

Section 31-1 **Fishes** (pages 679-692)

SECTION REVIEW

In this section you discovered that at some time during their development vertebrates have a notochord, a hollow dorsal nerve cord, and pharyngeal slits. In most vertebrates, the notochord is replaced by a vertebral column during development.

You learned that fishes are aquatic vertebrates that usually have scales, paired fins, and gills. Fishes have a two-chambered heart and a single-loop circulatory system. Fishes may be oviparous (egg-laying), ovoviviparous (eggs are incubated inside the mother's body), or viviparous (embryos develop inside the mother and are nourished directly by the mother's body).

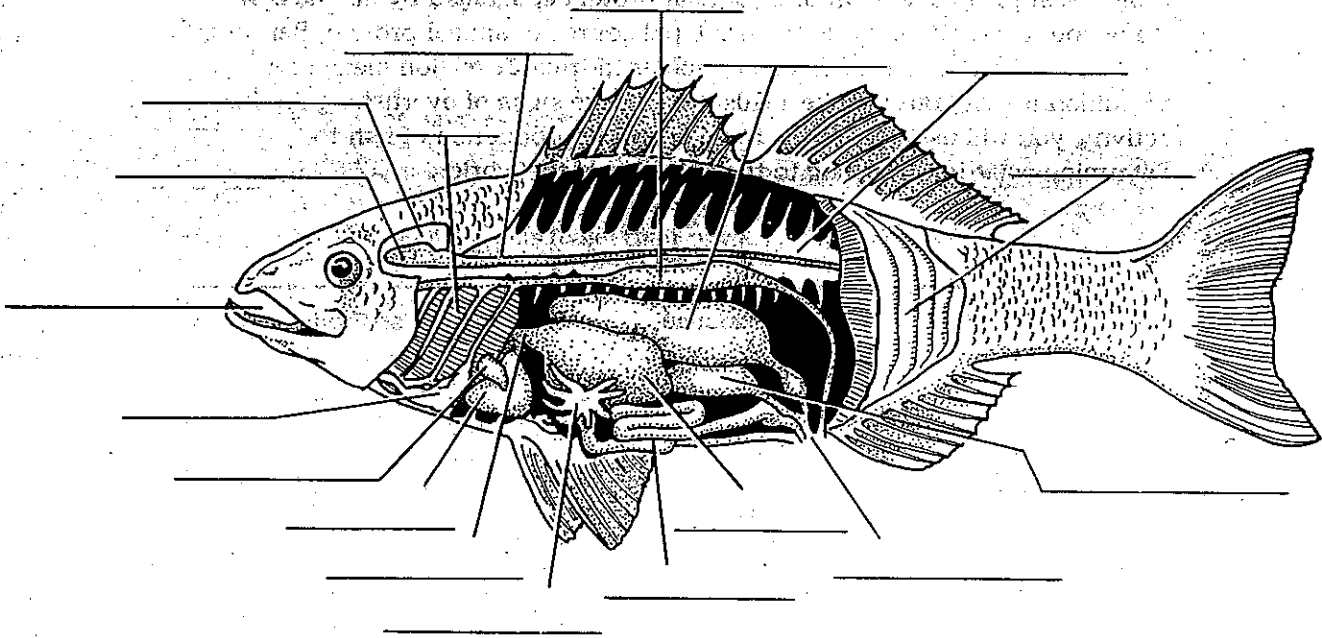
Jawless fishes, such as lampreys and hagfishes, are eellike parasites and scavengers that lack paired fins, scales, and a vertebral column. They are the most primitive type of fishes.

Members of the class Chondrichthyes have a skeleton of cartilage. Cartilaginous fishes include sharks, rays, skates, sawfish, and chimaeras.

Bony fishes make up the class Osteichthyes and about 40 percent of all vertebrates. Most bony fishes are ray-finned fishes. Bony fishes include groupers, salmon, eels, and mudskippers, to name a few.

Identifying Internal Structures: Building Vocabulary Skills

The drawing below represents the internal anatomy of a fish. Label each part of the fish.



Relating Form to Function: Finding the Main Ideas

The chart below lists some of the internal structures of the fish. In the space provided, identify the main function of each structure.

