

Chapter 28**Arthropods and Echinoderms****Section 28–1 Introduction to the Arthropods (pages 715–719)**

This section identifies the main features of arthropods. It also describes the important trends in arthropod evolution and explains how growth and development take place in arthropods.

What Is an Arthropod? (page 715)

1. What is the basic body plan of all arthropods? _____

2. A tough body wall that protects and supports the body of arthropods is called a(an) _____.
3. What is chitin? _____

4. Circle the letter of each sentence that is true about arthropod exoskeletons.
 - a. The exoskeletons of many land-dwelling species have a waxy covering.
 - b. All arthropod exoskeletons are the same shape.
 - c. Lobster exoskeletons cannot be crushed by hand.
 - d. An exoskeleton is an external covering.
5. What are appendages? _____

6. Is the following sentence true or false? The appendages of arthropods are jointed. _____

Evolution of Arthropods (page 716)

7. Circle the letter of where the first arthropods appeared more than 600 million years ago.
 - a. the land b. the sea c. the air d. bodies of fresh water
8. What are two ways in which arthropods have evolved since they first appeared?
 - a. _____
 - b. _____
9. Circle the letter of each sentence that is true about arthropod evolution.
 - a. Most primitive arthropods had only one or two body segments.
 - b. Arthropod appendages evolved into different forms.
 - c. The early body plan was modified gradually.
 - d. Appendages of living arthropods include wings, flippers, and mouthparts.

Chapter 28, Arthropods and Echinoderms (continued)

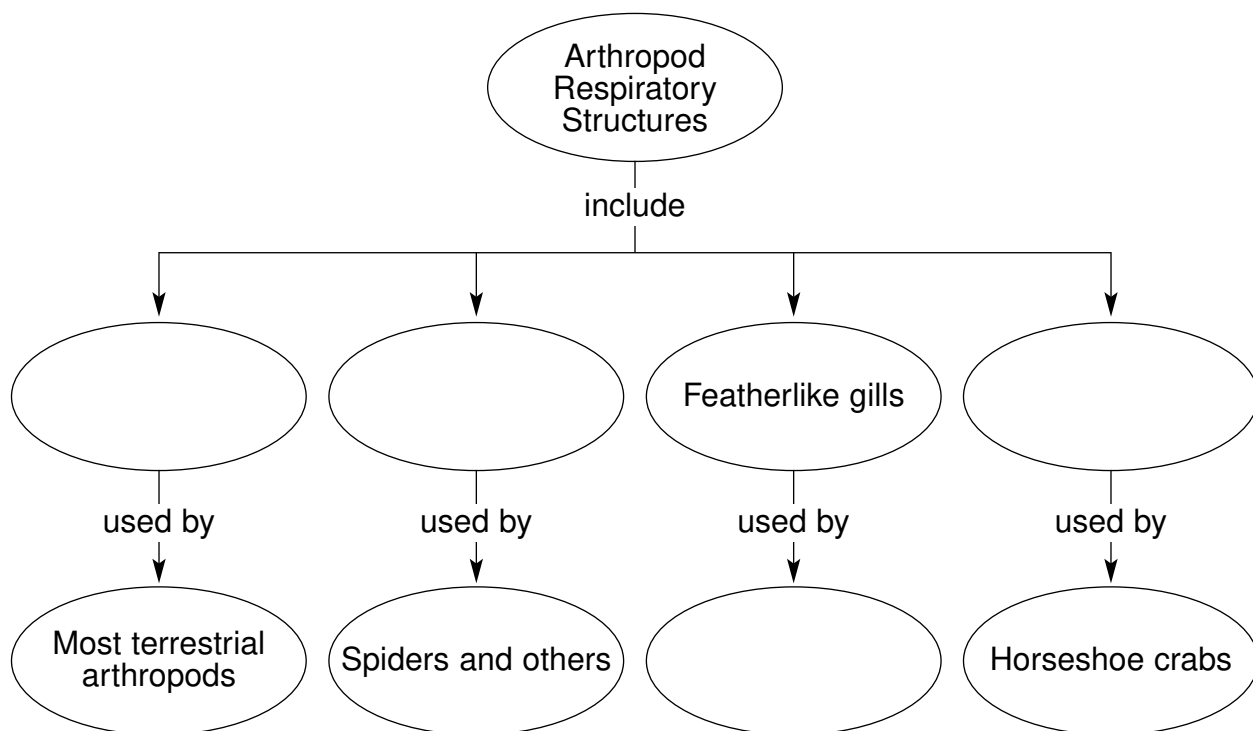
Form and Function in Arthropods (pages 716–719)

10. Is the following sentence true or false? Arthropods include herbivores, carnivores, and omnivores. _____

Match the arthropod structure with its function.

