Heart Rate & Breathing Rate Investigation

SBI3U | Student laboratory assignment | 1 of 4

Prepare for your investigation

Name: _____ Date: _____ Class: _____

Research question

How do exercise intensity and recovery time influence heart rate and breathing rate?

Learning goal: use the virtual model to gather evidence, explain heart rate & breathing rate investigation 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.

• Record a resting baseline with intensity set to 0%.

• Run at least three exercise trials at different intensities, using the same exercise duration.

• For each trial, record values at the end of exercise and after 60 and 120 seconds of recovery.

• Compare heart and breathing rates, graph your results, and identify controlled and responding variables.

• Complete the report with a discussion of physiological mechanisms and model limitations.

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	Intensity	Exercise (s)	HR end	BR end	HR +60 s

Data table 1 — continued (2)

Trial / item	BR +60 s	HR +120 s	BR +120 s

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 heart and breathing rate responses across exercise intensities. (K/U, A)

6. Explain why rates remain elevated after exercise and gradually recover. (K/U, A)

7. Explain how the cardiovascular and respiratory systems work together during exercise. (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