Structure	Function
Anus	
Brain	
Esophagus	
Gills	
Heart	
Intestine	
Kidney	
Mouth	
Ovary	
Pyloric ceca	
Stomach	
Swim bladder	

Analyzing Data

Fisheries supply 23 percent of all animal protein consumed by humans. In many countries, fish provide the principal source of animal protein. Between 1950 and 1970, the world fish catch increased from 21 million metric tons to 66 million metric tons. By the 1970s, there were signs of overfishing. In this activity, you will use data about the worldwide production of fish to determine what is happening to the fisheries of the world.

World Fish Production, 1950 - 1983

Year	Fish Production (metric tons)	Year	Fish Production (metric tons)
1950	21.1	1975	66.4
1955	28.9	1976	69.4
1960	40.2	1977	68.5
1965	53.2	1978	70.2
1970	65.6	1979	71.2
1971	66.1	1980	72.3
1972	62.0	1981	75.1
1973	62.7	1982	76.8
1974	66.5	1983	74.0

1. How did fish production change between 1950 and 1960? _____

2. How did fish production change between 1960 and 1970? _____

3. How did fish production change between 1970 and 1980? _____

4. How was the growth rate in fish production between 1950 and 1960 different from the growth rate in fish production between 1970 and 1980? Explain your answer.

5. When did the fish population decrease? _____

Recognizing Fact and Opinion

Read the following statements about fishes. Determine whether each statement is fact or fiction. Indicate your answer by the word "fact" or the word "fiction" on the line provided.

- _____ 1. A hagfish has six hearts.
- _____ 2. Some fishes are able to glow in the dark.
- _____ 3. Most sharks attack and kill humans.
- _____ 4. A shark uses about 20,000 teeth throughout its lifetime.
- _____ 5. A shark's skeleton is made up of bone..
- _____ 6. Fishes have a keen sense of smell.
- _____ 7. Electric eels can produce electric potentials of several hundred volts.
- _____ 8. All fishes use gills to get their oxygen supply.
- _____ 9. Shark skin feels like sandpaper.
- _____ 10. The whale shark is the largest fish in existence, measuring over 18 meters in length.

Find the Oddball: Identifying Patterns

Examine each of the following lists of animals. In each list, one of the animals does not belong. In the space provided, write the name of the animal that does not belong and explain your choice.

1. shark, jellyfish, guppy, ray _____

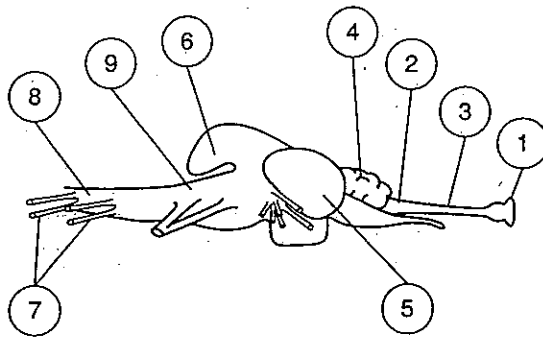
2. sawfish, shark, salmon, ray _____

3. lamprey, trout, hagfish _____

4. skate, eel, guppy, grouper _____

Identifying Internal Structures: Building Vocabulary Skills

The drawing below represents the brain of a fish. Label each part of the fish brain.



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

Relating Form to Function: Finding the Main Ideas

The chart below lists the parts of the fish brain. In the space provided, identify the main function of each structure.

Structure	Function
Cerebellum	
Cerebrum	
Medulla	
Olfactory lobe	
Optic lobe	

Concept Mapping

The construction of and theory behind concept mapping are discussed on pages vii–ix the front of this Study Guide. Read those pages carefully. Then consider the concepts presented in Section 31–1 and how you would organize them into a concept map. Now look at the concept map for Chapter 31 on page 304. Notice that the concept map has been started for you. Add the key facts and concepts you feel are important for Section 31–1. When you have finished the chapter, you will have a completed concept map.

Section 31-2 Amphibians (pages 692-701)

SECTION REVIEW

In this section you learned that amphibians are vertebrates that have a moist skin, lack scales and claws, and are usually aquatic as larvae and terrestrial as adults. Most adult amphibians breathe with lungs.

