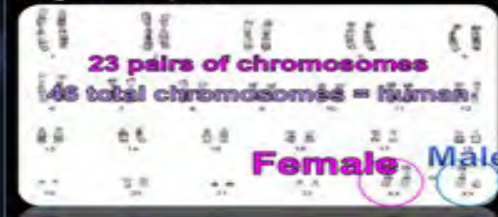


Karyotype, Genetic Disorders, Stem Cells, Cloning, Issues in Life Science Technologies

Preview is a compressed file

- Karyotype: The number and visual appearance of the chromosomes in the cell nuclei of an organism or species.



- Which type of cloning is this picture?
- Gene cloning, which creates copies of genes or segments of DNA.
- Reproductive cloning, which creates copies of whole animals
- Therapeutic cloning, which creates embryonic stem cells.



- Another bioethics issue for discussion.
- Picture below of the first synthetic organisms created on a computer and then grown in the lab, "Synthetic Life"

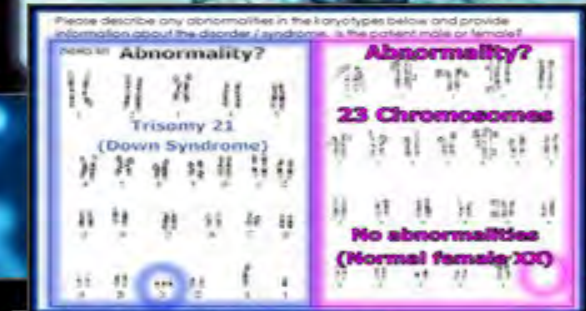
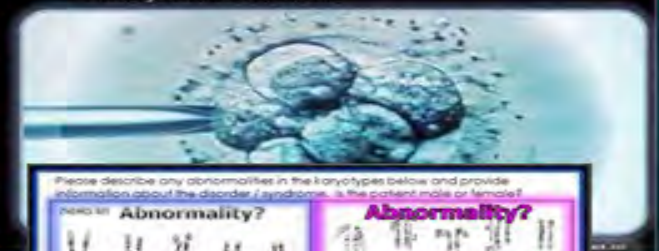


- Genetic engineering refers to a set of technologies that are being used to change the genetic makeup of cells.
- By moving genes across species boundaries you can produce novel organisms.

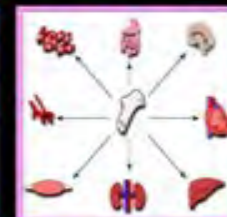


- The following are topics that could be covered within the study of bio-ethics. A few include...

– Embryonic Stem Cells



- Three types of stem cells.
- Adult Stem Cells.
- Embryonic Stem Cells.
- Cord Blood Stem Cells.



6 Lessons

Interactive Slideshows

Person in the Mirror: A Success Story

https://www.youtube.com/watch?v=k9Ts8jXw5ml&t=31s&ab_channel=Children%27sWisconsin



- Stem cells: Cells that have the remarkable potential to develop into many different cell types in the body.



• Three different types of cloning:

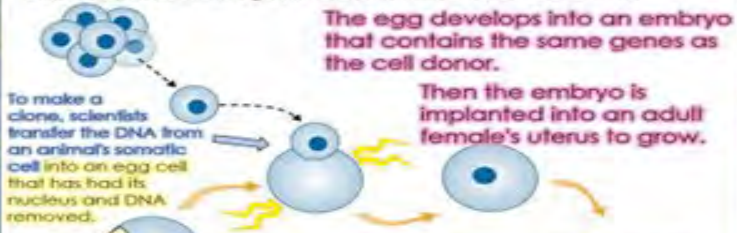
- Gene cloning, which creates copies of genes or segments of DNA.
- Reproductive cloning, which creates copies of whole animals.
- Therapeutic cloning, which creates embryonic stem cells.



Describe reproductive cloning below and some of the ethics associated with it.

The egg develops into an embryo that contains the same genes as the cell donor.

Then the embryo is implanted into an adult female's uterus to grow.



Reproductive cloning is an inefficient technique and most cloned animal embryos never develop. The cloned animal has often been observed with some negative health effects. These include an increase in their size when born, defects in vital organs, premature aging, and immune system problems. Clones created from a cell taken from an adult might have chromosomes that are shorter than normal (telomeres), which may condemn the clones' cells to a shorter life span.

• Can anyone find the abnormality in karyotype?

ZWK01047 key



- Note! The following area of focus shows many people who were born with a genetic disorder. In many cases, these individuals live a normal life, in other cases these disorders are life threatening.

– We should approach this unit with caring and empathy.



What are GMO's?

GMO stands for "Genetically Modified Organism." GMOs are living beings that have had their genetic code changed in some way. This change is generally a targeted one to improve a desired trait. A gene is usually inserted into a plant's genetic code.

Why use them now?

Most of the crop grown around the world today address problems caused by insects or weeds such as drought resistance or insect resistance. Some GMOs can enhance a plant's nutrition.

Are they regulated?

The regulation of genetically modified crops in the United States is divided among three regulatory agencies: the United States Department of Agriculture's Animal and Plant Health Inspection Service (USDA-APHIS), the U.S. Environmental Protection Agency (EPA), and the Department of Health and Human Services' Food and Drug Administration (FDA).

- Which is the human and which is the chimpanzee karyotype?



23 pairs
46 Chromosomes



24 pairs
48 Chromosomes

XX

Follow Along Bundle

The sum of the squares of the elements of a matrix A is called the Frobenius norm of A , denoted by $\|A\|_F$. It is defined as:

$$\|A\|_F = \sqrt{\sum_{i,j} a_{ij}^2}$$

Below the formula, a 3x3 matrix A is written:

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$$

To the right of the matrix, the formula for the Frobenius norm is repeated:

$$\|A\|_F = \sqrt{\sum_{i,j} a_{ij}^2}$$

Below the formula, the calculation is shown:

$$\|A\|_F = \sqrt{1^2 + 2^2 + 3^2 + 4^2 + 5^2 + 6^2 + 7^2 + 8^2 + 9^2}$$

The final result is:

$$\|A\|_F = \sqrt{165}$$
[illegible]

Explain the following terms in your own words:

1. Explain the following terms in your own words:

2. Explain the following terms in your own words:

3. Explain the following terms in your own words:

4. Explain the following terms in your own words:

5. Explain the following terms in your own words:

6. Explain the following terms in your own words:

7. Explain the following terms in your own words:

8. Explain the following terms in your own words:

9. Explain the following terms in your own words:

10. Explain the following terms in your own words:

A handwriting practice sheet for the word "Wing". It features four rows, each with a large blue-outlined box for the word and a smaller blue-outlined box for the letter "W". The first row is pre-filled with "Wing" and "W". The subsequent three rows are empty for practice. The sheet includes a title "Wing" and a subtitle "W" at the top. The word "Wing" is written in a cursive script. The letter "W" is written in a cursive script. The sheet is designed for children to practice writing the word and the letter.

What are the risks?

Why are they used?

Are they dangerous?

Are they regulated?

What does the opposition say?

[illegible]

The notebook page is white with a light blue header section at the top. The header contains a date field on the left, a time field in the center, and a page number field on the right. Below the header, the page is divided into a grid of eight rectangular writing areas, arranged in four rows and two columns. Each writing area has a blue border and is filled with horizontal blue lines. The first row of writing areas is partially filled with handwritten text in blue ink. The rest of the page is blank.

Header Section:

- Date: _____
- Time: _____
- Page: _____

Writing Areas:

- Row 1, Column 1: I am a student at _____
- Row 1, Column 2: I am a student at _____
- Row 2, Column 1: I am a student at _____
- Row 2, Column 2: I am a student at _____
- Row 3, Column 1: I am a student at _____
- Row 3, Column 2: I am a student at _____
- Row 4, Column 1: I am a student at _____
- Row 4, Column 2: I am a student at _____

14 Pages

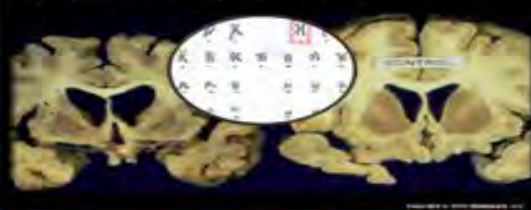
Activities, Assessments, Keys, and more all built-in

- Some questions that you and your partner may be asked...
 - What genetic disorder does your child have?
 - What are some of the symptoms of this disorder?
 - What treatment is available / What is daily life like?
 - Do you know any of the genetics associated with disorder? Carriers, Probability.

