Biology
UNIT Genetic Inheritance

October 19th – October 30th

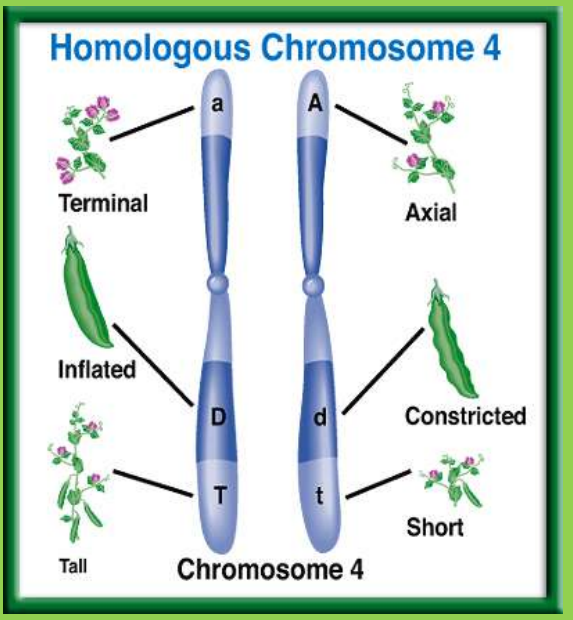
March 28th – April 8th

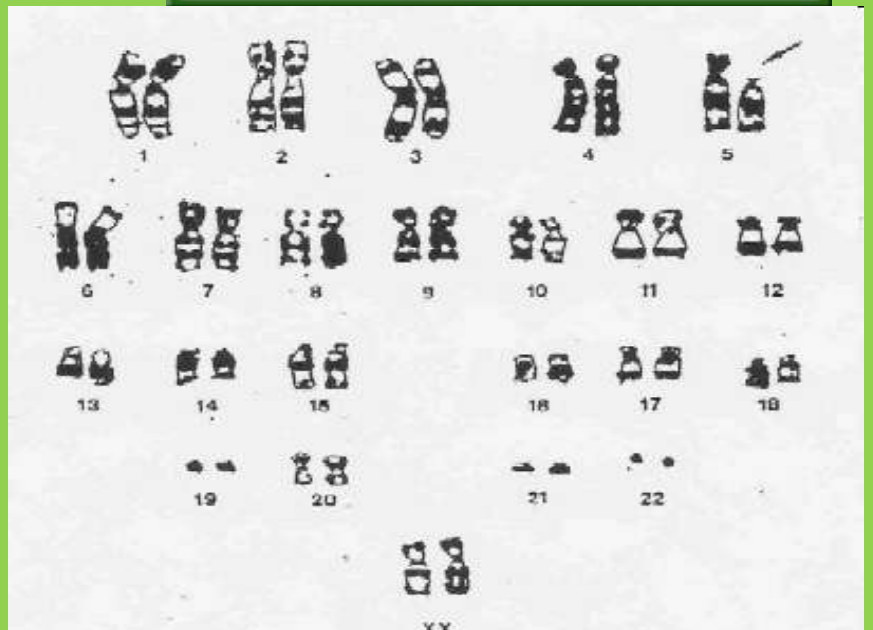
3/28 Chromosomes 10.1

Obj. TSW explain why half of an individual's DNA sequence comes from each parent and identify a karyotype in the warm up and class notes, Human Traits Checklist & PTC tasting. P.8NB

HW – Read CH 10,

1 page notes Page 11 NB





1. Compare & Contrast Heredity & Traits.
2. Compare & Contrast Gametes & and Fertilization.
3. Compare & Contrast a Zygote & a Chromosome.

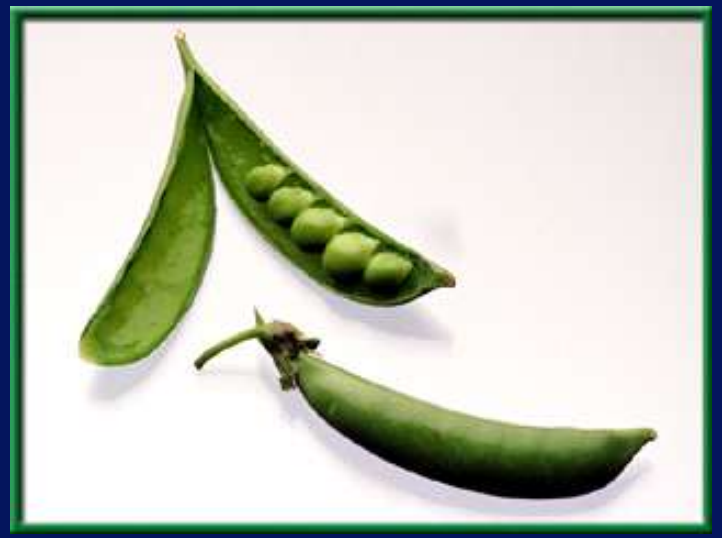
Karyotype – a picture of all 23 pairs of chromosomes.

Why Mendel Succeeded

- It was not until the mid-nineteenth century that Gregor Mendel, an Austrian monk, carried out important studies of heredity—the passing on of characteristics from parents to offspring.
- Characteristics that are inherited are called traits.

Mendel chose his subject carefully

- Mendel chose to use the garden pea in his experiments for several reasons.

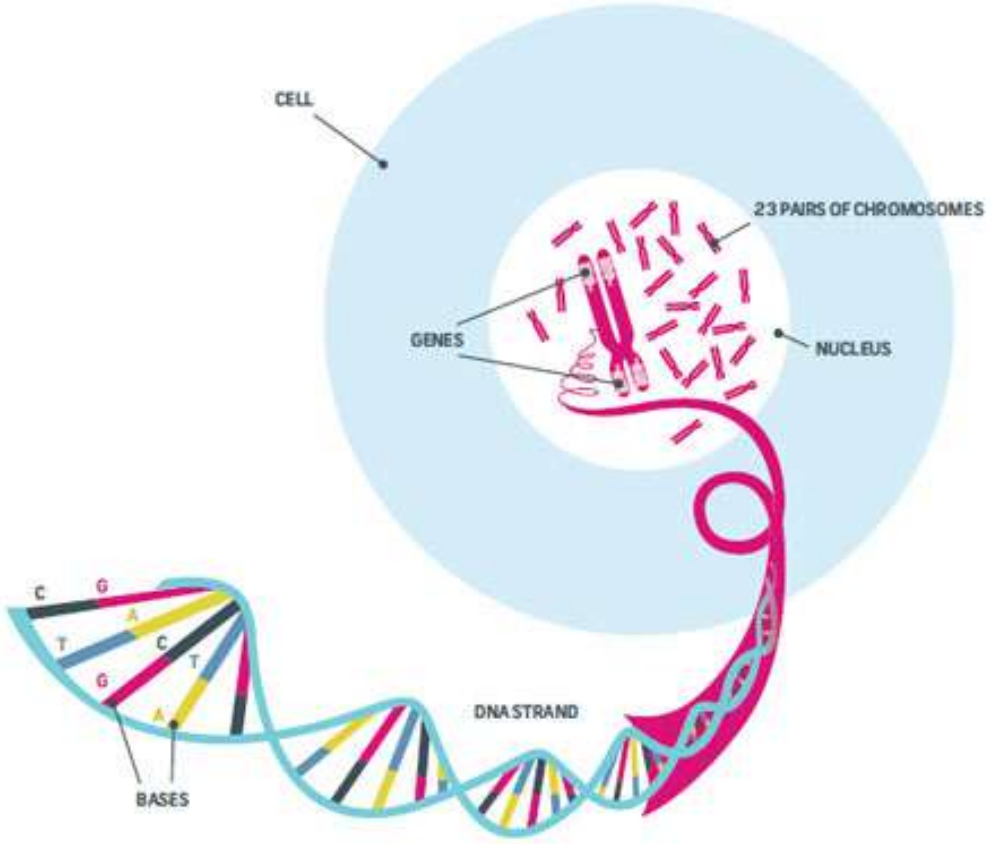


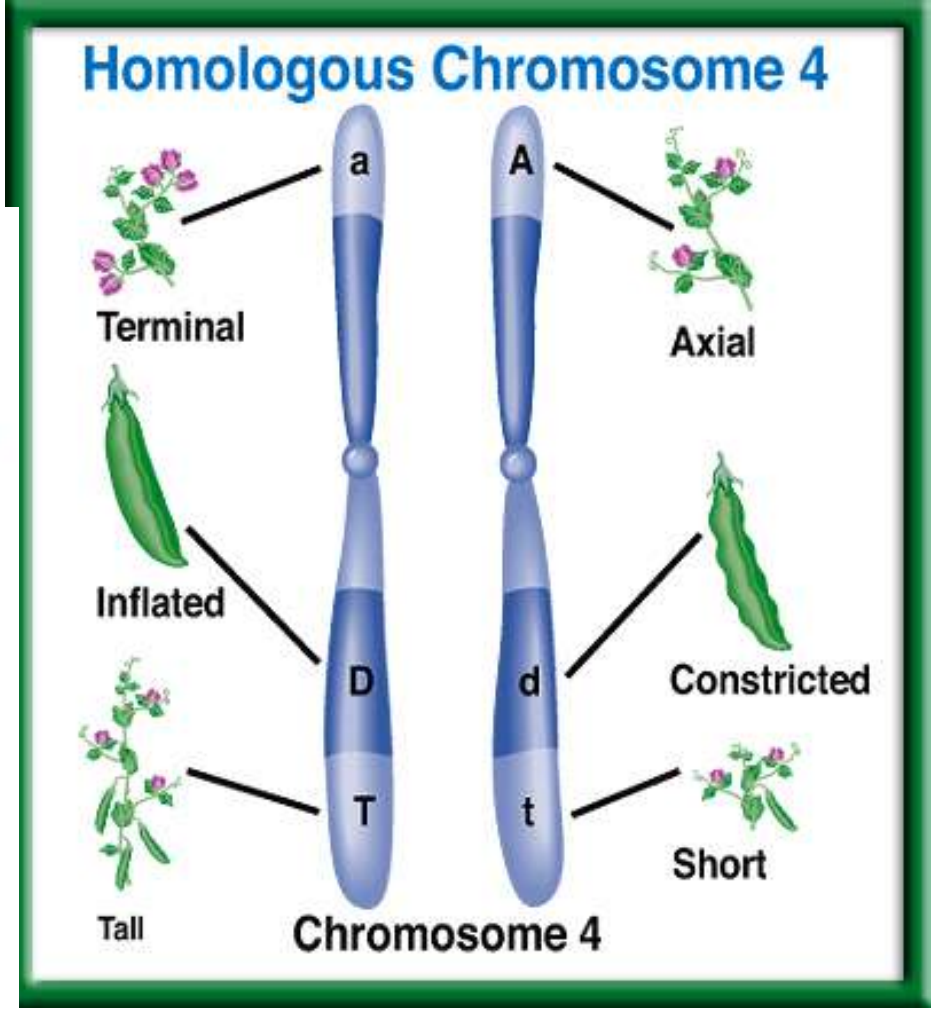
- Garden pea plants reproduce sexually, which means that they produce male and female sex cells, called gametes.

Mendel chose his subject carefully

- The male gamete forms in the pollen grain, which is produced in the male reproductive organ.
- The female gamete forms in the female reproductive organ.
- In a process called fertilization, the male gamete unites with the female gamete.
- The resulting fertilized cell, called a zygote (ZI goht), then develops into a seed.

Homologous Chromosome





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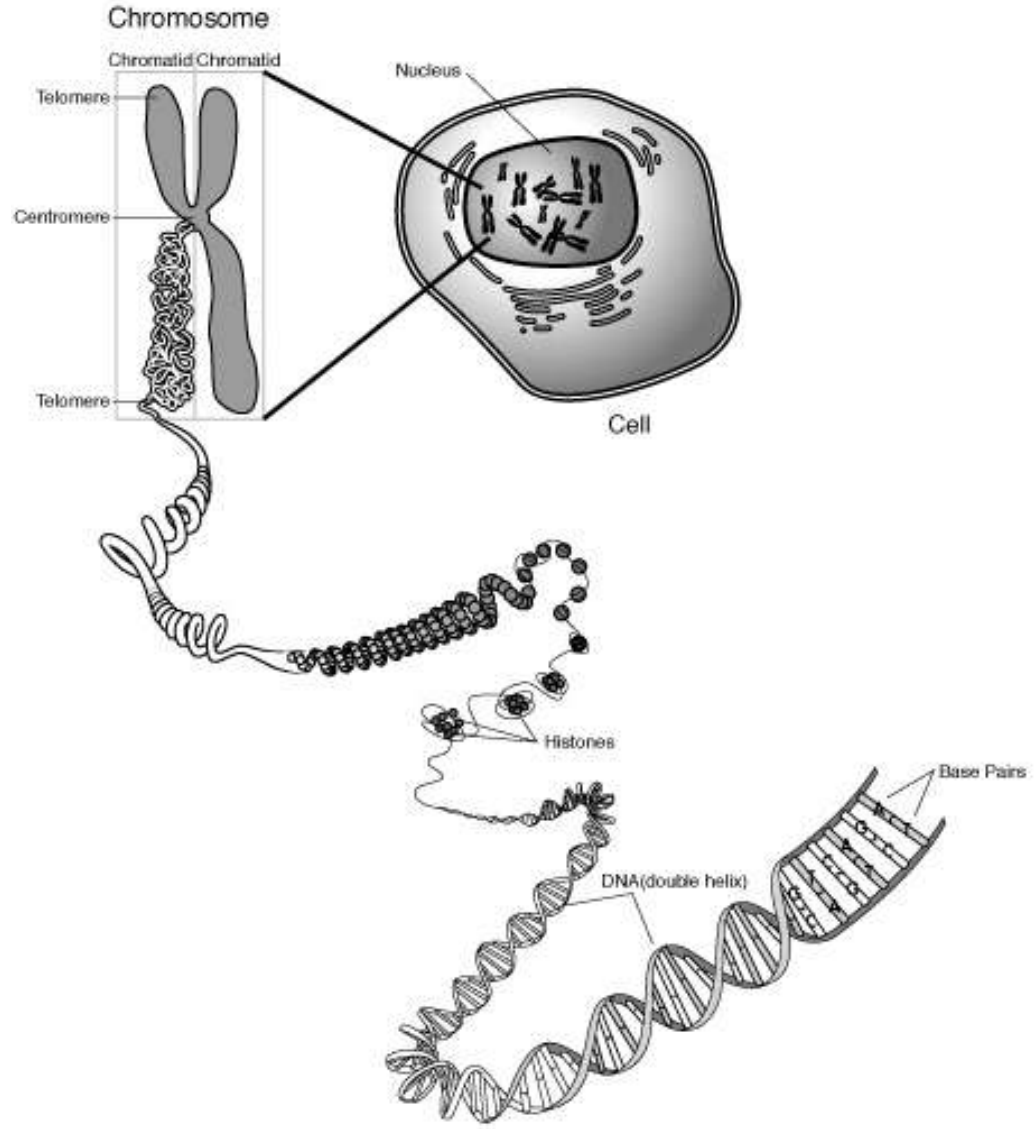
PREVIOUS SLIDE | TABLE OF CONTENTS | NEXT SLIDE | RESOURCES

Place the following in order from smallest to largest:
chromosome, gene, nucleotide, cell, DNA, nucleus



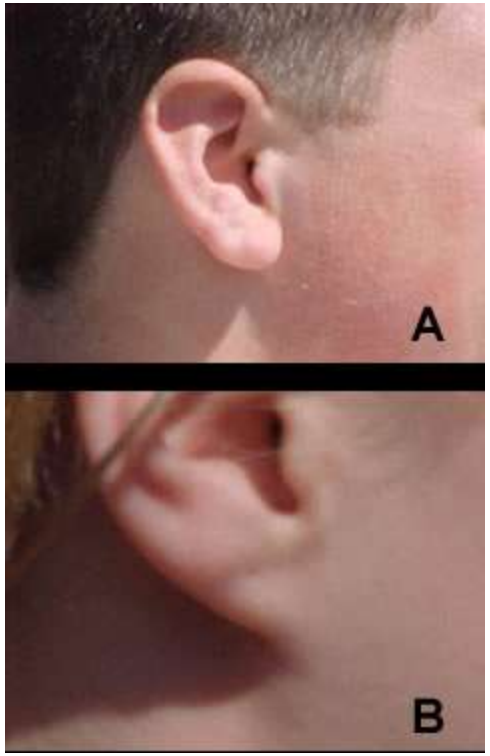
Why Mendel Succeeded

Mendel was the first person to succeed in predicting how traits are transferred from one generation to the next.

A complete explanation requires the careful study of genetics—the branch of biology that studies heredity.

Human Traits Checklist

Cleft Chin



Widow's Peak

Floppy Ears

Human Traits Check list

Hitch Hikers Thumb

Mid Digit Hair

Bent Little finger

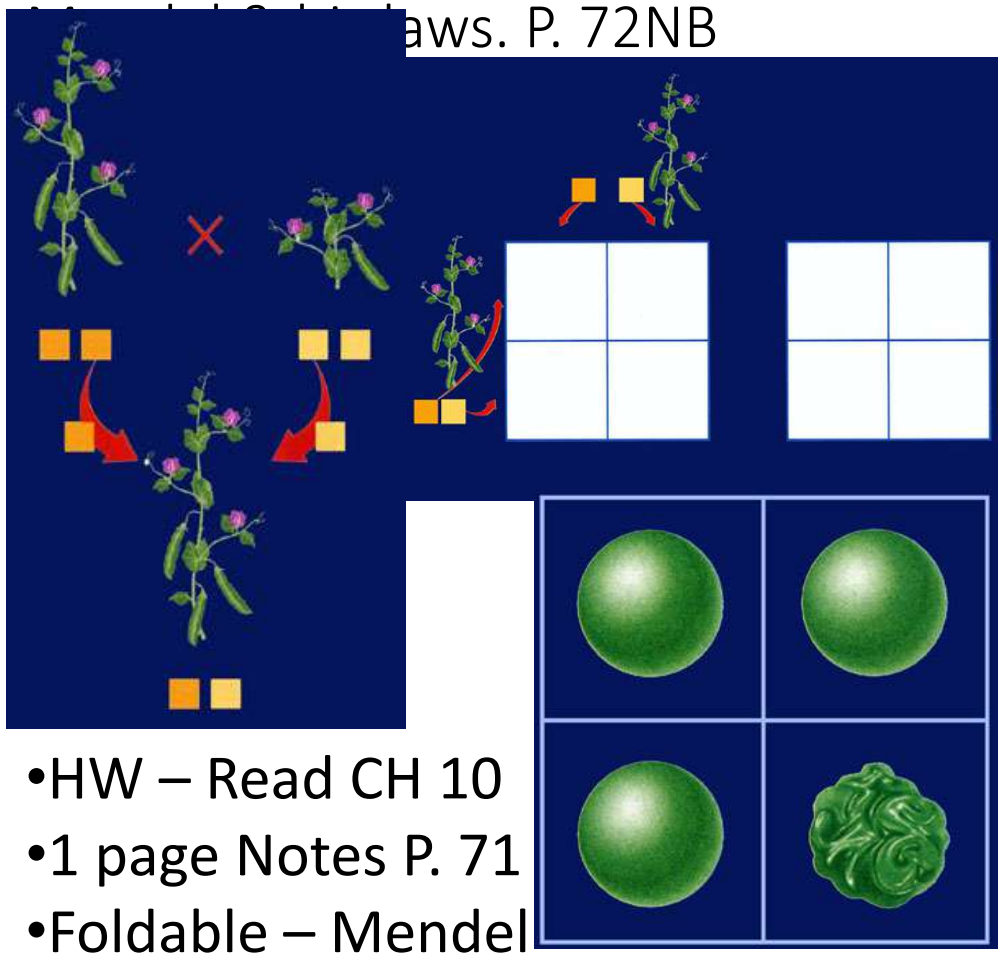
Dimples

Human Traits Checklist/ Wheel
p. 9 NB

- Genetic Diversity is important because it ensures that some people survive to continue the species under changed environmental events.
- 99.9% of humans DNA are identical.
- .1% of your DNA accounts for all our differences in humans.
- We are relatively a young species.

3/17 Mendel's Monohybrid Crosses 10.1

Obj. TSW explain the rule of dominance in their page of Cornell notes, sex determination punnett square, & monohybrid cross & Foldable on [illegible]aws. P. 72NB

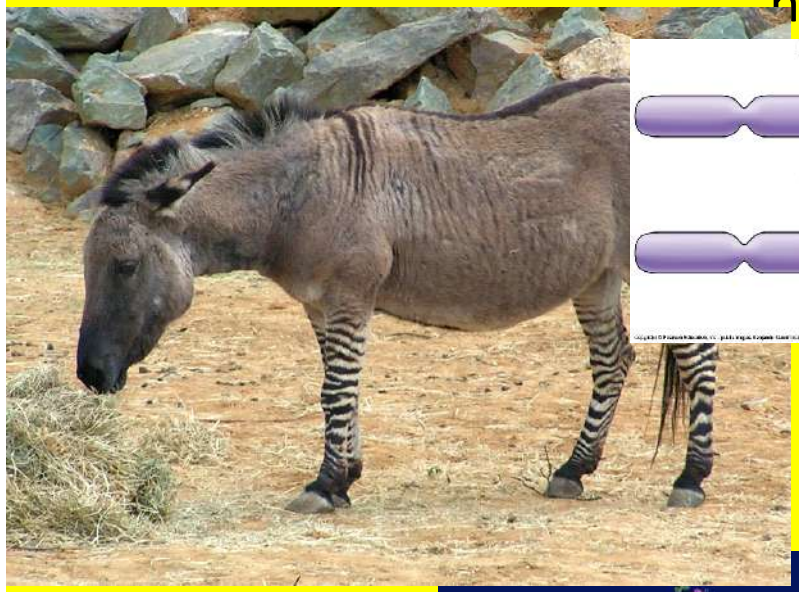


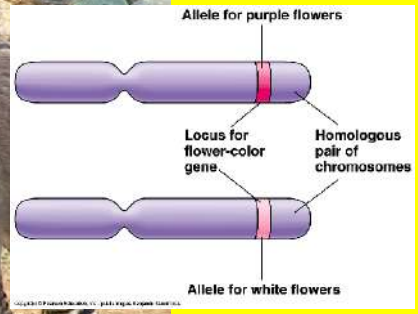
1. Explain what an allele is and give an example of hybrid alleles for a trait (Round pea - R).
2. Compare & Contrast Dominant & Recessive alleles.
3. Using the letter T for tall, Compare & Contrast Genotype and Phenotype.

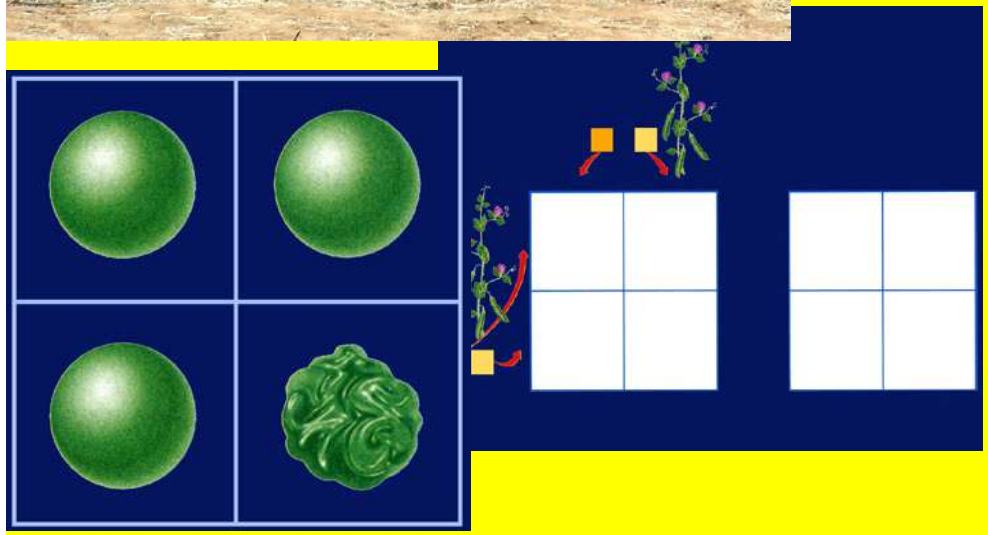
- HW – Read CH 10
- 1 page Notes P. 71
- Foldable – Mendel
- HW - CH 10 WS

3/13 Mendel's Monohybrid Crosses CH 10.1

Obj. TSW explain how to perform a sex determination & monohybrid cross Punnett square, explain the Rule of dominance, & do a Foldable on Mendel & his laws. P. 72NB







1. Explain what an **allele** is and give an example of **hybrid** alleles for a trait (brown hair).
2. Compare & Contrast **Dominant & Recessive** alleles.
3. Compare & Contrast **Genotype and Phenotype**.

HW – Read CH 10, 1 page Notes P. 71NB

HW – Foldable p. 73 NB

The rule of unit factors

Mendel concluded that each organism has two factors that control each of its traits.

We now know that these factors are genes and that they are located on chromosomes.

1. Genes exist in alternative forms. We call these different gene forms alleles.

Pea Plant – Round – R

- wrinkled – r

Hybrid - Rr

The rule of dominance

2. Mendel called the observed trait dominant and the trait that disappeared recessive.

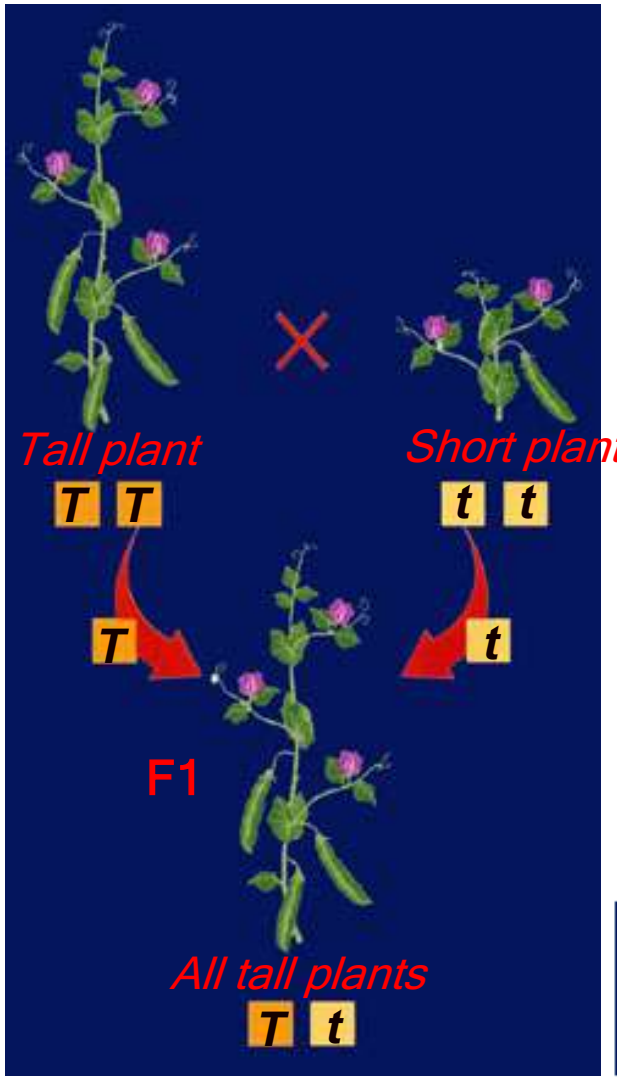
Pea Plant – Round – R

- wrinkled - r

Mendel concluded that the allele for tall plants is dominant to the allele for short plants.

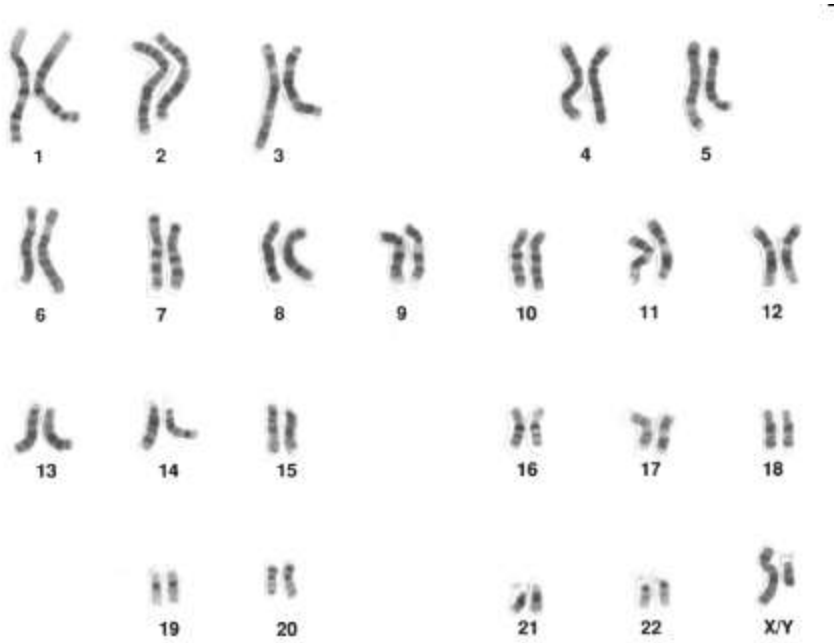
The rule of dominance

When recording the results of crosses, it is customary to use the same letter for different alleles of the same gene.



