HUMAN SCIENCE Lesson Plan

Day 1: Meiosis Mitosis~The Great Divide

Outcomes for Today

2. Mutation and sexual reproduction lead to genetic variation in a population. As a basis for understanding this concept:

2.a Students know meiosis is an early step in sexual reproduction in which the pairs of chromosomes separate and segregate randomly during cell division to produce games containing one chromosome of each type.

PREPARE

1. Background Background knowledge to engage the content

How do you get pregnant?

We all know *how* you get pregnant. But not actually ***how*** you get pregnant. Pregnancy occurs during sexual reproduction. Sex cells are the cells involved in reproduction. During this time a sperm cell (male) penetrates the egg (female) and then the cells start to divide.

In regular human cells there are 46 chromosomes. When the cell divides the chromosomes copy themselves and then the cell divides. Each new cell has an exact set of 46 chromosomes.

The male and female sex cell only has 23 chromosomes each. When the sperm fertilizes the egg the chromosomes join together making one complete set of 46. When the cell divides it is then an exact replica of the male and female cell carrying traits from both the mother and the father.

"Meiosis." *World Book Discover.* World Book, 2010. Web. 12 July 2010.

2. Word Wall vocabulary words to teach and add to the Word Wall.

Meiosis:	Type of cell division that only takes place in sex cells.
Reproduction:	The making of a new living thing.
Gametes:	Sex cells used in reproduction.
Chromosomes:	Structures in cells, which carry genes.
Genes:	Determines how a body develops. The male cell carries half and the female cells carry half.

READ

3. View

Go to:	**www.discoveryeducation.com (Subscription Based Website)**
Search:	Meiosis (located in video segments)
Locate:	Meiosis (a segment of Cell Division). (approximate run time 03:48)
Article Name:	Mitosis and Meiosis – Insights and Facts Asexual and Sexual Reproduction of Chromosomes and Cytokinesis **http://scientificinquiry.suite101.com/article.cfm/mitosis_and_meiosis_insights_and_facts#ixzz0tbirtQAP**

RESPOND

4. Visual Process.

Venn Diagram (Compare and contrast Mitosis and Meiosis):

- Using your prior knowledge of Mitosis and what you have learned today about Meiosis create a Venn Diagram. Compare and contrast the two processes and how they affect cell division.

Mnemonic Device:

- Create a Mnemonic Device that you can use to tell the difference between Mitosis and Meiosis.

EXPLORE

5. Activity Explore more deeply with a visual or oral language activity.

Activity located in the lesson plan for Meiosis Day 2

6. Discussion Ask discussion questions that engage at many levels

Key Questions

- How does mitosis and meiosis differ?
- Why does the male and female sex cell only have 23 chromosomes?
- What would happen if sex cells had a full set of 46 chromosomes?
- Why is it important for children to have traits from both the mother and father?

EXTEND

7. Write, Draw or Speak.

Science Journal:
In today's journal list 5 things your learned based on the video, article, or activity.

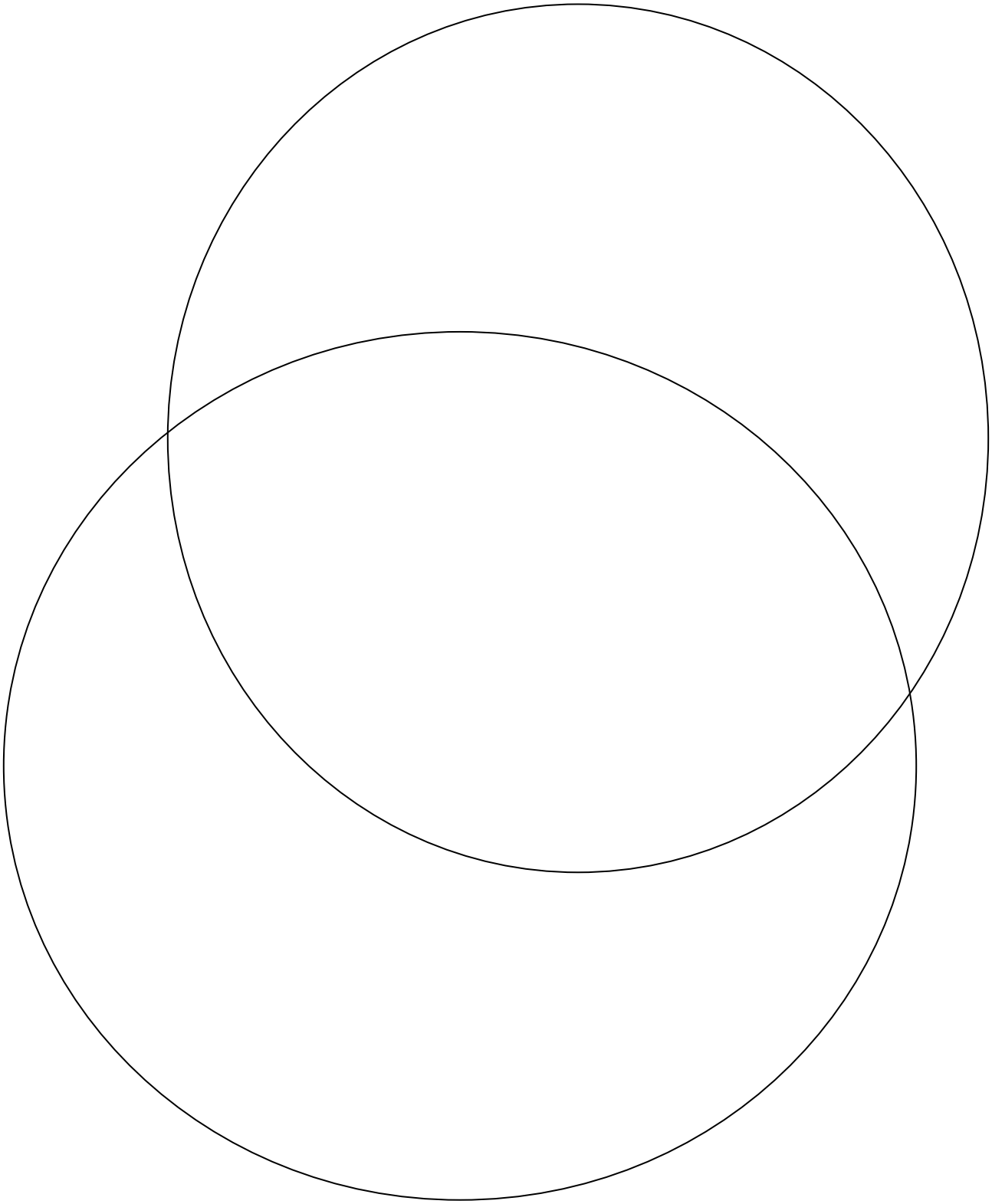
8. Close Close by extending today's lesson to what you can do in your life and the world.