LET'S DISCUSS



- Huntington's Disease:** A genetic disorder passed down through families in which nerve cells in the brain degenerate. Creates nervous problems.



- Which is the human and which is a mouse karyotype?



**20 Pairs,
40 Chromosomes**



**23 pairs
46 Chromosomes**

- Virtual Karyotype Lesson Answers

A

40 year Old Female, Trisomy 21, extra chromosome 21 (Down's Syndrome)

B

One or more extra sex chromosomes (i.e., XXY) Klinefelter's Syndrome

C

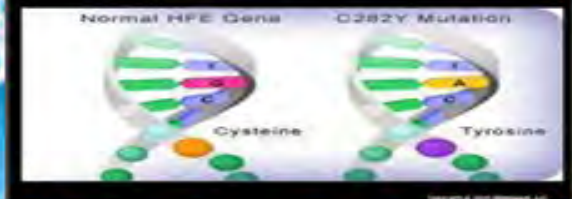
Extra chromosome 13, Trisomy 13 Syndrome.
Patients C died shortly after birth, with many anomalies including polydactyly (6 fingers) and a cleft lip.

- Can anyone find the abnormality in this karyotype?



Edwards syndrome, aka (trisomy 18), is a genetic disorder caused by the presence of all, or part of a third copy of chromosome number 18. Most babies will die before birth or shortly after.

- Answer: Mutations occur in the genetic material (DNA or RNA). These errors can occur during copying, or exposure to radiation, chemicals, viruses, and from unknown reasons.



- Another potential problem centers on the relative age of the cloned cell's chromosomes.
 - As cells go through their normal rounds of division, the tips of the chromosomes, called telomeres, shrink.

This is a Chromosome



Complete the Punnett Square and then describe the outcomes.

Triple X syndrome, also called trisomy X or 47,XXX. Females normally have two X chromosomes. In all cells - one X chromosome from each parent. In triple X syndrome, a female has three X chromosomes.

Turner syndrome, a condition that affects only females, results when one of the X chromosomes (sex chromosomes) is missing or partially missing.

Klinefelter's Syndrome: XXY
A genetic condition in which a male is born with an extra copy of the X-chromosome.

OH No! Unable to be capable of being, growing, or developing and functioning normally.

- Some positives and negatives of designer babies.



- Reduces risk of genetic diseases
- Reduces risk of inherited medical conditions
- Better understanding of genetics
- Increased life span
- Can give a child genes that the parents do not carry
- Prevent next generation of family from getting characteristics/diseases
- Better chance the child will succeed in life?

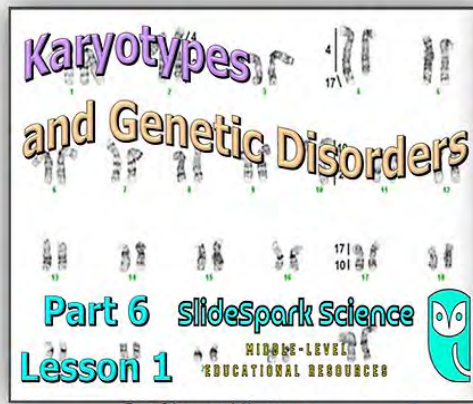


- Termination of embryos
- Could create a gap in society
- Possibility of damage to the gene pool
- Baby has no choice in the matter
- Genes often have more than one use
- Geneticists might make errors
- Loss of Individuality
- Other children in family could be affected by parent's decision
- Only the rich can afford it

Short Reading on the Ethics of Designer Babies <https://www.nuffieldbioethics.org/designer-babies>

Part 6: DNA and Genetics Unit 6 Lessons of 50 minutes and 11 Page Follow Along Work Bundle, Karyotype, X and Y Chromosome, Human Karyotype vs Chimpanzee, Identifying Abnormalities in Karyotypes and their corresponding Disorder, Various Syndromes associated with Genetic Disorders, Sex Linked Disorders, Genetic Disorders with Descriptions, Virtual Lab Karyotype, Genetic Disorder Research Project, Students Partner up and complete research about a Genetic Disorder, Circle Discussion about Genetic Disorders, Bio-Ethics, Some Topics in the Biosciences, Sinking Ship Ethical Dilemma Activity, Genetic Engineering, GMO's, Difference b/t USDA Organics and Non-GMO Verified, Stem Cells, Types of Stem Cells, Embryonic Stem Cells and Stances, Cloning, Different Types of Cloning, Understanding the Differences, Applications of Cloning, Negatives of Cloning, Synthetic Life, Designer Babies, Box Game Review, Crossword Puzzle, Optional Movie with Worksheet Extension

Part 6: DNA and Genetics Unit



Karyotypes and Genetic Disorders

Part 6 Slidespark Science
Lesson 1 MIDDLE-LEVEL EDUCATIONAL RESOURCES

Part 6 Lesson 1 Karyotypes

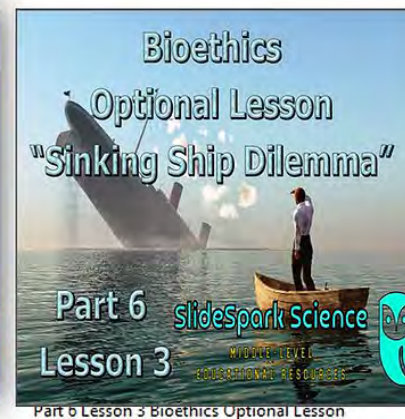


Normal HFE Gene C282Y Mutation

Genetic Disorders Research

Part 6 Lesson 2 Slidespark Science
(1 Day Research) (1 to .5 Day Present) MIDDLE-LEVEL EDUCATIONAL RESOURCES

Part 6 Lesson 2 Genetic Disorder Research

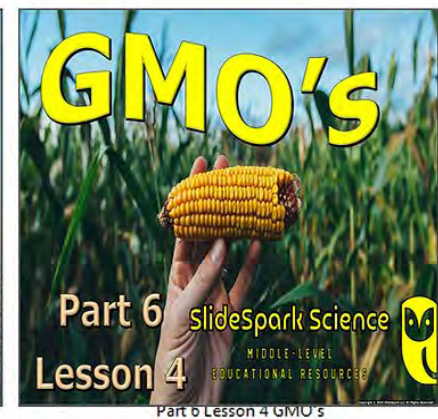


Bioethics

Optional Lesson "Sinking Ship Dilemma"

Part 6 Slidespark Science
Lesson 3 MIDDLE-LEVEL EDUCATIONAL RESOURCES

Part 6 Lesson 3 Bioethics Optional Lesson



GMO's

Part 6 Slidespark Science
Lesson 4 MIDDLE-LEVEL EDUCATIONAL RESOURCES

Part 6 Lesson 4 GMO's



Stem Cells

Part 6 Slidespark Science
Lesson 5 MIDDLE-LEVEL EDUCATIONAL RESOURCES

Part 6 Lesson 5 Stem Cells



Cloning

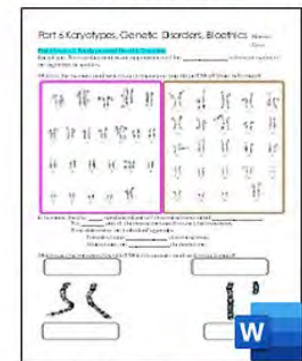
Part 6 Slidespark Science
Lesson 6 MIDDLE-LEVEL EDUCATIONAL RESOURCES

Part 6 Lesson 6 Cloning and Wrap Up



Part 6 Karyotypes, Genetic Disorders, Bioethics, Stem Cells, Cloning, GMO's, Synthetic Life, Designer Babies, Box Game Review, Crossword Puzzle, Optional Movie with Worksheet Extension

Part 6 Work Bundle Answers



Part 6 Karyotypes, Genetic Disorders, Bioethics, Stem Cells, Cloning, GMO's, Synthetic Life, Designer Babies, Box Game Review, Crossword Puzzle, Optional Movie with Worksheet Extension

Part 6 Work Bundle Print

SlideSpark Science

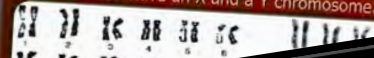


MIDDLE-LEVEL EDUCATIONAL RESOURCES

Interactive slideshows provide the roadmap for an amazing learning experience for students in grades 5-9. A Detailed set of work bundles chronologically follow the digital learning, providing a clear and intuitive roadmap to understanding. As the teacher or student advances through a slideshow, exciting hands-on activities, fantastic visuals, fill-in notes, review opportunities, video links, assessments, and much more are strategically placed throughout. Interactive learning unfolds step by step and supported by the work bundle to reach all types of learners. Everything you need to run to an amazing learning experience is provided in this one-of-a-kind science curriculum.

