MYP/3D Science Unit Planner

Marietta City Schools

Grade & Course: 10th Grade Biology	**Topic:** Cellular Reproduction: The Cell Cycle, Mitosis, and Meiosis	**Duration:** 4 weeks
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Georgia Standards of Excellence for Biology:

SB1. Obtain, evaluate, and communicate information to analyze the nature of the relationships between structures and functions in living cells.

b. Develop and use models to explain the role of cellular reproduction (including binary fission, mitosis, and meiosis) in maintaining genetic continuity.*

SB2. Obtain, evaluate, and communicate information to analyze how genetic information is expressed in cells.

a. Construct an explanation of how the structures of DNA and RNA lead to the expression of information within the cell ~~via the processes of replication, transcription, and translation.~~ *

b. Construct an argument based on evidence to support the claim that inheritable genetic variations may result from: new genetic combinations through meiosis (crossing over, nondisjunction); non-lethal errors occurring during replication (insertions, deletions, substitutions); and/or heritable mutations caused by environmental factors (radiation, chemicals, and viruses).

SB3. Obtain, evaluate, and communicate information to analyze how biological traits are passed on to successive generations.

c. Construct an argument to support a claim about the relative advantages and disadvantages of sexual and asexual reproduction.

Narrative / Background Information

Prior Student Knowledge: (REFLECTION – PRIOR TO TEACHING THE UNIT)

Georgia Standards of Excellence for 7th Science:

S7L3. Obtain, evaluate, and communicate information to explain how organisms reproduce either sexually or asexually and transfer genetic information to determine the traits of their offspring.

a. Construct an explanation supported with scientific evidence of the role of genes and chromosomes in the process of inheriting a specific trait.

b. Develop and use a model to describe how asexual reproduction can result in offspring with identical genetic information while sexual reproduction results in genetic variation.

Year-Long Anchoring Phenomena: (LEARNING PROCESS)

Sickle cell is a heritable genetic mutation that evolved in response to interactions in ecosystems.

Unit Phenomena (LEARNING PROCESS)

Cancer

MYP Inquiry Statement:

Models help us visualize the relationship between the structures and functions that shape identity.

MYP Global Context:

Identities & Relationships

Related Concept:

Models, Patterns

Key Concept:

Relationships,Development, Identity

Approaches to Learning Skills:	**Disciplinary Core Ideas: (KNOWLEDGE & SKILLS)**	**Crosscutting Concepts: (KNOWLEDGE & SKILLS)**
Thinking Skills Communication Skills	Events of the cell cycle Mitosis & Cytokinesis Asexual Reproduction / Binary Fission Cancer Benefits of sexual reproduction Meiosis I and II Crossing over / variation and continuity Nondisjunction and chromosomal abnormalities	Structure & Function Cause & Effect System & System Models

GADOE Achievement Level Descriptors for Biology

Disciplinary Core Content: Events of the cell cycle, Mitosis & Cytokinesis, Asexual Reproduction / Binary Fission, Cancer, Benefits of sexual reproduction, Meiosis I and II, Crossing over / variation and continuity, Nondisjunction and chromosomal abnormalities
Focus Science & Engineering Practices: developing and using models; constructing explanations, engaging in argument from evidence
Focus Crosscutting Concepts: cause and effect, structure and function, system & system models

The beginning learner can…	**The developing learner can…**	**The proficient learner can…**	**The distinguished learner can…**
• recognize the role of cellular reproduction in maintaining genetic continuity; • identify features in the structures of DNA and; • communicate that there are advantages and disadvantages of sexual and asexual reproduction;	• recognize models used to explain the role of cellular reproduction in maintaining genetic continuity; • provide examples of inheritable genetic variations that may result from new genetic combinations through meiosis; • describe the advantages and disadvantages of sexual and asexual reproduction; • determine how models can be used to explain patterns of inheritance;	• develop and use models to explain the role of cellular reproduction (meiosis) in maintaining genetic continuity; • develop and use models to explain the role of cellular reproduction (i.e., binary fission and mitosis) in maintaining genetic continuity; • construct an argument to support a claim about the relative advantages and disadvantages of sexual and asexual reproduction;	• refine models to explain the role of cellular reproduction (mitosis) in maintaining genetic continuity; • refine an argument to support a claim about the relative advantages and disadvantages of sexual and asexual reproduction; • refine models to explain the role of cellular reproduction (meiosis) in maintaining genetic continuity; • analyze an argument based on evidence to support the claim that inheritable genetic variations may result from new genetic combinations through meiosis;

