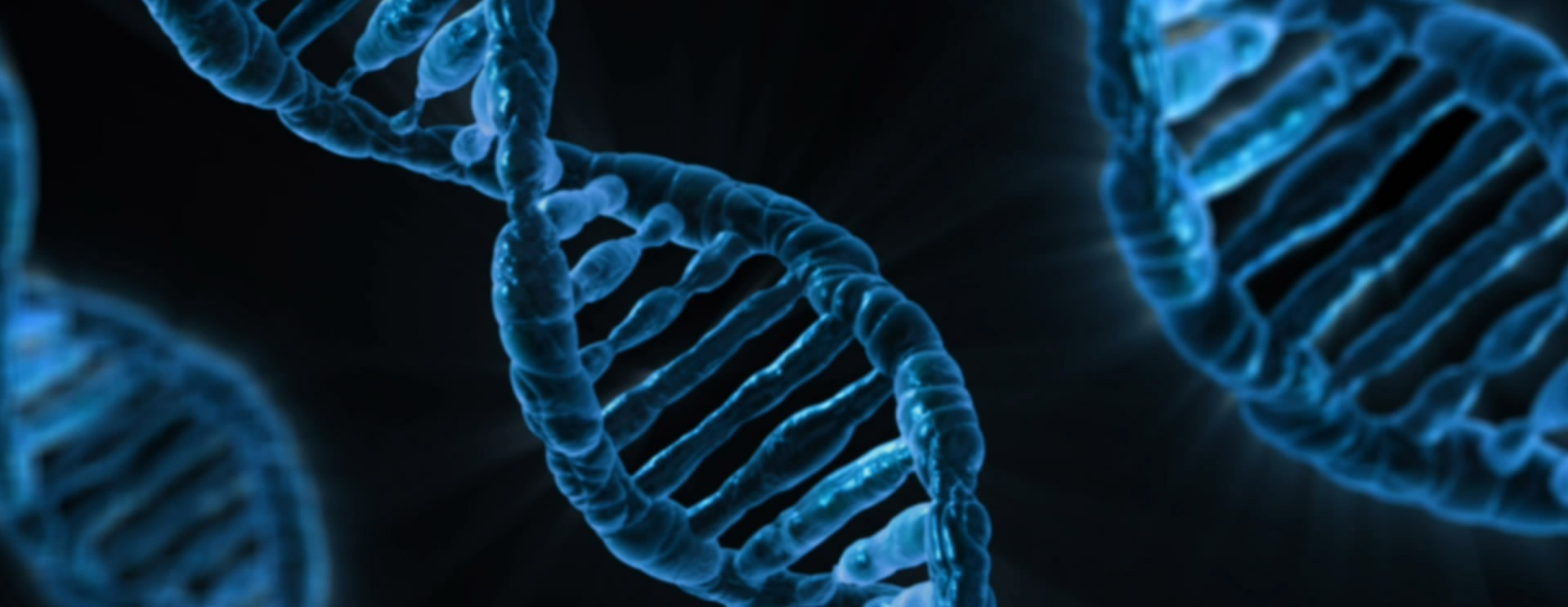
***Unit 05 AP Biology Master HyperDoc of Expectations and Resources***

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**Heredity: 8-11% of AP Exam**

**Big Ideas~ 1: Evolution *(EVO)*, 2: Energetics *(ENE)*, 3: Information Storage & Transmission *(IST)*, 4: System Interactions *(SYI)***