Each unit in the curriculum is designed to help teachers deliver the best possible learning experience for their students. Our interactive science slideshows are filled with questions and answers, important fill-in notes, hands-on activities, projects, games, built-in quizzes, and end of the unit assessment pieces. Students follow along with a work bundle that documents the entire learning experience for a fantastic review and assessment piece.

- In humans, they're 22 numbered pairs of chromosomes called autosomes.
- The 23rd pair of chromosomes are the sex chromosomes.
- They determine an individual's gender.
 - Females have two X chromosomes,
 - Males have an X and a Y chromosome.



- Three types of Stem Cells.
 - Adult Stem Cells.
 - Embryonic Stem Cells.
 - Cord Blood Stem Cells.



• Three different types of cloning:

- Gene cloning, which creates copies of genes or segments of DNA.
- Reproductive cloning, which creates copies of whole animals.
- Therapeutic cloning, which creates embryonic stem cells.

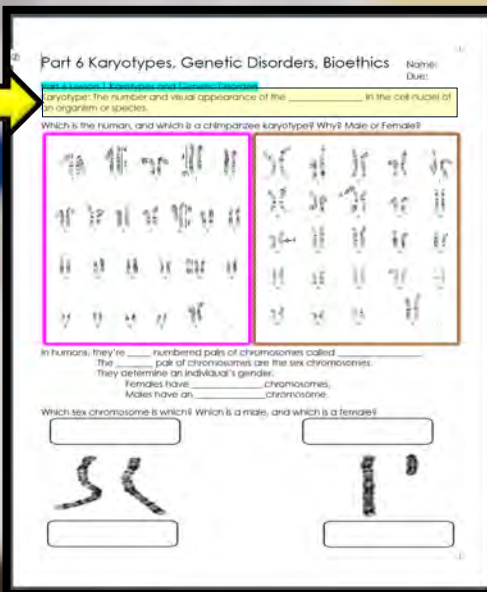
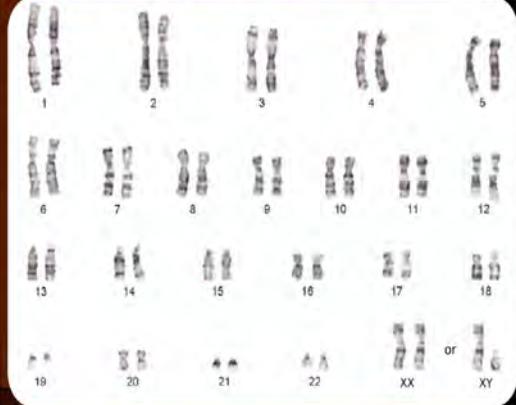


- Which type of cloning is this picture?
- Gene cloning, which creates copies of genes or segments of DNA.
- Reproductive cloning, which creates copies of whole animals.
- Therapeutic cloning, which creates embryonic stem cells.

Gene cloning



- Karyotype: The number and visual appearance of the chromosomes in the cell nuclei of an organism or species.



Guided Notes: Help students record important information in a fun and easy-to-understand way. Designed blue-colored text contain a few pieces of crucial information that students must record into their work bundle to complete the notes. Students will use these important notes throughout the work bundle.

The set-up of the slideshows are designed to make learning fun and interactive for students. With a mix of questions and answers, teachers can use these slides to get their students thinking and actively participating in their education. Plus, the answers are always revealed on the next slide, providing students with immediate feedback and helping teachers assess their understanding.

- Which is the **human** and which is the chimpanzee karyotype?

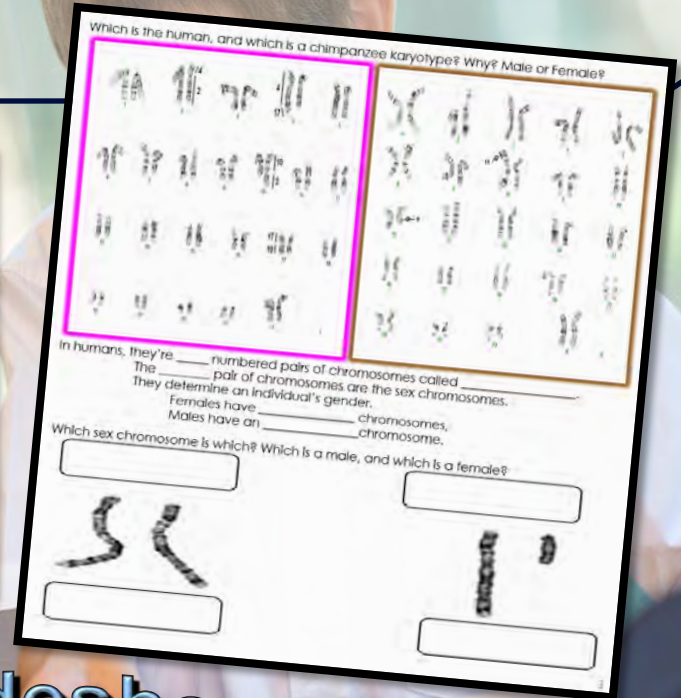


- Which is the **human** and which is the chimpanzee karyotype?



Next Slide

slideshow supports
Work Bundle



Lesson Planning

Daily lessons space exciting hands-on activities, red slide notes, video and academic links, projects, simulations, readings, built-in quizzes, and review opportunities throughout the slideshows. A typical day may have many different learning styles being targeted. Daily lesson planning becomes advancing through the slideshow roadmap the night before. Each lesson is roughly 50 minutes, but sometimes things can speed up or slow down. The best strategy is just to go at your classes own pace. The work bundle chronologically follows the interactive slideshow and you can always spend extra time assessing the quality of the writing within. If you don't quite finish a lesson, you can always pick it up the next day where you left off. The only real trick in timing is not starting a larger activity if you don't have the available time to complete. The slideshows have been designed to be a low stress, go at your classes own pace experience. Most activities are designed to be cost effective, using general materials that can be gathered from your local stores.

	<u>Part 6 Lesson 1 Karyotypes</u> Google Slides		<u>Part 6 Lesson 2 Genetic Dis...</u> Google Slides
	<u>Part 6 Lesson 4 GMO's</u> Google Slides		<u>Part 6 Lesson 5 Stem Cells</u> Google Slides
	<u>Part 6 Lesson 6 Cloning and...</u> Google Slides		<u>Part 6 Lesson 3 Bioethics O...</u> Google Slides

Lessons chronologically follow a single work bundle

Follow Along Work Bundle

Each science unit comes with several work bundles. The bundles should be printed before the unit begins and distributed to the students on the first day of the unit. The work bundles will be due shortly after the completion of the unit. The work bundle will become a resource for the review games, crossword puzzles, and will be collected for assessment. The work bundle follows the entire learning experience and will be used every day. They are chronological to the lessons and provide places to record fill-in notes, answer questions, collect data, graph and much more. An answer version is provided that can be distributed to your support professionals. A digital version of the work bundle and some writable .pdf versions are provided if you want to go paperless. These work bundles are perfect for students looking for an easy and organized way to track their progress and stay on top of their studies.

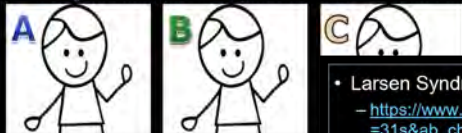
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Built-in Links

Our science education program is designed with the modern, multimedia learner in mind, and our video and academic links are a perfect complement to our educational materials. These short clips or amazing interactive sites are embedded into the slideshow at just the right places for a fantastic review. Whether you're studying biology, chemistry or physics, our video links are an excellent way to reinforce

your learning.

