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STUDY GUIDE

CHAPTER 28
Arthropods

Section 28–1 Introduction to Arthropods *(pages 607–616)*

SECTION REVIEW

In this section you were introduced to the largest and most diverse animal phylum: the arthropods. You discovered that this group of animals includes horseshoe crabs, spiders, scorpions, ticks, shrimp, barnacles, waterfleas, centipedes, millipedes, and butterflies and all other insects, as well as the large group of extinct animals known as trilobites.

You learned that the three main characteristics of an arthropod are a tough exoskeleton, a series of jointed appendages, and a segmented body. You learned how arthropods carry out essential life functions, and you studied in detail the body plan of a representative arthropod, the grasshopper.

You discovered that growth and development in arthropods is associated with the process called molting. Arthropods molt, or shed, their exoskeletons in order to grow larger. Some arthropods also change in form as well as in size when they molt. Some arthropods, such as grasshoppers and crabs, change gradually as they grow and develop. Others, such as butterflies and beetles, change abruptly and dramatically as they go from one stage of development to the next.

Relating Terms: Building Vocabulary Skills

Consider the following terms: *exoskeleton, chitin,* and *molt.* In the space provided, write a brief paragraph in which you discuss how these terms are related to one another and explain the importance of these terms in identifying arthropods.

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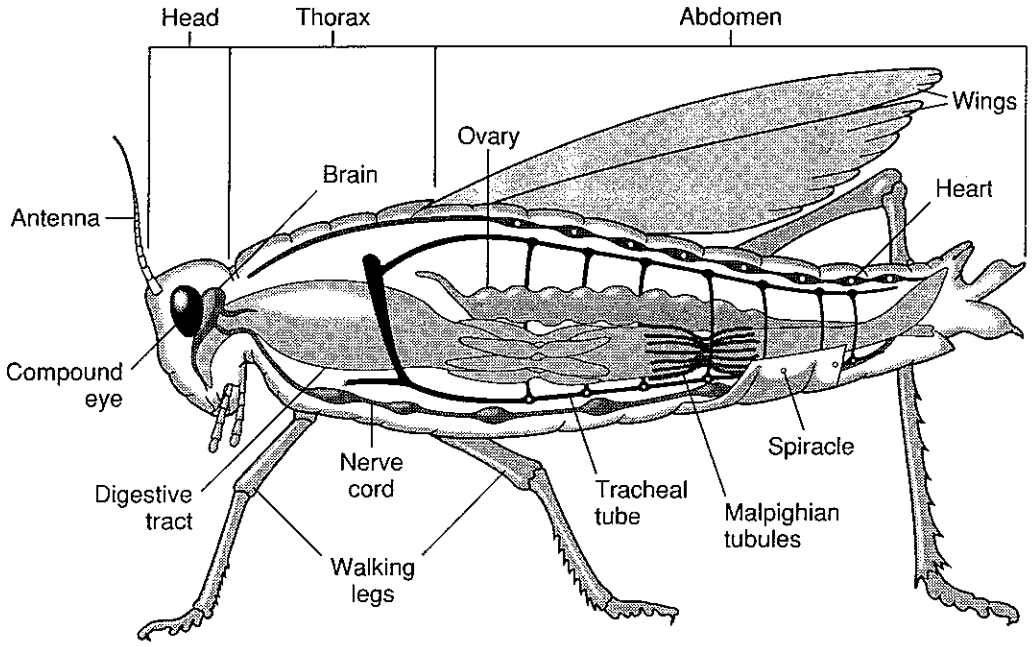
Interpreting Diagrams: Understanding the Main Ideas

The accompanying diagram shows the internal structures of a representative arthropod, the grasshopper. Refer to the diagram to answer the questions that follow.



