Natural Selection & Evolution

SBI3U | Student laboratory assignment | 1 of 4

Prepare for your investigation

Name: _____ Date: _____ Class: _____

Research question

How do environmental conditions and selection strength influence the frequency of inherited traits and alleles over generations?

Learning goal: use the virtual model to gather evidence, explain natural selection & evolution and communicate a supported conclusion.

Materials: WorksheetGalaxy virtual laboratory, this assignment, calculator or spreadsheet if needed. Virtual observations only; do not recreate hazardous procedures or perform physical fitness tests without teacher approval.

1. Define two relevant scientific terms from the Background Information tab. (K/U)

2. Write a prediction or hypothesis with a scientific reason. (K/U, T/I)

3. Identify the variable or feature compared, the measured outcome and constants or consistent observation criteria. (T/I)

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Perform the virtual laboratory

Open the corresponding virtual lab and read Background Information. Follow the investigation instructions below. Record authentic simulated results; do not invent data.

Investigation A — Environmental selection

• Set population size to 120, initial D-allele frequency to 0.50, selection strength to 0.50, and generations to 15.

• Run three replicate trials in a dark environment. Record each run.

• Repeat three trials in a light environment, keeping other settings unchanged.

• Compare changes in allele and phenotype frequencies.

Investigation B — Population size and drift

• Choose selection strength 0 (neutral selection).

• Run three trials with a population of 20, then three trials with a population of 200.

• Compare variation in final allele frequencies between trials and explain the role of chance.

Submission requirements

Record each completed observation using the simulator’s record control when available. Use Data & Graphs to review results. Export CSV if available; attach additional rows or screenshots when needed.

Record the exact settings and any changes to the method.

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Observations & results

Enter the actual results. Keep trial IDs consistent between continued tables. Attach the full exported data or extra sheets when the procedure requires more rows. Include units as displayed.

Data table 1

Trial / item	Environment	N	Selection	Generations	Initial D

Data table 1 — continued (2)

Trial / item	Final D	ΔD	Final dark phenotype

Data table 2

Trial / item	Generation	D allele frequency	Dark phenotype frequency

Qualitative observations / sample calculation (show units where applicable)

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Analysis, conclusion & assessment

4. Present a labelled graph of a measured relationship, or an annotated diagram / comparison chart for qualitative investigations. Attach it separately. Explain the pattern using recorded evidence. (C, T/I)

5. Compare two contrasting observations from your investigation of Natural Selection & Evolution. Explain the difference using the background information. (K/U, A)

6. Use a specific recorded result to answer the research question. Explain the scientific reasoning behind it. (K/U, A)

Conclusion and evaluation: answer the research question, revisit the prediction using evidence, identify a model limitation and propose an improvement. (T/I, A)

Submit this assignment plus your completed Lab Report (printed or saved as PDF from the lab) and any supporting data/figures.

K/U: accurate concepts /10	T/I: method, data, reasoning /12	C: clear tables, units, report /8	A: explanation, conclusion, transfer /10

Total: /40