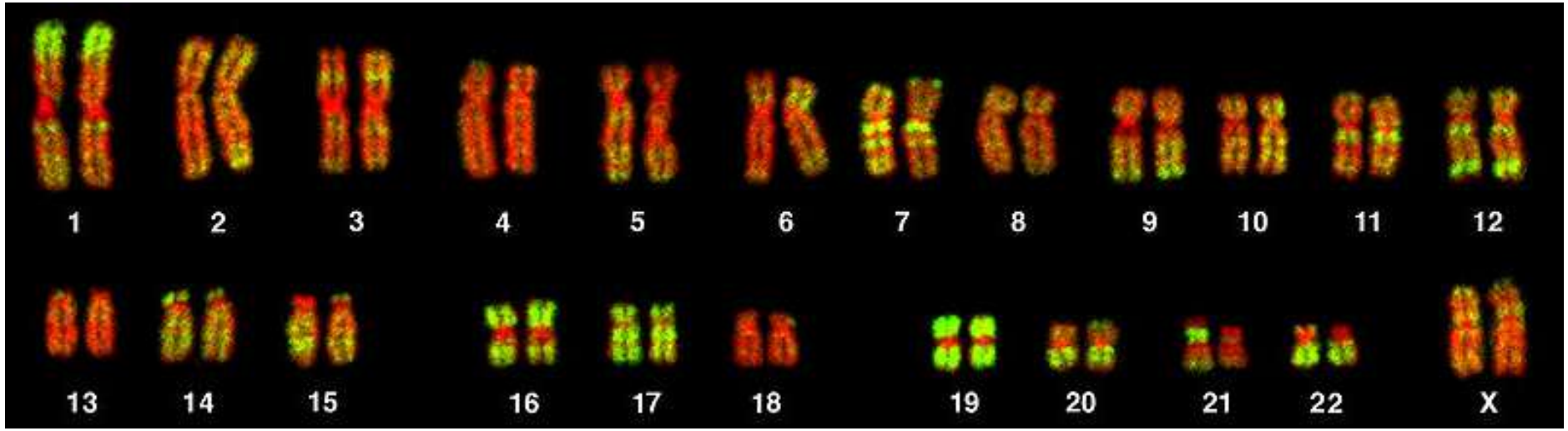
Chromosomes Page 73 NB

- *Humans have 23 pairs of chromosomes (46 all together)
- *autosomes: there are equal numbers of copies in males and females (22 pairs, 44 total)
- *sex chromosomes: Chromosomes that determine the sex of the organism (1 pair, 2 total); XX=female XY=male

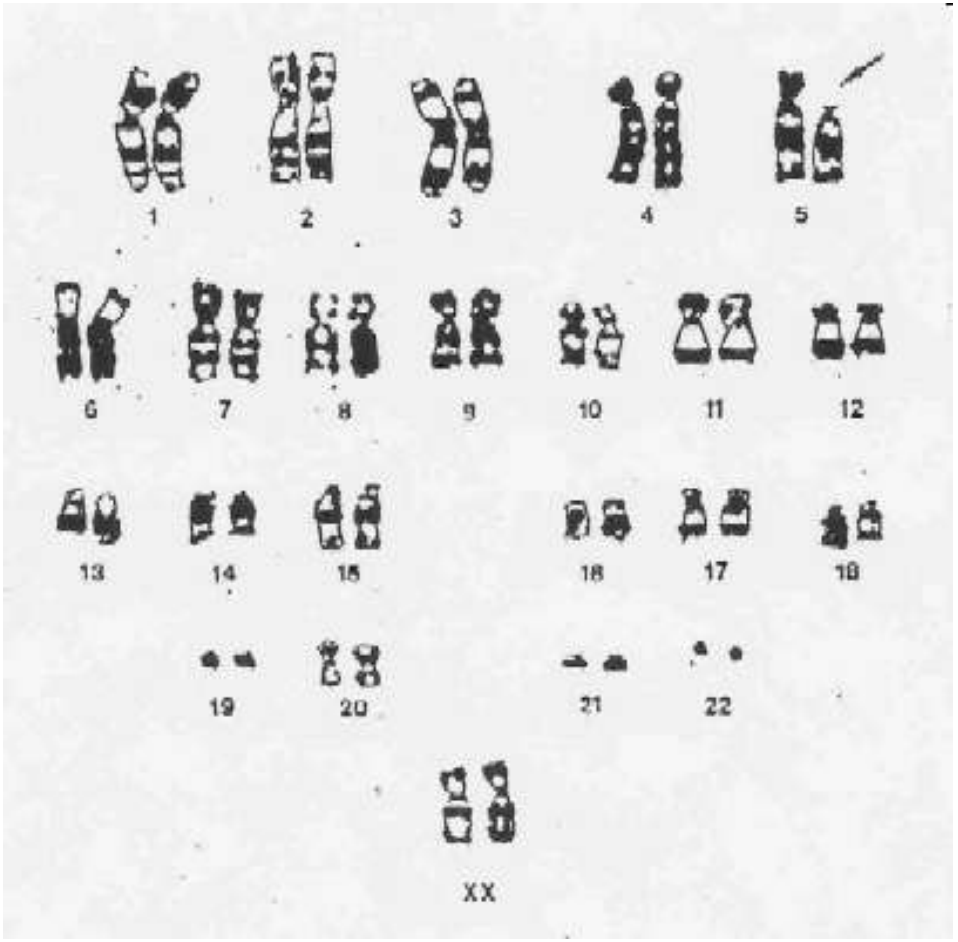


Female Karyotype

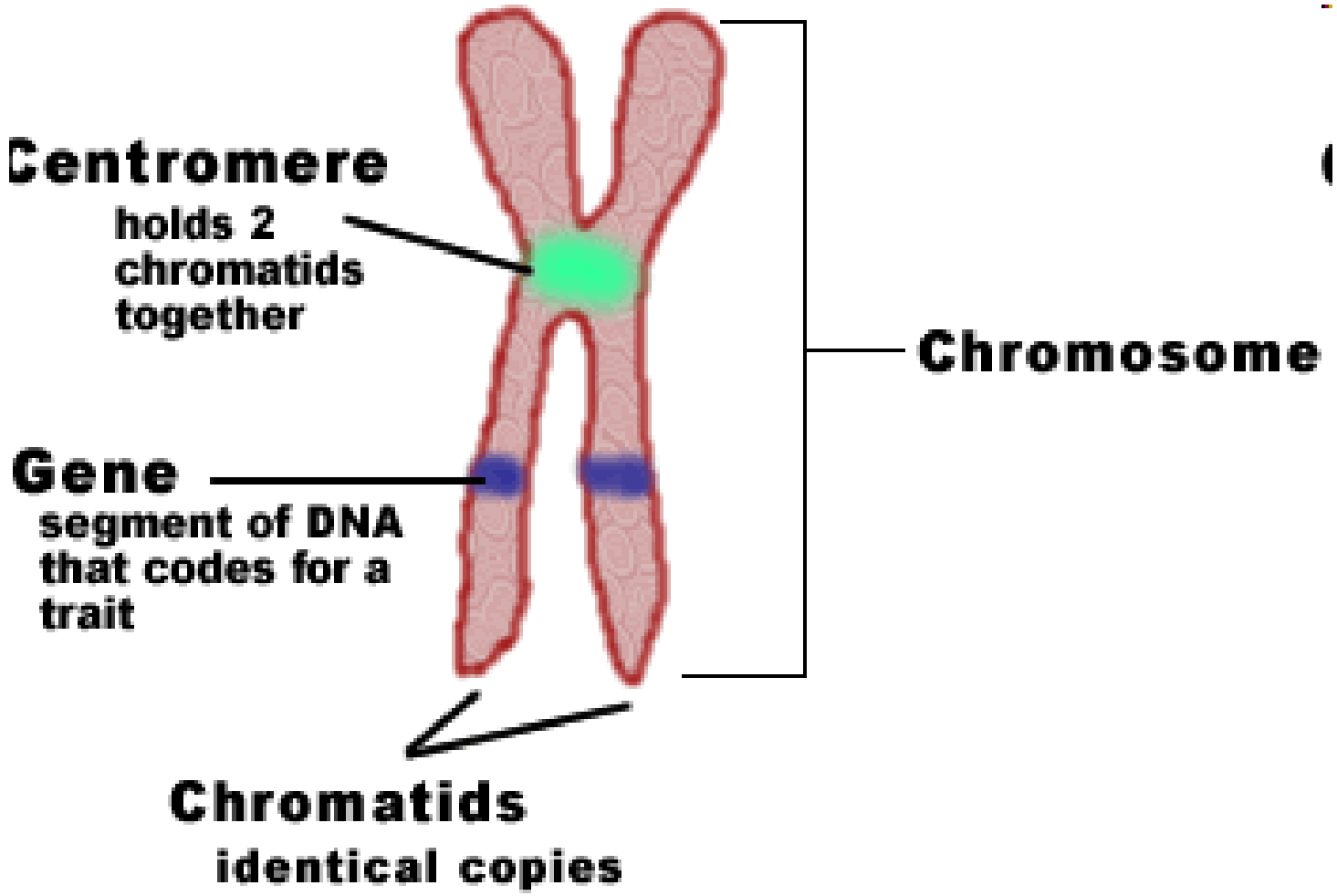
- *Karyotype: the complete set of chromosome in the cells of an organism



- *Homologous chromosomes: there are two copies of each chromosome; same size, same shape, same genes
- Each pair is known as homologous chromosomes p. 73NB



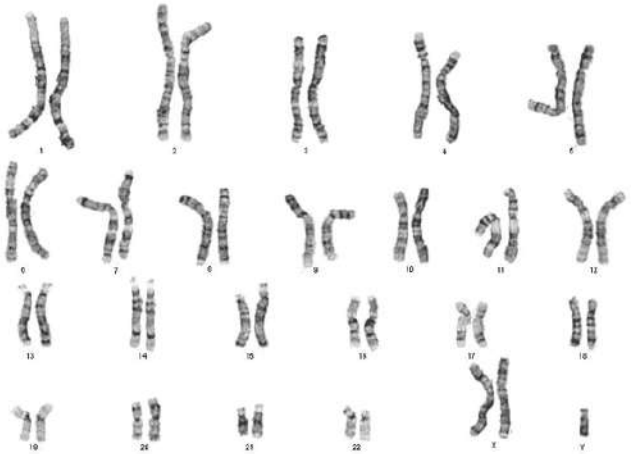
Draw this Diagram P. 73NB

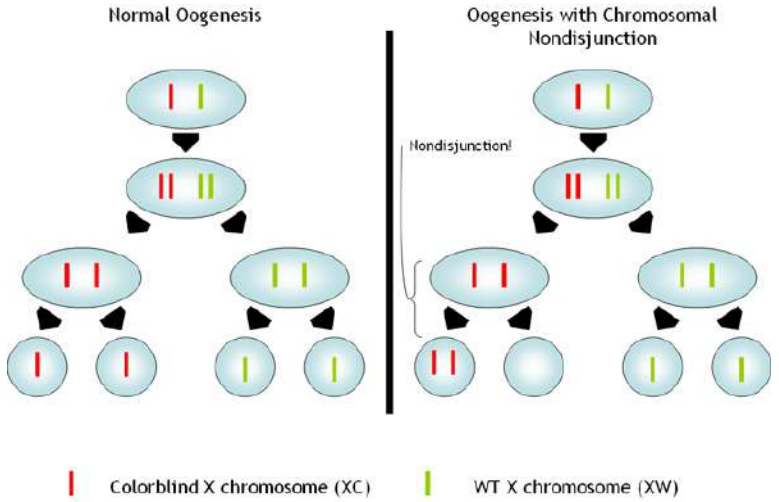


Actual Stained Chromosome

Klinefelter's Syndrome - XXY

- A condition in which males have an extra X sex chromosome
- the most common sex chromosome disorder
- the second most common condition caused by the presence of extra chromosomes.
- 1 out of every 1000 males.
- 1 out of every 500 has an extra X chromosome but does not have the syndrome
- Symptoms: almost always infertile, smaller testicles, some neurophysiological deficits, long lanky build, more severe cases have breast tissue and osteoporosis
- Treatment: usually just testosterone



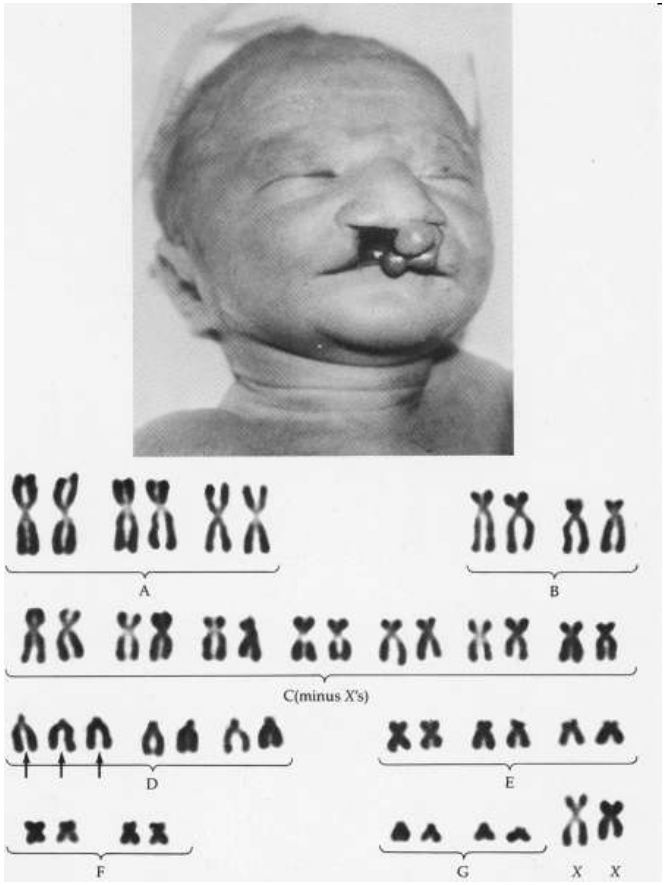


Turner Syndrome

- When a female is missing all or part of one of the X chromosomes (X0)
- 1 out of every 2500 girls are affected
- Symptoms: short stature, swelling broad chest, low hairline, low set ears, webbed necks, gonadal dysfunction, sterility
- High risk of: congenital heart disease, diabetes, vision problems, hearing problems

Patau's Syndrome

- also known as **trisomy 13**, a syndrome in which a patient has an additional chromosome 13 due to a nondisjunction of chromosomes during meiosis.
- Affects 1 in 25,000 live births; risk increases with age of female pregnancy
- Causes heart and kidney defects, mental and motor challenged, extra digits, low set ears, structural eye defects, abnormal genetalia

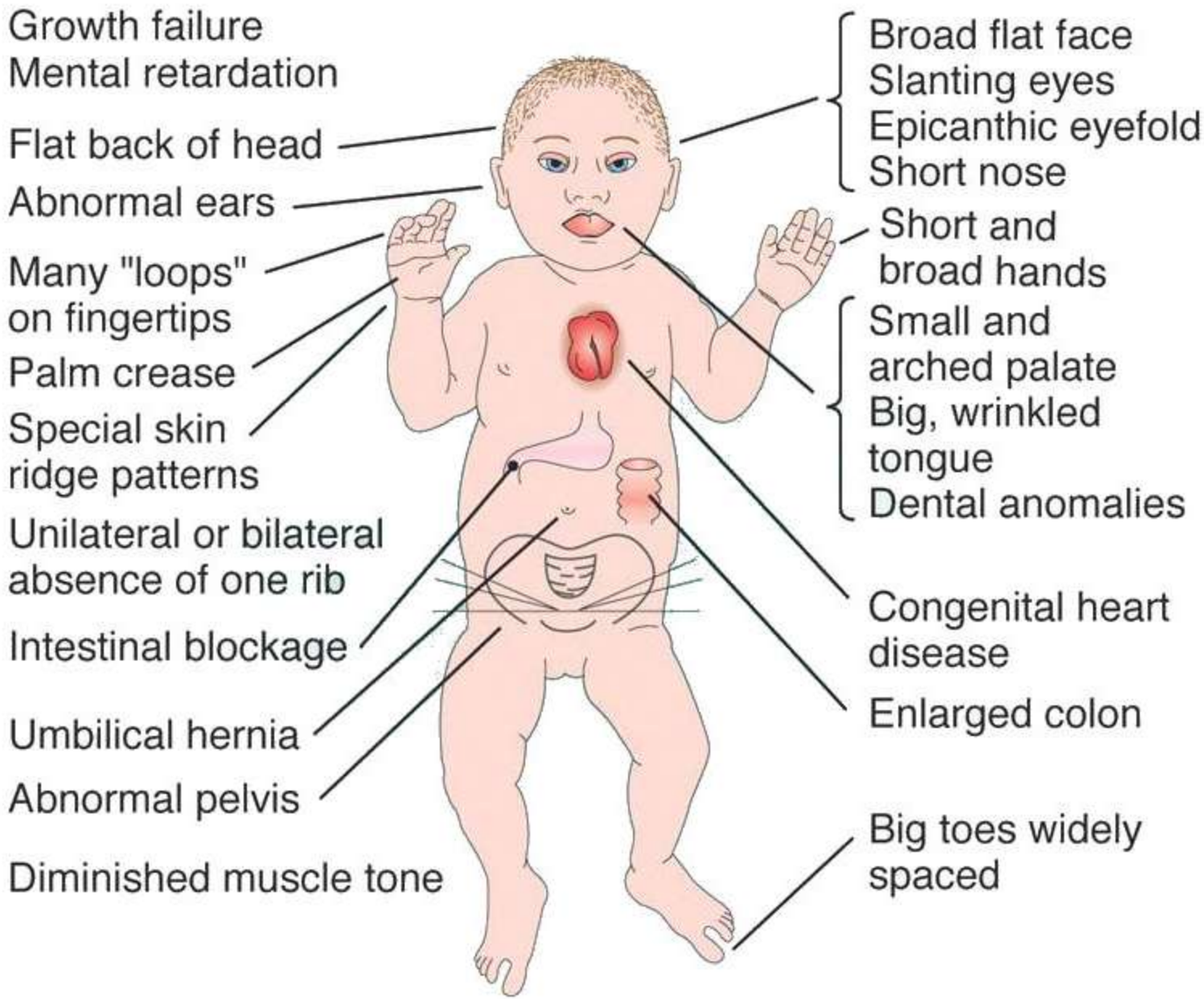


XYY Syndrome

- Most often, the extra Y chromosome causes no unusual physical features or medical problems.
- boys have an increased growth velocity during earliest childhood, with an average final height approximately 7 cm above expected final height.
- 1 in 1000 boys affected
- Increased learning disabilities, delayed speech/language skills, behavioral problems such as anger/agression

Down’s Syndrome

- **Down's syndrome** AKA **trisomy 21**, or **trisomy G** is a chromosomal disorder caused by the presence of all or part of an extra 21st chromosome.
- 1 out of 1000 births are affected
- Small chin, round face, oversized tongue, shorter limbs, poor muscle tone, ear infections, heart defects,


Growth failure
Mental retardation
Flat back of head
Abnormal ears
Many "loops" on fingertips
Palm crease
Special skin ridge patterns
Unilateral or bilateral absence of one rib
Intestinal blockage
Umbilical hernia
Abnormal pelvis
Diminished muscle tone
Broad flat face
Slanting eyes
Epicanthic eyefold
Short nose
Short and broad hands
Small and arched palate
Big, wrinkled tongue
Dental anomalies
Congenital heart disease
Enlarged colon
Big toes widely spaced

Triple X Syndrome

- a form of chromosomal variation characterized by the presence of an extra X chromosome in each cell of a human female.
- 1 in 1000 births
- only one X chromosome is active at any time in a female cell. Thus, triple X syndrome most often causes no unusual physical features or medical problems.
- Females with the condition may have menstrual irregularities, and, have an increased risk of learning disabilities, delayed speech, deficient language skills, and delayed development of motor skills.

Question 1

The passing on of characteristics from parents to offspring is _____.

A. genetics

B. heredity

C. pollination

D. allelic frequency

The answer is B. Genetics is the branch of biology that studies heredity.

Question 2

What are traits?

Answer

Traits are characteristics that are inherited. Height, hair color and eye color are examples of traits in humans.

Question 3

Gametes are _____.

A. male sex cells

B. female sex cells

C. both male and female sex cells

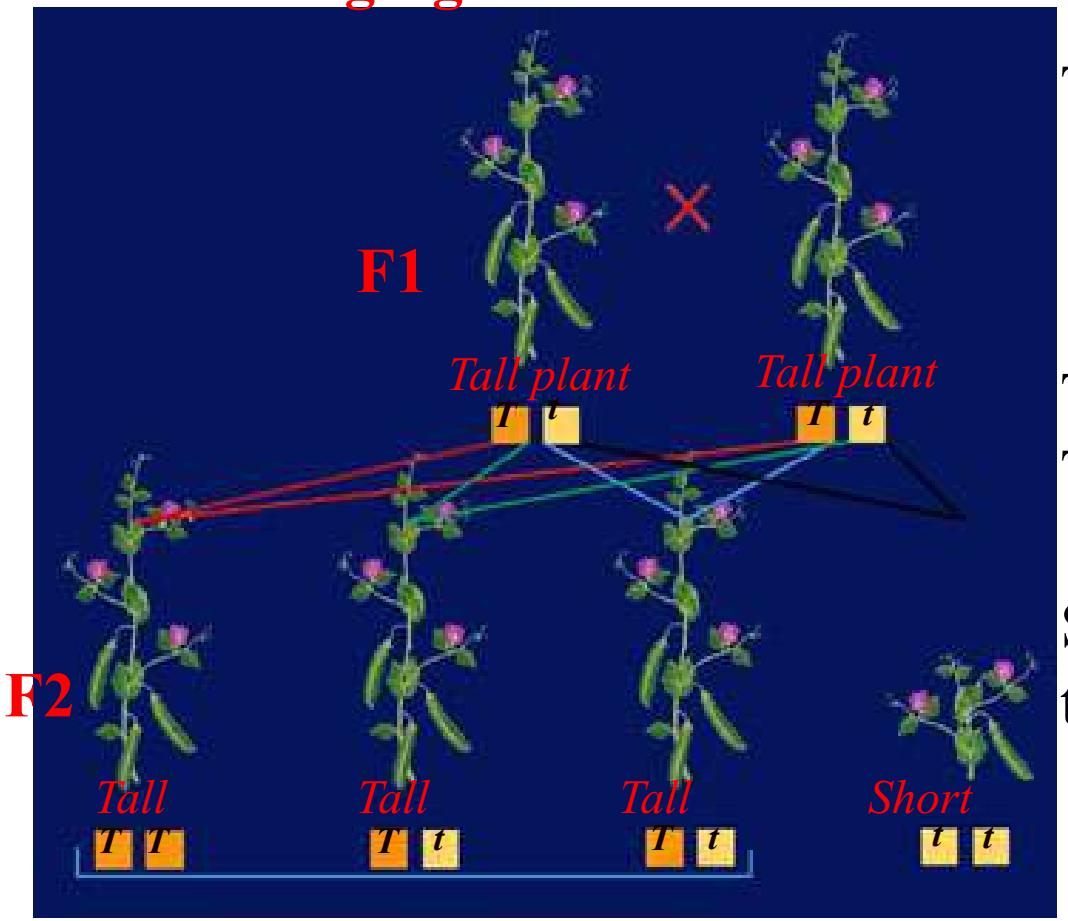
D. fertilized cells that develop into adult organisms

Section Check

The answer is C. Organisms that reproduce sexually produce male and female sex cells, called gametes.

Phenotypes (How it looks) and Genotypes (Letters that represent the trait)

Law of segregation *Tt* × *Tt* cross



Two organisms can look alike but have different underlying allele combinations.

Tall – Phenotype

TT, Tt – Genotype

Short – Phenotype

tt - Genotype

END OF SLIDE

?

RESOURCES

Phenotypes and Genotypes

The way an organism looks and behaves is called its phenotype. Ex. Tall, Round, Brown Hair, wrinkled

The allele combination an organism contains is known as its genotype. Ex. TT, Rr, Bb, rr

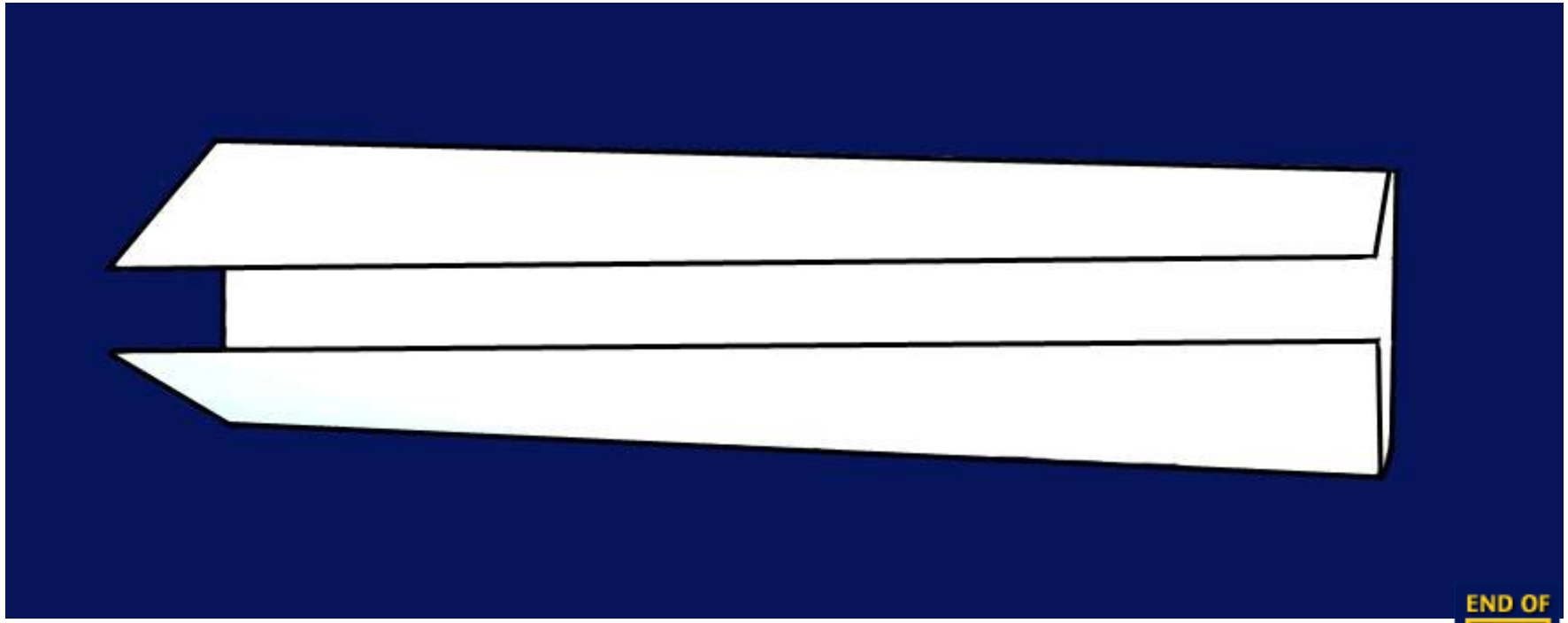
An organism's genotype can't always be known by its phenotype.

Foldables Study Organizers

STEP 1

Fold one piece of paper lengthwise into thirds.

