Biology Big 20 Georgia Standards of Excellence

Dr.

1) SB1a. Construct an explanation of how cell structures and organelles interact as a system to maintain homeostasis.	**2) SB1**b. Develop and use models to explain the role of cellular reproduction (including binary fission, mitosis, and meiosis) in maintaining genetic continuity. Formerly # 8	**3) SB1**c. Construct arguments supported by evidence to relate the structure of macromolecules to their interactions in carrying out cellular processes.	**4) SB1**d. Plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.
5) SB2a. Construct an explanation of how the structures of DNA and RNA lead to the expression of information within the cell via the processes of replication, transcription, and translation.	**6) SB3**a. Use Mendel's laws to ask questions and define problems that explain the role of meiosis in reproductive variability. b. Use mathematical models to predict and explain patterns of inheritance.	**7) SB2**b. Construct an argument based on evidence to support the claim that inheritable genetic variations may result from: • new genetic combinations through meiosis • non-lethal errors occurring during replication and/or • heritable mutations caused by environmental factors	**8) SB3**c. Construct an argument to support a claim about the relative advantages and disadvantages of sexual and asexual reproduction.
9) SB1e. Ask questions to investigate and provide explanations about the roles of photosynthesis and respiration in the cycling of matter and flow of energy within the cell (e.g., single-celled alga).	**10) SB4**a. Construct an argument supported by scientific information to explain patterns in structures and function among clades of organisms, including the origin of eukaryotes by endosymbiosis. Clades should include: ♣ archaea ♣ bacteria ♣ eukaryotes • fungi • plants • animals	**11) SB4**b. Analyze and interpret data to develop models (i.e., Cladograms) based on patterns of common ancestry and the theory of evolution to determine relationships among major groups of organisms. c. Construct an argument supported by empirical evidence to compare and contrast the characteristics of viruses and organisms.	12) SB2c. Ask questions to gather and communicate information about the use and ethical considerations of biotechnology in forensics, medicine, and agriculture. Formerly # 7
13) SB5a. Plan and carry out investigations and analyze data to support explanations about factors affecting biodiversity and populations in ecosystems.	**14) SB5**b. Develop and use models to analyze the cycling of matter and flow of energy within ecosystems through the processes of photosynthesis and respiration. • Arranging components of a food web according to energy flow. • Comparing the quantity of energy in the steps of an energy pyramid. • Explaining the need for cycling of major biochemical elements (C, O, N, P, and H).	**15) SB5**c. Construct an argument to predict the impact of environmental change on the stability of an ecosystem. d. Design a solution to reduce the impact of a human activity on the environment.	**16) SB5**e. Construct explanations that predict an organism's ability to survive within changing environmental limits (e.g., temperature, pH, drought, fire).
17) SB6a. Construct an explanation of how new understandings of Earth's history, the emergence of new species from pre-existing species, and our understanding of genetics have influenced our understanding of biology.	**18) SB6**b. Analyze and interpret data to explain patterns in biodiversity that result from speciation.	**19) SB6**c. Construct an argument using valid and reliable sources to support the claim that evidence from comparative morphology, embryology, biochemistry, and genetics support the theory that all living organisms are related by way of common descent.	**20) SB6**d. Develop and use mathematical models to support explanations of how undirected genetic changes in natural selection and genetic drift have led to changes in populations of organisms. e. Develop a model to explain the role natural selection plays in causing biological resistance

