Name _____ Period _____

Chapter 33: Invertebrates

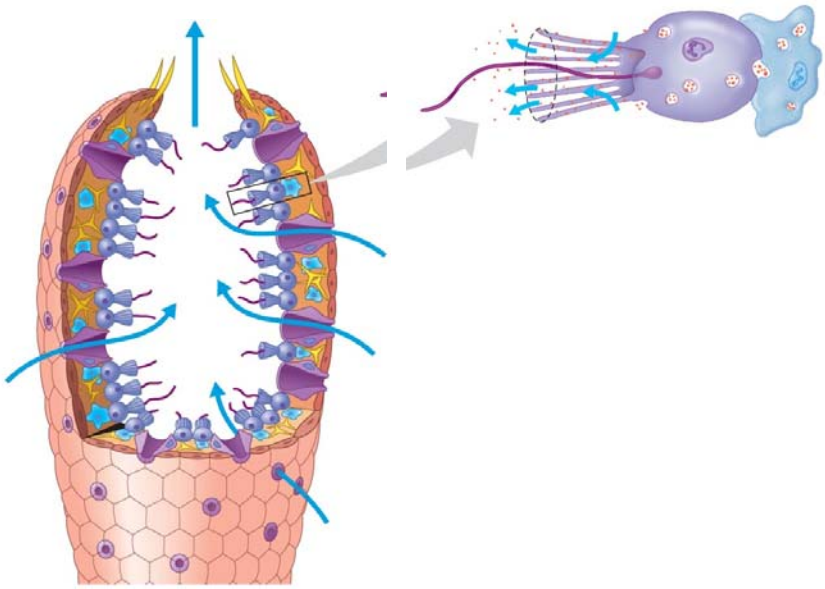
Chapters 31, 32, and 33 should be considered as a single unit, and you should try to put all of them together in a single conceptual framework. Due to the scope of our course, you are likely to see more general questions on individual phyla. For each of the phyla that we highlight in the questions that follow, try to know the characters that are unique to that group, and focus on the evolution of various systems. So they have time to teach the more difficult molecular concepts, many teachers choose to have students learn this unit on their own. Our goal here is to focus your time and energy on what we have seen to be commonly asked information. At the end of this *Reading Guide* chapter, you will find a chart that may help you to organize this knowledge.

Concept 33.1 Sponges are basal animals that lack true tissues

1. You may have learned in an earlier course that sponges are in the phylum *Porifera*. This group is now known to be polyphyletic, and all *sponges* belong to either phylum *Calcarea* or phylum *Silicea*. They are the simplest animals and lack true tissues.

   Label the following: *pores, spongocoel, epidermis, amoebocytes, choanocyte, flagellum, spicules, epidermis*, and *mesohyl*.

   On this sketch of a typical sponge, *explain* how water flows through the body of a sponge, and describe how it obtains food.



2. What is the feeding method of a sponge?

3. Go back to the labels you applied to the figure above, and explain or define each term: *osculum, spongocoel, epidermis, pore, mesohyl, amoebocyte, choanocyte, spicules.*

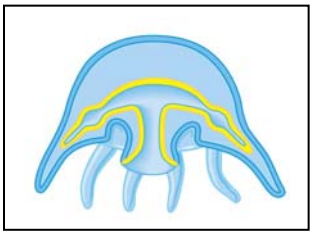
4. Most sponges are *hermaphrodites*. What does this mean?

5. Go to the chart at the end of this *Reading Guide*. Consider that the sponges have only two cell layers, and both are in contact with the surrounding medium. They have no specialized tissues, and therefore no organs. This will help you explain how a sponge obtains oxygen or gets rid of wastes. Fill in the chart for sponges.

Concept 33.2 Cnidarians are an ancient phylum of eumetazoans

6. Sketch the polyp form of a cnidarian and add these labels: *gastrovascular cavity, mouth/anus, epidermis, gastrodermis, tentacle, mesoglea*, and *gastrovascular cavity*.

7. *Cnidarians* are *diploblastic* and have *radial symmetry*. Use your sketch above to explain what this means.



8. If you flip the polyp form, squish it a bit, and give it a floatation device, you will have the body form of a jellyfish. What is this body form called?

9. What are *nematocysts*, and how do they help a cnidarian obtain its food?

10. Read the rest of this concept carefully to complete the chart at the end. What is the nervous system of a cnidarian? Do they have a brain?

11. What is the "skeleton" of a cnidarian? Check the glossary to explain how this type of skeleton works.

Concept 33.3 Lophotrochozoans, a clade identified by molecular data, have the widest range of animal body forms

You may breathe a sigh of relief to know that we are going to condense this section and look at only three phyla: *Platyhelminthes, Mollusca,* and *Annelida*.

