Population Genetics Simulation

Name:	

Go to the [Population Genetics Simulation] at Biology Simulations.

I. Equilibrium

1. Set information to the following:

Population Size	1000
Number of Generations	50
Red Allele Starting Frequency	.5
Red Survival Chance	1
Purple Survival Chance	1
Blue Survival Chance	1
Chance of Red to Blue Mutation	0
Chance of Blue to Red Mutation	0

2. Run the simulation and record the **final allele frequencies**.

Red Allele Frequency	
Blue Allele Frequency	

3. Use chi-squared to test if the allele frequencies remained constant over time (null hypothesis).

a. Find the expected number of alleles and the observed number of alleles.

Observed = final frequency x 2000* *total number of alleles = 1000 x 2
Expected = starting frequency x 2000

Allele	Observed	Expected
Red		
Blue		

b. Calculate the chi-square value.

c. Is the null hypothesis (no change occurred) rejected or supported (fail to reject)?

d. Write a 1-2 sentence conclusion explaining what happened.

II. Selection

1. Set information to the following:

Population Size	1000
Number of Generations	50
Red Allele Starting Frequency	.5
Red Survival Chance	1
Purple Survival Chance	1
Blue Survival Chance	0
Chance of Red to Blue Mutation	0
Chance of Blue to Red Mutation	0

2. Run the simulation and record the **final allele frequencies**.

Red Allele Frequency	
Blue Allele Frequency	

3. Use chi-square to test if the allele frequencies remained constant over time (null hypothesis).

a. Find the expected number of alleles and the observed number of alleles.

Allele	Observed	Expected
Red		
Blue		

b. Calculate the chi-square value.

c. Is the null hypothesis (no change occurred) rejected or supported?

d. Write a 1-2 sentence conclusion explaining what happened.

III. Heterozygote Advantage

1. Set information to the following:

Population Size	1000
Number of Generations	50
Red Allele Starting Frequency	.5
Red Survival Chance	.5
Purple Survival Chance	1
Blue Survival Chance	0
Chance of Red to Blue Mutation	0
Chance of Blue to Red Mutation	0

2. Run the simulation and record the **final allele frequencies**.

Red Allele Frequency	
Blue Allele Frequency	

3. Use chi-square to test if the allele frequencies remained constant over time (null hypothesis).

a. Find the expected number of alleles and the observed number of alleles.

Allele	Observed	Expected
Red		
Blue		

b. Calculate the chi-square value.

c. Is the null hypothesis (no change occurred) rejected or supported?

d. Write a 1-2 sentence conclusion explaining what happened.

IV. Mutation

1. Set information to the following:

Population Size	1000
Number of Generations	50
Red Allele Starting Frequency	.5
Red Survival Chance	1
Purple Survival Chance	1
Blue Survival Chance	1
Chance of Red to Blue Mutation	.01
Chance of Blue to Red Mutation	0

2. Run the simulation and record the **final allele frequencies**.

Red Allele Frequency	
Blue Allele Frequency	

3. Use chi-square to test if the allele frequencies remained constant over time (null hypothesis).

a. Find the expected number of alleles and the observed number of alleles.

Allele	Observed	Expected
Red		
Blue		

b. Calculate the chi-square value.

c. Is the null hypothesis (no change occurred) rejected or supported?

d. Write a 1-2 sentence conclusion explaining what happened.

V. Small Population

1. Set information to the following:

Population Size	100
Number of Generations	50
Red Allele Starting Frequency	.5
Red Survival Chance	1
Purple Survival Chance	1
Blue Survival Chance	1
Chance of Red to Blue Mutation	0
Chance of Blue to Red Mutation	0

2. Run the simulation and record the **final allele frequencies**.

Red Allele Frequency	
Blue Allele Frequency	

3. Use chi-square to test if the allele frequencies remained constant over time (null hypothesis).

a. Find the expected number of alleles and the observed number of alleles.
**total number of alleles = 100 x 2*

Allele	Observed	Expected
Red		
Blue		

b. Calculate the chi-square value.

c. Is the null hypothesis (no change occurred) rejected or supported?

d. Write a 1-2 sentence conclusion explaining what happened.