FOLDABLES™ Study Organizer



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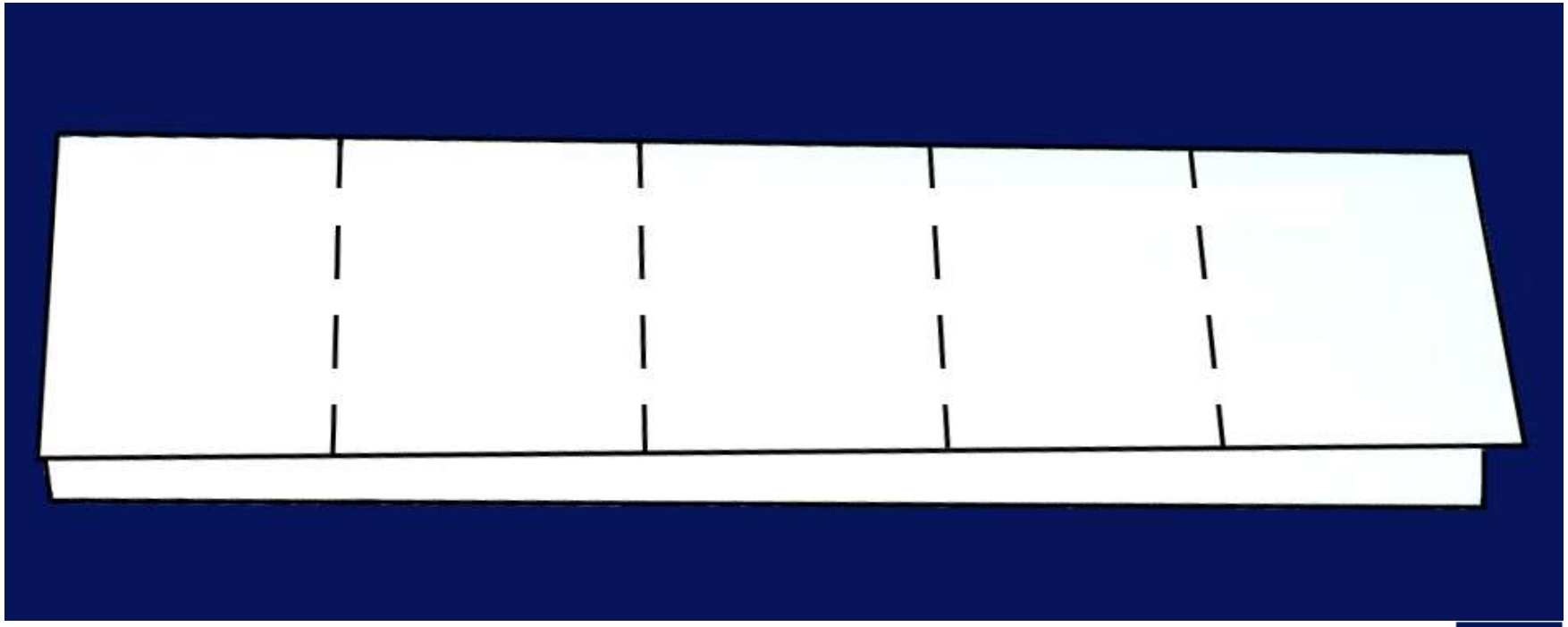
STEP 2

Fold the paper widthwise into fifths.



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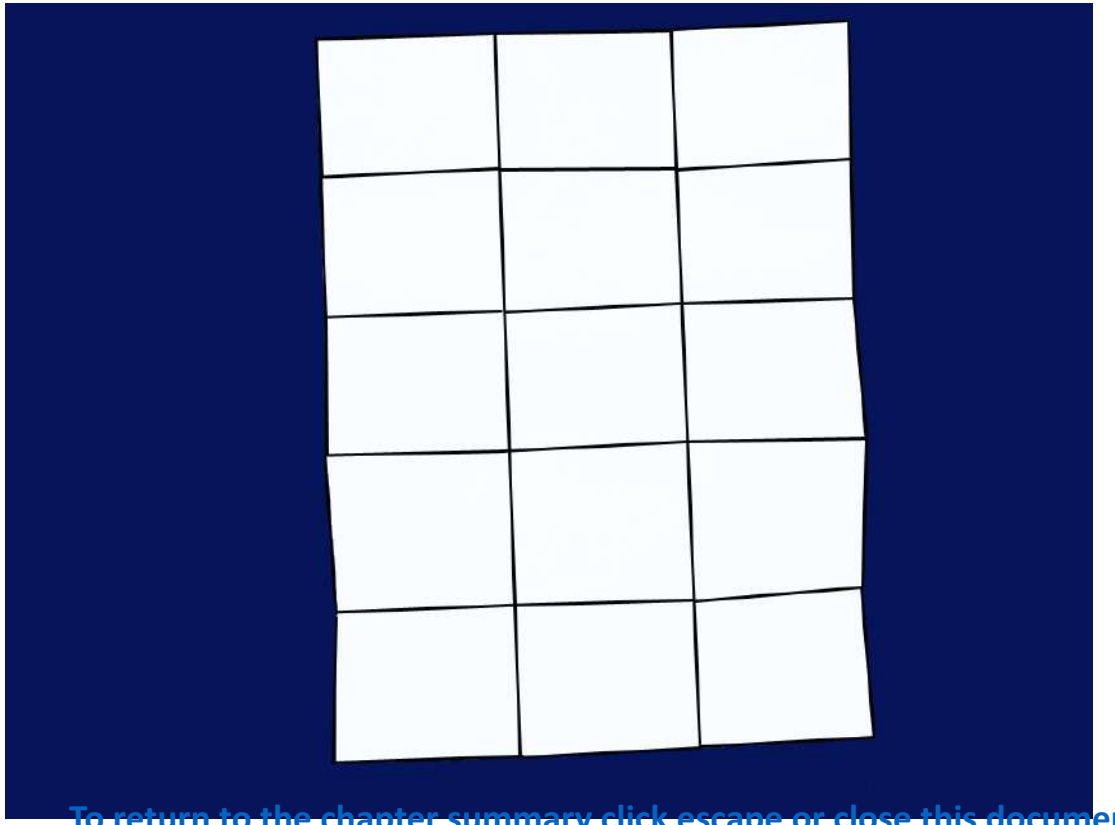
STEP 3

Unfold, lay the paper lengthwise, and draw lines along the folds.



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RESOURCES

Foldables Study Organizers

Page 75 NB

STEP 4

Label your table as shown.

Mendel	Describe in Your Words	Give an Example
Rule of unit factors Allele		
Rule of Dominance		
Law of Segregation		
Law of independent assortment		

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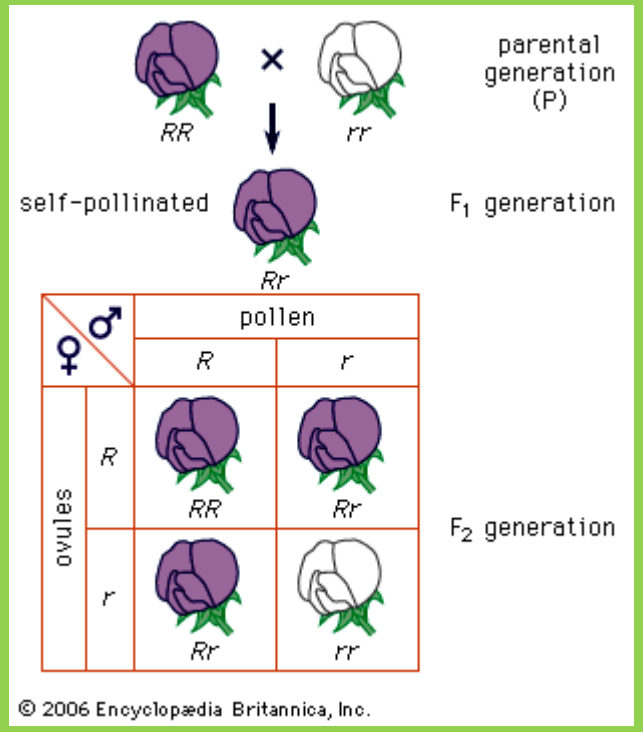
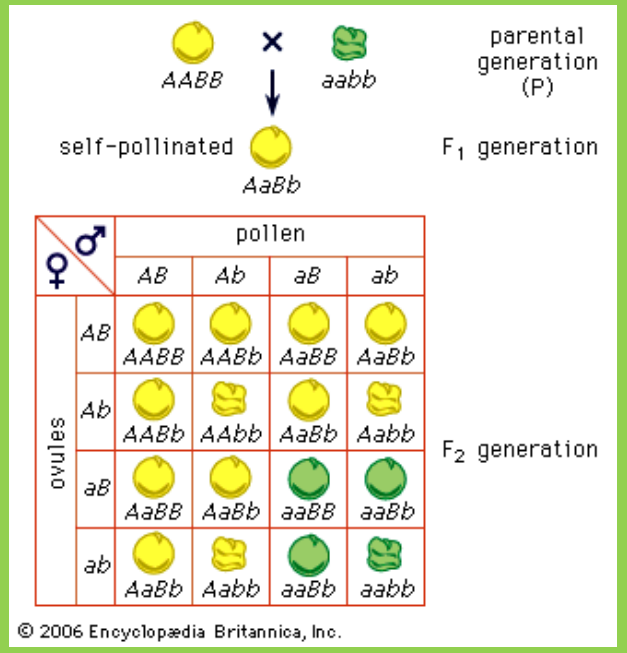
RESOURCES

3/29 Mendel's two laws CH 10.1

Obj. TSW demonstrate understanding of Mendel's laws by completing a monohybrid or dihybrid cross. P. 10NB





1. Explain Mendel's Law of Segregation.
2. Explain Mendel's Law of Independent Assortment.
3. Draw a punnett square with the monohybrid cross for two heterozygous tall pea plants. What is the probability of having a short pea plant?

Frankenfish P. 17 NB

- With two pennies, flip each to get the pair of random alleles (genotype) for your phenotype (Physical Characteristic) of your fish.
- Circle the Characteristic of your fish.
- Then Draw & Color your fish, make sure to give it a name.
- Please write your name on the paper.

Heads/ Head = Two Dominant Alleles (BB)
Heads/ Tails = One Dominant & One Recessive Allele (Bb)
Tail/ Tail = Two Recessive Alleles (bb)
Use the following words to write an AXES paragraph about genetics: Dominant, Recessive, Gene, Trait, Chromosome, Allele, Genotype, Phenotype

Frankenfish Activity AXES Paragraph page 17 NB

- A **dominant** trait for the Frankenfish Activity was the Long Straight body shape. A **recessive** trait was the triangular tail shape. These **traits** are inherited by **gene**, segments of the DNA on a **chromosome**. The **genotype** for the body shape of BB. The **phenotype** is the physical characteristic of a long straight body shape. **Alleles** are variations of the trait, B is an allele.

Chromosomes & Inheritance p. 13NB

- Do to http://learn.genetics.utah.edu/
- Click on chromosomes & Inheritance
- Click on Make a Karyotype **Write the sex of the offspring & how you know.**
- Click on Using Kayotypes to detect genetic disorders.
- After reading the page, **write a summary that includes Homologous Chromosome, Autosomes, Sex Chromosomes, and Karyotype.**
- **How can Karyotypes be used to diagnose genetic disorders?**

Karyotype – Chromosomes and Inheritance p. 13 NB AXES paragraph

- The karyotype is a picture of homologous chromosomes, pairs of chromosomes with the same traits, but maybe different versions. The karyotype shown is of a male. I know this because the 23rd pair of chromosomes are XY, those are the sex chromosomes that code for male. The first 22 pairs of chromosomes are called Autosomes that code for the body traits. Karyotypes are used to diagnose genetic disorders by seeing if there are three pairs of chromosomes or missing chromosomes and/ or parts of chromosomes.

The law of segregation

1. **The law of segregation** states that every individual has two alleles of each gene and when gametes (eggs & sperm) are produced, each gamete receives one of these alleles.

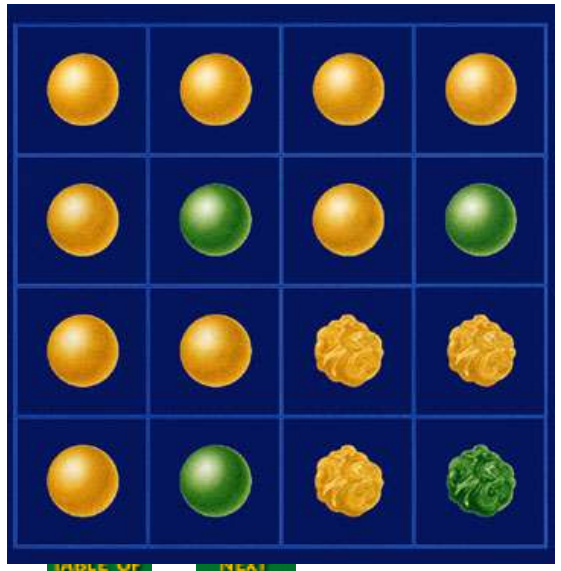
During fertilization, these gametes randomly pair to produce four combinations of alleles.

Each gamete receives one allele.

The law of independent assortment

2. Mendel's second law states that genes for different traits—for example, seed shape and seed color—are inherited independently of each other.

This conclusion is known as the law of independent assortment.



Phenotypes and Genotypes

An organism is **homozygous** for a trait if its two alleles for the trait are the same. **RR,ss, HH**

The **true-breeding** tall plant that had two alleles for tallness *(TT)* would be homozygous for the trait of height.

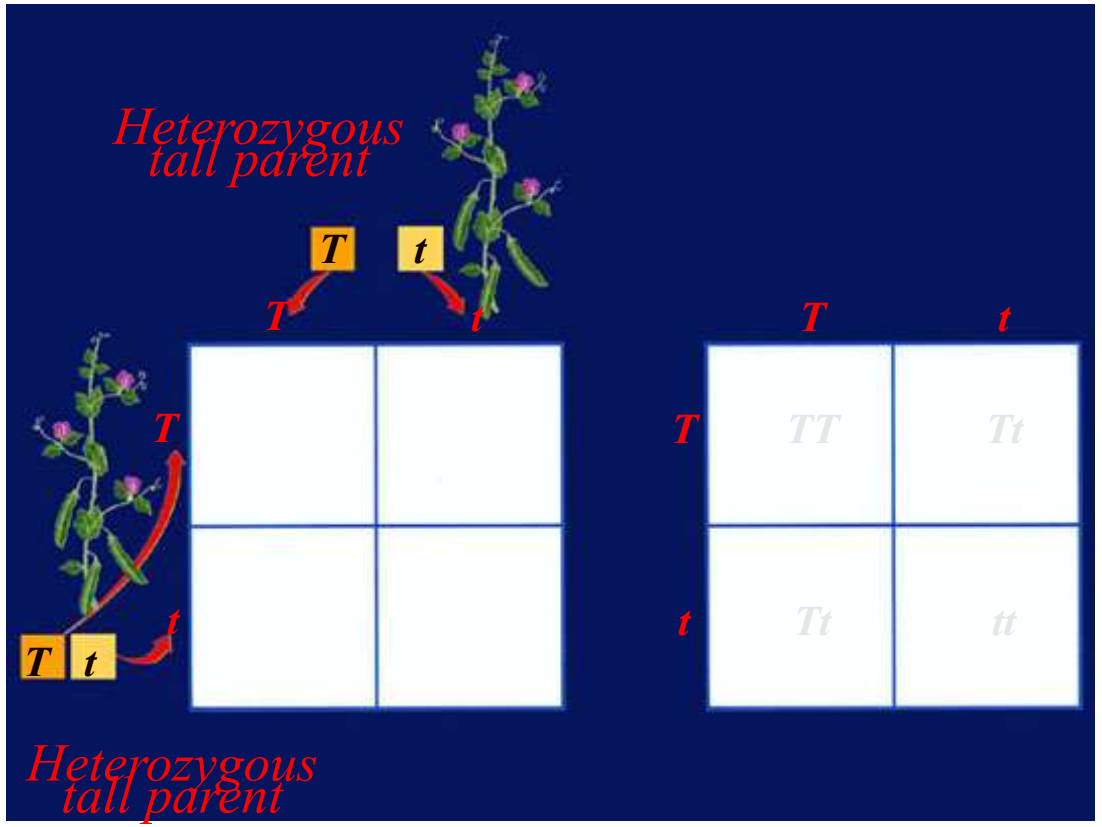
Phenotypes and Genotypes

An organism is **heterozygous** for a trait if its two alleles for the trait differ from each other**. Tt, Ss, XY**

Therefore, the tall plant that had one allele for tallness and one allele for shortness ***(Tt)*** is heterozygous for the trait of height.

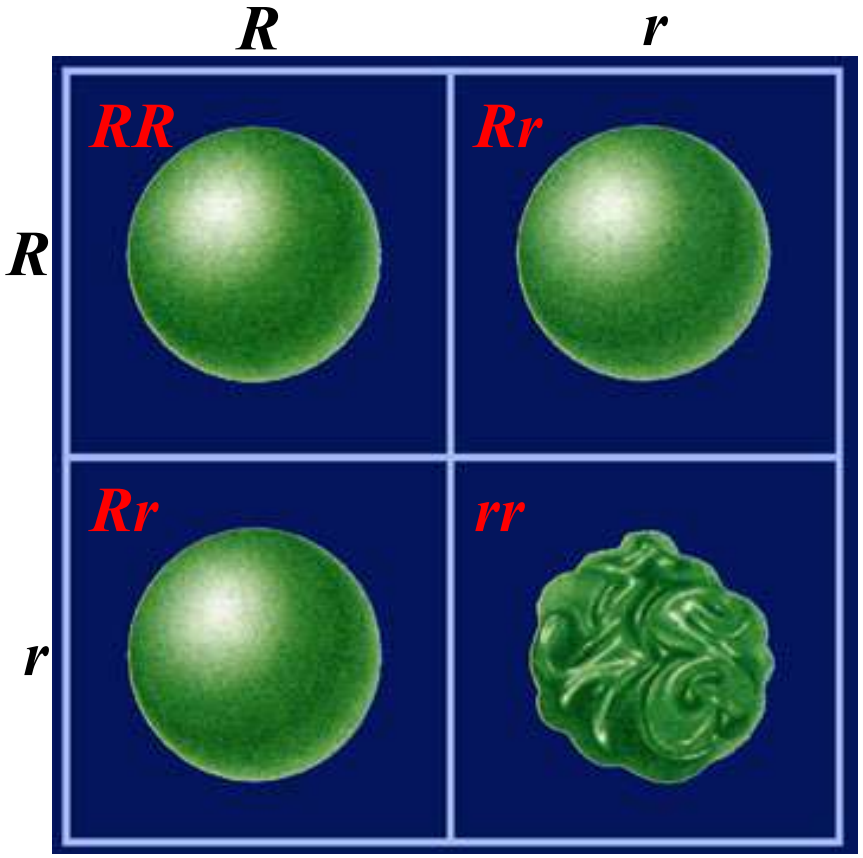
Hybrid - Mm

Monohybrid crosses



A Punnett square for this cross is two boxes tall and two boxes wide because each parent can produce two kinds of gametes for this trait.

Probability



The Punnett square shows three plants with round seeds out of four total plants, so the probability is $^{3}/4$.

Complete Dominance

– the Dominant completely masks the recessive, only 2 versions of a trait.

Mendel's Seven Pea Traits

What would be appropriate alleles to use for each trait?

	Seed shape	Seed color	Flower color	Flower position	Pod color	Pod shape	Plant height
Dominant trait	round	yellow	purple	axial (side)	green	inflated	tall
Recessive trait	wrinkled	green	white	terminal (tips)	yellow	constricted	short

SLIDE

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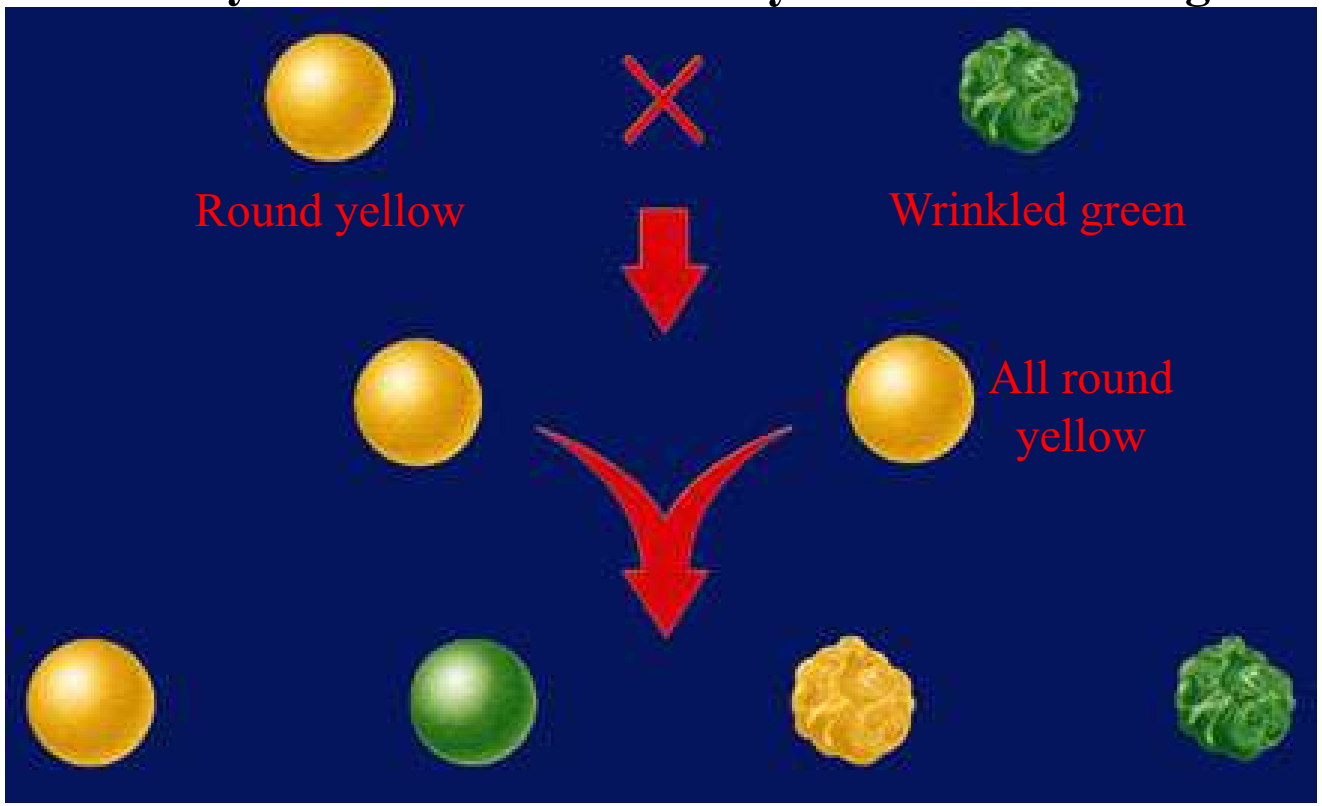
Punnett Square Practice Activity
p.265 Biology Book

- Make 7 Punnett square boxes on P.77
- Choose different genotypes for each of the different Pea Traits and perform Punnett square crosses with different compbinations of genotypes.
- Write to the side the % probability of the Homozygous Recessive, Heterozygous, Homozygous Dominant

10.1 Mendel's Laws of Heredity

The first generation

Dihybrid Cross **round yellow x wrinkled green**



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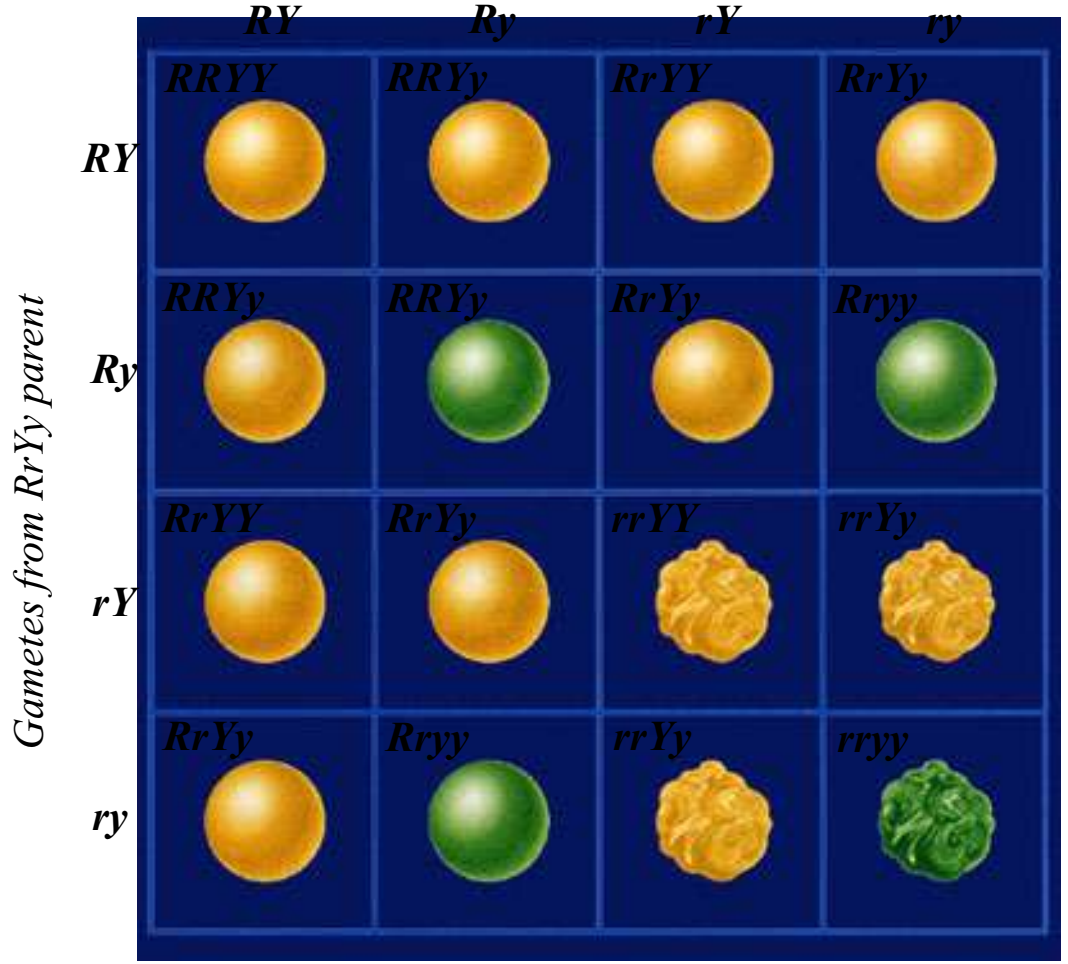
Punnett Square of Dihybrid Cross

Gametes from RrYy parent



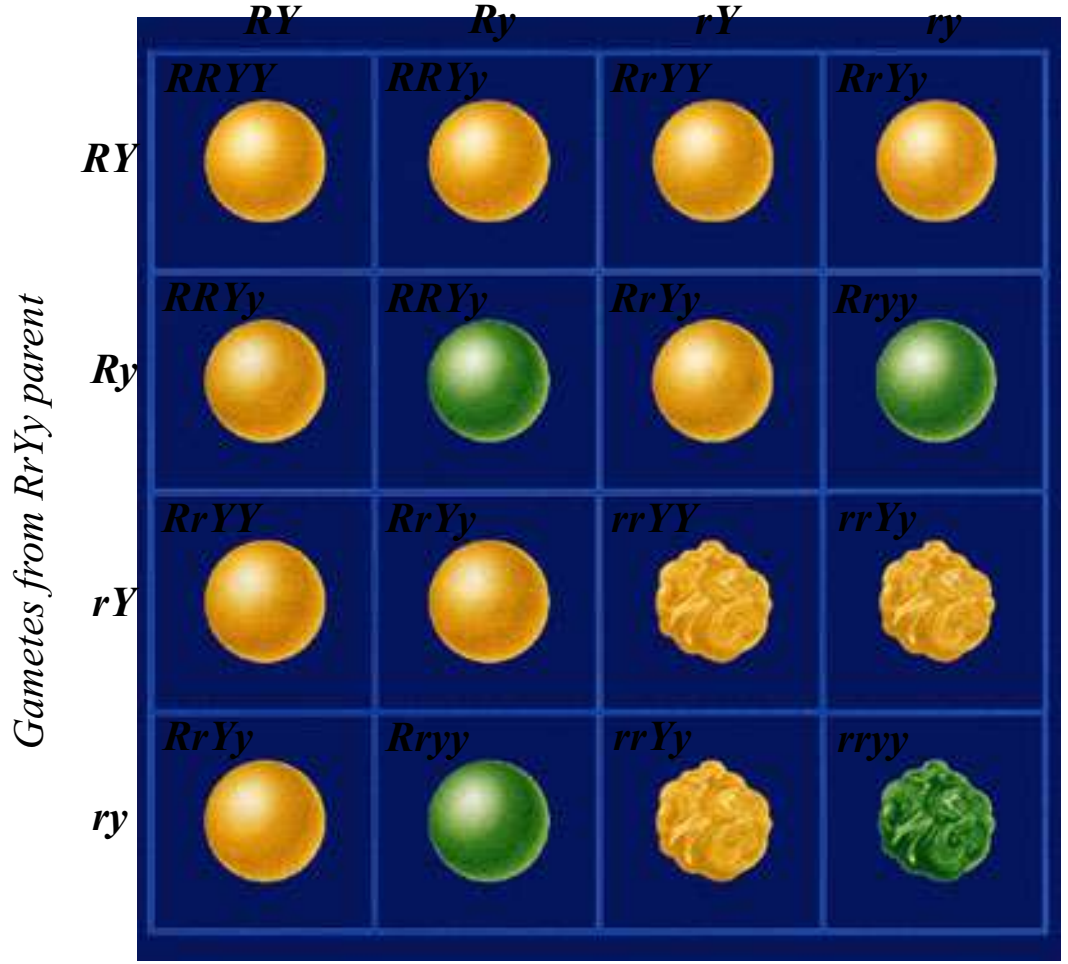
Dihybrid crosses

A Punnett square for a dihybrid cross will need to be four boxes on each side for a total of 16 boxes.

