



HESS COGNITIVE RIGOR MATRIX (MATH-SCIENCE CRM):

Applying Webb's Depth-of-Knowledge Levels to Bloom's Cognitive Process Dimensions



Revised Bloom's Taxonomy	Webb's DOK Level 1 Recall and Reproduction	Webb's DOK Level 2 Skills and Concepts	Webb's DOK Level 3 Strategic Thinking/Reasoning	Webb's DOK Level 4 Extended Thinking
Remember Retrieve knowledge from long-term memory, recognize, recall, locate, identify	<ul style="list-style-type: none"> o Recall, observe, and recognize facts, principles, properties 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 Construct meaning, clarify, paraphrase, represent, translate, illustrate, give examples, classify, categorize, summarize, generalize, infer a logical conclusion, predict, compare or contrast, match like ideas, explain, construct models	<ul style="list-style-type: none"> o Evaluate an expression o Locate points on a grid or number on number line o Solve a one-step problem o Represent math relationships in words, pictures, or symbols o Read, write, compare decimals in scientific notation 	<ul style="list-style-type: none"> o Specify and explain relationships (e.g., nonexamples or examples; cause-effect) o Make and record observations o Explain steps followed o Summarize results or concepts o Make basic inferences or logical predictions from data or observations o Use models or diagrams to represent or explain mathematical concepts o Make and explain estimates 	<ul style="list-style-type: none"> o Use concepts to solve nonroutine problems o Explain, generalize, or connect ideas using supporting evidence o Make and justify conjectures o Explain thinking or reasoning when more than one solution or approach is possible o Explain phenomena in terms of concepts 	<ul style="list-style-type: none"> o Relate mathematical or scientific concepts to other content areas, other domains, or other concepts o Develop generalizations of the results obtained and the strategies used (from investigation or readings) and apply them to new problem situations
Apply Carry out or use a procedure in a given situation; carry out (apply to a familiar task) or use (apply) to an unfamiliar task	<ul style="list-style-type: none"> o Follow simple procedures (recipe-type directions) o Calculate, measure, apply a rule (e.g., rounding) o Apply algorithm or formula (e.g., area, perimeter) o Solve linear equations o Make conversions among representations or numbers, or within and between customary and metric measures 	<ul style="list-style-type: none"> o Select a procedure according to criteria and perform it o Solve a routine problem applying multiple concepts or decision points o Retrieve information from a table, graph, or figure and use it to solve a problem requiring multiple steps o Translate between tables, graphs, words, and symbolic notations (e.g., graph data from a table) o Construct models given criteria 	<ul style="list-style-type: none"> o Design an investigation for a specific purpose or research question o Conduct a designed investigation o Use concepts to solve nonroutine problems o Use and show reasoning, planning, and evidence o Translate between problem and symbolic notation when not a direct translation 	<ul style="list-style-type: none"> o Select or devise an approach among many alternatives to solve a problem o Conduct a project that specifies a problem, identifies solution paths, solves the problem, and reports results
Analyze Break into constituent parts, determine how parts relate, differentiate between relevant-irrelevant, distinguish, focus, select, organize, outline, find coherence, deconstruct	<ul style="list-style-type: none"> o Retrieve information from a table or graph to answer a question o Identify whether specific information is contained in graphic representations (e.g., table, graph, T-chart, diagram) o Identify a pattern or trend 	<ul style="list-style-type: none"> o Categorize, classify materials, data, figures based on characteristics o Organize or order data o Compare-contrast figures or data o Select an appropriate graph and organize and display data o Interpret data from a simple graph o Extend a pattern 	<ul style="list-style-type: none"> o Compare information within or across data sets or texts o Analyze and draw conclusions from data, citing evidence o Generalize a pattern o Interpret data from complex a graph o Analyze similarities-differences between procedures or solutions 	<ul style="list-style-type: none"> o Analyze multiple sources of evidence o Analyze complex or abstract themes o Gather, analyze, and evaluate information
Evaluate Make judgments based on criteria, check, detect inconsistencies or fallacies, judge, critique	"UG"—unsubstantiated generalizations = stating an opinion without providing any support for it!		<ul style="list-style-type: none"> o Cite evidence and develop a logical argument for concepts or solutions o Describe, compare, and contrast solution methods o Verify reasonableness of results 	<ul style="list-style-type: none"> o Gather, analyze, and evaluate information to draw conclusions o Apply understanding in a novel way, provide argument or justification for the application
Create Reorganize elements into new patterns or structures, generate, hypothesize, design, plan, produce	<ul style="list-style-type: none"> o Brainstorm ideas, concepts, or perspectives related to a topic 	<ul style="list-style-type: none"> o Generate conjectures or hypotheses based on observations or prior knowledge and experience 	<ul style="list-style-type: none"> o Synthesize information within one data set, source, or text o Formulate an original problem given a situation o Develop a scientific or mathematical model for a complex situation 	<ul style="list-style-type: none"> o Synthesize information across multiple sources or texts o Design a mathematical model to inform and solve a practical or abstract situation



Available for download at resources.corwin.com/HessToolkit and www.karin-hess.com/free-resources