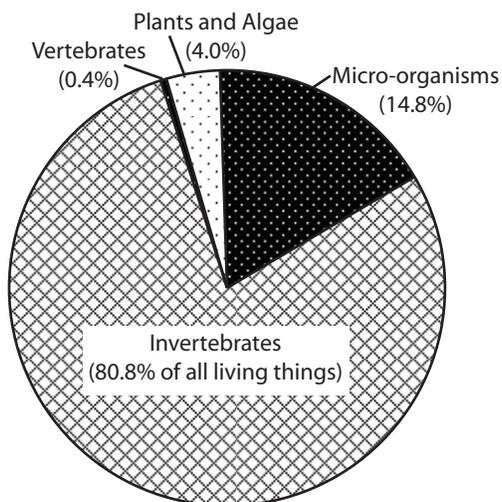


31—Invertebrates

A ¹The animal kingdom is divided into two major groups: **vertebrates** and **invertebrates**. ²Vertebrate means “with a backbone”. ³Many animals, such as birds, fish, reptiles, amphibians, and mammals, are in the vertebrate group. ⁴However, there are far more invertebrate (without backbone) animals on Earth. ⁵View the graph below to see how the proportion of invertebrates compares to the proportion of other living organisms.



B ⁶Some invertebrates live on land and others live in water. ⁷When you walk outside in the yard or in a park, what type of animal are you most likely to see? ⁸You would probably see ants on the ground and bees, flies, and butterflies on plants or flying in the air. ⁹Insects are the largest part of the **Arthropod** phyla, which is the largest group of invertebrates. ¹⁰Arthropods can be found almost everywhere, including forests, deserts, oceans, lakes, the sky, underground, and even in our homes.

C ¹¹Insects and other arthropods are supported by their **exoskeleton**, which also protects them like a coat of armor. ¹²The word *insect* in Latin and Greek means “cut into sections”. ¹³The insect’s body has three sections. ¹⁴The **head** has a pair of antennae, eyes, and a mouth. ¹⁵The **thorax**, which is the middle section, has the six legs and wings (in some species). ¹⁶In the rear is the **abdomen**, which contains many body systems, such as the respiratory, digestive, and reproductive systems.

D ¹⁷Insects go through a **metamorphosis**, which means that they undergo drastic changes during their life cycle. ¹⁸To develop and grow, an insect must molt. ¹⁹Since the exoskeleton cannot grow, the insect **molts**, or sheds this outer covering, and then grows a larger exoskeleton. ²⁰Some insects go through an **incomplete metamorphosis** with only three stages, like the grasshopper. ²¹After hatching from an egg, the young are called **nymphs** and look very similar to the adult. ²²As they molt and develop, they become adults. ²³Some insects go through a **complete metamorphosis** with four stages. ²⁴The egg is the first stage. ²⁵Next, the **larva** hatches from the egg. ²⁶During this worm-like stage, the larva looks very different from the adult. ²⁷Third is the **pupa** stage. ²⁸For this part of the metamorphosis, the larva has sealed itself into a cocoon structure. ²⁹During the pupa stage, the insect transforms and then finally emerges as an adult.

E ³⁰There are a wide variety of invertebrates on Earth beyond insects and other arthropods. ³¹Study the table below to learn more about many invertebrate phyla.

| <u>Phyla</u> | <u>Characteristics</u> | <u>Common Examples</u> |
|--------------|---|---|
| Arthropods | exoskeleton (hard outer skeleton), segmented, jointed | beetles, centipedes, spiders, shrimp, crabs |
| Echinoderms | marine, spiny skin | sand dollar, sea star, sea urchins |
| Cnidarians | aquatic, stinging cells, single opening | jelly fish, anemone, coral |
| Mollusks | soft body, most have shells | snails, clams, octopus, squid |
| Annelids | segmented worms, moist or wet environment | earthworms, leeches |
| Nematodes | thread-like, cylinder shaped | roundworms |

1. For each statement, circle T for true and F for false. If the statement is false, replace the **bold word(s)** to make the statement true. Then write "D" for diagram or the number of the sentence(s) that best supports your answer.

a. T F A **small** percentage of living organisms are invertebrates. ____

b. T F Invertebrate animals **do not have** a backbone. ____

c. T F Echinoderms are commonly found in **your yard**. ____

d. T F The majority of people see arthropods **almost every day**. ____

2. The prefix **exo-** in the word exoskeleton most likely means:

- a. internal
- b. exit
- c. without
- d. external

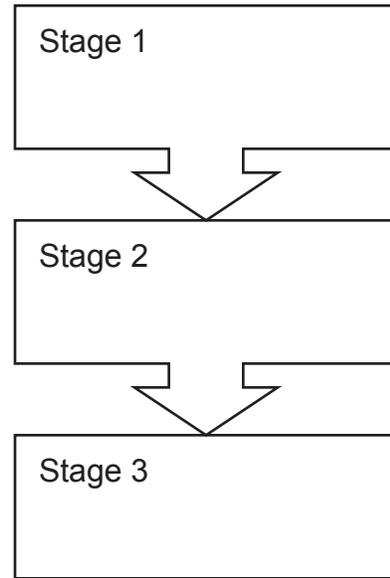
3. Choose the best answer about insects. All insects:

- a. go through metamorphosis
- b. go through the pupa stage
- c. have three body sections
- d. both a and c are correct

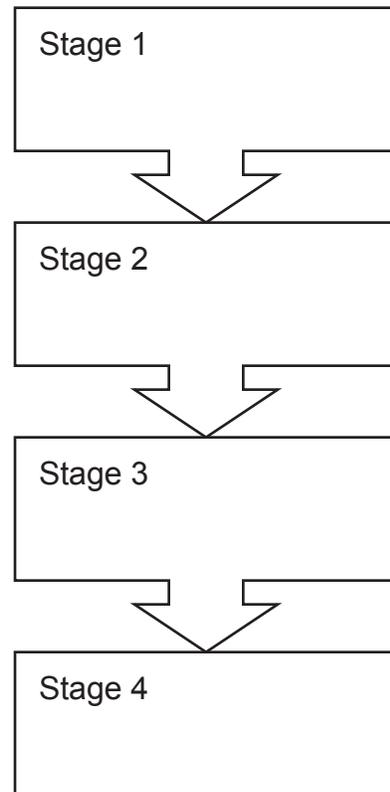
Write the numbers of the two sentences that best support your answer. ____, ____

4. What percent of living organisms are NOT invertebrates?

5. List the three stages an insect goes through during incomplete metamorphosis:



6. List the four stages an insect goes through during complete metamorphosis:



7. During one of the stages of complete metamorphosis, the insect does not eat. Which stage do you think this is? Why?

Lesson 31, Invertebrates

1. a. F (D), large
b. T (4)
c. F (D), the ocean
d. T (10)
2. d
3. d (13, 17)
4. 19.2%
5. egg, nymph, adult
6. egg, larva, pupa, adult
7. The pupa cannot eat because it is sealed inside a cocoon and has no way to get food.
8. **Head:** pair of antennae, eyes, and mouth
Thorax: six legs and wings **Abdomen:** body systems
9. Two insects, arachnids such as spiders and scorpions, crustaceans such as lobsters and/or other arthropods can be named. Details could include: exoskeleton, three body section and metamorphosis for insects, and segmented or jointed body.
10. Using the chart from the lesson, check to see if the answer includes one of the animals and the characteristics from each of the phyla: arthropods, echinoderms, cnidarians, and mollusks.