

**Background Information**

The appearance of each animal phylum in the fossil record represents the evolution of a successful and unique body plan. Modern sponges and cnidarians have little internal specialization. As larger and more complex animals have evolved, specialized cells join together to form tissues, organs, and organ systems.

All invertebrates except sponges exhibit some type of symmetry. Cnidarians and echinoderms exhibit radial symmetry—body parts extend from the center of the body. Worms, mollusks, and arthropods exhibit bilateral symmetry—they have mirror image right and left sides. The evolution of bilateral symmetry was accompanied by the trend toward cephalization, which is the concentration of sense organs and nerve cells in the front of the body. Invertebrates with cephalization can respond to the environment in more sophisticated ways than can simpler invertebrates.

Most complex animals are coelomates, with a true coelom that is lined with tissue derived from mesoderm. A coelom is a body cavity. Flatworms are acoelomates—they don't have a coelom. Roundworms are pseudocoelomates—their coelom is only partially lined with mesoderm. Annelids, mollusks, arthropods, and echinoderms have true coeloms.

In most invertebrates, the zygote divides to form a blastula. In protostomes, the blastopore develops into a mouth. In deuterostomes, the blastopore develops into an anus. Worms, arthropods, and mollusks are protostomes. Echinoderms and chordates are deuterostomes.

**Procedure**

1. Complete the table below about animals with different types of skeletons.
  
2. Fill in the column marked description for the type of skeleton and provide two examples of animals with that particular type of skeleton.

	Hydrostatic Skeleton	Exoskeleton	Endoskeleton
<b>Description of the Type of Skeleton</b>			
<b>Two Examples of Animals with this Type of Skeleton</b>	a.  b.	a.  b.	a.  b.

3. Complete the table that shows the general characteristics of the main groups of invertebrates. For Germ Layers choose between none, two, or three. For Body Symmetry, choose between none, radial, or bilateral. For Cephalization, choose yes or no. For Coelom, choose between, none, pseudocoelom, or coelom.

Invertebrate	Germ Layers	Body Symmetry	Cephalization	Coelom
Sponges				
Cnidarians				
Flatworms				
Roundworms				
Mollusks				
Annelids				
Arthropods				
Echinoderms				

### Analysis and Conclusion

1. What general characteristic do all of the invertebrates have in common?
2. Which invertebrate groups have either an exoskeleton or endoskeleton?
3. Are the echinoderms classified as a protostome or deuterostome?
4. If an animal is a protostome, what does the blastopore become as the animal undergoes development of its body?
5. Name one unique characteristic of each of the invertebrate groups. Sponges have been completed for you already.

sponges - no body symmetry

cnidarians - \_\_\_\_\_

flatworms - \_\_\_\_\_

roundworms - \_\_\_\_\_

mollusks - \_\_\_\_\_

annelids - \_\_\_\_\_

arthropods - \_\_\_\_\_

echinoderms - \_\_\_\_\_