



## BioComm Correlation to the Virginia Standards of Learning BIOLOGY

| Standard  | Location/Page where Standard is found  |
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| <b>BIO.1 The student will plan and conduct investigations in which:</b>                               |  |
| a) observations of living organisms are recorded in the lab and in the field;                         | 24-25; 28-31; 40-42; 91-92; 94-96; 99-102; 112-116; 120-125; 128; 143-145; 147-150; 176-178; 189; 211-216; 222-223; 225-227; 228-230; 232-234; 243-244; 225-261; 347; 369-371; 378-389; 386-389; 392-396; 3990400; 405-412; 434-436; 443-445; 506-507. |
| b) hypotheses are formulated based on direct observations and information from scientific literature; | 13, 15 #7; 30 #5; 50 #3; 55 #3; 78; 115; 124-125; 203; 207; 211-215; 225-227; 232-235; 243-244; 253-255; 257-259; 267-269; 378-380; 386-389; 392-396.  |
| c) variables are defined and investigations are designed to test hypotheses;                          | 23-25; 27; 29-30; 47-48; 51; 54-55; 78-80; 115-116; 124-125; 203-205; 211-215; 225-227; 232-235; 243-244; 253-255; 257-269; 378-380; 386-398; 392-396.   |
| d) graphing and arithmetic calculations are used as tools in data analysis;                           | 31; 49; 50 #4; 51; 54-55; 80; 115-116; 124-125; 203-205; 211-215; 225-227; 232-235; 243-244; 253-255; 257-269; 378-380; 386-398; 392-396;  |
| e) conclusions are formed based on recorded quantitative and qualitative data;                        | 31; 49; 50 #4; 51; 54-55; 80; 115-116; 124-125; 203-205; 211-215; 225-227; 232-235; 243-244; 253-255; 257-269; 378-380; 386-398; 392-396.  |

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| f) sources of error inherent in experimental design are identified and discussed;   | 31; 49; 50 #4; 51; 54-55; 80; 115-116; 124-125; 203-205; 211-215; 225-227; 232-235; 243-244; 253-255; 257-269; 378-380; 386-398; 392-396;   |
| g) validity of data is determined;  | 31; 49; 50 #4; 51; 54-55; 80; 115-116; 124-125; 203-205; 211-215; 225-227; 232-235; 243-244; 253-255; 257-269; 378-380; 386-398; 392-396.   |
| h) chemicals and equipment are used in a safe manner;   | 8; 14; 24; 41; 51; 54; 122; 124; 138; 203-205; 211-215; 225-227; 229; 232-235; 260; 262; 386-389; 393-394.  |
| i) appropriate technology including computers, graphing calculators, and probeware, is used for gathering and analyzing data and communicating results; | 56-57; 58-61; 66-67; 269; 511-513; 581-585; 754-758.  |
| j) research utilizes scientific literature;   | 58; 115; 125; 145; 188-189; 269; 287; 355; 377; 413; 465.   |
| k) differentiation is made between a scientific hypothesis and theory;  | 29-30; 48; 202; 223; 255; 261; 264; 268; 271; 335; 369; 279; 386.   |
| l) alternative scientific explanations and models are recognized and analyzed; and  | 24-27; 30-31; 45-46; 49-55; 64-67; 72-75; 132-133; 358-359; 565-567; 572-576; 590-592; 608-611; 746-753.  |
| m) a scientific viewpoint is constructed and defended (the nature of science).  | 2-7; 12-12; 17-23; 57; 24-27; 49-55; 4-67; 72-75; 89; 106-107; 118-119; 132-133; 140-142; 180-184; 191-193; 199; 172-276; 282-284; 358-359; 366-368; 590-592; 416-420; 426-427; 482-485; 490-496; 508; 51-; 522-525; 565-567; 572-576; 608-611; 660-662; 746-753. |
| <b>BIO.2 The student will investigate and understand the history of biological concepts. Key concepts include:</b>                                      |   |
| a) evidence supporting the cell theory;   | 200-210.  |
| b) scientific explanations of the development of organisms through time (biological evolution);   | 27; 428-434; 439-442; 453-455; 456-458.   |

