**Genetics**

## This unit is divided into 3 sections and should take eight weeks to complete

1. What is DNA?
2. Genetics
3. Biotechnology

## Essential Questions/Big Ideas

• What are genes? How are they connected to DNA?

• What is the purpose of genes and DNA?

• What is biotechnology?

• How does biotechnology impact our lives?

• What are the pros and cons of biotechnology?

• How can we use Punnett Squares to predict traits?

## Standards and Access Points

[SC.912.L.16.10](http://www.cpalms.org/Public/PreviewStandard/Preview/2021" \t "_top) Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.

* [SC.912.L.16.In.5](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8366');) Identify ways that biotechnology has impacted society and the environment, such as the development of new medicines and farming techniques.
* [SC.912.L.16.Su.4](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8367');) Recognize that new medicines and foods can be developed by science (biotechnology).
* [SC.912.L.16.Pa.4](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8368');) Recognize a food.

[SC.912. L.16.1](http://www.cpalms.org/Public/PreviewStandard/Preview/2010" \t "_top) Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.

* [SC.912. L.16. In.1](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8356');) Identify that genes are sets of instructions that determine which characteristics are passed from parent to offspring.
* [SC.912. L.16.Su.1](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8357');) Recognize characteristics (traits) that offspring inherit from parents.
* [SC.912. L.16. Pa.1](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8358');) Recognize similar characteristics (traits) between a child and parents, such as hair, eye, and skin color, or height.

[SC.912.L.16.3](http://www.cpalms.org/Public/PreviewStandard/Preview/2015) Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.

* [SC.912.L.16.In.3](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8360');) Recognize that a substance called DNA carries genetic information in all organisms, and changes (mutations) in DNA can be helpful or harmful to an organism.
* [SC.912.L.16.Su.2](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8361');) Recognize that all organisms have a substance called DNA with unique information.
* [SC.912.L.16.Pa.2](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8362');) Recognize similarities in characteristics of plants and animals of the same type (species).

[SC.912.L.16.5](http://www.cpalms.org/Public/PreviewStandard/Preview/2017) Explain the basic processes of transcription and translation, and how they result in the expression of genes.

* [SC.912.L.16.In.3](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8360');) Recognize that a substance called DNA carries genetic information in all organisms, and changes (mutations) in DNA can be helpful or harmful to an organism.
* [SC.912.L.16.Su.2](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8361');) Recognize that all organisms have a substance called DNA with unique information.
* [SC.912.L.16.Pa.2](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8362');) Recognize similarities in characteristics of plants and animals of the same type (species).

[SC.912.L.16.8](http://www.cpalms.org/Public/PreviewStandard/Preview/2020) Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.

* [SC.912.L.16.In.4](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8363');) Identify that cancer can result when cells change or grow uncontrollably.
* [SC.912.L.16.Su.3](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8364');) Recognize that cancer may result when cells change or grow too fast.
* [SC.912.L.16.Pa.3](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8365');) Recognize that illness can result when parts of our bodies are not working properly.

[SC.912.L.16.9](http://www.cpalms.org/Public/PreviewStandard/Preview/2012) Explain how and why the genetic code is universal and is common to almost all organisms.

* [SC.912.L.16.In.3](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8360');) Recognize that a substance called DNA carries genetic information in all organisms, and changes (mutations) in DNA can be helpful or harmful to an organism.
* [SC.912.L.16.Su.2](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8361');) Recognize that all organisms have a substance called DNA with unique information.
* [SC.912.L.16.Pa.2](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8362');) Recognize similarities in characteristics of plants and animals of the same type (species).

[SC.912.L.14.6](http://www.cpalms.org/Public/PreviewStandard/Preview/1948" \t "_top) Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health

* [SC.912.L.14.In.4](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8333');) Describe common human health issues.
* [SC.912.L.14.Su.3](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8334');) Recognize common human health issues.
* [SC.912.L.14.Pa.3](javascript:%20parent.pushUrl('/Public/PreviewAccessPoint/Preview/8335');) Identify ways to prevent infection from bacteria and viruses, such as hand washing and first aid.

**Key Vocabulary**

| agriculture | alleles | biotechnology | clone | DNA |
| --- | --- | --- | --- | --- |
| forensic | genes | inbreeding | Mendel | nucleotide |
| phenotype | purebred | replication | RNA | technology |
| transformation | translation |  |  |  |

# DNA

PowerPoints

* DNA Genes Biotech Vocabulary [Click here](https://accesstoflsresources.weebly.com/uploads/2/3/7/3/23739164/1._genetics_vocabulary.pptx)
* DNA Genes Biotech Vocabulary Websites [Click here](https://accesstoflsresources.weebly.com/uploads/2/3/7/3/23739164/2._genetic_vocabulary_with_video_support.pptx)
* What is DNA [Click here](https://accesstoflsresources.weebly.com/uploads/2/3/7/3/23739164/3._what_is_dna.pptx)