Student-Friendly Learning Targets

- I can recognize the role of cellular reproduction in maintaining genetic continuity.
- I can recognize models used to explain the role of cellular reproduction in maintaining genetic continuity.
- I can describe reasons for cell division (growth, reproduction, renewal).
- I can describe the events of the somatic cell cycle, including important events in each phase (G1, S, G2, and Mitosis).
- I can model the events of the somatic cell cycle, including important events in each phase (G1, S, G2, and Mitosis).
- I can define mitosis.
- I can define binary fission.
- I can explain the role of mitosis in maintaining genetic continuity.
- I can explain the role of binary fission in maintaining genetic continuity.
- I can compare and contrast mitosis and binary fission.
- I can model mitosis (beginning and end stages).
- I can model binary fission.
- I can refine models to explain the role of cellular reproduction in maintaining genetic continuity.
- I can define cancer.
- I can explain that cancer is uncontrolled cell division.
- I can discuss possible causes of cancer in humans.
- I can define sexual reproduction.
- I can define asexual reproduction.
- I can communicate that there are advantages and disadvantages of sexual and asexual reproduction.
- I can describe the advantages and disadvantages of sexual and asexual reproduction.
- I can compare and contrast sexual and asexual reproduction.
- I can construct an argument to support a claim about the relative advantages and disadvantages of sexual and asexual reproduction.
- I can refine an argument to support a claim about the relative advantages and disadvantages of sexual and asexual reproduction.
- I can appropriately use key terms such as chromosome, chromatid, recombinant chromosome, gamete, sex cell, somatic cell, meiosis, crossing over, hereditary, diploid, haploid, fertilization, nondisjunction, monosomy, trisomy.
- I can compare and contrast mitosis and meiosis.
- I can develop and use models to explain the role of cellular reproduction (meiosis) in maintaining genetic continuity.
- I can explain how events in meiosis, including crossing over and nondisjunction, may increase genetic variation.
- I can use evidence to support an argument about how events in meiosis, including crossing over and nondisjunction, can increase genetic variation.
- I can differentiate between Meiosis I and Meiosis II.

Possible Preconceptions/Misconceptions: (REFLECTION – PRIOR TO TEACHING THE UNIT)

Students may have preconceptions that all organisms reproduce the same way, or that sexually reproducing organisms do not maintain genetic continuity due to variation in offspring. They may also believe that all organisms that sexually reproduce will always sexually reproduce, and that there is no benefit to asexual reproduction.

Key Vocabulary:

cell cycle, cell division, mitosis, nucleus, chromosome, centriole, centromere, spindle fiber, sister chromatids, daughter cells, parent cell, cancer, carcinogen, binary fission, bacteria, sexual reproduction, asexual reproduction, homologous chromosome, meiosis I, meiosis II, parent cell, replicated chromosome, unreplicated chromosome, sister chromatids, spindle fibers, chromosomal mutation, crossing over, genetic variation, karyotype, nondisjunction, recombinant DNA, trisomy, genetic continuity, genome

Inquiry Statements:

Factual:

What type of reproduction results in genetic variation? What type of reproduction is an advantage when you need to increase the population numbers quickly? What type of reproduction involves genetic material from two parents? What type of reproduction involves genetic material from only one parent? How are DNA and RNA similar and different? What is cancer?

Conceptual:

What are the disadvantages and advantages of asexual reproduction? What are the disadvantages and advantages of sexual reproduction? How do mitosis and binary fission ensure continuity of genetic information? What can cause cancer?

Debatable:
Do environmental or genetic factors cause mutations that result in more diversity in a population?

Unit Objectives: Understand the role of cells and division in maintaining genetic continuity.			
Assessments: Formative & Summative			
Common Formative Assessment or MYP Essay Common Summative Assessment or MYP Essay			
Learning Activities and Experiences	**Inquiry & Obtain: (LEARNING PROCESS)**	**Evaluate: (LEARNING PROCESS)**	**Communicate: (LEARNING PROCESS)**
Weeks 1 & 2: **Topic 1: Mitosis & Asexual Reproduction** - events of the cell cycle - mitosis (basic - not memorization of stages) - asexual reproduction /binary fission **Topic 2: Cancer** - What is cancer? - What can cause cancer?	Common Openers & Closers for Unit 3A PPT Cell Growth & Division (Honors) Cell Cycle Notes (On Level)	Introduction to the Cell Cycle Exploration Model & Explain the Cell Cycle & Mitosis Partners Activity Webbed Feet Phenomenon Exploration Who Killed Yew Murder & Mitosis Case Study Driving Questions for Cell Cycle, Mitosis and Binary Fission Cell Cycle And Cancer Click and Learn https://docs.google.com/document/d/1GVBPrXiDycJOp6UgBSDd1WElBda6Xgf8PU8bmK4ieUk/edit?usp=sharing Mitosis Modeling https://docs.google.com/document/d/1DhuNahrpgBLxqdhdxq_U2tFMj0T3m_kKvU_w8WRHYbc/edit?usp=sharing	Unit 3A Study Guide Common Formative Assessment or MYP Essay Cell Cycle Model Project and Project Rubric

Week 3 & 4: - Topic 3: Advantages & Disadvantages of Sexual and Asexual Reproduction - Chromosomal Abnormalities	Common Openers & Closers for Patterns of Heredity Unit Meiosis & Patterns of Heredity PPT (Honors) Meiosis PPT (On-Level) Patterns of Heredity PPT (On-Level) -	Meiosis Exploration Meiosis Modeling Activity Mitosis v Meiosis Graphic Organizer Mitosis v Meiosis Review	Common Formative Assessment or MYP Essay Common Summative Assessment Remediation on CSA

Resources (hyperlink to model lessons and/or resources):
All Common Learning Experiences are located on the teachers' Schoology Page.

Reflection: Considering the planning, process and impact of the inquiry

Prior to Teaching	During Teaching	After Teaching
Students generally have significant misconceptions or misunderstandings regarding the theory of evolution.		