- **Virtual Karyotype Lesson (Easy / Quick Option)**
 - http://www.biology.arizona.edu/human_bio/activities/karyotyping/karyotyping.html
 - Please record three stick people with their letter and tell me about their karyotype / disorder as you navigate the site. Additional Research = ☺ teacher



- Virtual Karyotype Lab (Optional / Longer)
 - More difficult with lots of cutting (Stay Organized!)
 - Have envelopes handy. If chromosomes get mixed between groups it's all over.
 - <http://www3.nd.edu/~nismec/biomodel/mod9/9%20Human%20Karyotyping%20Activity.pdf> (more difficult)



- Video Link! What are GMO's
 - <https://www.youtube.com/watch?v=sH4bi60alZU>



- Optional. Virtual Cloning Lesson
 - https://learn.genetics.utah.edu/content/cloning/clic_kandclone



- Clone species that are endangered or that have gone extinct.
 - It's not as easy as it sounds. 5 minute SciShow
 - https://www.youtube.com/watch?v=mvXDPLx8-Tl&ab_channel=SciShow



- Interview with Graig Venter about the creation of synthetic life.
– http://www.youtube.com/watch?v=haMOJ5ga_ZI



- Human Embryonic Stem Cells
 - <https://www.youtube.com/watch?v=dly->



- **Larsen Syndrome. A Success Story**
 - https://www.youtube.com/watch?v=k9Ts8jXw5ml&t=31s&ab_channel=Children%27sWisconsin

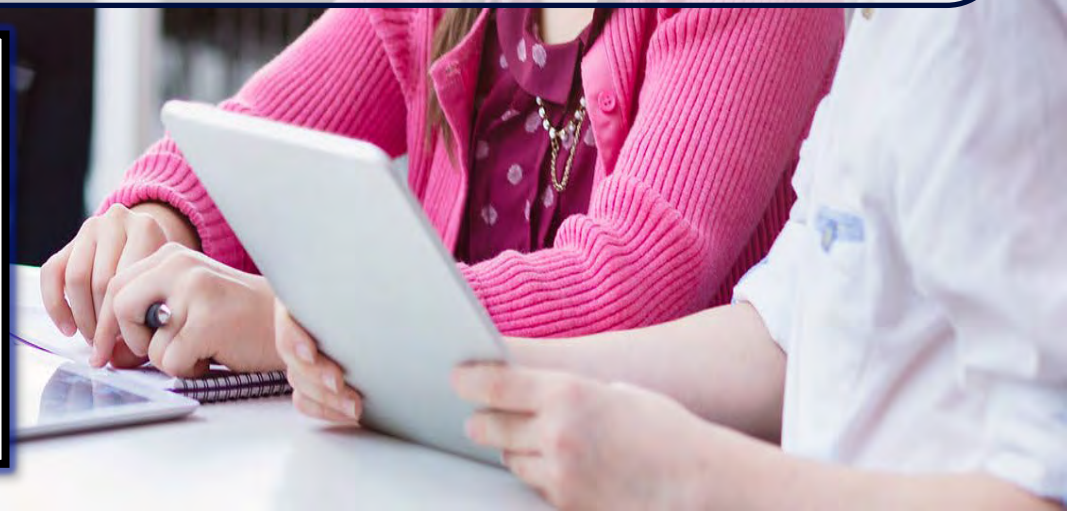


- [illegible]

Google Classroom Compatible

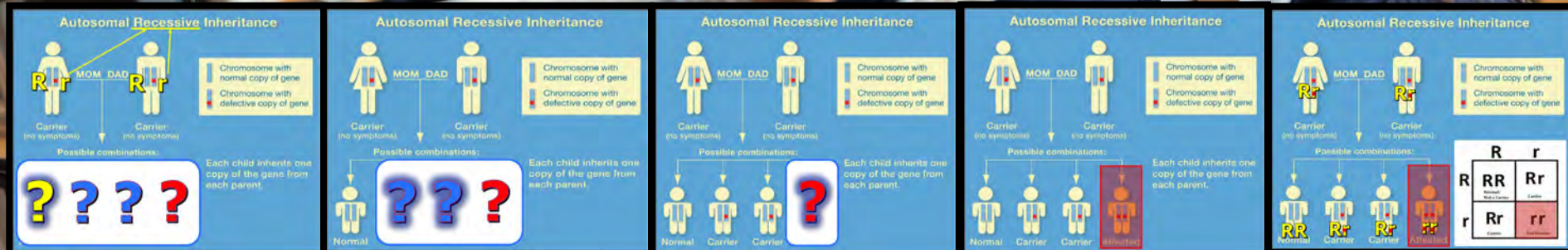
Our digital learning programs are designed for students to learn science in a flexible and engaging environment. Our Google Classroom-compatible units provide a seamless learning experience whether your students are in the classroom or learning from home. Our step-by-step slideshows and student work bundles ensure that students can complete their work independently. The PowerPoint Slideshows and step-by-step work bundles can easily be loaded to your Google Drive and posted in your Google Classroom. These are great for daily lessons, students who need additional time, and for a student who was absent and looking to catch up in their work bundle.

	<u>Part 6 Lesson 1 Karyotypes</u> Google Slides		<u>Part 6 Lesson 2 Genetic Dis...</u> Google Slides
	<u>Part 6 Lesson 4 GMO's</u> Google Slides		<u>Part 6 Lesson 5 Stem Cells</u> Google Slides
	<u>Part 6 Lesson 6 Cloning and...</u> Google Slides		<u>Part 6 Lesson 3 Bioethics O...</u> Google Slides

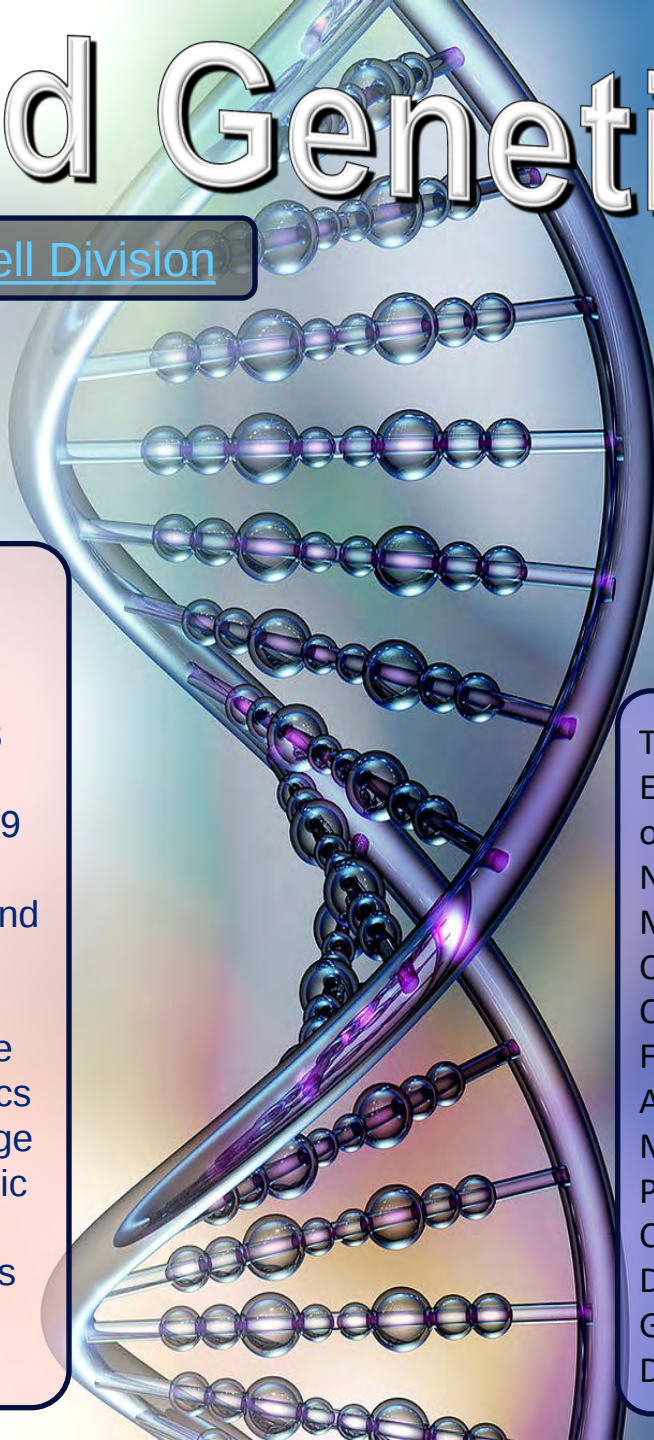


Built-in Questions and Assessments

Many slides will have relevant terms covered with a box. When advancing through the slideshow an outline around the box will glow with a bright color. The next slide will make the box disappear. These slides allow the teacher to call upon students or table groups / check for understanding before advancing. The team at SlideSpark has found that using this technique helps to keep the students focused. Constantly recalling and reviewing information learned is necessary when moving through a large unit. The slideshows don't just give everything away for free. Students should be able to demonstrate knowledge before moving on. Some slides have full questions instead of just covered terms. In these slides, the teacher should encourage small group work. The teacher can then call upon one or two groups to share before advancing the slide. The next slide will always reveal the correct answer.