Students should complete the chart below based on their learning from the day. They should fill in the chart with one change and one habit per day.

- *Change I can make = decreasing bad habits and bad choices;*
- *Habit I can build = Increasing healthy habits and choices*

Change I can make	
Habit I can build	

6g6 Venn Diagram Chart



HUMAN SCIENCE Lesson Plan

Day 2: Meiosis Mitosis—The Great Divide

Outcomes for Today

2. Mutation and sexual reproduction lead to genetic variation in a population. As a basis for understanding this concept:

2.a Students know meiosis is an early step in sexual reproduction in which the pairs of chromosomes separate and segregate randomly during cell division to produce games containing one chromosome of each type.

PREPARE

1. Background Background knowledge to engage the content

How many ways are there to make a baby? (Class discussion)

Based on your prior knowledge come up with a list of ways parents choose to have a child.

This discussion should be school appropriate and include some of the following:

Adoption
Use of a surrogate mother
Invetro-fertilization

2. Word Wall vocabulary words to teach and add to the Word Wall.

Meiosis:	Type of cell division that only takes place in sex cells.
Reproduction:	The making of a new living thing.
Gametes:	Sex cells used in reproduction.
Chromosomes:	Structures in cells, which carry genes.
Genes:	Determines how a body develops. The male cell carries half and the female cells carry half.

READ

3. View

Go to:	**http://PBS.com**
Search:	Meiosis
Locate:	NOVA Online: How Cells Divide: Mitosis Meiosis (approximate run time 08:00)
Article Name:	**The 18 Ways (And Then Some)** by Sarah Holt
Go to:	**www.PBS.com** **http://www.pbs.org/wgbh/nova/baby/18ways.html**

RESPOND

4. Visual Process.

There will be no visual process in today's lesson. Proceed to the activity.

EXPLORE

5. Activity Explore more deeply with a visual or oral language activity.

Go to: **www.PBS.com**
Search: Meiosis
Locate: Nova: How Cells Divide: Mitosis vs. Meiosis
Prepare to review slides with your students.
Print slide show for students.

Meiosis Model:
Create a meiosis or mitosis model.

- Place students in groups of 2 or 3.
- Using pipe cleaners, sketches, or clay have students create a model that shows the steps a cell goes through as it undergoes mitosis or meiosis.
- Have students name and explain each step on their model.
- Once students have completed their model they should explain it to the class.
- As a group have students cite the differences between the two processes.

6. Discussion Ask discussion questions that engage at many levels

Key Questions

- What is the final outcome of mitosis?
- What is the final outcome of meiosis? Why?
- How does cell division help create children?
- Is it ethical for scientist to use technology to create life for parents that can not have children? Why or why not?

EXTEND

7. Write, Draw or Speak.

Science Journal:
In today's journal list:

- Three things that you knew prior to starting the lesson;
- Three things you learned in today's lesson;
- Restate the three things you learned in the form of a question.

8. Close Close by extending today's lesson to what you can do in your life and the world.

Students should complete the chart below based on their learning from the day. They should fill in the chart with one change and one habit per day.

- *Change I can make = decreasing bad habits and bad choices;*
- *Habit I can build = Increasing healthy habits and choices*

Change I can make	
Habit I can build	

HUMAN SCIENCE Lesson Plan

Day 1: Diploid Cells

Outcomes for Today

2. Mutation and sexual reproduction lead to genetic variation in a population. As a basis of for understanding this concept:

2.b Students know only certain cells in a multicellular organism undergo meiosis.

PREPARE

1. Background Background knowledge to engage the content

What is fertility?

Fertility is the ability of an individual or couple to reproduce through normal sexual activity. About 90% of healthy, fertile women are able to conceive. Normal fertility takes place when a healthy sperm (male) is able to penetrate a healthy egg (female).

The sperm has to successfully pass through open ducts in the male testes to the fallopian tubes (female) and then meet the egg. Once the sperm has penetrated the egg it has to successfully attach itself to the lining of the uterus.

Any problem in these steps due to prior health issues, drug or alcohol use, low weight, STI's, or injury can result in the inability to get pregnant or have a healthy child free from birth defects.

2. Word Wall vocabulary words to teach and add to the Word Wall.

Fertilization:	The union of an egg nucleus and a sperm nucleus
Haploid:	A cell containing only one member of each chromosome pair characteristic of a species.
Diploid:	A cell containing both members of every chromosome pair characteristic of a species.
Gamete:	A sex cell. Either an egg cell or a sperm cell formed in meiosis, having half the number of chromosomes as body cells.
Nucleus:	The membranous organelle that houses the chromosomal DNA.
Chromosomes:	Long threadlike group of genes found in the nucleus of all eukaryotic cells and most visible during meiosis and mitosis. Chromosomes consist of DNA and protein.
Centrioles:	Help organize microtubule assembly during cell division.
Cell membrane:	The membrane at the boundary of every cell that serves as a selective barrier to the passage of ions and molecules.

READ

3. View

Go to: **http://www.discoveryeducation.com** **(Subscription Based Website)**
Search: Diploid cells
Locate: Meiosis: Making Haploid Cells used for sexual reproduction
A segment of Biology; Science of Life—Making New Life: The basics of Reproduction

Go to: **www.pbs.org**
Search: Fertility
Locate: Fertility Throughout Life by Lexi Krock

RESPOND

4. Visual Process.

Venn Diagram (Compare and contrast Diploid and Haploid Cells)

- Using your prior knowledge of Mitosis and Meiosis and what you have learned today about Diploid and Haploid cells create a Venn Diagram. Compare and contrast the two processes and how they affect cell division.

EXPLORE

5. Activity Explore more deeply with a visual or oral language activity.

Diploid Haploid Puzzle
Diploid and haploid cells result as a stage of meiosis.

- Create a chart of events that occur during meiosis;
- Across the top of the chart list the cell parts (nucleus, chromosomes, centrioles, spindles, and cell membrane)
- Down the left side, add the phases of meiosis
    - Interphase
    - Prophase I
    - Anaphase I
    - Telophase I
    - Prophase II
    - Metaphase II
    - Anaphase II
    - Telophase II
- Make a grid describing each event that occurs in each cell part during each phase.
- Create your puzzle
  Have students cut the chart apart and then match the phase with its description. They can do this activity in teams.

6. Discussion Ask discussion questions that engage at many levels

Key Questions

- How does mitosis and meiosis differ?
- Why does the male and female sex cell only have 23 chromosomes?
- What would happen if sex cells had a full set of 46 chromosomes?
- Why is it important for children to have traits from both the mother and father?
- What factors contribute to a healthy fertilization? What can happen if the fertilization is not healthy?

EXTEND

7. Write, Draw or Speak.

Science Journal:
Based on today's lesson list 5 things you learned today and how they can affect your choices in the future.

