Chapter 11 honors book Chapter 7 biology book

Essential question: How does your genes affect what you look like?

S4 C2 PO 3: Explain how genotypic variation occurs and results in phenotypic divesity

1. Identity the components of Mendel's Law
2. Describe the contributions of major scientists to genetic diversity
3. Identify Punnett Square ratios
4. Identify a genetic disorder based on a karyotype
5. Identify the category of a genetic disorder based on a karyotype
6. Categorize a genetic disorder
7. Identify outcomes of non-Mendelian genetics
8. Identify the conditions when genetic changes are most likely inherited

Review of terms:

Phenotype: is the physical characteristics of an organism.
Genotype: is the genetic make up of an organism.
Autosomal genes : are non-sex genes

Trait: Distinguishing characteristics that are inherited

History lesson
Gregor Mendel
Founder of modern genetics

http://www.biography.com/people/gregor-mendel-39282/videos/gregor-mendel-mini-biography-35737667892

https://www.youtube.com/watch?v=Mehz7tCxjSE

Watch the full lesson and answer the practice questions.

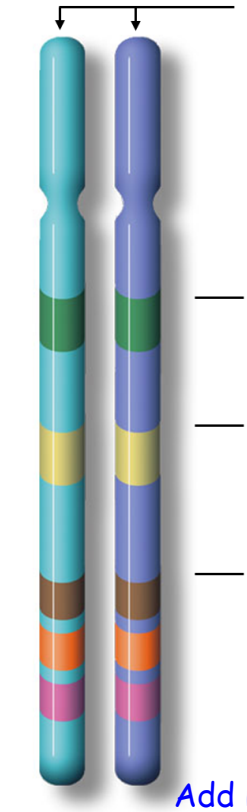
http://ed.ted.com/lessons/how-mendel-s-pea-plants-helped-us-understand-genetics-hortensia-jimenez-diaz/review_open#question-6

Genes
Units of information about specific traits (proteins)
Passed from parents to offspring
Each has a specific location (locus) on a chromosome

Big Picture: Heredity is the transfer of traits from parents to offspring

Alleles
- Different molecular forms of a gene
- Arise by mutation
- Dominant allele masks a recessive allele that is paired with it.

Allele combinations
- Homozygous
  - Having two identical alleles at a locus
    - AA or aa
- Heterozygous
  - Having two different alleles at a locus
  - Aa



A *pair of homologous chromosomes*, each in the unduplicated state (most often, one from a male parent and its partner from a female parent)

A *gene locus* (plural, loci), the location for a specific gene on a chromosome. Alleles are at corresponding loci on a pair of homologous chromosomes

A pair of alleles may be identical or nonidentical. They are represented in the text by letters such as D or d

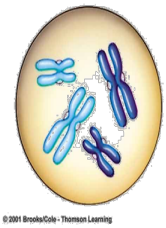
Three *pairs of genes* (at three loci on this pair of homologous chromosomes); same thing as three pairs of alleles

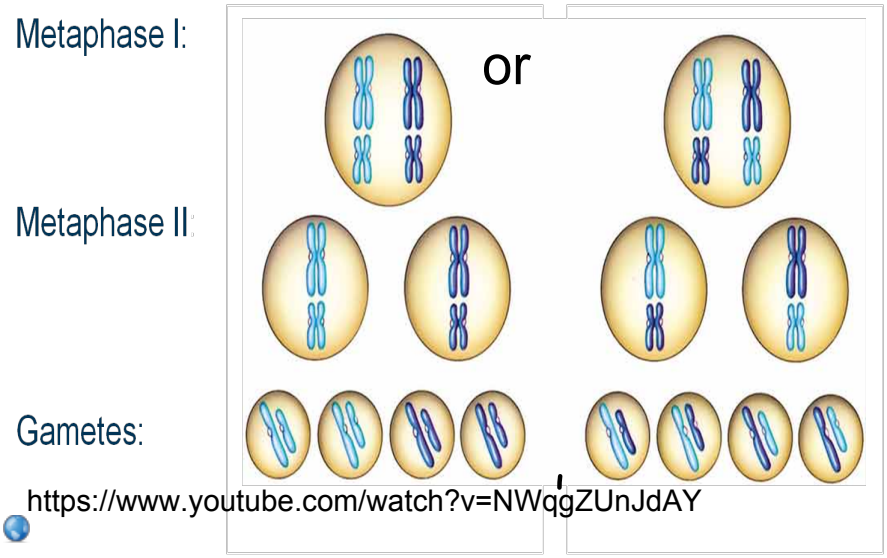
Add information to diagram then watch animation

