Levels of Learning: From Simple to Complex

Sanger Learning & Career Center
life and learning in sync
DIVISION OF STUDENT AFFAIRS

One way to think of learning is in terms of three domains: cognitive (knowing), affective (feeling) and psychomotor (doing). Here's a classification system for the cognitive domain of learning, with examples from different types of classes.

increasing complexity ↓

Learning task	Example from a history class	Example from a biology class	Example from a math class	Typical words in the question
Remember: Recall fundamental knowledge – concrete facts, dates, definitions, etc.	When was the 4th Amendment ratified?	What is DNA?	What is the difference-quotient definition of the derivative?	define, identify, label, match, name, recall, recognize, sort
Comprehend/Understand: Give the meaning and/or significance of facts, events, and so forth. Be able to explain or summarize them.	What is the meaning of the 4th Amendment?	Explain the role of DNA in protein synthesis.	What does the derivative represent with respect to the graph of the original function?	discuss, explain, generalize, give examples, interpret, restate, summarize
Apply: Use your understanding of a subject to address a new situation.	What sorts of realities may have gone into drafting the 4th Amendment?	What would happen if a point mutation turned an amino acid codon into a stop codon?	Find the equation of the tangent line to the graph of $f(x) = x^2$, at the point $(1, f(1))$	apply, demonstrate, hypothesize, imitate, predict, relate, show, solve, use
Analyze: Compare one subject's parts, characteristics, overall meaning, and so forth, with another's.	What may be some common issues between Amendments 3, 4, and 5?	Why does it matter that DNA is antiparallel?	What does each term in the difference-quotient definition of the derivative represent graphically?	analyze, break down, contrast, discriminate, outline
Evaluate: Critique or judge a subject, based on its own attributes, and on the ways in which it compares with other subjects.	Which Amendment is most relevant to modern society?"	Develop an argument against splicing insecticidal genes into the corn genome.	Why is the derivative also said to represent "instantaneous rate of change" and how does this definition compare with the "slope of a tangent line" definition?	argue, assess, compare, decide, evaluate, persuade, rate, support, verify
Create: Design or invent a new model, scenario, or project based on the subject you've learned.	Argue for or against warrantless wiretapping, based on the 4th Amendment.	Propose a single-gene splice that would create an interesting fish for the pet trade.	The commonly used difference-quotient definition is not unique. Give another representation for the notion of the derivative and sketch a graph labeling the parts of this representation.	adapt, combine, compose, design, imagine, plan, synthesize, transform

For more info on classification of the cognitive domain, see Lorin W. Anderson, David R. Krathwohl et al (eds.) *A Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Educational Objectives*. New York: Longman, 2001.

Now it's your turn ...

PART I: Match each sample question to its corresponding level of learning.

The pipe system pictured below has an unusually (and unnecessary) large drop in energy head. Can you find (and explain) the problem?	Remembering
By observing its characteristics, identify the rock type.	Understanding
Which came first, the Cenozoic Era or the Paleozoic Era?	Applying
A small town in Texas recently built its first shopping mall with a large parking lot. But now because of the increased impervious cover, many of the adjoining streets and houses are experiencing flooding. Design a system that will reduce the flooding. Incorporate low impact development technologies in your proposal.	Analyzing
How does orthographic lifting create a thunderstorm?	Evaluating
A certain refrigeration unit will provide 100 kJ/s of cooling and 50 kW of compressor power is required to run the refrigerator. Considering cycle efficiency, should the unit instead by run as a heat pump instead? Why or why not?	Creating

PART II: Use what you know about levels of learning to 1) prepare for a test and 2) analyze your results.

Level	**Before the test: self-test** What sorts of questions do you expect on the test? Find/create/share questions at each of those levels	**After the test: analyze** Go through your returned test and identify the level of each question
Remembering		
Understanding		
Applying		

NOW WHAT?

- Try to answer the questions, and determine which levels you find most difficult.
- Match how you study to the level. For example:
  To remember: make flash cards or create mnemonics.
  To understand: summarize key concepts in 2-3 sentences, or teach the material to a friend.
  To apply: see if you can use what you've learned to solve problems.
- For all levels, practice producing (writing, saying) information, not just looking it over in your notes.

- Look for any patterns in the questions you answered correctly to determine your strengths.
- Then look for any patterns in the questions you missed: Do they tend to be at a particular level? Are they from a particular source (lecture, book, discussion section, homework, etc.)?
- Identify what levels and/or sources to study more for future exams .