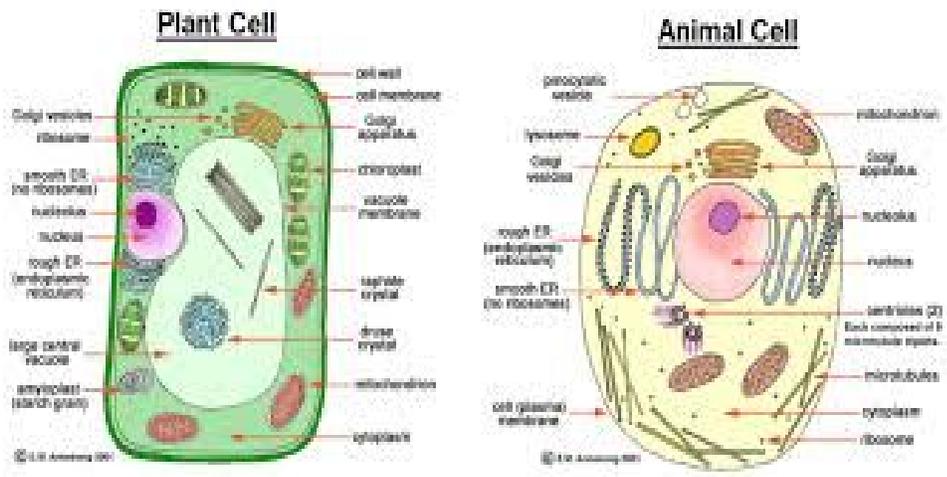


Study Guide Q3 benchmark

- Measurement
 - Rulers measure length (meters)
 - Thermometer measure temperature (celcius)
 - Graduated cylinder measure volume (liters)
 - Beaker measure volume (liters)
 - Triple beam balance measure mass (grams)
- Experimental design
 - Independent variables= the variable that the scientist (I) change...what is physically changes
 - Dependent variables= the variable that changes because of the independent variable...what you are measuring or trying to find out
 - Constants= what stays the same in an experiment
 - hypothesis= if, then statement that predicts possible outcomes in an experiment
 - Example: (IV= **BOLD**, DV= underlined, constants= *italics*)
 - Tom wants to see which **type of fertilizer** helps his sunflowers grow the tallest. Tom puts 3 different types of fertilizer into the soil of 3 sunflowers. Sunflower 1 receives natural fertilizer (animal waste), sunflower 2 receives chemical fertilizer (miracle grow), and sunflower 3 receives no fertilizer. Each plant receives the same *amount of sunlight and water and are in the same kind of pot*.
 - Conclusion (what happened?) the sunflower with the natural fertilizer grew the tallest
 - Correct hypothesis: If I use natural fertilizer on my sunflower plants, then it will grow taller than the sunflowers with chemical fertilizer or no fertilizer.
- Cells
 - Prokaryotic= cells with no nucleus (archaebacteria and eubacteria)
 - Eukaryotic= cells with a nucleus (protists, fungi, plants, animals)
 - Organelles-parts of the cell
 - nucleus= controls the cells activities, contains DNA
 - Cell membrane= controls what enters and exits the cell (selectively permeable)
 - cytoplasm= jelly like substance that surrounds organelles
 - mitochondrion= produces energy for the cell, where respiration takes place
 - Endoplasmic reticulum= transfers materials around the cell
 - vacuole= stores materials, larger in plants
 - chloroplast= in plant cells, contains chlorophyll (green pigment) where photosynthesis takes place
 - Cell wall= surrounds the plant cell, provides it with support



