Big Idea 3

Content Area: **Template**
Course(s):
Time Period:
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Status: **Published**

State Mandated Topics Addressed in this Unit

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N/A	N/A

Big idea 3: Living systems store, retrieve, transmit and respond to information essential to life processes

Learning Objectives

- 3.A Heritable information provides for continuity of life
- 3.B Expression of genetic information involves cellular and molecular mechanisms
- 3.B.1 Gene regulation results in differential gene expression, leading to cell specialization LO 3.18 The student is able to describe the connection between the regulation of gene expression and observed differences between different kinds of organisms [SP 7]
- 3.C The processing of genetic information is imperfect and is a source of genetic variation
- 3.D Cells communicate by generating, transmitting, and receiving chemical signals
- 3.E – Transmission of information results in changes within and between biological systems
- LO 3. 45 The student is able to describe how nervous systems transmit information. [SP 1]
- LO 3.1 The student is able to construct scientific explanations that use the structures and mechanisms of DNA and RNA to support the claim that DNA and, in some cases, that RNA are the primary sources of heritable information. [SP 6]
- LO 3.10 The student is able to represent the connection between meiosis and increased genetic diversity necessary for evolution [SP 7]
- LO 3.11 data sets to support the claim that heritable information is passed from one generation to another generation through mitosis, or meiosis followed by fertilization. [SP 5]
- LO 3.12 The student is able to construct a representation that connects the process of meiosis to the passage of traits from parent to offspring. [SP 1, 7]
- LO 3.13 The student is able to pose questions about ethical, social or medical issues surrounding human genetic disorders. [SP 3]
- LO 3.14 The student is able to apply mathematical routines to determine Mendelian patterns of inheritance provided by data sets. [SP 2]
- LO 3.15 the student is able to explain deviations from Mendel's model of the inheritance of traits [SP 6]

- LO 3.16 the student is able to explain how the inheritance patterns of many traits cannot be accounted for by Mendelian genetics. [SP 6]
- LO 3.17 The student is able to describe representations of an appropriate example of inheritance patterns that cannot be explained by Mendel's model of the inheritance of traits. [SP 1]
- LO 3.19 The student is able to describe the connection between the regulation of gene expression and observed differences between individuals in a population [SP 7]
- LO 3.2 The student is able to justify the selection of data from historical investigations that support the claim that DNA is the source of heritable information [SP 4]
- LO 3.20 The student is able to explain how the regulation of gene expression is essential for the processes and structures that support efficient cell function. [SP 6]
- LO 3.21 The student can use representations to describe how gene regulation influences cell products and function. [SP 1]
- LO 3.22 The student is able to explain how signal pathways mediate gene expression, including how this process can affect protein production. [SP 6]
- LO 3.23 The student can use representations to describe mechanisms of the regulation of gene expression. [SP 1]
- LO 3.24 The student is able to predict how a change in genotype, when expressed as a phenotype, provides a variation that can be subject to natural selection [SP 6, 7]
- LO 3.25 The student can create a visual representation to illustrate how changes in a DNA nucleotide sequence can result in a change in the polypeptide produced. [SP 1]
- LO 3.26 The student is able to explain the connection between genetic variations in organisms and phenotypic variations in populations [SP 7]
- LO 3.27 The student is able to compare and contrast processes by which genetic variation is produced and maintained in organisms from multiple domains [SP 7]
- LO 3.28 The student is able to construct an explanation of the multiple processes that increase variation within a population. [SP 6]
- LO 3.29 The student is able to construct an explanation of how viruses introduce genetic variation in host organisms. [SP 6]
- LO 3.3 The student is able to describe representations and models that illustrate how genetic information is copied for transmission between generations [SP 1]
- LO 3.30 The student is able to use representations and appropriate models to describe how viral replication introduces genetic variation in the viral population. [SP 1]
- LO 3.31 The student is able to describe basic chemical processes for cell communication shared across evolutionary lines of descent [SP 7]
- LO 3.32 The student is able to describe basic chemical processes for cell communication shared across evolutionary lines of descent [SP 7]
- LO 3.33 The student is able to use representation(s) and appropriate models to describe features of a cell signaling pathway [SP 1]
- LO 3.34 The student is able to construct explanations of cell communication through cell-to-cell direct contact or through chemical signaling [SP 6]
- LO 3.35 The student is able to create representation(s) that depict how cell-to-cell communication occurs by direct contact or from a distance through chemical signaling. [SP 1]
- LO 3.36 The student is able to describe a model that expresses the key elements of signal transduction pathways by which a signal is converted to a cellular response [SP 1]
- LO 3.37 The student is able to describe a model that expresses key elements to show how change in signal transduction can alter cellular response. [SP 6]
- LO 3.38 The student is able to describe a model that expresses key elements to show how change in

signal transduction can alter cellular response. [SP 1]

