Competition for Food & Population Sampling

SBI4U | Student laboratory assignment | 1 of 4

Prepare for your investigation

Name: _____ Date: _____ Class: _____

Research question

How does food availability influence population growth, and how accurately can quadrat sampling estimate a population?

Learning goal: use the virtual model to gather evidence, explain competition for food & population sampling 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.

Part A — Competition for Food

• Predict how changing food availability will affect the population.

• Keep starting population and growth rate constant. Run three simulations with low, medium, and high food availability.

• Record the population across 20 generations and compare the growth curves.

• Identify evidence of resource limitation and explain the carrying capacity in each run.

Part B — Population Sampling

• Generate a virtual grassland. Sample at least 10 randomly selected quadrats .

• Calculate mean count, density (organisms/m^2), and estimated population.

• Repeat using deliberately high-density (biased) quadrats.

• Compare both estimates with the true population and explain sampling bias and uncertainty.

Submission

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	Food (%)	N_0	r	K	Final N

Data table 1 — continued (2)

Trial / item	Generations

Data table 2

Trial / item	Set	Method	Quadrats	Mean/m²	Estimate

Data table 2 — continued (2)

Trial / item	True total	Error (%)

Data table 3

Trial / item	Quadrat	Count	Selection

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. Explain how food availability changed the growth curve and carrying capacity. (K/U, A)

6. Compare random and biased quadrat estimates using numerical evidence. (K/U, A)

7. Explain how clustering and sample size affect sampling reliability. (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