- Cell theory
 - Living cells come from other living cells
 - All living things are composed of cells
 - Cells are the smallest basic unit of life
- Levels of organization
 - Cells-tissues-organs-organ system- organism
 - Cells work together to make tissues
 - Tissues work together to make organs
 - Organs work together to make organ systems
 - Organ systems work together to make an organism
- Cell Cycle
 - 3 main phases: Interphase, mitosis, cytokinesis
 - Interphase: when chromosomes duplicate and get ready for cell division
 - Mitosis: when the cell begins to divide- prophase, metaphase anaphase telophase
 - Prophase- chromosomes pair up
 - Metaphase- chromosomes line up in the middle
 - Anaphase- chromosomes split apart
 - Telophase- two new cells begin to form
 - Cytokinesis: when the 2 new daughter cells completely separate
 - Mitosis- happens in BODY cells (muscle cells, bone cells, nerve cells, skin cells, brain cells, and cells from any organ)
 - Meiosis- happens in SEX cells (sperm cells, egg cells)
- Genetics
 - Inherited traits: traits passed down from parent to offspring (ex: straight/ curly hair, fur/hair color, attached/unattached earlobes, eye color, skin color, freckles, dimples)
 - NOT inherited traits: traits that CANNOT be passed on from parent to offspring (ex: scars, hair length, tattoos)
 - DNA is a double helix shape
 - Dominant genes: traits that show up more frequently (represented by a capital letter)
 - Recessive genes: traits that are more hidden-need both alleles to be recessive to show up (represented by a lower case letter)
 - Alleles are the gene pairs that determine traits
 - DNA must replicate for life to happen and new cells to be made and traits to be passed on
 - Genotype: the letter/gene combination-- GG, Gg, gg
 - Phenotype: the actual trait that can be seen-- blue eyes, freckles, height, fur color

		Father's Genes	
		B	b
Mother's Genes	B	BB	Bb
	b	Bb	bb

- Punnett square

- Purebred: gene pair (letters) are the same --BB, bb
- Hybrid: gene pair (letters) are different-- Bb
- Gregor Mendel= worked with pea plants to see how traits are passed from parent to offspring (dominant/recessive)
- Watson and Crick: developed first model of DNA
- Rosalind Franklin: used Xrays to see the structure of DNA
- Evolution
 - Changes over time is evolution
 - Natural Selection: the strongest or best adapted organisms will survive and pass on those traits to offspring
 - Adaptation: having the strongest traits to fit into a particular ecosystem
 - Mutations: any change in the genes or DNA
- Classification (Dear King Philip Come Over For Good Soup :))
 - Domain-Kingdom-Phylum-Class- Order- Family- Genus-Species
 - Animals of the same species look similar and can reproduce and their offspring can reproduce
- Plants
 - Eukaryotic, producers
 - Have a cell wall for support and structure and a chloroplast to absorb sun's energy for photosynthesis
 - Photosynthesis
 - Uses carbon dioxide (CO₂)+ water (H₂O)+ sunlight to produce= oxygen (O₂) + Glucose (SUGAR)
 - Vascular plants have roots stems and leaves (ex: ferns, pine trees, oak trees, flowers)
 - Nonvascular plants DO NOT have roots stems and leaves (ex: moss, liverworts, hornworts)
- Protists
 - Unicellular organisms, eukaryotic (have a nucleus), and live in water
 - Ex: Euglena, paramecium, amoeba
- Animal Kingdom
 - Multicellular, nucleus, heterotrophic
 - Vertebrates have a backbone/spinal cord (EX: fish, amphibian, reptile, bird, mammals)
 - Can be warm-blooded (body temperature stays the same) EX: birds and mammals
 - Can be cold-blooded (body temperature changes with the environment) EX: fish, amphibians, reptiles
 - Invertebrates DO NOT have a backbone/spinal cord
 - Sponges
 - Echinoderms (starfish)
 - Annelids (worms)
 - Cnidarians (jelly fish)
 - Mollusks (squid, clams)
 - Arthropods (insects, crabs, spiders)
 - insects= have 3 body segments and 6 legs
 - Arachnids (spiders)= 2 body segments and 8 legs
- Relationships among populations and communities
 - Food Webs: Photosynthesis/plants are the foundation for all food webs
 - Territorial Imperative: when an organism defends the habitat that it lives in
 - Cooperation: when 2 organisms work together to gain the same resource
 - Competition: when 2 organisms "fight" over the same resource

- Social Hierarchy/Order: when organisms live in a group and have an order, status, or rank are used to provide structure and work load
- Producers: organisms that go through a photosynthesis (ex: plants, phytoplankton)
- Consumers: organisms that get energy by eating other organisms (ex: shrimp, cats, chickens)
- Decomposers: break down dead or decaying organisms and return nutrients to soil
- Symbiosis
 - Mutualism: both organisms working together; both benefit
 - Commensalism: 1 organism benefits the other is neither helped nor harmed
 - Parasitism: 1 organism benefits and the other is harmed
- Predator-prey: predator eats prey
- Population: all of the animals of the same species living in an area (ex: a group of giraffes living in the grasslands)
- Community: all of the populations living in an area (ex: giraffes, elephants, and lions living in the grasslands)