- LO 3.39 The student is able to construct an explanation of how certain drugs affect signal reception and, consequently, signal transduction pathways [SP 5]
- LO 3.4 The student is able to describe representations and models illustrating how genetic information is translated into polypeptides [SP 1]
- LO 3.40 The student is able to analyze data that indicate how organisms exchange information in response to internal changes and external cues, and which can change behavior. [SP 5]
- LO 3.41 The student is able to create a representation that describes how organisms exchange information in response to internal changes and external cues, and which can result in changes in behavior [SP 1]
- LO 3.42 The student is able to describe how organisms exchange information in response to internal changes or environmental cues. [SP 7]
- LO 3.43 The student is able to construct an explanation, based on scientific theories and models, about how nervous systems detect external and internal signals, transmit and integrate [SP 7]
- LO 3.44 The student is able to describe how nervous systems detect external and internal signals [SP 1]
- LO 3.46 The student is able to describe how the vertebrate brain integrates information to produce a response [SP 1]
- LO 3.47 The student is able to create a visual representation of complex nervous systems to describe/explain how these systems detect external and internal signals, transmit and integrate information, and produce responses. [SP 1]
- LO 3.48 The student is able to create a visual representation to describe how nervous systems detect external and internal signals. [SP 1]
- LO 3.49 The student is able to create a visual representation to describe how nervous systems transmit information [SP 1]
- LO 3.5 The student can justify the claim that humans can manipulate heritable information by identifying at least two commonly used technologies [SP 6]
- LO 3.50 The student is able to create a visual representation to describe how the vertebrate brain integrates information to produce a response [SP 1]
- LO 3.6 The student can predict how a change in a specific DNA or RNA sequence can result in changes in gene expression. [SP 6]
- LO 3.7 The student can make predictions about natural phenomena occurring during the cell cycle [SP 6]
- LO 3.8 The student can describe the events that occur in the cell cycle [SP 1]
- LO 3.9 The student is able to construct an explanation, using visual representations or narratives, as to how DNA in chromosomes is transmitted to the next generation via mitosis, or meiosis followed by fertilization [SP 6]

Essential Skills

- 3. D.1 Cell communication processes share common features that reflect a shared evolutionary history
- 3.A.1 DNA and in some cases RNA, is the primary source of heritable information
- 3.A.2 In eukaryotes, heritable information is passes to the next generation in processes that include the cell cycle and mitosis or meiosis plus fertilization
- 3.A.3 The chromosomal basis of inheritance provides an understanding of the pattern of passage (transmission) of genes from parent to offspring
- 3.A.4. The inheritance pattern of many traits cannot be explained by simple Mendelian genetics

- 3.B.1 Gene regulation results in differential gene expression, leading to cell specialization
- 3.B.2 A variety of intercellular and intracellular signal transmissions mediate gene expression
- 3.C.1 Changes in genotype can result in changes in phenotype
- 3.C.2 Biological systems have multiple processes that increase genetic variation
- 3.C.3 Viral replication results in genetic variation, and viral infection can introduce genetic variation into the hosts
- 3.D. 2 Cells communicate with each other through direct contact with other cells or from ad distance via chemical signaling
- 3.D.3 Signal transduction pathways link signal reception with cellular response
- 3.D.4 Changes in signal transduction pathways can alter cellular response
- 3.E.1 Individuals can act on information and communicate it to others
- 3.E.2 Animals have nervous systems that detect external and internal signals, transmit and integrate information, and produce responses

Standards

Instructional Tasks/Activities

- Activity 1
- Activity 10
- Activity 2
- Activity 3
- Activity 4
- Activity 5
- Activity 6
- Activity 7
- Activity 8
- Activity 9

Assessment Procedure

- Classroom Total Participation Technique
- Classwork
- DBQ
- Essay
- Exit Ticket/Entrance Ticket/Do Now
- Journal / Student Reflection
- Kahoot

- Other named in lesson
- Peer Review
- Performance
- Problem Correction
- Project
- Quiz
- Rubric
- Teacher Collected Data
- Test
- Worksheet

Recommended Technology Activities

- Appropriate Content Specific Online Resource
- Chromebook
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Gimkit
- GoGuardian
- Google Classroom
- Google Docs
- Google Forms
- Google Slides
- Kahoot
- MagicSchool AI
- Other- Specified in Lesson
- Quiziz
- Screencastify

Accommodations & Modifications & Differentiation

Accommodations and Modifications should be used to meet individual needs. Their IEP and 504 plans should be used in addition to the following suggestions.

Gifted and Talented

- Compare & Contrast

- Conferencing
- Debates
- Jigsaw
- Peer Partner Learning
- Problem Solving
- Structured Controversy
- Think, Pair, Share
- Tutorial Groups

Instruction/Materials

- alter format of materials (type/highlight, etc.)
- color code materials
- eliminate answers
- extended time
- extended time
- large print
- modified quiz
- modified test
- Modify Assignments as Needed
- Modify/Repeat/Model directions
- necessary assignments only
- Other (specify in plans)
- other- named in lesson
- provide assistance and cues for transitions
- provide daily assignment list
- read class materials orally
- reduce work load
- shorten assignments
- study guide/outline
- utilize multi-sensory modes to reinforce instruction

Environment

- alter physical room environment
- assign peer tutors/work buddies/note takers
- assign preferential seating
- individualized instruction/small group
- modify student schedule (Describe)

- other- please specify in plans
- provide desktop list/formula

Modifications

1. Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)
2. Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
3. Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures,
illustrations, graphs, charts, data tables, multimedia, modeling).
4. Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple
representation and multimodal experiences).
5. Engage students with a variety of Scientific practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
6. Use project-based science learning to connect science with observable phenomena.
7. Structure the learning around explaining or solving a social or community-based issue.

8. Provide ELL students with multiple literacy strategies.
9. Collaborate with after-school programs or clubs to extend learning opportunities.

Resources

- Campbell Biology Chapters: 1, 13, 14, 15, 16, 17, 19, 20, 21, 23, 25, 27
- Campbell Biology Chapters: 15, 16, 18, 20, 46
- Campbell Biology Chapters: 48, 49, 50, 51, 52, 54
- Campbell Biology Chapters: 5, 6, 12, 13, 14, 15, 16, 17, 19, 20, 28, 38, 46
- Campbell Biology Chapters: 6, 11, 27, 31, 32, 39, 42, 43, 45, 47, 48,