Dihybrid crosses

Punnett Square of Dihybrid Cross

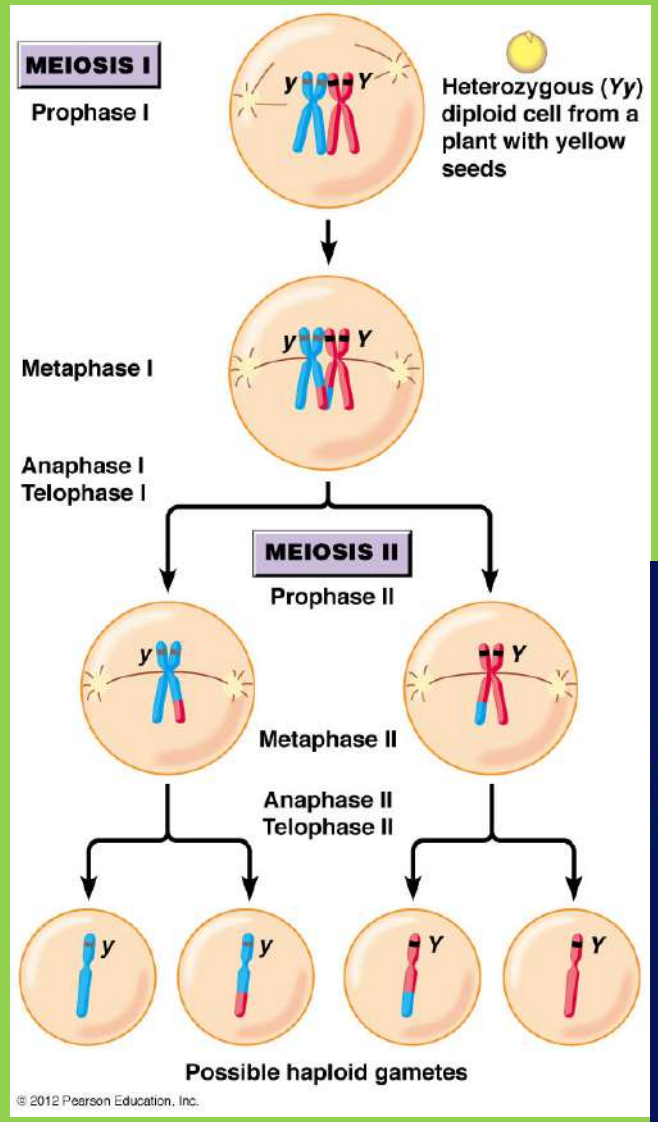
Gametes from RrYy parent



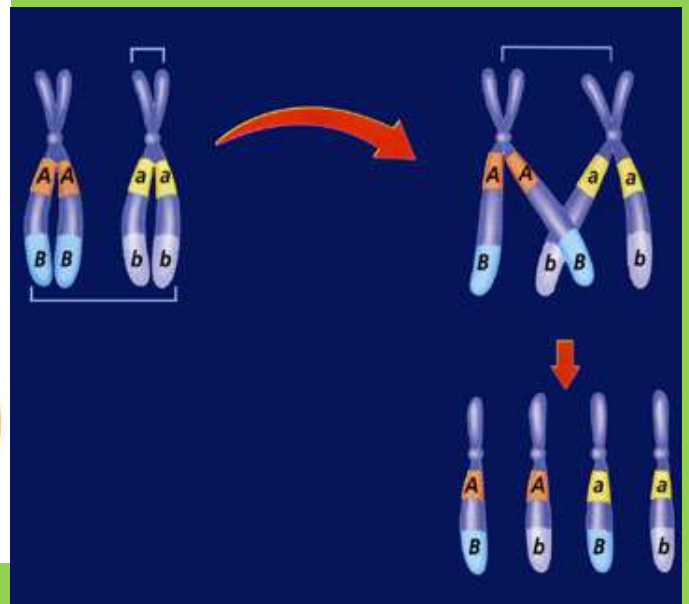
F1 cross: *RrYy ´ RrYy*

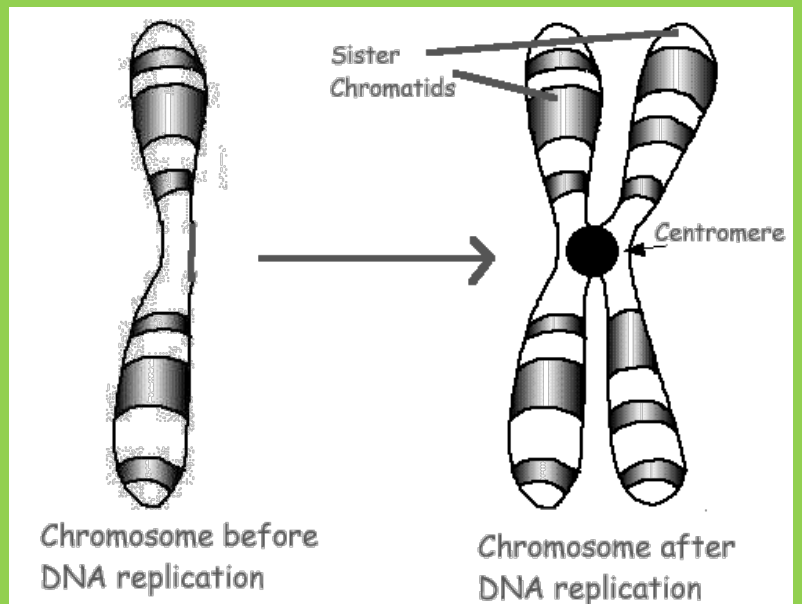
3/30 Meiosis 10.2

Obj. TSW demonstrate understanding of Meiosis by drawing how the chromosomes segregate randomly and produce gametes. P.12 NB



1. Compare and Contrast Haploid and Diploid cells.
2. Explain what homologous chromosomes are.
3. Explain what crossing over is during Meiosis and why it is important.

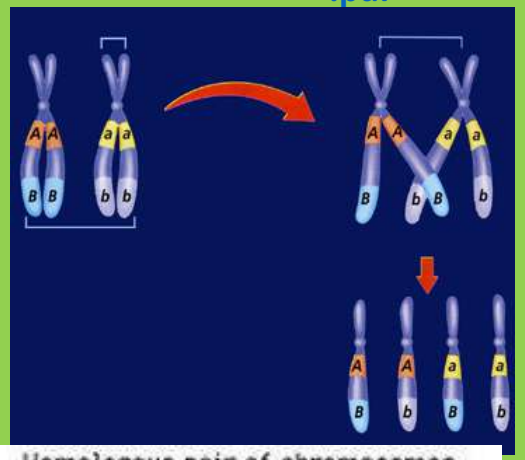


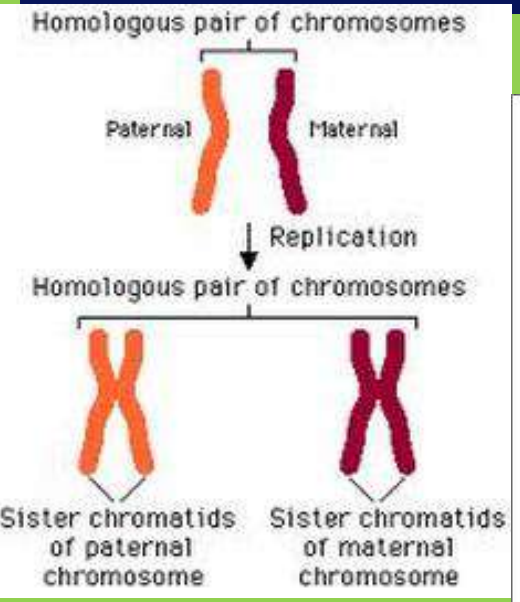


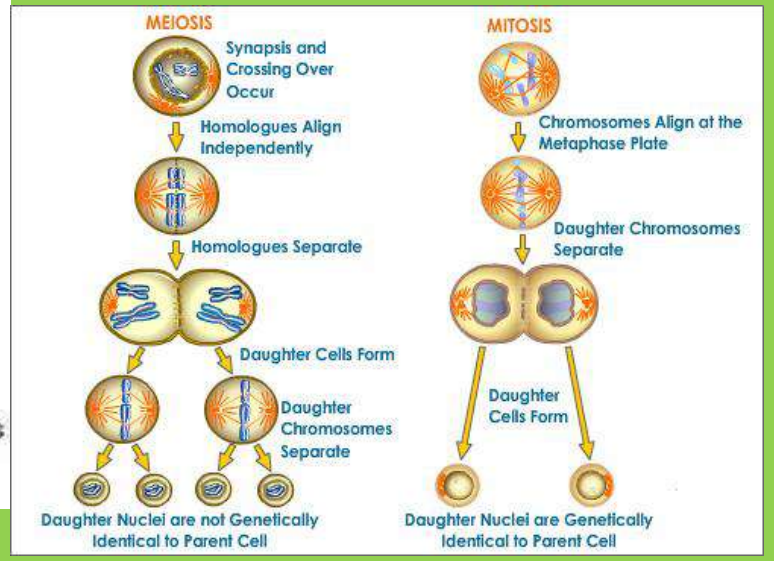
3/31 Genetic Inheritance 10.1 & 10.2

Obj. TSW demonstrate understanding of homologous chromosomes Mendel's laws, Mitosis & Meiosis by doing a concept map and a foldable. p. 14 NB

http://www.cde.ca.gov/ta/tg/sr/documents/cstrtqbiology.pdf



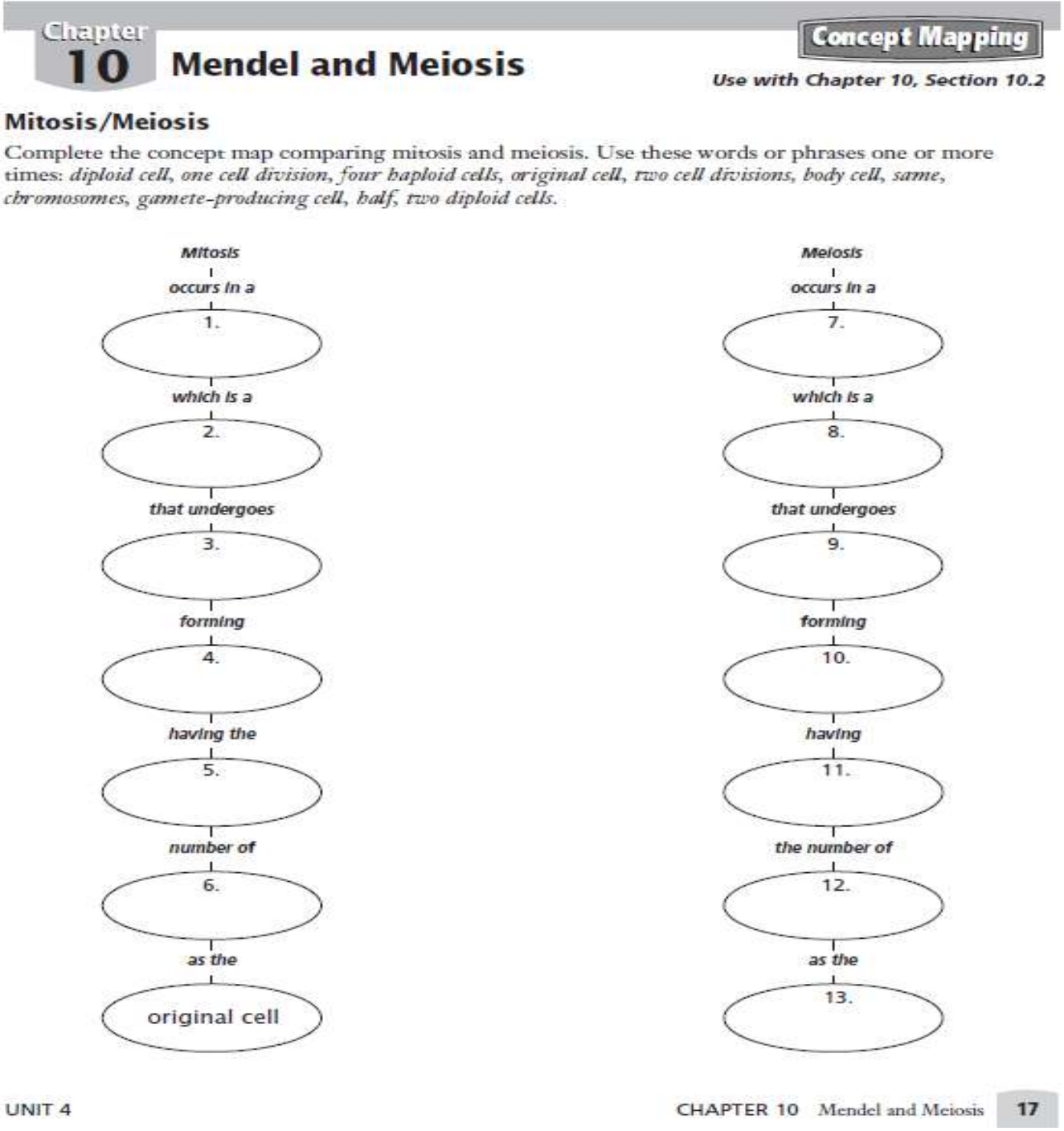




1. Compare & Contrast Homozygous and Heterozygous genotypes.
2. Explain what crossing over is during Meiosis and why it is important?
3. Compare & Contrast haploid and diploid cells.

HW Read CH 12
1 page Notes
Page 21 NB
HW Read CH 10
1 page Notes
Page 11 NB

Write a 4 sentence summary P. 15 NB



Chapter 10 Mendel and Meiosis

Concept Mapping

Use with Chapter 10, Section 10.2

Mitosis/Meiosis

Complete the concept map comparing mitosis and meiosis. Use these words or phrases one or more times: *diploid cell, one cell division, four haploid cells, original cell, two cell divisions, body cell, same, chromosomes, gamete-producing cell, half, two diploid cells.*

Mitosis

occurs in a

1.

which is a

2.

that undergoes

3.

forming

4.

having the

5.

number of

6.

as the

original cell

Meiosis

occurs in a

7.

which is a

8.

that undergoes

9.

forming

10.

having

11.

the number of

12.

as the

13.

UNIT 4

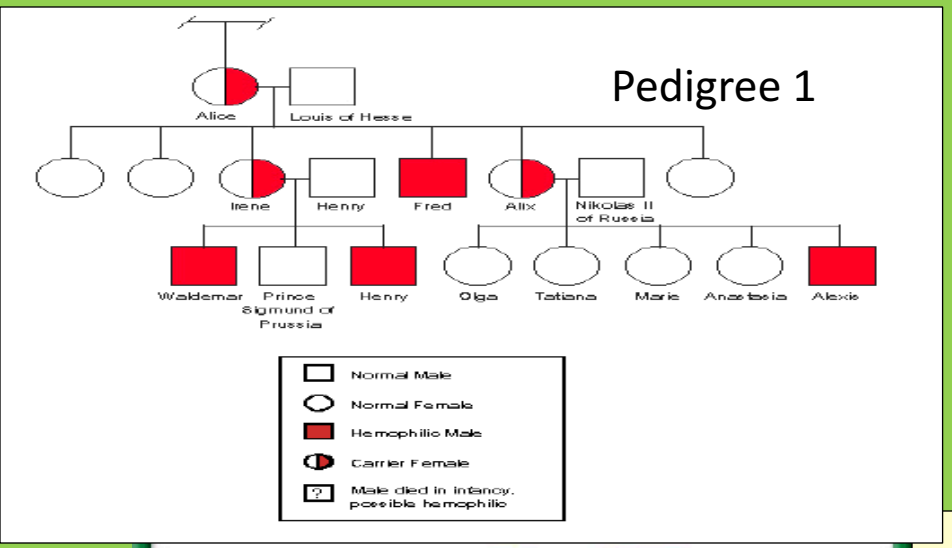
CHAPTER 10 Mendel and Meiosis 17

- Diploid
- One cell division
- Four haploid cells
- Original cell
- Two cell divisions
- Body cell
- Same
- Chromosome
- Gamete-producing cell
- Half
- Two diploid cells

4/01 Pedigrees 12.1

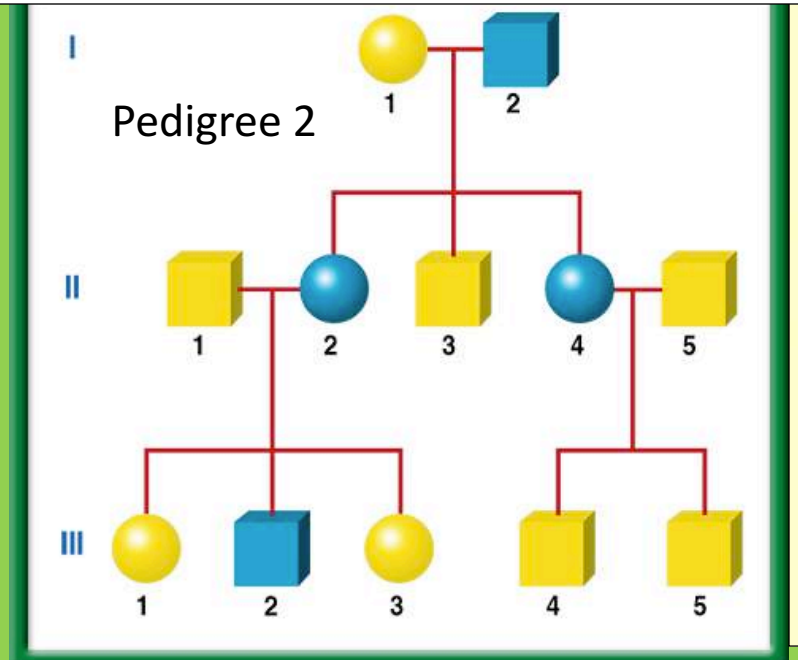
Obj. TSW determine the mode of inheritance of a trait by examining a pedigree in a group pedigree project. P.16 NB

Pedigree 1

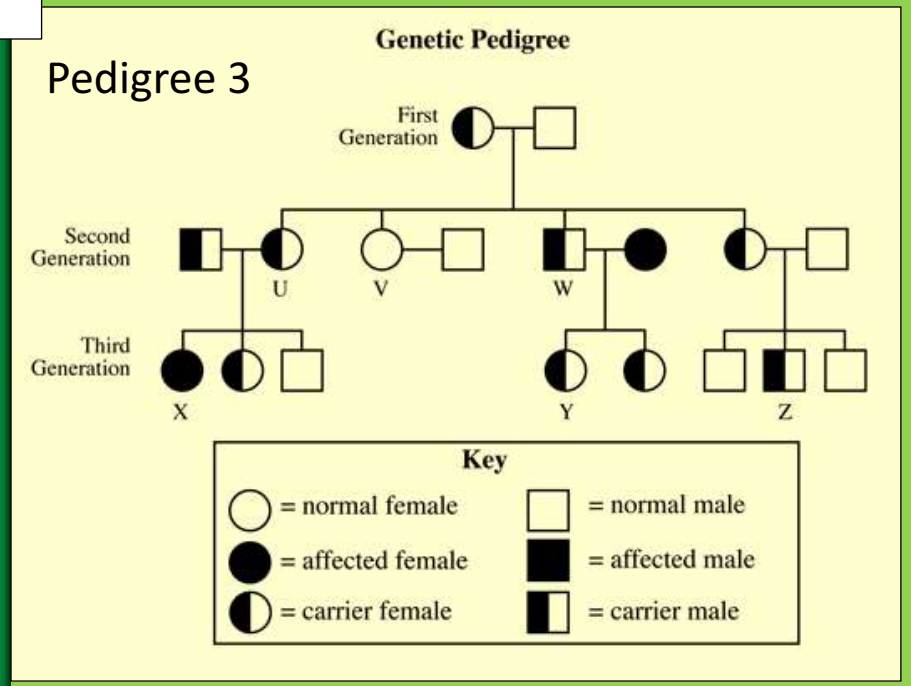


1. Identify and explain the Mode of inheritance for each of these three pedigrees.
   - Dominant or Recessive
   - Autosomal or Sex - Linked

Pedigree 2



Pedigree 3



Meiosis Activity with beads. Use page 267 Biology book.

Simulate the process of Meiosis with a partner.

Show us your simulation.

Explain in your notebook **page 15**

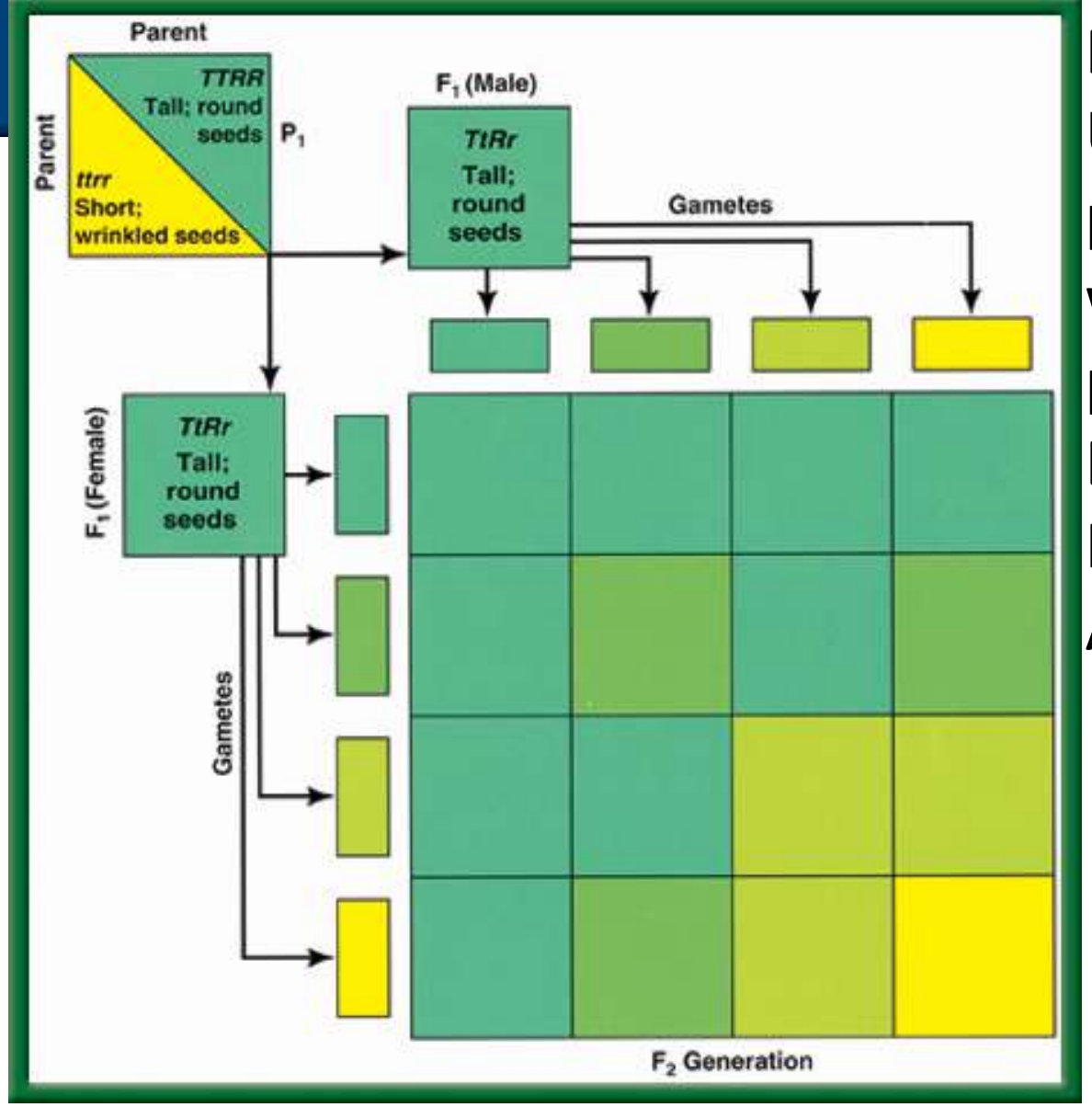
How does Meiosis add genetic variation to the population?

Use these words: **gamete, sex cell, haploid, homologous chromosomes, division, egg or sperm cell.**

- Mitosis vs. Meiosis video demonstration

10.1

Dihybrid Cross



P. 17 NB

Use ¾ of paper, ¼ to write an AXES paragraph

Law of Independent Assortment

Date	Title/ Topic	Page
10/19	WU – Chromosomes CH 10.1	8
10/19	Activity: Human Traits Checklist	9
10/21	WU – Mendel's Two Laws CH 10.1	10
10/20	HW – 1 page Notes CH 10	11
10/22	WU – Meiosis CH 10.2	12
10/22	Karyotyping & Punnett Square Practice	13
10/23	WU – Genetic Inheritance CH 10.1 – 10.2	14
10/22 QUIZ	**Concept Map: Mendel & Meiosis w/ summary Meiosis Paragraph from Meiosis Bead Activity**	**15 Notebook Check P. 8 – 15 (40 points)**

Homozygous and Heterozygous

1. **Homozygous:** when identical alleles of the gene are present on both chromosomes
   - Said to be true breeding
   - Homo means same
   - Can be homozygous recessive (bb) or homozygous dominant (BB)
- **Heterozygous:** when two different alleles occupy the gene's position on the chromosomes
   - Heterozygous: Bb

2. **Crossing Over** adds **genetic variation** to the species. It is an example of Genetic Recombination and happens during Prophase 1 of Meiosis.

3. **Haploid Cells** are the **gametes,** Egg & Sperm Cells. They have 1 set of chromosomes from mom or dad.

Diploid Cells are the **Body Cells**, heart, muscle cells. They have 2 sets of chromosomes from Mom & Dad.

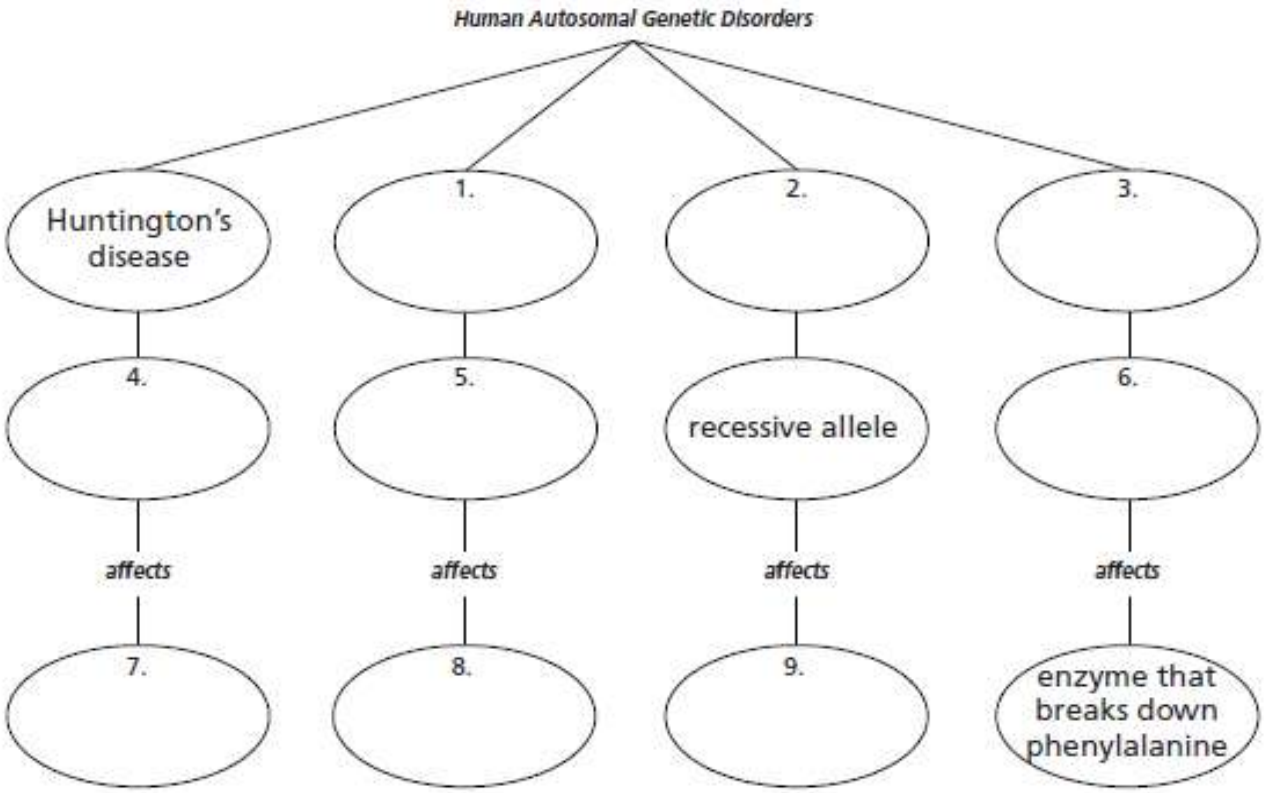
Chapter 12 **Patterns of Heredity and Human Genetics**

Concept Mapping

Use with Chapter 12, Section 12.1

Human Autosomal Genetic Disorders

Complete the concept map on human autosomal genetic disorders. Use these words or phrases one or more times: *Tay-Sachs disease, recessive allele, phenylketonuria, dominant allele, lungs and pancreas, central nervous system, cystic fibrosis.*



P. 19 NB
4 Sentence Summary

Read this section of the Book 12.1 about Human Autosomal Genetic Disorders. Then place these words in the location where they belong on the Concept map.