DNA and Genetics Unit



DNA and Genetics Unit, Cell Division

DNA and Genetics Unit

42 Lessons 6 Parts. (8th-10th Most Difficult) Part 1 is an Introduction to DNA and contains 9 Lessons and 13 Page Work Bundle. Part 2 about Mitosis and contains 6 Lessons and 9 Page Work Bundle. Part 3 explores Cancer / Anti-Smoking and Vaping and has 8 Lessons and 9 Page Work Bundle. Part 4 investigates Meiosis and contains 4 Lessons and 12 Page Work Bundle. Part 5 is about Genetics and contains 12 Lessons and 16 Page Work Bundle. Part 6 Explores Genetic Disorders, Karyotypes and some issues in Bio-Ethics. It has 6 Lessons and 11 Page Work Bundle.

The DNA and Genetics Unit: DNA, DNA Extraction, Structure of DNA, Discovery of the Double Helix, Rosalind Franklin, Nucleotides, RNA, Cell Division, Mitosis, Phases of Mitosis, Chromosomes, Cancer, Ways to Avoid Cancer, What is Inside a Cigarette?, Facts about Smoking?, Anti-Smoking Ads, Meiosis, Phases in Meiosis, Mendelian Genetics, Gregor Mendel, Punnett Squares, Probability, Dihybrid Cross, Codominance, Incomplete Dominance, Karyotypes, Bio-Ethics, GMO's, Genetic Disorders, Stem Cell Debate, Cloning Debate.

Part 1: DNA 9 Lessons of 50 minutes and 13 Page Follow Along Work Bundle, Introduction to DNA, DNA Extraction Lab with Split Peas, DNA structure and Role, Double Helix, Flow of Information, DNA to RNA to Proteins, Transcription, Translation, Friedrich Miescher Isolation of DNA, DNA's Discovery Case Study and Reading, Watson and Crick 1953, Maurice Wilkins, Rosalind Franklin, X-Ray Diffraction, DNA's Structure, Step by Step Drawing and Labeling of DNA, Nucleotide, Base Pairs, Adenine, Thymine, Cytosine, Guanine, Games with Base Pairs, Phosphate Backbone, Ribose Sugar, RNA, Differences between RNA and DNA, Build DNA Model, Review of the Flow of Information, DNA Replication, Step by Step Diagram of DNA Replication, Inherited vs. Acquired Traits, Eukaryotic Cells, Prokaryotic Cells, Box Game Review, Crossword Puzzle, Unit Assessment.

Parts 2-4, Mitosis, Cancer, Meiosis: Part 2 Cell Division: 6 Lessons of 50 minutes and 9 Page Follow Along Work Bundle, Why do we Age?, Mitosis, Time Lapse of Cells Dividing, Chromosomes, Structure of a Chromosome, DNA Wrapping, Chromatin vs. Chromosome, Steps Chromosome formation, Phases of Mitosis, PPMAT, Details with Visuals and Explanations, of Each Phase, Interphase, Prophase, Prometaphase, Metaphase, Anaphase, Telophase, Cytokinesis, Mitosis Song, Review of Phases with Visuals, Complete a Mitosis Puzzle Activity, Visual Quiz of Mitosis, Box Game Review, Explanation of Why we Age, Mitosis Simulation with Gummy Worms, Crossword Puzzle, End Unit Assessment

Parts 2-4, Mitosis, Cancer, Meiosis: Part 3: Cancer, 8 Lessons of 50 Minutes and 9 Page Follow Along Work Bundle, What is Cancer?, Lifestyle Choices to help aid in the prevention of Cancer, Skin Cancer, Dangers of Skin Cancer, Ways to avoid UV Exposure, Dangers of Tanning, Abcde's of Understanding Skin Moles and Cancer, Dangers of Smoking, Starting Anti-Tobacco Campaign Project, Dissection of a Typical US Blended Cigarette, Case Study on the Filter and how they don't work, Facts about Smoking, Start of Ad Campaign Portion of Unit, Students watch Anti-tobacco ads and reflect on their usefulness, Visual Tour of some harmful chemical in cigarettes, Full Ingredient List, Nitrosamines, How Chemicals Impact DNA, Visual Tour of the Negative Health Impacts Smoking Can Cause, Stroke, Heart Disease, Smokers Lung vs Non-Smoker, Coating of Alveoli in Tar, Neck Breathers, laryngectomy Laryngectomy, tracheostomy, Emphysema, Chronic Bronchitis, Danger of Second Hand Smoke, Buerger's Disease, Hairy Tongue / lingua villosa, Tour of the the nastiest hairy tongues out there, Dangers of Smokeless Tobacco, Mouth and Throat Cancer, Dangers of Smoking while Pregnant, Comparing Twins Study, Vaping, Dangers of Vaping, Popcorn Lung, Wet Lung, A lot Still Unknown, Case Study on JUUL, Nicotine Levels in Vaping / e-juices, Nicotine and the Adolescent Brain, Anti-Tobacco Campaign Projects, Box Game Review, Crossword Puzzle, End Unit Assessment

Parts 2-4, Mitosis, Cancer, Meiosis: Part 4 Meiosis, 4 Lessons of 50 minutes and 12 Page Follow Along Work Bundle, Somatic Cells vs. Gametes, Haploid vs Diploid, The Reproductive System, Ovum, Male Gamete, Step by Step Drawing of Male Gamete, Flagella, Male Gamete Motility, Step by Step Drawing of Ovum, Zygote, Fertilization, Phases of Meiosis, Two Cell Divisions, Synapsis, Homologous Recombination, Meiosis Puzzle Challenge, Independent Orientation, Reduction Division, Genes, Mendel's Law of Segregation, Important Events in Meiosis Review, Mendel's Laws of Heredity, Meiosis Simulation with Gummy Worms as Chromosomes Activity, Box Game Review, Connection of Meiosis to Genetics and Evolution, Crossword Puzzle, End Unit Assessment

Part 5: Genetics: 12 Lesson of about 50 minutes and 16 Page Follow Along Work Bundle, Introduction to Genetics with the exploration of some common phenotypes, Tasting PTC Paper, Case Study Gregor Mendel, Selective Breeding, Descent with Modification, Survival of the Fittest, Heredity / Law of Segregation, Genetic Variation, Pure Breed Offspring, Mendel's Results with Pea Plants F1, F2, Generation, Phenotypes, Genotypes, Flow of Information DNA to RNA to Gene Expression, Fertilization, Asexual Reproduction, Genes and Alleles, Polygenic Traits, Dominant and Recessive Alleles, Vocabulary Review, Mendel's Laws of Heredity, Biologist Nettie Stevens Case Study, Punnett Squares, Monohybrid Crosses, How to complete a Punnett Square, Probability, Homozygous and Heterozygous, Built-in Quiz, Designing Your Child Coin Flip / Learning Terms Activity, More Practice with Punnett Squares, Dihybrid Crosses, Why Inbreeding can lead to mutations, Triple Crosses with Gecko Punnett Square, Complete Dominance, Incomplete Dominance, Codominance, Pedigree Chart, Autosomal Trait vs. Sex linked trait, Five Fingers of Evolution, Box Game Review, Crossword, End Unit Assessment

Part 6: DNA and Genetics Unit: 6 Lessons of 50 minutes and 11 Page Follow Along Work Bundle, Karyotype, X and Y Chromosome, Human Karyotype vs Chimpanzee, Identifying Abnormalities in Karyotypes and their corresponding Disorder, Various Syndromes associated with Genetic Disorders, Sex Linked Disorders, Genetic Disorders with Descriptions, Virtual Lab Karyotype, Genetic Disorder Research Project, Students Partner up and complete research about a Genetic Disorder, Circle Discussion about Genetic Disorders, Bio-Ethics, Some Topics in the Biosciences, Sinking Ship Ethical Dilemma Activity, Genetic Engineering, GMO's, Difference b/t USDA Organics and Non-GMO Verified, Stem Cells, Types of Stem Cells, Embryonic Stem Cells and Stances, Cloning, Different Types of Cloning, Understanding the Differences, Applications of Cloning, Negatives of Cloning, Synthetic Life, Designer Babies, Box Game Review, Crossword Puzzle, Optional Movie with Worksheet Extension

DNA and Genetics Unit

- In 1962, Watson, Crick, and Wilkins won the Nobel Prize for physiology/medicine.
- Franklin had died of Ovarian Cancer.