Worksheets Videos and Resources

* Activities, Articles, Games and Links [Click here](https://accesstoflsresources.weebly.com/uploads/2/3/7/3/23739164/activities_articles_games_and_links.docx)
* Dream Job – Forensics Article [Click here](https://newsela.com/read/dream-jobs-forensic-scientist/id/21689/)
* Brain Pop DNA Activity [Click here](https://www.brainpop.com/science/cellularlifeandgenetics/dna/)
* Yummy DNA Activity [Click here](https://www.yourgenome.org/activities/yummy-gummy-dna)
* Sequence Bracelet Activity [Click here](https://www.yourgenome.org/activities/sequence-bracelets)
* DNA and RNA – Tons of Activities/Labs and Links DNA scientists and concepts puzzle pieces [Click here](http://www.nclark.net/DNA_RNA)
* Virtual Lab – Bacteria/DNA [Click here](https://www.hhmi.org/biointeractive/bacterial-identification-virtual-lab)
* Materials and Resources for Double Helix [Click here](https://geneed.nlm.nih.gov/topic_subtopic.php?tid=15&sid=16)
* Materials and Resources for Replication [Click here](https://geneed.nlm.nih.gov/topic_subtopic.php?tid=15&sid=21)
* Materials and Resources for DNA Forensics [Click here](https://geneed.nlm.nih.gov/topic_subtopic.php?tid=37)
* DNA Rap Song [Click here](https://www.youtube.com/watch?v=T5gEIViVAPw)
* DNA Replication Animation [Click here](https://www.hhmi.org/biointeractive/dna-replication-basic-detail)
* DNA from Neanderthal Ancestors [Click here](https://accesstoflsresources.weebly.com/uploads/2/3/7/3/23739164/dna_from_neanderthal_ancestors_gives_us_immunity_article.docx)
* DNA and Genes Article [Click here](https://accesstoflsresources.weebly.com/uploads/2/3/7/3/23739164/dna_genes_article.docx)
* DNA Genes Vocabulary Matching Activity [Click here](https://accesstoflsresources.weebly.com/uploads/2/3/7/3/23739164/dna_genes_biotech_matching_1.docx)
* DNA, Genes and Biotechnology Vocabulary Matching [Click here](https://accesstoflsresources.weebly.com/uploads/2/3/7/3/23739164/dna_genes_biotech_matching_2.docx)

# Genetics

PowerPoint

* Genetics [Click here](https://accesstoflsresources.weebly.com/uploads/2/3/7/3/23739164/4.__genetics.pptx)

Worksheets Videos and Resources

* Video: Mendel My Favorite Scientist [Click here](https://youtu.be/YxKFdQo10rE)
* Mendel’s laws on inheritance [Click here](https://florida.pbslearningmedia.org/resource/hew06.sci.life.gen.mendelinherit/mendels-laws-of-genetic-inheritance/)
* Video: Law of Dominance [Click here](https://www.youtube.com/watch?v=w3CmT3Wmt3g)
* Video: Law of Segregation [Click here](https://www.youtube.com/watch?v=Fs0-STXp7NQ)
* Video: Law of Independent Assortment [Click here](https://www.youtube.com/watch?v=qIGXTJLrLf8)
* Things you not know about DNA [Click here](https://learn.genetics.utah.edu/content/basics/dnathings)
* Video: What are traits? [Click here](https://www.youtube.com/watch?v=SldwzOJ23J8)
* What is a trait? [Click here](https://florida.pbslearningmedia.org/resource/lsps07.sci.life.gen.trait/what-is-a-trait/)
* Video: Dominant versus recessive [Click here](https://www.youtube.com/watch?v=G-_fwABa2BU)
* Video: Genotypes vs Phenotypes [Click here](https://www.youtube.com/watch?v=lYAHx7NiF3g)
* Video: Punnett Square Basics [Click here](https://www.youtube.com/watch?v=znWCgqlC-s8)
* From Flowers to Freckles [Click here](http://www.floridastudents.org/PreviewResource/StudentResource/113778)
* Parent traits video and quiz [Click here](https://study.com/academy/practice/quiz-worksheet-punnett-squares-genetics.html)
* Analyzing Inheritance Patterns [Click here](http://www.floridastudents.org/PreviewResource/StudentResource/163206)
* Video: Amoeba Sisters sex linked traits: [Click here](https://www.youtube.com/watch?v=h2xufrHWG3E)
  + Amoeba Sisters/ Video Recap [Click here](https://accesstoflsresources.weebly.com/uploads/2/3/7/3/23739164/video_recap_of_sex-linked_traits_by_amoeba_sisters_new_header.pdf)
* DNA/Genes word search [Click here](https://accesstoflsresources.weebly.com/uploads/2/3/7/3/23739164/word_search.docx)
* DNA, Genes and Biotechnology Crossword [Click here](https://accesstoflsresources.weebly.com/uploads/2/3/7/3/23739164/black_puzzle_2.pdf)
  + Crossword Answer Key [Click here](https://accesstoflsresources.weebly.com/uploads/2/3/7/3/23739164/b_puzzle_key.pdf)
* Genetics Home Page and Links [Click here](https://geneed.nlm.nih.gov/index.php)
* Materials and Resources for Stem Cell Research [Click here](https://geneed.nlm.nih.gov/topic_subtopic.php?tid=52&sid=53)
* Mr. Lee – Genetics Rap [Click here](https://www.youtube.com/watch?v=_IOIx__UJ5g)
* Genetic Engineering Animations [Click here](https://www.hhmi.org/biointeractive/genetic-engineering)
* Video: Learning from Mice – transgenics [Click here](https://www.hhmi.org/biointeractive/learning-mice-science-transgenic-technology)
* MRSA Gene Hunt Activity [Click here](https://www.yourgenome.org/activities/mrsa-gene-hunt)
* Carry Out Your Own Genetic Variation Investigation Activity [Click here](https://www.yourgenome.org/activities/investigate)
* Interactive lizard lab – How has the lizard changed over time? [Click here](https://www.hhmi.org/biointeractive/lizard-evolution-virtual-lab)
* Scientists find genes that make some kids’ hair uncombable [Click here](https://accesstoflsresources.weebly.com/uploads/2/3/7/3/23739164/uncombable_hair_article.docx)
* All About Genetics [Click here](https://kidshealth.org/en/parents/about-genetics.html)
* Cancer: A result of mutation? [Click here](http://www.cpalms.org/Public/PreviewResourceLesson/Preview/129128)
* Cancer [Click here](https://www.khanacademy.org/embed_video?v=RZhL7LDPk8w)
* Cancer cells: Mutations Gone Wild! [Click here](http://www.cpalms.org/Public/PreviewResourceStudentTutorial/Preview/119811)
* How do cancer cells behave differently from healthy ones? [Click here](http://www.cpalms.org/Public/PreviewResourceUrl/Preview/117923)

