

CONCEPTUAL UNDERSTANDING

Conceptual Understanding is -

- Rich in relationships and understanding
- Can be applied to new settings within and across disciplines
- Proficiency developed through active, reflective learning

From VA SOL Standards “Goals”

- apply scientific concepts, skills, and processes to everyday experiences
- make informed decisions
- design, construct, and interpret models
- evaluate data
- comprehend how information is related to other key facts, and suggest additional interpretations of its meaning or importance
- apply the facts and principles to new problems or situations, using the information to explain new phenomena, and determining when there are exceptions
- analyze the underlying details of important facts and principles, recognizing the key relations and patterns that are not always readily visible
- arrange and combine important facts, principles, and other information to produce a new idea, plan, procedure, or product

Inquiry: Essential Knowledge

Terms

Infer
Gather
Predict
Design an investigation

Discourse: Essential Knowledge Terms

Analyze and critique
Argue
Compare and contrast
Communicate
Debate pros and cons
Describe
Discuss
Explain
Formulate conclusions
Summarize

Symbols, Models, Tools Essential Knowledge Terms

Apply the steps of ____
Arrange
Calculate
Categorize
Chart and analyze
Use models
Create and interpret
Construct
Collect, record, analyze and report
Define
Find Gather
Identify
Illustrate (show)
Interpret
Measure and record
Model (action)
Observe and identify
Order and sequence
Recognize
Record
Select and use
Solve

Conceptual Understanding VA SOL Essential

Knowledge Terms

Apply the concept(s) of ___ to ___
Construct
Connect
Correlate the structure with function
Compare and contrast
Create (model, etc.)
Critique
Differentiate between and/or among
Design
Determine the relationship between

Develop and use a classification system

Evaluate
Forecast
Formulate
Infer
Illustrate (develop)
Interpret
Relate __ to __

INQUIRY

DISCOURSE

**SYMBOLS,
MODELS &
TOOLS**

- Inquiry refers to the activities of students in which they develop conceptual knowledge of scientific ideas
- Inquiry in the classroom is structured around the 5 E Learning Cycle in which students
 - **Engage** in science-oriented questions
 - **Explore** possible answers through investigation
 - Formulate **explanations** based on data
 - **Extend** and apply understanding in a new context
 - **Evaluate** the validity of ideas and understandings

From VA SOL Standards “Goals”

*investigate phenomena
curiosity
observing
predicting
hypothesizing
inferring
develop and use an experimental design
defining, controlling, and manipulating variables
experience the richness and excitement of scientific
discovery of the natural world through the
collaborative quest for knowledge and
understanding*

- Discourse relates to using written or spoken language to organize and refine knowledge, ideas, or experiences about a topic
- Discourse should occur both with “self” and “others”
 - Discussing one’s answers to investigation questions
 - Using a reading strategy when reading text
 - Creating an interactive notebook entry
 - Organizing ideas into a concept map

From VA SOL Standards “Goals”

*use the language of science to
communicate understanding
explain the information in one’s own
words*

Proficiency in the use of symbols, models, and tools develops Procedural Knowledge

- Based on formal language, symbolic or visual representations
- Used as an abstract tool to communicate in a specific context
- Proficiency developed through rote practice
- Symbols, models and tools include words, numbers, formulas, tables, charts, diagrams, 3-D models, simulations, procedures, etc.
 - Symbols are abstract representations used to communicate information and ideas related to a concept
 - Tools include equipment and procedures (i.e., reading a triple-beam balance)

From VA SOL Standards “Goals”

*measuring
interpreting
analyzing
recall or recognize important information,
key definitions, terminology, and facts
make judgments about information in
terms of its accuracy, precision,
consistency, or effectiveness
classifying and sequencing*