**Mullins High School**

**Grade 10**

**Biology 1 State Standards**

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Standard H.B.1:

The student will use the science and engineering practices, including the processes and skills of scientific inquiry , to develop understandings of science content.

Performance Indicators:

H.B.1A.1 Ask questions to (1)generate hypotheses for scientific investigations,

(2)refine models,explanations or designs or (3)extend the results of

Investigations or challenge scientific arguments or claims.

H.B.1A.2 Develop,use and refine models to (1)understand or represent phenomena,

Processes and relationships,(2)test devices or solutions or (3) communicate

Ideas to others.

H.B.1A.3 Plan and conduct controlled scientific investigations to answer questions,

Test hypotheses and develop explanations:(1)formulate scientific questions

And testable hypothesis based on credible scientific information,(2)identify

Materials , procedures and variables(3)use appropriate laboratory

Equipment, technology, and techniques to collect qualitative and quantitative

Data, and (4)record and represent data in an appropriate form.Use

Appropriate safety procedures.

H.B.1A.4 Analyze and interpret data from informational texts and data collected

From investigations using a range of methods(such as tabulation, graphing or

Statistical analysis) to (1) reveal patterns and construct meaning,

(2)support or refute hypotheses, explanations, claims or designs or

(3)use grade level appropriate statistics to analyze data.

H.B.1A.5 Use mathematical and computational thinking to (1)use and manipulate

Appropriate metric units,(2)express relationships between variables for

Models and investigations and (3)use grade level appropriate statistics to

Analyze data.

H.B.1A.6 Construct explanations of phenomena using(1) primary or secondary

Scientific evidence and models,(2)conclusions from scientific

investigations,(3)predictions based on observations and measurements

Or (4)data communicated in graphs,tables or diagrams.

H.B.1A.7 Construct and analyze scientific arguments to support claims, explanations

Or designs using evidence and valid reasoning from observation,data or

Informational texts.

H.B.1A.8 Obtain and evaluate scientific information to (1) answer questions,

(2)explain or describe phenomena,(3) develop models,(4)evaluate hypotheses

Explanations,claims,or designs or (5)identify and/or fill gaps in knowledge.

Communicate using the conventions and expectations of scientific writing or

Oral presentations by(1)evaluating grade appropriate primary or secondary

Scientific literature or (2)reporting the results of student experimental

Investigations.

H.B.1B.1 Conduct devices or design solutions using scientific knowledge to solve

Specific problems or needs:(1) ask questions to identify problems or needs

(2)ask questions about the criteria and constraints of the device or solution

(3)generate and communicate ideas for possible devices or solutions,

(4)build and test devices or solutions,(5)determine if the devices or solution

Solved the problem and refine the design if needed and(6)communicate the

Results.

Standard H.B.2

The student will demonstrate an understanding that the essential functions of life take place within cells or systems of cells.

Performance Indicators:

H.B.2A.1 Construct explanations of how the structures of carbohydrates, lipids,

Protein, and nucleic acids (including DNA and RNA) are related to their

Functions in organisms.

H.B.2A.2 Plan and conduct investigations to determine how various environmental

factors(including temperature and pH) affect enzyme activity and the rate

Of biochemical reactions.

H.B.2B.1 Develop and use models to explain how specialized structures within cells

(including the nucleus, chromosome,cytoskeleton,endoplasmic reticulum,

Ribsomes and Golgi complex)interact to produce,modify and transport

Proteins. Models should compare and contrast how prokaryotic cells meet

The same life needs as eukaryotic cells without similar structures.

H.B.2B.2 Collect and interpret descriptive data on cell structure to compare and

Contrast different types of cells(including prokaryotic vs eukaryotic,

And animal versus plant versus fungal)

H.B.2B.3 Obtain information to contrast the structure of viruses with that of cells

And to explain , in general , why viruses must use living cells to reproduce.

H.B.2C.1 Develop and use models to exemplify how the cell membrane serves to

Maintain homeostasis of cell through both active and passive transport

Processes.

H.B.2C.2 Ask scientific questions to define the problems that organisms face in

Maintaining homeostasis within different environments(including water of

Varying solute concentrations)

H.B.2C.3 Analyze and interpret data to explain the movement of molecules(including

water) across a membrane.

H.B.2D.1 Construct models to explain how the processes of cell division and cell

Differentiation produce and maintain complex multicellular organisms.

H.B.2D.2 Develop and use models to exemplify the changes that occur in a cell cycle

(including change in cell size,chromosome,cell membrane/cell wall,and the

Number of cells produced),predict, based on the models,what might happen to

A cell that does not progress through the cycle correctly.

H.B.2D.3 Construct explanations for how the cell cycle is monitored by check point

System and communicate possible consequences of the continued cycling of

Abnormal cells.

