

High School Biology: Mendelian Genetics & Punnett Squares



Name: _____ Date: _____

Part A: Genetics Probability. Analyze the crosses and determine genotypic and phenotypic ratios.

1. In pea plants, purple flowers (P) are completely dominant over white flowers (p). If two heterozygous purple-flowered plants (Pp × Pp) are crossed, what percentage of their offspring is predicted to display white flowers?
- A. 0%
 - B. 25%
 - C. 50%
 - D. 75%
2. An organism has the observable physical traits of brown fur and short ears. These observable physical characteristics represent the organism's:
- A. Phenotype
 - B. Genotype
 - C. Karyotype
 - D. Pedigree allele sequence
3. In a test cross to determine whether a black guinea pig with a dominant phenotype is homozygous dominant (BB) or heterozygous (Bb), it should be mated with an individual that is:
- A. Homozygous dominant (BB)
 - B. Homozygous recessive (bb)
 - C. Heterozygous (Bb)
 - D. Any random mate regardless of phenotype

Part B: Genetic Terminology & Patterns Matrix. Categorize each genetic concept under the appropriate heading.

Sort these items: Homozygous (identical alleles, e.g., TT or tt) vs Heterozygous (different alleles, e.g., Tt); Law of Segregation: Two alleles for each trait separate during gamete formation in meiosis; Incomplete Dominance: Heterozygote exhibits an intermediate blended phenotype (e.g., pink snapdragons); Hemizygous X-linked recessive inheritance observed on sex chromosomes; Law of Independent Assortment: Genes for different traits sort independently during gametogenesis; Codominance: Both alleles are simultaneously fully expressed without blending (e.g., AB blood type)

Allele Combinations	Mendelian Principles	Non-Mendelian Patterns