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| Biotechnology—4 Days |
| Essential Standard:  Bio 3.3 Understand the application of DNA technology  Bio 1.1 Understand the relationship between the structures and functions of cells and their organelles |
| Clarifying Objectives:  Bio.3.3.1 Interpret how DNA is used for comparison and identification of organisms.  Bio.3.3.2 Summarize how transgenic organisms are engineered to benefit society.  Bio.3.3.3 Evaluate some of the ethical issues surrounding the use of DNA technology (including cloning, genetically modified organisms, stem cell research, and Human Genome Project).  Bio 1.1.3 Explain how instructions in DNA lead to cell differentiation and result in cells specialized to perform specific functions in multicellular organisms |
| Essential Vocabulary:  DNA fingerprint, gel electrophoresis, restriction enzyme, genetic engineering, bacterial transformation, transgenic organism / GMO (genetically modified organism), recombinant DNA, plasmid, vector, host, Human Genome Project, genetic screening, gene therapy |

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| **Essential Questions** | **What to Know** | **Do I Know It?** | **Did I Know It? (# Missed)** | **Assessment** |
| **3.3.1**  How is a DNA fingerprint different from an actual fingerprint?  How is a DNA fingerprint made and used?  1-2 Days | 1. I will explain the production of a DNA fingerprint and the steps to make it. 2. I will model the process of producing a DNA fingerprint (online or paper/pencil) 3. I will interpret a DNA fingerprint in crime scene (forensics) and paternity applications | 1. \_\_\_\_\_\_\_\_ 2. \_\_\_\_\_\_\_\_ 3. \_\_\_\_\_\_\_\_ | 1. \_\_\_\_\_\_\_\_\_ (\_\_\_\_/\_\_\_\_) 2. \_\_\_\_\_\_\_\_\_ (\_\_\_\_/\_\_\_\_) 3. \_\_\_\_\_\_\_\_\_ (\_\_\_\_/\_\_\_\_) | Formal Quiz over Biotechnology  Date: \_\_\_\_\_ |
| **3.3.2**  How can the DNA of an organism be modified to change its traits?  How is changing DNA of plants and other organisms useful to humans?  1-2 Days | 1. I will explain the production of a transgenic organism containing a desired gene 2. I will model the process of producing a transgenic organism (online or cut/paste) 3. I will describe the applications of genetic engineering in agriculture, industry and medicine | 1. \_\_\_\_\_\_\_\_ 2. \_\_\_\_\_\_\_\_ 3. \_\_\_\_\_\_\_\_ | 1. \_\_\_\_\_\_\_\_\_ (\_\_\_\_/\_\_\_\_) 2. \_\_\_\_\_\_\_\_\_ (\_\_\_\_/\_\_\_\_) 3. \_\_\_\_\_\_\_\_\_ (\_\_\_\_/\_\_\_\_) |
| **3.3.3**  How do we know where human genes are located on chromosomes?  Will scientists ever be able to develop “cures” for genetic disorders?  Should we (humanity) be manipulating the natural DNA of organisms?  1-2 Days | 1. I will describe the purpose of the Human Genome Project as locating and sequencing genes on human chromosomes 2. I will explain how the HGP has led to genetic screening and the development of gene therapy for certain genetic disorders 3. I will evaluate the benefits and drawbacks of genetic engineering, gene therapy, and stem cell research | 1. \_\_\_\_\_\_\_\_ 2. \_\_\_\_\_\_\_\_ 3. \_\_\_\_\_\_\_\_ | 1. \_\_\_\_\_\_\_\_\_ (\_\_\_\_/\_\_\_\_) 2. \_\_\_\_\_\_\_\_\_ (\_\_\_\_/\_\_\_\_) 3. \_\_\_\_\_\_\_\_\_ (\_\_\_\_/\_\_\_\_) |