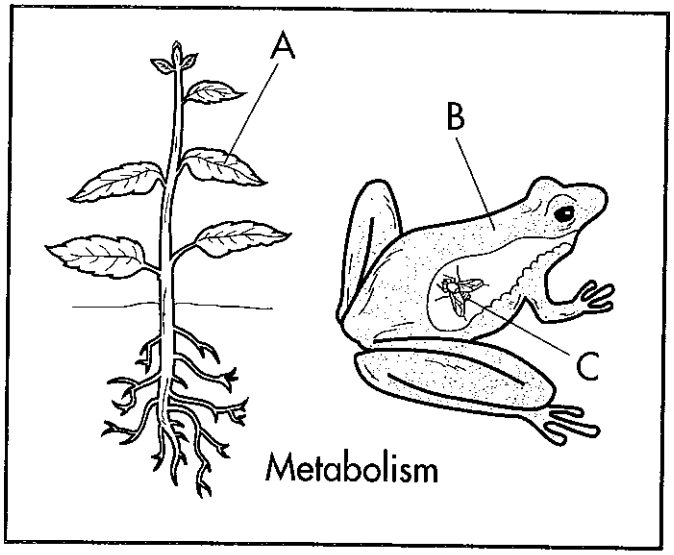
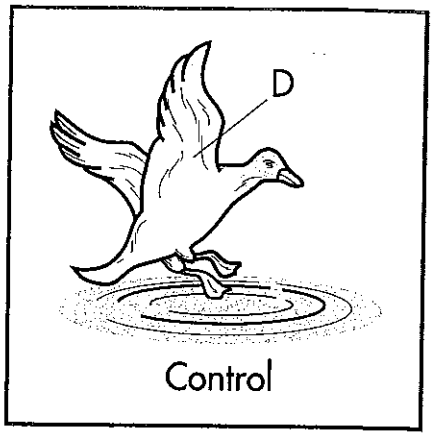
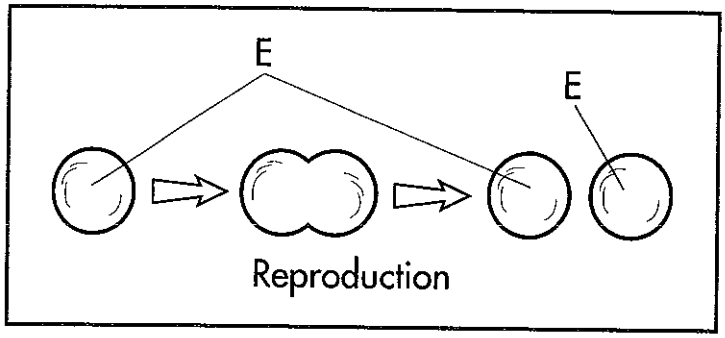
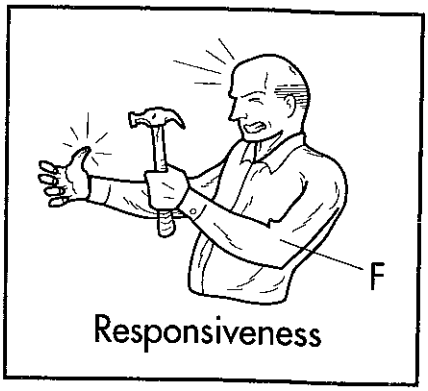

A
B
C
Metabolism


D
Control


E
E
Reproduction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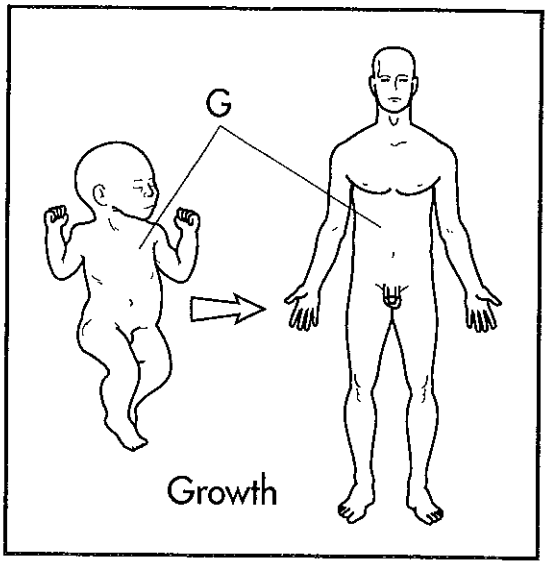
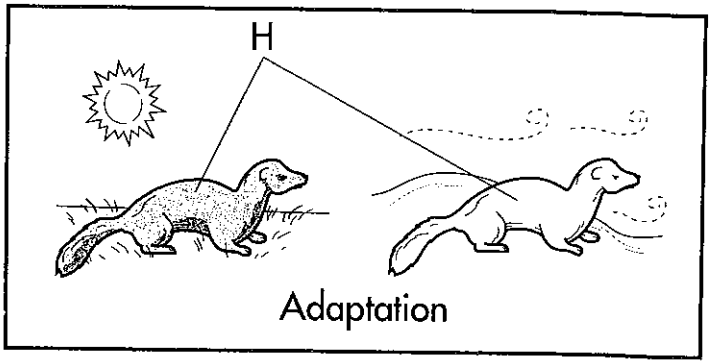
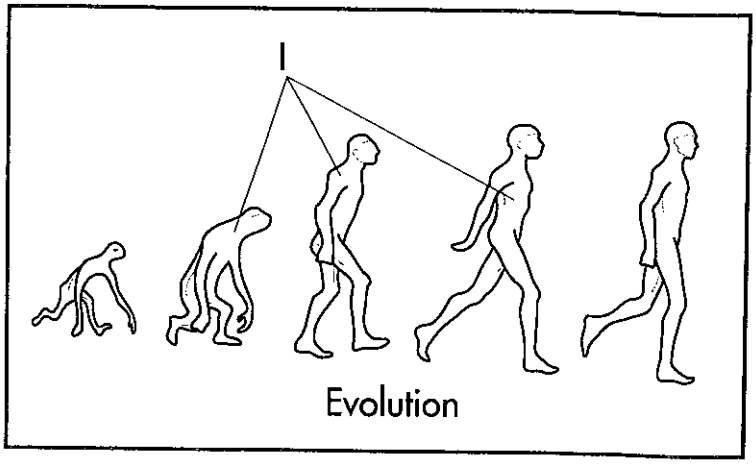
Responsiveness


