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| **Descriptions of Cognitive Skill Categories for MCAS Mathematics Assessment Items Types of Cognitive Demands Needed to Demonstrate Content Proficiency**  Updated February 2021 (*modeled after Norman Webb’s Depth of Knowledge Levels*) | | | | |
| **Cognitive Skill Category 1**  *Recall and Recognition* |  | **Cognitive Skill Category 2**  *Analysis/Application of Skills and Concepts* |  | **Cognitive Skill Category 3**  *Analysis, Judgment, and Synthesis* |
| Test items in this category require students to recall mathematical definitions, terms, notations, simple concepts, and procedures, as well as apply common, routine procedures or algorithms (*that may involve multiple steps*) to solve well- defined problems. | Test items in this category require students to engage in mathematical reasoning beyond simple recall, a more flexible thought process, and enhanced organization of thinking skills. The items demand that students make a decision about the approach needed, represent or model a situation based on their interpretation, or use one or more non-routine procedures to solve well-defined problems. | Test items in this category require students to perform more abstract analysis, planning, and evidence gathering to verify answers and explain their thinking. The items demand that students engage in analyzing and reasoning about an open-ended situation with multiple decision points to represent or model contextual mathematical situations and solve more complex, non-routine, or less well-defined problems. |
| *Examples include:* | *Examples include:* | *Examples include:* |
| Solving a problem where the solution process is routine, including an explanation to show the steps used, e.g., rounding. | Solving a problem where the solution process is not routine, including an explanation of the solution process to show or describe the steps used. Items may involve estimation or  have multiple possible solutions. | Solving a problem where the solution process is complex, including an explanation and justification of the solution process. Items may have multiple possible solutions, and involve multiple decision points and  complex situations, with limited resources or conflicting constraints. |
| Recalling a mathematical/geometrical procedure, term, or property, such as reading or using a scale or measurement tool. | Reasoning about mathematical procedures, objects, or relationships, such as computing and interpreting probability. | Providing logical explanations and justifying conclusions (with or without a context) about mathematical procedures, objects, or relationships. |
| Identifying a pattern or a mathematical relationship. | Identifying and extending patterns or sequences, or other mathematical relationships. | Analyzing relationships between patterns; formulating mathematical models and applying them to the solutions of more complex  problems. |
| Reading tables or graphs; plotting a given value /ordered pair on a number line or coordinate plane or identifying the value/ordered pair of a point shown on a number line or coordinate plane. | Creating simple tables, two-way tables, graphs, or number lines and translating between tables and graphs; interpreting tables, graphs, or number lines to solve problems; plotting a value/ordered pair on a number line or coordinate plane  involving multiple steps. | Making decisions on features of a graph and aggregating information from the graph; making predictions based on information given in tables and graphs. |
| Determining measures of center and spread. | Interpreting measures of center and spread and using the measures to compare multiple data sets; classifying and organizing/ordering data to identify relationships between the sets. | Comparing, contrasting, and/or synthesizing data sets; drawing conclusions from or making predictions based on a series of observations. |
| Identifying lines of symmetry, magnitudes of rotation,  and recognizing similarity or congruence of transformed figures. | Graphing a transformation or a sequence of transformations  and identify transformations that map a pre-image onto an image. | Analyzing and reasoning about the properties of geometric figures, including cross-sections of three-dimensional figures. |