled intestines help them break down hard-to-digest plant materials. Adult amphibians are mostly carnivorous. Their feeding apparatus and digestive tract are transformed to a meat-eating structure with a much shorter intestine.
- Lung; also, skin and mouth cavity
- Oxygen-poor blood circulates from the body into the right atrium. At the same time, oxygen-rich blood from the lungs and skin enters the left atrium. The atria contract and blood is pumped into the ventricle. When the ventricle contracts, blood is pumped into a single vessel, which divides and distributes blood to the lungs and body. Most oxygen-poor blood goes to the lungs, and most oxygen-rich blood goes to the rest of the body.
- Examples of structures used by amphibians for movement include tails in larvae; four legs; well-developed hind limbs for jumping long distances; and disks on their toes that serve as suction cups.
- Amphibians require water for reproduction.



HOMEWORK GUIDE

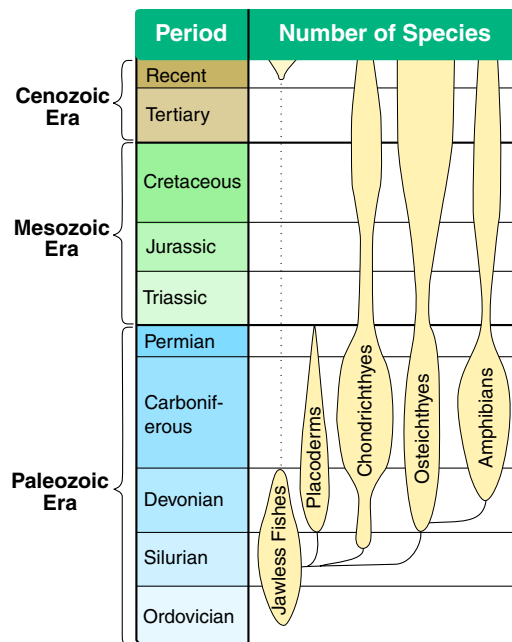
Section:	Questions:
Section 30-1	1, 2, 11, 12, 32
Section 30-2	3-7, 13-20, 27, 28, 33, 34
Section 30-3	8-10, 21-26, 29-31

Critical Thinking

27. Many saltwater fishes could probably not survive in fresh water because their kidneys could not switch to a freshwater mode by excreting excess water and conserving salts.
28. Since dams would be an obstacle in the upstream swim of salmon, the dams would prevent some salmon from reproducing.
29. Pollutants can travel through thin, moist skin more easily than dry skin. Shell-less eggs are more vulnerable to pollutants than eggs with shells.
30. a. Devonian Period b. Osteichthyes; the line for amphibians originates in Osteichthyes. c. Jawless fishes and Osteichthyes d. Placoderms
31. Students need to find out what tadpoles normally eat and then alter that diet in their experiment. They would need to control the temperature, pH, and oxygen content of the water. They would have to decide whether to use increases in mass, length, or time required for metamorphosis as a measurement of development.
32. Both tunicates and lancelets have the four chordate characteristics—a dorsal, hollow nerve cord; a notochord; pharyngeal pouches; and a tail that extends beyond the anus—during some stage of their life cycle. Vertebrates are also chordates in which the notochord develops into the backbone.
33. Fishes with certain adaptations were able to survive in certain habitats better than others. If any new mutation gave an individual fish a selective advantage, it would be better equipped to survive in that habitat. Over time, diversity in fishes increased as they became adapted to new habitats.
34. The arthropod mandible, which is designed for biting and grinding food, is similar to a fish's mouth. Mandibles are also used as filter feeders in some arthropods. A mandible differs from a fish's mouth in structure; an insect has no jaws or teeth.

Critical Thinking

27. **Applying Concepts** The kidneys of saltwater fishes are adapted to meet the needs of a marine environment. Why would it be impossible for a saltwater fish to survive in fresh water?
28. **Inferring** How might dams across rivers affect the reproduction of salmon?
29. **Inferring** The skin of amphibians is thin and moist. Amphibian eggs have no shell and must be kept moist. How might the worldwide decline of amphibian populations be related to these two characteristics?
30. **Interpreting Graphics** The chart below shows changes in five groups of vertebrates over the past 500 million years. The thickness of each band indicates changes in the relative number of species over geologic time. Use this chart to answer the questions.
- During which period did amphibians evolve?
 - Did the amphibians evolve from early jawless fishes or from early bony fishes (Osteichthyes)? Explain your answer.
 - In which groups of fishes have the number of species increased during recent times?
 - Which group of fishes is extinct?



31. **Designing Experiments** Design an experiment to determine the effect of diet on the development of tadpoles. Define the variables you would need to control.
32. **Applying Concepts** Which anatomical characteristics of nonvertebrate chordates suggest that, in terms of phylogeny (evolutionary relationships), these animals are more closely related to vertebrates than to other groups of animals?
33. **Connecting Concepts** In Chapter 15, you learned about Darwin's theory of evolution by natural selection. How might natural selection have contributed to the great diversity of fishes that exists today? (Hint: Think of the many different kinds of aquatic environments that fishes inhabit.)
34. **Connecting Concepts** In Chapter 28, you learned about structure and function in arthropods. Which structure of a typical bony fish is similar to the mandible of an arthropod? How are the two structures different?

Writing in Science

Write a paragraph comparing and contrasting the characteristics of the three major groups of amphibians. Be sure to say how they are similar as well as how they are different. (Hint: To prepare to write, construct a compare-contrast table that compares the three groups. Characteristics for comparison might include shape of body, number of legs, and habitat.)

Performance-Based Assessment

Modeling Structure and Function Using modeling clay, paper, or other suitable materials, make a three-dimensional model of a fish or an amphibian. Identify each of the external structures described in the chapter. Attach flags or markers that describe how each of these structures is adapted to the habitat and behavior of the animal you have modeled.

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