- Tay – Sachs Disease
- Recessive allele
- Phenylketonuria
- Dominant allele
- Lungs & pancreas
- Central Nervous System
- Cystic Fibrosis

Genetic Inheritance

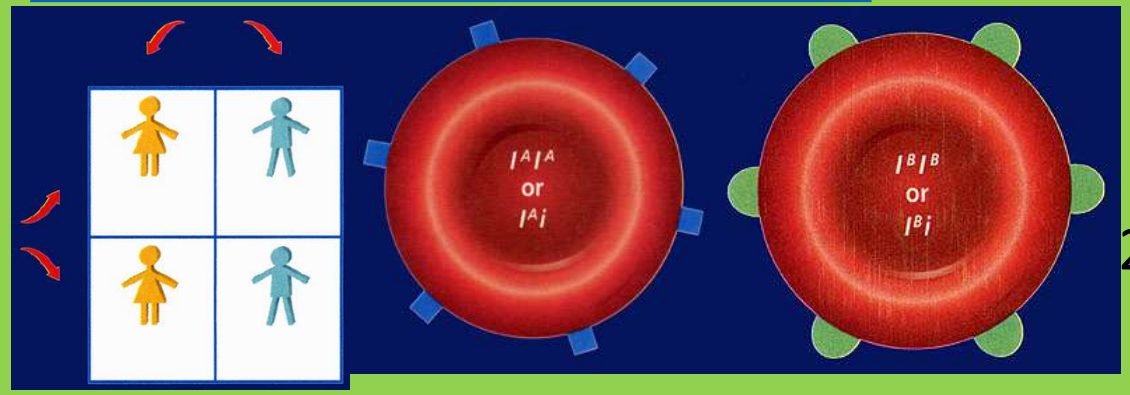
Why are there different Blood Types?

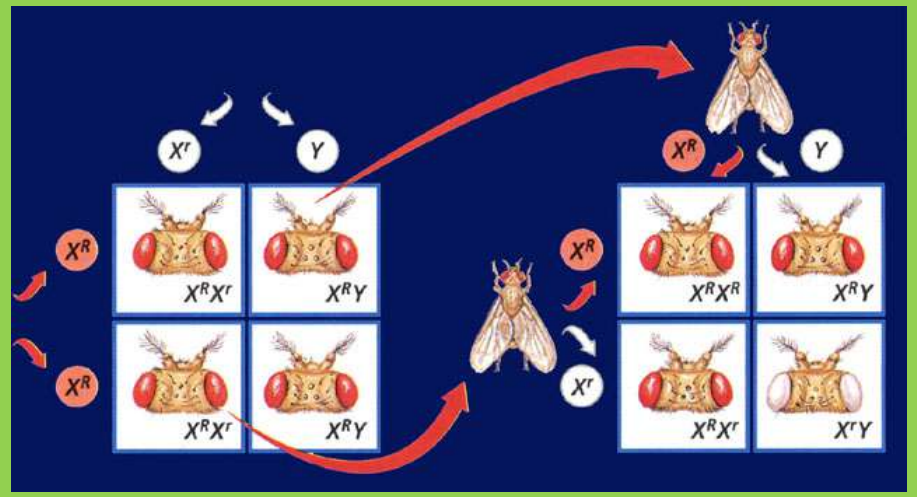
Week 10

10/27 Inheritance 12.2 & 12.3

Obj. TSW demonstrate understanding of Blood Types (multiple allelic), by performing punnett square crosses with probabilities. P.18 NB

http://learn.genetics.utah.edu/



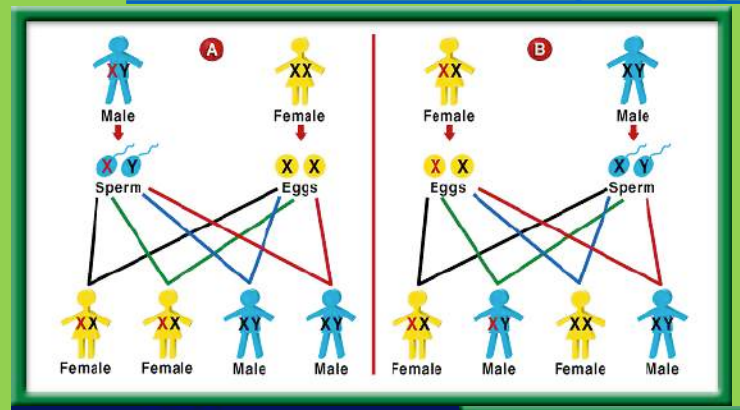


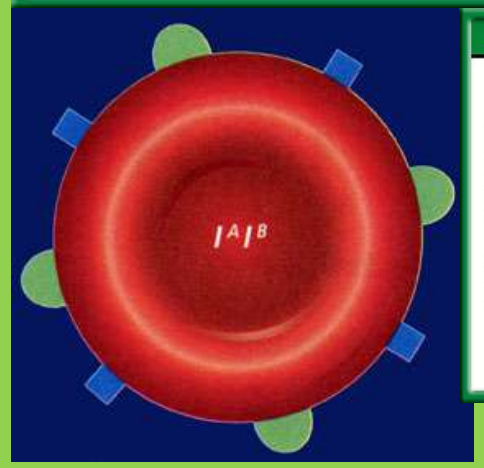
1. How is the sex of an offspring determined? Show the Punnett Square. What % will be male, what % will be female?
2. In sex-linked inheritance, which chromosome will the trait be expressed? How is it different from an autosome?
3. Perform a multiple allelic cross Punnett Square of the blood types: $I^Ai \times I^Bi$.

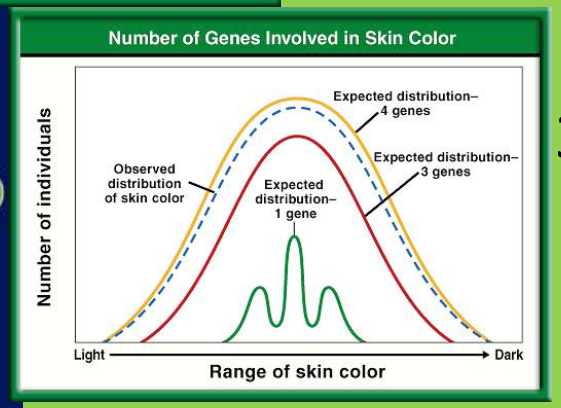
10/28 Complex & Polygenic Inheritance 12.3

Obj. TSW predict possible combinations of alleles in a zygote from the genetic makeup of the parents during classroom activities. P.20 NB

http://www.cde.ca.gov/ta/tg/sr/documents/cstrtqbiology.pdf

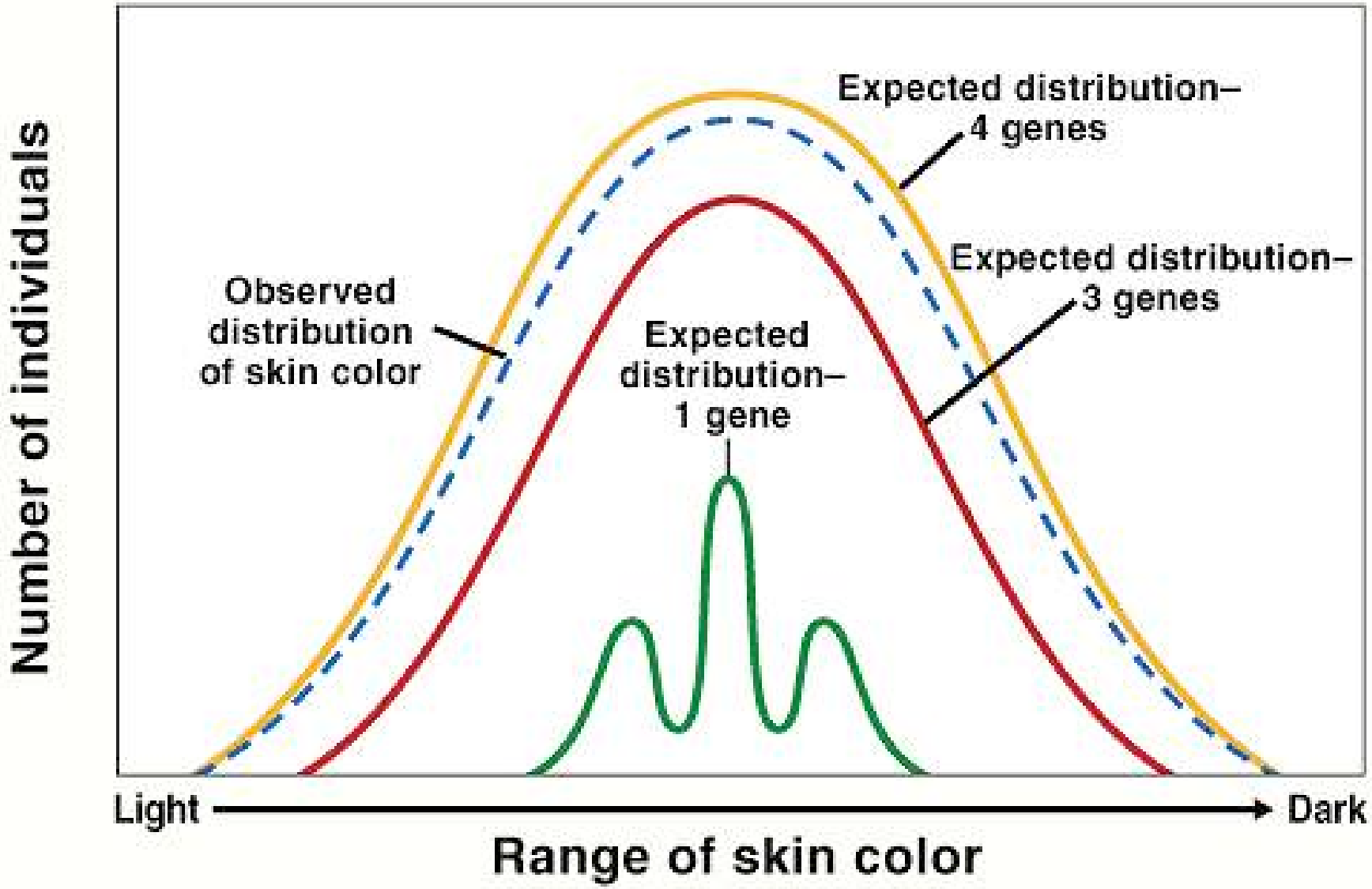




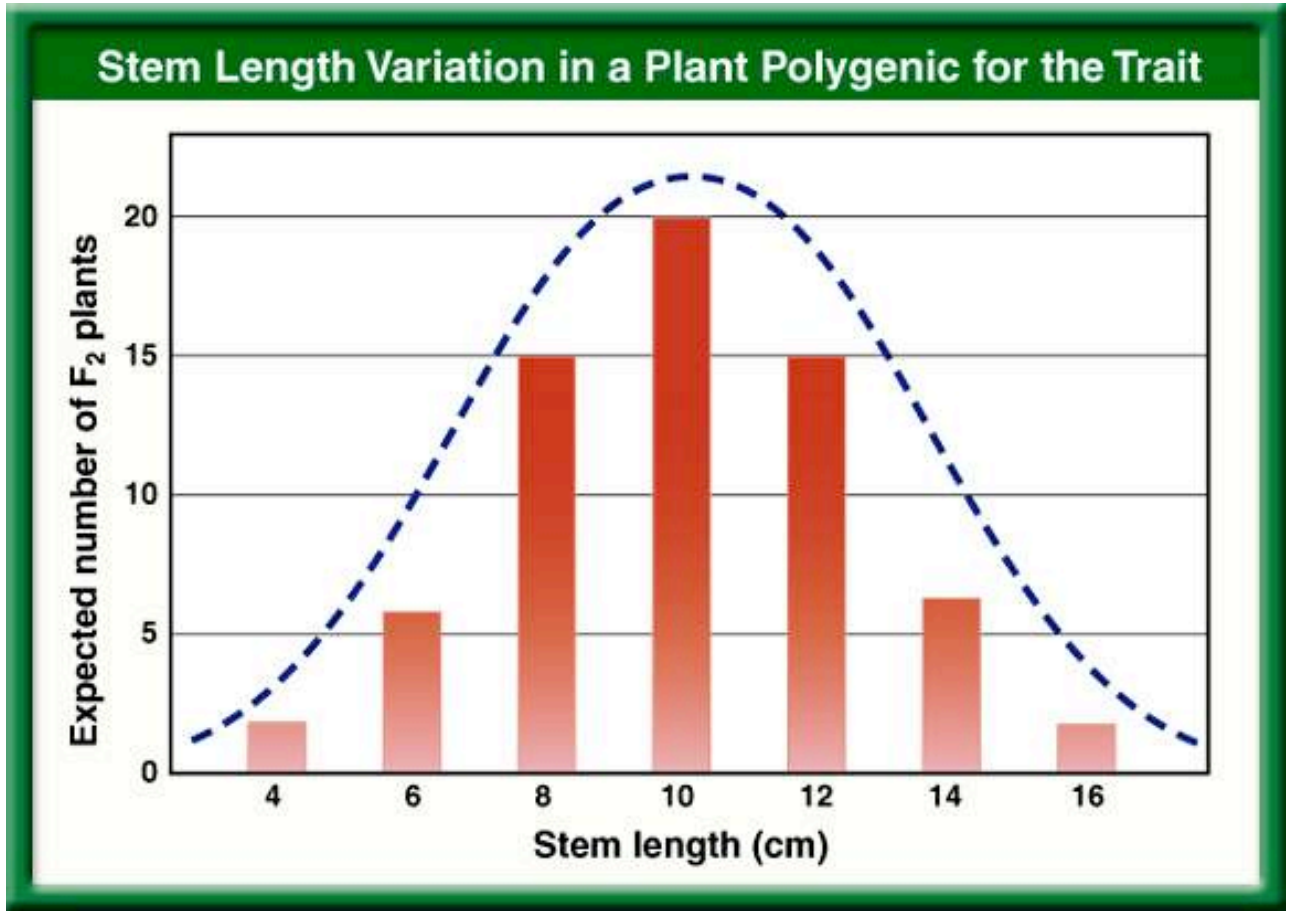


1. Determine the possible blood types of the children of parents that both have type AB.
2. Explain why a male with a recessive X – linked trait usually produces no female offspring with the trait.
3. Explain polygenic inheritance. Give an example. Draw the graph.

Number of Genes Involved in Skin Color



Stem Length Variation in Plants



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END OF SLIDE

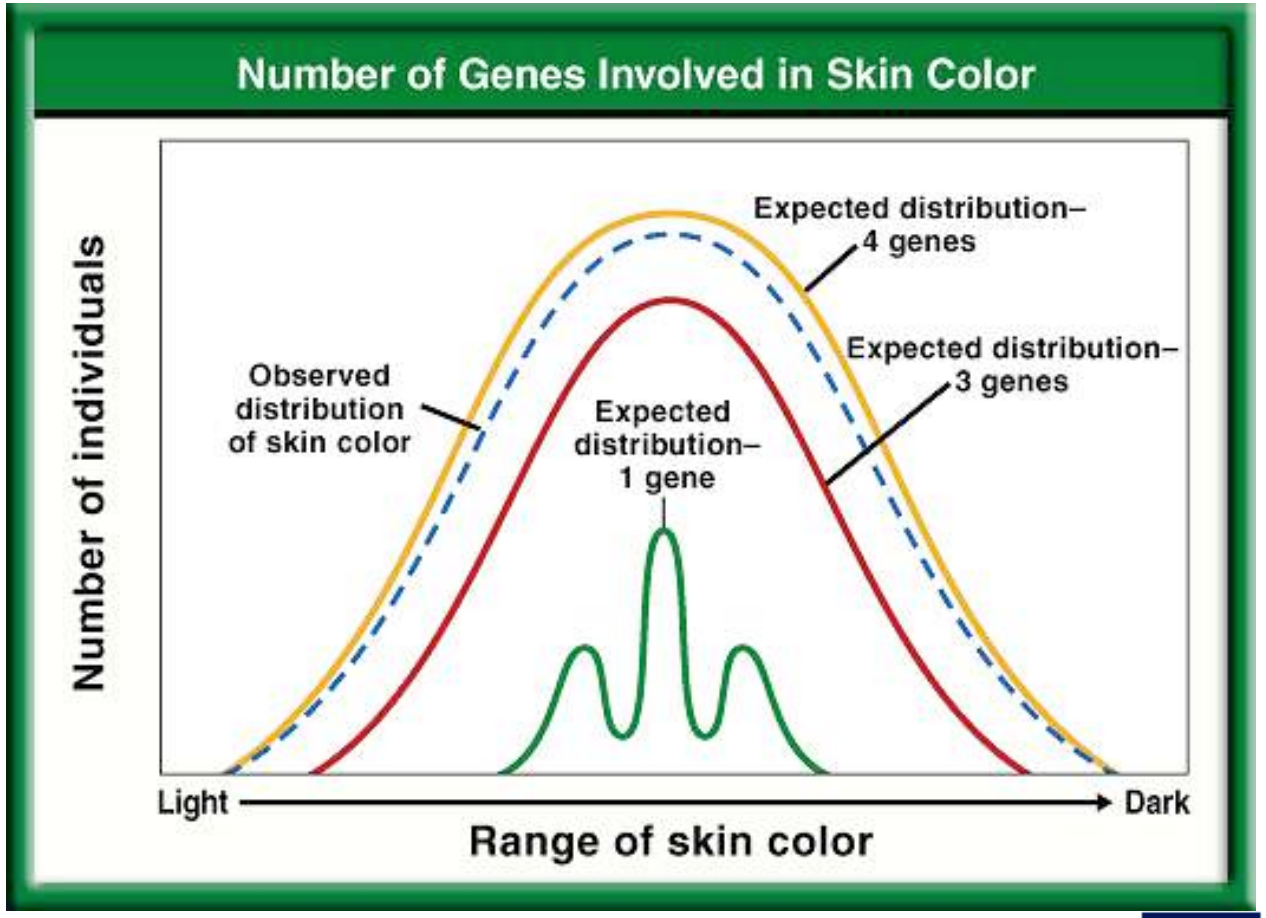
PREVIOUS SLIDE

TABLE OF CONTENTS

NEXT SLIDE

RESOURCES

Number of Genes Involved in Skin Color



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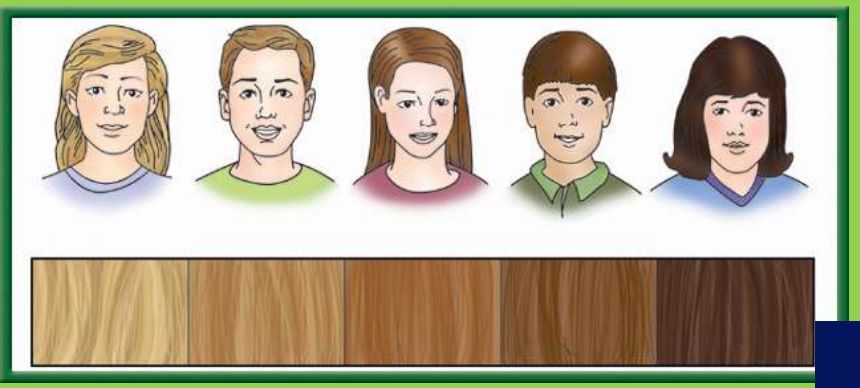
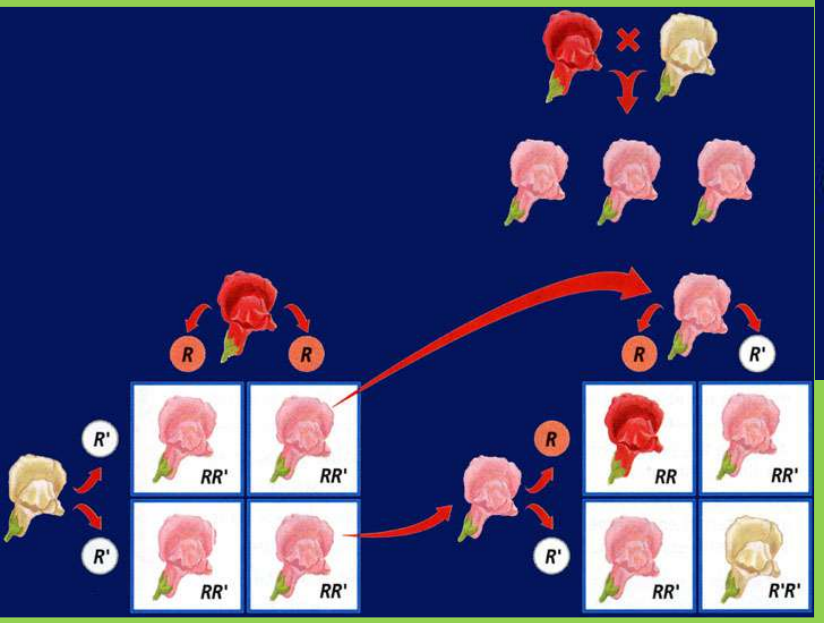
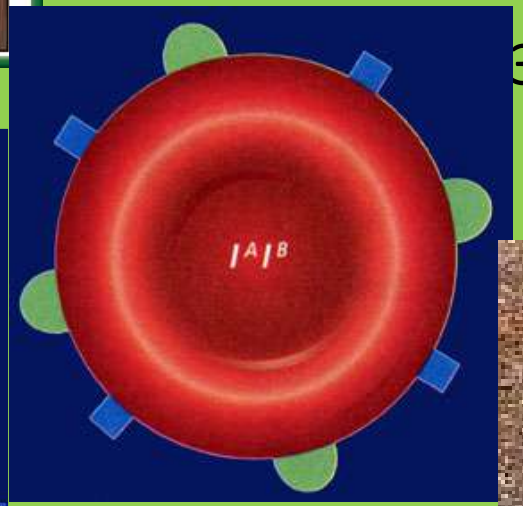
10/29 Incomplete Dominance & Codominance 12.2
Obj. TSW demonstrate understanding of Pedigrees by finishing the study guide. P.22 NB







1. Draw a Punnett square and explain how incomplete dominance is inherited in Snap Dragon flowers.
2. Draw a Punnett square and explain how Codominance is inherited in Checkered chickens.
3. What color would the chicken be if feather color were inherited by incomplete dominance?

TABOO

- Dominant
- Allele
- Heterozygous
- Phenotype
- Karoytype
- Pure – Breeding

TABOO

- Recessive
- Genotype
- Homozygous
- Zygote
- Chromosome
- Hybrid

TABOO

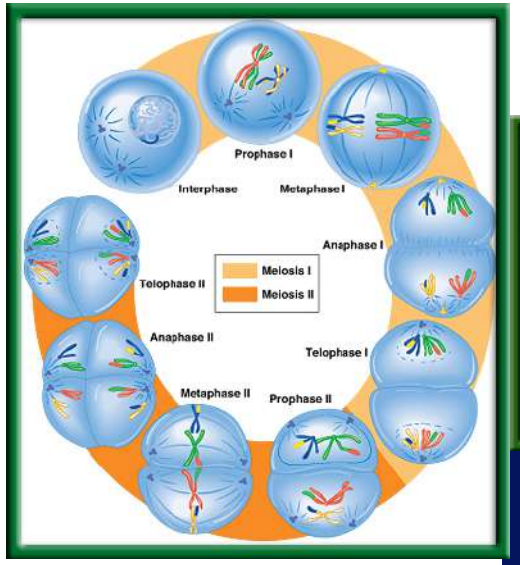
- Probability
- Haploid
- Offspring
- Ratio
- DNA
- Meiosis

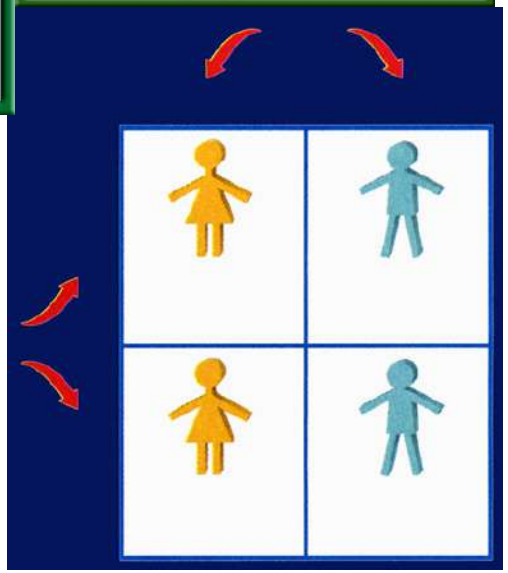
TABOO

- Diploid
- Punnett Square
- Mitosis
- Protein
- Gametes
- Homologous Chromosomes

3/21 Genetic Inheritance 10.1 & 10.2

Obj. TSW demonstrate understanding of genetic inheritance by doing well on the mendelian genetics quiz. P. 84NB

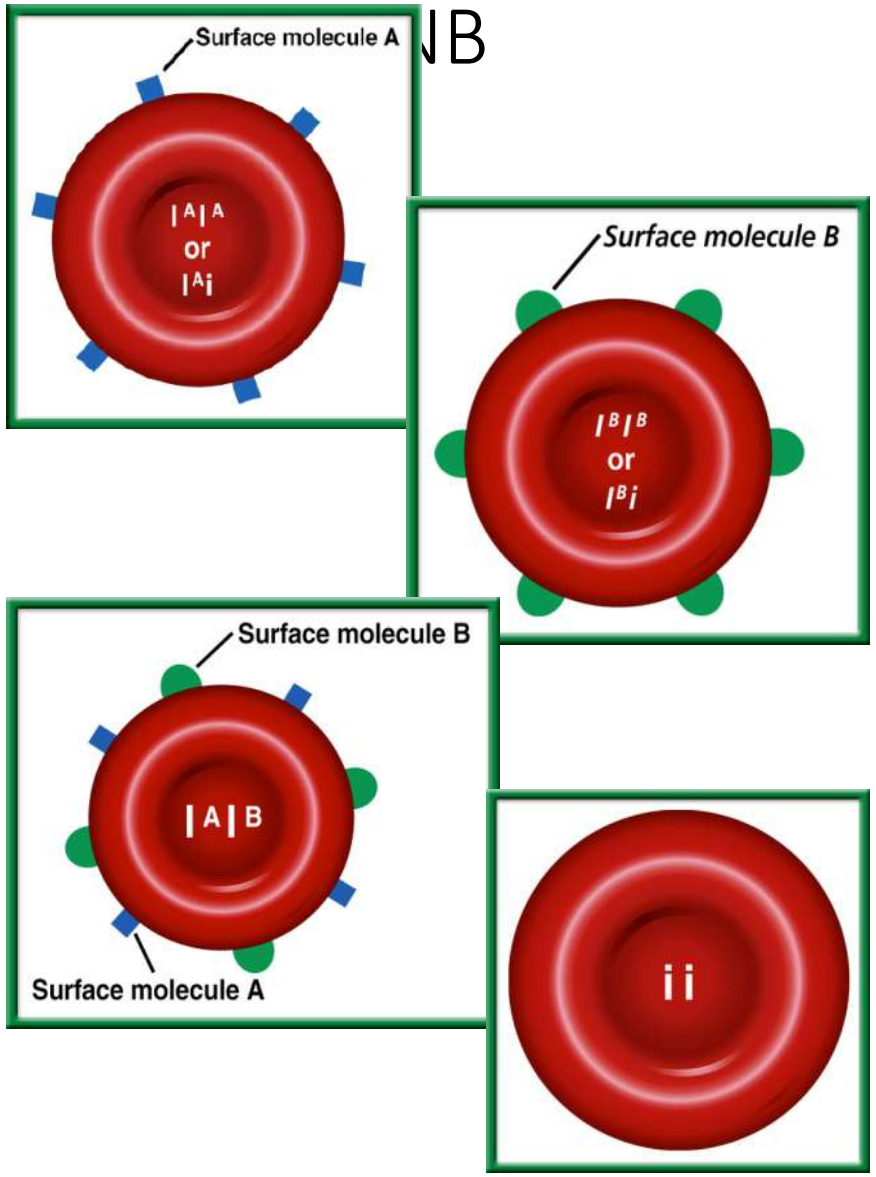




1. Draw the process of Meiosis (P.267BB) and explain it's purpose.
2. Explain and draw fertilization using an egg (n) & sperm (n).
3. Using a Punnett Square, show how sex determination is 50%.