- There are four different types of **Nucleotides** found in DNA
- A is for Adenine
- G is for Guanine
- C is for Cytosine
- T is for Thymine

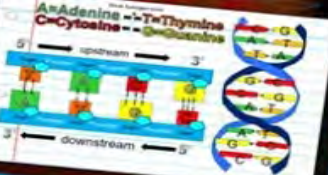


Watson and Crick were able to figure out that one strand went up and one went down.

Watson and Crick also found that if they paired Thymine with Adenine and Cytosine with Guanine.

DNA works like a ladder.

Phosphate backbone



Enzymes are essential for DNA replication



Label your paper with genes & your genetic code



40 Lessons

Interactive Slideshows

- Activity! **Simulating Mitosis with beads.**

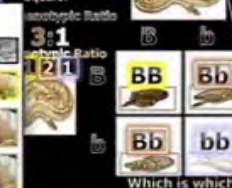
- Gummy Worms will work as well, while board markers.
- Follow video. Teacher will pause and check your work.
- <https://www.youtube.com/watch?v=xGVBH1U1HMA&list=PLy0u0u0u0>



- Decide if the picture / information is a learned behavior or inherited trait. 1-10



- Let's try one Punnett Square.



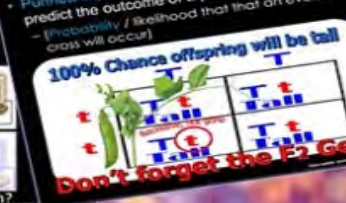
- DNA has the information for our cells to make proteins. **Name A and B?**



- Which two are switched / incorrect?



- Punnett Square: A diagram that is used to predict the outcome of a particular cross - (Probability / likelihood that an event / cross will occur)



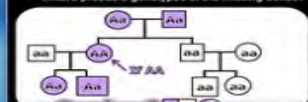
With Follow Along Work Bundles



60 Pages of Work Bundle

Assessments, Video Links, Hands-On Activities, Answer Keys, Games, and more all built-in

- The shaded circles and squares is a dominant allele. Shaded = Dominant
- What's the probable genotypes of the missing boxes?



- This is the name for an organism's genetic makeup, or allele combinations.



- Which gender decides the child's gender?
- Use the Punnett Square below to help you.



- Anyone up for a triple-het x triple-het cross?



- Which is the **homozygous** and which is the **heterozygous**?



- What is the name for an organism's physical appearance or its visible traits.

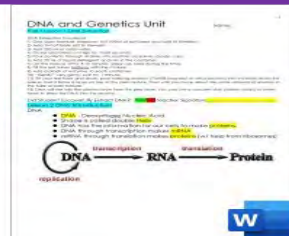


Part 1: DNA 9 Lessons of 50 minutes and 13 Page Follow Along Work Bundle, Introduction to DNA, DNA Extraction Lab with Split Peas, DNA structure and Role, Double Helix, Flow of Information, DNA to RNA to Proteins, Transcription, Translation, Friedrich Miescher Isolation of DNA, DNA's Discovery Case Study and Reading, Watson and Crick 1953, Maurice Wilkins, Rosalind Franklin, X-Ray Diffraction, DNA's Structure, Step by Step Drawing and Labeling of DNA, Nucleotide, Base Pairs, Adenine, Thymine, Cytosine, Guanine, Games with Base Pairs, Phosphate Backbone, Ribose Sugar, RNA, Differences between RNA and DNA, Build DNA Model, Review of the Flow of Information, DNA Replication, Step by Step Diagram of DNA Replication, Inherited vs. Acquired Traits, Eukaryotic Cells, Prokaryotic Cells, Box Game Review, Crossword Puzzle, Unit Assessment.

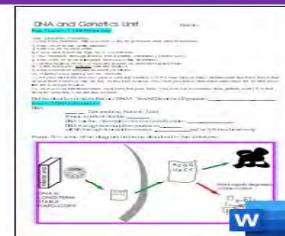
Part 1: DNA



Additional and Printables



Part 1 DNA Work Bundle Answers



Part 1 DNA Work Bundle Print



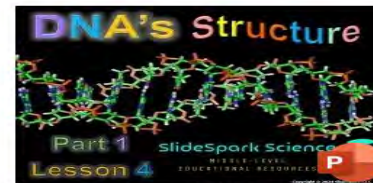
Part 1 Lesson 1 DNA Extraction Lab



Part 1 Lesson 2 DNA Introduction



Part 1 Lesson 3 DNA Discovery



Part 1 Lesson 4 DNA Structure



Part 1 Lesson 5 Build DNA Model RNA



Part 1 Lesson 6 DNA Replication



Part 1 Lesson 7 Inherited Traits



Part 1 Lesson 8 Review Game



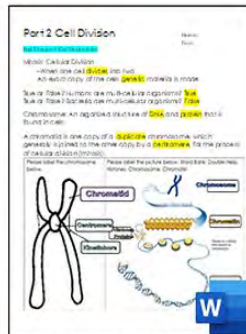
Part 1 Lesson 9 Review Game Answers

Part 2 Cell Division: 6 Lessons of 50 minutes and 9 Page Follow Along Work Bundle, Why do we Age?, Mitosis, Time Lapse of Cells Dividing, Chromosomes, Structure of a Chromosome, DNA Wrapping, Chromatin vs. Chromosome, Steps Chromosome formation, Phases of Mitosis, PPMAT, Details with Visuals and Explanations, of Each Phase, Interphase, Prophase, Prometaphase, Metaphase, Anaphase, Telophase, Cytokinesis, Mitosis Song, Review of Phases with Visuals, Complete a Mitosis Puzzle Activity, Visual Quiz of Mitosis, Box Game Review, Explanation of Why we Age, Mitosis Simulation with Gummy Worms, Crossword Puzzle, End Unit Assessment

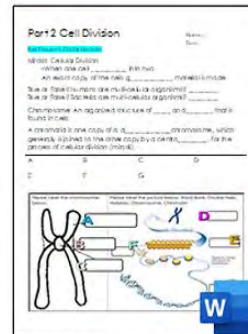
Parts 2-4, Mitosis, Cancer, Meiosis



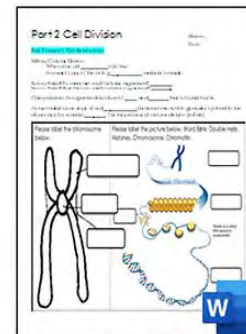
Additional and Printables



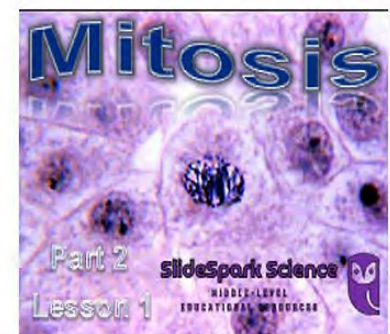
Part 2 Answers Work Bundle Print



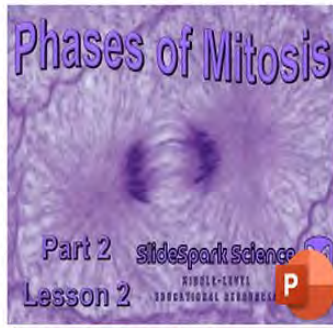
Part 2 Cell Division Work Bundle Digital



