

MYP/3D Science Unit Planner

Marietta City Schools

Grade & Course: 10th Grade Biology	Topic: The Cell Cycle: Mitosis, Binary Fission and the Structure and Function of DNA and RNA	Duration: 2.5 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. * 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. <i>*Note: portion of standard with strikethrough addressed during Unit 3B.</i>		
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: Scientific and Technological Innovation Related Concept: Models, Patterns Key Concept: Relationships, Systems		

Approaches to Learning Skills: COMMUNICATION: Communication Skills SOCIAL: Collaboration Skills	Disciplinary Core Ideas: (KNOWLEDGE & SKILLS) Asexual Reproduction (binary fission, mitosis) The Cell Cycle & Cancer DNA Structure & Function RNA Structure & Function Advantages & Disadvantages of Asexual Reproduction Advantages & Disadvantages of Sexual Reproduction -	Crosscutting Concepts: (KNOWLEDGE & SKILLS) Structure & Function Cause & Effect
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[GADOE Achievement Level Descriptors for Biology](#)

Disciplinary Core Content: the cell cycle, cancer, mitosis, structure of DNA, Structure of RNA, function of DNA, function of RNA, advantages of asexual reproduction, advantages of sexual reproduction, disadvantages of asexual reproduction, disadvantages of sexual reproduction.

Focus Science & Engineering Practices: developing and using models; constructing explanations, engaging in argument from evidence

Focus Crosscutting Concepts: cause and effect, structure and function

The beginning learner can... <ul style="list-style-type: none"> 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; 	The developing learner can... <ul style="list-style-type: none"> recognize models used to explain the role of cellular reproduction in maintaining genetic continuity; recognize that the structures of DNA and RNA lead to the expression of information within the cell describe the advantages and disadvantages of sexual and asexual reproduction; 	The proficient learner can... <ul style="list-style-type: none"> develop and use models to explain the role of cellular reproduction (i.e., binary fission and mitosis) in maintaining genetic continuity; construct an explanation of how the structures of DNA and RNA lead to the expression of information within the cell construct an argument to support a claim about the relative advantages and disadvantages of sexual and asexual reproduction; 	The distinguished learner can... <ul style="list-style-type: none"> refine models to explain the role of cellular reproduction in maintaining genetic continuity; refine an explanation of how the structures of DNA and RNA lead to the expression of information within the cell refine an argument to support a claim about the relative advantages and disadvantages of sexual and asexual reproduction;
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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 identify features in the structures of DNA and RNA.
- I can compare and contrast DNA and RNA in terms of function, type of sugar molecule, types of nitrogenous bases, shape of polymer.
- I can recognize that the structures of DNA and RNA lead to the expression of information within the cell.
- I can state the function of DNA and RNA in maintaining genetic continuity.
- I can construct an explanation of how the structures of DNA and RNA lead to the expression of information within the cell.
- I can refine an explanation of how the structures of DNA and RNA lead to the expression of information within the cell. **Honors for this unit, Other classes in the next Unit

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, nucleic acid, nucleotide base pair, DNA, double helix, RNA, 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 <ul style="list-style-type: none"> - events of the cell cycle - mitosis (basic - not memorization of stages) - asexual reproduction /binary fission Topic 2: Cancer <ul style="list-style-type: none"> - 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	Unit 3A Study Guide Common Formative Assessment or MYP Essay Cell Cycle Model Project and Project Rubric
Week 2 & 2.5: Topic 3: Introduction to DNA & RNA (Structure/Function) <ul style="list-style-type: none"> - basic structure of DNA - basic function of DNA - basic structure of RNA - basic function of RNA 	PPT Structure & Function of DNA/RNA (Honors) DNA & RNA Notes On Level)	DNA/RNA Reading & Modeling Strawberry DNA Extraction Lab and DNA Extraction Lab PPT	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.		