Complete dominance in alleles

- One allele is dominant over the other allele
- The dominant allele is represented by a capital letter
- The recessive allele is represented by a lower case letter

Theory of Segregation



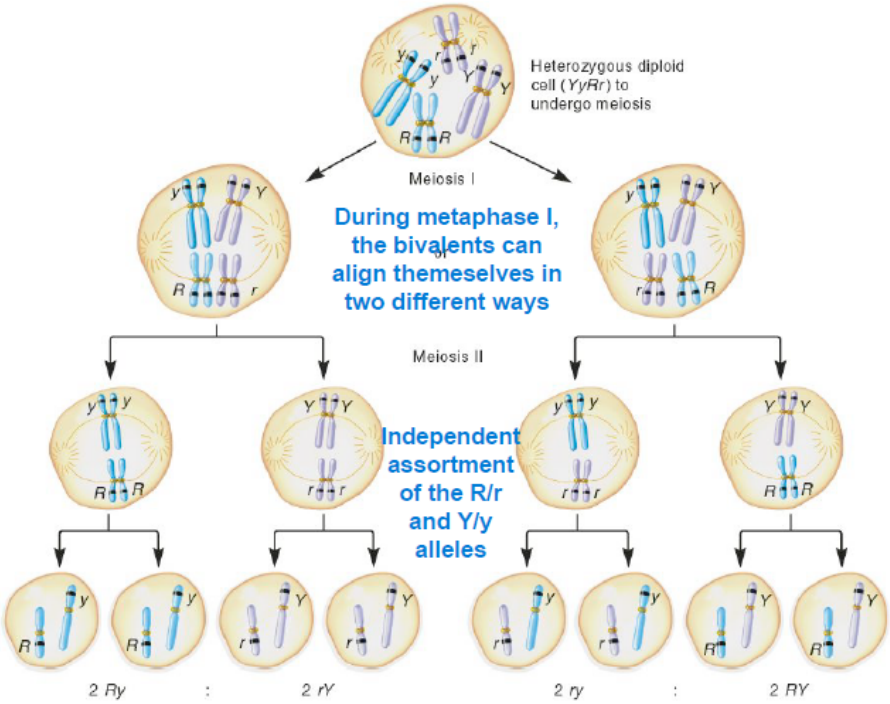


https://www.youtube.com/watch?v=NWqgZUnJdAY

Mendel had constructed a theory about his pea plants. The first one was the

Theory of Segregation

An individual inherits a unit of information (allele) about a trait from each parent. During gamete formation, the alleles segregate from each other randomly



Mendel also posed Independent Assortment

Mendel concluded that the two "units" for the first trait were to be assorted into gametes independently of the two "units" for the other trait.

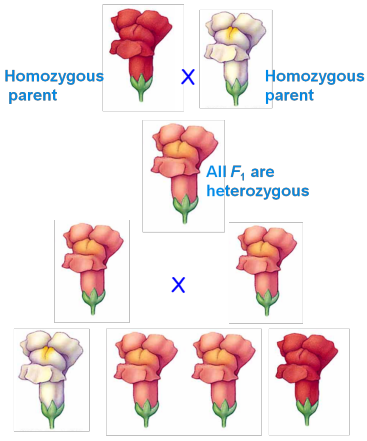
Members of each pair of homologous chromosomes are sorted into gametes at random during meiosis.

https://www.youtube.com/watch?v=wAHEejRUQdw

Key concept: Sometimes dominance and recessiveness is not simple.

