**Math Problem Solving (MPS)**

**Development of Working Hypothesis**

Guiding Statement:

Geary and his colleagues (2011) have identified three types of brain-based math disabilities: 1) procedural 2) semantic, and 3) visuospatial. All three types of disabilities may affect math reasoning skills because math story problems are varied enough to tax each brain system. However, the majority of students with semantic math disabilities will have math reasoning difficulties and also have reading problems. Language skills and their correlates are required as a first step to conceptualize math story problems and then as a second step in accurately and fluently retrieving math language and facts from long-term memory. Cognitive correlates of reasoning skills include executive functions (particularly inhibiting irrelevant items), attention, visual spatial, language use, memory and learning (working memory, long-term storage and retrieval), 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 Problem Solving (Math Problem Solving): 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 |  |
| Delayed response times on simple counting or computations |  |
| **Hypothesized Symptom Descriptions: Visual** |  |
| Difficulty with graphs, charts, and other visual math |  |
| Difficulty making charts or visuals from equations |  |
| Difficulty understanding geometric concepts and relationships |  |
| **General** |  |
| Family history of learning disability |  |

|  |  |  |
| --- | --- | --- |
| **Performance Relative to Intellectual development** | **Check if Description Applies:** | **Psychological Processing Area** |
| Difficulty with graphs, charts, and other visual representations |  | Visual Spatial |
| Difficulty with math vocabulary |  | Language |
| 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 |
| Difficulty with conceptual understanding |  | Fluid Reasoning |
| 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. |  | Attention and Executive Functions |

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| **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) | Core Instruction Daily | Yes No |
| **Tier II** | Math problem solving targeted intervention | 30 additional minutes of targeted instruction daily | Yes No |
| **Tier III** | Math problem solving 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 missing number probes  Repeated magnitude comparison probes  Repeated story problem probes | 4 data probes ≤16th %ile | 1x every 2-4 weeks | Yes  No |

**State Assessment**

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| --- | --- | --- | --- |
| **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**

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| --- | --- | --- | --- |
| **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 story problems worksheets | Not passing or <60% |  | Yes No |
| Graded math assessments from curriculum | Not passing or <60% |  | Yes No |