Meiosis and Basic Genetics Objective Sheet

**Tested Objectives**

Bio.3.2.1 Explain the role of meiosis in sexual reproduction and genetic variation

Bio.3.2.2 Predict offspring ratios based on a variety of inheritance patterns (including complete dominance)

**Essential Vocabulary (ALL must be defined for full credit)**

Sexual reproduction, gamete, zygote, meiosis, diploid (2*n*), haploid(*n*), reduction division, genetic variation, mutation, crossing over, random/ independent assortment, random fertilization, homologous chromosome pairs, allele, dominant, recessive, genotype, phenotype, homozygous/pure breeding, heterozygous/hybrid, Mendel’s Laws [dominance, segregation, independent assortment], P Generation, F1 Generation, F2 Generation, Punnett square, monohybrid cross

**Questions to Master (ALL must be answered for full credit)**

1. Why is there a different mechanism to produce sex cells (gametes) vs. body (somatic) cells?
2. How does meiosis reduce the chromosome number by one half?
3. How does sexual reproduction lead to genetic variation?
4. Differentiate between diploid and haploid cells pertaining to homologous chromosome pairs.
5. Illustrate the process of crossing over.
6. When does crossing over happen in meiosis?
7. Solve the following dominant/recessive (Mendelian) genetics problems involving one trait. Analyze the genotype and phenotype ratios of the offspring to answer questions about probability
	1. Mrs. and Mr. Smith both have widow’s peaks (dominant). Their first child also has a widow’s peak, but their second child doesn’t. Mr. Smith accuses Mrs. Smith of being unfaithful to him. Is he necessarily justified? Why or why not? Work the genetics problem predicting the genotypic and phenotypic ratios of this trait among their prospective children to support your answer.
		1. Dominant ( ): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Recessive ( ): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + 1. Parents \_\_\_\_\_\_\_ x \_\_\_\_\_\_\_
		2. Genotypes: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ratio: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



* + 1. Phenotypes: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ratio: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. An albino is a person without pigment in their eyes, hair, and skin. Normal pigmentation is dominant over albinism. Show a cross between a normal pigmented man (whose mother was albino) marries a homozygous normal woman.
		1. Dominant ( ): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Recessive ( ): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + 1. Parents \_\_\_\_\_\_\_ x \_\_\_\_\_\_\_
		2. Genotypes: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ratio: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + 1. Phenotypes: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ratio: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + 1. What is the probability they will have an albino child? \_\_\_\_\_\_\_\_\_\_
	1. If the man from #2 married a normal woman whose father was albino, what would be the probability they would have an albino child?
		1. Dominant ( ): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Recessive ( ): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + 1. Parents \_\_\_\_\_\_\_ x \_\_\_\_\_\_\_
		2. Genotypes: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ratio: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + 1. Phenotypes: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ratio: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + 1. Probability of an albino child: \_\_\_\_\_\_