What is a Punnett Square and How Do You Use It?

Worksheet

A Punnett square uses parent alleles to show all possible offspring genotypes. For a monohybrid cross (one trait), list each parent's alleles on the grid axes, multiply rows and columns, and read the genotype ratios (e.g., 1:2:1 or 3:1 phenotype ratio).

Questions

1. In a Punnett square, what do rows and columns represent?

A) Phenotypes of parents
B) Alleles from each parent
C) Chromosome pairs
D) Dominant traits only

2. If a Punnett square shows 16 boxes (44), how many traits are being analyzed?

A) One
B) Two
C) Three
D) Four

3. Tt Tt Punnett square. What percentage are homozygous?

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

4. AA aa. What is the genotype of all offspring?

A) AA
B) Aa
C) aa
D) Mixed

5. Complete a Punnett square for Aa Aa. What are the genotype and phenotype ratios?

6. Cross AA (tall plant) with aa (short plant). What are all offspring?

7. If both parents are Aa, what percentage of offspring will be homozygous?

8. Define: What is a Punnett square used for?

9. Define: What does a 22 Punnett square represent?

10. Define: In a 44 Punnett square, how many alleles does each parent have?

Answer Key

1. B) Alleles from each parent - Rows and columns show alleles each parent can pass. Their intersection shows offspring genotype.

2. B) Two - 44 is a dihybrid cross (two traits). Monohybrid (one trait) is 22.

3. B) 50% - 1 TT + 1 tt (homozygous) = 2 out of 4. 2/4 = 50%.

4. B) Aa - A from first parent + a from second parent = 100% Aa offspring (all heterozygous).

5. Grid (22): A a A | AA | Aa | a | Aa | aa | Genotypes: 1 AA : 2 Aa : 1 aa Phenotypes: 3 dominant (AA, Aa) : 1 recessive (aa) Ratio: 3:1

6. Grid: A A a | Aa | Aa | a | Aa | Aa | All boxes: Aa (100% heterozygous) All offspring are tall (dominant phenotype) Genotype ratio: 0:4:0 (all Aa)

7. Aa Aa Punnett square: 1 AA + 1 aa = 2 homozygous out of 4 2/4 = 0.5 = 50% Heterozygous (Aa) = 2/4 = 50%

8. To visualize and predict the possible offspring genotypes and phenotypes from a genetic cross.

9. A monohybrid cross (one trait)-each parent contributes one of two alleles.

10. Two alleles per trait, and you're tracking TWO traits-a dihybrid cross (AaBb AaBb).