**EXPECTATIONS:**

| **Topic** | **Learning Targets (I can …) and** Success Criteria (I am learning how …)  *Learning targets are in bold with their success criteria listed beneath* | **✔** |
| --- | --- | --- |
| **5.1** | **Meiosis** |  |
|  | **Explain how meiosis results in the transmission of chromosomes from one generation to the next. *IST-1.F*** |  |
| Meiosis is a process that ensures the formation of haploid gamete cells in sexually reproducing diploid organisms   1. Meiosis results in daughter cells with half the number of chromosomes of the parent cell. 2. Meiosis involves two rounds of a sequential series of steps (meiosis I and meiosis II). |  |
|  | **Describe similarities and/or differences between the phases and outcomes of mitosis and meiosis. *IST-1.G*** |  |
| Mitosis and meiosis are similar in the way chromosomes segregate but differ in the number of cells produced and the genetic content of the daughter cells. |  |
| **5.2** | **Meiosis and Genetic Diversity** |  |
|  | **Explain how the process of meiosis generates genetic diversity. *IST-1.H*** |  |
| Separation of the homologous chromosomes in meiosis I ensures that each gamete receives a haploid (1n) set of chromosomes that comprises of both maternal and paternal chromosomes. |  |
| During meiosis I, homologous chromatids exchange genetic material via a process called “crossing over” (recombination), which increases genetic diversity among the resultant gametes. |  |
| Sexual reproduction in eukaryotes involving gamete formation - including crossing over, the random assortment of chromosomes during meiosis, and subsequent fertilization of gametes - serves to increase variation.  *Exclusion Statement: The details of sexual reproduction cycles in various plants and animals are beyond the scope and the course of the AP exam.* |  |
| **5.3** | **Mendelian Genetics** |  |
|  | **Explain how shared, conserved, fundamental processes and features support the concept of common ancestry for all organisms. *EVO-2.A*** |  |
| DNA and RNA are carriers of genetic information. |  |
| Ribosomes are found in all forms of life. |  |
| Major features of the genetic code are shared by all modern living systems. |  |
| Core metabolic pathways are conserved across all currently recognized domains. |  |
|  | **Explain the inheritance of genes and traits as described by Mendel’s laws. *IST-1.I*** |  |
| Medel’s laws of segregation and independent assortment can be applied to genes that are on different chromosomes. |  |
| Fertilization involves the fusion of two haploid gametes. Restoring the diploid number of chromosomes and increasing genetic variation in populations by creating new combinations of alleles in the zygote -   1. Rules of probability can be applied to analyze passage of single gene traits from parent to offspring. 2. The pattern of interitance (monohybrid, dihybrid, sex-linked, and genetically linked genes) can often be predicted from data, including pedigree, that give the parent genotype/phenotype and the offspting genotypes/phenotypes.   **RELEVANT EQUATION**  Laws of Probability  If *A* and *B* are mutually exclusive, then: *P ( A or B) = P (A) + P(B)*  If *A* and *B* are independent, then: *P ( A or B) = P (A) x P(B)* |  |
| **5.4** | **Non-Mendelian Genetics** |  |
|  | **Explain deviations from Mendel’s model of the inheritance of traits. *IST-1.J*** |  |
| Patterns of inheritance of many traits do not follow ratios predicted by Mendel’s laws and can be identified by quantitative analysis, where observed phenotypic ratios statistically differ from predicted ratios -   1. Genes that are adjacent and close to one another on the same chromosome may appear to be genetically linked; the probability that genetically linked genes will segregate as a unit can be used to calculate the map distance between them. |  |
| Some traits are determined by genes on sex chromosomes and are known as sex-linked traits. The pattern of inheritance of sex-linked traits can often be predicted from data, including pedigree, indicating the parent genotype/phenotype and the offspring genotypes/phenotypes. |  |
| Many traits are the product of multiple genes and/or physiological processes acting in combination; these traits therefore do not segregate in Mendelian patterns. |  |
| Some traits result from non-nuclear inheritance -   1. Chloroplasts and mitochondria are randomly assorted to gametes and daughter cells; thus, traits determined by chloroplasts and mitochondrial DNA do not follow simple Mendelian rules. 2. In animals, mitochondria are transmitted by the egg and not by sperm; as such, traits determined by mitochondrial DNA are maternally inherited. 3. In plants, mitochondria and chloroplasts are transmitted in the ovule and not in the pollen; as such, mitochondria -determined and chloroplast -determined traits are maternally inherited. |  |
| **5.5** | **Environmental Effects on Phenotype** |  |
|  | **Explain how the same genotype can result in multiple phenotypes under different environmental conditions. *SYI-3.B*** |  |
| Environmental factors influence gene expression and can lead to phenotypic plasticity. Phenotypic plasticity occurs when individuals with the same genotype exhibit different phenotypes in different environments. |  |
| **5.6** | **Chromosomal Inheritance** |  |
|  | **Explain how chromosomal inheritance generates genetic variation in sexual reproduction. *SYI-3.C*** |  |
| Segregation, independent assortment of chromosomes, and fertilization result in genetic variation in populations. |  |
| The chromosomal basis of inheritance provides an understanding of the pattern of transmission of genes from parent to offspring. |  |
| Certain human genetic disorders can be attributed to the inheritance of a single affected or mutated allele or specific chromosomal changes, such as nondisjunction. |  |

