

Chapter Three Science: Structure of Living Things Study Guide

Lesson One

Activities of living things

- nutrition-the intake and use of food by living things
- respiration-the process by which energy is released from food; this process produces wastes
- excretion-removal of wastes produced by living things
- response and movement-reactions to changes in the surroundings
- growth-to increase in size or the amount of material contained
- reproduction-process by which living things produce offspring

Living things are made up of elements (such as carbon, hydrogen, and oxygen) and are organized into units or parts that make up the living things. Life activities are carried out in the smallest part of a living thing - **cells**

Cells-basic unit of life

- some are only one cell
- some are multicelled

Discovery of cells

- 1665 by Robert Hooke saw the first cell; looked at a cork under a microscope
- 1673 Anton van Leeuwenhoek observed the first one-celled living things such as bacteria and paramecia

Body cells in humans

- there are about ten trillion cells in the human body
- cells in the wall of the heart relay impulses to keep it pumping
- human skin cells are flat and wide to protect the cells beneath them
- human muscle cells work together for movement

Tissues-a group of similar cells working together performing the same function; humans have 4 main groups

- Epithelial Tissues-cells that line your checks, protects, lines, and absorbs
- Nerve Tissues-transport messages through the body
- Muscle Tissues-cells that contract, moving bones and moving substances through the body
- Connective Tissues-bone, cartilage, tendons, fat, and blood that support the body

Plant Tissues

- Dermal Tissue-covers the plant body
- Vascular Tissue-transport water, food, and other substances throughout the plant
- Ground Tissue-the charge of photosynthesis and storage
- Meristematic Tissue-area where new plants cells are made

Organs-groups of different tissues that work together to carry our certain activities

- animal organs include: heart, eyes, brain, and lungs
- plant organs include: stems, leaves, and roots

Organ Systems-systems that have specific functions and interact with each other in a variety of ways

Organism-any living thing that can carry our its life activities on its own

Lesson Two

Cell Parts

- Cell Membrane-outer covering that gives the cell shape and helps control materials that move in and out of the cell
- Nucleus-is the control center of the cell that directs cell activities; largest, most visible part
- Chromosomes-long strands found in the nucleus; blueprints of the cell; store and direct cell activities
- Cytoplasm-gel-like substance inside the cell membrane; processes take place within the cytoplasm and contains chemicals and other cell structures that carry out special jobs for the cell
- Mitochondria-rod-shaped structures known as the “powerhouses” of the cell; package and secrete materials containing energy that can be used by the cell
- Vacuoles-sac-like storage in cells; they store anything; animal vacuoles are smaller than plant vacuoles
- Transport system-extends from the nucleus to the cell membrane

Atoms-tiny particles that make up all matter

Elements-are made up of just one type of atom

Compounds-substances made up of more than one type of atom; example-carbon dioxide

Human Carbon Compounds

- Carbohydrates-supply energy for cell activities
- Lipids-store and release energy in larger amounts
- Proteins-used for cell growth and repair
- Nucleic Acids-contain codes that allow your cells to build proteins

Lesson Three

Molecules-group of tightly bonded atoms in constant motion

Diffusion-molecule of a substance move from an area of higher concentration to an area of lower concentration

Passive Transport-movement through cell membranes without the use of energy

Osmosis-diffusion of water through a cell membrane

Equilibrium-when concentration of water molecules is the same of each side of a cell membrane

Active Transport-molecules move from an area of lesser concentration to an area of higher concentration

Photosynthesis-a food making process that uses sunlight to produce sugar. It occurs in cells of green plants and other kinds of producers.

- Producers take in water from the soil and carbon dioxide from the air and change them into two new products-sugar and oxygen.
- Green plants store food in storage organs

Respiration-the energy in a sugar molecule is “unlocked” or released; takes place in cells in the mitochondria

Fermentation-the process of respiration that is carried out without oxygen

Lysosomes-cells that remove waste

- Jobs include:

- 1) vacuoles engulf food, waste, bacteria, or viruses
- 2) lysosome combines with the vacuole and releases its contents into it
- 3) lysosome's chemicals digest the content of the vacuole

Lesson Four

Life Cycle-all of the stages in a living thing's development from one generation to the next. A cycle has no beginning or end.

- Birth
- Growth and development
- Death

Reproduction-the process that a living thing uses to produce more of its own kind

Metamorphosis-when an animal changes from one form to a completely different form during their life cycle

Incomplete metamorphosis-a three stage change; includes grasshoppers

- 1) egg
- 2) nymph-resembles the adult, but has no wings. It will molt 5 times as it grows
- 3) adult grasshopper

Complete metamorphosis-abrupt changes until adulthood

Frog Life Cycle

- 1) Egg
- 2) Young fishlike tadpole
- 3) Tadpole-hind legs develop
- 4) Tadpole-front legs develop
- 5) Tadpole-tail shortens
- 6) Adult frog

Organism Growth

- Food molecules enter a cell through its membrane
- Cell uses these substances to form new cell material
- Cell grows as large as possible
- Cell divides
- Cells always stay the same size throughout life;

Cell cycle-the time made up of growth and a time for dividing

Interphase-time a cell spends growing and developing

Cell Division

- 1) nucleus of a cell divides into two identical cells (mitosis)
- 2) cytoplasm divides and then cell division is complete

Causes of cancer

- some scientists think that it is caused by a mistake in the cell cycle
- researchers have identified certain chemical as triggers of cancers including chemicals and the

sun

- Cancer is any of a group of diseases in which cells divide faster and more often than normal cells and can spread throughout the body

Mitosis-takes place when body cells divide

- Walter Fleming first observed in 1879

-a second set of chromosomes form inside the cell; when the cell splits and produces two new cells

Phases of Mitosis

Interphase-the nucleus can be clearly seen; chromosomes make copies of themselves

Prophase-chromosomes become visible; membrane around the nucleus begins to disappear

Metaphase-chromosome pairs line up along the middle of the cell

Anaphase-chromosome pairs split apart and begin to move to opposite sides of the cell

Telophase-nuclear membrane forms around each set of chromosomes as the original cell; cytoplasm divides; two new cells are formed

Sexual Reproduction-occurs when sperm cell from a male and an egg cell from a female join to make a fertilized egg.

- some
- External Fertilization-sperm and egg cells come together outside the female's body; fish and amphibians reproduce this way
 - Internal Fertilization-sperm and egg cells come together inside the female's body; some fish and amphibians, all reptiles, all birds. And all mammals

Asexual reproduction-one parent reproduction through mitosis

-regeneration-sponges-a piece falls off and creates a new organism

-sea anemones-just split in half

-hydras-form a bud that falls off and creates a new organism

Fertilization-the joining of one egg and one sperm

-half of chromosomes come from each parent

Zygote-the cell that forms from a fertilized egg

-divides by mitosis and grows into a new organism

Phases of Meiosis

Interphase-cell replicates its chromosomes

Prophase I-chromosomes become visible; the membrane around the nucleus begins to disappear

Metaphase I-pairs of chromosomes line up

Anaphase I-pairs of chromosomes separate

Telophase I-cell divides

Meiosis II-the second division of meiosis is simply a mitosis of the products of the first division of meiosis

Life Span-the length of time an animal can live under the best conditions

Life Expectancy-the average amount of time an individual animal might live according to the conditions around it. Affected by conditions in the environment such as food or water