H.B.2D.4 Construct scientific arguments to support the pros and cons of

Biotechnological applications of stem cells using examples from both plants

And animals.

Standard H.B.3:

The student will demonstrate an understanding that all essential processes within organisms require energy which in most ecosystems is ultimately derived from the Sun and transferred into chemical energy by the photosynthetic organisms of that ecosystem.

Performance Indicators:

H.B.3A.1: Develop and use models to explain how chemical reactions among ATP,ADP

And inorganic phosphate ct to transfer chemical energy within cells.

H.B.3A.2: Develop and revise models to describe how photosynthesis transforms light

Energy into stored chemical energy.

H.B.3A.3: Construct scientific arguments to support claims that chemical elements in

In the sugar molecules produced by photosynthesis may interact with other

Elements to form amino acids,lipids, nucleic acids or other large organic

Molecules.

H.B.3A.4 Develop models of the major inputs and outputs of cellular respiration

(aerobic and anaerobic )to exemplify the chemical process in which the

Bonds of new compounds are formed and a net transfer of energy results

H.B.3A.5 Plan and conduct scientific investigations or computer stimulations to

Determine the relationship between variables that affect the processes of

Fermentation and/or cellular respiration in living organisms and interpret the

Data in terms of real world phenomena.

Standard H.B.4:

The student will demonstrate an understanding of the specific mechanisms by which characteristics or traits are transferred from one generation to the next via genes.

Performance Indicators:

H.B.4A.1: Develop and use models at different scales to explain the relationship

Between DNA,genes and chromosomes in coding the instructions for

Characteristics traits transferred from parent to offspring.

H.B.4A.2 Develop and models to explain how genetic information (DNA) is

Copied for transmission to subsequent generations of cells(mitosis)

H.B.4B.1 Develop and use models to describe how the structure of DNA determines

The structure of resulting proteins or RNA molecules that carry out the

Essential functions of life.

H.B.4B.2 Obtain, evaluate and communicate information on how biotechnology

(including gel electrophoresis, plasmid-based transformation and DNA

fingerprinting) may be used in the fields of medicine, agriculture and

Forensic science

H.B.4C.1 Develop and use models of sex cell formation (meiosis)to explain why the

DNA of the daughter cells is different from the DNA of the parent cell.

H.B.4C.2 Analyze data on the variation of traits among individual organisms within a

Population to explain patterns in the data in the context of transmission of

Genetic information.

H.B.4C.3 Construct explanations for how meiosis followed by fertilization ensures

Genetic variation among offspring within the same family and genetic

Diversity within populations of sexually reproducing organisms.

H.B.4D.1 Develop and use models to explain how mutations in DNA that occur during

replication(1) can affect the protein that are produced or the traits that

Results and (2) may or may not inherited.

Standard H.B.5:

The student will demonstrate an understanding of biological evolution and the diversity of life.

Performance Indicators:

H.B.5.1 Summarize the process of natural selection

H.B.5.2 Explain how genetic processes result in the continuity of life forms over

Time.

H.B.5.3 Explain how diversity within a species increases the chances of survival.

H.B.5.4 Explain how genetic variability and environmental factors lead to biological

Evolution.

H.B.5.5 Exemplify scientific evidence in the fields of anatomy ,embryology,

Biochemistry and paleontology that underlies the theory of biological

Evolution.

H.B.5.6 Summarize ways that scientists use data from a variety of sources to

Investigate and critically analyze aspects of evolutionary theory.

H.B.5.7 Use a phylogenetic tree to identify the evolutionary relationships among

Different groups of organisms.

Standard H.B.6:

The student will demonstrate an understanding that ecosystem are complex , interactive systems that are both biological communities and physical components of the environment.

Performance Indicators:

H.B.6A.1: Analyze and interpret data that depicts changes in the abiotic and biotic

Components of an ecosystem over time or space(such as percent change,

Average change, correlation and proportionality) and propose hypotheses

About possible relationships, between the changes in the biotic

Components of the environment.

H.B.6A.2 Use mathematical and computational thinking to support claims that

Limiting factors affect the number of individuals that an ecosystem

Can support

H.B.6B.1 Develop and use models of the carbon cycle which include the interactions

Between photosynthesis , cellular respiration and other processes that

Releases carbon dioxide, to evaluate the effects of increasing atmospheric

Carbon dioxide on natural and agricultural ecosystems.

H.B.6B.2 Analyze and interpret qualitative data to construct an explanation for the

Effects of greenhouse gases(such as carbon dioxide and methane) on the

Carbon cycle and global climate.

H.B.6C.1 Construct scientific arguments to support claims that changes in the biotic

And abiotic components of various ecosystems over time affect the ability of

An ecosystem to maintain homeostasis.