1. Which structures are found in the head of a grasshopper?_____

_____

2. What structure connects the brain to the rest of the body?_____

_____

3. What is the long structure that runs along the top of the abdomen? What is its function?

_____

4. What relationship exists between a spiracle and a tracheal tube? What is the function of the tracheal tubes? _____

_____

_____

5. What is the function of the Malpighian tubules? How is their function related to their location?_____

_____

_____

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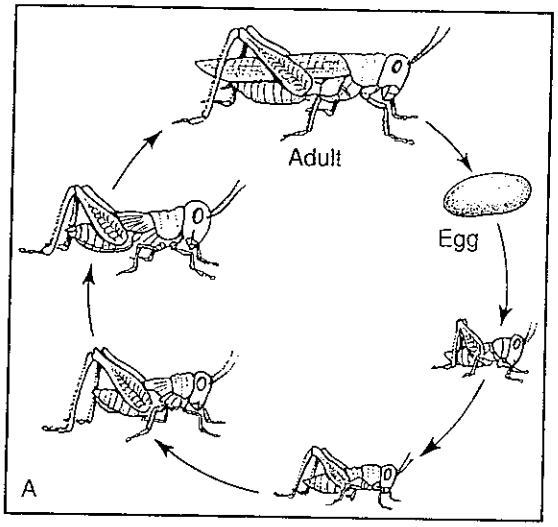
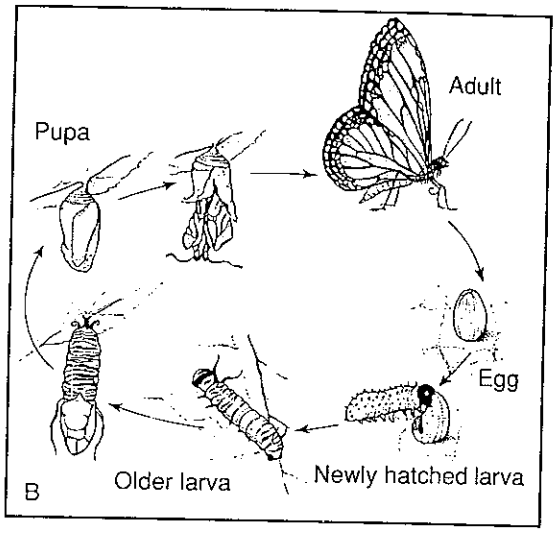
Metamorphosis: Interpreting Diagrams

The accompanying diagrams show two types of metamorphosis that takes place in insects. Refer to the diagrams to answer the questions that follow.





1. In diagram A, what changes do you see in the arthropod as it changes from a young animal to an adult? _____

2. Are there other changes in the animal in diagram A that you cannot see?

_____

3. Does diagram A show complete or incomplete metamorphosis? Explain.

_____

_____

4. How many different forms of growth are shown in diagram B? What are these forms?

_____

5. Does diagram B show complete or incomplete metamorphosis? Explain.

_____

_____

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 28–1 and how you would organize them into a concept map. Now look at the concept map for Chapter 28 on page 278. Notice that the concept map has been started for you. Add the key facts and concepts you feel are important for Section 28–1. When you have finished the chapter, you will have a completed concept map.

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Section 28–2 Spiders and Their Relatives (pages 617–620)

SECTION REVIEW

In this section you learned about the arthropods that belong to the subphylum Chelicerata. These animals include horseshoe crabs and the group of organisms known as arachnids.

You discovered that chelicerates have a body that is divided into two parts and that they have two characteristic pairs of mouthparts. The first pair of mouthparts are called chelicerae. The second pair are called pedipalps. Both sets of mouthparts are adapted to serve different functions in different species.

Applying Definitions: Building Vocabulary Skills

Study the following list of animals. Identify those that are arachnids by putting an A in the blank. Identify those that are chelicerates but not arachnids by putting a C in the blank. If the animal is not a chelicerate, do not put a mark in the blank.