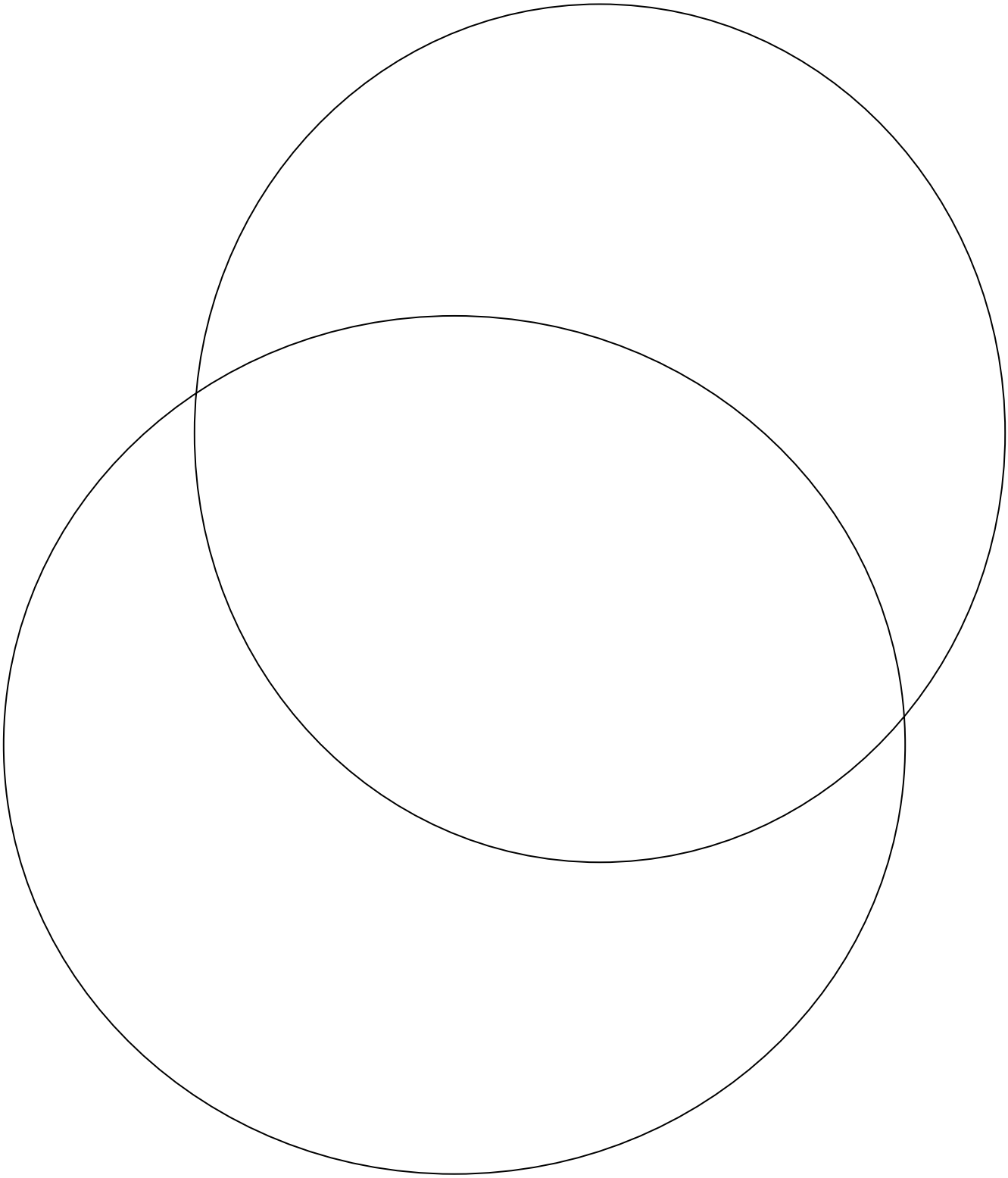
8. Close Close by extending today's lesson to what you can do in your life and the world.

Students should complete the chart below based on their learning from the day.
They should fill in the chart with one change and one habit per day.

- *Change I can make = decreasing bad habits and bad choices;*
- *Habit I can build = Increasing healthy habits and choices.*

Change I can make	Find out where there is access to health care in your community. Go to at least one wellness visit per year.
Habit I can build	

6g6 Venn Diagram Chart



HUMAN SCIENCE Video Notes

Name:

Part I:
Note taking tips: (Cornell Notes)

- Write important details from the video, segment, article, or passage in the second column;
- After you write your notes, return to the first column and add phrases, words and questions related to the details. A sketch or picture may also be helpful.

Title: Date:

Column 1: Phrases, words, questions or a sketch related to the details in column 2.	Column 2:Important Details

Part II:
Note taking tips: (Cornell Notes)

- Summarize the video, article, or passage in the space below. Use your own words.

HUMAN SCIENCE Lesson Plan

Day 2: Meiosis Mitosis—The Great Divide

Outcomes for Today

2. Mutation and sexual reproduction lead to genetic variation in a population. As a basis of for understanding this concept:

2.a Students know meiosis is an early step in sexual reproduction in which the pairs of chromosomes separate and segregate randomly during cell division to produce games containing one chromosome of each type.

PREPARE

1. Background Background knowledge to engage the content

How many ways are there to make a baby? (Class discussion)
What circumstances could prevent couples for being able to have a child?

Based on your prior knowledge come up with a list of ways parents choose to have a child. This discussion should be school appropriate. Topic areas should include but are not limited to:

Invetro-Fertilization
Adoption
Surrogate mother
Traditional methods

2. Word Wall vocabulary words to teach and add to the Word Wall.

Meiosis:	Type of cell division that only takes place in sex cells.
Reproduction:	The making of a new living thing.
Gametes:	Sex cells used in reproduction.
Chromosomes:	Structures in cells, which carry genes.
Genes:	Determines how a body develops. The male cell carries half and the female cells carry half.

READ

3. View

Go to: **http://PBS.com**
Search: Meiosis
Locate: NOVA Online: How Cells Divide: Mitosis Meiosis

Article Name: **The 18 Ways (And Then Some)** by Sarah Holt
Go to: **www.PBS.com**
http://www.pbs.org/wgbh/nova/baby/18ways.html

RESPOND

4. Visual Process.

KWL Chart
As a class create a KWL Chart about conception, fertility, and cell division.

EXPLORE

5. Activity Explore more deeply with a visual or oral language activity.

Go to: www.PBS.com
Search: Meiosis
Locate: Nova: How Cells Divide: Mitosis vs. Meiosis
Prepare to review slides with your students.
Print slide show for students.

Meiosis Model:
Create a meiosis or mitosis model.

- Place students in groups of 2 or 3.
- Using pipe cleaners, sketches, or clay have students create a model that shows the steps a cell goes through as it undergoes mitosis or meiosis.
- Have students name and explain each step on their model.
- Once students have completed their model they should explain it to the class.
- As a group have students cite the differences between the two processes.

