**Math Calculation (MC)**

**Development of Working Hypothesis**

Guiding Statement:

Math calculation skills have generally been conceptualized and evaluated as paper-and-pencil math computations. However, brain-based math calculation skill development is somewhat more complex. Researchers have examined developmental elements such as number sense (immediately apprehending exact quantities of small collections of objects and the approximate magnitudes of larger collections, estimation, and making small adjustments in numbers of items relatively automatically) and counting knowledge and strategies (1:1 correspondence, stable order, cardinality, abstraction, etc.). There are three subtypes of brain-based math disabilities: procedural, semantic, and visuospatial (Geary et al. 2011). Math calculation activities may be affected by any of these. Their characteristics are listed below. The type of math instruction in schools may also play a role in diagnosis and intervention. Nearly a decade of math instruction has emphasized conceptual problem solving which may have resulted in a reduced emphasis on instruction in basic number skills (Geary, 2004). Cognitive correlates of calculation skills have been centered on executive functions (particularly inhibiting irrelevant items), attention, memory and learning (working memory, long-term storage and retrieval, and rapid naming), meta-cognition (sequential reasoning), problem solving (particularly quantitative reasoning), and speed of cognitive processing.

Purpose:

This document is designed to be used in conjunction with the SIT process to summarize and analyze a student’s data across all tiers of support, to formulate a hypothesis of the nature of the difficulty, and assist teams with determining if a disability is suspected.

**Math Calculation (MC): Check box to the right if description applies.**

|  |  |
| --- | --- |
| **Hypothesized Symptom Descriptions : Semantic** |  |
| When facts are retrieved, there is a high error rate |[ ]
| Problems with rapid number identification |[ ]
| Early delays in counting objects or object sets |[ ]
| Errors are often “neighbors” of the numbers in the problem (e.g., 2 + 5 = 6) |[ ]
| Require excessive repetition of math facts for learning |[ ]
| Difficulty retrieving math facts such as answers to simple math problems |[ ]
| Gets the same problem wrong after solving it correctly earlier |[ ]
| Delayed response times on simple counting or computations |[ ]
| **Hypothesized Symptom Descriptions : Procedural** |  |
| Errors in regrouping process including column alignment, 0’s, decrementing |[ ]
| Uses inefficient or ineffective strategies when solving simple problems |[ ]
| Lack of understanding of concepts underlying use of certain procedures |[ ]
| Uses less mature procedures for computations (finger counting, counting all) |[ ]
| Problems with sequence or order in computations |[ ]
| **Hypothesized Symptom Descriptions : Visual** |  |
| Difficulty understanding geometric concepts and relationships |[ ]
| Difficulty making charts or visuals from equations |[ ]
| Difficulty with graphs, charts, and other visual math |[ ]
| **General** |  |
| Family history of learning disability |[ ]

|  |  |  |
| --- | --- | --- |
| **Performance Relative to Intellectual development** | **Check if Description Applies:** | **Psychological Processing Area** |
| Difficulty with mental math. Frequently asks for directions to be repeated or gets lost in the middle of a problem or assignment. Tendency to lose track when working on sequential activities. Difficulty with multi-tasking. |[ ]  Working Memory |
| Does well on daily assignments but doesn’t do well on formative assessment/end of week tests. Difficulty recalling facts and related concepts/ideas. Difficulty with memorization. Difficulty with word retrieval. |[ ]  Long Term Storage and Retrieval |
| Difficulty with conceptual understanding |[ ]  Fluid Reasoning |
| Takes longer to compete tasks than others the same age |  | Processing Speed |
| Difficulty naming learned numbers, letters, or names quickly, or substitutes the wrong name or word, has words on “the tip of the tongue” but can’t remember, takes long pauses in speaking, uses the wrong word or “speaks around” a word or someone’s name, has difficulty recalling known words from a particular category  |[ ]  Speed of Lexical Access |
| Difficulty with numeral and math symbols  |[ ]  Orthographic Processing |
| Mind appears to go blank, gets overwhelmed with difficult tasks, or can’t pay attention for long, unusual or erratic patterns of error, easily distracted from relatively mundane tasks, inattentiveness to errors, problems when focusing on more than one thing at a time. Difficulty figuring out what is needed for a task, getting started, or sticking to a plan of action, does not anticipate the time or sequence necessary for task completion |[ ]  Executive Functions and Attention |

|  |  |  |
| --- | --- | --- |
| **Culturally and Linguistically Appropriate Instructional Intervention Implemented (Reading interventions that correspond to the proposed area of weakness should be implemented (e.g. phonological, orthographic).** | **Dates of Intervention****Frequency/Duration** | **Is *progress* being****made when compared to****peers (for CLD students compare progress to CLD peers’ progress)?** |
| **Tier I**  |  [ ] Effective core instruction (e.g. 80% of students making sufficient gains) | [ ]  Daily core instruction  | [ ] Yes [ ]  No |
| **Tier II** | [ ]  Math Calculation targeted intervention | [ ] 30 additional minutes of targeted instruction daily | [ ] Yes [ ]  No |
| **Tier III** | [ ] Math Calculation intensive intervention  | [ ]  30 additional minutes of intensive intervention daily | [ ] Yes [ ]  No |

**Progress Monitoring Data** (At least one of the following repeated progress monitoring probes must be administered)**:**

|  |  |  |  |
| --- | --- | --- | --- |
| **PERFORMANCE relative to Grade** **Empirically-derived Criterion Assessments**  | **Criteria for Academic Weakness** | **Administered**  | **Data Indicates an Academic Weakness**  |
| [ ] easyCBM Math[ ]  Repeated digits-correct computation probes[ ]  Repeated counting strategy probes[ ] Repeated fluent number identification probes[ ]  Repeated numbers reversed working memory probes | 4 data probes ≤16th %ile  | [ ]  | [ ] Yes [ ] No |

**State Assessment**

|  |  |  |  |
| --- | --- | --- | --- |
| **ACHIEVEMENT relative to STATE STANDARDS Curriculum/Grade Leveled Assessments** | **Criteria for Academic Weakness** | **Administered** | **Data Indicates an Academic Weakness**  |
| Oregon State Assessment – Math | Not Met (current year) ≤16th %ile previous years | [ ]  | [ ] Yes [ ] No |

**Report Cards/Classroom Assessment**

|  |  |  |  |
| --- | --- | --- | --- |
| **PERFORMANCE relative to STATE STANDARDS Curriculum/Grade Leveled Assessments**  | **Criteria for Academic Weakness** | **Administered** | **Data Indicates an Academic Weakness**  |
| Standards-based report card – Math  | Not yet, D, F  | [ ]  | [ ] Yes [ ] No |
| Teacher-scored math computation worksheets | Not passing or <60%  | [ ]  | [ ] Yes [ ] No |
| Teacher-scored math computation worksheets | Not passing or <60%  | [ ]  | [ ] Yes [ ] No |