There are three types
- complete dominance (Mendelian)
- incomplete dominance (Non-Mendelian)
- codominance (Non-Mendelian)

Incomplete dominance



So what is incomplete dominance?

In the heterozygous condition neither allele is completely dominant over the other, "blending" of alleles.

Codominance

Neither allele is dominant over the other, so in the heterozygous condition both alleles are expressed.

Examples codominance

A monohybrid cross in a brown-coated and white coated cattle showing co-dominance

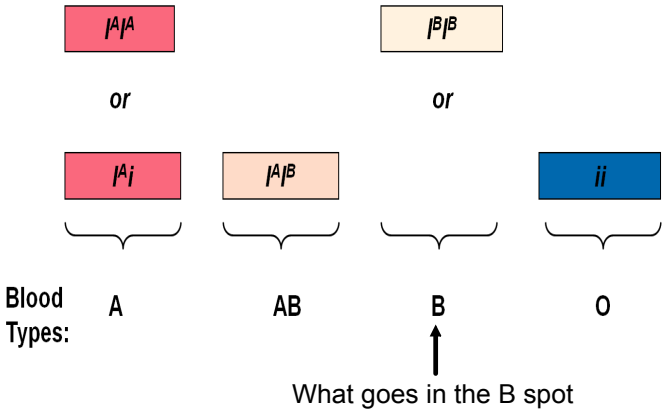
More examples codominance

ABO Blood Types

- Gene that controls ABO type codes for enzyme that dictates structure of a glycolipid on blood cells
- Two alleles (I^A and I^B) are codominant when paired
- Third allele (i) is recessive to others

ABO Blood Type

Range of genotypes:



What goes in the B spot

I stands for immunoglobin

http://www.nobelprize.org/educational/medicine/bloodtypinggame/game/index.html

blood typing game

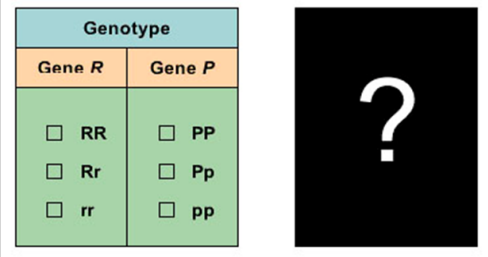
blood type punnett squares

https://www.youtube.com/watch?v=9O5JQqlngFY

Pleiotropy

Alleles at a single locus may have effects on two or more traits

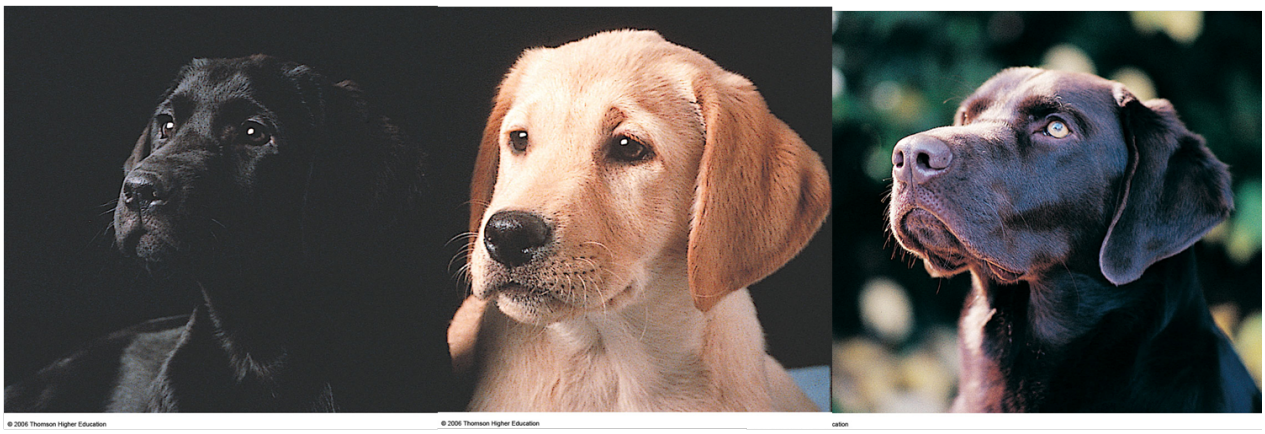
Marfan syndrome- mutation in gene for fibrillin affects skeleton, cardiovascular system, lungs, eyes, and skin