12. *Platyhelminthes* means "flatworm," which describes the shape of these worms. This is the first phylum we are studying that is *triploblastic*. This group is *acoelomate*, a term you learned in the last chapter. It is the only *acoelomate* group we will study, so be sure to know this. As you read this paragraph, complete the line on the chart for *Platyhelminthes* at the end of this *Reading Guide*. Remember that if there is no specialized system for gas exchange, for example, then it occurs by diffusion, and this is what you should write in the chart.

13. *Excretion* is not just a polite word for *defecation*; instead, it refers to the elimination of *nitrogenous waste*. Your primary nitrogenous waste is urine, produced by the kidneys. What specialized organ do flatworms have to manage water balance and nitrogenous wastes?

    Include this information on the chart at the end of this *Reading Guide*.

14. Focus on the three classes of *Platyhelminthes* listed below to complete this chart.

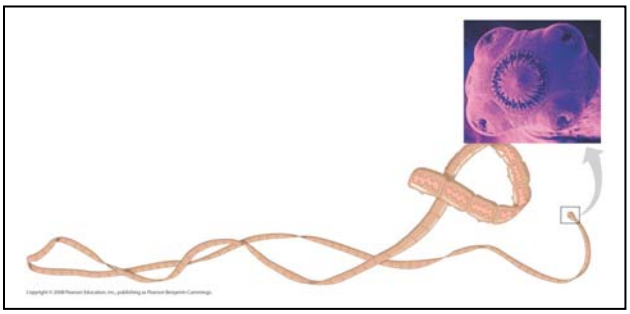
Class	**Example(s)**	**Features to Note**
Turbellaria		
Trematoda		
Cestoda		

15. *Planaria* are the only free-living (not parasitic) examples from the chart above. Notice the presence of *eyespots* and *ganglia* in the *Planaria*. Label them. This is the first group we see with *bilateral symmetry* and sense organs concentrated at the anterior end. What is the term for this move toward having a "head" where sense organs and brain are concentrated? (See Chapter 32 if you have forgotten.)

16. Label the *mouth* in the *Planaria*. Where do wastes leave? The digestive system seen here is sometimes called two-way. Why?

17. Parasitic worms often have complex life cycles involving multiple hosts. Sketch the life cycle of a *blood fluke*.

18. Look at the evil head of a tapeworm! How do they attach to the gut of the host? This is another worm with a complex life cycle. How might *you* get a tapeworm?



19. Tapeworms have no digestive system. Why not?

20. Here are some important features of animals in the phylum *Mollusca*. Explain each one.

muscular foot

visceral mass

mantle

radula

21. You are familiar with many molluscs. Give the key features of each class, and provide an example.

Class	**Key Features**	**Example**
Polyplacophora		
Gastropoda		
Bivalvia		
Cephalopoda		

22. The last phylum in this concept is *Annelida*. This group is sometimes called the segmented worms because of its visible rings. There are three classes. Give the information for each class in the chart that follows.

Class	**Key Features**	**Examples**
Oligochaeta		
Polychaeta		
Hirudinea		

23. Many students dissect an earthworm in introductory biology, and all of us have seen living earthworms (much more interesting). Study the figure of an earthworm, and be familiar with these features:

clitellum

ventral nerve cord

crop/gizzard

metanephridia

chaetae

24. Both *molluscs* and *annelids* have a true *coelom*. Refer to Chapter 32, and define *coelom* again.

Concept 33.4 Ecdysozoans are the most species-rich animal group

25. What do the root words that name this group mean?

ecdyso–

–zoan

26. Phylum *Nematoda* includes the worms we often call roundworms. Their bodies are cylindrical, unlike those of the flatworms, and lack segmentation. What makes up the body covering of a nematode?

27. *Caenorhabditis elegans* is a model research organism and is widely studied. It is an example of a free-living nematode. Some interesting parasitic nematodes include the human parasites pinworms, hookworms, and *Trichinella*. How does this last parasite work? Note that its life cycle involves more than one host.

28. What does the phylum name *Arthropoda* mean?

29. The *ecdysozoans* are a huge group, but members have some common features. What is the body covering? What molecule is it made of?

30. The only way an arthropod can grow is to shed its *chitinous exoskeleton*. What is this shedding process called?

31. Describe the circulatory system of arthropods. Note that most molluscs have a similar type of circulatory system.

32. Let's focus on some specific groups. How many legs do *arachnids* have?

33. What are three examples of *arachnids*?

34. *Millipedes* and *centipedes* are placed in the subphylum *Myriapoda*, which means "many legs." Complete the following chart.

