

BIOLOGY BLITZ LESSONS 2011 - 2012

TOPIC	OVER-ARCHING QUESTION	VOCABULARY	CONCEPTS	QUESTIONS
Theory of Evolution	What evidence is there that supports the scientific theory of evolution?	Fossils - Evidence of organisms that existed in the past.	Evidence of common ancestry for evolution comes from many sources	What evidence is there that supports the scientific theory of evolution? [a] water is polar [b] fossil record [c] blood type [d] structure of carbohydrates
		Evolution - the process of biological change over generations.		
		Species - a group of living things that are so similar that they produce fertile offspring.	Fossils provide a record of evolution	
Natural Selection	What are conditions required for Natural Selection to occur?	Natural Selection - a mechanism by which individuals that have inherited beneficial adaptations produce more offspring on average than do other individuals.	Natural Selection acts on existing variations.	Q: What are the conditions required for natural selection? A: Overproduction of offspring, inherited variation and the struggle to survive
		Artificial Selection - process by which humans change a species by breeding it for certain traits.		
		Heritability - the ability of that trait to be passed down from one generation to the next.	Overproduction results in competition between offspring for resources; heritable differences or variations exist in every population; successful survival results in individuals that are "naturally selected" to live longer.	
		Fitness - A measure of the ability to survive and produce more offspring relative to other members of the population in a given environment.		
Origin of Life	How does science help us explain how all life, including us, came to be?	Nebula - is a cloud of gas and dust in space.	Today, the most widely accepted hypothesis of Earth's origins suggest that the solar system was formed by a condensing nebula.	There are many scientific hypotheses and evidence for the origin of the first cells on Earth. Which of the following is NOT a credible hypothesis for the origin of life on Earth? [a] organic molecule hypotheses [b] spontaneous generation [c] meteorite hypothesis [d] early structure hypotheses
		Ribozymes - RNA molecules that can catalyze specific chemical reactions.	There are many scientific hypotheses and evidence for the origin of the first cells on Earth (organic molecule hypotheses, meteorite hypothesis, and early structure hypotheses) [ribozymes]	
		Endosymbiosis - a relationship in which one organism lives within the body of another.	There is evidence that supports the scientific theory of the origin of eukaryotic cells (endosymbiosis).	

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Kingdoms and Domains	How do we classify organisms?	Linnean Classification - 7 levels or taxa from the most general to the most specific.	Scientists needed a system for classifying organisms down to individual species, a way to systematically name all living things.	The science of naming all organisms using Latin terms, so that science had a way to differentiate individual organisms is called [a] taxonomy [b] nomenclature [c] biodiversity [d] species
		Taxonomy - the general science of naming and classifying organisms.	Binomial nomenclature is to give scientists all over the world a uniform naming system.	
		Binomial nomenclature - a system that gives each species a 2 part scientific name using latin words.		
Energy in Ecosystems	Describe the flow of energy in an ecosystem as it pertains to producers, consumers and decomposers.	Producers - organisms that get their energy from non-living resources, making their own food.	Life in an ecosystem requires a source of energy.	Q: How does energy flow, and what role does it play within an ecosystem? A: The ultimate source of energy comes from sunlight -> producers -> consumers -> decomposers
		Consumers - organisms that get their energy by eating other living or once living resources, such as plants and animals.	Food chains and food webs model the flow of energy in an ecosystem .	
		Detritivores - organisms that eat detritus, or dead organic matter.	Trophic levels are levels of nourishment in a food chain, consisting of primary producers, primary consumers (that eat the producers), secondary consumers that eat both, and tertiary consumers that eat all of the above.	
		Decomposers - are detritivores that break down organic matter into simpler compounds.		
Populations	How is a population's size determined by immigration, births, emigration, and deaths?	immigration -move in to the area.	Factors that effect population size- number of births, number of deaths, immigration emmigration	What are other limiting factors-think biotic and abiotic? A: Abiotic - sun, soil, water, natural disaster Biotic - pathogens (disease), predators, competition (survival of the fittest), relationship between species (Clownfish/anemone)
		emmigration - Exit the area.		
		carrying capacity - largest population an environment can support over time.		
		biotic - any living thing in an ecosystem.	These are governed (ruled) by limiting fators: large population = more demand on the ecosystem (need for food)	
		abiotic - a non-living component of an ecosystem.		