_____ **1.** Horseshoe crab

_____ **2.** Grasshopper

_____ **3.** Red velvet mite

_____ **4.** Wolf spider

_____ **5.** Praying mantis

_____ **6.** Tarantula

_____ **7.** Trilobite

_____ **8.** Scorpion

_____ **9.** Tick

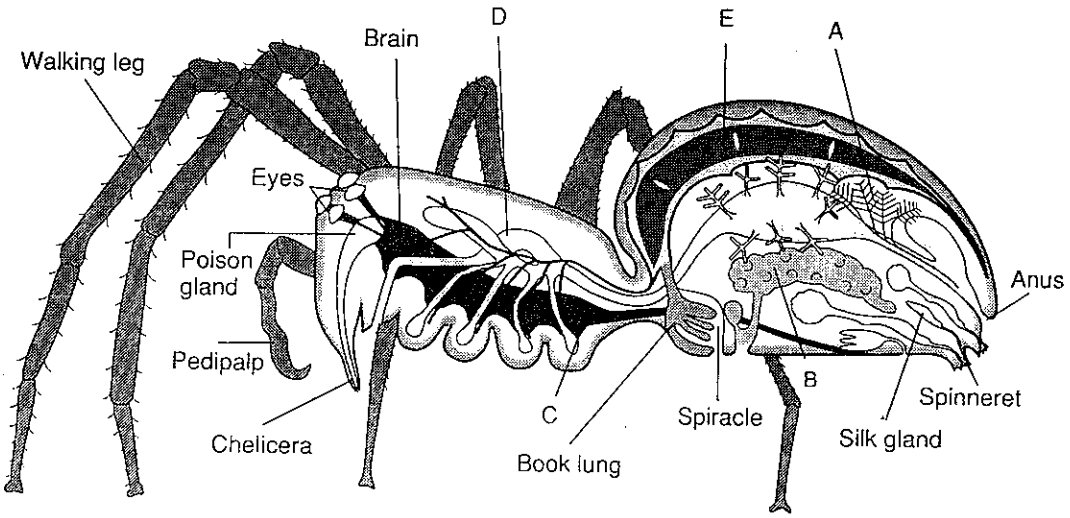
_____ **10.** Centipede

_____ **11.** Hummingbird

_____ **12.** Chigger

Interpreting a Diagram: Understanding the Main Ideas

The internal structures of a typical spider are shown in the accompanying diagram. Use the diagram to answer the questions that follow.



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1. How many major body parts does a spider have? What are they called? Label these body parts on the diagram. _____

2. Based on the diagram, what is the relationship between the poison gland and the chelicera? What would you expect the function of the chelicera to be?

3. Identify structure A and describe its function. _____

4. Which lettered structure is the heart? _____

5. What appears to be the relationship between the silk gland and the spinneret?

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 28–2 and how you would organize them into a concept map. Now look at the concept map for Chapter 28 on page 278. Notice that the concept map has been started for you. Add the key facts and concepts you feel are important for Section 28–2. When you have finished the chapter, you will have a completed concept map.

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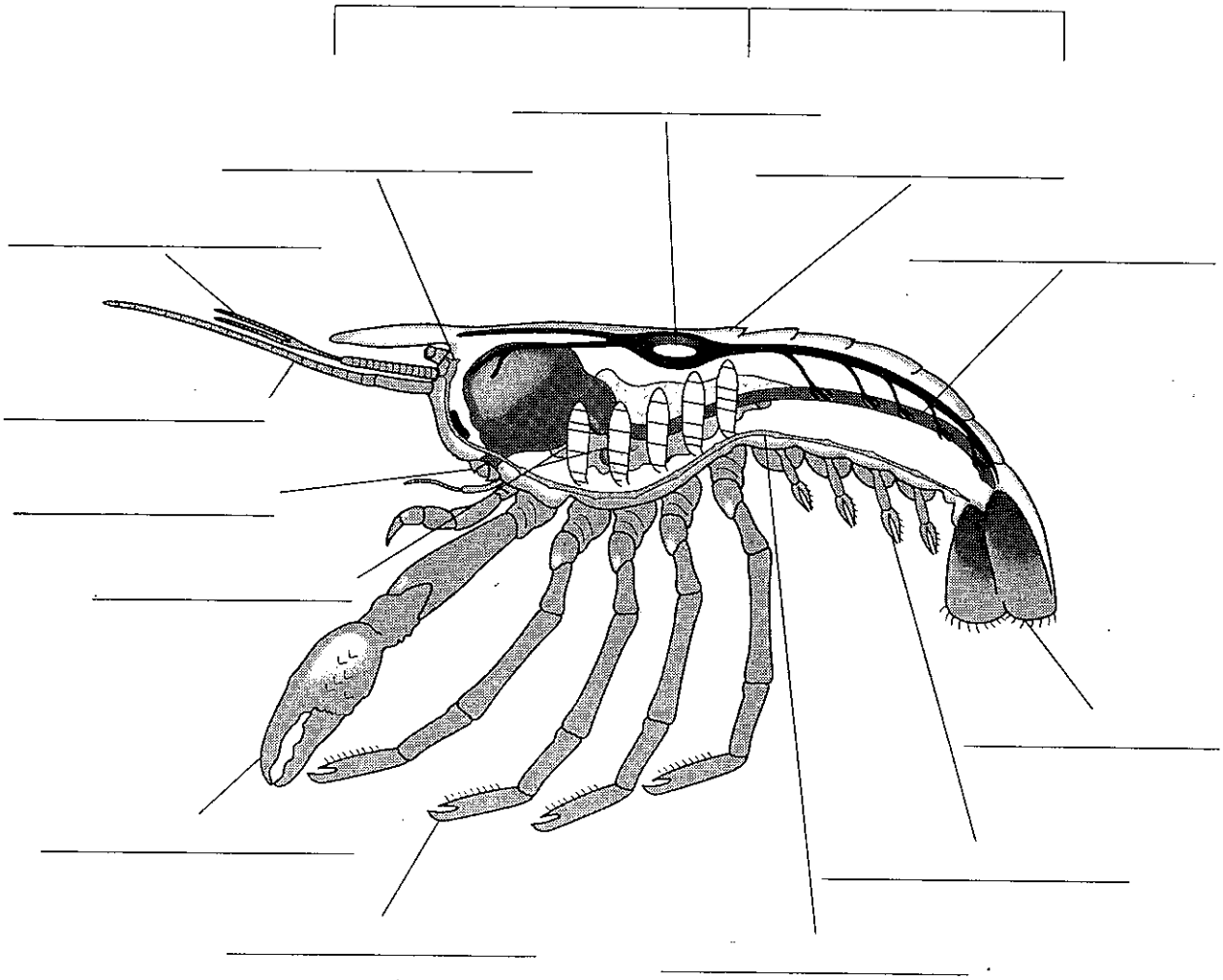
Section 28–3 Crustaceans (pages 620–621)