Part 2 Cell Division Work Bundle Print



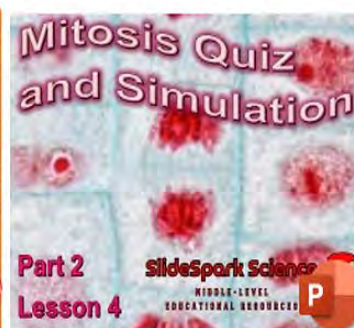
Part 2 Lesson 1 Cell Division Intro



Part 2 Lesson 2 Phases Mitosis



Part 2 Lesson 3 Mitosis Review



Part 2 Lesson 4 Simulation and Quiz



Part 2 Lesson 5 Review Game

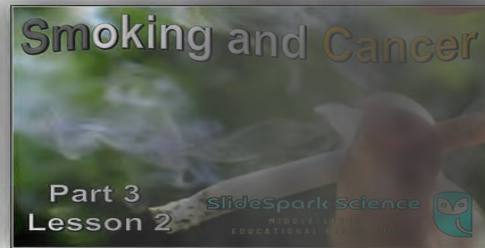


Part 2 Lesson 6 Answers Review Game

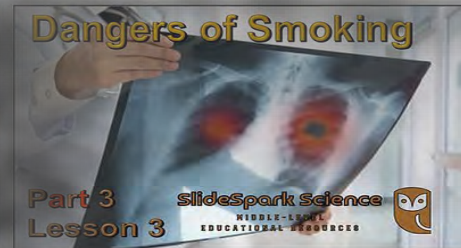
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Part 3 Lesson 1 Cancer and Skin Cancer



Part 3 Lesson 2 Smoking and Cancer



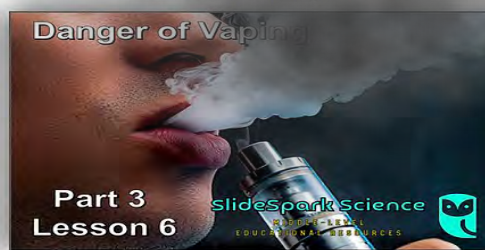
Part 3 Lesson 3 Smoking Cont I



Part 3 Lesson 4 Smoking Cont II



Part 3 Lesson 5 Smoking Cont III



Part 3 Lesson 6 Vaping Dangers



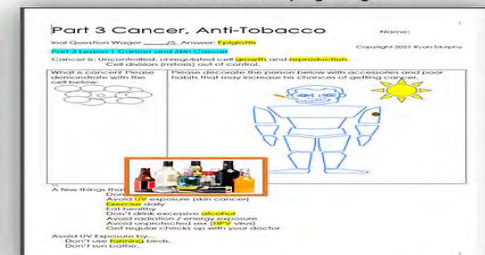
Part 3 Lesson 7 Campaign and Wrap Up



Part 3 Lesson 8 Review Game



Part 3 Lesson 9 Review Game Answers



Part 3 Work Bundle Answers



Part 3 Work Bundle Print

Parts 2-4,
Mitosis, Cancer,
Meiosis

Part 4 Meiosis, 4 Lessons of 50 minutes and 12 Page Follow Along Work Bundle, Somatic Cells vs. Gametes, Haploid vs Diploid, The Reproductive System, Ovum, Male Gamete, Step by Step Drawing of Male Gamete, Flagella, Male Gamete Motility, Step by Step Drawing of Ovum, Zygote, Fertilization, Phases of Meiosis, Two Cell Divisions, Synapsis, Homologous Recombination, Meiosis Puzzle Challenge, Independent Orientation, Reduction Division, Genes, Mendel's Law of Segregation, Important Events in Meiosis Review, Mendel's Laws of Heredity, Meiosis Simulation with Gummy Worms as Chromosomes Activity, Box Game Review, Connection of Meiosis to Genetics and Evolution, Crossword Puzzle, End Unit Assessment

Parts 2-4, Mitosis, Cancer, Meiosis



Part 4 Lesson 1 Sex Cells



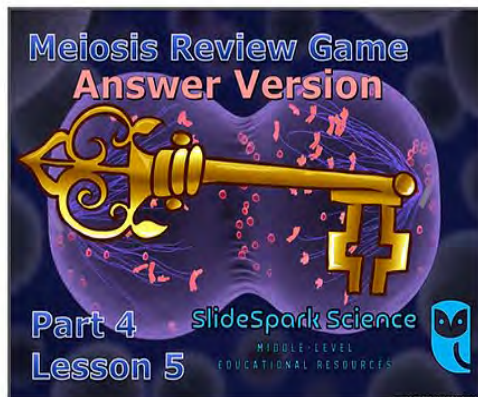
Part 4 Lesson 2 Meiosis



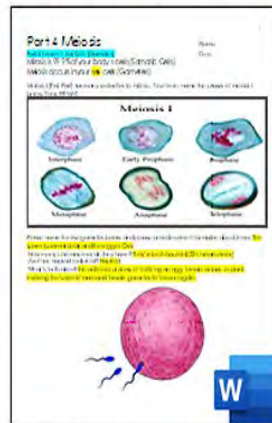
Part 4 Lesson 3 Meiosis Wrap Up



Part 4 Lesson 4 Meiosis Review Game



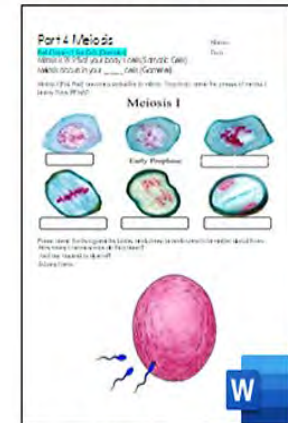
Part 4 Lesson 5 Answer Review Game



Part 4 Work Bundle Answers



Part 4 Work Bundle Digital

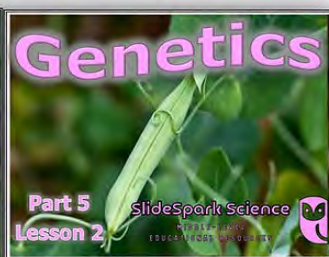


Part 4 Work Bundle Print

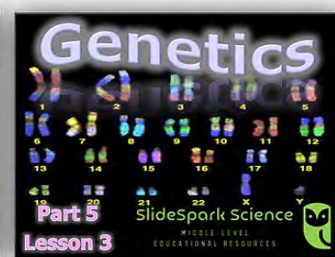
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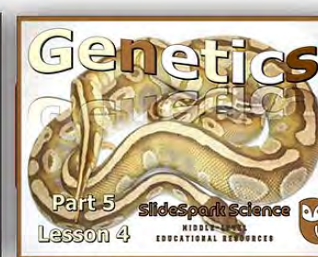
Part 5 Lesson 1 Genetics



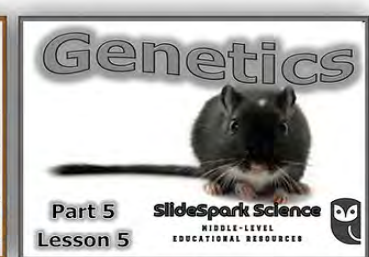
Part 5 Lesson 2 Mendel and terms



Part 5 Lesson 3 Genetics Alleles



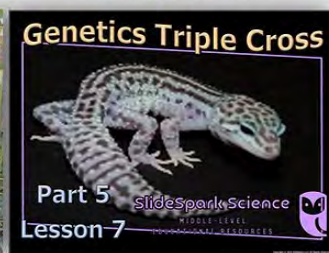
Part 5 Lesson 4 Probability Punnett Sq



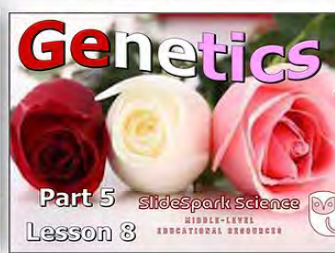
Part 5 Lesson 5 Punnett Sq cont.



