What is Mendel's Law of Independent Assortment?

Worksheet

The Law of Independent Assortment states that alleles of different genes separate independently during gamete formation, so the inheritance of one trait does not affect the inheritance of another.

Questions

1. What phenotype ratio results from an AaBb AaBb dihybrid cross?

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

2. How many different gametes can an AaBb organism produce?

A) 1
B) 2
C) 4
D) 8

3. Independent assortment requires genes to be:

A) On the same chromosome close together
B) On different chromosomes (or far apart)
C) Both recessive
D) Both dominant

4. A test cross AaBb aabb produces what ratio?

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

5. A pea plant heterozygous for seed shape and color (RrYy) self-pollinates. What phenotype ratio is expected in the offspring for round/wrinkled and yellow/green seeds combined?

6. Out of 320 offspring from an AaBb AaBb cross, how many are expected to show both recessive traits (aabb)?

7. A test cross AaBb aabb is performed. What phenotype ratio is expected?

8. Define: What does the Law of Independent Assortment state?

9. Define: What ratio results from a dihybrid AaBb AaBb cross?

10. Define: What condition must be true for genes to assort independently?

Answer Key

1. C) 9:3:3:1 - Two independently assorting 3:1 ratios combine to 9:3:3:1.

2. C) 4 - AB, Ab, aB, ab - four combinations in equal numbers.

3. B) On different chromosomes (or far apart) - Genes linked closely on the same chromosome do not assort independently.

4. C) 1:1:1:1 - Four gamete types from AaBb pair with the single aabb gamete type, giving equal 1:1:1:1 classes.

5. Each gene assorts independently: Rr Rr and Yy Yy separately give 3:1 each Combine the two 3:1 ratios: (3:1) (3:1) = 9:3:3:1 Phenotypes: 9 round-yellow : 3 round-green : 3 wrinkled-yellow : 1 wrinkled-green

6. Double-recessive fraction = 1/16 320 1/16 = 20 So about 20 offspring are expected to be aabb

7. AaBb parent makes 4 gamete types in equal numbers: AB, Ab, aB, ab aabb parent makes only ab gametes Offspring: AaBb, Aabb, aaBb, aabb - each 1/4 Phenotype ratio = 1:1:1:1

8. Alleles of different genes separate independently during gamete formation.

9. 9:3:3:1 phenotype ratio.

10. They must be on different chromosomes, or far enough apart on the same chromosome to avoid linkage.