SECTION REVIEW

In this section you learned about the subphylum Crustacea. Crustaceans are primarily aquatic. They range in size from microscopic water fleas to spider crabs up to 6 meters across. Crustaceans are characterized by a hard exoskeleton, two pairs of antennae, and mouthparts called mandibles. The main body parts are the head, thorax, and abdomen. In many species, the head and thorax have fused into a cephalothorax that is covered by a shell called the carapace.

Summarizing Information: Finding the Main Ideas

A. Identify and label the following structures on the accompanying diagram of a crayfish: *abdomen, brain, carapace, cephalothorax, claw, first antenna, gills, heart, intestine, mandible, nerve cord, second antenna, swimmeret, tail, walking leg.*



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B. Complete the table as follows: (1) List each type of major appendage on a crayfish; (2) tell whether each type of appendage is attached to the head, thorax, or abdomen; (3) briefly describe the function of each type of appendage.

Major Appendages on a Crayfish		
Appendage	**Location**	**Function**

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 28–3 and how you would organize them into a concept map. Now look at the concept map for Chapter 28 on page 278. Notice that the concept map has been started for you. Add the key facts and concepts you feel are important for Section 28–3. When you have finished the chapter, you will have a completed concept map.

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Section 28–4 Insects and Their Relatives (pages 622–628)

SECTION REVIEW

The subphylum Uniramia is made up of insects and their relatives, the millipedes and centipedes. Uniramians are arthropods that are characterized by one pair of antennae and appendages that do not branch. Uniramians inhabit almost every terrestrial habitat on Earth. In addition, some species live in fresh water and a few others live in marine habitats.

The first class of uniramians that you read about in this section, centipedes, consists of carnivores that have one pair of legs on each of their many body segments. Centipedes possess poison claws in their head region, which are used to capture and stun or kill prey.

The second class of uniramians, millipedes, consists of herbivores that have two pairs of legs on each of their many body segments. Many millipedes curl up into a ball to protect themselves. Some can also defend themselves by secreting unpleasant or toxic chemicals.

The third class of uniramians, insects, consists of arthropods that are characterized by a body composed of three parts—head, thorax, and abdomen—and that have three pairs of legs attached to the thorax. Insects have developed many intriguing adaptations for feeding, movement, social behavior, and communication.

Describing Insects: Using the Main Ideas

Some of the following statements correctly describe insects. Others do not. Read each statement carefully. If the statement correctly describes insects, write "correct" in the space provided. If the statement does not correctly describe insects, write "incorrect" and explain why the statement is incorrect in the space provided.

1. The bodies of insects are characterized by two main sections and five pairs of legs.

_____

_____

2. Many insects undergo a developmental process called metamorphosis, which can be incomplete or complete. _____

_____

3. Unlike many arthropods, insects have no mouthparts. _____

_____

_____

4. Many insects form societies in which members are dependent upon one another for survival. _____

_____

5. Many insects use chemicals called pheromones to communicate with one other.

_____

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6. Insects are characterized by a long, wormlike body composed of many leg-bearing segments. _____

