What Is Genetics?

Worksheet

Genetics is the branch of biology that studies genes, heredity and variation in living organisms - how traits such as eye color or blood type are inherited from parents.

Questions

1. In Aa Aa cross, what percentage of offspring is expected to be homozygous recessive (aa)?

A) 25%
B) 50%
C) 75%
D) 100%

2. Which term describes an organism with two different alleles for a gene (e.g. Aa)?

A) Homozygous dominant
B) Homozygous recessive
C) Heterozygous
D) Hemizygous

3. A recessive allele's trait appears in the phenotype only when...

A) paired with a dominant allele
B) present in a single copy
C) paired with another recessive allele
D) never

4. What tool predicts offspring genotype ratios from a cross?

A) Karyotype
B) Pedigree chart
C) Punnett square
D) Gel electrophoresis

5. In a cross between two heterozygous pea plants (Aa Aa), what fraction of the 400 offspring are expected to show the dominant phenotype?

6. A homozygous recessive plant (aa) is crossed with a homozygous dominant plant (AA). What genotype are all offspring?

7. Two Aa parents have 4 children. What is the probability at least one child is aa (recessive)?

8. Define: What is a gene?

9. Define: Allele vs gene?

10. Define: Genotype vs phenotype?

Answer Key

1. A) 25% - Genotype ratio is 1 AA : 2 Aa : 1 aa, so aa = 1/4 = 25%.

2. C) Heterozygous - Two different alleles = heterozygous.

3. C) paired with another recessive allele - Recessive traits show up only in the homozygous recessive genotype (aa).

4. C) Punnett square - The Punnett square arranges parental gametes to show possible offspring genotypes.

5. Aa Aa gives genotype ratio 1 AA : 2 Aa : 1 aa Dominant phenotype = AA + Aa = 3/4 of offspring 3/4 400 = 300 offspring

6. AA contributes only A gametes aa contributes only a gametes Every offspring gets one A and one a all Aa (heterozygous, dominant phenotype)

7. P(aa per child) = 1/4, P(not aa) = 3/4 P(none aa in 4 children) = (3/4)^4 = 81/256 0.316 P(at least one aa) = 1 0.316 = 0.684 68%

8. A segment of DNA that codes for a specific trait or protein.

9. A gene is the DNA segment; an allele is one specific version of that gene (e.g., brown vs blue eye allele).

10. Genotype is the genetic makeup (e.g., Aa); phenotype is the observable trait (e.g., brown eyes).