**RESOURCES: *(Tip: add your own (GSN) and helpful resources in the table below to a copy of this document)***

| **AP Bio Topics** | **Classroom Discussions (GSN), Labs, Activities & Assignments:** | **Additional Materials:**  [**Khan Academy: Heredity**](https://www.khanacademy.org/science/ap-biology/heredity) |
| --- | --- | --- |
| **5.1-2** | * [**10: Meiosis and Sexual Reproduction (GSN)**](https://drive.google.com/open?id=1UdQSc0b3b1dFEBBtv4JKvzd7CiL2Vb3v05XXSEQ-XxA) & [**Presentation** .pdf](https://drive.google.com/open?id=0B1kdFzBe787hTzM0UW9ZVDkyQTA) | MsLitten’s 7th Period Reviews:   * [MsLitten AP Bio Review of Meiosis Ch 10](https://youtu.be/qQNKQa2wdyc)   Bozeman:   * [Cell Cycle, Mitosis & Meiosis](http://www.bozemanscience.com/028-cell-cycle-mitosis-and-meiosis) * [Diploid vs. Haploid](http://www.bozemanscience.com/diploid-vs-haploid)   Knuffke Prezis:   * [Meiosis](https://prezi.com/el-sh-qgrgsj/ap-bio-information-7-meiosis/)   Quizizz:   * [Cell Cycle, Mitosis, Meiosis](http://quizizz.com/join/quiz/5c38add95c5663001be542b5/start?referrer=5b5a8e97e2a7ef0019fa2355) * [Mitosis vs Meiosis Challenge](http://quizizz.com/join/quiz/5c38ad82639405001a591eaa/start?referrer=5b5a8e97e2a7ef0019fa2355) |
| **5.3-6** | * [**11: Mendelian Patterns of Inheritance (GSN)**](https://drive.google.com/open?id=1hnJx1_byWsnyik5MzR67rCK71xBabIc7xGLn_1twRjI) & [**Presentation.pdf**](https://drive.google.com/open?id=1xsZpzOqHEMUF3KD_RiUJxQLVOPcPhhaC) * **POGIL: The Statistics of Inheritance** | MsLitten’s 7th Period Reviews:   * [Ms Litten AP Bio Ch 11 Review #1](https://youtu.be/bBNI0PEXg3U) & [#2](https://youtu.be/9AoY8ltXNZo) * [MsLitten AP Bio Data/Chi-Square](https://youtu.be/vj0uP0lZ_90)   Bozeman:   * [Mendelian Genetics](http://www.bozemanscience.com/029-mendelian-genetics) * [Advanced Genetics](http://www.bozemanscience.com/030-advanced-genetic) * [Genotypes and Phenotypes](http://www.bozemanscience.com/033-genotypes-and-phenotypes) * [Genetic Recombination and Gene Mapping](https://youtu.be/TU44tR0hJ8A) * **5.5** [**Genotype Expression**](http://www.bozemanscience.com/053-genotype-expression) * [Lab: Genetics of Drosophila](http://www.bozemanscience.com/ap-bio-lab-7-genetics-of-drosophila)   Knuffke Prezis:   * [AP Bio Intro to Mendelian Genetics](https://prezi.com/jousblqvrtns/ap-bio-information-9-intro-to-mendelian-genetics/) * [AP Bio Extensions to Mendelian Genetics](https://prezi.com/zphgne1krrqo/ap-bio-information-10-extensions-to-mendelian-genetics/) * [AP Bio Human Genetic Conditions](https://prezi.com/bpqviw0m4jjk/ap-bio-information-11-human-genetic-conditions/) * [Chromosomal Abnormalities](https://prezi.com/y7_-iiu2ny3c/ap-bio-information-8-chromosomal-abnormalities/)   Quizizz:   * [Mendelian Genetics](http://quizizz.com/join/quiz/5bdb7232bb8334001a197681/start?referrer=5b5a8e97e2a7ef0019fa2355) * [AP Bio Mendelian Genetics](http://quizizz.com/join/quiz/5bdb7291a92e75001af0e44a/start?referrer=5b5a8e97e2a7ef0019fa2355) |
| **Check** | **College Board: Personal Progress Check 5** | **#yougotthis** |

**CONNECTIONS: *A Step Further (Choose one connection below to read/analyze & then take a step further (follow an associated link) for your assessment)***

| **Sustainability** | [Video: The International Treaty on Plant Genetic Resources for Food and Agriculture](https://youtu.be/BxEODh-weG8)  [Food and Agriculture Organization of the United Nations: Sustainability](http://www.fao.org/sustainability/en/)  [UN News](https://news.un.org/en/story/2015/10/511942-rice-genetics-placed-global-data-pool-help-develop-sustainable-crops-un-agency): [Rice genetics placed in global data pool to help develop sustainable crops – UN agency](https://news.un.org/en/story/2015/10/511942-rice-genetics-placed-global-data-pool-help-develop-sustainable-crops-un-agency) |
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| **NGSS** | [HS-LS3-1](https://www.nextgenscience.org/pe/hs-ls3-1-heredity-inheritance-and-variation-traits)  [HS-LS3-2](https://www.nextgenscience.org/pe/hs-ls3-2-heredity-inheritance-and-variation-traits)  Identify which [Science Practices](https://ngss.nsta.org/PracticesFull.aspx) you have “practiced” this unit - provide evidence |
| **Careers** | [National Society of Genetic Counselors](https://www.nsgc.org/page/becomeageneticcounselor)  [American Society of Human Genetics](https://www.ashg.org/education/careers.shtml) |
| **Interesting Information** | [People with Albinism: Not Ghosts but Human Beings](https://albinism.ohchr.org/about-albinism.html) and their [Stories](https://albinism.ohchr.org/stories.html)  [Unbalanced Chromosomal Inheritance More Common than Thought](https://www.the-scientist.com/news-opinion/unbalanced-chromosomal-inheritance-more-common-than-thought-66563)  [How afraid of Human Cloning should we be?](https://www.theguardian.com/commentisfree/2018/jan/25/afraid-cloning-humans-macaque-monkeys-reality) |

| **Big Idea** | **Enduring Understandings:** | **Topic** |
| --- | --- | --- |
| IST-1 | **Heritable information provides for continuity of life.** | 5.1-4 |
| EVO-2 | **Organisms are linked by lines of descent from common ancestry.** | 5.3 |
| SYI-3 | **Naturally occurring diversity among and between components within biological systems affects interactions with the environment.** | 5.5-6 |

Document framework provided by Winnie Litten