Conceptual Understanding: Cells grow and reproduce through a regulated cell cycle. Within multicellular organisms, cells repeatedly divide for repair, replacement, and growth. Likewise, an embryo begins as a single cell that reproduces to form a complex, multicellular organism through the processes of cell division and differentiation.

BIO.1E Students will develop and use models to explain the role of the cell cycle during growth, development, and maintenance in multicellular organisms.
BIO.1E. 1 Construct models to explain how the processes of cell division and cell differentiation produce and maintain complex multicellular organisms.
BIO.1E. 2 Identify and describe the changes that occur in a cell during replication. Explore problems that might occur if the cell does not progress through the cycle correctly (cancer).
BIO.1E. 3 Relate the processes of cellular reproduction to asexual reproduction in simple organisms (i.e., budding, vegetative propagation, regeneration, binary fission). Explain why the DNA of the daughter cells is the same as the parent cell. Conceptual Understanding: Organisms require energy to perform life functions. Cells are transformers of energy, continuously utilizing a complex sequence of reactions in which energy is transferred from one form to another, for example, from light energy to chemical energy to kinetic energy. Emphasis is on illustrating the inputs and outputs of matter and the transfer and transformation of energy in photosynthesis and cellular respiration. Assessment is limited to identification of the phases (i.e., glycolysis, citric acid cycle, and electron transport chain) in cellular respiration as well as light and light-independent reactions of photosynthesis and does not include specific biochemical reactions within the phases.

BIO.2 Students will explain that cells transform energy through the processes of photosynthesis and cellular respiration to drive cellular functions.
BIO.2.1 Use models to demonstrate that ATP and ADP are cycled within a cell as a means to transfer energy.
BIO.2.2 Develop models of the major reactants and products of photosynthesis to demonstrate the transformation of light energy into stored chemical energy in cells. Emphasize the chemical processes in which bonds are broken and energy is released, and new bonds are formed and energy is stored.
BIO.2.3 Develop models of the major reactants and products of cellular respiration (aerobic and anaerobic) to demonstrate the transformation of the chemical energy stored in food to the available energy of ATP. Emphasize the chemical processes in which bonds are broken and energy is released, and new bonds are formed and energy is stored.
BIO.2.4 Conduct scientific investigations or computer simulations to compare aerobic and anaerobic cellular respiration in plants and animals, using real world examples.
Unit 4: Conceptual Understanding: Somatic cells contain homologous pairs of chromosomes, one member of each pair obtained from each parent, that form a diploid set of chromosomes in each cell. These chromosomes are similar in genetic information but may contain different alleles of these genes. For sexual reproduction, an offspring must inherit a haploid set from each parent. Haploid gametes are formed by meiosis, a specialized cell division in which the chromosome number is reduced by half. During meiosis, members of a homologous pair may exchange information and then are randomly sorted into gametes resulting in genetic variation in sex cells.

BIO.3A Students will develop and use models to explain the role of meiosis in the production of haploid gametes required for sexual reproduction.

BIO.3A. 1 Model sex cell formation (meiosis) and combination (fertilization) to demonstrate the maintenance of chromosome number through each generation in sexually reproducing populations. Explain why the DNA of the daughter cells is different from the DNA of the parent cell.
BIO.3A. 2 Compare and contrast mitosis and meiosis in terms of reproduction.
BIO.3A. 3 Investigate chromosomal abnormalities (e.g., Down syndrome, Turner's syndrome, and Klinefelter syndrome) that might arise from errors in meiosis (nondisjunction) and how these abnormalities are identified (karyotypes).
Unit 5: Conceptual Understanding: Offspring inherit DNA from their parents. The genes contained in the DNA (genotype) determine the traits expressed in the offspring's phenotype. Alleles of a gene may demonstrate various patterns of inheritance. These patterns of inheritance may be followed through multiple generations within families.
BIO.3B Students will analyze and interpret data collected from probability calculations to explain the variation of expressed traits within a population.
BIO.3B. 1 Demonstrate Mendel's law of dominance and segregation using mathematics to predict phenotypic and genotypic ratios by constructing Punnett squares with both homozygous and heterozygous allele pairs.
BIO.3B. 2 Illustrate Mendel's law of independent assortment using Punnett squares and/or the product rule of probability to analyze monohybrid crosses.
BIO.3B. 3 Investigate traits that follow non-Mendelian inheritance patterns (e.g., incomplete dominance, codominance, multiple alleles in human blood types, and sex-linkage).
BIO.3B. 4 Analyze and interpret data (e.g., pedigrees, family, and population studies) regarding Mendelian and complex genetic traits (e.g., sickle-cell anemia, cystic fibrosis, muscular dystrophy, color-blindness, and hemophilia) to determine patterns of inheritance and disease risk.

|  | $\begin{aligned} & \text { OBJECTIVE/ } \\ & \text { OUTCOME } \end{aligned}$ | TEACHING STRATEGIES／ACTIVITIES | ASSESSMENTS | HOMEWORK | I CAN STATEMENTS／ ESSENTIAL QUESTIONS |
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| $\begin{aligned} & \text { 営 } \\ & \text { ¿ } \end{aligned}$ | －1E－1E． 3 <br> －3A－3A． 2 | －BW：Biology state test questions <br> －Review Bellwork <br> －Students will complete guided notes while teacher presents powerpoint on chromosome abnormalities． <br> －Students will complete Karyotype activity <br> －CL：What is the abnormality？ | －Socratic question． <br> －Observation during activity | －Study for test | －I can explain the phases of the cell cycle <br> －I can explain the phase of Meiosis． <br> －I can identify pictures of mitosis and meiosis． <br> I can compare Mitosis and Meiosis |
|  | －1E－1E． 3 <br> －3A－3A． 2 <br> － 9 week test | －BW：Phases of Mitosis <br> －Students will present answers on the board <br> －Students will complete Study guide for 9 week test． <br> －Students will whiteboard and present answers to study guide． <br> －Students will play review game for test <br> －CL：answer the questions on the board | －Fist of five review <br> －Socratic question | －None | －I can explain the phases of the cell cycle <br> －I can explain the phase of Meiosis． <br> －I can compare Mitosis and Meiosis |
|  | 3A3 | －BW：Log in to computer <br> －Students will complete 9 week test CL：What was the hardest part of the test？ | 9 week assessment． | None | －Identify different types of abnormalities through a karyotype． |
| $\begin{aligned} & \text { 突 } \\ & \text { 苞 } \\ & \ldots \end{aligned}$ | 3B－3B． 2 | －BW：What gene do you have？ <br> －Review Bellwork <br> －Students will start on guide notes on Genetics while teacher goes through power point． <br> －Students will complete genetic practice． Then whiteboard the answers． <br> －CL：Genetic vocabulary game | －Observation during work <br> －Socratic questions | None | －I can explain terminology that goes along with genetics． <br> －I can complete a simple Punnett square． |


| $\frac{\pi}{i}$ | 3B-3B. 2 | - BW: Genetic review bellwork <br> - Students will complete Monster Inc. worksheet. (Basic genetic squares) <br> - Students will complete Bunny genetics and present answers. <br> - Review game <br> - CL: Monster mash genetics (Punnett square practice) | - Socratic questioning <br> - Observation during work | None | - Explain terminology that goes along with genetics. <br> - Complete a simple Punnett square |
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