Science Unit 2- Plan
7th Grade

Unit Time Frame:

12/1/2014 to 1/30/2015

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Science Unit 1
Grade 7

Unit Overview

This unit addresses the structural components of living cells and their functions. An understanding of the structure of cells is one of the first steps in comprehending the complex cellular interactions that direct and produce life. Before students can understand how multiple cells can work together to create complex biological functions, it is necessary to understand what biological functions single cells are capable of performing on their own to sustain life.

Primary Interdisciplinary Connections: Math, Language Arts, Social Studies

21st Century : Global connections

Enduring Understanding:	***Unit Essential Questions:***
Students will understand that….. • Science is a human endeavor that starts with a question. (Mendel). • Genes are segments of DNA molecules that are passed from parents to their off spring. • Sexual reproduction allows for many possible combinations of genes in offspring. • During sexual reproduction, a sperm cell from a male fuses with an egg cell from the female to create a zygote, which carries genetic information from both parents. • Reproduction is characteristic of living things and is essential for the survival of species. • Genetic information is passed from generation to generation by DNA; DNA controls the traits of an organism. • Changes in the DNA of an organism can cause changes in traits, and manipulation of DNA in organisms has led to genetically modified organisms. • DNA = Deoxyribonucleic Acid • Traits which are passed from parents to offspring are carried in DNA. • DNA is a blueprint for the cells in an organism. • Without DNA, an organism's traits would never form.	• How is the DNA "blueprint for life"? • How does sexual reproduction allow for many possible combinations of genes within offspring? • How are traits passes from one generation to the next? • In what ways are Math and Science interconnected disciplines?

Knowledge:	***Skills:***
Students will know….	***Student will be able to ….***
• How traits are passed from one generation to the next. • How patterns in the inheritance of traits can be used to predict how frequently they may appear in offspring. • How offspring can display traits unlike	• Diagram how hereditary information is passed from parents to offspring through DNA (using Punnett squares) • Illustrate that every gene has at least two alleles demonstrating that one

their parents based on the principles of dominant and recessive alleles. • How to calculate probability based on the crossing of certain organisms. • The main difference between body and reproductive cells; as well as how the processes of mitosis and meiosis compare.	gene is typically dominant and the other is recessive, but not ignoring the fact that organisms may have an incomplete dominant allele or co-allele as well. • Predict the outcome of crossing organisms using mathematical probability
Evidence of Understanding:	
Pre- Assessments Notebook and Journal Entries Performance Assessments Reading/ Writing Prompts Student Observation/Anecdotal Notes Homework Readorium Unit Assessments	
Differentiation opportunities will include: • Challenge worksheets/problems for advanced learners; e.g. blanks instead of word banks or matching • Extension opportunities • Choice of number of problems on homework sheets • Weaker students paired with stronger students during group work and lab activities • Modification of tests for lower level learners; word banks instead of blanks; smaller sections of matching; three choice multiple choice problems; choice of type and number of open-ended questions • Visual, kinesthetic and auditory presentation of material • Use of graphic organizers to take notes • Varied reading strategies; e.g. students read aloud, students read silently, students read as a class, teacher reads to students, students read to a partner. • Performance options • Study guides	
Preconception /Misconceptions	
Cells	

- All cells are same shape and size
- There are no single-celled organisms
- Some living parts of an organism are not made of cells
- Plants are not made of cells
- Cells of bacteria or living organism do not make molecules for their own growth and repair
- Plant/animal/bacteria cells do not extract their own waste
- Cells do not need a way to eliminate waste materials to function
- Cells are not organized into the body structures of the organism they are part of
- Animal cells do not carry out essential life functions for themselves
- Cells do not need water to function
- The interior of a cell is: filled with water, is solid, or with air.

List other that you discover in your class:

_____
_____
_____
_____
_____

Before beginning unit administer pretest. (Week of 12/1/2014) Check that all materials are available, usable, and ready

Materials:

Materials are supplied by the Teacher or School Site: Be aware that the classroom teacher or school site must supply a few items. Here is a summary of those items needed for chapters 5, 7-8.

