

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 ($Pp \times Pp$) 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

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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