CURRICULUM MAP
BIOLOGY

1st Nine Weeks	2nd Nine Weeks
Life Science *1. Explain that living cells* *a. are composed of a small number of key chemical elements (carbon, hydrogen, oxygen, nitrogen, phosphorus and sulfur)* *b. are the basic unit of structure and function of all living things* *c. come from pre-existing cells after life originated, and* *d. are different from viruses* *2. Compare the structure, function and interrelatedness of cell organelles in eukaryotic cells (e.g., nucleus, chromosome, mitochondria, cell membrane, cell wall, chloroplast, cilia, flagella) and prokaryotic cells.* *3. Explain the characteristics of life as indicated by cellular processes including:* *a. homeostasis* *b. energy transfers and transformation* *c. transportation of molecules* *d. disposal of wastes* *e. synthesis of new molecules* 11. Explain that living organisms use matter and energy to synthesize a variety of organic molecules (e.g., proteins, carbohydrates, lipids and nucleic acids) and to drive life processes (e.g., growth, reacting to the environment, reproduction and movement).	**Life Science** *4. Summarize the general processes of cell division and differentiation, and explain why specialized cells are useful to organisms and explain that complex multicellular organisms are formed as highly organized arrangements of differentiated cells.* *10. Describe how cells and organisms acquire and release energy (photosynthesis, chemosynthesis, cellular respiration and fermentation).* **Earth Science** *4. Describe how organisms on Earth contributed to the dramatic change in oxygen content of Earth's early atmosphere.*

CURRICULUM MAP
BIOLOGY

3rd Nine Weeks	4th Nine Weeks
Life Science *6. Explain that a unit of hereditary information is called a gene, and genes may occur in different forms called alleles (e.g., gene for pea plant height has two alleles, tall and short).* 8. Use the concepts of Mendelian and non- Mendelian genetics (e.g., segregation, independent assortment, dominant and recessive traits, sexlinked traits and jumping genes) to explain inheritance. *5. Illustrate the relationship of the structure and function of DNA to protein synthesis and the characteristics of an organism.* 7. Describe that spontaneous changes in DNA are mutations, which are a source of genetic variation. When mutations occur in sex cells, they may be passed on to future generations; mutations that occur in body cells may affect the functioning of that cell or the organism in which that cell is found. *13. Explain that the variation of organisms within a species increases the likelihood that at least some members of a species will survive under gradually changing environmental conditions.* 14. Relate diversity and adaptation to structures and their functions in living organisms (e.g., adaptive radiation). 20. Recognize that a change in gene frequency (genetic composition) in a population over time is a foundation of biological evolution. *21. Explain that natural selection provides the following mechanism for evolution; undirected variation in inherited characteristics exist within every species. These characteristics may give individuals an advantage or disadvantage compared to others in surviving and reproducing. The advantaged offspring are more likely to survive and reproduce. Therefore, the proportion of individuals that have advantageous characteristics will increase. When an environment changes, the survival value of some inherited characteristics may change.* 22. Describe historical scientific developments that occurred in evolutionary thought (e.g., Lamarck and Darwin, Mendelian Genetics and modern synthesis).	**Earth Science** *3. Explain how geologic time can be estimated by multiple methods (e.g., rock sequences, fossil correlation and radiometric dating).* 1. Summarize the relationship between the climatic zone and the resultant biomes. (This includes explaining the nature of the rainfall and temperature of the mid-latitude climatic zone that supports the deciduous forest.) 2. Explain climate and weather patterns associated with certain geographic locations and features (e.g., tornado alley, tropical hurricanes and lake effect snow). 5. Explain how the acquisition and use of resources, urban growth and waste disposal can accelerate natural change and impact the quality of life. 6. Describe ways that human activity can alter iogeochemical cycles (e.g., carbon and nitrogen cycles) as well as food webs and energy pyramids (e.g., pest control, legume rotation crops vs. chemical fertilizers). **Life Science** *12. Describe that biological classification represents how organisms are related with species being the most fundamental unit of the classification system. Relate how biologists arrange organisms into a hierarchy of groups and subgroups based on similarities and differences that reflect their evolutionary relationships.* *15. Explain how living things interact with biotic and abiotic components of the environment (e.g., predation, competition, natural disasters and weather).* 16. Relate how distribution and abundance of organisms and populations in ecosystems are limited by the ability of the ecosystem to recycle materials and the availability of matter, space and energy. 17. Conclude that ecosystems tend to have cyclic fluctuations around a state of approximate equilibrium that can change when climate changes, when one or more new species appear as a result of immigration or when one or more species disappear. 18. Describe ways that human activities can deliberately or inadvertently alter the equilibrium in ecosystems. Explain how changes in technology/biotechnology can cause significant changes, either positive or negative, in environmental quality and carrying capacity. 19. Illustrate how uses of resources at local, state, regional, national, and global levels have affected the quality of life (e.g., energy production and sustainable vs. nonsustainable agriculture). *9. Describe how matter cycles and energy flows through different levels of organization in living systems and between living systems and the physical environment. Explain how some energy is stored and much is dissipated into the environment as thermal energy (e.g., food webs and energy pyramids).*

