

Basic Principles of Inheritance

1. Multiple Choice Question (MCQ)

In a dihybrid cross between two heterozygous individuals ($AaBb \times AaBb$), what is the expected phenotypic ratio according to Mendel's principles of inheritance?

- A) 9:3:3:1
- B) 1:1:1:1
- C) 3:1
- D) 2:1

Answer: A) 9:3:3:1

2. Multiple Select Question (MSQ)

Which of the following statements about sex-linked inheritance are correct?

- A) Hemophilia is an example of an X-linked recessive disorder.
- B) Y-linked traits can be inherited by both males and females.
- C) In humans, males are the homogametic sex.
- D) A color-blind mother will always pass the allele to her sons.

Answer: A) and D)

3. Numerical Answer Type (NAT)

If a heterozygous tall pea plant (Tt) is crossed with a dwarf plant (tt), what percentage of the offspring are expected to be tall? (Enter the answer as a whole number)

Answer: 50

4. MCQ (Dominance and Epistasis)

Which of the following best describes epistasis?

- A) One gene completely masks the effect of another gene.
- B) Both alleles of a gene are expressed equally.
- C) A heterozygous condition results in a blended phenotype.
- D) A single gene affects multiple traits.

Answer: A) One gene completely masks the effect of another gene.

5. NAT (Genotypic Ratio Calculation)

In a cross between two heterozygous individuals for a single autosomal gene ($Aa \times Aa$), what is the expected ratio of homozygous dominant individuals? (Enter the answer as a decimal fraction)

Answer: 0.25 (or 25%)