Chapter 10:	Chapter 11:	Chapter 12:
▪ Prepared slides of horse ascaris and onion root tip ▪ Graph paper ▪ Pipe cleaners: 2 different colors and sizes ▪ Chart paper ▪ 0 shaped cereal ▪ Color pencils ▪ Construction paper ▪ String/yarn	▪ PTC (phenylthiocarbamide) paper ▪ Calculators ▪ Crazy trait game ▪ Markers ▪ 2 clear containers ▪ Dried black beans and white beans ▪ Colored pencils	▪ Different colored beads ▪ Clear plastic connectors ▪ DNA sequences ▪ Envelopes ▪ Colored paper ▪ Yarn/string

Addresses in Unit 1

New Jersey Common Core Standards

5.1 Science Practices	All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.
Strand A	**Understand Scientific Explanations: Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world. Who, what, when, where, why, and how questions form the basis for young learners' investigations during sensory explorations, experimentation, and focused inquiry**
5.1.4.A.1	Fundamental scientific concepts and principles and the links between them are more useful than discrete facts.
5.1.4.A.2	Outcomes of investigations are used to build and refine questions, models, and explanations.
Strand B	**Generate Scientific Evidence Through Active Investigations: Observations and investigations form young learners' understandings of science concepts.**
5.1.4.B.1	Building and refining models and explanations requires generation and evaluation of evidence.
5.1.4.B.2	Tools and technology are used to gather, analyze, and communicate results.
5.1.4.B.3	Evidence is used to construct and defend arguments
5.1.4.B.4	Reasoning is used to support scientific conclusions.
Strand C	**Reflect on Scientific Knowledge: Interacting with peers and adults to share questions and explorations about the natural world builds young learners' scientific knowledge.**
5.1.4.C.1	Scientific understanding changes over time as new evidence and updated arguments emerge.
5.1.4.C.2	Revisions of predictions and explanations occur when new arguments emerge that account more completely for available evidence.
Strand D	**Participate Productively in Science: Science practices include drawing or "writing" on observation clipboards, making rubbings, or charting the growth of plants.**
5.1.4.D.1	Science has unique norms for participation. These include adopting a critical stance, demonstrating a willingness to ask questions and seek help, and developing a sense of trust and skepticism.
5.1.4.D.2	In order to determine which arguments and explanations are most persuasive, communities of learners work collaboratively to pose, refine, and evaluate questions, investigations, models, and theories (e.g., scientific argumentation and representation).
5.1.4.D.3	Instruments of measurement can be used to safely gather accurate information for making scientific comparisons of objects and events.
5.3 Life Science	**Life Science: All students will understand that life science principles are powerful conceptual tools for making sense of the complexity, diversity, and interconnectedness of life on Earth. Order in natural systems arises in accordance with rules that govern the physical world, and the order of natural systems can be modeled and predicted through the use of mathematics.**
Strand A	**Organization and Development: Living organisms are composed of cellular units (structures) that carry out functions required for life. Cellular units are composed of molecules, which also carry out biological functions**
5.3.8.A.1	All organisms are composed of cell(s). In multi-cellular organisms, specialized cells perform specialized functions. Tissues, organs, and organ systems are composed of cells and function to serve the needs of cells for food, air, and waste removal.
5.3.8.A.2	During the early development of an organism, cells differentiate and multiply to form the many specialized cells, tissues, and organs that compose the final organism. Tissues grow

	through cell division.
Strand D	**Heredity and Reproduction:** Organisms reproduce, develop, and have predictable life cycles. Organisms contain genetic information that influences their traits, and they pass this on to their offspring during reproduction.
5.3.8.D.1	Some organisms reproduce asexually. In these organisms, all genetic information comes from a single parent. Some organisms reproduce sexually, through which half of the genetic information comes from each parent.
5.3.8.D.2	The unique combination of genetic material from each parent in sexually reproducing organisms results in the potential for variation.
5.3.8.D.3	Characteristics of organisms are influenced by heredity and/or their environment.

Next Generation Science Standards

Performance Expectations

LS3-1 LS1-2 Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful beneficial, or neutral effects to the structure and function or an organism.

LS3-2 Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

NGSS Science and Engineering Practices

Developing and Using Models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

*Develop and use a model to describe phenomena. (MS-LS3-1 &2).

Disciplinary Core Ideas

LS1.B : Growth and Development of Organisms

- Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring,). (MS-LS3-2)

LS3.A: Information Processing

- Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins which in turn affects the traits of the individual. Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. (MS-LS3-1)
- Variations of inherited traits between parent and offspring arise from genetic differences that result from the sub-set of chromosomes (and therefore genes) inherited. (MS –LS3-2)

LS3.B: Variation of Traits

- In sexually reproducing organisms, each parent contributes haof of the genes acquired (at random) by the offspring. Individuals haave two of each chromosome and hence tow alleles of each gene, one acquired from each parent. These versions may be identical or may differ from each other. (MS-LS3-2)

Cross Cutting Concepts

Cause and Effect: Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS3-2)

Structure and Function: Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts; therefore , complex natural and designed structures/systems can be analyzed to determine how they function.. (MS-LS3-1)

