Name _____ Date _____ Period _____

Handout A: Characteristics of Life

Directions: 1. Read and highlight the main ideas in each passage.
2. Circle **Key** vocabulary
3. Answer the questions below each passage.

Most people feel confident that they could identify a living thing from a nonliving thing, but sometimes it's not so easy. Scientists have argued for centuries over the basic characteristics that separate life from non-life. Some of these arguments are still unresolved. Despite these arguments, there do seem to be some generally accepted characteristics common to all living things. Anything that possesses all these characteristics of life is known as an organism.

1. The scientific term for a living thing is a(n) _____.

I. Contain one or more CELLS

Scientists know that all living things are organized. The smallest unit of organization of a living thing is the cell. A cell is a collection of living matter enclosed by a barrier known as the **plasma membrane** that separates it from its surroundings. Cells can perform all the functions we associate with life.

Cells are organized and contain specialized parts that perform particular functions. Cells are very different from each other. A single cell by itself can form an entire living organism. Organisms consisting of only a single cell are called **unicellular**. A bacterium or a *protist* like *amoebas* and *paramecia* are unicellular. However, most of the organisms you are familiar with, such as dogs and trees, are **multicellular.** Multicellular organisms contain hundreds, thousands, even trillions of cells or more. Multicellular organisms may have their cells organized into tissues, organs, and systems. Whether it is unicellular or multicellular, all structures and functions of an organism come together to form an orderly living system.

Functional cells are not found in nonliving matter. Structures that contain dead cells or pieces of cells are considered dead. For example, wood or cork cut from a tree is made up largely of **cell walls**. The cells are no longer functional.

2. All living things have _____.
3. What is the simplest level at which life may exist? _____
4. Are all cells alike? Explain _____

_____

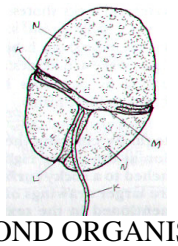
5. All cells perform various jobs or _____particular to their shape and location.
6. What surrounds a cell and separates it from its environment? _____
7. What is the difference between unicellular and multicellular organisms? _____

_____

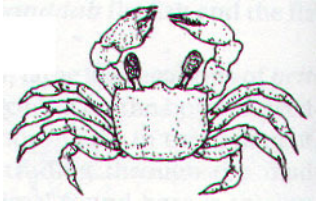
8. Multicellular organisms can be organized into what other levels? _____

_____

9. **Circle** which of the following would be made of cells. Place a **box** around the ones which only show cell walls. Cork Sponge Wood Plastic Tree
10. Examine these 2 organisms. Which one is unicellular and which is multicellular (label each)?



POND ORGANISM
(Under a microscope)



CRAB

II. REPRODUCTION

Perhaps the most obvious of all the characteristics of life is reproduction, the production of offspring. Organisms don't live forever. For life to continue, organisms must replace themselves. Reproduction is not essential for the survival of an individual organism. However, it is essential for the continuation of an organism's species. A species is a group of similar-looking organisms that can interbreed and produce fertile offspring. If individuals in a species never reproduced, it would mean an end to that species' existence on Earth.

11. Define reproduction. _____

_____

12. Must EVERY member of a particular species (one kind of organism) be able to reproduce in order for the species to survive? Explain why or why not.

_____

13. What would happen if all individuals in a species were sterile (not able to have babies)?

_____

14. Reproduction is NOT essential for the survival of an individual _____ but is essential for the survival of the _____.

15. What is meant by extinction? _____

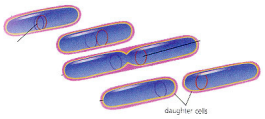
There are two basic kinds of reproduction: sexual and asexual. Sexual reproduction requires that two cells (sperm and egg) unite to produce the first cell of the new organism. Organisms reproducing sexually do not always have "sex!" In many cases sperm and egg are released into the water where they meet. Most familiar organisms – from maple trees to birds and bees – reproduce sexually. In asexual reproduction, a single organism can reproduce without the aid of another. Sometimes these organisms can just divide themselves in two!