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Human Interactions and the Environment	How do the needs and wants of humans affect their surroundings?	Nonrenewable resources - resource that cannot be replenished by natural processes.	The growing human population exerts pressure on Earth's natural resources	A few hundred years ago, inhabitants of English villages could graze their cattle on shared pasture lands called commons. Since grazing was free of charge, villagers often put as many cattle as possible on those commons. Land is considered what type of resource? [a] sustainable [b] renewable [c] nonrenewable [d] commodity	
		Renewable resources - resource that can regenerate quickly and that is replaceable.	Effective management of Earth's resources will help meet the needs of the future		
		Ecological footprint - amount of land necessary to produce and maintain enough food, water, shelter, energy, and waste.			
Nature of Science	What are the steps in the Scientific Method?	Dependent Variables - are observed and measured during an experiment; what is changed w/o manipulation.	Science is a way of thinking, gathering and questioning evidence.	Q: Describe the natural progression of scientific thinking / method. A: OBSERVING, FORMING HYPOTHESES, TESTING HYPOTHESES, ANALYZING DATA, AND EVALUATING RESULTS	
		Independent Variable - a condition that is manipulated or changed by the experimenter.			
		Inference - a decision you make based on your observation.	Science is a cycle. The following steps may take place in no particular order: OBSERVING, FORMING HYPOTHESES, TESTING HYPOTHESES, ANALYZING DATA, AND EVALUATING RESULTS		Q: All scientific experiments begin with posing a problem based on an _____.
		Theory - proposed explanation for a wide range of observations and experiments.			A: Observation
Properties of Water	How is life so dependent on water?	Hydrogen bond - an attraction between a slightly positive hydrogen atom and a slightly negative atom.	Life depends on hydrogen bonds	Every cell of all the organisms on earth depend on this important molecule for structural support and the ability to transport materials into and out of the cells [a] CO ₂ [b] oxygen [c] H₂O [d] hydrogen	
		Cohesion - the attraction among molecules of a substance.	Hydrogen bonds are involved in all nucleotides in		
		Adhesion - the attraction among molecules of different substances.	Water, the most abundant molecules on the planet, has two hydrogen bonds for each molecule of water.		

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Carbon Compounds	Why are carbon-based molecules the foundation of life?	Carbohydrates - molecules composed of sugar monomers and include starches that are used as a source of usable energy and in plant structure.	All organisms are made of four types of carbon-based molecules: carbohydrates, lipids, nucleic acids, and proteins	Proteins control the rate of reactions and regulate cell processes. Some are used to form bones and muscles. Proteins are polymers formed from [a] lipids [b] carbohydrates [c] amino acids [d] nucleic acids.
		Lipids - molecules that include fats, oils, and cholesterol and are a source of usable energy and as parts in cell structure.		
		Nucleic Acids - molecules made up of nucleotide monomers that work together to make proteins.	Many carbon-based molecules are made of small molecular subunits the are linked together to form a larger molecule. (monomer --> polymer)	
		Protein - molecules made up of chains of amino acids that are used to grow the body, repair, and make enzymes.		
Cell Theory	What is the scientific theory of cells?	Cell Theory: Theory that states all organisms are made of cells, all cells are produced by other living cells, and the cell is the most basic unity of life. (more of an inference)	Early studies led to the development of cell theory. 1. All organisms are made of cells 2. All existing cells are produced by other living cells 3. The cell is the most basic unit of life	The cell theory was first proposed in 1838. Evidence obtained through additional scientific investigations resulted in the current cell theory. Which statement describes a component of the original cell theory that was removed after new information was discovered? [a] All living things are made of cells [b] All cells come from existing cells [c] Cells form through spontaneous generation [d] Cells are the basic form of life
		Law: Well supported descriptions; same outcome every time (more of an observation)	ALL CELLS have 3 things in common: cell membrane, cytoplasm and DNA.	What 3 things to ALL CELLS have in common? A: Cell membrane, cytoplasm and nucleus