Class	**Example**	**Legs per Segment**	**Diet**
	Millipedes		
	Centipedes		

35. For the class *Insecta*, how many legs do all members have?

36. What are the three body regions of insects?

37. Insects show two types of metamorphosis. Explain each type.

incomplete metamorphosis

complete metamorphosis

38. *Crustaceans* are primarily aquatic and have many pairs of appendages. How many appendages does a lobster have?

39. What specialized respiratory structures do many crustaceans have?

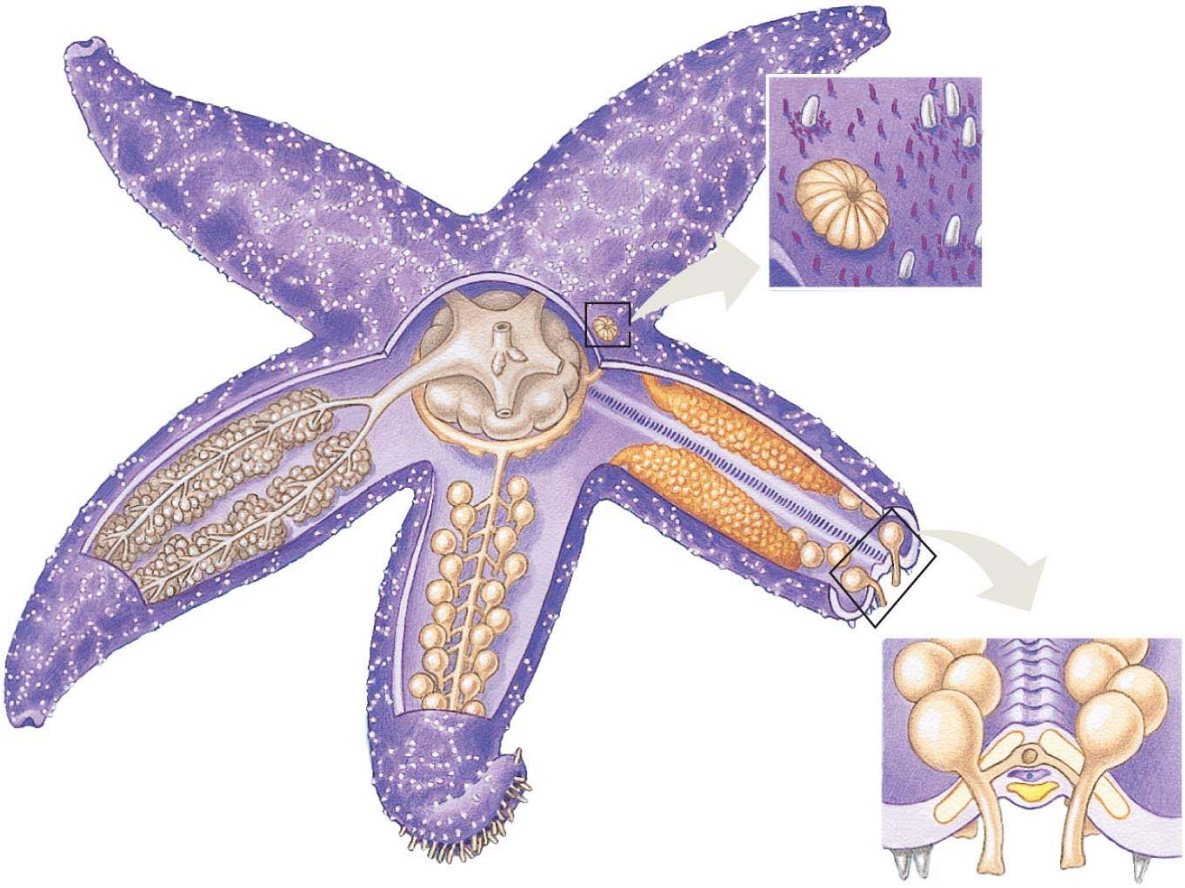
40. Complete this chart to summarize the different groups of arthropods.

Group	**# of Appendages**	**Respiratory Organs**	**Examples**
Arachnids			
Insects			
Crustaceans			

Concept 33.5 Echinoderms and chordates are deuterostomes

41. What does the phylum name, *Echinodermata*, mean?

42. Besides a spiny skin, *echinoderms* have a *water vascular system* with *tube feet*. Label the features of the water vascular system on the following sketch, and explain how the system works.