3/24 Modes of Inheritance: Multiple Allelic CH 12

Obj. TSW learn how different traits are inherited in the



1. What are the 6 genotypes for blood?
2. What are the 4 phenotypes for blood?
3. Do a punnett square cross between two heterozygotes for A Blood and B blood.

Blood Typing Game

Multiple Alleles Govern Blood Type Answers #1 & 2

Human Blood Types

Genotypes	Surface Molecules	Phenotypes
$I^A I^A$ or $I^A i$	A	A
$I^B I^B$ or $I^B i$	B	B
$I^A I^B$	A and B	AB
ii	None	O

Question #3.

	I^A	i
I^B	I^AI^B	I^Bi
i	I^Ai	ii

Genotypes:

Phenotypes:

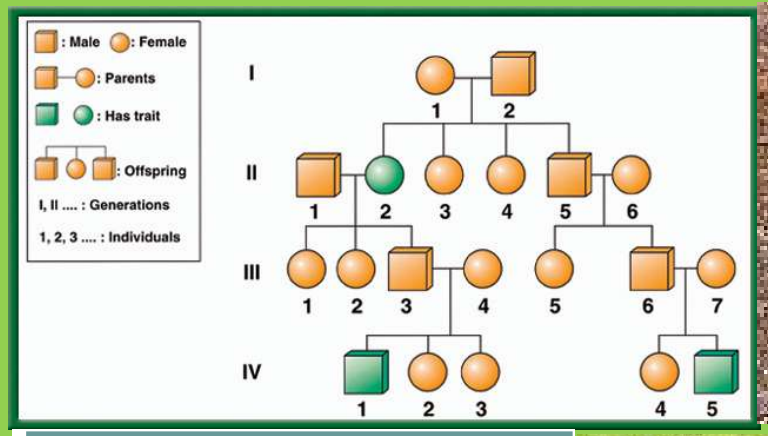
Probability of
A Blood?
B Blood?
AB Blood?
O Blood?

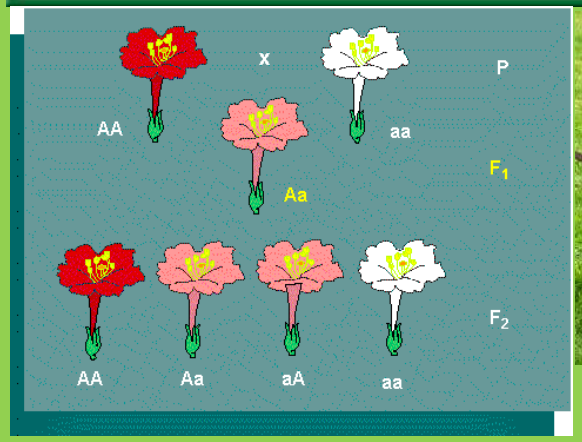
For every question you missed…

- Write 1 sentence: Why is the right answer right?
- Write 1 sentence: What was wrong about your answer?
- Staple to your quiz. Turn in.
- Finish your Study guide – due tomorrow.

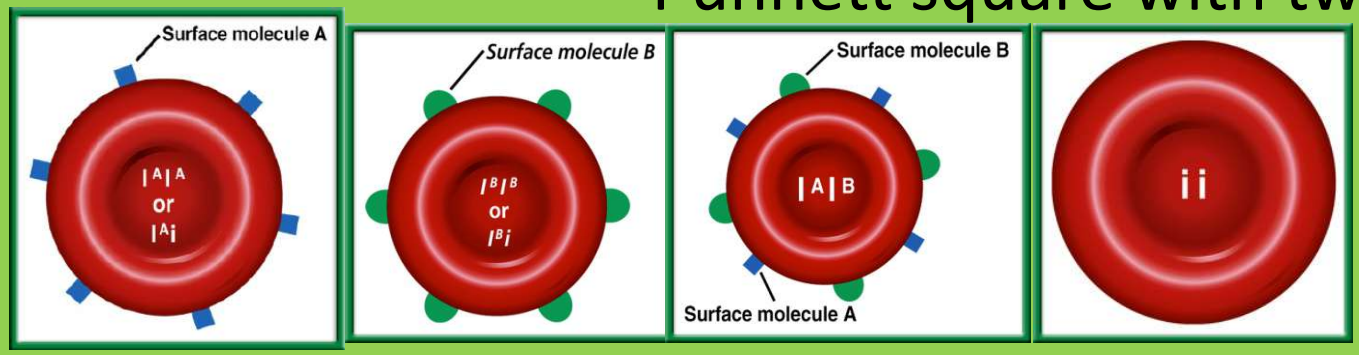
10/25 Patterns of Heredity & Human Genetics 12.1 – 12.3

Obj. TSW discover how multiple alleles are inherited by doing their warm up and competing a Foldable. P. 24 NB





1. Write all the symbols used for a pedigree. Draw a pedigree of just your mom & dad and any siblings. (Youngest to the left)
2. Compare & contrast Incomplete Dominance and Codominance.
3. Write the 6 genotypes for the 4 phenotypes for blood. Make a Punnett square with two crosses.

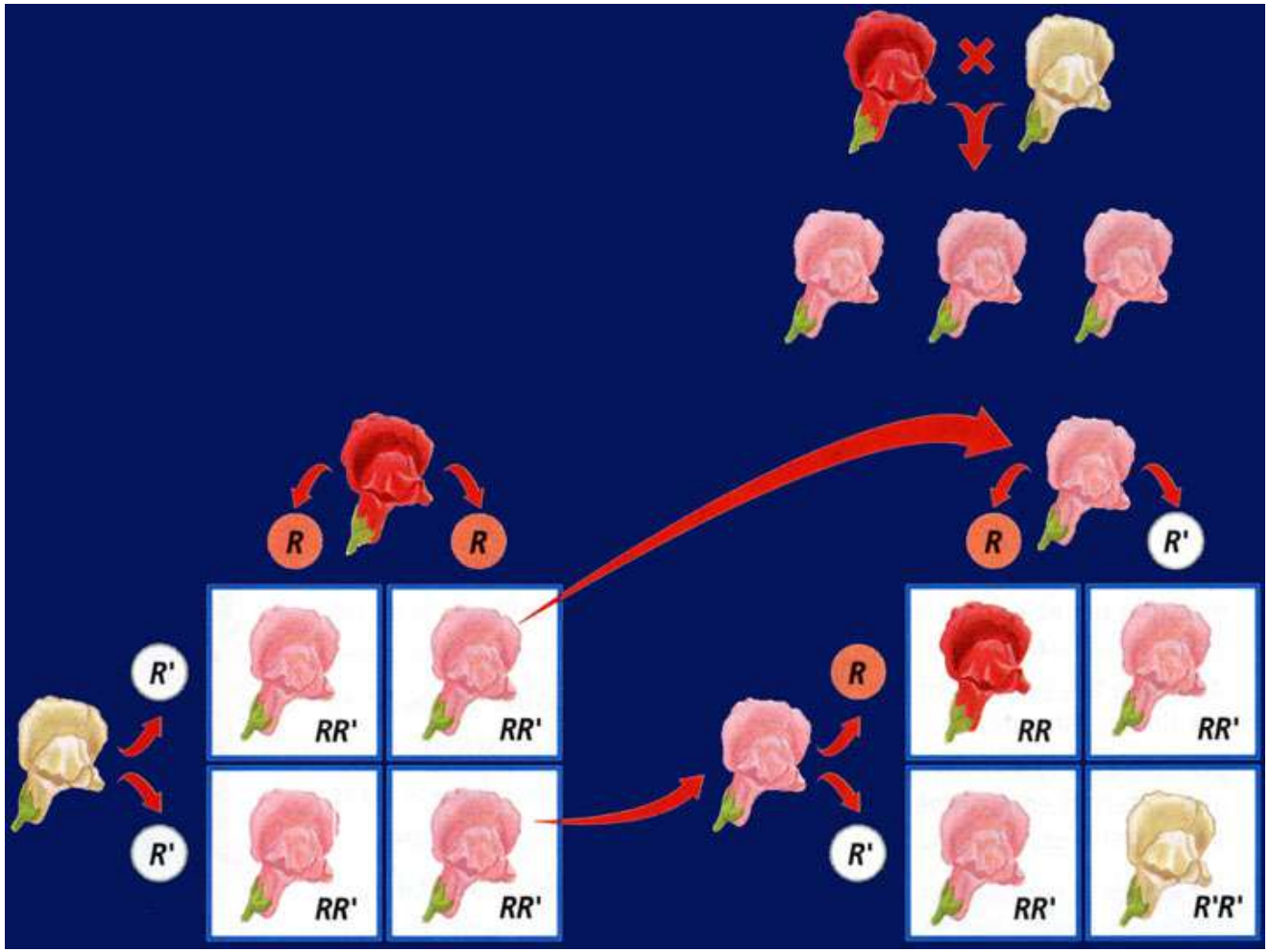


Incomplete dominance: Appearance of a third phenotype p. 77NB

- When inheritance follows a pattern of dominance, heterozygous and homozygous dominant individuals both have the same phenotype.
- When traits are inherited in an incomplete dominance pattern, however, the phenotype of heterozygous individuals is intermediate between those of the two homozygotes.

Incomplete dominance: Appearance of a third phenotype

- For example, if a homozygous red-flowered snapdragon plant *(RR)* is crossed with a homozygous white-flowered snapdragon plant (R′ R′), all of the F_1 offspring will have pink flowers.


R
R
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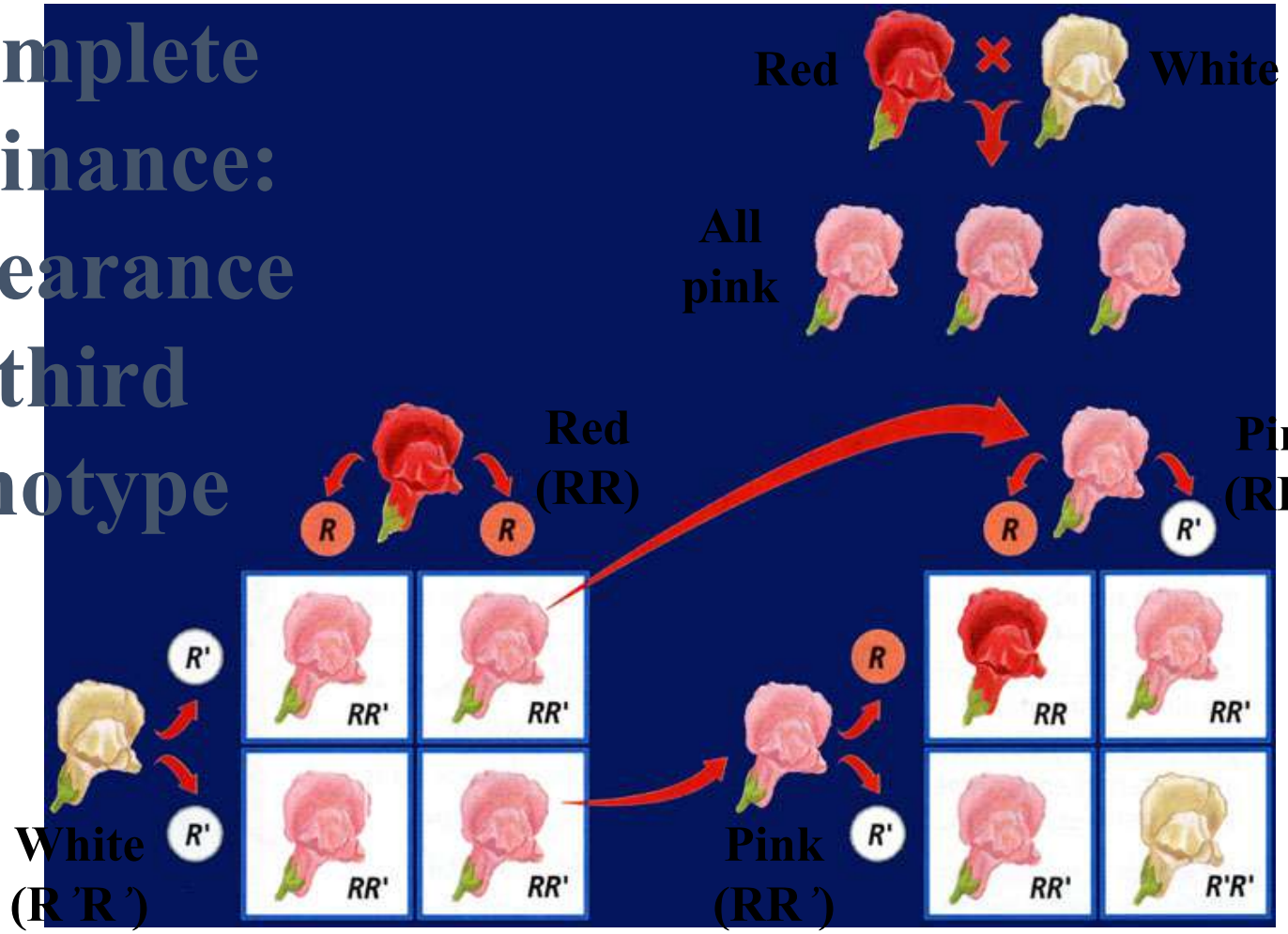
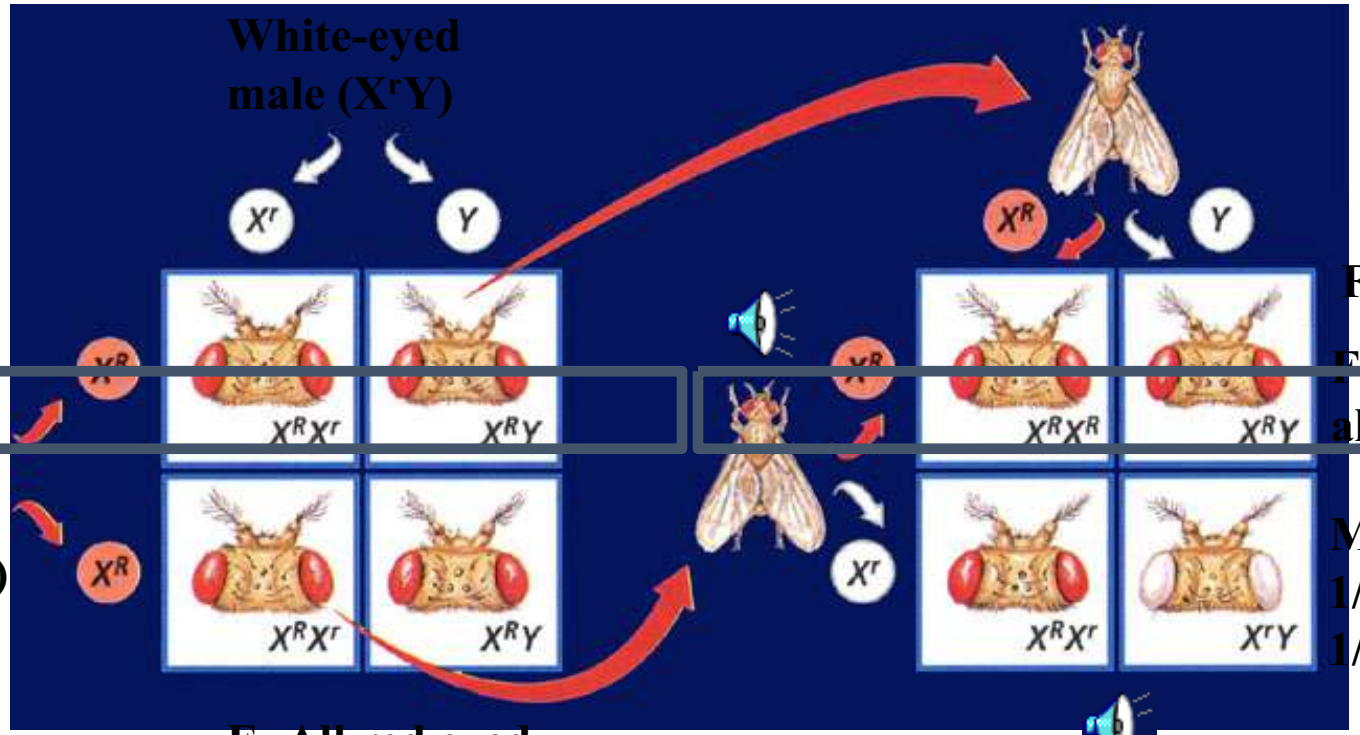
R'R'

Incomplete dominance: Appearance of a third phenotype



Sex-linked inheritance



Red-eyed female (X^RX^R)

F_1 All red eyed

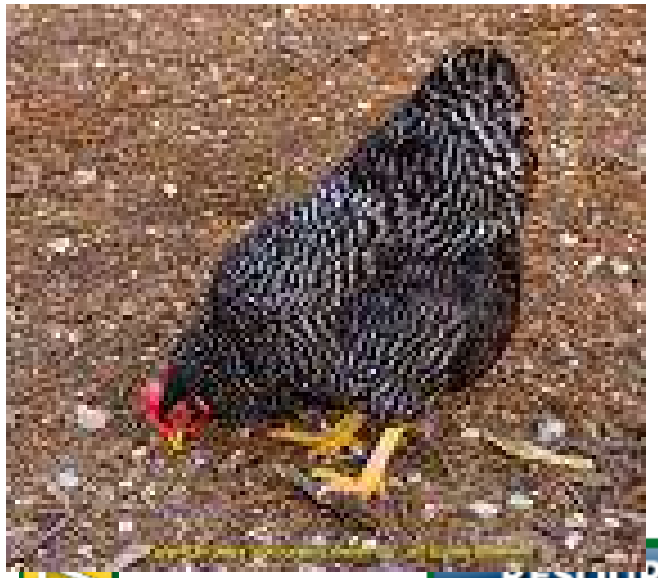
F_2

Females: all red eyed

Males: 1/2 red eyed 1/2 white eyed

Codominance: Expression of both alleles

- Codominant alleles cause the phenotypes of both homozygotes to be produced in heterozygous individuals. In codominance, both alleles are expressed equally.



Karyotyping Chromosomes P. 81NB P.329 BB

1. How many chromosomes are present in Spread #1? 46 Spread#2 46 Spread #3 46 Set A 47 Set B 47
2. Sperm 23 Chromosomes/egg 23 chromosomes

3 &4 Spread #1 Girl (XX) Spread #2 Boy(XY) Spread #3 Girl (XX) Spread A Boy (XY) Spread B Boy (XXY)

5 & 6. Yes, Spread A is Trisomy 21, Spread B is XXY Chr 23.

7. Possible Problems for Trisomy 21- Down's Syndrome, XXY is Kleinfelter's Syndrome

8. In today's medicine Karyotyping is used to determine the sex of the child and to see is there are abnormalities in the chromosomes.

Mitosis vs Meiosis

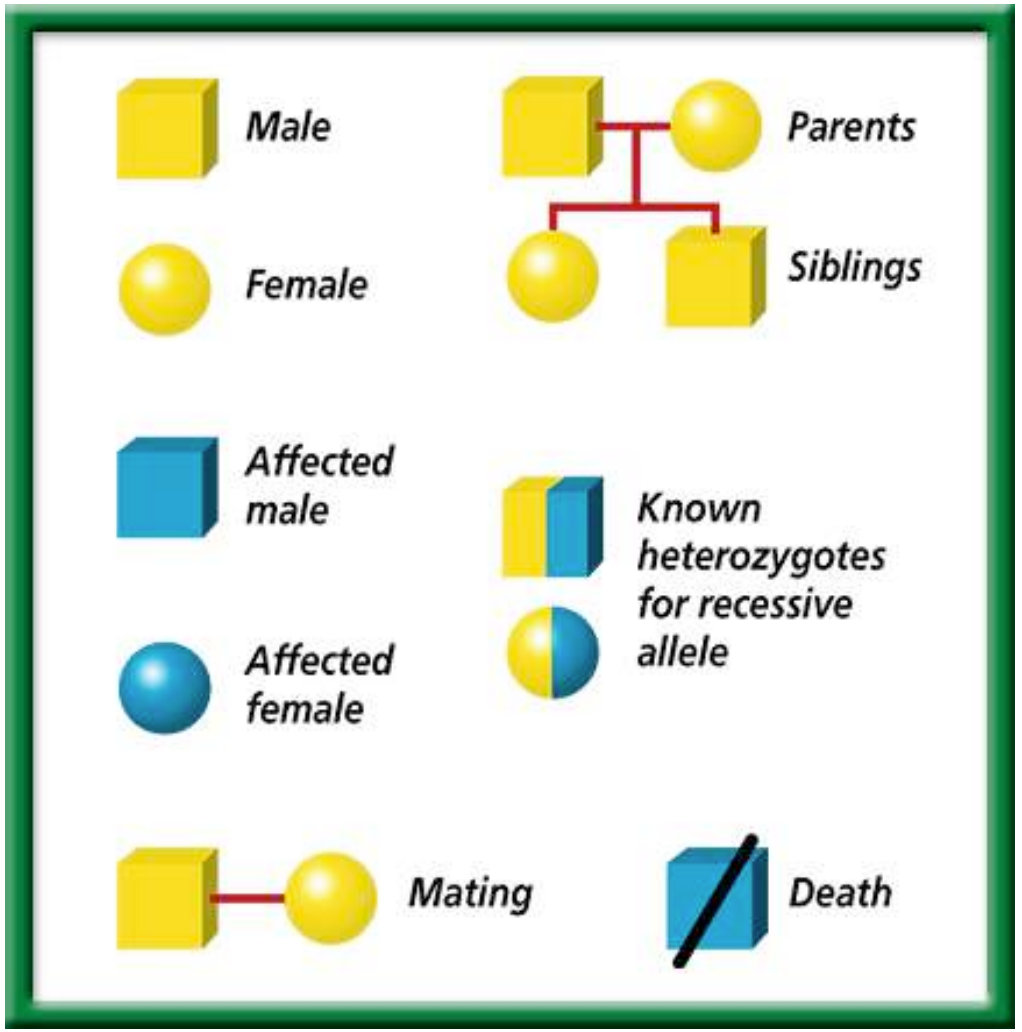
Somatic Cell (Body Cell)

- 2N (Diploid)
- 46 Chromosomes
- 1 Division
- Produces 2 identical cells, same as the parent cell

- **Gametes (Sex Cell)**
- 2N -> 1N (Haploid)
- 23 Chromosomes
- 2 Divisions
- Produces 4 Haploid cells, all different from each other and the parent cells. (Crossing Over)
- Increases Genetic Variation

Pedigree P. 309

Symbols Used by Geneticists



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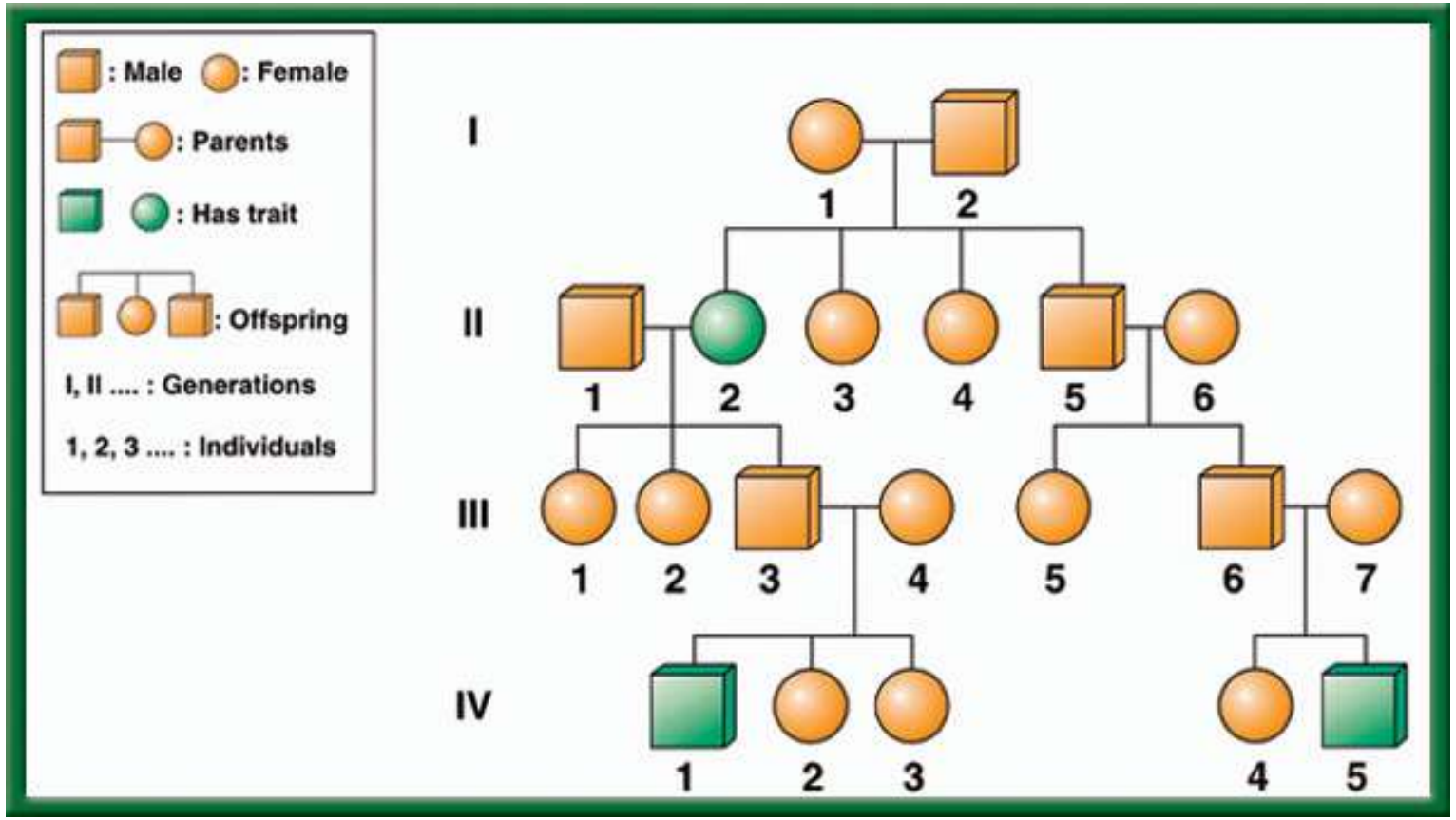
Transparencies



