Unit 05: DNA and Cellular Cycles

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **FY**
Status: **Published**

Standards Alignment

New Jersey Student Learning Standards

LS1: From Molecules to Organisms: Structures and Processes
LS1.A: Structure and Function

All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1)(secondary to HS-LS3-1)

LS1.C: Organization for Matter and Energy Flow in Organisms

The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (suchas proteins or DNA), used for example to form new cells. (HS-LS1-6)

LS3: Heredity: Inheritance and Variation of Traits
LS3.A: Inheritance of Traits

Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used(expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory orstructural functions, and some have no as-yet known function. (HS-LS3-1)

LS3.B: Variation of Traits

In sexual reproduction, chromosomes can sometimes swap sectionsduring the process of meiosis (cell division), thereby creating new geneticcombinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmentalfactors can also cause mutations in genes, and viable mutations areinherited. (HS-LS3-2)

LA.K-12.NJSLSA.R3	Analyze how and why individuals, events, and ideas develop and interact over the course of a text.
LA.K-12.NJSLSA.R5	Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.
LA.RST.9-10	Reading Science and Technical Subjects
LA.RST.9-10.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LA.RST.9-10.5	Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).

SCI.1.LS1.A	Structure and Function
SCI.1.LS3.B	Variation of Traits
SCI.5.LS1.C	Organization for Matter and Energy Flow in Organisms
1-LS1	From Molecules to Organisms: Structures and Processes
1-LS3	Heredity: Inheritance and Variation of Traits
1-LS3-1.LS3.A	Inheritance of Traits

Integration of Career Readiness, Life Literacies and Key Skills

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

Technology / Integration of Computer Science and Design Thinking

Interdisciplinary Connections: NJSLS for ELA, Social Studies, Science and/or Math Section

Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media LiteracyNew Section

see Crosswalks

21st Century Life and Careers

Stage I: Desired Results

Transfer/Overview/Rationale

Transfer / Overview / Rationale
Unit Rationale The purpose of this unit…

Meaning

Essential Questions

Essential Questions

- What is the role of DNA in a eukaryotic cell?
- What is the relationship between DNA and chromosomes?
- Why do eukaryotic cells reproduce through the process of mitosis?
- Describe the stages of the cell cycle
- Why is it important to regulate the stages of the cell cycle?
- What is the relationship between caner and the cell cycle?

Enduring Understanding/Indicators of Understanding

Enduring Understanding/Indicators of Understanding

Students will understand that:

- DNA is the genetic material that is found in the nucleus

- The DNA coils tightly and neatly to form chromosomes
- Eukaryotic cells reproduce by mitosis
- The stages of the cell cycle
- The cell regulates its stages of the cell cycle
- Cancer results from uncontrolled cell division

Acquisition (Student Learning Objectives)

Knowledge

Knowledge

Students will know…

- DNA, which is found in the nucleus, is the bodies blueprints to code for all of our traits
- During cell division in eukaryotic cells, the DNA coils tightly to form the chromosomes
- Eukaryotic cells reproduce through the process of mitosis
- The stages of the cell cycle: interphase, mitosis and cytokinesis
- The cell must regulate the stages of the cell cycle
- Cancer results from no longer having control of the timing of the cell cycle

Skills

Skills

Student will be skilled at …

- Explain what DNA is
- Describe the relationship between DNA and chromosomes
- Explain how eukaryotic cells reproduce
- List and describe the steps of mitosis
- Explain why its important for cells to be able to regulate the cell cycle
- Explain how cancer results from the inability to control the cell cycle

Stage 3: Learning Plan

Resource and Mentor Texts

Resources and Mentor Texts

- Glencoe Biology Textbook
- Powerpoints on lectures and exit slips
- Lab materials
- Worksheets
- Tests and quizzes

Formative Assessment Strategies

Formative Assessment Strategies

exit slips

tests/quizzes

lab assessments

lab write-ups

worksheets

quick thoughts

class discussion

writing assignments

Learning Activities/Unit of Study

Learning Activities/Unit of Study

DNA

1 - An introduction to DNA lecture and exit slip

2 - An introduction to DNA lecture and exit slip

3 - DNA structure worksheet

4 - DNA cut and paste

5 - DNA cut and paste

6 - The history of DNA lecture and exit slip

7 - The function of DNA lecture and exit slip

8 - DNA quiz

9 - DNA extraction lab

10 - DNA replication lecture and exit slip

11 - DNA replication lecture and exit slip

13 - DNA replication vocabulary exercise

Cell Cycle

14 - cell cycle lecture and exit slip

15 - cell cycle lecture and exit slip

16 - cell cycle foldable

17 - cell cycle foldable

18 - mitosis lecture

19 - mitosis lecture

20 - mitosis powerpoint identification lab

21 - mitosis microscope identification lab

22 - cell cycle quiz

Regulating the cell cycle

23 - regulating the cell cycle lecture and exit slip

24 - regulating the cell cycle lecture and exit slip

25 - cancer reading activity

Assessment

26 - cell cycle and DNA review

27 - cell cycle and DNA bingo

28 - cell cycle and DNA benchmark

- Lecture and exit slips
- Mitosis identification lab
- Mitosis identification quiz
- Quizzes and benchmark
- Cell cycle foldable
- Homework
- Vocabulary
- Directed Reading

Modifications and/or Accommodations

Suggested Modifications (ELL, Sp. Ed, GIfted, At-risk of Failure)

English Language Learners

Native language support: The teacher provides auditory or written content to students in their native language.

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

Special Education Students

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how much time they have to complete an assignment.

Students with 504 Plans

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Gifted & Talented Strategies

Extensions/Enrichments: Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

Modify/Change Activities: Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

Students at Risk of School Failure

Directions or Instructions: Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

Peer Support: Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

Alternate or Modified Assignments: Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just may be that you will need to assign an alternate assignment.

Increase One to One Time: When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

Contracts: It helps to have a working contract between you and your students at risk. This helps prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

Hands On: As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

Tests/Assessments: Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

Seating: Seat students near a helping peer or with quick access to the teacher. Those with hearing

or sight issues need to be close to the instruction which often means near the front.