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1) SB1a. Prokaryotes, eukaryote, membrane, cell wall, nucleus, chloroplast, ER, ribosome, mitochondria, vacuole, lysosome, homeostasis, nucleolus, centrioles, Golgi apparatus, membrane bound organelles,	**2) SB1**b. Sexual reproduction, asexual reproduction, mitosis, meiosis, somatic cells, gametes. Sperm, egg, haploid, diploid, autosome, sex chromosome, karyotype, DNA synthesis, cell cycle, prophase, metaphase, fission, anaphase, telophase, budding	**3) SB1**c. carbohydrates, proteins, lipids, nucleic acids, nucleotides, fatty acids, amino acids, saccharides, polymers, monomers, carbon, hydrogen, oxygen	**4) SB1**d. Diffusion, osmosis, hypertonic, hypotonic, isotonic, solute, solvent, passive transport, active transport, cytolysis, plasmolysis, crenation, Turgor pressure, facilitated diffusion, exocytosis, endocytosis,
5) SB2a. DNA, mRNA, nucleic acid, nucleotide, thymine, adenine, cytosine, guanine, uracil, replication, transcription, translation, double helix, tRNA, codon, anticodon, protein synthesis, ribosome, sugar, base, phosphate, gene	**6) SB3**a. Meiosis, Punnett Square, dominant, recessive, crossing over, sex-linked, homologous chromosomes, alleles, traits, genes, diploid, haploid, blood type, gamete, F1 generation, pedigree, heterozygous, homozygous, phenotype, genotype, heredity, multiple alleles, codominance, dihybrid, incomplete dominance, Mendel, monohybrid	**7) SB2**b. mutagen, Insertion mutation, Deletion mutation, Substitution mutation, UV radiation, DNA technology DNA in forensics, DNA in medicine, DNA in agriculture, nondisjunction, point mutation, frameshift, DNA fingerprint, polymerase, crossing over, recombination	**8) SB3**c. Sexual reproduction, asexual reproduction, mitosis, meiosis, somatic cells, gametes. Sperm, egg, haploid, diploid, autosome, sex chromosome, karyotype, DNA synthesis, cell cycle, prophase, metaphase, fission, anaphase, telophase, budding
9) SB1e. Energy, mitochondria, ADP, ATP, aerobic, anaerobic, respiration, chloroplast, Kreb's Cycle, calvin Cycle, electron transport chain, light reactions, photosynthesis, inputs, outputs, $C_6H_{12}O_6$, glycolysis, carbon fixation, NAD, NADP, cristae, stroma. Thylakoid, Chlorophyll, phosphorylation	**10) SB4**a. archaebacteria, eubacteria, protists, fungi, plants, and animals, autotroph, taxonomy, absorptive heterotroph, ingestive heterotroph, characteristics of life, chemosynthesis, unicellular photosynthesis, multicellular,	**11) SB4**b. Domain, kingdom, phylum, class, order, family, genus, species, scientific name, taxonomy, binomial nomenclature, dichotomous key, classification, virus, protein coat, nucleic acid, prion, Cladogram, clade, lytic cycle, lysogenic cycle,	**12) SB2c.** DNA technology DNA in forensics, DNA in medicine, DNA in agriculture, nondisjunction, point mutation, frameshift, DNA fingerprint, electrophoresis, clone, mutation, PCR, GMOs, gene therapy, forensics, recombination, CRISPR
13) SB5a. species, populations, communities, ecosystems, biomes, niche, habitat, symbiosis, parasite, predator, prey, host, commensalism, mutualism, competition, terrestrial, marine, aquatic, freshwater, biosphere	**14) SB5**b. Food chain, food web, trophic level, consumers, producers, decomposers, Biomass, energy pyramid, water cycle, nitrogen cycle, carbon cycle, methane, transpiration, greenhouse gasses, acid rain, nodules, decomposition, transpiration, evaporation, run off, fossil fuels, combustion,	**15) SB5**c. Primary succession, secondary succession, global warming, population growth, pesticides, tundra, over-consumption, carrying capacity, desert, rainforest, deciduous forest, coniferous forest, abyss, coral reef, estuary, taiga, climax community, recycle, polar, atmosphere, ozone layer, global climate change, greenhouse gases, acid rain, fracking, endangered species, extinction	**16) SB5**e. Leaves, stems, roots, flowers, xylem, phloem, guard cells, stomata, cell wall, cuticle, stamen, pistil, seedless plants, vascular tissue, gymnosperm, angiosperm, fern, monocot, dicot, tropism, alternation of generations, hormones, Hibernation, aestivation, camouflage, ethology
17) SB6a. Darwin, Lamarck, natural selection, survival of the fittest, use and disuse, acquired traits, endosymbiont theory, Linnaeus, primordial soup, fitness, gradualism, punctuated equilibrium	**18) SB6**b. biodiversity, ancestry, homolgous structures, analogous structures, convergent evolution, divergent evolution, comparative anatomy, comparative embryology	**19) SB6**c. Comparative biochemistry, mold, cast, fossil, relative dating, stratification, DNA fingerprinting, amino acid sequences, electrophoresis, absolute dating,	**20) SB6**d. Natural selection, overproduction, variation, survival of the fittest, resistance, genetic isolation, gene pool, adaptive radiation, speciation, diversity, artificial selection