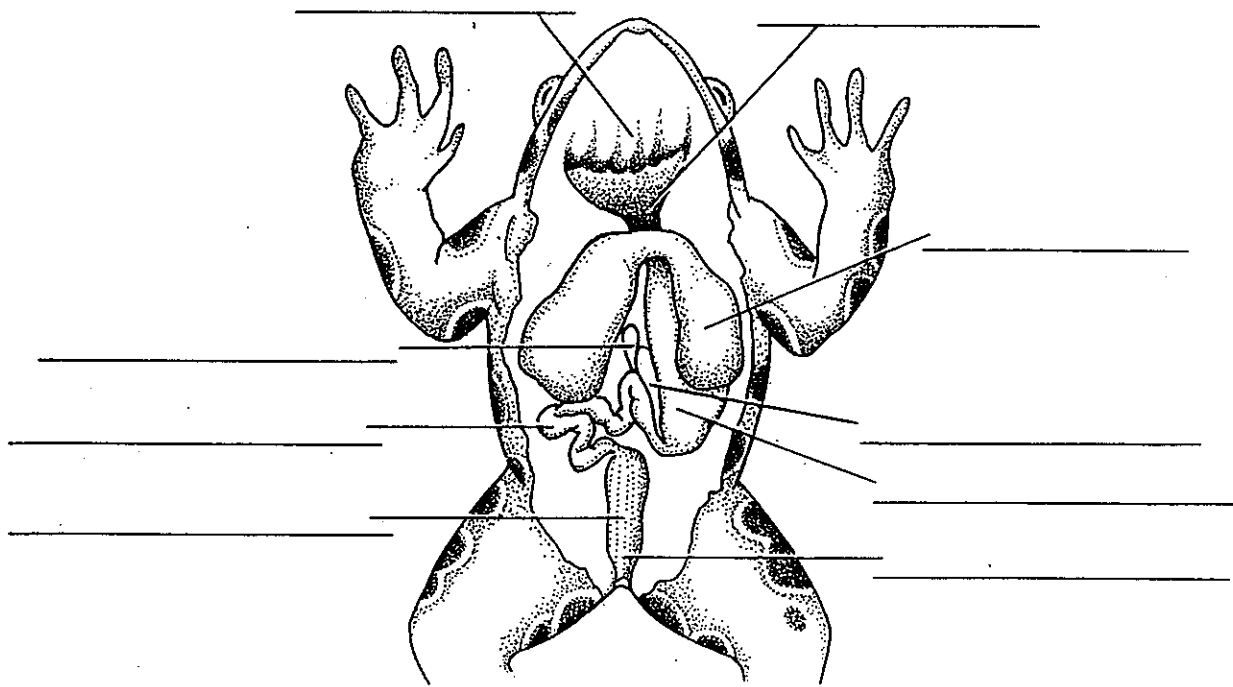
Although amphibian larvae are herbivores and filter feeders, amphibian adults are usually carnivores. Adult amphibians usually use a combination of lungs, skin, and mouth cavities to breathe, whereas amphibian larvae usually use their gills and skin.

Adult amphibians have a three-chambered heart and a double-loop circulatory system. Fertilization in amphibians may be internal or external. Amphibians may be oviparous, ovoviviparous, or viviparous. Amphibians have well-developed nervous and sensory systems.

Salamanders have a tail even after they have undergone metamorphosis into the adult form. Frogs and toads have large hind legs adapted for jumping and swimming. Adult frogs and toads usually lack tails.

Identifying Internal Structures: Building Vocabulary Skills

The drawing below represents the internal anatomy of a frog. Label each part of the frog.



