Stars, Galaxies & the H–R Diagram

SNC1W | Student laboratory assignment | 1 of 4

Prepare for your investigation

Name: _____ Date: _____ Class: _____

Research question

How do stellar temperature, radius and luminosity help distinguish regions of the H–R diagram?

Learning goal: use the virtual model to gather evidence, explain stars, galaxies & the h–r diagram 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.

• Write a hypothesis about the relationship between surface temperature and luminosity for main-sequence stars.

• Select at least six stars, including a main-sequence star, a giant or supergiant, and a white dwarf. Record each in the data table.

• Use the custom star controls to hold temperature constant while changing radius. Record three trials.

• Hold radius constant while changing temperature. Record three trials.

• Compare your observations with the plotted reference stars.

• Classify the three illustrated galaxies and explain what galaxy shape can and cannot reveal.

• Complete the report and submit the printed PDF or exported JSON as directed by your teacher.

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	Star	Temperature (K)	Radius (R☉)	Luminosity (L☉)	Region

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. Identify the independent, dependent and controlled variables in your radius investigation. (K/U, A)

6. Describe how luminosity changed when radius increased at constant temperature. Include numerical evidence. (K/U, A)

7. Describe how luminosity changed when temperature increased at constant radius. Include numerical evidence. (K/U, A)

8. Explain why a cool red giant can be more luminous than a hotter main-sequence star. (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