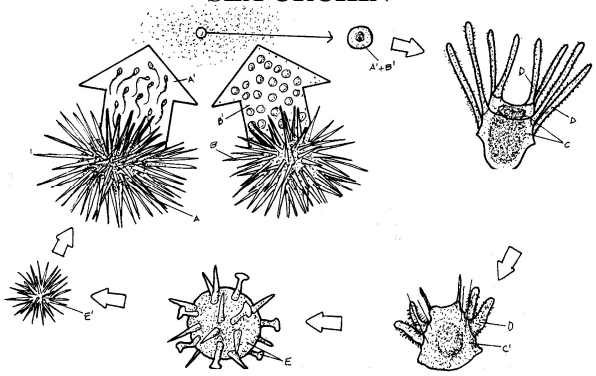
16. Name and define the two basic kinds of reproduction. _____

_____

17. Identify which organisms are reproducing sexually and which are reproducing asexually.

BACTERIA **HYDRA** **SEA URCHIN**





III. GROWTH and DEVELOPMENT

Adults don't always look like the babies of a species. All organisms begin their lives as single cells. Over time, these organisms grow and take on the characteristics of their species. Growth results in an increase in the amount of living material and the formation of new structures.

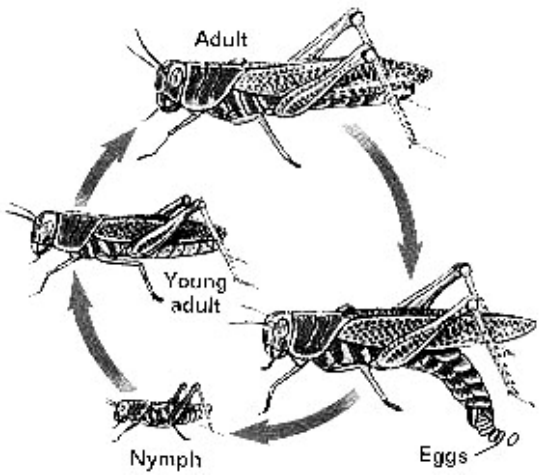
All organisms grow, and different parts of organisms may grow at different rates. Organisms made up of only one cell may change little during their lives, but they do grow. On the other hand, organisms made up of numerous cells go through many changes during their lifetimes. Think about some of the structural changes your body has already undergone in your short life. All of the changes that take place during the life of an organism are known as its development.

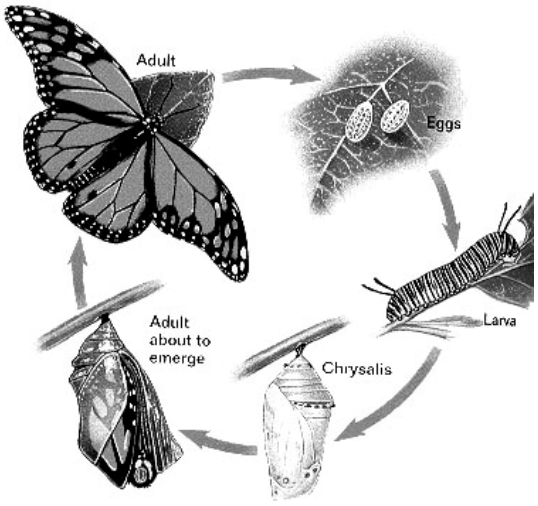
18. How do all organisms begin life? _____

19. What is the difference between growth and development? _____
_____

20. Do unicellular organisms GROW? Do unicellular organisms DEVELOP?
_____

21. Identify which graphic BEST shows growth and which BEST shows development and LABEL!





IV. OBTAIN and use ENERGY: Metabolism

Energy is the ability to make things change. Energy is important because it powers life processes. It provides organisms with the ability to maintain balance, grow, reproduce, and carry out other life functions. Some organisms obtain energy from the foods they eat or, in the case of plants and several other types of organisms, the foods that they produce. Organisms that get energy from the food they eat are called heterotrophs. Organisms that use energy from the sun to make their own food (which they then use for energy) are called autotrophs. The process is called photosynthesis.

As you'll learn, energy doesn't just flow through individual organisms; it also flows through communities of organisms, or ecosystems, and determines how organisms interact with each other and the environment.