Epistasis

Interaction between the products of gene pairs.

Common among genes for hair color in mammals



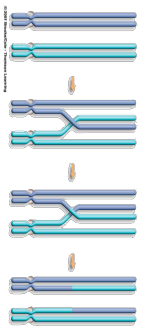
Watch animation about non-Mendelian genetics

https://www.youtube.com/watch?v=YJHGfbW55l0

Sex linked traits

https://www.youtube.com/watch?v=h2xufrHWG3E

Crossing over
- Each chromosome becomes zippered to its homologue
- All four chromatids are closely aligned
- Nonsister chromosomes exchange segments



Effect of Crossing over
- After crossing over, each chromosome contains both maternal and paternal segments
- Creates new allele combination in offspring

Non-disjunction

During Meiosis II Sister chromatids do not separate, resulting in one cell missing a chromosome and one with an extra chromosome.

X-tra X For a boy = Klinfelters

X-tra #21 = trisomy 21 = Dawns Syndrome

a girl w/o an X = Turner's Syndrome XO

trisomy 13 = Patau's syndrome

Review

https://www.youtube.com/watch?v=rIe7mPXkYhs

https://www.youtube.com/watch?v=YJHGfbW55l0

https://www.youtube.com/watch?v=NWqgZUnJdAY

https://www.youtube.com/watch?v=-_UcDhzjOio

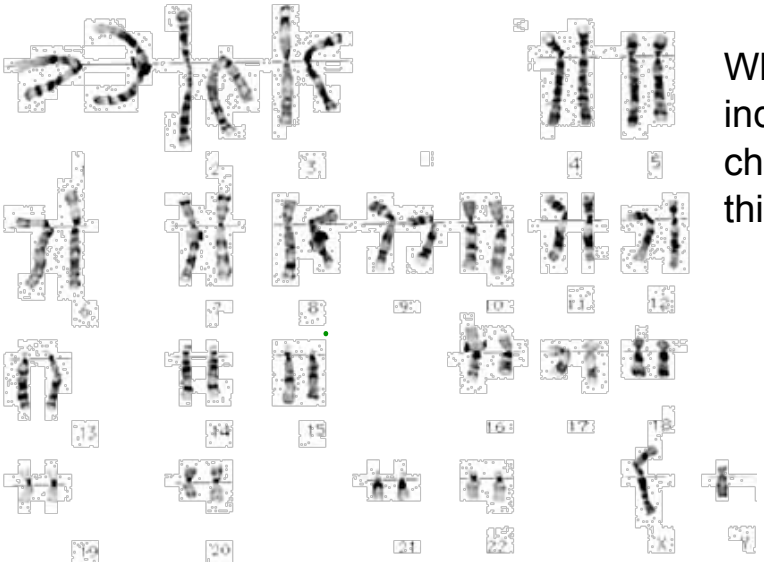
https://www.youtube.com/watch?v=KaxSDryqB6M

know these terms

1. Homozygous:
2. Heterozygous:
3. Genotype:
4. Phenotype:
5. Allele:
6. Gene:
7. DNA:
8. Chromosome:
9. Trait:
10. Dominant allele:
11. Recessive allele:
12. Gametes
13. Sex-linked trait
14. Law of Independent assortment
15. Law of Segregation
16. Haploid
17. Diploid
18. Codominance
19. Incomplete dominance