6. Discussion Ask discussion questions that engage at many levels

Key Questions

- What is the final outcome of mitosis?
- What is the final outcome of meiosis? Why?
- How does cell division help create children?
- Is it ethical for scientist to use technology to create life for parents that can not have children? Why or why not?

EXTEND

7. Write, Draw or Speak.

Science Journal
Think about the ethical issues surrounding pregnancy. Do you think it is ethical for doctors to help parents get pregnant? What positives come from this practice? What are potential negatives that might arise from this use of technology? Explain your answers and your reasoning.

8. Close Close by extending today's lesson to what you can do in your life and the world.

Students should complete the chart below based on their learning from the day. They should fill in the chart with one change and one habit per day.

- *Change I can make = decreasing bad habits and bad choices;*
- *Habit I can build = Increasing healthy habits and choices*

Change I can make	
Habit I can build	

KWL Chart

K What do you know?	W What do you want to know?	L What have you learned?

HUMAN SCIENCE Lesson Plan

Day 1: William's Syndrome

Outcomes for Today

2. Mutation and sexual reproduction lead to genetic variation in a population. As a basis for understanding this concept:

2.c Students know how random chromosome segregation explains the probability that a particular allele will be in a gamete.

PREPARE

1. Background Background knowledge to engage the content

What is William's Syndrome?

William's syndrome is a genetic condition that is present at birth and can affect anyone. It is characterized by medical problems, including cardiovascular disease, developmental delays, and learning disabilities. These occur side by side with striking verbal abilities, highly social personalities and an affinity for music.

WS affects 1 in 10,000 people worldwide – an estimated 20,000 to 30,000 people in the United States. It is known to occur equally in both males and females and in every culture.

Unlike disorders that can make connecting with your child difficult, children with WS tend to be social, friendly and endearing. Parents often say the joy and perspective a child with WS brings into their lives had been unimaginable.

Common features of William's syndrome include:

Characteristic facial appearance
Heart and blood vessel problems
Hypercalcemia (elevated blood calcium levels)
Low birth-weight / slow weight gain
Feeding problems
Irritability (colic during infancy)
Dental abnormalities
Kidney abnormalities
Hernias
Hyperacusis (sensitive hearing)
Musculoskeletal problems
Overly friendly (excessively social) personality
Developmental delay, learning disabilities and attention deficit disorder
From the William's Association Website

2. Word Wall vocabulary words to teach and add to the Word Wall.

Probability:	The chance that any given event will occur
Genetic Prediction:	Predicting the most possible outcomes of traits based on observation data using gene traits.
Allele:	One of two or more possible forms of a gene, each affecting the heredity trait somewhat differently.
Gamete:	A sex cell. Either an egg cell or a sperm formed by meiosis, having half the number of chromosomes as body cells.

READ

3. View

Go to:	**www.PBS.org**
Search:	Genetic Expression
Locate:	Ghost in Your Genes; A Tale of Two Mice; have students view segments 1, 3, 4, 5 (Approximate run time: 4:00)

RESPOND

4. Visual Process.

KWL Chart:
As a class, have students complete a KWL Chart about traits that would be considered a genetic inheritance. (hint: blood type, ear lobes connected or not, hairline, etc.)

EXPLORE

5. Activity Explore more deeply with a visual or oral language activity.

Genetic Traits

Go to:	**www.discoveryeducation.com (Subscription Based Website)**
Search:	Genetic traits (look in the activity section)
Find:	Patterns in Math and Genetics Watch video segments (approximate run time 5:00) Either individually or in groups have students complete the activity

6. Discussion Ask discussion questions that engage at many levels

Key Questions

- What is the difference between the term gene and allele?
- Why is the study of genetic inheritance important for children? How can it help them?
- How can the study of genetic inheritance potentially hinder you?
- How can genetic inheritance benefit society? (think food production)
- What is genetic engineering?
- What could you consider ethical issues surrounding genetic engineering? Do you think the benefits outweigh the negatives?

EXTEND

7. Write, Draw or Speak.

Science Journal:
Write an entry in your science journal. Why is the ability to track your genetic inheritance important? What decisions can that information help you make in the future?

8. Close Close by extending today's lesson to what you can do in your life and the world.

Change I can make	
Habit I can build	

HUMAN SCIENCE Video Notes

Name:

Part I:
Note taking tips: (Cornell Notes)

- Write important details from the video, segment, article, or passage in the second column;
- After you write your notes, return to the first column and add phrases, words and questions related to the details. A sketch or picture may also be helpful.

Title: Date:

Column 1: Phrases, words, questions or a sketch related to the details in column 2.	Column 2:Important Details

Part II:
Note taking tips: (Cornell Notes)

- Summarize the video, article, or passage in the space below. Use your own words.

KWL Chart

K What do you know?	W What do you want to know?	L What have you learned?

HUMAN SCIENCE Lesson Plan

Day 2: William's Syndrome

Outcomes for Today

2. Mutation and sexual reproduction lead to genetic variation in a population. As a basis for understanding this concept:

2.c Students know how random chromosome segregation explains the probability that a particular allele will be in a gamete.

PREPARE

1. Background Background knowledge to engage the content

Review background knowledge from Day 1 (see below)
What is William's Syndrome?

William's Syndrome is a genetic condition that is present at birth and can affect anyone. It is characterized by medical problems, including cardiovascular disease, developmental delays, and learning disabilities. These occur side by side with striking verbal abilities, highly social personalities and an affinity for music.

WS affects 1 in 10,000 people worldwide – an estimated 20,000 to 30,000 people in the United States. It is known to occur equally in both males and females and in every culture.

Unlike disorders that can make connecting with your child difficult, children with WS tend to be social, friendly and endearing. Parents often say the joy and perspective a child with WS brings into their lives had been unimaginable.

Common features of Williams syndrome include:
Characteristic facial appearance
Heart and blood vessel problems
Hypercalcemia (elevated blood calcium levels)
Low birth-weight / slow weight gain
Feeding problems
Irritability (colic during infancy)
Dental abnormalities
Kidney abnormalities
Hernias
Hyperacusis (sensitive hearing)
Musculoskeletal problems
Overly friendly (excessively social) personality
Developmental delay, learning disabilities and attention deficit disorder
From the William's Association Website

2. Word Wall vocabulary words to teach and add to the Word Wall.

Probability: The chance that any given event will occur

READ

3. View

Go to: **www.discoveryeducation.com (Subscription Based Website)**
Search: Genetics
Find: Understanding Genetics
View: Segment 1, 3, 4 (approximate run time 06:00)
Segment 1—Historical Background of the Science of Genetics (02:25)
Segment 3—Chromosomes and Inheritance (01:05)
Segment 4—Fertility and Meiosis (01:36)

RESPOND

4. Visual Process.

KWL Chart:
As a class, have students complete a KWL Chart about traits that would be considered a genetic inheritance. (hint: blood type, ear lobes connected or not, hairline, etc.)

