Figure Kit

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How to Read a Scientific Figure (Micro-Guide)

Name: _____ **Date:** _____

Astronomy is a science of *inference.* A figure is not "the truth"—it's a compact argument made out of data, axes, and assumptions.

Step 0: Identify the figure's job (one sentence)

This figure is trying to show:

Step 1: Read the axes like a scientist

- **What are the axes?** (write the full variable names, not just symbols)
  x-axis: _____ **units:** _____
  y-axis: _____ **units:** _____

- **What is *measured* vs *inferred*?**
  Measured (observables): _____
  Inferred (model-dependent): _____

- **What is the scale?** (linear/log; important!)
  linear   log   mixed/other: _____

Step 2: Describe the pattern (before you interpret it)

Use literal description first.

- **Trend:** _____

- **Scatter / uncertainty:** _____

- **Outliers:** _____

- **Range / limits:** _____

If error bars exist: what do they represent?   measurement error   intrinsic scatter   not sure

Step 3: What claim does the figure support (conservatively)?

Conservative claim (supported by what's shown):

Evidence in the figure (point to a specific feature/value/region):

Step 4: Name at least one assumption

Interpretation requires assumptions. Name one.

Assumption: _____
If this assumption fails, the interpretation might change because:

Step 5: Ask the "discriminating test" question

What new measurement would best reduce ambiguity?

Next measurement: _____
If we saw _____, it would strengthen the claim. If we saw _____, it would weaken it.

Quick checklist (for seminar)

I can say what each axis means and its units.
I separated *description* from *interpretation.*
I named at least one assumption.
I can propose a next measurement.

Socratic Seminar Prep — Half-Sheet

Name: _____ **Date:** _____
Seminar topic / "text" (figure, excerpt, dataset): _____

1) My Claim (one sentence)

Write a *specific* claim that you think the "text" supports.

Claim:

_____

_____

2) Evidence (two concrete pieces)

Point to *specific* evidence: a quoted phrase, a trend, an axis label + value, a feature in a spectrum, etc.

Evidence #1 (what I'm pointing to):

Why it supports my claim (one sentence):

Evidence #2 (what I'm pointing to):

Why it supports my claim (one sentence):

3) Assumption (what must be true for my claim to hold)

Name at least one assumption your inference relies on. (Examples: equilibrium, calibration, geometry, negligible dust, "standard candle" validity, selection effects.)

Assumption:

If this assumption fails, my claim would change like this:

4) Uncertainty (optional but strongly encouraged)

Try a confidence estimate *with a reason.*

I am about _____% confident because

5) Next Measurement (the discriminating test)

If you had one new observation/measurement you could make, what would best test your claim or distinguish between competing explanations?

Next measurement:

What outcome would strengthen my claim?

What outcome would weaken my claim?

6) One Question I want to ask the group

Ask something that pushes thinking forward (not a yes/no question).

Question: