Living Environment Unit 3 – Human Reproduction, Meiosis, and Embryology

Unit Overview: Species transcend individual life spans through reproduction. In this unit, students will learn about the processes of gamete production, fertilization, and development and how these processes follow an orderly sequence of events. Study of human reproduction and development is highlighted.

Essential Questions:
- How do humans pass on their genetic information?
- How do sexually reproducing organisms (parents) produce offspring that resemble but are not identical to the parents?
- Why are the processes of reproduction and development necessary for the continuation of any species?
- What makes meiosis and fertilization the key to sexual reproduction in a variety of organisms?
- What is the difference between meiosis and mitosis?
- How does an entire human grow and develop from a single cell?
- What are the factors that influence human reproduction and development?
- How are the specialized structures in human female and male reproductive systems (as in other mammals) designed to support fertilization and embryonic/fetal development?
- What are factors that impact human fetal development?

MST Standard 4 – Science
Key Idea 2: Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.
Key Idea 4: The continuity of life is sustained through reproduction and development.

New York State Science Learning Standard Performance Expectation
HS-LS3-2: Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, (3) mutations caused by environmental factors and/or (4) genetic engineering.
HS-LS1-8: Use models to illustrate how human reproduction and development maintains continuity of life.
Fetal Development:
Students will be able to explain how the mother and fetus affect each other’s health.

Meiosis:
Students will be able to describe how haploid cells develop into mature gametes; compare autosomes to sex chromosomes; body cells to sex cells; and mitosis to meiosis.

Reproductive Anatomy:
Students will be able to describe the structure and function of the male and female reproductive systems.

Reproductive Processes:
Students will be able to explain the role of hormones in the reproductive process.

Meiosis:
Students will be able to compare autosomes to sex chromosomes; and mitosis to meiosis.

Meiosis:
Students will be able to describe the structure and replication of genetic material result in offspring that resemble their parents.

Meiosis:
In sexually reproducing organisms, the new individual receives half of the genetic information from its mother (via the egg) and half from its father (via the sperm). Sexually produced offspring often resemble but are not identical to, either of their parents.

Meiosis:
– Explain how organisms, including humans, reproduce their own kind.

Meiosis:
– Reproduction and development are necessary for the continuation of any species.

Meiosis:
– The processes of meiosis and fertilization are key to sexual reproduction in a wide variety of organisms. The process of meiosis results in the production of eggs and sperm which each contain half of the genetic information. During fertilization, gametes unite to form a zygote, which contains the complete genetic information for the offspring.

Meiosis:
– Zygote may divide by mitosis and differentiate to form the specialized cells, tissues, and organs of multicellular organisms.

Meiosis:
– Human reproduction and development are influenced by factors such as gene expression, hormones, and the environment. The reproductive cycle in both males and females is regulated by hormones such as testosterone, estrogen, and progesterone.

Meiosis:
– The structures and functions of the human female reproductive system, as in almost all other mammals, are designed to produce gametes in ovaries, allow for internal fertilization, support

Meiosis:
– Environmental factors can cause mutations in genes. Only mutations in sex cells can be inherited.

Meiosis:
– Advances in biotechnology have allowed organisms to be modified genetically.

Meiosis:
– Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus, the variation and distribution of traits observed depends on both genetic and environmental factors.

Meiosis:
– The structures and functions of the human female reproductive system produce gametes in ovaries, allow for internal fertilization, support

Meiosis:
– In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations 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.

Meiosis:
– Environmental factors can affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus, the variation and distribution of traits observed depends on both genetic and environmental factors.

Meiosis:
– The structures and functions of the human female reproductive system produce gametes in ovaries, allow for internal fertilization, support

Meiosis:
– gamete
– homologous chromosome
– autosome
– sex chromosome
– somatic cell
– sexual reproduction
– fertilization
– diploid
– haploid
– meiosis
– sperm
– egg
– polar body
– reproductive system
– puberty
– ovary
– ovum
– uterus
– estrogen
– fallopian tube
– testis
– testosterone
– scrotum
– epididymis
– vas deferens
– semen
– blastocyte
– embryo
– amniotic sac
– placenta
– umbilical cord
– fetus

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<thead>
<tr>
<th>4.1g</th>
<th>4.1h</th>
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<tbody>
<tr>
<td>Fertilization, support the internal development of the embryo and fetus in the uterus, and provide essential materials through the placenta, and nutrition through milk for the newborn.</td>
<td>The structures and functions of the human male reproductive systems, as in other mammals are designed to produce gametes in testes and make possible the delivery of these gametes for fertilization.</td>
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<td>In humans, the embryonic development of essential organs occurs in early stages of pregnancy. The embryo may encounter risks from faults in its genes and from its mother’s exposure to environmental factors such as inadequate diet, use of alcohol/drugs/tobacco, other toxins, or infections throughout her pregnancy.</td>
<td>The continuity of life is sustained through reproduction and development. Human development, birth, and aging should be viewed as a predictable pattern of events influenced by factors such as gene expression, hormones, and the environment.</td>
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### Resources

- **http://ngss.nsta.org/Classroom-Resources.aspx** - Searchable NYSSLS/NGSS aligned resources curated by NSTA
- **Buffalo Public Schools Science Department LE Webpage** – BPS Living Environment curriculum resource hub
- **BPS Science Department Recommended Virtual Labs** – Virtual lab resources with embedded links to virtual labs and student sheets. Must be logged into BPS google document account through BPS Gmail account to access.
- **NYS Regents Living Environment Exams 2010-2020** – NYSED’s Office of State Assessment webpage for released Regents Living Environment Examinations
- **NYS MST Science Learning Standards Living Environment** – Current NYS Living Environment Standards
- **NYS P-12 Science Learning Standards (HS)** – NYSSLS High School Standards for Living Environment
- **NYSED Bilingual Glossaries** – NYS Statewide Language Regional Bilingual Education Resource for NYSED approved bilingual glossaries.