EXPLORE

5. Activity Explore more deeply with a visual or oral language activity.

Genetic Traits
Go to: **www.discoveryeducation.com (Subscription Based Website)**
Search: Genetic traits (look in the activity section)
Find: Patterns in Math and Genetics
Watch video segments
Segment one: (approximate run time 6:11)
Segment two: (approximate run time 11:15)
Either individually or in groups have students complete the activity
Note: This is a lower level activity. You may want to modify or use your schools math curriculum to support the probability section.

6. Discussion Ask discussion questions that engage at many levels

Key Questions
No questions today

EXTEND

7. Write, Draw or Speak.

Science Journal

How does the study of probability help determine the chance that a child may be born with a certain genetic trait? How do you think this information can help parents and doctors? Would you want to know if your unborn child was at risk for a certain genetic disorder? Why or why not?

8. Close Close by extending today's lesson to what you can do in your life and the world.

Change I can make	
Habit I can build	

HUMAN SCIENCE Lesson Plan

Day 3: Williams Syndrome

Outcomes for Today

2. Mutation and sexual reproduction lead to genetic variation in a population. As a basis for understanding this concept:

2.c Students know how random chromosome segregation explains the probability that a particular allele will be in a gamete.

PREPARE

1. Background Background knowledge to engage the content

What is Cystic Fibrosis?

Cystic fibrosis is an inherited chronic disease that affects the lungs and digestive system of about 30,000 children and adults in the United States (70,000 worldwide). A defective gene and its protein product cause the body to produce unusually thick, sticky mucus that:

- clogs the lungs and leads to life-threatening lung infections; and
- obstructs the pancreas and stops natural enzymes from helping the body break down and absorb food.

In the 1950s, few children with cystic fibrosis lived to attend elementary school. Today, advances in research and medical treatments have further enhanced and extended life for children and adults with CF. Many people with the disease can now expect to live into their 30s, 40s and beyond.

People with CF can have a variety of symptoms, including:

- very salty-tasting skin;
- persistent coughing, at times with phlegm;
- frequent lung infections;
- wheezing or shortness of breath;
- poor growth/weight gain in spite of a good appetite; and
- frequent greasy, bulky stools or difficulty in bowel movements.

Statistics

- About 1,000 new cases of cystic fibrosis are diagnosed each year.
- More than 70% of patients are diagnosed by age two.
- More than 45% of the CF patient population is age 18 or older.
- The predicted median age of survival for a person with CF is more than 37 years.

2. Word Wall vocabulary words to teach and add to the Word Wall.

Genetic Chart:	Chart used to trace genetic traits from generation to generation.
Genetic Expression:	The trait that is expressed once meiosis occurs.
Genetic Inheritance:	Traits that are inherited through the generations.

READ

3. View

Go to:	**http://www.cff.org/AboutCF/**
Search:	Living with Cystic Fibrosis
Locate:	In the Spotlight (article) chose the featured article of the month or previous spotlights Read article as a class
View:	In the Spotlight video (run times vary depending on the video you choose)

RESPOND

4. Visual Process.

Cystic Fibrosis is a genetic trait that is inherited. Based on the article you read and the video create a poster.

- Divide your poster in half;
- On one side list the traits of a person with CF;
- On the other side use pictures to depict how the “In the Spotlight” feature chose to live their life
- Use words and pictures to depict their choice

EXPLORE

5. Activity Explore more deeply with a visual or oral language activity.

Go to:	**http://www.pbs.org**
Search:	Chromosome Segregation
Visit:	Nove/Teachers/ Classroom Activity/Judgment Day Prepare and have students participate in section one of the activities. Materials and web resources are located at the above mentioned website.

Class Chart: (class discussion and chart data)
As a class discuss inherited traits such as:

- Attached or detached earlobes, freckles, widow’s peak, cleft chin, dimples, thumb crossover, tongue rolling and hitchhikers thumb types of traits.
- This data can be discussed or you can have the students plot the class data. (How many students have the above traits?)
- Have students chart the data for your class.

6. Discussion Ask discussion questions that engage at many levels

Key Questions

- Why is it helpful to be able to chart and track your family's genetic history?
- In what ways can genetic data help the yourself, the community, and the world?
- Do any other factors besides genes affect genetic inheritance?

EXTEND

7. Write, Draw or Speak.

Science Journal

Based on what you have learned today, how can creating a genetic chart help you with your health history and your future choices? Write 1-2 paragraphs.

8. Close Close by extending today's lesson to what you can do in your life and the world.

Students should complete the chart below based on their learning from the day. They should fill in the chart with one change and one habit per day.

- *Change I can make = decreasing bad habits and bad choices;*
- *Habit I can build = Increasing healthy habits and choices*

Change I can make	
Habit I can build	

HUMAN SCIENCE Video Notes

Name:

Part I:
Note taking tips: (Cornell Notes)

- Write important details from the video, segment, article, or passage in the second column;
- After you write your notes, return to the first column and add phrases, words and questions related to the details. A sketch or picture may also be helpful.

Title: Date:

Column 1: Phrases, words, questions or a sketch related to the details in column 2.	Column 2:Important Details

Part II:
Note taking tips: (Cornell Notes)

- Summarize the video, article, or passage in the space below. Use your own words.

HUMAN SCIENCE Lesson Plan

Day 4: William's Syndrome

Outcomes for Today

2. Mutation and sexual reproduction lead to genetic variation in a population. As a basis for understanding this concept:

2.d Students know new combinations of alleles may be generated in a zygote through the fusion of male and female gametes (fertilization)

PREPARE

1. Background Background knowledge to engage the content

What is a genetic pedigree chart?

A genetic-inheritance pedigree chart is similar to a family tree but more useful for studying the transmission of hereditary diseases. The chart is particularly helpful in examining the occurrence of a genetic condition in a family over several generations. Once the data are collected, it is easy to interpret the results by creating the genetic-inheritance pedigree chart.

Read more: **How to Make a Genetic-Inheritance Pedigree Chart | eHow.com http://www.ehow.com/how_5185836_make-geneticinheritance-pedigree-chart.html#ixzz0vCKtmcKk**

2. Word Wwall vocabulary words to teach and add to the Word Wall.

Genetic Chart:	Chart used to trace genetic traits from generation to generation.
Genetic Expression:	The trait that is expressed once meiosis occurs.
Genetic Inheritance:	Traits that are inherited through the generations.
Genotype:	The genetic make-up of an organism.
Genetic Diploid:	A cell containing both members of every chromosome pair characteristic of a species.
Karyotype:	A method of organizing the chromosomes of a cell in relation to number, size, and type.