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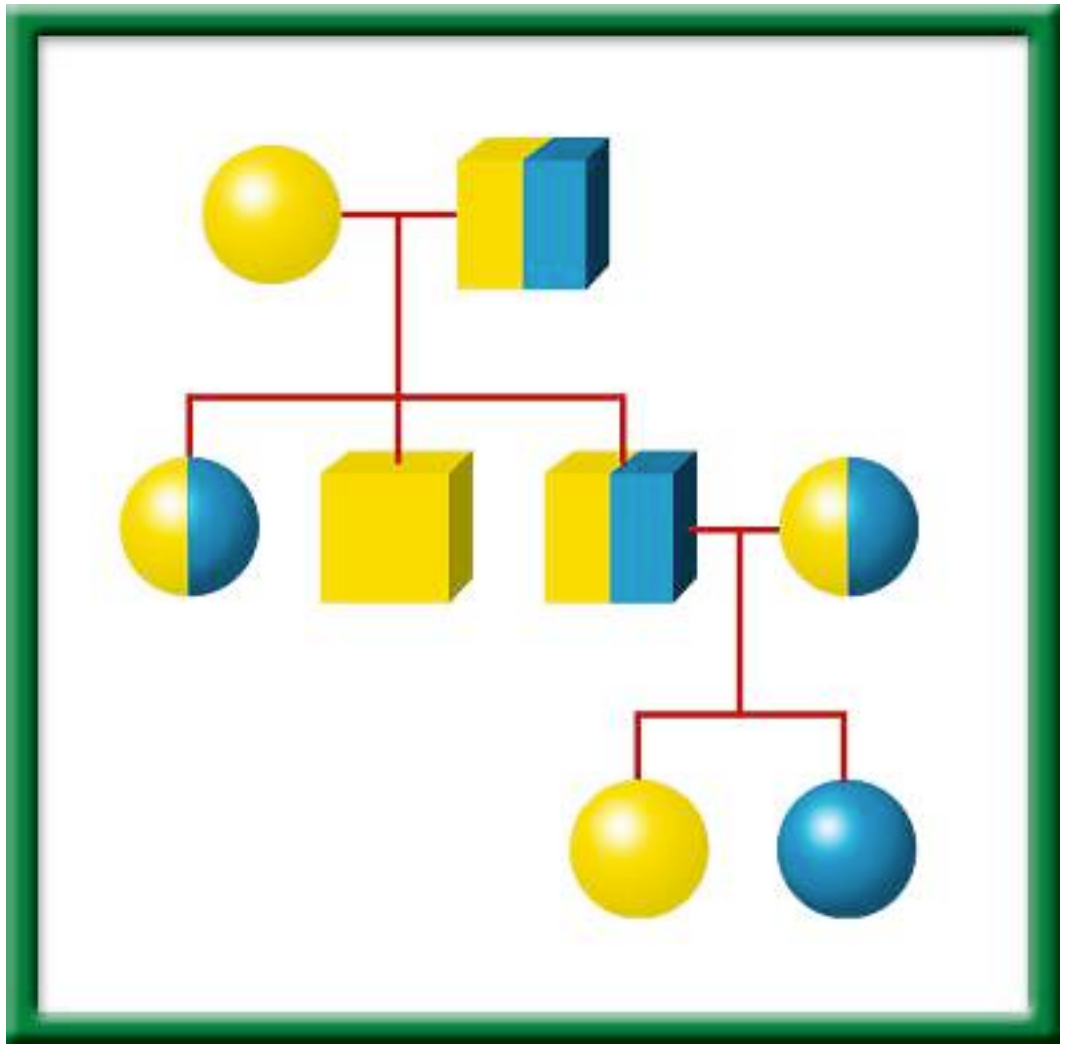
Simple Pedigree



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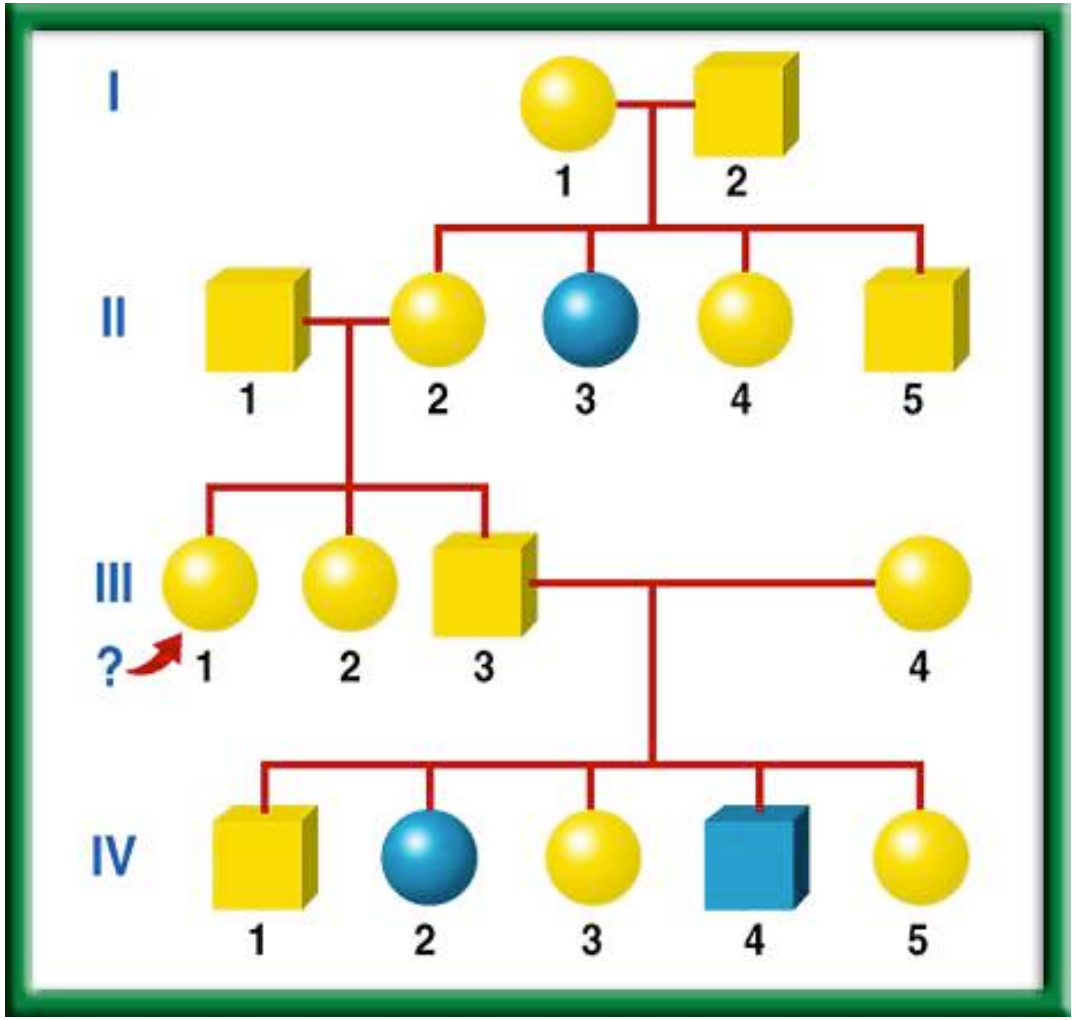
Fictional Pedigree



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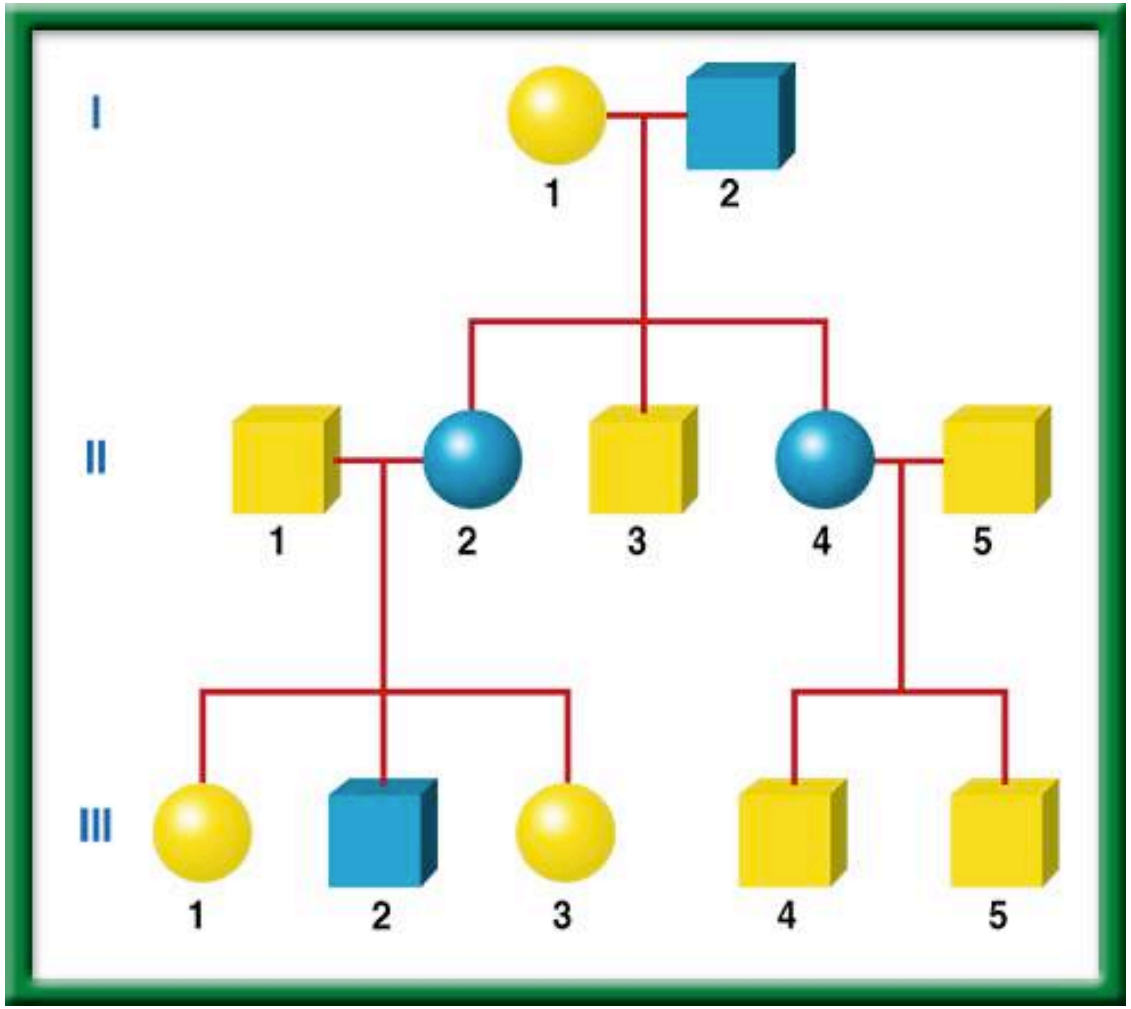
Pedigree-Huntington Disease



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Huntington's disease

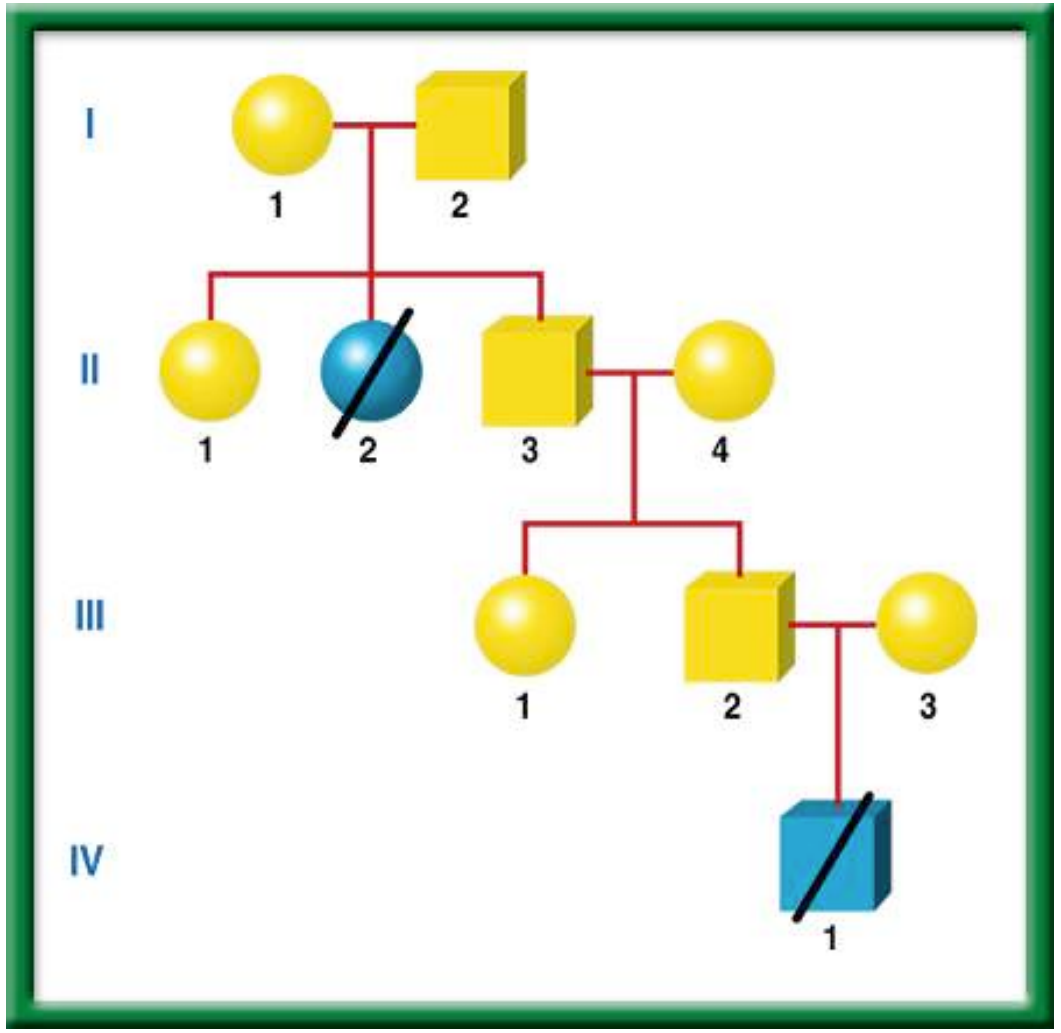
- Huntington's disease is a lethal genetic disorder caused by a rare dominant allele.

- It results in a breakdown of certain areas of the brain.

Huntington's disease

- Ordinarily, a dominant allele with such severe effects would result in death before the affected individual could have children and pass the allele on to the next generation.
- But because the onset of Huntington's disease usually occurs between the ages of 30 and 50, an individual may already have had children before knowing whether he or she is affected.

Pedigree-Tay Sachs Disease



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Chapter 12

Foldables Study Organizers

STEP 1

Fold a vertical sheet of notebook paper from side to side.

FOLDABLES™ Study Organizer

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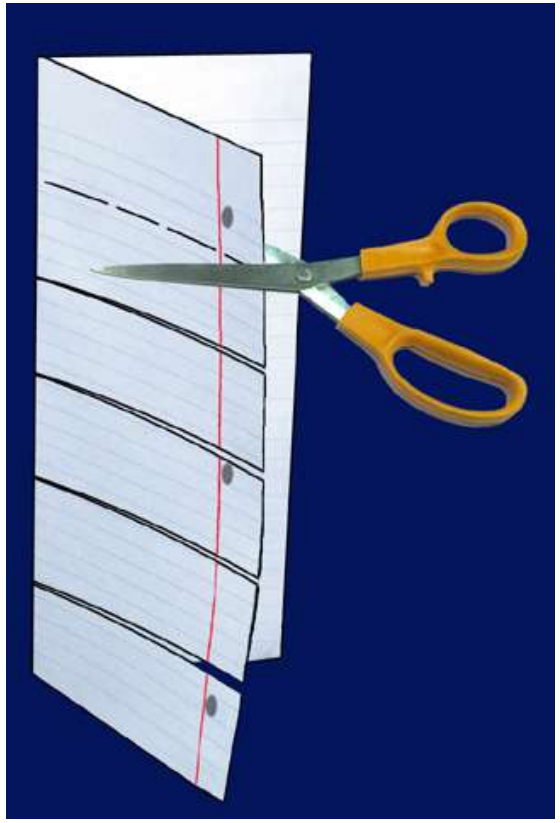
END OF SLIDE

STEP 2

Cut along every fifth line of only the top layer to form tabs.



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Chapter 12

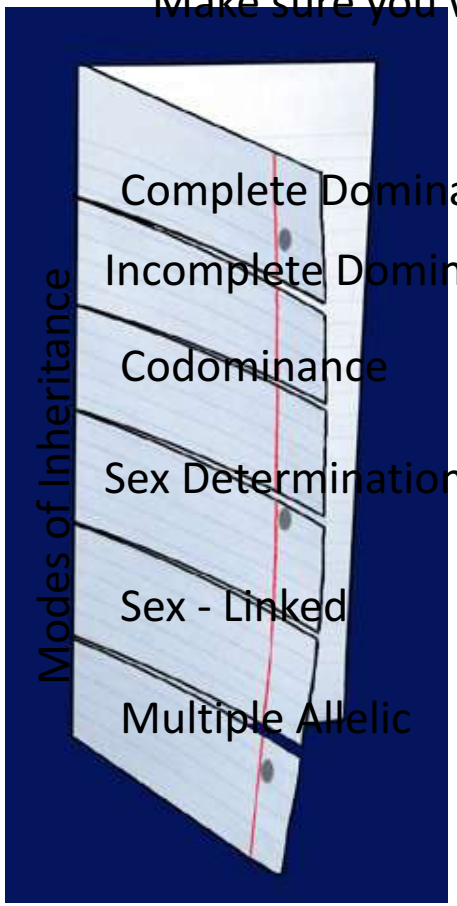
Foldables Study Organizers

STEP 3

Label each tab.

P. 83 NB

Explain how the traits are inherited by giving an example of a punnett square for each. Make sure you write the key for the genotypes.



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http://learn.genetics.utah.edu/
http://www.cde.ca.gov/ta/tg/sr/documents/cstrtqbiology.pdf
Karyotyping Activity
http://www.biology.arizona.edu/human_bio/activities/karyotyping/karyotyping.html

1. Heredity & Traits
    1. Make a Karyotype
    2. Using Karyotypes to predict genetic disorders

2. Genetic Disorders Library
    1. Cystic Fibrosis
    2. Down's Syndrome
    3. Huntington's disease
    4. Sickle Cell Anemia
    5. PKU
    6. Duchenne's Muscular Dystrophy
    7. Osteogenesis Imperfecta
    8. Leukemia
    9. Achondroplasia

CDE Website –2008 Biology Released Test Questions

Multiple Alleles Govern Blood Type

Human Blood Types

Genotypes	Surface Molecules	Phenotypes
$I^A I^A$ or $I^A i$	A	A
$I^B I^B$ or $I^B i$	B	B
$I^A I^B$	A and B	AB
ii	None	O

Multiple phenotypes from multiple alleles

- Although each trait has only two alleles in the patterns of heredity you have studied thus far, it is common for more than two alleles to control a trait in a population.
- Traits controlled by more than two alleles have multiple alleles. 

The importance of blood typing

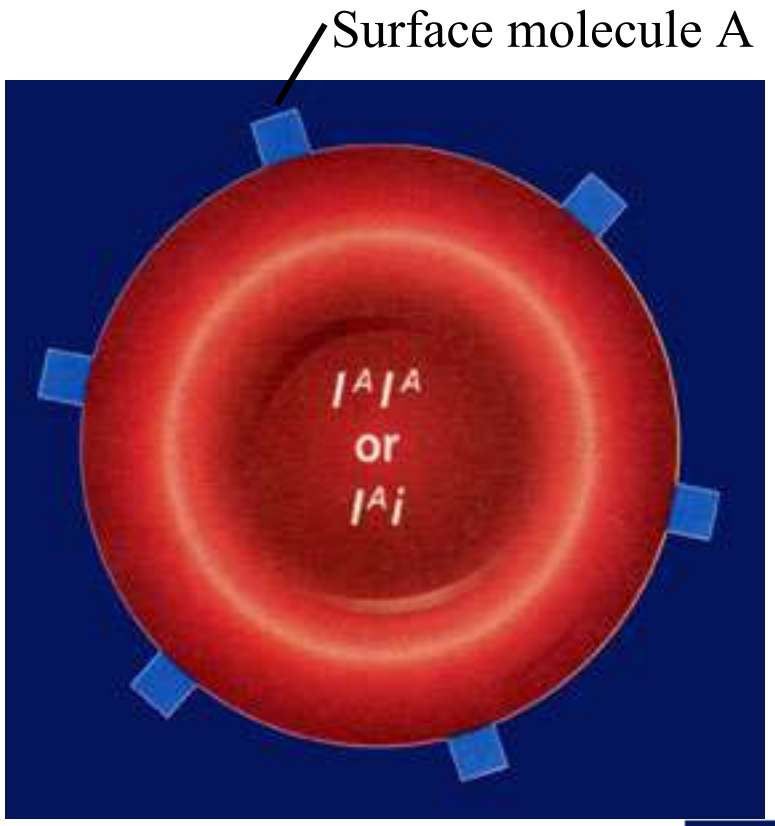
- Determining blood type is necessary before a person can receive a blood transfusion because the red blood cells of incompatible blood types could clump together, causing death.

The ABO Blood Group

- The gene for blood type, gene *I*, codes for a molecule that attaches to a **membrane protein** found on the surface of red blood cells.
- The I^A and I^B alleles each code for a different molecule.
- Your immune system recognizes the red blood cells as belonging to you. If cells with a different surface molecule enter your body, your immune system will attack them.

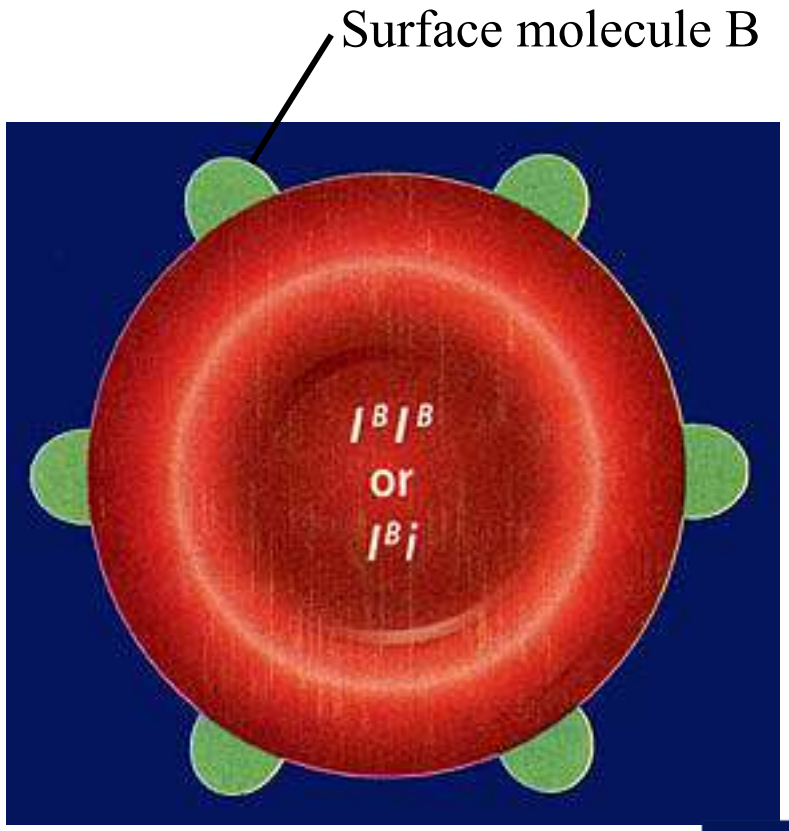
Phenotype A

- The I^A allele is dominant to *i*, so inheriting either the $I^A i$ alleles or the $I^A I^A$ alleles from both parents will give you type A blood.
- Surface molecule *A* is produced.



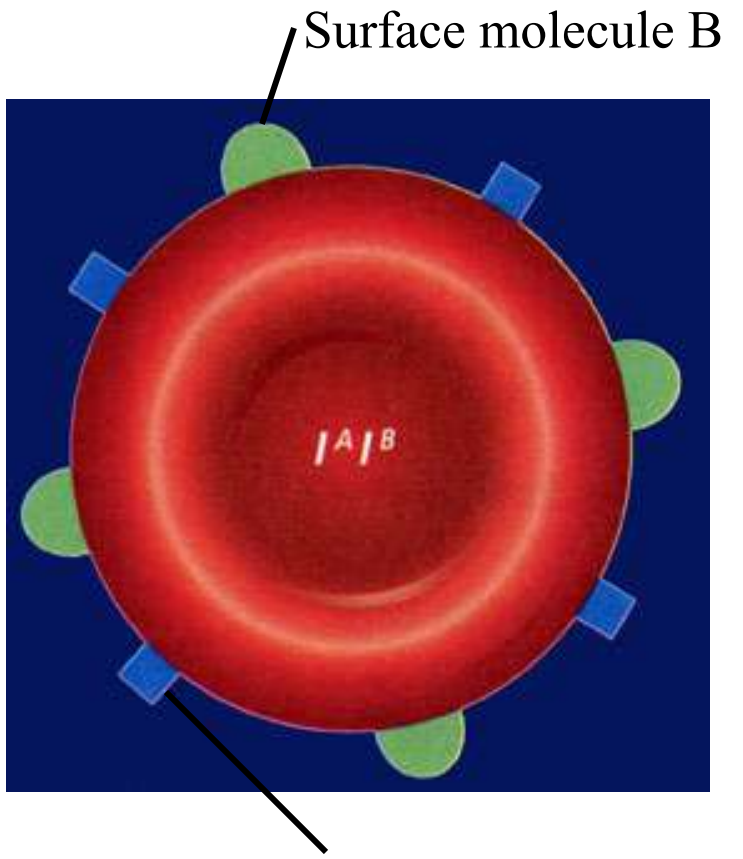
Phenotype B

- The I^B allele is also dominant to *i*.
- To have type B blood, you must inherit the I^B allele from one parent and either another I^B allele or the *i* allele from the other.
- Surface molecule B is produced.

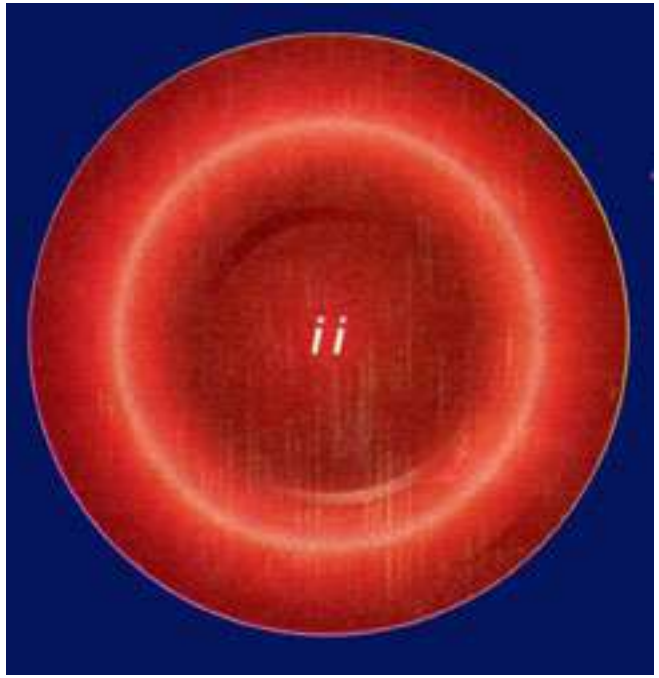


Phenotype AB

- The I^A and I^B alleles are codominant.
- This means that if you inherit the I^A allele from one parent and the I^B allele from the other, your red blood cells will produce both surface molecules and you will have type AB blood.



Phenotype O



- The *i* allele is recessive and produces no surface molecules.
- Therefore, if you are homozygous *ii*, your blood cells have no surface molecules and you have blood type O.

Question 2

According to the table, if you inherit the I^A allele from one parent and the I^B allele from the other parent, you will have type _____ blood.

Human Blood Types

Genotypes	Surface Molecules	Phenotypes
$I^A I^A$ or $I^A i$	A	A
$I^B I^B$ or $I^B i$	B	B
$I^A I^B$	A and B	AB
	None	O

A. A

C. AB

B. B

D. O

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CA: Biology/Life Sciences 3a

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RESOURCES

The answer is C. The I^A and I^B alleles are codominant. Your red blood cells would produce both surface molecules and you would have type AB blood.

Human Blood Types

Genotypes	Surface Molecules	Phenotypes
$I^A I^A$ or $I^A i$	A	A
$I^B I^B$ or $I^B i$	B	B
$I^A I^B$	A and B	AB
ii	None	O

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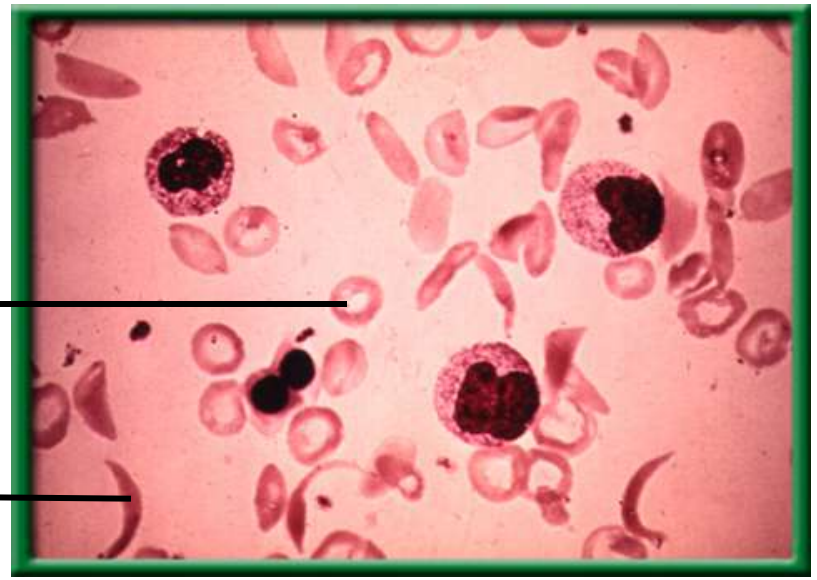
Question 1

What is the difference between simple Mendelian inheritance and codominant inheritance?