### English Language Learners (ELL) Enhancements

- **To access hyperlinked material, you must be logged into your BPS Google Drive**

### English Language Learners (ELL) Enhancements

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<tr>
<th>Listening</th>
<th>Speaking</th>
<th>Reading</th>
<th>Writing</th>
<th>Instructional Accommodations (depending on the student’s needs)</th>
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</thead>
<tbody>
<tr>
<td>- Translanguaging - Use of their entire linguistic repertoire. Have things translated into their language (if student can read in their home language)</td>
<td>- <strong>Sentence Frames</strong> - to begin a sentence - such as Evolution is… or I think that evolution is…</td>
<td>- <strong>Sentence Frames</strong> - to begin a sentence - such as Biodiversity is… or An example of competition is….</td>
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<td>- <strong>Extended time</strong> for tests in class, projects and assignments</td>
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<td>- <strong>Build background knowledge</strong></td>
<td>- <strong>Academic Conversation Starters:</strong> Have a visual of a list of academic sentence starters that students can refer to in a discussion. Examples include - I expect ____ to happen. My data shows that… This helps students have a more science focused dialogue.</td>
<td>- <strong>Visual Aids</strong> - Pictures or models to support vocabulary words and concepts</td>
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<td>- <strong>Directions read.</strong> Broken down as necessary</td>
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<td>- <strong>Visuals</strong> - GIFs, pictures- will assist students in understanding what they are listening to</td>
<td>- <strong>Choral Reading</strong> - To build fluency, self-confidence and motivation with reading/speaking</td>
<td>- <strong>Video to review or introduce a topic - use closed captioning</strong> to help students read along while they listen to the content</td>
<td>- <strong>Choral Reading</strong> - To build fluency, self-confidence and motivation with reading/speaking</td>
<td>- <strong>Model</strong> how to complete the activity in the lesson</td>
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<td>- Video to review or introduce a topic - use closed captioning to help students see the words and pronunciations while they listen to the content</td>
<td>- <strong>Word stretching / Vowel stretching</strong> when instructing allows student to listen closely to the pronunciation of the word</td>
<td>- <strong>Video to review or introduce a topic - use closed captioning</strong> to help students read along while they listen to the content</td>
<td>- <strong>Cloze passages</strong> with word banks</td>
<td>- <strong>Oral simplification</strong> of directions or questions</td>
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<td>- <strong>Word stretching / Vowel stretching</strong> when instructing allows student to listen closely to the pronunciation of the word</td>
<td>- <strong>Sentence Frames</strong> - to begin a sentence - such as Evolution is… or I think that evolution is…</td>
<td>- <strong>Word banks</strong></td>
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<td>- <strong>Translated version</strong> of test when available. Student may have both version English and native language version</td>
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<td>- <strong>Standing</strong></td>
<td>- <strong>Academic Conversation Starters:</strong> Have a visual of a list of academic sentence starters that students can refer to in a discussion. Examples include - I expect ____ to happen. My data shows that… This helps students have a more science focused dialogue.</td>
<td>- <strong>Graphic Organizers</strong> to help break down the writing process and organize thoughts</td>
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<td>Use of <strong>approved bilingual glossaries</strong> from NYS in each subject</td>
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<td>- <strong>4 Square / Frayer models</strong> to help students gain a deeper understanding of vocabulary.</td>
<td>- <strong>Highlighting</strong> important text to assist students in answering questions after the reading.</td>
<td>- <strong>Standards-based sentence stems</strong></td>
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## Special Education Modifications

- **Special Education students must have accommodations as per Individual Educational Plan (IEP)**

### Instructional

- Pre-teach vocabulary
- Use picture vocabulary
- Scaffold Depth of Knowledge questions
- Provide copy of notes/notes in “cloze” form
- Use of Think, Pair, and Share strategy to help process information
- Scaffold written assignments with the use of graphic organizers
- Allow for multiple ways to respond (verbal, written, response board)
- Provide model of performance task
- Modify informational text to fit the needs of the students
- Provide a digital or paper interactive notebook
- Present complex tasks in multiple ways
  - Provide mnemonic strategies for Living Environment concepts

### Technology:

- Audio reading of text
- Text to type functions
- Videos to clarify/visualize Living Environment concepts
- Record class lecture/discussions and make accessible to student
- Nearpod - interactive presentations of notes
- Playposit - show a video clip about the topic and add your own questions for them to answer as they watch
  - Allow students to type answers in chat on Teams

### In Class Assessments

- Provide review packet or review sheet of concepts covered on the test
- Practice similar questions prior to the test
- Provide multiple options for projects
- Give a timeline of when things are due and remind them of the process often.
- Use of timer in class
- Break all complex tasks into chunks

### Other:

- Arrange seating for maximum engagement and minimum distraction
- Accessible lab space (counter level)

## Step Up to Writing

### SUTW Strategies

- Transitions for Different Purposes
- Four Step Summary Paragraph
- Meaningful Sentences
- Planning Paragraphs with Informal Outline
- Stretching Paragraphs in Essays and Reports
- Traffic Light Colors for Informative Explanatory Writing

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**BPS Science Department 2021 Living Environment Unit 3**