4.1

* Most animals are invertebrates
  + Invertebrates are a diverse group of organisms
    - **Invertebrates** – animals that do not have backbones or bone tissue
      * **Sponges**
      * **Cnidarians**
      * **Worms**
      * **Mollusks**
      * **Echinoderms**
      * **Arthropods**
    - **Sponges** – simplest multicellular animals on earth
      * **Sessile** – they live attached to one spot and do not move from place to place
      * Sponges reproduce asexually (budding) and sexually through fertilization
        + **Larva** – an immature form or early stage of an organism that is different from the parent
        + Sponge larva can swim

4.2

* Cnidarians and worms have different body plans
  + Cnidarians have simple body systems
    - Cnidarians are invertebrates found only in water
      * Jellyfish, corals, sea anemones, hydras
        + Have **tentacles** – fingerlike extensions of their body that reach into the water
      * Reproduce sexually and asexually and use water for both
      * Mobile – can move their bodies from place to place
  + Animals have different body plans
    - **Radial symmetry** – circular body shape, allows organisms to capture food from any direction
    - **Bilateral symmetry** – identical left and right sides
  + Most worms have complex body systems
    - Segmented worms – sectioned bodies
    - Flatworms and round worms
      * Flatworms move with cilia not muscle
      * Round worms use muscles to move

4.3

* Most mollusks have shells, and echinoderms have spiny skeletons
  + **Mollusks** are soft-bodied animals
    - **Bivalves** – hard shell made of two matching halves
      * Take in oxygen through **gills** – an organ that filters dissolved oxygen from water
    - **Gastropods** – diverse group, withdraws into shell for protection
      * Use **lungs** to take in oxygen
    - **Cephalopods** – live in saltwater environments, have brain and nerves, use gills
  + Mollusks show a range of adaptations
  + Echinoderms have unusual adaptations
    - **Echinoderms** – group of invertebrates that live in the ocean, show radial symmetry, have a skeleton made of stiff hard plates, not bone tissue

4.4

* Arthropods have exoskeletons and joints
  + Most invertebrates are arthropods – has segmented body covered with a hard outer skeleton
    - **Exoskeleton** – a strong outer covering made of a material called chitin
    - **Molting** – the process of shedding an exoskeleton as an arthropod grows
  + Insects are six-legged arthropods
    - **Metamorphosis** – appearance and body systems may change dramatically throughout the life cycle of an insect
  + Crustaceans live in water and on land
  + Arachnids are eight-legged arthropods
  + Millipedes and centipedes are arthropods