

Ch. 5B Review Questions: Genetics

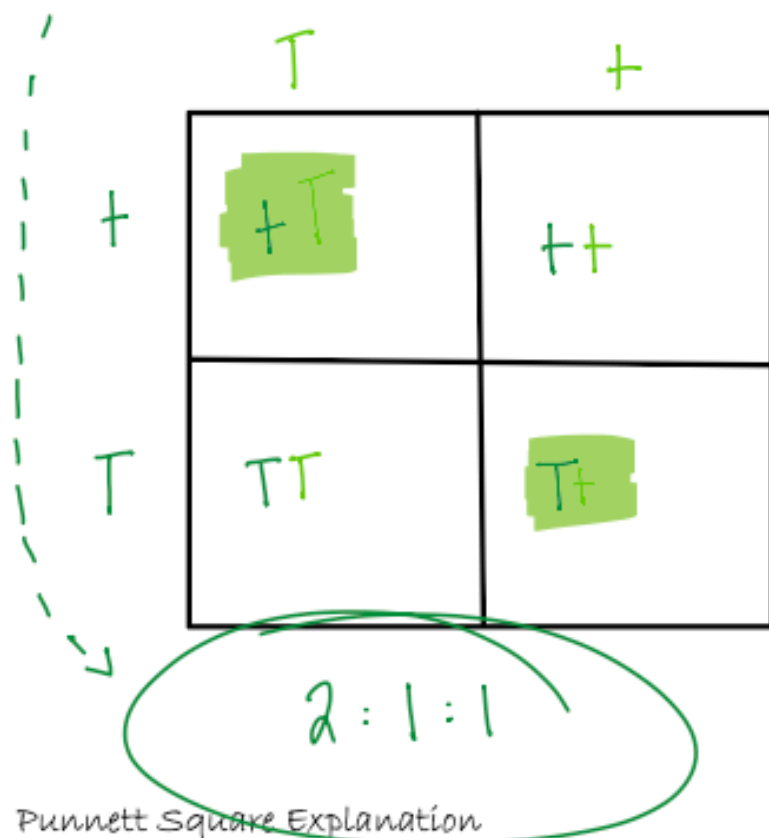
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Review Questions 5.4 (pg. 117)

- Gregor Mendel is known as the Father of Genetics. He has a set of conclusions called the *Mendelian Genetics* from his years of classifying thousands of plants and recording many pages of notes.
- Describe
 - The concept of **unit characteristics** are basically gene characteristics
 - Pea Plants - two genes for being tall is called "TT" (dominant)
 - Pea Plants - two genes for being short is called "tt" (recessive)
 - Concept of **dominance**
 - When the trait is being carried throughout the generations
 - Concept of **segregation**
 - The gene separates so there is one gene for each characteristic in each gamete (eg. tT, TT, tt, Tt)
- Difference between Genotype & Phenotype
 - Genotype** - the gene of the organism
Phenotype - the look of the organism
- Difference between homozygous yellow peas and heterozygous yellow pea
 - Homozygous yellow pea** - Alleles are the same (eg. TT, tt)
 - Both parents were yellow
 - Heterozygous yellow pea** - Alleles are different (eg. Tt, tT)
 - They are F2 - it was unpredictable
- Difference between **gene** & **allele**
 - Gene:**
 - Responsible for inherited characteristics
 - Located on chromosomes
 - Most organisms have homologous pairs of chromosome
 - Allele**
 - It is 2 or more genes
 - Expressed in letters (eg. TT, tt, Tt, tT)
- Two organisms **heterozygous** (different letters, eg. Tt, tT) are crossed
The expected genotypic ratio



6. Punnett Square Explanation
 - a. The alleles of the two organisms are written on the top and sides. If it's a **girl** - on top, if it's a **boy**, it's on the side. You add the characteristic left to the top to get the predicted alleles for the organism's offspring. You then find the similar letters and see how many, then count how many are not matching and put into a ratio.
7. The **phenotypic ratio** of the cross described in Question 6 is **3:1**
 - a. For every three offspring, there will be one different one
 - i. Purple & Yellow kernel - Every **3 purple** kernels, **1 yellow** kernel
 - b. Find the dominant trait (capital letter) and see how many there are versus the recessive trait,
8. A biologist can learn by looking at the Punnett square for a cross is the ratio of the look of the organism's offspring and the allele pattern.
9. The **Test Cross** is when you mate an organism that look similar but you don't know what their genotype is.
 - a. This test can be used to determine what the offspring of the organism will be.
10. The information a geneticist can learn by looking at a pedigree for a cross is by using colors and symbols to see what the dominant and recessive genes are along with the possible expectations of the later offspring's.

Review Questions 5.5 (pg. 122)

1. Compare: **simple dominance** with **incomplete dominance**
 - Simple dominance - the feature is "exactly" the same in the organism/person
 - Incomplete dominance - the feature is "mixed" with the recessive gene
 - a. Examples of **incomplete dominance** is
 - Cross breed of a dog- (eg. Labradoodle) having the look of a Labrador & poodle
 - Kid having the looks of both their parents
2. Compare **incomplete dominance** with **codominance**
 - Incomplete dominance - the feature is "mixed" with the recessive - blending together
 - Codominance - the feature is "mixed" with the recessive, but instead of **blending** it is separate
 - (eg. Horse with codominance - Black body with white spots
Horse with incomplete dominance - black + white = grey)
 - The offspring is heterozygous
 - a. Examples of these two together
 - a. Incomplete dominance - Bernedoodle, having the looks blended of a BMD and Doodle
 - b. Codominance - a chicken having both black and white spots on feathers
3. Condition of **multiple alleles**
 - a. Blood type - "A" "B" "O"
Recessive allele in blood - lowercase 'i'
4. Concept of **independent assortments**
 - The separation of one set of alleles during gamete formation is not affected by the presence or segregation of other sets of alleles
5. **Polygenic inheritance v. multiple alleles**
 - Polygenic inheritance: Two or more genes working together result in a single trait
 - Multiple alleles: Many variations of a gene present

Review Questions 5.6 (pg. 126)

1. Autosomes v. sex chromosomes
 - Autosomes: non-sex-determining chromosomes and are typically number
 - Sex chromosomes: determines the sex/gender of the human (X or Y)
2. Sex is determined by the chromosome
 - If there is a Y chromosome- it is a **male**. If there is a double X, it is a **female**.
 - It is the father's genes that determines the gender of the kid, not the mother because it takes the "Y" chromosome to form a boy (since the mother only has "XX")
3. The X-linked traits can not be passed from father to son and only from father to daughter because the man will always give his son the "Y" chromosome and not the "X".
 - a. The mother can give the characteristics to the daughter and son
 - Eg. If a son were to be color blind, it would have to be from the mother because the father lacks X-linked traits.
4. A garden pea is a good organism to study genetics on because it was first experimented on to show genetics, self pollinating, and easy to observe from the outward appearance, especially with the different colors.
 - a. Humans are a poor organism for studying genetics because they are so complex