G
Growth


H
Adaptation


I
Evolution

Chapter 1-1: Characteristics of Living Things

Biology is the scientific discipline that is concerned with the study of life. Strictly speaking, it is difficult to describe any one prototypical living thing, but in this plate we will describe some characteristics that all living things possess.

> As you look over the plate, you will note that it consists of seven sections, each of which shows one characteristic of a living thing.

One of the characteristics of living things is internal organization. The cell itself is characterized by internal organization, and, in the case of multicellular organisms, the organism possesses an overall internal organization.

All living things must obtain materials and energy from the environment. These are used in metabolism, which is the sum of all of the chemical reactions that occur in an organism. In this plate, we see a **plant (A)** and an **animal (B)**. Plants obtain nutrients from the soil, while animals obtain them through the ingestion of **food (C)**. In both organisms, reactions are carried out and substances are synthesized and broken down. Energy is released from the organic substances that were obtained from the environment, and this energy fuels the organism.

All living things exhibit control (see the **bird (D)** in the figure), which refers to the coordination of their body activities, as well as the regulation of their processes; internal and external. Control refers to the fact that the metabolic activities in living things occur in sequence and at specific rates. The flapping of the bird's wings, for example, requires that nerve impulses are coordinated as they travel to muscles and that muscles contract in sequence. Blood must be supplied to tissues, and waste products must be removed from them. Dynamic control is absent in nonliving things.

> We have examined metabolism and control as two characteristics of living things. We now move to three additional characteristics as we continue our introduction. Continue your reading below as you color the plate.

Another essential aspect of life is reproduction. Here we see a **cell (E)** undergoing binary fission to produce two identical daughter cells. Reproduction is accompanied by an increase in size called growth. In the process of growth, living things increase the size of their structures. In this plate, we see growth in a **human (G)**. Growth can also mean that cells increase in size, number, and specialization. As you can imagine, the fully formed human is much more complex than the fertilized egg cell from which it developed.

Living things also exhibit responsiveness, which means that they respond to changes in their environment. In the art, you can see a **responsive individual (F)** reacting to an injury. Hormones, nerve cells, and various other chemical substances bring about responses in humans.

> We have now examined five characteristics that all living things possess. We will finish by examining adaptation and evolution, two more characteristics that are attributed to living organisms.

Adaptation refers to physical adjustments organisms make over relatively long periods of time to changes in their environments. In this plate, you can see an **adapted animal (H)**. This is an animal with a coat that blends with the brown prairie grass among which it lives in the summertime. When snows falls, the animal loses its brown coat and takes on a white one in order to blend into its new environment.

Evolution refers to populations changing over time. Evolution is a slow change in the genetic makeup of a population (rather than an individual) that enables it to survive in its environment. We show the **evolving population (I)** as the evolution of the human species. By continuing to adapt to its changing environment, the human population survived the selective pressures of the environment over thousands of years. Arguably, with evolution, our population improved its ability to live in the environment, and avoided extinction. Other populations, which failed to make these adaptations, became extinct.

Characteristics of Living Things

○ Plant .....A	○ Bird .....D	○ Human .....G
○ Animal .....B	○ Cell .....E	○ Adapted Animal .....H
○ Food C	○ Responsive Individual .....F	○ Evolving Population....I

Chapter 1 Coloring Book

1-1 Characteristics of Living Things

a. With what study is biology concerned?

b. What kind of organization characterizes living things?

c. For what do living things use materials & energy?

d. The sum of al the chemical reactions that occur in an organism:

e. Where do plants obtain nutrients? Animals?

f. The coordination of body activities:

g. How do metabolic activities occur in living things?

h. Binary fission is an example of this characteristic of life:

i. Increase in size &/or structure & specialization:

j. Responding to changes in the environment:

k. Physical adjustments organisms make over relatively long periods of time to changes in their environment:

l. Population changing over time refers to:

m. What happens to populations who fail to make adaptations?