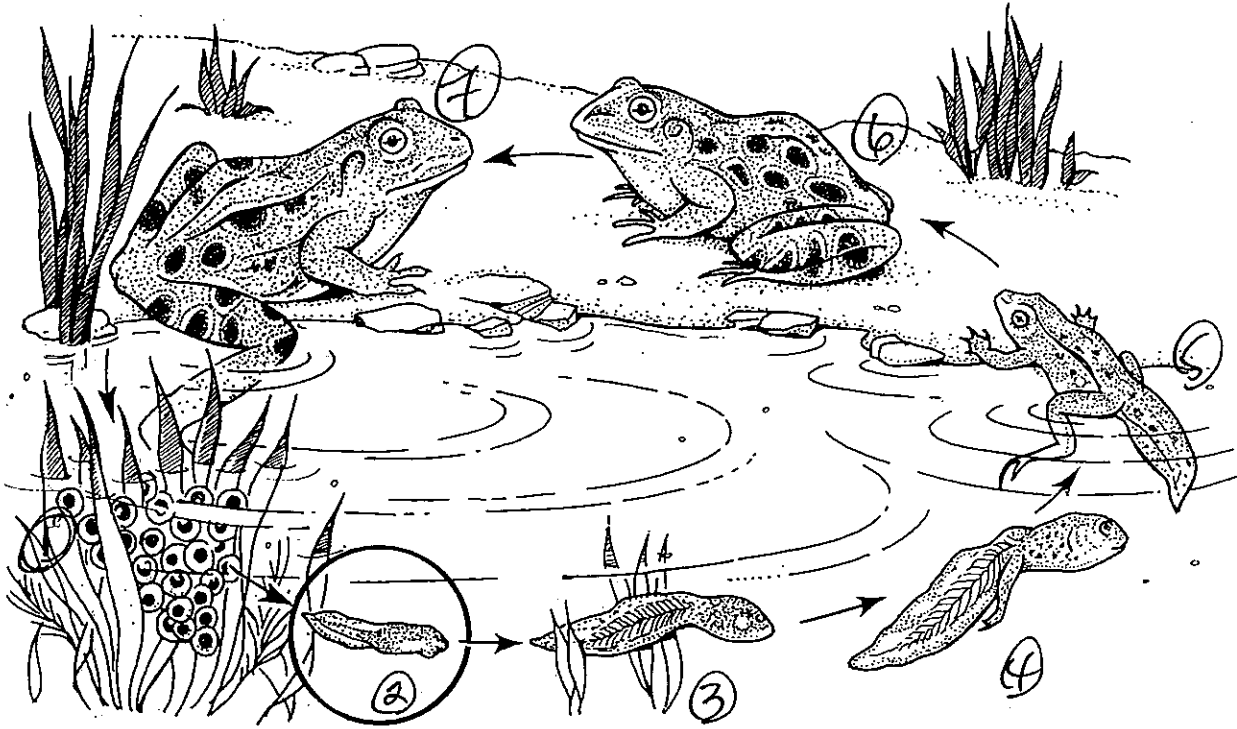
Relating Form to Function: Finding the Main Ideas

The chart below lists some of the internal structures of the frog. In the space provided, identify the main function of each structure.

Structure	Function
Cloaca	
Esophagus	
Gall bladder	
Large intestine	
Liver	
Mouth	
Pancreas	
Small intestine	
Stomach	

Frog Metamorphosis: Sequencing an Event

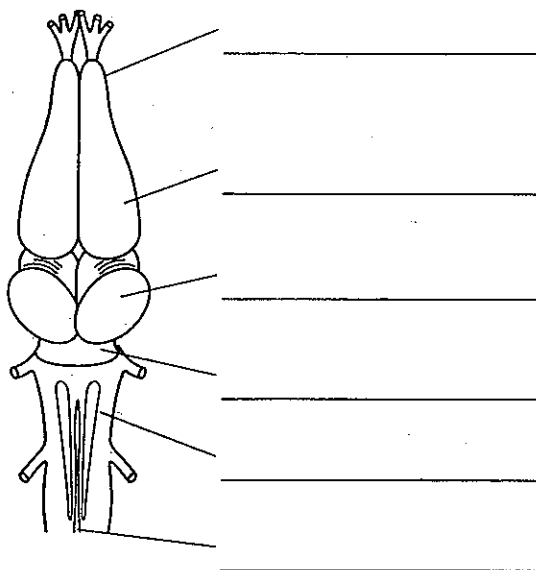
Describe what is happening during each stage in the metamorphosis of a frog.



① _____

Identifying Internal Structures: Building Vocabulary Skills

The drawing below represents the brain of a frog. Label each part of the frog brain.



Comparing Body Forms

Complete the following chart.

Characteristic	Tadpole	Adult Frog
Habitat		
Method of breathing		
Method of locomotion		
Diet		
Type of circulatory system		

Concept Mapping

The construction of and theory behind concept mapping are discussed on pages vii-ix in the front of this Study Guide. Read those pages carefully. Then consider the concepts presented in Section 31-2 and how you would organize them into a concept map. Now look at the concept map for Chapter 31 on page 304. Notice that the concept map has been started for you. Add the key facts and concepts you feel are important for Section 31-2. When you have finished the chapter, you will have a completed concept map.