

Topic Review Guide 9: Mendel

To Think About: How is heritable information passed to the next generation in eukaryotes, and how do changes in genotype result in changes in phenotype of an organism? In what ways does the chromosomal basis of inheritance provide an understanding of the patterns of transmission of genes from parent to offspring, and how are inheritance patterns of many traits explained other than through simple Mendelian genetics? What multiple processes increase genetic variation in biological systems, and how do environmental factors influence the expression of the genotype in an organism?

Watch:

First: [Mr. Andersen's "Mendelian Genetics" video](#)

Then: [Mr. Andersen's "Advanced Genetics" video](#)

Last: [Mr. Andersen's "Linked Genes" video](#)

Read: Chapter 8.1, Hillis et al. [Principles of Life](#), 1st edition (2012), pages

Then: Chapter 8.2 and 8.3, pages

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

- Sumanas Inc: [Meiosis Animation](#)
- Biocoach: [Meiosis](#)
- Hillis et al.: [Independent Assortment of Alleles Animation](#)
- Hillis et al.: [Test Cross](#)
- DNA From The Beginning: [Classical Genetics Tutorials and Animations](#)
- University of Arizona Biology Project: [Mendelian Genetics Monohybrid Problem Set](#)
- University of Arizona Biology Project: [Mendelian Genetics Dihybrid Problem Set](#)
- University of Arizona Biology Project: [Sex-Linked Problem Set](#)
- Biocoach: [Mendelian Genetics](#)

Listen and Look: Here is a list of key terms and concepts you will hear about and see during these podcasts and chapter readings. Get to know them! Be able to connect them to one another using a concept map.

KEY TERMS

Diploid (2n)	Haploid (n)	Sister chromatid	Meiosis
Gamete	Somatic cell	Crossing over	Homologous chromosome
Zygote	Nondisjunction	Independent assortment	Genetics
Genotype	Phenotype	Law of Segregation	Law of Independent Assortment
Dominant	Recessive	Monohybrid cross	Dihybrid cross
Homozygous	Heterozygous	Gene	Allele
Test cross	Probability	Genotypic ratio	Phenotypic ratio
Pedigree	Sex-linked traits	Incomplete dominance	Non-nuclear inheritance
Multiple alleles			

Recall and Review: Use the lecture in the video and your textbook reading to help you answer these questions.

1. Prior to Mendel's work, it was commonly thought that traits from each parent blended to yield the traits shown in the offspring. **Explain** how Mendel's ideas about inheritance differ from what was previously thought.

2. **Explain** how the following terms are related: P generation, F1 generation, F2 generation, hybrid.
3. **Create** a diagram that illustrates the relationship among the following terms: gene, allele, genotype, phenotype, heterozygous, homozygous.
4. **Explain** what the purpose of a test cross is.
5. 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.
6. Mendel used pea plants to conduct his studies on heredity. **Explain** why pea plants a good study organism for him to use.
7. **Explain** the difference between parental type and recombinant type chromosomes. **Draw** a diagram that illustrates the difference between the two.
8. **Explain** how crossing over can unlink genes.
9. **Describe** how sex is determined in humans and how the SRY gene plays a role in sex determination.
10. **Describe** the inheritance patterns and symptoms of color blindness, Duchenne muscular dystrophy, and hemophilia. **Explain** why these genetic disorders are more frequently inherited by males.
11. **Describe** two types of non-nuclear inheritance and how traits are passed on through these mechanisms.

Learn More: For more information about inheritance of traits and production of gametes, follow the links below:

- [The Blue People of Troublesome Creek](#): interesting story about a family from Kentucky with methemoglobinemia
- [Queen Victoria and Hemophilia](#): Trace the passage of hemophilia through the royal families of Europe
- [Nondisjunction in Humans](#): learn how gametes can end up with extra chromosomes
- [PBS' The Evolution of Sex](#): learn why sexual reproduction is advantageous from an evolutionary standpoint