**Topic Review Guide**: Meiosis (5.1), Genetic Diversity (5.2) and Chromosomal Inheritance (5.6)

**To Think About**: What is the difference between diploid and haploid? What is the purpose of and steps involved in meiosis? What similarities and differences are there between mitosis and meiosis? What is crossing over and how does it increase genetic diversity? When does random assortment of chromosomes in meiosis increase genetic diversity? How does fertilization increase genetic diversity? How does the law of segregation account for genetic variation? How does independent assortment result in genetic variation? What is nondisjunction and how does it contribute to genetic variation? How does fertilization in sexually reproducing organisms lead to genetic variation? What effect does chromosomal inheritance have on genetic variation and human disorders?

**Watch:** [AP Daily Video 5.1 “Meiosis”](https://apclassroom.collegeboard.org/d/ruhlggxuky?sui=6,5); [5.2 “Meiosis and Genetic Diversity”](https://apclassroom.collegeboard.org/d/eb90ma6udm?sui=6,5); 5.6 “Chromosomal Inheritance” Video [1](https://apclassroom.collegeboard.org/d/6ukifqx5le?sui=6,5) and [2](https://apclassroom.collegeboard.org/d/yqz0g0q283?sui=6,5)

***or***

**Read:** Module 26 & Module 30, Biology for the AP Course

***or***

**Slideshow**: [Module 26](https://docs.google.com/presentation/d/1VVCRP1ZLXnEbN0eBHZvQ_bQc6qTzE3YIvKD44Z3WTwk/edit?usp=sharing) & [Module 30](https://docs.google.com/presentation/d/1euWHAv3zRBiW8ffTZCYfyktt5MDQp0gxo7D1dURRXM4/edit?usp=sharing), Biology for the AP Course

**Supplementary Resources**: Click the links below for more information to help you learn more about this lesson.

* Guided Notes [5.1](https://docs.google.com/document/d/1r-NLbVHo08Di7kg8I9Vgnx0HKn2BEmRfzuJbPlSea-s/edit?usp=sharing), [5.2](https://docs.google.com/document/d/1BtSIvvw6Fvaw8rfl8Jo-1vB2-UH4Inw99H5J-kyQrOY/edit?usp=sharing) and 5.6 [Video 1](https://docs.google.com/document/d/1H8hw8pEnjWnYo25b5TiJ2bCJnTbjuWgIBmnnzhribFE/edit?usp=sharing) and [Video 2](https://docs.google.com/document/d/1m0uM9_Bl3BrkdrXSQw45MYCDK4_Xp9KLMSsc7nN_YL8/edit?usp=sharing)
* Bozeman Science: [Cell Cycle, Mitosis, Meiosis](http://www.bozemanscience.com/028-cell-cycle-mitosis-and-meiosis)
* Crash Course Biology: [Heredity](http://http/www.youtube.com/watch?v=CBezq1fFUEA)
* Crash Course Biology: [Meiosis](http://http/www.youtube.com/watch?v=qCLmR9-YY7o)
* Sumanas Inc: [Meiosis Animation](http://www.sumanasinc.com/webcontent/animations/content/meiosis.html)
* Biocoach: [Meiosis](http://www.phschool.com/science/biology_place/biocoach/meiosis/intro.html)
* Hillis et al.: [Independent Assortment of Alleles Animation](http://bcs.whfreeman.com/hillis1e/#667501__674141__)
* BioNinja: [Stages of Meiosis](https://ib.bioninja.com.au/higher-level/topic-10-genetics-and-evolu/101-meiosis/stages-of-meiosis.html)
* University of Arizona: [Stages of Meiosis tutorial (with practice questions)](http://www.biology.arizona.edu/cell_bio/tutorials/meiosis/main.html)

**Recall and Review:** Use the lecture in the video and your textbook to help you answer these questions in your BILL. Before you start, mark your level of understanding. After you have completed the questions, then check to see what level of understanding you have achieved. If you’re still at a level N or level A, it is recommended that you stop in for office hours.

| **Essential Knowledge:**  What You Absolutely Must Know and Understand | | | | |
| --- | --- | --- | --- | --- |
| Levels of Mastery | | | | *I can explain how meiosis results in the transmission of chromosomes from one generation to the next. (Topic 5.1)* |
| **N** | **A** | **E** | **M** | **Questions You Should Be Able to Answer** |
|  |  |  |  | 1. **Explain** why meiosis is often called “reduction division.” |
|  |  |  |  | 1. **Explain** why sexually reproducing organisms must produce haploid gametes. |
|  |  |  |  | 1. **Explain** the relationship among these words:  gene, DNA, chromosome, sister chromatid. |
| **Essential Knowledge:**  What You Absolutely Must Know and Understand | | | | |
| Levels of Mastery | | | | *I can describe similarities and/or differences between the phases and outcomes of mitosis and meiosis. (Topic 5.1)* |
| **N** | **A** | **E** | **M** | **Questions You Should Be Able to Answer** |
|  |  |  |  | 1. **Create** a graphic organizer that illustrates the differences between meiosis and mitosis. Include the following features:    1. Chromosome number of daughter cells    2. Number of cells produced and a number of nuclear divisions    3. Purpose of the process    4. Type of cells the process occurs in |
| **Essential Knowledge:**  What You Absolutely Must Know and Understand | | | | |
| Levels of Mastery | | | | *I can explain how the process of meiosis generates genetic diversity. (Topic 5.2)* |
| **N** | **A** | **E** | **M** | **Questions You Should Be Able to Answer** |
|  |  |  |  | 1. **Explain** how each of the following contributes to increasing genetic variation among members of the same species:    1. Crossing over    2. Independent assortment    3. Random fertilization |
|  |  |  |  | 1. **Create a visual representation** that illustrates what a homologous pair of chromosomes is. |
| **Essential Knowledge:**  What You Absolutely Must Know and Understand | | | | |
| Levels of Mastery | | | | *I can explain how chromosomal inheritance generates genetic variation in sexual reproduction. (Topic 5.6)* |
| **N** | **A** | **E** | **M** | **Questions You Should Be Able to Answer** |
|  |  |  |  | 7. Using a t-chart, **demonstrate** the differences between the law of segregation  and the law of independent assortment. **Explain** how both are related to the  process of meiosis and when during the meiotic process these things occur. |
|  |  |  |  | 8**. Describe** two genetic disorders that can result from nondisjunction during  meiosis. |
|  |  |  |  | 9. **Describe** the inheritance patterns of Huntington’s disease. **Explain** why this  genetic disorder is inherited in a different pattern from albinism, which is a  recessive inheritance pattern. |

| Learn More: For more information about the inheritance of traits and production of gametes, follow the links below:   * [Nondisjunction in Humans](http://faculty.clintoncc.suny.edu/faculty/michael.gregory/files/bio%20101/Bio%20101%20Laboratory/Human%20Genetics%201/Photographs_of_beads/photographs_of_beads.htm): learn how gametes can end up with extra chromosomes * [PBS’ The Evolution of Sex](http://www.pbs.org/wgbh/evolution/sex/advantage/index.html): learn why sexual reproduction is advantageous from an evolutionary standpoint |
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