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| c) evidence supporting the germ theory of infectious disease;  | 243-250; 253-254.  |
| d) development of the structural model of DNA; and   | 326-338; 350-353.  |
| e) the collaborative efforts of scientists, past and present.  | 9; 16; 161; 165; 187; 316; 321; 324; 352-353; 356; 372; 428-430; 451; 456-458; 461; 498; 612-616; 630-634; 660-671; 694-705; 714-717; 724-729. |
| <b>BIO.3 The student will investigate and understand the chemical and biochemical principles essential for life. Key concepts include:</b>   |  |
| a) water chemistry and its impact on life processes;   | 32-33; 36-37; 211-216; 504.  |
| b) the structure and function of macromolecules;   | 35-38; 86-89; 699-700.   |
| c) the nature of enzymes; and  | 262; 267; 339-351.   |
| d) the capture, storage, transformation, and flow of energy through the processes of photosynthesis and respiration.   | 81-88; 120; 260-265.   |
| <b>BIO.4 The student will investigate and understand relationships between cell structure and function. Key concepts include:</b>  |  |
| a) characteristics of prokaryotic and eukaryotic cells;  | 208-211; 222-223; 430-431.   |
| b) exploring the diversity and variation of eukaryotes;  | 208-209.   |
| c) similarities between the activities of a single cell and a whole organism; and  | 366-386; 372-375; 378-384; 386-400; 407-412.   |
| d) the cell membrane model (diffusion, osmosis, and active transport).   | 198-242 265-268.   |
| <b>BIO.5 The student will investigate and understand life functions of archaeobacteria, monerans(eubacteria), protists, fungi, plants, and animals including humans. Key concepts include:</b> |  |
| a) how their structures and functions vary between and within the kingdoms;  | 208-216; 430-480.  |

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| b) comparison of their metabolic activities;   | 208-209.   |
| c) analyses of their responses to the environment;   | 366-368; 366-368; 372-375;<br>378-384; 402-412; 430-480. |
| d) maintenance of homeostasis;   | 198-242; 265-268.  |
| e) human health issues, human anatomy, body systems, and life functions; and   | 242-268; 288-289; 310-316;<br>321; 325-326.              |
| f) how viruses compare with organisms.   | 210-211.   |
| <b>BIO.6 The student will investigate and understand common mechanisms of inheritance and protein synthesis. Key concepts include:</b> |  |
| a) cell growth and division;   | 292-298.   |
| b) gamete formation;   | 299-305.   |
| c) cell specialization;  | 307-309.   |
| d) prediction of inheritance of traits based on the Mendelian laws of heredity;  | 284-287; 290-291; 310-3222;<br>342-344.                  |
| e) genetic variation (mutation, recombination, deletions, additions to DNA);   | 322-326; 344-346; 353-455.                               |
| f) the structure, function, and replication of nucleic acids (DNA and RNA);  | 329-335.   |
| g) events involved in the construction of proteins;  | 335-337; 344-345.  |
| h) use, limitations, and misuse of genetic information; and  | 358-361; 382-389.  |
| i) exploration of the impact of DNA technologies.  | 347-361; 663-666; 698-701.                               |
| <b>BIO.7 The student will investigate and understand bases for modern classification systems. Key concepts include:</b>                |  |

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| a) structural similarities among organisms;  | 433-441; 443-450.   |
| b) fossil record interpretation;   | 457-464; 443-467.   |
| c) comparison of developmental stages in different organisms;  |   |
| d) examination of biochemical similarities and differences among organisms; and  | 660-662.  |
| e) systems of classification that are adaptable to new scientific discoveries.   | 441-442.  |
| <b>BIO.8 The student will investigate and understand how populations change through time. Key concepts Include:</b>                                |   |
| a) evidence found in fossil records;   | 457-464; 466-467.   |
| b) how genetic variation, reproductive strategies, and environmental pressures impact the survival of populations;                                 | 141-142.  |
| c) how natural selection leads to adaptations;   | 162-164; 453-455; 458-459.  |
| d) emergence of new species; and   | 439-441.  |
| e) scientific explanations for biological evolution.   | 428-434; 456-461; 462-468.  |
| <b>BIO.9 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. Key concepts include:</b> |   |
| a) interactions within and among populations including carrying capacities, limiting factors, and growth curves;                                   | 102-112; 145-153; 156-160; 162-178.   |
| b) nutrient cycling with energy flow through ecosystems;   | 91-93; 99-103.  |
| c) succession patterns in ecosystems;  | 122-124; 542-549.   |
| d) the effects of natural events and human activities on ecosystems; and   | 104-105; 119-120; 126; 472-479; 587-591; 602-611; 630-634; 714-723; 730-736; 740- |

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|  | 747.     |
| e) analysis of the flora, fauna, and microorganisms of Virginia ecosystems including the Chesapeake Bay and its tributaries. | 635-639. |