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Cell Structure	What are the differences between plant and animal cells?	<p>Prokaryotic Cells - do not have a nucleus or other membrane-bound organelles. Instead the cell's DNA is suspended in the cytoplasm.</p> <p>Eukaryotic Cells - have a nucleus and other membrane-bound organelles. The nucleus, the largest organelle, encloses the genetic information (DNA).</p>	Plant and animal cells have specific functions	<p>Q: If a cell has a cell wall, what type of organism is this cell a part of?</p> <p>A. Plant Cell</p>
	What are the differences between prokaryotic and eukaryotic cells?	<p>Plant Cells - have chloroplasts and a cell wall and enlarged water storage vacuoles.</p> <p>Animal Cells - have mitochondria and cell membrane.</p>	Prokaryotic cells lack a nucleus and most internal structures of eukaryotic cells.	<p>Q. If a cell does not have a nucleus, it is a _____ cell. But it still has _____, _____, and a _____.</p> <p>A: prokaryote, DNA, cytoplasm, cell membrane</p>
The Brain	The nervous system's two parts work together	see concepts: refer to diagrams on pages 727 and 728	<p>The cerebrum interprets signals from your body and forms responses such as hunger, thirst, emotions, and pain.</p> <p>The cerebellum coordinates your movements.</p> <p>The pons regulates breathing and passes signals between the brain and the spinal cord.</p> <p>The medulla oblongata connects the brain to the spinal cord / controls heart functions, swallowing, and coughing.</p> <p>The mid brain controls some reflexes, such as changing the size of the pupil to control the amount of light entering the eye.</p> <p>The brain stem connects the brain to the spinal cord and controls the most basic activities required for life.</p>	Using the diagrams on pages 727 and 728 ask the students to identify parts of the brain and their functions.

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The Cardiovascular System	What factors affect the flow of blood in the cardiovascular system?	Blood pressure-force with which blood pushes against the wall of an artery.	Factors that affect the flow of blood in the cardiovascular system include: blood pressure, blood volume, resistance, disease, and exercise	<p>The rate at which blood flows through the human body changes in response to many factors. Which statement describes one of these factors and its effect on blood flow?</p> <p>A. A high viscosity of blood causes an increased resistance in the blood vessels and leads to slow blood flow.</p> <p>B. A low blood pH decreases the rate of diffusion through the blood vessels and leads to slow blood flow.</p> <p>C. The changing of the shape of red blood cells to a crescent shape decreases resistance and leads to a faster blood flow.</p> <p>D. The narrowing of blood vessels increases pressure and leads to a faster blood flow.</p>
		Blood volume - the total amount of blood in the body.		
		Viscosity - the measure of resistance of blood to flow.		
		Resistance - the force against the blood flow.		
The Immune System	How do body systems protect you from pathogens?	Immune System - the body system that fights off infection and pathogens.	Many body systems protect you from pathogens	<p>An organism's first line of defense against pathogens, bacteria, and viruses is:</p> <p>[a] Skin</p> <p>[b] White blood cells</p> <p>[c] antibodies</p> <p>[d] t-cells</p>
		Phagocytes - a cell that destroys pathogens by surrounding them and engulfing them.	Skin is the first line of defense against invaders	
		Pathogen - disease-causing agents that cause illness.	White blood cells find and kill pathogens that have gotten past the body's external barriers	