_____

_____

_____

7. Almost all insects are aquatic. _____

_____

8. Insects have two pairs of antennae and often have a hard exoskeleton that contains calcium carbonate. _____

_____

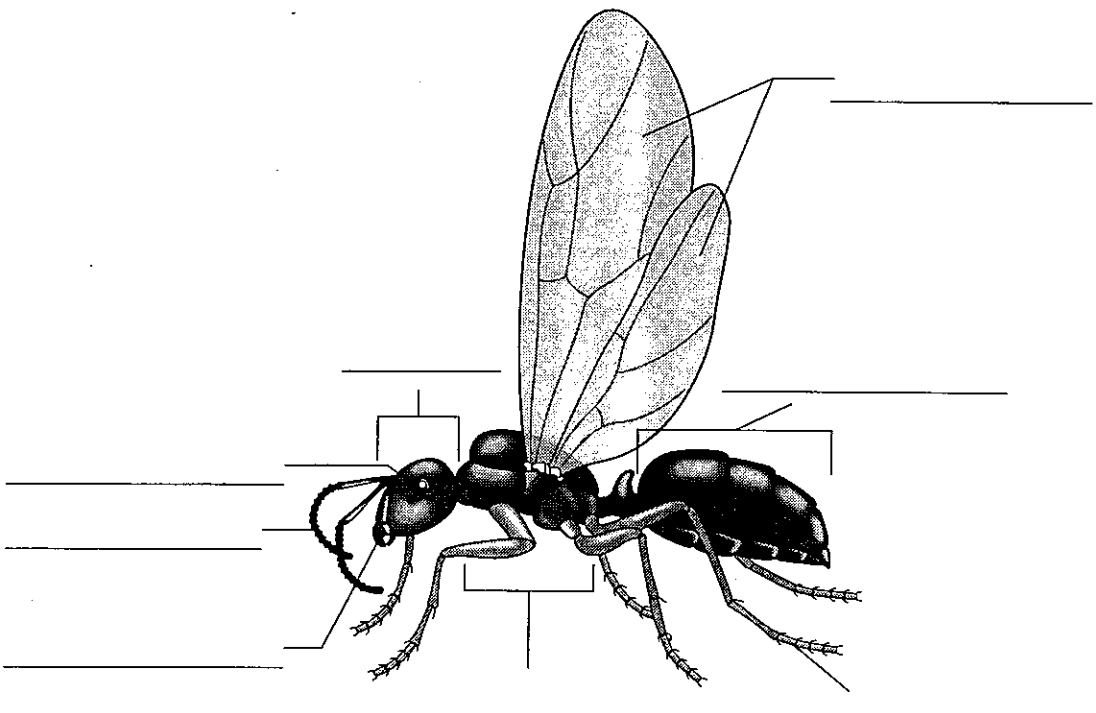
_____

9. Insects may communicate through "dancing." _____

_____

Insect Body Plan: Labeling Diagrams

On the accompanying diagram of a typical insect, label the following structures: *abdomen, antenna, compound eye, head, leg, mandibles, thorax, wings.*



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Relating Concepts: Finding the Main Ideas

Explain how the terms in each of the following pairs are related to each other.

1. Centipedes, millipedes: _____

2. Uniramian, insect: _____

3. Mandibles, mouthparts: _____

4. Queen, worker: _____

5. Pheromone, cricket chirp: _____

6. Round dance, waggle dance: _____

7. Insect society, caste: _____

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 28–4 and how you would organize them into a concept map. Now look at the concept map for Chapter 28 on page 278. Notice that the concept map has been started for you. Add the key facts and concepts you feel are important for Section 28–4. When you have finished the chapter, you will have a completed concept map.

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Section 28–5 How Arthropods Fit into the World (pages 629–631)

SECTION REVIEW

In this section you learned about the many roles that arthropods play in nature. For example, they are direct and indirect sources of food for many organisms. Arthropods are also involved in many symbiotic relationships with plants and animals, including the pollination of flowers.

You discovered that arthropods affect humans both positively and negatively. Although some are important as sources of food and as agents of pollination in agriculture, others cause crop damage and carry diseases.

Applying Concepts: Understanding the Main Ideas

1. Describe how each of the following organisms would probably view an arthropod:

Venus fly trap: _____

Frog: _____

Flowering plant: _____

Fish: _____

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Acacia tree: _____

2. List four ways in which arthropods can have a positive effect on humans and four ways in which they can have a negative effect.

Positive: _____

Negative: _____

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 28–5 and how you would organize them into a concept map. Now look at the concept map for Chapter 28 on page 278. Notice that the concept map has been started for you. Add the key facts and concepts you feel are important for Section 28–5. When you have finished the chapter, you will have a completed concept map.