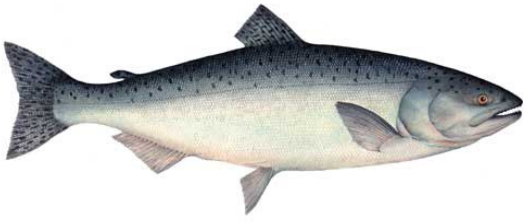
22. Define energy. _____
_____

23. Why is energy important to a living organism? _____
_____

24. What is the difference between an *autotroph and a heterotroph*? _____
_____

25. What is the name of the process that plants use to make their own food using energy from the sun?
_____

26. Identify each of the organisms below as either *a heterotroph* or an *autotroph*.



Chinook Salmon
Onchorhynchus tshawytscha

V. RESPOND to the

ENVIRONMENT

Living things live in a constant connection with the environment, which includes the air, water, weather, temperature, any organisms in the area, and many other factors. These external environmental factors act as stimuli and can cause a response from living things. Organisms need to respond to the changes in order to stay alive and healthy. For example, if you go outside on a bright summer day, the sun may cause you to squint. Perhaps the bark of an approaching dog causes you to turn your head quickly. Just as you are constantly sensing and responding to changes in your environment, so are all other organisms. For example, a specialized leaf of the Venus' flytrap senses the light footsteps of a soon-to-be-digested green bottle fly. The plant responded to this environmental stimulus by rapidly folding the leaf together

27. What are some environmental factors (stimuli) that organisms respond to?

_____

28. Organisms must also respond to _____ factors in order to stay healthy & survive.

29. Give <u>two</u> examples from the reading of how living things respond to changes in their environment

_____

_____

30. If light is applied to a human eye, how does it respond?

_____

VI. Maintain HOMEOSTASIS

An organism must respond to changes in the internal environment as well. Internal conditions include the level of water, nutrients, and minerals inside the body. It also refers to body temperature and hormone levels. Adjustments to internal changes help organisms maintain a stable internal environment. The regulation of an organism's internal environment to maintain conditions suitable for life is called homeostasis. Or you can just think of it as keeping everything in BALANCE! For example, you have a "thermostat" in your brain that reacts whenever your body temperature varies slightly from 37°C (about 98.6°F). If this internal thermostat detects a slight rise in your body temperature on a hot day, your brain signals your skin to produce sweat. Sweating helps cool your body.

The ability of mammals and birds to regulate body temperature is just one example of homeostasis. Mechanisms of homeostasis enable organisms to regulate their *internal* environment, despite changes in their *external* environment.

31. **Describe homeostasis.** _____

_____

32. What are two internal factors that organisms respond to? _____

_____

VII. Living things contain a UNIVERSAL GENETIC CODE: DNA

All organisms store complex information that serves as a blueprint to make all of the cellular structures in order to live, grow, and reproduce. The genetic material contained in molecules of DNA has a specific role which is to copy, store and transmit information. This information is copied and passed from parent to offspring. With a few minor variations, life's genetic code is almost identical in every organism on Earth.

Your DNA describes the color of your hair, your blood type and unfortunately your risk of getting cancer.

33. What are the 3 roles of DNA in heredity?_____

_____

34. How similar are living things on earth? _____

_____

35. What does DNA help to code for, give an example of 2 traits that you carry in your family.

_____

VIII. Living things EVOLVE

Over generations, groups of organisms evolve, or change over time. Evolutionary change links all life to a common origin of more than 3.5 billion years ago. Evidence of this shared history is found in all aspects of living and fossil organism, from physical features to structures of proteins to the sequences of DNA. The more fitness, (how well an organism can survive and reproduce in an environment) the greater the likelihood the

organism will reproduce and pass down those favorable traits to the next generation. Some examples can be seen in the change in color of the **peppered** moth after the Industrial Revolution is a classic example of evolution in action.

The peppered moth story is simple, easy to illustrate, and makes intuitive sense. When newly industrialized parts of Britain became polluted in the nineteenth century, smoke killed lichens growing on trees and blackened their bark. Pale colored moths which had been well camouflaged before when they rested on tree trunks

became very conspicuous and were eaten by birds. Rare dark moths, which had been conspicuous before, were now well camouflaged in the black background. As birds switched from eating mainly dark moths to mainly pale moths, the most common moth color changed from pale to dark. Natural selection had caused a change in the British moth population. The moths had evolved

36. What is Fitness?

_____

37. Describe Evolution

_____