# Biotechnology GMO’s

PowerPoint

* Biotechnology [Click here](https://accesstoflsresources.weebly.com/uploads/2/3/7/3/23739164/5.__biotechnology.pptx)

Worksheets Videos and Resources

* What is biotechnology? [Click here](https://www.bio.org/what-biotechnology)
* Risks and Benefits of Biotechnology [Click here](https://newsela.com/read/lib-sustainability-biotechnology/id/37321/)
* An introduction to biotechnology [Click here](http://www.biotechnology.amgen.com/index.html)
* Careers in biotechnology [Click here](https://florida.pbslearningmedia.org/resource/biot09.biotech.car.biotstudent/biotechnology-student-profile/)
* Materials and Resources on Biotechnology [Click here](https://geneed.nlm.nih.gov/topic_subtopic.php?tid=41)
* Materials and Resources for Biostatistics [Click here](https://geneed.nlm.nih.gov/topic_subtopic.php?tid=45)
* Biotech Rap [Click here](https://www.youtube.com/watch?v=ulWkAuKWsZM)
* Ph. Diddy on the Scene/Biotech Song [Click here](https://www.youtube.com/watch?v=lCblncsE8wQ)
* Olives in Italy [Click here](https://newsela.com/read/italy-olives/id/11036/)
* Manmade meats [Click here](https://www.nbcnews.com/mach/innovation/lab-grown-meat-may-save-lot-more-farm-animals-lives-n743091)
* Video: Meat of the future [Click here](https://www.youtube.com/watch?v=u468xY1T8fw)
* Video: Your food, farm to table [Click here](https://www.youtube.com/watch?v=K1XbEpNZ5yk)
* Video: Food Biotechnology: Get the Facts [Click here](https://www.youtube.com/watch?v=b8EDEimG-DY)
* Mosquitos [Click here](https://newsela.com/read/zika-mosquitoes/id/14848/)
* Video: Mosquitos in Africa [Click here](https://www.youtube.com/watch?v=N1hiIfqzISQ)
* Video: Gene drives wiping out mosquitos [Click here](https://www.youtube.com/watch?v=oVTUr5glumU)
* Transgenic fly – Interactive Lab [Click here](https://www.hhmi.org/biointeractive/transgenic-fly-virtual-lab)
* Impact on Biotechnology [Click here](http://www.floridastudents.org/PreviewResource/StudentResource/105492)
* Henrietta Lacks’ “immortal” cells [Click here](https://newsela.com/read/smi-henrietta-lacks-immortal-cells/id/23915/)
* Video: The Pro’s of GMOs [Click here](https://www.youtube.com/watch?v=bnNy7aLEcos)
* Video: The Con’s of GMOs [Click here](https://www.youtube.com/watch?v=OB_0OLKGMpQ)
* Yes or No to GMO [Click here](http://www.floridastudents.org/PreviewResource/StudentResource/119324)
* Meet two baby monkeys who were cloned in China [Click here](https://newsela.com/read/monkeys-cloned/id/39857/)
* Dolly the Sheep [Click here](https://newsela.com/read/dolly-sheep-cloning-years-later/id/19110/)