Common Core State Standards

CCSS: English Language Arts	
Reading Informational Text	
RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
CCSS: Writing-	
W7.1	Write arguments to support claims with clear reasons and relevant evidence.
W7.2	Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
CCSS: Speaking and Listening:	
SL.7.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.
SL.7.2	Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, and orally) and explain how the ideas clarify a topic, text, or issue under study.
SL.7.3	Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and the relevance and sufficiency of the evidence.
SL.7.4	Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.
SL.7.5	Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.
SL.7.6	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate. (See grade 7 Language standards 1 and 3 herefor specific expectations.)
CCSS: Mathematics	
6-EEC.9	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time

Overview Unit 2 – Chapters 10, 11, 12

Summary

This unit covers a series of topics including: 1) Reproduction Students describe the function of cell division and mitosis and differentiate between prokaryotic and eukaryotic cells. Students compare and contrast the stages of the cell cycle, and explain what happens to chromosome during cell division. Students differentiate between asexual and sexual reproduction and describe the process of meiosis. 2) Heredity. Students will explore and explain how traits are inherited. They will differentiate between phenotype and genotype. They will demonstrate how to complete and interpret Punnett squares. Students will describe the importance of sex chromosomes. They will compare and contrast incomplete dominance and co- dominance. Students explain how environmental factors influence inheritance. 3) The Code of Life. Students identify the structure and function of the DNA molecule and describe the process of DNA replication and explain mutations and their results.

Core Concepts/ Understandings

- Genes are segments of DNA molecules that are passed from parents to their off spring..
- Reproduction is characteristic of living things and is essential for the survival of species.
- Genetic information is passed from generation to generation by DNA; DNA controls the traits of an organism.
- Changes in the DNA of an organism can cause changes in traits, and manipulation of DNA in organisms has led to genetically modified organisms.
- DNA is a blueprint for the cells in an organism and without DNA, an organism's traits would never form.

Performance

- Diagram how hereditary information is passed from parents to offspring through DNA (using Punnett squares)
- Illustrate that every gene has at least two alleles demonstrating that one gene is typically dominant and the other is recessive, but not ignoring the fact that organisms may have an incomplete dominant allele or co-allele as well.
- Predict the outcome of crossing organisms using mathematical probability

New Vocabulary

Cell division, chromosome, cell cycle, interphase, asexual and sexual reproductions, sex cells, meiosis,, diploid, haploid, fertilization, zygote, embryo, cell differentiation, Traits, heredity, genetics, true-breeding plants, cross-pollination, gene, alleles, dominant and recessive alleles, phenotype, genotype, DNA replicator, base sequence, protein synthesis, mutation genetic disorder, selective breeding, genetic engineering, DNA fingerprinting, genome, mitochondria DNA

Assessments

Pre-assessment
Post assessment
Readorium
Lab work
Homework
Notebook and Journal Entries
Performance Assessments
Reading/Writing Prompts
Student Observation
Unit Assessments

Chapter 10

Summary

10.1 Students describe the function of cell division and mitosis. Students differentiate between prokaryotic and eukaryotic cells. They observe the cell cycle and identify the different stages. Students compare and contrast the stages of the cell cycle, and explain what happens to chromosome during cell division.
10.2 Students differentiate between asexual and sexual reproduction and describe the process of meiosis. They explain what happens during fertilization and cell differentiation and specialized cells.

Core Concepts/ Understandings

- Organisms grow and develop
- Major function of cell division and mitosis is to produce exact replicas
- Chromosomes are strands of genetic material made of DNA
- Important characteristic of living organisms is ability to reproduce (asexual and sexual)
- Longest stage of cell division is interphase
- Shortest stage is cytokinesis (end result is w daughter cells (chromotids)
- Chromosomes are not visible before mitosis

Focus Questions

- How do cells make exact copies of themselves?
- How do organisms reproduce to make similar organisms?

New Vocabulary

Cell division, chromosome, cell cycle, interphase asexual and sexual reproductions, sex cells, meiosis,, diploid, haploid, fertilization, zygote, embryo, cell differentiation

Teacher Preparations	Body of Evidence	Time Frame
-Prepare materials for the week -Administer pre-assessment for chapter 10 -Read: "Motivate", "Explore", "Explain", "Extend", and "Assess" Complete Investigations: *10A Observing the Cell cycle and 10B Modeling Mitosis and Meiosis* *-End of chapter 10- administer post assessment* Scores sent to District	• Notebook Investigation Entries • Lab 10A • Lab 10B • My Journal Entries: pg. 196 • Review Questions • Journal Entries • Readorium / Informational Text • Student Observations • Homework • Individual work • Chapter 10 Assessments: pretest (entered but no grade) • Post test	5 sessions 1 session = 80 minutes

Homework /Center Activities /Extra Practice

- Readorium
- Chapter Connection pg.208
- Chapter Activity pg. 210
- Skill Sheets
- Section Review 10.1, 10.2

Culminating project: Cell Division Flip Book pg. 212

Chapter 11

Summary

11.1 Students will explore and explain how traits are inherited. They will describe Mendel's experiment and its results. They will differentiate between phenotype and genotype.
11.2 Students will explain how Mendel's work is used to predict heredity. They will demonstrate how to complete and interpret Punnett squares. Students will describe the relationship between Punnett squares and probability.
11.3 Students will describe the importance of sex chromosomes. They will compare and contrast incomplete dominance and co- dominance. Students explain how environmental factors influence inheritance.