READ

3. View

Go to:	**www.discoveryeducation.com (Subscription Based Website)**
Search:	Genetic Chart
Locate:	Biologix: Sex-Linked Inheritance
View:	Organizing Information About Sex-Linked Inheritance in Pedigree Chart (Approximate run time 2:14) The other segments in this video are worth adding if time allots.

RESPOND

4. Visual Process.

Genetic Chart:

Create and label the parts of a genetic chart:

- What does a square represent?
- What does a circle represent?
- What happens if a square or circle is completely filled in?
- What is represented if a square or circle has a dot in it?
- What is represented if a square or circle has a line through it? What additional information should be given with that information?

EXPLORE

5. Activity Explore more deeply with a visual or oral language activity.

Create a genetic chart for a family with the following conditions.

A mother and father have 5 children.

- Dad is a carrier for “Itsybitsy Scratchy”syndrome;
- Mom is affected by “Itsybitsy Scratchy” syndrome;
- Their second child died on May 2, 2010 of an unrelated cause;
- Their fourth child died at birth on November 29, 2007 of “Itsybitsy Scratchy” syndrome;
- Their first child is a carrier;
- Their third child had not signs or symptoms and is not a carrier;
- Their fifth child is affected by “Itsybitsy Scratchy” syndrome.

6. Discussion Ask discussion questions that engage at many levels

Key Questions

- How can a genetic chart help a child whose parents are affected by a condition plan for their future? What decisions can this chart help them make?
- Do you see the pedigree chart as a useful tool in future planning?
- Outside of family planning do you see other uses for a pedigree chart? Explain?
- What situations would make use of a genetic chart almost impossible?
- Why it is important for everyone in a family to have awareness of their family’s medical history?
- Do you think traits and diseases could be prevented by using this chart?

EXTEND

7. Write, Draw or Speak.

Science Journal:
In your journal think of your family and some of their traits—they can be basic: ability to roll their tongue or widow's peak or more sever a genetic disorder such as CF, or even heredity issues such as diabetes or obesity.

- Create a genetic chart for your family.
- Do you think you are at risk for a certain condition?
- What can you do now to help prevent that condition?

An example: I am at risk for diabetes. I can prevent diabetes by exercising 20-30 minutes per day and limiting the carbohydrates I eat.

This chart is for the student's information only and should not be shared with the class.

8. Close Close by extending today's lesson to what you can do in your life and the world.

Students should complete the chart below based on their learning from the day. They should fill in the chart with one change and one habit per day.

- *Change I can make = decreasing bad habits and bad choices;*
- *Habit I can build = Increasing healthy habits and choices*

Change I can make	
Habit I can build	

HUMAN SCIENCE Video Notes

Name:

Part I:
Note taking tips: (Cornell Notes)

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Part II:
Note taking tips: (Cornell Notes)

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HUMAN SCIENCE Lesson Plan

Day 5: William's Syndrome

Outcomes for Today

2. Mutation and sexual reproduction lead to genetic variation in a population. As a basis for understanding this concept:

2.e Students know why approximately half of an individual's DNA sequence comes from each parent.

PREPARE

1. Background Background knowledge to engage the content

What is DNA?

DNA, or deoxyribonucleic acid, is the hereditary material in humans and almost all other organisms. Nearly every cell in a person's body has the same DNA . Most DNA is located in the cell nucleus (where it is called nuclear DNA), but a small amount of DNA can also be found in the mitochondria (where it is called mitochondrial DNA or mtDNA).

An important property of DNA is that it can replicate, or make copies of itself. Each strand of DNA in the double helix can serve as a pattern for duplicating the sequence of bases. This is critical when cells divide because each new cell needs to have an exact copy of the DNA present in the old cell

When and egg is fertilized by a sperm the 23 chromosomes from each cell connect to form the unborn child DNA. Half of the father's traits and half of the mother's traits join together ensuring that no two humans are alike. This helps create genetic variety and ensure that the species can continue.

2. Word Wall vocabulary words to teach and add to the Word Wall.

Chromosomes:	A long thread-like group of genes found in the nucleus of all cells and most visible during mitosis and meiosis. Chromosomes consist of DNA and protein.
DNA:	Deoxyribonucleic acid. The heredity material of most organisms; DNA makes up the genes.
Polypeptides:	A long chain of chemically bonded amino acids.

READ

3. View

Go to: **www.discoveryeducation.com (Subscription Based Website)**
Search: DNA
Locate: Elements of Biology: Genetics: The Molecular Basis of Heredity
View: Entire video approximate run time 18:00

RESPOND

4. Visual Process.

No visual process today

EXPLORE

5. Activity Explore more deeply with a visual or oral language activity.

Web Search
This activity can be an individual project or a group project.
Go to: **http://www.dna.gov/**
Search: Highlights, Solving Crimes, Identifying Persons and Victims, or Post Conviction Testifying
Have students choose one of the search topics and answer the following questions—(worksheet on last page of today's lesson)

6. Discussion Ask discussion questions that engage at many levels

Key Questions

- Why do humans get half of their DNA from their mother and half from their father? What would happen if they did not split their DNA?
- What is unique about the chromosomes and DNA of the sex cells of humans?
- Why is it important for individuals to have traits from both sets of parents? What would happen if we did not?
- Based on today's activity what are the benefits of testing for peoples DNA? What are the negatives of DNA tests?

EXTEND

7. Write, Draw or Speak.

DNA testing can be a benefit to families and to the community but there are also negative effects. Write two paragraphs. Based on your findings from your web search, what are the positive effects of DNA testing? What are the negative effects? What ethical issues should be addressed when using DNA to help grow plants, convict felons, and test for diseases in unborn children?

8. Close Close by extending today's lesson to what you can do in your life and the world.

Students should complete the chart below based on their learning from the day. They should fill in the chart with one change and one habit per day.

- *Change I can make = decreasing bad habits and bad choices;*
- *Habit I can build = Increasing healthy habits and choices*

Change I can make	
Habit I can build	

HUMAN SCIENCE Video Notes

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Part II:
Note taking tips: (Cornell Notes)

- Summarize the video, article, or passage in the space below. Use your own words.

DNA Web Search

This activity can be an individual project or a group project.
Go to: **http://www.dna.gov/**
Search: Highlights, Solving Crimes, Identifying Persons and Victims, or Post Conviction Testifying
Have students answer the following questions.

In the highlights section, what is the main purpose of using DNA in criminal proceedings?

How can DNA be used to help investigators?

Other than using DNA to get a conviction for a crime what other ways can DNA be used to help families and law enforcement?

What are the benefits of using DNA in law enforcement?

What are the negatives?

Use your search engine to find additional ways DNA is being used in the world to benefit us. List 5-7 new innovations.

HUMAN SCIENCE Lesson Plan

Day 1: Is it a boy or a girl?

Outcomes for Today

2. Mutation and sexual reproduction lead to genetic variation in a population. As a basis for understanding this concept:

2.f Students know the role of chromosomes in determining an individual's sex.