What is the function of a karyotype?

http://learn.genetics.utah.edu/content/begin/traits/karyotype/

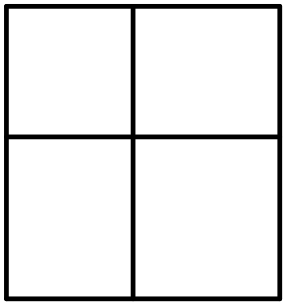


What is the sex of this individual? How many chromosomes does this person have?

dihybrid crosses

https://www.youtube.com/watch?v=qIGXTJLrLf8

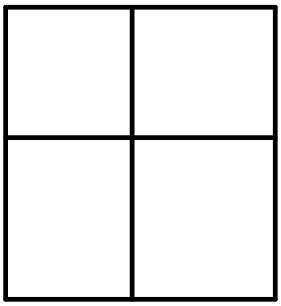
1. Cross two plants that are heterozygous for green pods. Green is dominant to yellow.



Genotypic ratio: _____

Phenotypic ratio: _____

2. Cross a homozygous tall plant with a short plant



Genotypic ratio: _____

Phenotypic ratio: _____

3. Red flower (R) is dominant over white flower (r). Predict the genotypes and phenotypes of the offspring whose one parent is heterozygous red and the other is homozygous white flower. Show the genotypes of these two parents. Fill in a Punnett square to show the resulting offspring. Show the phenotypic and genotypic ratio.

Parent 1 genotype_____

Parent 2 genotype_____

Genotypes of offspring_____

Genotypic ratio _____

Phenotypes of offspring_____

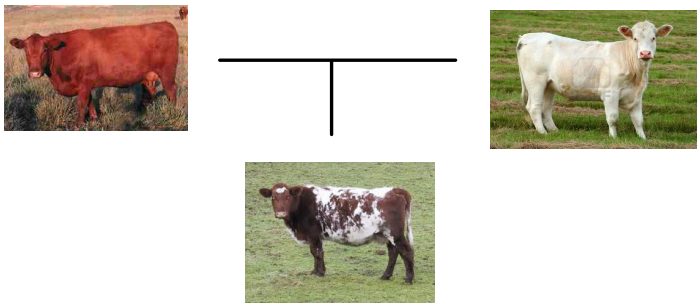
Phenotypic ratio _____

4. Color blindness is a sex linked trait. A color blind man marries a non-color blind woman. They have two sons that are normal sighted and one daughter that is colorblind. Explain how this happened.

5. In some cats, the gene for tail length shows incomplete dominance. Cats can have no tails (N), long tails (L), or short tails (NL).

a. Cross a short tail cat and a cat with no tail.

b. Cross a long tail cat and a short tail cat. What proportion of the offspring will have short tails? Long tails?

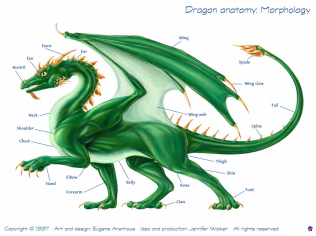


In cows, the allele for red hair (H^R) and the allele for white hair (H^W) are codominant. The heterozygous condition results in a mixture of red and white hairs and the cows are called roan.

4. Cross a red cow with a white bull. What is the genotype and phenotype ratio of the offspring?

5. Cross one of the offspring from the above mating with a roan cow. What is the likelihood of producing a white cow from this match? A red? A roan?

Dihybrid cross
Fire breathing (F) is dominant to non-fire breathing (f)
Red scales (R) are dominant to green scales (r)
cross a heterozygous fire breathing red scaled dragon with a heterozygous fire breathing red scaled



Attachments

cross_pollination.html

pleiotropy_Marfan.html

crossover_review.html

genetic_terms_v2.html

monohybrid_v2.html

test_cross.html

snapdragon_crosses.html

dog_color.html