**Genes and Alleles PowerPoint Notes**

**Plant and animal cells contain many thousands of different genes and typically have two copies of every gene. The two copies (or alleles) of the gene may or may not be identical, and one may be dominant in determining the phenotype while the other is recessive.**

**Mendel**
When Mendel published his work in the 1800s, he did not use the word “_________” to describe his units of heredity. He also wasn’t sure where his units might be found or how to identify them. His work went unnoticed for almost ___________ years.

**Walter Sutton**
In 1902, American scientist Walter Sutton (1877 to 1916) examined the ________________ of grasshopper cells under a microscope. He observed that chromosomes occurred in ________________ pairs that separated during meiosis. A year later, Sutton found that ________________ contained genes! He had discovered Mendel’s units of ________________! These laws are taken from ________________ basic laws of how traits are passed on to offspring and what ________________ knew about genes, chromosomes, DNA, and meiosis.

- Individual units called ________________ determine an organism’s ________________.
  - A gene is a segment of ________________, located on the chromosomes, that carries hereditary instructions from parent to offspring.
- For each gene, an organism typically receives one ________________ from each parent.
- If an organism inherits different alleles for a trait, one allele may be ________________ over the other.
- The alleles of a gene separate from each other when ________________ cells are formed during meiosis.

** Alleles and Meiosis**
Alleles of a gene ________________ during meiosis. Homologous pairs of chromosomes separate during ________________. Since ________________ of a gene are found in corresponding locations on homologous pairs of chromosomes, they also separate during meiosis.

**How do alleles separate?**
To illustrate how alleles separate, let’s follow the alleles for the flower color trait in a pea plant with the ________________ $Pp$. The plant in this example has a dominant allele ($P$) and a recessive allele ($p$). What is the phenotype of the plant? You are correct if you said ________________!

**Fertilization in Peas**
To keep it simple, only one pair of chromosomes is shown. A real pea plant has 14 chromosomes (7 pairs). When fertilization occurs, offspring inherit ________________ ________________ in a pair from each parent. As a result, one ________________ for a gene also comes from each parent. When Mendel crossed pure breeding, purple-flowered plants with pure-breeding, white-flowered plants, the first generation offspring were ________________ with the genotype $Pp$. 
Predicting genotype and phenotype using Punnett Squares

You can predict the ____________ and ______________ of offspring if you know the genotypes of the parents. A punnett square shows all of the possible combinations of ____________ from the parents. You can use a punnett square to show Mendel’s first cross. He crossed a true-breeding, purple-flowered plant with a true-breeding, white-flowered plant. Since the purple-flowered plant is true breeding, it has two ____________ alleles. The genotype of the purple-flowered plant is PP. Since white flowers are recessive, the only possible genotype for a white-flowered plant is ______________.

First Generation Punnett

As you can see, all of the offspring in Mendel’s first cross had a genotype of ______________. That’s why all of the plants in the first generation had purple flowers. Using a punnett square, you can predict the possible ______________ and ______________ of the offspring.

Probability

When you flip a coin, there is a 50 percent chance you’ll get heads and a 50 percent chance you’ll get tails. The way the coin lands is completely ______________. Like flipping a coin, the chance of inheriting a certain genotype and phenotype is ______________. Probability is the mathematical chance that an event will occur. Probability can be expressed as a ______________ or a ______________.

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\frac{3}{4} \times 100 = 75\%
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\frac{1}{4} \times 100 = 25\%
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