PREPARE

1. Background Background knowledge to engage the content

Is it a boy or a girl?

When you are expecting a child that is the question everyone wants to know. Do you buy a cute little dress or a baseball glove? In reality you have a 50-50 chance of being right. But how is sex determined? What happens in the womb to determine if a child is a boy or a girl? Who contributes to the sex genes of a child?

Normal human cells carry 44 chromosomes, 44 are pairs of homologous chromosomes and 2 are sex chromosomes. Females carry two XX Chromosomes and males carry an XY Chromosome. The sex of the child is dependent on how the chromosomes pair and split. If the X of the female and the X of the male pair together a child will be a girl. If the X of the female pairs with the Y of the male the child will be a boy.

2. Word Wall vocabulary words to teach and add to the Word Wall.

Chromosome: Long threadlike group of genes found in the nucleus of all eukaryotic cells and most visible during meiosis and mitosis. Chromosomes consist of DNA and protein.

Homologous: Having the same alleles or genes in the same order of arrangement:

READ

3. View

Go to: **www.PBS.org**
Search: How is sex determined
Locate: NOVA: Life's Greatest Miracle, How is Sex determined

Go to: **www.pbs.org**
Search: How is sex determined
Locate: Scientific American Frontiers; The Gene Hunters
Article: Why the Y? By Steve Rozen**,**
PhD, Genetics Researcher, Whitehead Institute

RESPOND

4. Visual Process.

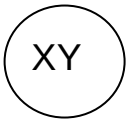
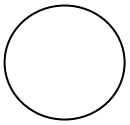
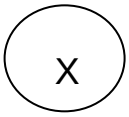
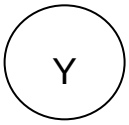
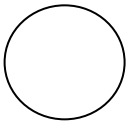
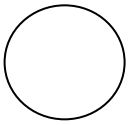
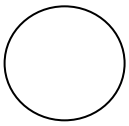
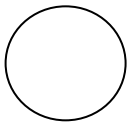
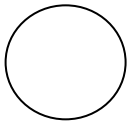
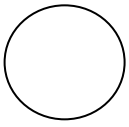
KWL Chart
Create and maintain a class KWL Chart about sex selection. What did students know about how sex was determined in a child, what did they want to know, and what did they learn?

Venn Diagram
Compare and contrast the male sex cell vs. the female sex cells. Create a Venn Diagram to show their similarities and differences.

EXPLORE

5. Activity Explore more deeply with a visual or oral language activity.

Visually represent the process of sexual selection. Given a male healthy sperm fertilizes a female healthy egg. Fill in the chart below.
Once the chart is completed explain the steps that are occurring.

Parent Cells What combination of sex cells do each parent cells possess? (label each cell)	Male Sperm (hint: XY) 	Female Egg 
Normal Cell Split for a sperm and an egg Sketch a sperm and an egg once they have been formed	  (Hint: each egg and sperm should have one sex cell in it)	 
Offspring: Sketch the possible combinations of offspring.	  Write the result of each of the combinations under each offspring	 

6. Discussion Ask discussion questions that engage at many levels

Key Questions

- What are the odds of a sperm cell impregnating an egg? What defense mechanisms hinder the process?
- How is sex determined? Is it a 50-50 chance? What factors contribute to it?
- Why is it important for both the male and the female to be healthy when considering having a child?
- Do you think that your choices now affect the overall health and well being of your child when you conceive? How?

EXTEND

7. Write, Draw or Speak.

Science Journal

- List three things you learned today
- Write those items in the form of a question

8. Close Close by extending today's lesson to what you can do in your life and the world.

Students should complete the chart below based on their learning from the day. They should fill in the chart with one change and one habit per day.

- *Change I can make = decreasing bad habits and bad choices;*
- *Habit I can build = Increasing healthy habits and choices*

Change I can make	
Habit I can build	

HUMAN SCIENCE Video Notes

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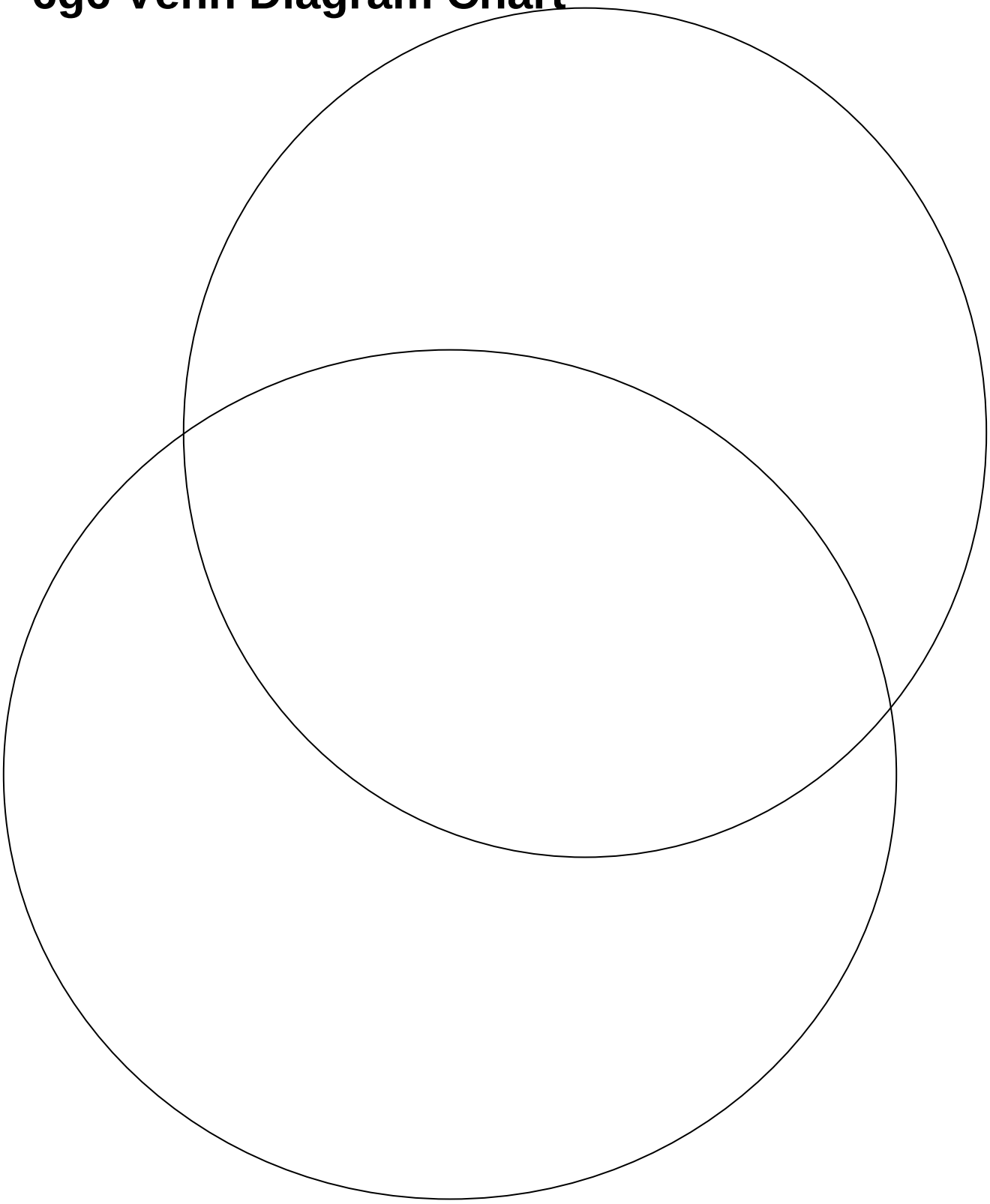
KWL Chart

K What do you know?	W What do you want to know?	L What have you learned?

