****Genetics #1: Meiosis and Mendel

*For additional support and information, read and reference*

*Chapter 12 in your Biology “Bee” Book.*

* **Section 1 – Chromosomes and Meiosis**
  + Somatic Cells vs Germ cells
    - * Somatic =
      * Germ =

Female =

Male =

* + - Chromosome =
      * Each species has a characteristic number.
      * Humans =
      * Each pair = Homologous pair – b/c
        + One comes from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and one from the\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
        + Code for the same type of traits
      * Autosomes vs Sex Chromosomes
        + Autosomes =
        + Sex Chromosomes =

X and Y

X and Y are not \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

When pairing

XX =

XY =

The Female can only donate and \_\_\_\_\_\_\_\_\_\_\_

The Male can donate an X or and \_\_\_\_\_\_\_\_\_\_\_

* + - Sexual Reproduction
      * + They fuse and become one cell =
    - Diploid vs Haploid
      * Body cells =
        + One from the mother and one from the father
        + Diploid cells are represented by 2n.

Diploid 2n…

* + - * Gametes =
        + Contains only
        + Represented by : (n)

In humans = 22 autosomes + 1 sex chromosome

n = 23

**Section 1 Review Questions:**

* **Identify:**

Which cell type makes up the brain? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* **Summarize:**

Are homologous chromosomes identical to each other? Explain

* **Apply:**

Why is it important that gametes are haploid cells?

**Section 2:**

* + **Meiosis: Nuclear division**
    - 1 Diploid “Germ Cell” …..
    - Has two major parts:
      * Each of these contains 4 steps:
      * That means from start to finish there are 8 total steps.
        + Read and Study the Image on page 174 and 175
    - **Homologous Chromosomes:**
      * Very similar in size and appearance.
      * Carries the same genes on each.
  + One will have mom’s info.
  + The other will have dad’s info.

* + - **Chromatid:**
      * Each half of a duplicated chromosome is called a = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      * Sister Chromatids =
        + Not divided until \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - **Gametogenesis :**
      * **Sperm**

Draw and Label

* + - * **Egg**
        + **Polar Bodies**

**Section 2 Review Questions:**

* **Contrast:**

What is the major difference between metaphase I and metaphase II?

* **Infer:**

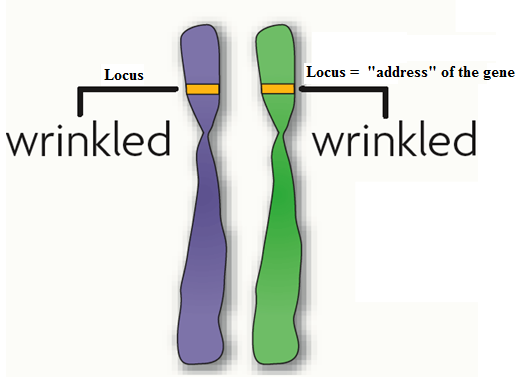
Explain why Mendel’s choice of either-or characteristics aided his research?

**Section 3:**

* **Traits:**
  + Examples:
* **Genetics:**
  + Father of Genetics: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - He worked with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because they reproduce quickly and he could \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
    - Each plant contains both \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_reproductive organs.
    - This means that in nature, the peas would typically self-pollinate. (plant mates with itself).
    - Over time when organisms self-pollinate they can develop a\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
    - Purebred =
    - **Mendel’s Three Key Choices:**
* **Cross =**
* Mendel demonstrated that traits are inherited as\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + They are **not** blended or diluted.
* **Law of Segregation:** 
  + Organisms **inherit** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ copies of each gene, one from each parent.
  + Organisms **donate** only \_\_\_\_\_\_\_\_\_\_ copy of each gene in their gametes. Thus the two copies of each gene **segregate, or separate**, during gamete formation.

**Section 4 - Traits, Genes and Alleles**

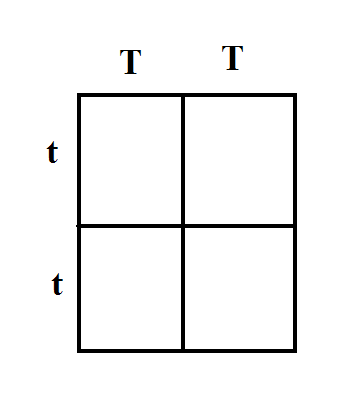
* **Gene:** 
  + Each gene has a specific position or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on a pair of homologous chromosomes.



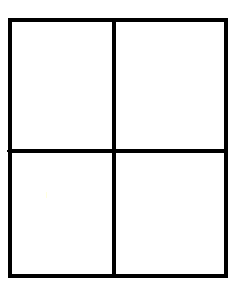
* + **Allele:**
    - Your cells have two alleles for each gene because……
      * **Dominant:**
        + If you inherit this allele it will show up.
        + Example:
      * **Recessive:** 
        + Example
      * If the alleles are different we call them:
        + (Hetero) = different
        + Example :
      * If the alleles for the trait are the same we call them:
      * However, there are two ways that alleles can be homozygous:
  + **Genome:**
  + **Genotype:**
  + **Phenotype:**
    - If it is a trait that can be seen, then the phenotype is what you see!

**Section 5– Traits and Probability**

* **Punnett Square:**
  + Remember that is a cross is defined as: Mating of two organisms.
  + Visual Vocab: Draw and Label the Punnett Square that is on page 183.
  + **Monohybrid Crosses:**
    - Sample Problem: Let’s Cross a Purebred Tall Plant with Purebred Short plant. To help you out on this problem, think back to what the term “Purebred” tells us.



* + - * + How many of the offspring will be Homozygous dominant? \_\_\_\_\_\_\_\_\_\_\_
        + What is the phenotype of all of the offspring? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Use the following information and set up and work out the Punnett Square.
  + In Mendel’s Pea plants
    - Purple flowers are dominant. (F)
    - White flowers are recessive. (f)
    - What would the outcome be if you crossed to plants that were both heterozygous for flower color?



* Testcross:
* Dihybrid Crosses:
  + Example Worksheets = **Use the practice Dihybrid Cross worksheets to help you better understand this concept.**
* Law of Independent Assortment:
* Probability