43. As adults, many echinoderms appear to have radial symmetry, but *their larval stage is bilateral*. This is an important feature to note. As you read this section, what other interesting facts do you find about members of this group?

44. Let's go back and look at phylogeny. Use the chart copied below from Chapter 32 to explain the *key feature* that separates each of the following groups:

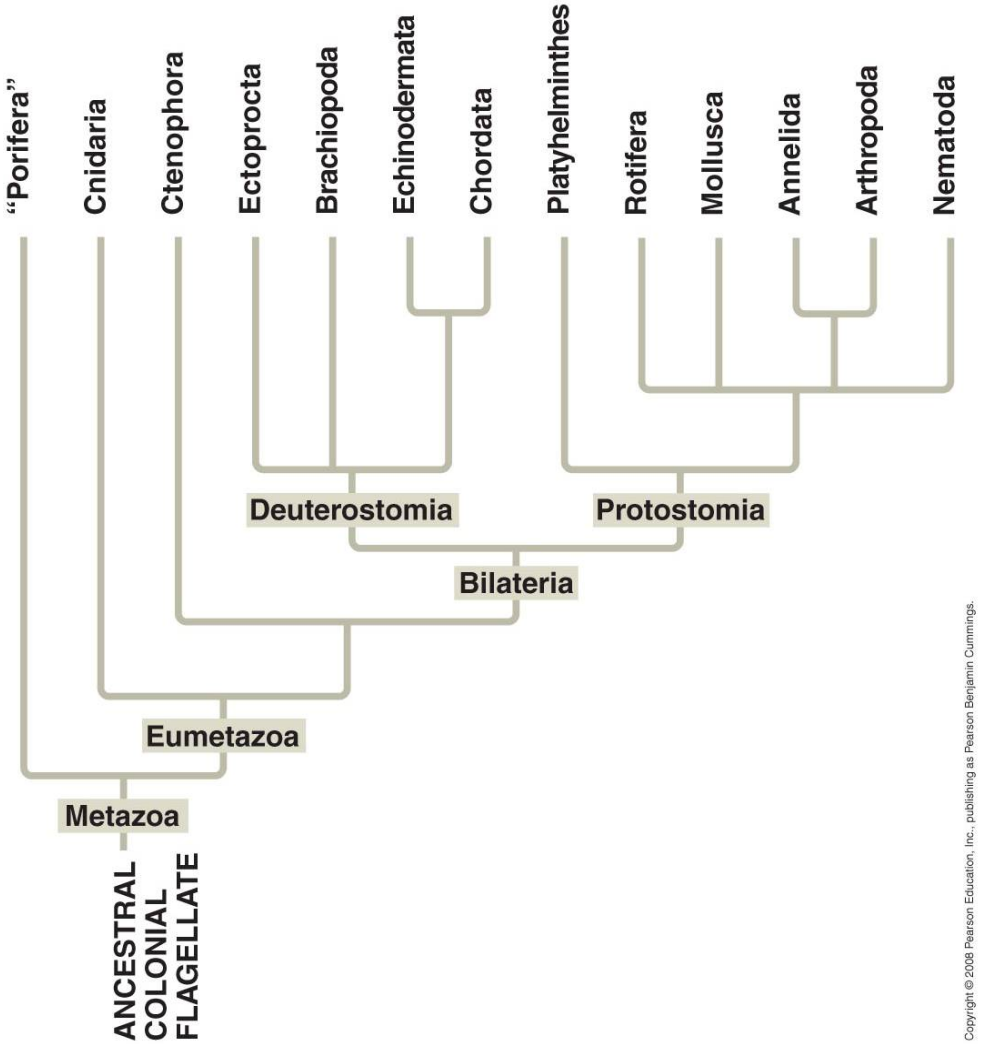
"Porifera" from all other groups

Cnidaria from all other groups

Protostomes from *deuterostomes* (Which are the only two deuterostome groups?)

Platyhelminthes from other *protostomes*

Annelids and *arthropods* from *nematodes*



Now you should be ready to test your knowledge. Place your answers here:
Testing Your Knowledge: Self-Quiz Answers

1._____ 2._____ 3._____ 4._____ 5._____ 6._____

A COMPARISON OF IMPORTANT FEATURES OF SELECTED ANIMAL PHYLA

PHYLUM	Examples	Unique Features	Circulatory	Respiratory	Nervous	Excretory	Digestive
Calcarea/ Silicea							
Cnidaria							
Platyhelminthes							
Nematoda							
Mollusca							
Annelida							
Arthropoda							
Echinodermata							
Chordata							