6g6 Venn Diagram Chart



HUMAN SCIENCE Lesson Plan

Day 1: I Have my mother's eyes and my father's hair

Outcomes for Today

2. Mutation and sexual reproduction lead to genetic variation in a population. As a basis for understanding this concept:

2.g Students know how to predict possible combinations of alleles in a zygote from the genetic make-up of the parents.

PREPARE

1. Background Background knowledge to engage the content

How do you predict genetic traits or diseases?

Genetic traits and diseases are predicted in a number of ways. Parents who know they have a family history or have a genetic disease may choose to seek the advice of a genetic counselor prior to having child. This counselor can meet with the parents and after doing an extensive family history and tests can determine the probability of a child becoming a carrier or having the disease. Parent can then determine if they want to have a child together or choose adoption or egg/sperm donation.

Testing is also done for mothers who are expecting. Due to technology doctors can gain much information about a child with the use of ultra sounds and blood test, among others to test for genetic disorders and possible birth defects.

Testing is recommended for certain groups but it is up to the parents to decide if they choose to have any testing done while pregnant.

2. Word Wall vocabulary words to teach and add to the Word Wall.

Allele:	One or more possible forms of a gene, each affecting heredity trait somewhat differently.
Gamete:	A sex cell. Either an egg cell or a sperm cell formed in meiosis, having half the number of chromosomes as body cells.
Heredity:	The genetic transmission of characteristics from parents to offspring.
Probability:	The chance that any given event will occur.

READ

3. View

Article

Go to: http://kidshealth.org/

Search: Parents; Doctors and Hospitals; Medical Tests and Exams;

Locate: Genetic Testing

RESPOND

4. Visual Process.

Collage:
As a group create a collage that would depict your idea of a “perfect” baby and child. You can use pictures, words, poems, etc. to represent your child.

EXPLORE

5. Activity Explore more deeply with a visual or oral language activity.

Trait Model
When a human egg is fertilized there are many possible trait/gene combinations that can occur. The result is a variety of human traits. . .the probability of any two humans having identical genetic traits is very small. Except, in the cases of identical twins.

You will need cans, sacks, or envelopes (some sort of empty container). One set to represent the genes in the sperm cell and the other to represent the genes in the egg cell. The number of containers should correlate to the number of traits you would like to study.

- Use tag board to represent the genes. Mark them dominant or recessive for that trait. Put each gene into a separate container.
- Have students choose one gene from each parent container and record the result of their offspring.
- Keep a table of the results.
- Have students sketch their offspring once completed
- What is the probability of any two classroom offspring having the same genetic traits?

Activity table attached

6. Discussion Ask discussion questions that engage at many levels

Key Questions

- How can genetic testing during pregnancy be helpful? Do you think it gives you more options?
- What is the reliability of testing for birth defects and genetic testing during pregnancy? If you found out your baby “might” have an issue what would you do?
- What are the moral and ethical issues that surround genetic testing during pregnancy?

EXTEND

7. Write, Draw or Speak.

Using the genetic table you created in today's activity sketch your "offspring" with the traits it inherited.
In 1-2 paragraphs describe your "offspring" and the probability that it has similar traits as another class "offspring".
Discuss your findings with your group and the class.

8. Close Close by extending today's lesson to what you can do in your life and the world.

Students should complete the chart below based on their learning from the day.
They should fill in the chart with one change and one habit per day.

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Change I can make	
Habit I can build	

Genetic Traits Table
(to be used with today's activity)

Trait	Sperm Cell (list if the trait is dominant or recessive from the father cell)	Egg Cell (list if the trait is dominant or recessive from the mother cell)
Example: Hair Color Brown	D1	D2

HUMAN SCIENCE Lesson Plan

Day 2: I Have my mother's eyes and my father's hair

Outcomes for Today

2. Mutation and sexual reproduction lead to genetic variation in a population. As a basis for understanding this concept:

2.g Students know how to predict possible combinations of alleles in a zygote from the genetic make-up of the parents.

PREPARE

1. Background Background knowledge to engage the content

What is biotechnology?

Biotechnology is the use of microorganisms, such as bacteria or yeasts, or biological substances, such as enzymes, to perform specific industrial or manufacturing processes.

Applications include the production of certain drugs, synthetic hormones, and bulk foodstuffs as well as the bioconversion of organic waste and the use of genetically altered bacteria in the cleanup of oil spills.

The application of the principles of engineering and technology to the life sciences; bioengineering.

2. Word Wall vocabulary words to teach and add to the Word Wall.

No Word Wall Words Today.

READ

3. View

Go to: www.PBS.org
Search: Oil Spill
Locate: How to clean up an oil spill
View: As a class

RESPOND

4. Visual Process.

Collage
Create a collage depicting the items in your life that science has contributed to.

EXPLORE

5. Activity Explore more deeply with a visual or oral language activity.

Future of Biotechnology
Go to: **www.iptv.org**
Search: Explore More go to Issues
Locate the links on the right: Explore with your students—Genes and Jobs, Ensuring Genetic Privacy, or Currently Available Test

6. Discussion Ask discussion questions that engage at many levels

Key Questions

- How can genetic testing help the environment and your community?
- What types of jobs and future careers are there in genetics?
- What are some of the Pro's and Con's of genetic testing?
- How has your life been impacted for the positive or negative with genetic testing?
- What are some of the ethical concerns behind genetic testing?

EXTEND

7. Write, Draw or Speak.

Create a "T" Chart that depicts the positives and negatives of genetic testing.

- Think of your local community, the nation, and the world as you create your list.

Have students pick one item on the list. In a paragraph expand on that item. Why is it a positive or negative to society. How can it help or hinder people. What are the long term affects of that item? Use logical reasoning and clear concise points.

8. Close Close by extending today's lesson to what you can do in your life and the world.

Students should complete the chart below based on their learning from the day. They should fill in the chart with one change and one habit per day.

- *Change I can make = decreasing bad habits and bad choices;*
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