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The Reproductive System	How do cells become specialized after fertilization?	Fetus - unborn offspring from the end of the eighth week after fertilization to the moment of birth.	During the first trimester, the complete body plan is becoming visible (major organs form, limbs develop and phalanges develop, gender shows)	During which trimester do the lungs begin to breathe amniotic fluid? [a] first [b] second [c] third [d] fourth
		Trimester - one of three periods of approximately three months each into which human pregnancy is divided.	The second trimester is a time of continuing development and increased physical activity (joints develop, fetal movement, rapid brain growth, lungs begin working, urinary system begins functioning).	
			During the third trimester organ systems mature and the fetus grows to its largest size (fetus responds to sound and light, dreams, eyes open and close, hair grows on scalp, bones grown and harden, neuron synapses develop, fetus turns).	
Plant organs and tissues	How do the structures of plant tissues and organs directly relate to their roles in physiological processes?	Plant Cells - have chloroplasts and a cell wall and enlarged water storage vacuoles	Physiological processes include: photosynthesis, cellular respiration, transpiration and reproduction	Terrestrial plants have stomata on the surface of their leaves. A signal stoma is surrounded by two guard cells that change shape in response to environmental factors and open or close the stoma. Which of the following best explains how the structure of the leaf is used in the process? A. Water enters the plant through the surface of the leaf for transpiration. B. gases for photosynthesis are exchanged through the surface of the leaf. C. Energy for cellular reproduction is absorbed through the surface of the leaf. D. Carbon dioxide enters the plant through the surface of the leaf for cellular respiration.
		Organs-different type of tissue that work together to perform a specific function.	The basic plant organs include: roots, stems, leaves, flowers, fruits, and cones.	
		Tissue- groups of cells that work together to perform a similar function		

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Photosynthesis/ Cellular Respiration	How are photosynthesis and cellular respiration related? Can students use the equations for both processes	Photosynthesis-process that captures energy from sunlight to make sugars that store chemical energy.	The products for photosynthesis are used as the reactants in cellular respiration and vice versa.	How are photosynthesis and cellular respiration interrelated? A- The reactants in photosynthesis (carbon dioxide and water) become the products in cellular respiration
		Cellular respiration-releases chemical energy from sugars and other carbon-based molecules to make ATP when oxygen is present.		
		Glucose- sugar:product of photosynthesis.	The role of ATP in photosynthesis: it helps to transfer energy within the chloroplasts	
		ATP-molecule that transfers energy from the breakdown of food molecules to cell processes.		
Mitosis/ Meiosis	Compare and contrast mitosis and meiosis	Mitosis-the division of the cell nucleus and its content.	Mitosis produces genetically identical cells, results in diploid cells, takes place throughout an organisms lifetime and is involved in asexual reproduction.	Create venn diagram to compare mitosis and meiosis. (see concepts for information for each)
		Meiosis- nuclear division that divides a diploid cell into haploid cells.		
		Sexual reproduction- fusion of 2 gametes that result in offspring that are a genetic mixture of both parents.	Meiosis- produces genetically unique cells, results in haploid cells, takes place only at certain times in an organisms life cycle and is involved in sexual reproduction.	
		Asexual reproduction- the creation of offspring from a single parent that does not involve the joining of gametes		

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Biotechnology	What are some types of biotechnology on the individual, society and the environment, including medical and ethical issues?	biotechnology- use and application of living things and biological processes	Biotechnology can have positive and negative effects on individuals and the environment.	<p>Genetic engineering is used in medicine. For example, the hormone insulin is essential for controlling sugar in the blood. Some people with diabetes cannot make the insulin their body needs. How can biotechnology be used to help those with diabetes?</p> <p>A. Genetically engineered bacteria are used to produce insulin.</p> <p>B. Humans can instruct robots to repair living organisms.</p> <p>C. Duplication of chromosomes</p> <p>D. Prokaryotic cell division through binary fission.</p>
		genetic engineering- changing of an organism's DNA to give the organisms new traits	Biotechnology is the manipulation of living organisms or their parts to produce useful products.	