In Mendelian inheritance, heterozygous individuals will display the inherited dominant trait of the homozygotes. When traits are inherited in a codominant pattern the phenotypes of both homozygotes are displayed equally in the heterozygotes.

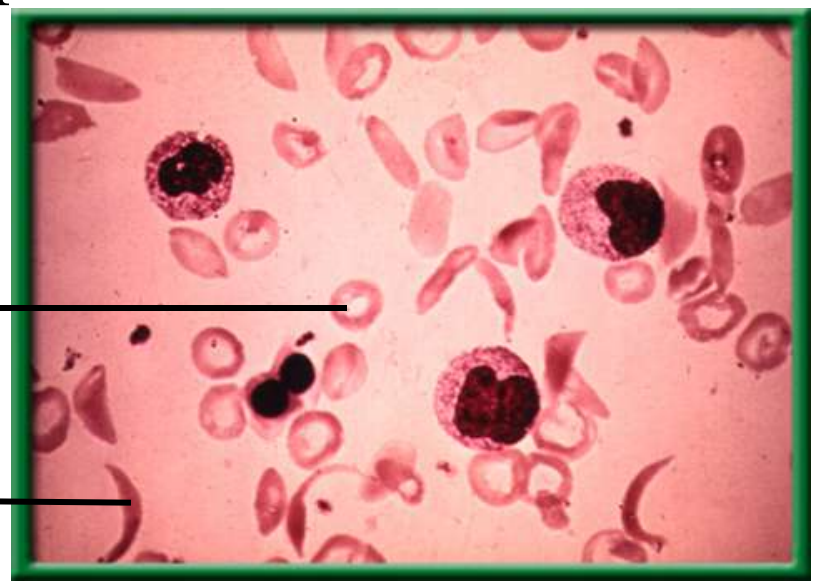
Sickle-cell disease

- The change in shape occurs in the body's narrow capillaries after the hemoglobin delivers oxygen to the cells.

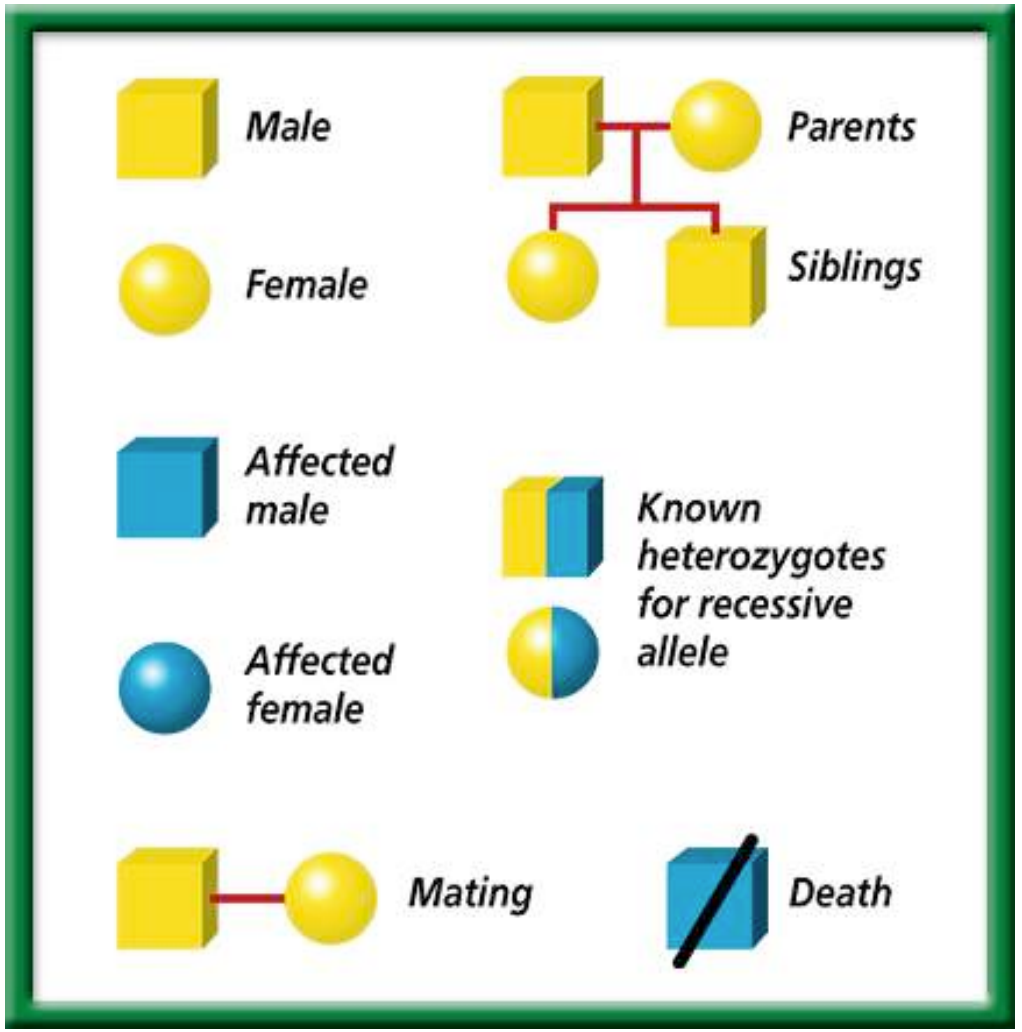


Sickle-cell disease

- Abnormally shaped blood cells, slow blood flow, block small vessels, and result in tissue damage and pain.



Symbols Used by Geneticists



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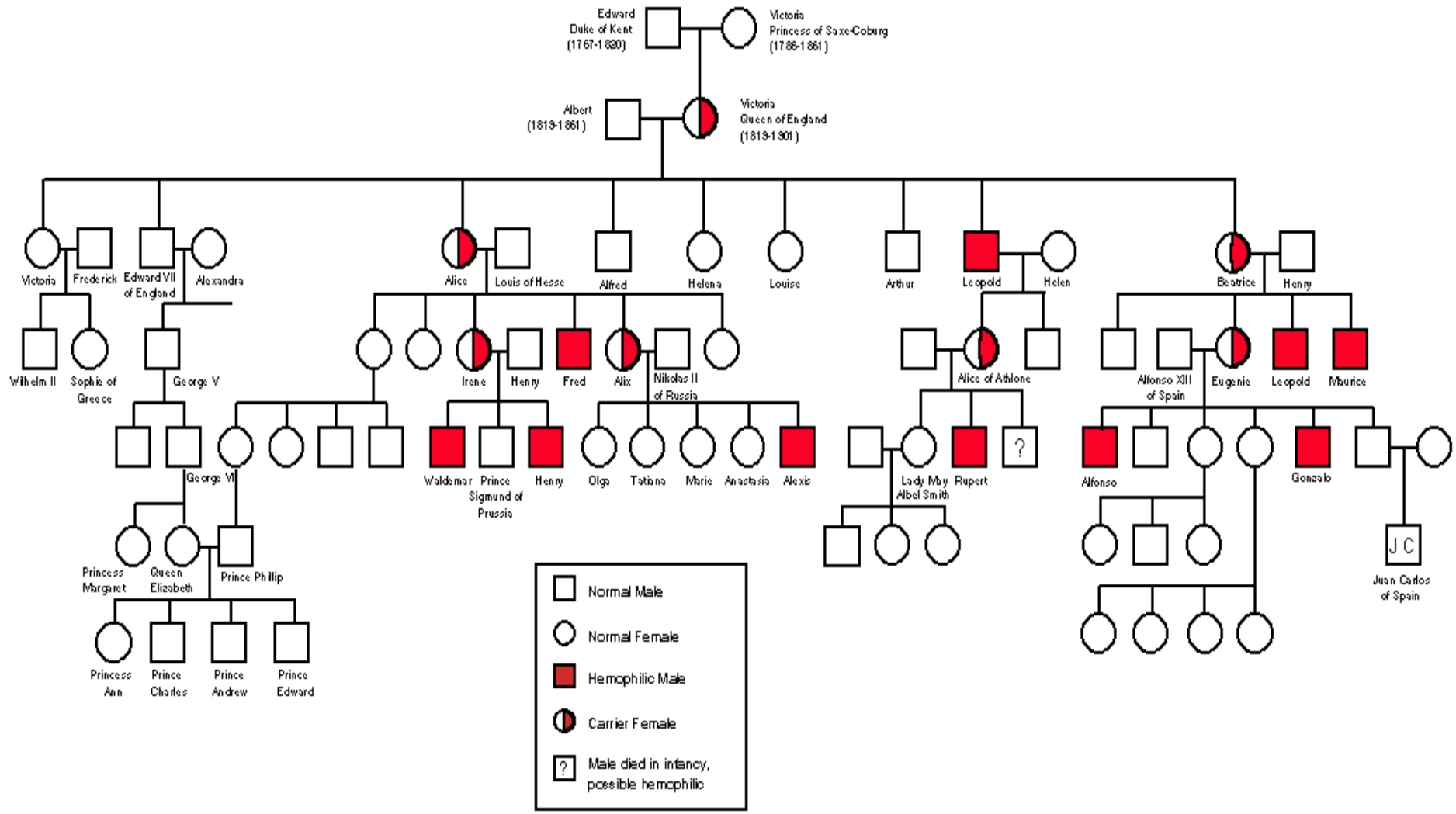
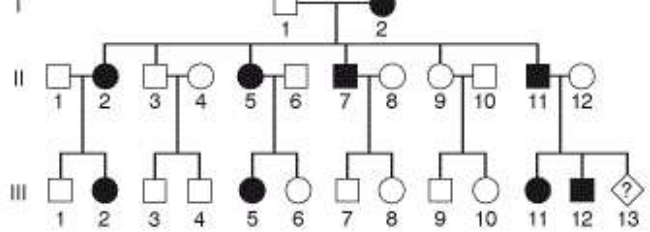
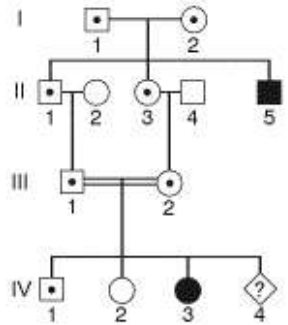

Edward
Duke of Kent
(1767-1820)
Victoria
Princess of Saxe-Coburg
(1786-1861)
Albert
(1819-1861)
Victoria
Queen of England
(1819-1901)
Victoria
Frederick
Edward VII
of England
Alexandra
Alice
Louis of Hesse
Alfred
Helena
Louise
Arthur
Leopold
Helen
Beatrice
Henry
Wilhelm II
Sophie of
Greece
George V
Irene
Henry
Fred
Alix
Nikolas II
of Russia
Alice of Athlone
Alfonso XIII
of Spain
Eugenie
Leopold
Maurice
George VI
Waldemar
Prince
Sigmund of
Prussia
Henry
Olga
Tatiana
Marie
Anastasia
Alexis
Lady May
Abel Smith
Rupert
?
Alfonso
Gonzalo
Princess
Margaret
Queen
Elizabeth
Prince Phillip
J C
Juan Carlos
of Spain
Princess
Ann
Prince
Charles
Prince
Andrew
Prince
Edward
Normal Male
Normal Female
Hemophilic Male
Carrier Female
?
Male died in infancy,
possible hemophilic

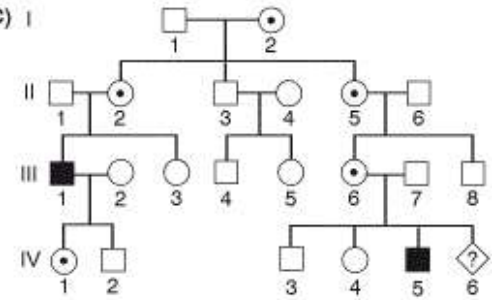
(A)


I
1 2
II
1 2 3 4 5 6 7 8 9 10 11 12
III
1 2 3 4 5 6 7 8 9 10 11 12 ?13

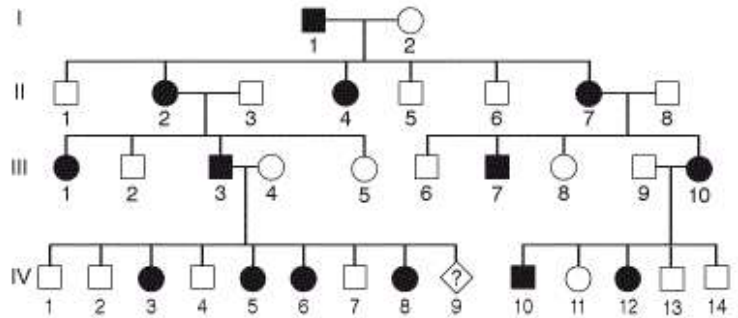
(B)


I
1 2
II
1 2 3 4 5
III
1 2
IV
1 2 3 ?4

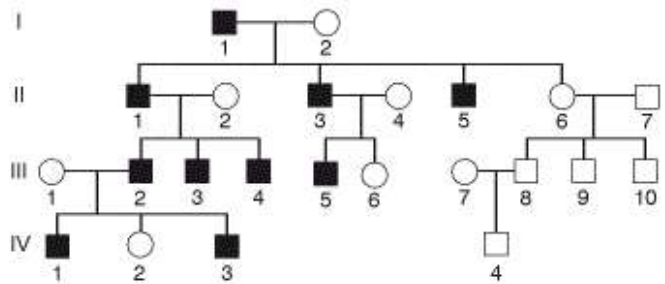
(C)


I
1 2
II
1 2 3 4 5 6
III
1 2 3 4 5 6 7 8
IV
1 2 3 4 5 ?6

(D)


I
1 2
II
1 2 3 4 5 6 7 8
III
1 2 3 4 5 6 7 8 9 10
IV
1 2 3 4 5 6 7 8 ?9 10 11 12 13 14

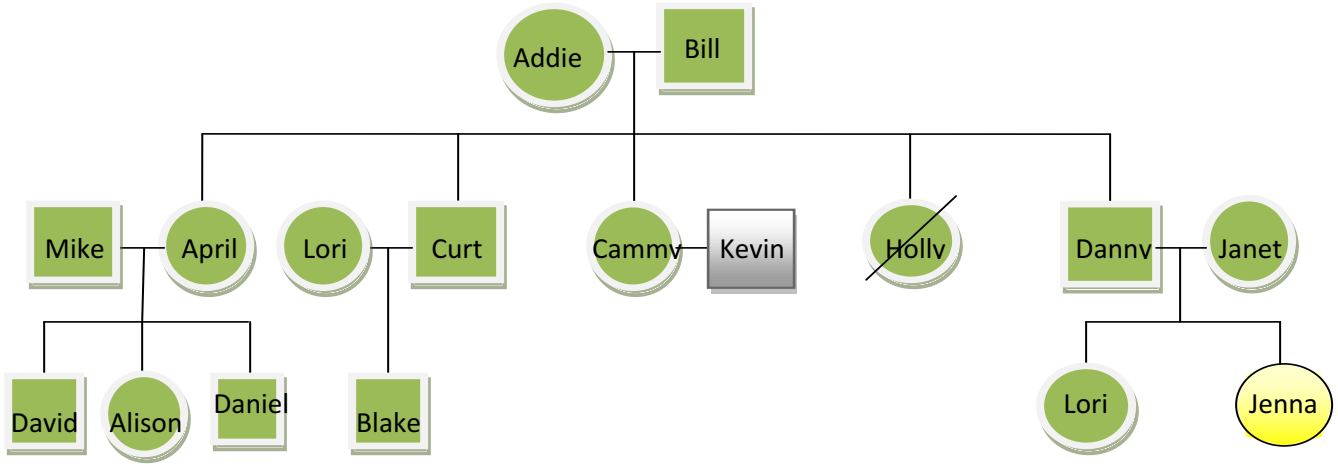
(E)

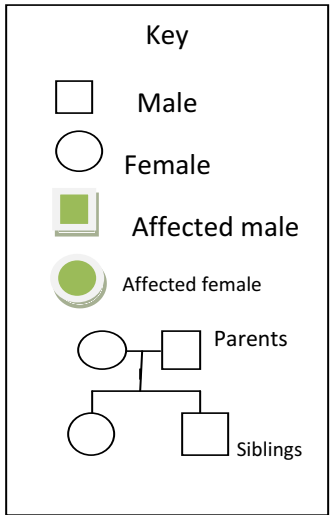

I
1 2
II
1 2 3 4 5 6 7
III
1 2 3 4 5 6 7 8 9 10
IV
1 2 3 4

Family Pedigree Project

- Show 3 Generations
- One side of the family
- Include at least 12 individuals
- Show only 1 trait
- Show the key of what the traits are
- Show affected individuals with the trait (color)
- Label Autosomal or sex-linked
- Label Dominant or recessive
- Write Genotypes

Daniel Ponzi's pedigree

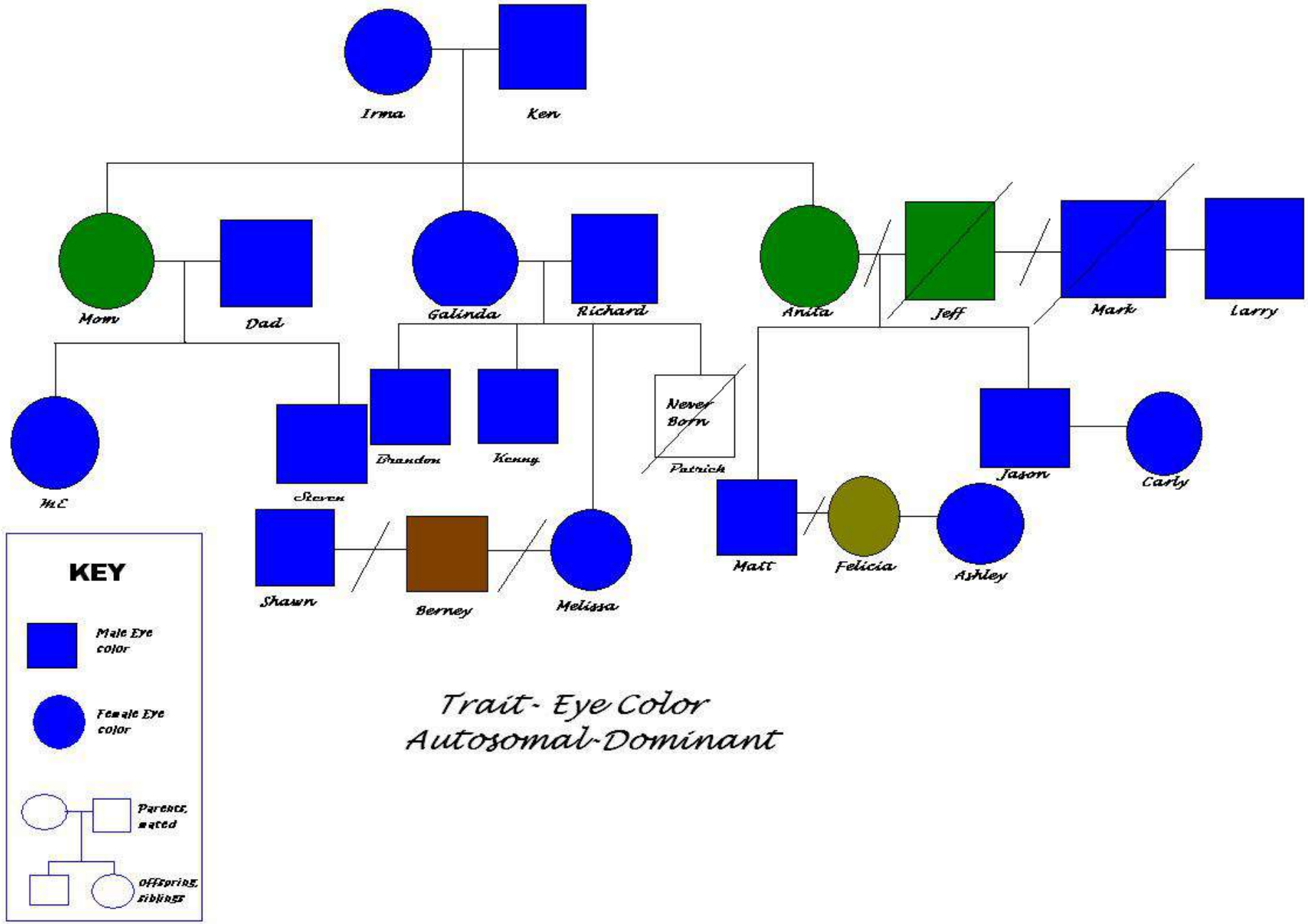




Dominant-Autosomal

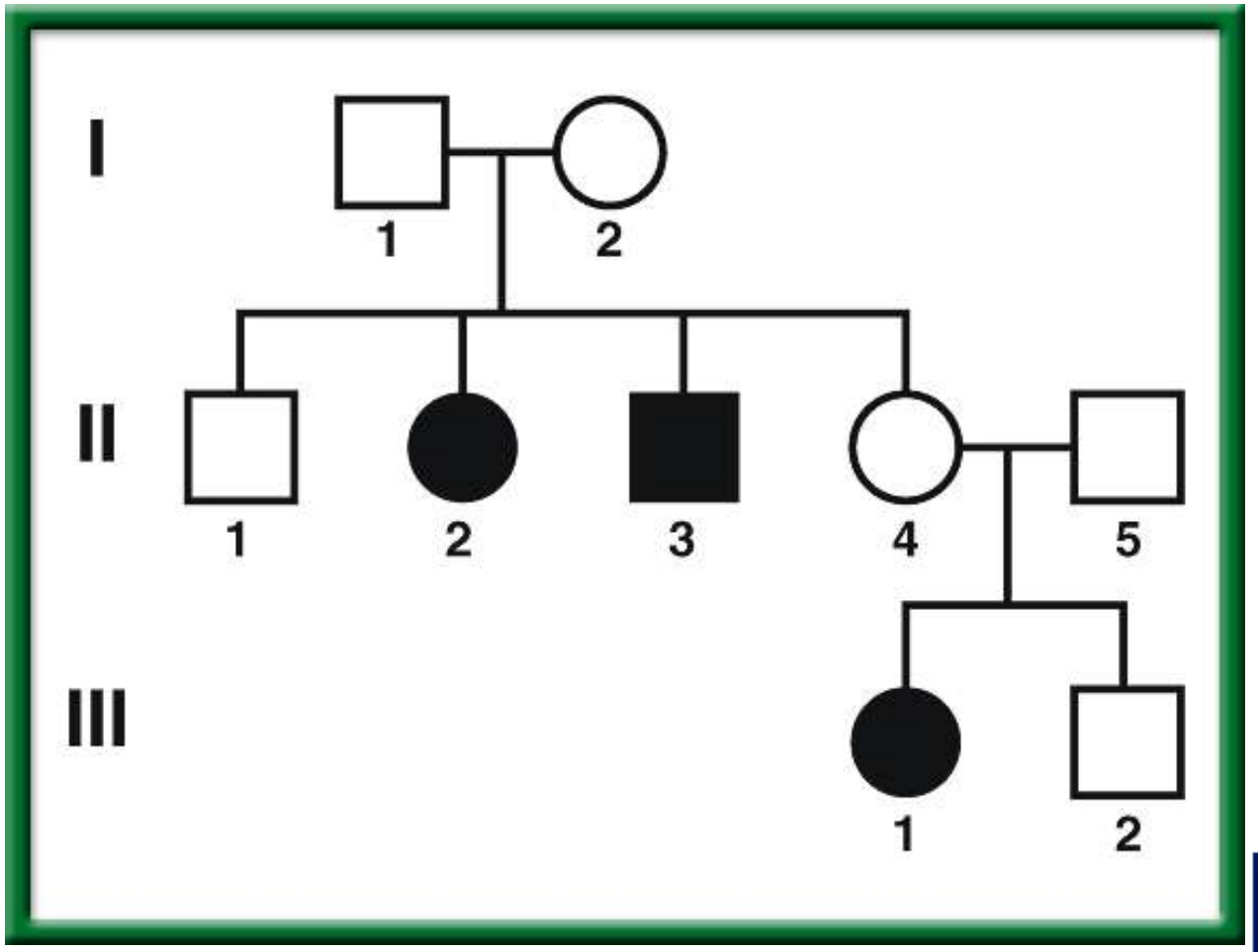
Trait-brown hair

Kristen Mcadoo's Family Pedigree



Trait- Eye Color
Autosomal-Dominant

Pedigree Chart



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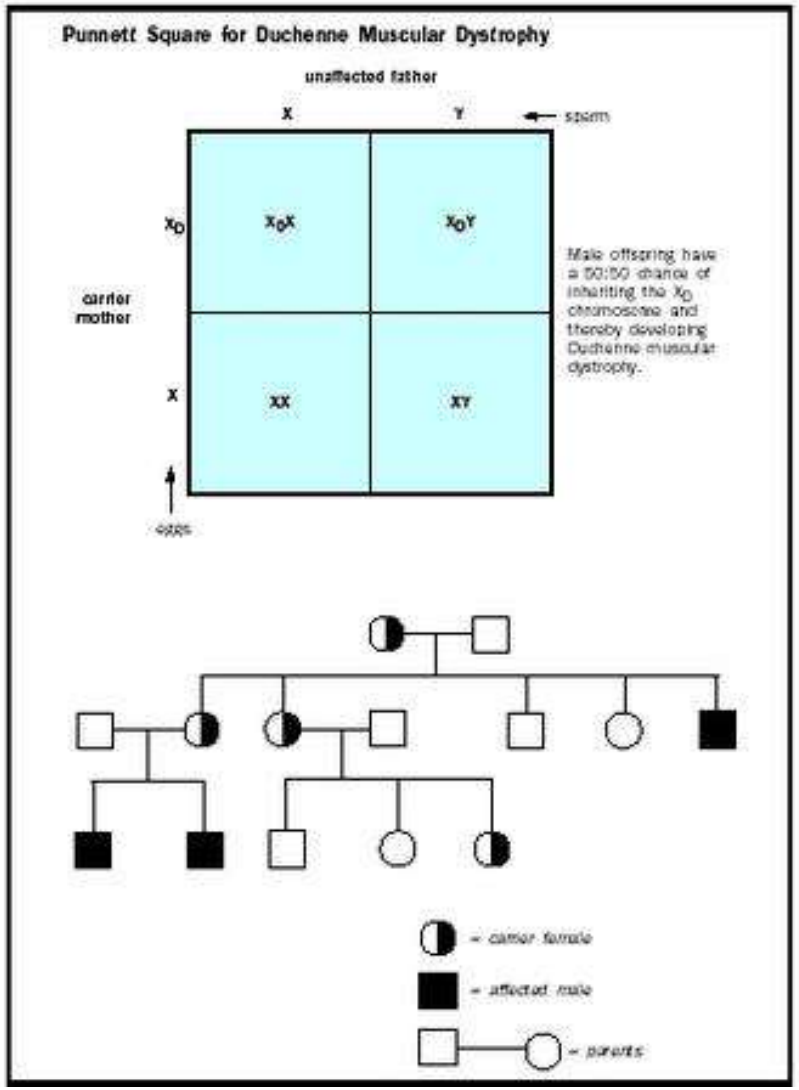
Classroom Family Pedigree

- Work by yourself, with a partner or two other people.
- Come up and get a Family Scenario of an Inherited Trait
- Draw a Rough Family Pedigree on Binder paper, with affected people shaded, carriers half shaded, and unaffected not shaded. Include all names.
- Include a Key showing all the possible combinations of the trait for each sex.
- What is the Disease/ Trait? Give a definition.
- Is the Disease/ Trait Dominant or Recessive?
- Is the trait Autosomal or Sex – Linked?
- Show all Genotypes

3/26 Complex Inheritance of Human Traits 12.3

Obj. TSW predict possible combinations of alleles in a zygote from the genetic make up of the parents by working on a pedigree. P.86 NB



1. Reading the Pedigree from the Problem Solving Lab 12.3 p. 326, Is this an autosomal or sex-linked disorder? How do you know?
2. Using the same pedigree as above, What would be the probability of the individual IV-1 having a daughter that is a carrier, and a son inheriting the disorder?
3. Compare & Contrast Autosomes and Sex Chromosomes.