Hess' Cognitive Rigor Matrix & Curricular Examples: Applying Webb's Depth-of-Knowledge Levels to Bloom's Cognitive Process Dimensions - Math/Science

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Create Reorganize elements into new patterns/structures, generate, hypothesize, design, plan, construct, produce	Evaluate Make judgments based on criteria, check, detect inconsistencies or fallacies, judge, critique	Analyze Break into constituent parts, determine how parts relate, differentiate between relevant-Irrelevant, distinguish, focus, select, organize, outline, find coherence, deconstruct	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	Understand Construct meaning, clarify, paraphrase, represent, translate, illustrate, give examples, classify, categorize, summarize, generalize, infer a logical conclusion (such as from examples given), predict, compare/contrast, match like ideas, explain, construct models	Remember Retrieve knowledge from long-term memory, recognize, recall, locate, identify	Revised Bloom's
e eleme ns/struc hypothe	ments b eck, det ncies or	constitutom par how par e betwe elevant, focus, outline, f	r use a lituation familiar to an L	nd neaning, repressustrate, summa infer a l (such as iven), p ontrast, contrast, contr	er bwledge lemory, ecall, lo	Bloom
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Brainstorm ideas, concepts, or perspectives related to a topic		Retrieve information from a table or graph to answer a question Identify whether specific information is contained in graphic representations (e.g., table, graph, T-chart, diagram) Identify a pattern/trend	Follow simple procedures (recipe-type directions) Calculate, measure, apply a rule (e.g., rounding) Apply algorithm or formula (e.g., area, perimeter) Solve linear equations Make conversions among representations or numbers, or within and between customary and metric measures	Evaluate an expression Locate points on a grid or number on number line Solve a one-step problem Represent math relationships in words, pictures, or symbols Read, write, compare decimals in scientific notation	Recall & Reproduction o Recall, observe, & recognize facts, principles, properites exactly identify conversions among representations or numbers (e.g., customary and metric measures)	Webb's DOK Level 1
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obsent of and of		Categorize, classify ma figures based on charac Organize or order data Comparel. contrast figur Select appropriate grap organize & display data Interpret data from a sir	Select a procedure ac criteria and perform it Solve routine problem multiple concepts or c Retrieve information f graph, or figure and u problem requiring mul Translate between tat words, and symbolic it and attact from a tab Construct models give	Specify and explain release, non-examples/e.g., non-examples/exause-effect) Make and record obse Explain steps followed Summarize results or a Summarize from data/exause from data/exause from data/exause from data/exause from mathematic; or explain mathematic; wake and explain estin	Concepts	DOK Level
Generate conjectures or hypot based on observations or prior knowledge and experience		Categorize, classify materials figures based on characterist Organize or order data Compare! contrast figures or Select appropriate graph and organize & display data Interpret data from a simple (Extend a pattern	Select a procedure according to criteria and perform it Solve routine problem applying multiple concepts or decision pertended in the concepts or decision perepts, or figure and use it solve problem requiring multiple step problem requiring multiple step Translate between tables, grapwords, and symbolic notations graph data from a table) Construct models given criteria	Specify and explain relationshi (e.g., non-examples/examples cause-effect) Make and record observations Explain steps followed Summarize results or concepts Make basic inferences or logic predictions from data/observati Use models /dlagrams to repre or explain mathematical conce Make and explain estimates	र्छ	vel 2
Generate conjectures or nypotheses based on observations or prior knowledge and experience		Categorize, classify materials, data, figures based on characteristics Organize or order data Compare/. contrast figures or data Select appropriate graph and organize & display data Interpret data from a simple graph Extend a pattern	Select a procedure according to criteria and perform it Solve routine problem applying multiple concepts or decision points Retrieve information from a table, graph, or figure and use it solve a problem requiring multiple steps Translate between tables, graphs, words, and symbolic notations (e.g., graph data from a table) Construct models given criteria	Specify and explain relationships (e.g., non-examples/examples; cause-effect) Make and record observations Explain steps followed Summarize results or concepts Make basic inferences or logical predictions from data/observations Use models /dlagrams to represent or explain mathematical concepts Make and explain estimates		
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jynthesize lata set, si cormulate cormulate situation develop a nodel for a	rgumer bescribe olution erify re	ompare cross d nalyze ata, clit ienerall iterpret iterpret nalyze etween	Design invopurpose or purpose or Conduct a Conduct a Conce problems problems & short and eviden Translate t Translation translation	Use conc problems Explain, gusing sup Make and Explain the one respondence of concepts	igic Th	b's D
te an or to an or n a scier	ite evidence and gument for conversity of conversity of conversity of the conversity	Compare information across data sets or the Analyze and draw conditions citing evidence Generalize a pattern interpret data from conditions a final procedures between procedures.	vestiga or reser a desig a desig a desig a desig a septs to septs to rear ow rear ow rear on tation or a september of the rear of the rear or a september of	epts to generall generall porting porting the state of th	inking/	DOK Level 3
Synthesize information within one data set, source, or text formulate an original problem given a situation Develop a scientific/mathematical model for a complex situation	Cite evidence and develop a logical argument for concepts or solutions Describe, compare, and contrast solution methods Verify reasonableness of results	Compare information within or across data sets or texts Analyze and draw conclusions from data, citing evidence Generalize a pattern Interpret data from complex graph Analyze similarities/differences between procedures or solutions	Design investigation for a specific purpose or research question Conduct a designed investigation Use concepts to solve non-routine problems Use & show reasoning, planning, and evidence Translate between problem & symbolic notation when not a direct translation	Use concepts to solve <u>non-routline</u> problems Explain, generalize, or connect ideas <u>using supporting evidence</u> Make <u>and iustify</u> conjectures Explain thinking when more than one response is possible Explain phenomena in terms of concepts	Strategic Thinking/ Reasoning	vel 3
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multiple sources or texts Design a mathematical model to inform and solve a practical or abstract situation	cather, analyze, & evaluate information to draw conclusion to Apply understanding in a nove way, provide argument or justification for the application	Analyze multiple sources of evidence analyze complex/abstract themes Gather, analyze, and evaluate information	Select of devise approach among many alternatives to solve a problem Conduct a project that specific problem, identifies solution paths, solves the problem, ar reports results	Helate mathematical or scientific concepts to other content areas, other domains, or other concepts Develop generalizations of the results obtained and the strategies used (from investigation or readings) and apply them to new problem situations	Extended Thinking	Webb's DOK Level 4
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