# HESS COGNITIVE RIGOR MATRIX | MATH-SCIENCE CRM
## Integrating Depth-of-Knowledge Levels with Bloom's Cognitive Process Dimensions

| Revised Bloom's Taxonomy | DOK Level 1 Recall and Reproduction | DOK Level 2 Skills and Concepts | DOK Level 3 Strategic Thinking or Reasoning | DOK Level 4 Extended Thinking |
|---|---|---|---|---|
| **Remember** <br> Retrieve knowledge from long-term memory, recognize, recall, locate, identify | o Recall, observe, and recognize facts, principles, properties <br> o Recall/ identify conversions among representations or numbers (e.g., customary and metric measures) | Use these Hess CRM curricular examples with most mathematics or science assignments or assessments. | | |
| **Understand** <br> Construct meaning, clarify, paraphrase, represent, translate, illustrate, give examples, classify, categorize, summarize, generalize, infer a logical conclusion, predict, compare–contrast, match like ideas, explain, construct models | o Evaluate an expression <br> o Locate points on a grid or number on number line <br> o Solve a one-step problem <br> o Represent math relationships in words, pictures, or symbols <br> o Read, write, compare decimals in scientific notation | o Specify and explain relationships (e.g., non examples or examples; cause-effect) <br> o Make and record observations <br> o Explain steps followed <br> o Summarize results or concepts <br> o Make basic inferences or logical predictions from data or observations <br> o Use models or diagrams to represent or explain mathematical concepts <br> o Make and explain estimates | o Use concepts to solve non routine problems <br> o Explain, generalize, or connect ideas using supporting evidence <br> o Make and justify conjectures <br> o Explain thinking or reasoning when more than one solution or approach is possible <br> o Explain phenomena in terms of concepts | o Relate mathematical or scientific concepts to other content areas, other domains, or other concepts <br> o Develop generalizations of the results obtained and the strategies used (from investigation or readings) and apply them to new problem situations |
| **Apply** <br> Carry out or use a procedure in a given situation; carry out (apply to a familiar task), or use (apply) to an unfamiliar task | o Follow simple procedures (recipe-type directions) <br> o Calculate, measure, apply a rule (e.g., rounding) <br> o Apply algorithm or formula (e.g., area, perimeter) <br> o Solve linear equations <br> o Make conversions among representations or numbers, or within and between customary and metric measures | o Select a procedure according to criteria and perform it <br> o Solve routine problem applying multiple concepts or decision points <br> o Retrieve information from a table, graph, or figure and use it solve a problem requiring multiple steps <br> o Translate between tables, graphs, words, and symbolic notations (e.g., graph data from a table) <br> o Construct models given criteria | o Design investigation for a specific purpose or research question <br> o Conduct a designed investigation <br> o Use concepts to solve non routine problems <br> o Use and show reasoning, planning, and evidence <br> o Translate between problem and symbolic notation when not a direct translation | o Select or devise approach among many alternatives to solve a problem <br> o Conduct a project that specifies a problem, identifies solution paths, solves the problem, and reports results |
| **Analyze** <br> Break into constituent parts, determine how parts relate, differentiate between relevant-irrelevant, distinguish, focus, select, organize, outline, find coherence, deconstruct | o Retrieve information from a table or graph to answer a question <br> o Identify whether specific information is contained in graphic representations (e.g., table, graph, T-chart, diagram) <br> o Identify a pattern or trend | o Categorize, classify materials, data, figures based on characteristics <br> o Organize or order data <br> o Compare–contrast figures or data <br> o Select appropriate graph and organize and display data <br> o Interpret data from a simple graph <br> o Extend a pattern | o Compare information within or across data sets or texts <br> o Analyze and draw conclusions from data, citing evidence <br> o Generalize a pattern <br> o Interpret data from complex graph <br> o Analyze similarities–differences between procedures or solutions | o Analyze multiple sources of evidence <br> o Analyze complex or abstract themes <br> o Gather, analyze, and evaluate information |
| **Evaluate** <br> Make judgments based on criteria, check, detect inconsistencies or fallacies, judge, critique | "UG"—unsubstantiated generalizations = stating an opinion without providing any support for it! | | o Cite evidence and develop a logical argument for concepts or solutions <br> o Describe, compare, and contrast solution methods <br> o Verify reasonableness of results | o Gather, analyze, and evaluate information to draw conclusions <br> o Apply understanding in a novel way, provide argument or justification for the application |
| **Create** <br> Reorganize elements into new patterns or structures, generate, hypothesize, design, plan, produce | o Brainstorm ideas, concepts, or perspectives related to a topic | o Generate conjectures or hypotheses based on observations or prior knowledge and experience | o Synthesize information within one data set, source, or text <br> o Formulate an original problem given a situation <br> o Develop a scientific/mathematical model for a complex situation | o Synthesize information across multiple sources or texts <br> o Design a mathematical model to inform and solve a practical or abstract situation |