Exercise Question Solutions:

Law of Segregation:

2. Two true breed fruit flies, one had long body and the other had short body. All the F1 generation had long body.

a. Which allele is dominant?
b. Which allele is recessive?
c. Predict the genotype of the Parents.
d. Predict the genotype of the F1 generation.
e. Predict the genotype and phenotype of the F2 generation.

Answer:

a. Because the F1 generation is all long body, the long body trait is dominant.
b. Since long body is dominant, Short body is Recessive.
c. The parents are said to be true breed, therefore, assigning L for long and l for short body:

   True breed long body is LL

   True breed short body is ll

d. Parents : LL X ll

   F1 generation:

Female gametes

Male gametes

| | l | l |
|---|---|---|
| L | Ll | Ll |
| L | Ll | Ll |

   Genotype of F1 generation is Ll.

e. Ll X Ll

   F2 generation:

Female gametes

Male gametes

| | L | l |
|---|---|---|
| L | LL | Ll |
| l | Ll | ll |

Genotype: LL, Ll, ll.
Phenotype: long body and short body flies.

Law of Independent Assortment:

1. A farmer wishes to have a good variety of bean on his farm. He crosses a long bean which was resistant to infection with a variety was short and infected. Both the trait was pure breed for the trait.

| | Trait | Letter |
|---|---|---|
| Bean size | Long | L |
| | Short | l |
| Infection | Resistant to infection | R |
| | Non-resistant to infection (Infected) | r |

a. Write the genotype of parent plants.
b. List the gametes.
c. Draw punnett square to show F1 generation and F2 generation.
d. Write the phenotypic ratio for both generations.

Answer:

a. LLRR X llrr
b.



Gametes: LR and lr.

c. F1 generation:

| | | Female gametes |
|---|---|---|
| Male gametes | | lr |
| | LR | LlRr |


Gametes: LR,Lr, lR, lr

F2 generation:

Female gametes

Male gametes

| | LR | Lr | lR | lr |
|---|---|---|---|---|
| LR | LLRR | LLRr | LlRR | LlRr |
| Lr | LLRr | LLrr | LlRr | Llrr |
| lR | LlRR | LlRr | llRR | llRr |
| lr | LlRr | Llrr | llRr | llrr |

d. Phenotype:
F1 generation: Long and resistant to infection.
F2 Generation: Long and Resistant to infection, Short and resistant to infection, Long and non-resistant to infection, short and non-resistant to infection.

1. A true- breeding Rough Black pig was mated with true-breeding Smooth white pig.

| Phenotype (Coat) | Letters |
|---|---|
| Rough | R |
| Smooth | r |
| Black | B |
| White | b |

1. Explain the meaning of the term true breeding.

2. List the genotype of the Parents.

3. Use a punnett square and find out the Genotype of the F1 generation.

4. What are the Phenotypes of the F1 generation?

The F1 generation was then crossed to produce the F2 generation.

5. Write the possible gametes that F1 generation will produce.

6. Use a punnett square and show the genotypes of the F2 generation.

7. What are the possible phenotypes of the F2 generation?

8. What are the phenotypic ratio of the F2 generation?

If the owner what to breed Smooth white  coat guinea pig.

9. Of the F2 generation, what proportion has the traits that they want?

10. Which of mendel's Law are used here?

Solution:

1. Homozygous for a trait.
2. RRBB and rrbb
3. RrBb
4. Rough black coat pig.
5. RB, Rb, rB, rb.
6. 1 RRBB, 2 RRBb, 2 RrBB, 4 RrBb, 1 RRbb, 2 Rrbb, 1 rrBB, 2 rrBb, 1 rrbb.
7. Rough balck coat, Rough white coat, Smooth black coat, Smooth white coat.
8. Rough balck coat - 9

   Rough white coat - 3

   Smooth black coat - 3

   Smooth white coat – 1

9. 1/16

   (1/16 will be smooth white)

10. Law of Independent Assortment.