CURRICULUM MAP
Biology (Embedded)

Scientific Inquiry

1. Research and apply appropriate safety precautions when designing and conducting scientific investigations (e.g. OSHA, MSDS, eyewash, goggles and ventilation).
2. Present scientific findings using clear language, accurate data, appropriate graphs, tables, maps and available technology.
3. Use mathematical models to predict and analyze natural phenomena.
4. Draw conclusions from inquiries based on scientific knowledge and principles, the use of logic and evidence (data) from investigations.
5. Explain how new scientific data can cause any existing scientific explanation to be supported, revised or rejected.

Scientific Ways of Knowing

1. Discuss science as a dynamic body of knowledge that can lead to the development of entirely new disciplines.
2. Describe that scientists may disagree about explanations of phenomena, about interpretation of data or about the value of rival theories, but they do agree that questioning, response to criticism and open communication are integral to the process of science.
3. Recognize that science is a systematic method of continuing investigation, based on observation, hypothesis testing, measurement, experimentation, and theory building, which leads to more adequate explanations of natural phenomena.
4. Recognize that ethical considerations limit what scientists can do.
5. Recognize that research involving voluntary human subjects should be conducted only with the informed consent of the subjects and follow rigid guidelines and/or laws.
6. Recognize that animal-based research must be conducted according to currently accepted professional standards and laws.
7. Investigate how the knowledge, skills and interests learned in science classes apply to the careers students plan to pursue.

Science and Technology

1. Cite examples of ways that scientific inquiry is driven by the desire to understand the natural world and how technology is driven by the need to meet human needs and solve human problems.
2. Describe examples of scientific advances and emerging technologies and how they may impact society.
3. Explain that when evaluating a design for a device or process, thought should be given to how it will be manufactured, operated, maintained, replaced and disposed of in addition to who will sell, operate and take care of it. Explain how the costs associated with these considerations may introduce additional constraints on the design.

Life Science

26. Use historical examples to explain how new ideas are limited by the context in which they are conceived. These ideas are often rejected by the scientific establishment; sometimes spring from unexpected findings; and usually grow slowly through contributions from many different investigators (e.g., biological evolution, germ theory, biotechnology and discovering germs).
27. Describe advances in life sciences that have important long-lasting effects on science and society (e.g., biological evolution, germ theory, biotechnology and discovering germs).
28. Analyze and investigate emerging scientific issues (e.g., genetically modified food, stem cell research, genetic research and cloning).

Earth Science

7. Describe advances and issues in Earth and space science that have important long-lasting effects on science and society (e.g., geologic times scales, global warming, depletion of resources and exponential population growth).