

# The Three Phases of Logical Reasoning

## Questions & Look Fors

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#### LRP Phase 1

##### Questions

- ◆ What is the problem asking?
- ◆ How might you identify from the text the problem, question, or dilemma?
- ◆ How can the scenario be restated as an answer statement?

##### Look Fors

##### *Students:*

- ◆ are reading and comprehending texts across a range of types and disciplines.
- ◆ are actively engaged in authentic problem solving (instead of simply solving problems).
- ◆ are actively engaged in scientific inquiry by defining the problem to be solved.

##### *Teachers:*

- ◆ choose and plan for opportunities for students to be engaged in authentic, rigorous, and rich experiences that meet the needs of a diverse population.
- ◆ prepare by first engaging in the student experience themselves to determine where students might encounter difficulties and by developing questions that will help move both the learner and the learning forward.
- ◆ provide time for and facilitate discourse around the reading and understanding needed to identify the problem, question, or dilemma.

#### LRP Phase 2

##### Questions

- ◆ What information do you know?
- ◆ What additional information might be needed?

- ◆ What vocabulary or symbols need to be defined?
- ◆ What pattern(s) and/or relationship(s) do you see?
- ◆ What strategy(ies) could be used here? Why?
- ◆ How might you model the situation?
- ◆ How might you identify the different types of evidence needed to support your argument, proposal, or solution?

### **Look Fors**

#### ***Students:***

- ◆ can discern pertinent information from that which is not.
- ◆ “. . . read purposefully . . . to gain both general knowledge and discipline-specific expertise.” (CCSS-ELA Student Portrait 2)
- ◆ are reading and interpreting technical text to recognize the salient ideas.
- ◆ can understand the context of the problem and the quantities involved as well as how to work with the quantities.
- ◆ identify the specific types of evidence required by different disciplines.
- ◆ “. . . state the goal(s) of an investigation, predict outcomes, and plan a course of action that will provide the best evidence to support their conclusions.” (NGSS Practice 8)
- ◆ “. . . decide which variables should be treated as results or outputs, which should be treated as inputs and intentionally varied from trial to trial . . .” (NGSS Practice 8)
- ◆ use pattern(s)/relationship(s) to create a model (using various representations).
- ◆ extend known patterns and/or relationships and structures to refine the strategy/plan.

#### ***Teachers:***

- ◆ provide a wide range of subject matter from multiple sources that are of “quality and substance” for students to read.
- ◆ provide a range of ideas and problem situations that encourage varied solution paths.
- ◆ provide opportunities that create a need for students to develop a plan, strategy, or analysis.
- ◆ provide time for students to engage in planning and creation of a plan, strategy, or analysis.
- ◆ support students with specific feedback that will move the learner and learning forward. (William and Thompson, 2007)

## LRP Phase 3

### Questions

- ◆ How did I think about this?
- ◆ Is my answer reasonable and/or mathematically sound? How do I know?
- ◆ Does this argument make sense?
- ◆ How do I know I have sufficiently supported my conclusion(s) with evidence and cited sources as needed?
- ◆ How might my peers critique my reasoning?
- ◆ How could I demonstrate a counterexample/counterargument?
- ◆ Why is my answer reasonable?
- ◆ How does my answer satisfy the question posed?
- ◆ Where might I find more resources if needed?
- ◆ Is my model sufficient for this situation? Why or why not?

### Look Fors

#### *Students:*

- ◆ “. . . are expected to become more systematic and careful in their methods.” (NGSS Practice 3)
- ◆ are choosing and using appropriate tools strategically.
- ◆ are designing solutions/conclusions to problems, questions, and/or dilemmas.
- ◆ “. . . convey intricate or multifaceted information.” (CCSS-ELA Student Portrait 1)
- ◆ “. . . refine and share their knowledge through writing and speaking.” (CCSS-ELA Student Portrait 2)
- ◆ “. . . adapt their communication in relation to audience, task, purpose, and discipline.” (CCSS-ELA Student Portrait 3)
- ◆ refine their model as needed.

#### *Teachers:*

- ◆ allow students opportunities to engage in the process of argumentation.
- ◆ provide access to necessary resources.
- ◆ monitor student work to provide feedback to make sure students are on track toward the outcome.
- ◆ plan deliberately and intentionally to include critical skills needed in creating a valid report.
- ◆ create situations that call for students to communicate information, evidence, and ideas in multiple ways. (NGSS Practice 8)