Structure	Description
_____ 11. Tracheal tubes	a. Saclike organs that extract wastes from the blood and add them to feces
_____ 12. Spiracles	b. Network of branching tubes through which arthropods breathe
_____ 13. Book lungs	c. Organs through which horseshoe crabs respire
_____ 14. Book gills	d. Layers of respiratory tissue stacked like the pages of a book through which spiders respire
_____ 15. Malpighian tubules	e. Small openings on the side of the body through which air enters and leaves tracheal tubes

16. Complete the concept map about arthropod respiration.



17. Circle the letter of each sentence that is true about the response to the environment by arthropods.
- a. Most arthropods have sophisticated sense organs.
 - b. All arthropods have a brain.
 - c. Ganglia along a ventral nerve cord coordinate the movements of individual legs.
 - d. Very few arthropods have a well-developed nervous system.

18. How do aquatic arthropods carry out excretion? _____

19. How do arthropods move? _____

20. Circle the letter of each sentence that is true about arthropod reproduction.
- a. Aquatic arthropods have only internal fertilization.
 - b. In some species, males have an organ that places sperm inside females.
 - c. Terrestrial arthropods may have internal or external fertilization.
 - d. In some aquatic species, males shed sperm around eggs released into the environment.

Growth and Development in Arthropods (page 719)

21. When do arthropods undergo periods of molting? _____

22. What occurs in arthropods during molting? _____

Section 28–2 Groups of Arthropods (pages 720–725)

This section explains how arthropods are classified. It also describes the distinguishing features of the three major groups of arthropods.

Introduction (page 720)

1. What characteristics do biologists use to classify arthropods? _____

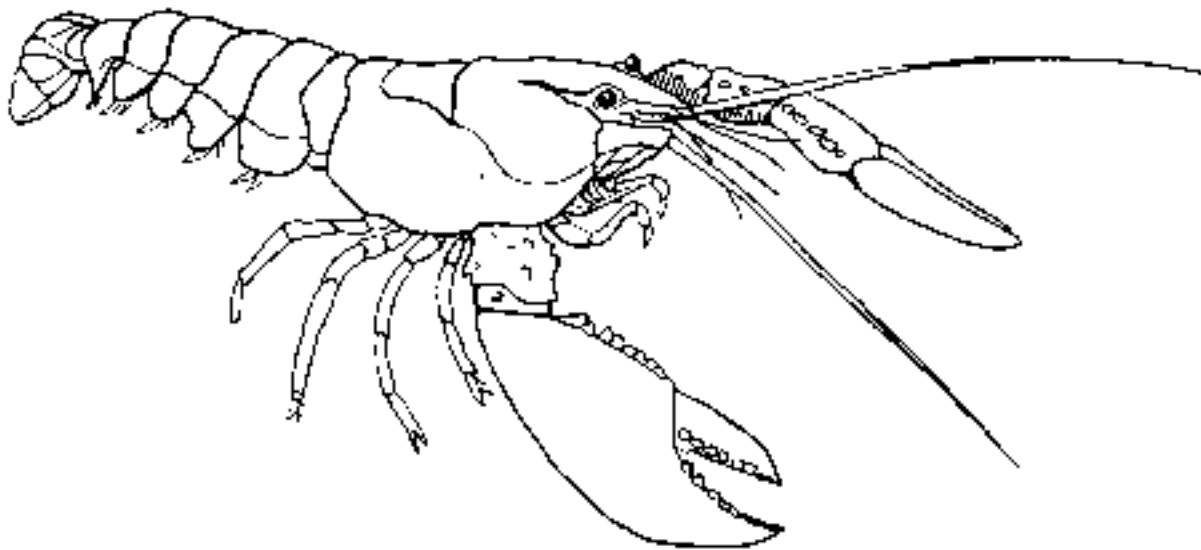
2. What are the three major groups of arthropods?
- a. _____
 - b. _____
 - c. _____

Crustaceans (pages 720–721)

3. Circle the letter of each description of structures that crustaceans typically have.
- a. two pairs of branched antennae
 - b. four or five body sections
 - c. chewing mouthparts called mandibles
 - d. two or three body sections

Chapter 28, Arthropods and Echinoderms *(continued)*

4. Label the two body sections of a typical crustacean.



5. Complete the table about crustacean body parts.

CRUSTACEAN BODY PARTS

Body Part	Description
Thorax	
	Fusion of the head with the thorax
Abdomen	
	The part of the exoskeleton that covers the cephalothorax
Mandible	
	First pair of legs in decapods, which bear large claws
Swimmerets	

6. The largest group of crustaceans are the _____.
7. Circle the letter of each sentence that is true about barnacles.
- They are sessile.
 - They have an outer, shell-like covering.
 - They move backward by snapping a tail.
 - They attach themselves to rocks and marine animals.

Spiders and Their Relatives (pages 722–724)

8. Horseshoe crabs, spiders, ticks, and scorpions are grouped as _____.
9. Circle the letter of each description of structures that chelicerates have.
 - a. four or five pairs of legs
 - b. three or four body sections
 - c. two pairs of branched antennae
 - d. mouthparts called chelicerae
10. What is the function of the chelicerae? _____

11. The appendages near the mouth that are usually modified to grab prey are called _____.
12. How do spiders respire? _____

13. What arthropods do arachnids include? _____

14. How are horseshoe crabs like and unlike crabs? _____

15. Why must spiders liquify their food to swallow it? _____

16. Circle the letter of each sentence that is true about spiders and silk.
 - a. Spiders spin silk into cocoons for eggs.
 - b. Spinning webs seems to be a programmed behavior.
 - c. Spinnerets are organs that contain silk glands.
 - d. Tarantulas cannot produce silk.
17. Is the following sentence true or false? Mites and ticks are usually parasitic. _____
18. Scorpions have pedipalps that are enlarged into _____.
19. How do ticks transmit Rocky Mountain spotted fever and Lyme disease? _____

Insects and Their Relatives (page 725)

20. Centipedes, millipedes, and insects are all grouped as _____.

Chapter 28, Arthropods and Echinoderms (continued)

21. Circle the letter of each description of structures that uniramians have.

- a. one pair of antennae
- b. unbranched appendages
- c. mouthparts called chelicerae
- d. jaws

22. Why are centipedes restricted to moist or humid areas? _____

23. How many pairs of legs does each body segment of centipedes and millipedes have? _____

Section 28–3 Insects (pages 726–733)

This section identifies the distinguishing features of insects. It also describes two types of development insects can undergo and explains what types of insects form societies.

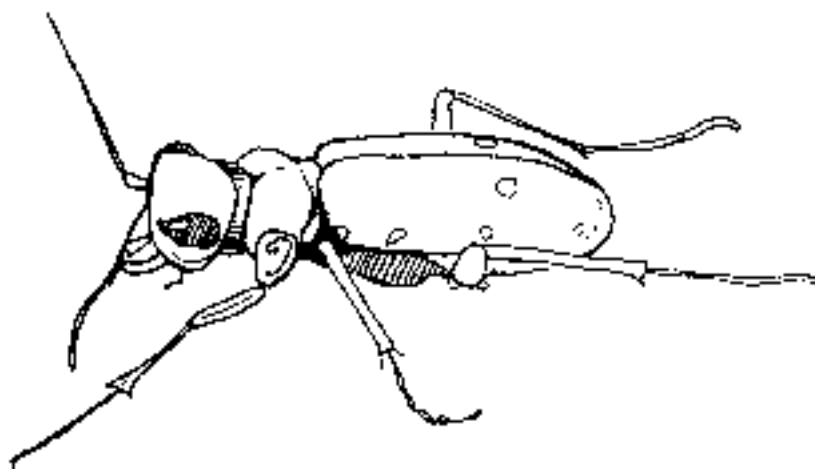
Introduction (page 726)

1. What are three characteristics of insects that have contributed to their evolutionary success?

- a. _____
- b. _____
- c. _____

What Is an Insect? (pages 727–729)

2. Label the three body parts of an insect.



3. How many pairs of legs does an insect have, and where are they attached? _____

4. Circle the letter of each sentence that is true about a typical insect.
 - a. It has tracheal tubes used for respiration.
 - b. It has a pair of compound eyes on the head.
 - c. It has two pairs of wings on the abdomen.
 - d. It has a pair of antennae on the head.
5. What is the multiple-lens structure of the compound eye better at detecting than the human eye? _____
6. Where do insects have chemical receptors for taste and smell? _____

7. Is the following sentence true or false? Many insects have well-developed ears. _____
8. Why do insect mouthparts take on a variety of shapes? _____

9. How many pairs of wings does a flying insect typically have, and what are they made of? _____

10. What has the evolution of flight allowed insects to do? _____

11. What is metamorphosis? _____

12. What is the main difference between complete metamorphosis and incomplete metamorphosis? _____

13. The immature forms of an insect that undergo incomplete metamorphosis are called _____.
14. Circle the letter of each type of insect that undergoes complete metamorphosis.
 - a. moths
 - b. bees
 - c. chinch bugs
 - d. beetles
15. What do the insects that undergo complete metamorphosis hatch into? _____
16. The stage in which an insect changes from larva to adult is called a(an) _____.

