

**I. MONOHYBRID CROSSES**

1. A man who is heterozygous for brown eyes (Bb) and a woman who is homozygous for blue eyes (bb) marry. What would be all possible genotypes and phenotypes of their offspring?

What would be the possible genotypic and phenotypic ratio if they had four or more children?

2. Homozygous recessive tall pea (gg) are crossed with homozygous dominant green peas (GG) what are the genotypes and phenotypes of the offspring and their ratios?
3. In a man, brown (B) is dominant over blue (b). Of the following three crosses of brown and blue eyes, determine the genotypic and phenotypic ratios. Use Punnett squares to show your work
  - a) Homozygous dominant x Homozygous dominant
  - b) Homozygous recessive x Homozygous recessive
  - c) Homozygous dominant x Homozygous recessive

4. In pod plants tall (T) is dominant over short (t). Of the following crosses of short and tall plants, determine the phenotypic and genotypic ratios of each cross. Use a Punnett square to show your work.
- a) Homozygous dominant x Heterozygous
  
  
  
  
  
  
  
  
  
  
  - b) Heterozygous x Heterozygous
  
  
  
  
  
  
  
  
  
  
  - c) Homozygous recessive x Heterozygous
  
  
  
  
  
  
  
  
  
  
  - 5. Curly hair (H) is dominant over straight hair (h). A man with straight hair, whose father had curly hair and mother had straight hair, marries a woman with curly hair. The woman's father had curly hair and mother had straight hair.
    - a) What is the man's genotype?
  
  
  
  
  
  
  
  
  
  
    - b) What is the woman's genotype?
  
  
  
  
  
  
  
  
  
  
    - c) What is the genotype of the man's father?
  
  
  
  
  
  
  
  
  
  
    - d) If the man and woman have four children, how many would be expected to have straight hair?

**II. DIHYBRID CROSSES**

1. In guinea pigs, black coat color (B) is dominant to albino (b). Rough coat (R) is dominant over smooth coat (r). Two animals are selected for breeding. Their genotypes are BBRR and bbrr. What are the expected genotypic and phenotypic ratios:
  - a) In the F<sub>1</sub> generation:
  - b) In the F<sub>2</sub> generation:
  - c) Among the offspring produced from crossing one of the F<sub>1</sub> with a pig having the genotype BBRR
2. In cattle, black coat, (R) is dominant to red coat (r). Hornlessness (H) is dominant to horned (h). A totally heterozygous bull was mated to a totally pure cow (homozygous dominant) for both traits.
  - a) What are the expected genotypic and phenotypic ratios of the offspring?

- b) A red-coated, horned male is mated with a heterozygous black horned female, then what are the genotypic and phenotypic ratios?
3. In peas, pod texture may be smooth or wrinkled. Color of pods may be green or yellow. Offspring of a single cross of smooth green pods were examined. Data:
- 38 green and smooth plants
  - 18 green and wrinkled plants
  - 8 yellow and smooth plants
  - 3 yellow and wrinkled plants
- a) Which traits would be dominant?
- b) Which traits would be recessive?
- c) Which of the following would be most probably be the genotypes of the parents?
- 1) GgSs x GgSs
  - 2) GgSS x GGss
  - 3) ggSS x GGSs
- d) If two yellow and wrinkled peas are crossed, what percentage should be yellow and smooth?

**III. INCOMPLETE DOMINANCE and CODOMINANCE (Non-Mendelian)**

1. In Andalusian fowl, the gene for black plumage, (B), is incompletely dominant to the gene for white plumage (B'). The heterozygous condition results in plumage that is blue. List the genotypic and phenotypic ratios expected from the following crosses:
  - a) black x blue
  - b) blue x blue
  - c) blue x white
2. In four-o'clocks the gene for red flowers (R) is incompletely dominant to that for white (R'). The heterozygous condition results in pink flowers. A gardener crosses a red four-o'clock with a white one. What are his expected genotypic and phenotypic ratios?
3. In another species of flower, the gene for red flowers (R) is codominant to that for white (R'). The heterozygous condition results in red and white flowers. A gardener crosses a red & white flower with a white one. What is the probability of offspring being red?

**PROBABILITY WORKSHEET-** Use rules of multiplication and addition to solve:

1. When selecting one or more cards, what is the probability of selecting:  
a jack?
  - a) a four of clubs?
  - b) a four of clubs?
  - c) a red card?
  - d) either a king or a queen?
  - e) a heart?
  - f) either a six of diamonds or a black card?
  
2. Given the following situations, calculate the probability of obtaining the offspring below:
  - a) having two girls in a row?
  - b) having a girl after the first girl is born?
  - c) having six sons in a row?
  - d) after having the above six sons, having another son?
  - e) homozygous tall peas crossed with homozygous short peas, having heterozygous tall peas?
  - f) a homozygous freckled father and a heterozygous freckled mother (freckles are dominant) having a non-freckled child?
  - g) having a girl and a boy, in either order (B, G, or G, B)