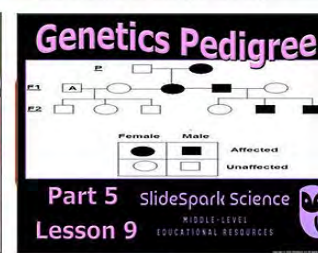
Part 5 Lesson 6 Dihybrid Cross



Part 5 Lesson 7 Triple Cross



Part 5 Lesson 8 Codominance More



Part 5 Lesson 9 Pedigree



Part 5 Lesson 10 Wrap-Up



Part 5 Lesson 11 Review Game



Part 5 Lesson 12 Review Game Answers



Part 5 Work Bundle Answers

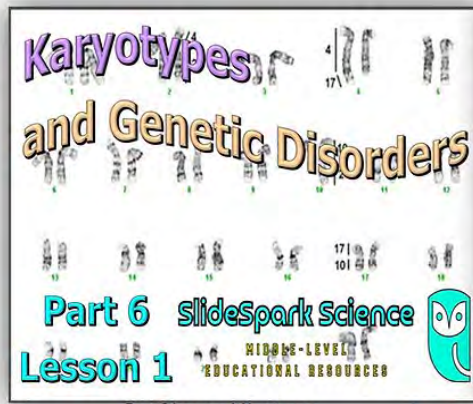


Part 5 Work Bundle Print

**Part 5:
Genetics**

Part 6: DNA and Genetics Unit 6 Lessons of 50 minutes and 11 Page Follow Along Work Bundle, Karyotype, X and Y Chromosome, Human Karyotype vs Chimpanzee, Identifying Abnormalities in Karyotypes and their corresponding Disorder, Various Syndromes associated with Genetic Disorders, Sex Linked Disorders, Genetic Disorders with Descriptions, Virtual Lab Karyotype, Genetic Disorder Research Project, Students Partner up and complete research about a Genetic Disorder, Circle Discussion about Genetic Disorders, Bio-Ethics, Some Topics in the Biosciences, Sinking Ship Ethical Dilemma Activity, Genetic Engineering, GMO's, Difference b/t USDA Organics and Non-GMO Verified, Stem Cells, Types of Stem Cells, Embryonic Stem Cells and Stances, Cloning, Different Types of Cloning, Understanding the Differences, Applications of Cloning, Negatives of Cloning, Synthetic Life, Designer Babies, Box Game Review, Crossword Puzzle, Optional Movie with Worksheet Extension

Part 6: DNA and Genetics Unit



Karyotypes and Genetic Disorders

Part 6 Slidespark Science
Lesson 1 MIDDLE-LEVEL EDUCATIONAL RESOURCES

Part 6 Lesson 1 Karyotypes

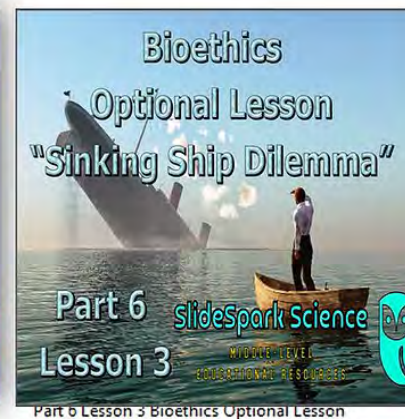


Normal HFE Gene C282Y Mutation

Genetic Disorders Research

Part 6 Lesson 2 Slidespark Science
(1 Day Research) (1 to .5 Day Present) MIDDLE-LEVEL EDUCATIONAL RESOURCES

Part 6 Lesson 2 Genetic Disorder Research

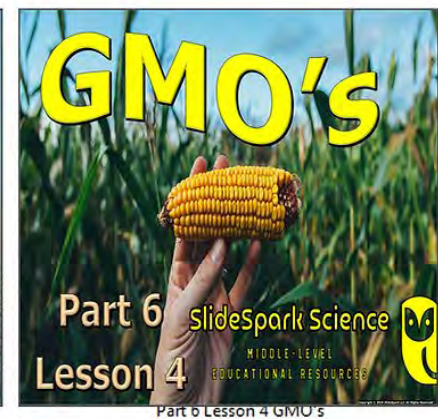


Bioethics

Optional Lesson "Sinking Ship Dilemma"

Part 6 Slidespark Science
Lesson 3 MIDDLE-LEVEL EDUCATIONAL RESOURCES

Part 6 Lesson 3 Bioethics Optional Lesson



GMO's

Part 6 Slidespark Science
Lesson 4 MIDDLE-LEVEL EDUCATIONAL RESOURCES

Part 6 Lesson 4 GMO's



Stem Cells

Part 6 Slidespark Science
Lesson 5 MIDDLE-LEVEL EDUCATIONAL RESOURCES

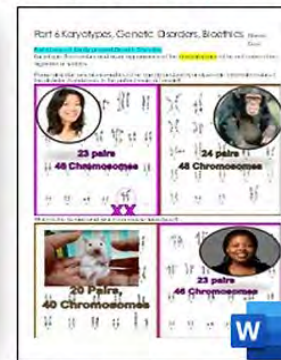
Part 6 Lesson 5 Stem Cells



Cloning

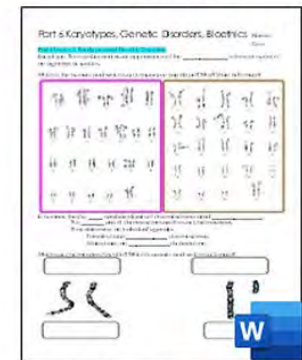
Part 6 Slidespark Science
Lesson 6 MIDDLE-LEVEL EDUCATIONAL RESOURCES

Part 6 Lesson 6 Cloning and Wrap Up



Part 6 Karyotypes, Genetic Disorders, Bioethics, Stem Cells, Cloning, GMO's, Synthetic Life, Designer Babies, Box Game Review, Crossword Puzzle, Optional Movie with Worksheet Extension

Part 6 Work Bundle Answers



Part 6 Karyotypes, Genetic Disorders, Bioethics, Stem Cells, Cloning, GMO's, Synthetic Life, Designer Babies, Box Game Review, Crossword Puzzle, Optional Movie with Worksheet Extension

Part 6 Work Bundle Print

Curriculum Guide

Number of Lessons in each unit (50 min, daily lessons) and difficult rating scale / intended grade level.

 =Easier,

 = More difficult,

 =Most difficult

Earth Science Units	Daily Lessons	Intended Grade	
Geology Topics Unit	60 Lessons	6-8 medium difficulty	
Weather and Climate Unit	40 Lessons	6-8 medium difficulty	
Astronomy Unit	60 Lessons	6-8 medium difficulty	
Weathering, Soil Sciences	28 Lessons	5-7 easier	
Rivers and Water Quality	25 Lessons	5-7 easier	
Water Molecule Unit	20 Lessons	5-7 easier	

Life Science Units

Life Science Units	Daily Lessons	Intended Grade	
Ecology Feeding Levels Unit	13 Lessons	5-6 easier	
Ecology Interactions Unit	30 Lessons	5-6 easier	
Ecology Abiotic Factors Unit	24 Lessons	5-6 easier	
Botany Unit	50 Lessons	5-7 easier	
Evolution and Natural Selection	40 Lessons	5-7 easier	
Taxonomy and Classification	50 Lessons	6-8 medium difficulty	
Infectious Diseases Unit	30 Lessons	7-9 more difficult	
DNA and Genetics Unit	42 Lessons	8-10 most difficult	
Human Body Systems Unit	85 Lessons	6-8 medium difficulty	
Cell Biology Unit	30 Lessons	8-10 most difficult	

Physical Science

	Daily Lessons	Intended Grade	
Laws of Motion and Machines Unit	33 Lessons	8-10 most difficult	
Matter Energy and the Environment	58 Lessons	7-10 medium difficulty	
Atoms and Periodic Table Unit	44 Lessons	8-10 most difficult	
Science Skills Unit	30 Lessons	5-7 medium difficulty	

[Physical Science Curriculum](#)

[Entire SlideSpark Science Curriculum](#)



Dear Valued Educator,

Our fully editable .pptx and .doc resources are perfect for educators looking to bring enthusiasm and creativity to their lessons. We encourage you to make changes to fit your needs and style. As science educators, we're committed to providing students with the tools they need to succeed in the classroom and beyond. Each unit in the curriculum includes a range of resources that have been developed through extensive research and use in a busy classroom. Our teaching approach is designed to make science education engaging and exciting for learners of all ages. We offer a one-of-a-kind science curriculum that will challenge, inspire, and educate students to become tomorrow's scientists and leaders. Join us today and learn more about how our program can help you achieve your classroom goals.

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Sincerely,

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SlideSpark Science

MIDDLE-LEVEL
EDUCATIONAL RESOURCES



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