Chapter 28, Arthropods and Echinoderms *(continued)*

17. Circle the letter of each sentence that is true about complete metamorphosis.
- a. The nymphs gradually acquire adult structures.
 - b. During the pupal stage, the body is completely remodeled inside and out.
 - c. The larva molt a few times but change little in appearance.
 - d. The adult that emerges seems like a completely different animal from the larva.

Insects and Humans (page 730)

18. Is the following sentence true or false? Only male mosquitoes bite humans and other animals to get a blood meal.

19. How do insects contribute beneficially to agriculture? _____

Insect Communication (page 731)

20. Circle the letter of each sentence that is true about insect communication.
- a. To attract females, male crickets chirp.
 - b. Much of an insect's communication involves finding a mate.
 - c. Insects communicate using visual signals.
 - d. Fireflies use sound cues to communicate with potential mates.

21. What are pheromones? _____

Insect Societies (pages 732–733)

22. What is a society? _____

23. Circle the letter of each sentence that is true about castes.

- a. Each caste has a body form specialized for its role.
- b. Most insect societies have multiple queens.
- c. Groups of individuals in a society are specialized to perform particular tasks.
- d. The queen is typically the largest individual in the colony.

24. What does a honeybee's round dance tell the other bees? _____

25. What does a honeybee's waggle dance tell the other bees? _____

Reading Skill Practice

By looking carefully at illustrations in textbooks, you can help yourself understand better what you have read. Look carefully at Figure 28–16 on page 728. What important idea do these illustrations communicate? Do your work on a separate sheet of paper.

Section 28–4 Echinoderms (pages 734–738)

This section identifies the distinguishing features of echinoderms. It also describes functions carried out by the water vascular system of echinoderms and describes the different classes of echinoderms.

Introduction (page 734)

1. An internal skeleton is called a(an) _____.
2. What forms an echinoderm's endoskeleton? _____
3. In what environment do all echinoderms live? _____

What Is an Echinoderm? (page 734)

4. Is the following sentence true or false? The bodies of most echinoderms are two-sided. _____
5. What are five features that characterize echinoderms?
 - a. _____
 - b. _____
 - c. _____
 - d. _____
 - e. _____
6. What characteristic of echinoderms indicates that they are closely related to vertebrates? _____

Form and Function in Echinoderms (pages 735–736)

7. What functions does the water vascular system carry out in echinoderms? _____
8. The water vascular system opens to the outside through a sievelike structure called a(an) _____.

Chapter 28, Arthropods and Echinoderms *(continued)*

9. What is a tube foot? _____

10. Is the following sentence true or false? Sea stars usually feed on mollusks. _____
11. In most echinoderms, how are solid wastes released? _____

12. What is the structure of the nervous system in most echinoderms? _____

13. What do most echinoderms use to move? _____

14. Is the following sentence true or false? Echinoderms reproduce by internal fertilization. _____

Groups of Echinoderms *(pages 737–738)*

15. Complete the table about groups of echinoderms.

GROUPS OF ECHINODERMS

Group	Description of Feeding	Description of Body
		Disk-shaped
		Star-shaped with slender, flexible arms
		Look like warty, moving pickles
		Star-shaped
		Long, feathery arms and attached to the ocean bottom by a stalk

16. How do sand dollars defend themselves? _____

17. When a brittle star is attacked, brittle stars shed one or more arms. How does this help the echinoderm? _____

18. Where are herds of hundreds of thousands of sea cucumbers found? _____
19. What happens if a sea star is pulled into pieces? _____

20. Where do many modern feather stars live? _____

Ecology of Echinoderms (page 738)

21. What is the effect of a sudden rise or fall in the number of echinoderms in a marine habitat? _____

22. Circle the letter of each sentence that is true about the ecology of echinoderms.
- a. The crown-of-thorns sea star is a major threat to coral reefs.
 - b. Sea urchins help control the distribution of algae.
 - c. Echinoderms feed almost exclusively on coral.
 - d. Sea stars help control the number of clams and corals.

WordWise

Answer the questions by writing the correct vocabulary terms in the blanks. Use the circled letter in each term to find the hidden word. Then write a definition of the hidden word.

What is it called when an arthropod sheds its entire exoskeleton and manufactures a large one to take its place?

— — — o — — —

What is the immature form of an insect called?

— — — — n —

What is the structure called on an echinoderm that operates much like a living suction cup?

— — — — — s — — —

What is a specific chemical messenger called that affects the behavior or development of other individuals of the same species?

— — — h — — — — —

What is a mouthpart adapted for biting and grinding food called?

— m — — — — —

What is the tough external covering of an arthropod called?

— e — — — — —

Hidden Word: — — — — —

Definition: _____