Core Concepts/ Understanding

- Reproduction is characteristic of living things and is essential for the survival of species.
- Genetic information is passed from generation to generation by DNA; DNA controls the traits of an organism.
- Changes in the DNA of an organism can cause changes in traits, and manipulation of DNA in organisms has led to genetically modified organisms.

Focus Questions

- What is "genetics" and who was Gregor Mendel?
- How are traits passed from one generation to the next?
- How can you predict the traits of the next generation?

New Vocabulary

Traits, heredity, genetics, true-breeding plants, cross-pollination, gene, alleles, dominant and recessive alleles, phenotype, genotype

Teacher Preparations	Body of Evidence	Time Frame
-Prepare materials for the week -Administer pre-assessment for chapter 11 -Read: "Motivate", "Explore", "Explain", "Extend", and "Assess" Review Investigations: *PTC (phenylthiocarbamide) & Crazy Traits* *-Administer post assessment Ch. 11* Scores sent to District	• Notebook Investigation Entries • Lab 11A • Lab 11B • My Journal Entries: pg. 228 • Review Questions • Journal Entries • Readorium / Informational Text • Student Observations • Homework • Individual work • Chapter 11 Assessments: pretest (entered but no grade) • Post test	7 sessions

Homework /Center Activities /Extra Practice

- Readorium
- Chapter "Challenges" pgs. 220, 229
- Chapter Connection pg.230
- Chapter "Solve It": pgs. 220, 223, 225
- Chapter Activity pg. 232
- Skill Sheets
- Section Review 11.1, 11.2, 11.3

Culminating Project: Punnett Squares pg. 236

Chapter 12

Summary

12.1 Students identify the structure and function of the DNA molecule. They describe the process of DNA replication and explain mutations and their results.

12.2 Students compare and contrast selective breeding and genetic engineering. They explore DNA fingerprinting and the use in solving crimes. Students describe the different DNA technologies.

Core Concepts/ Understandings

- Important uses of DNA technology and fingerprinting
- Structure of DNA molecule

Focus Questions

- What is DNA and what does it do?
- What is a genetic disorder?
- How is DNA used in the latest technologies?

New Vocabulary

DNA replicator, base sequence, protein synthesis, mutation genetic disorder, selective breeding, genetic engineering, DNA fingerprinting, genome, mitochondria DNA

Teacher Preparations	Body of Evidence	Time Frame
-Prepare materials for the week -Administer pre-assessment for chapter 12 -Read: "Motivate", "Explore", "Explain", "Extend", and "Assess" Review Investigations: *Diffusion and Osmosis, Photosynthesis and Color* *-Administer post assessment* Scores sent to District Data to be recorded in Genesis	• Notebook Investigation Entries • Lab 12A • Lab 12B • My Journal Entries: pgs. 238, 244 • Review Questions • Journal Entries • Readorium / Informational Text • Student Observations • Homework • Individual work • Chapter 12 Assessments: pretest (entered but no grade) • Post test	5 sessions

Homework /Center Activities /Extra Practice

• Readorium • Chapter "Challenges" pg. 244 • Chapter Connection pg. 250 • Chapter Activity pg. 252	• Skill Sheets • Section Review 12.1, 12.2

Culminating Project: Genetic Disorder Brochure pg. 255

My Journal

Chapter 10

10.1 1. How do cells make exact copies of themselves? 2. How do organisms reproduce to make similar organisms?

Chapter 11

11.3 Can you think of other environmental influences on your traits? Make a list of as many influences as you can think of.

Chapter 12

12.1 DNA is in the news almost every day. Find an article in a newspaper, magazine, or on the Internet that mentions DNA. Write a reflection about the article. How does the article make you feel about studying DNA?

12.2 There is much debate on the topic of genetic engineering. What are the potential advantages and disadvantages of genetic engineering?

Overview of Body of Evidence

This guide is intended to support the collection of Body of Evidence Opportunities. A student's Body of Evidence should, at a minimum, include work from in-class investigations that demonstrate a student's level of proficiency, data from Readorium, journals, the pre-assessment given at the beginning of the unit or/ and each chapter, the I-checks, and post assessments.

Resources:

Content books

Websites:

*United streaming:

http://www.discoveryeducation.com//?ref=streaming&returnUrl=http%3A%2F%2Fstreaming%2Ediscoveryeducation%2Ecom%2Findex%2Ecfm

*Readorium