Math SDI Tool

The purpose of this tool is to improve the quality and selection of specially designed instruction while strengthening the connection across IEP goals, progress monitoring, and KY Academic Standards. *Disclaimer: This tool is to be used in conjunction with the* **Supporting Document** *to provide an additional layer of support and guidance.*

Table of Contents

Number System and Operations (KY Academic Standards for Mathematics Domains: CC, OA, NBT, NF, NS, RP, NQ)

Areas of Concern	Problem Indicators (compared to same age peers)	SDI (Evidence- or Research-Based strategies)
Number words and numerals	• numeral identification • numeral recognition • number before and after • symbolic sequencing • writing numerals	• forward/backward chaining • simultaneous prompting • system of least/most prompts • time delay Explicit instruction in: • copy, cover, compare • trace then write
One to One Correspondence	• simple counting and one-to-one correspondence between number symbols and items/objects • "keeping track" of objects counted	• conceptual games for scaffolding instruction • concrete (manipulatives), semi-concrete (pictures), abstract (symbols) approach (CSA) Explicit instruction in: • counting strategies • multiple means for deliberate practice • multi-sensory teaching strategies (i.e., visual, auditory, kinesthetic and tactile) • system of least/most prompts • use of abacus
Verbal Counting and Cardinality	• counting in sequence • counting on from given number • counting backwards • delayed processing time	• choral counting • conceptual games for scaffolding instruction • forward/backward chaining • system of least/most prompts • time delay Explicit instruction in: • counting strategies • multi-sensory teaching strategies (i.e., visual, auditory, kinesthetic and tactile)

Subitizing	• recognizing typical dot patterns (without counting) • using typical dot patterns to determine quantity of irregular pattern (perceptual subitizing) • remembering previously encountered dot patterns	• conceptual games for scaffolding instruction • concrete (manipulatives), semi-concrete (pictures), abstract (symbols) approach (CSA) • simultaneous prompting • time delay Explicit instruction in: • typical dot pattern recognition
Meaning of symbols	• understanding meaning of symbols (=, +, - , ÷, ✕, <, >, etc.)	• concrete (manipulatives), semi-concrete (pictures), abstract (symbols) approach (CSA) • multi-sensory instruction Explicit instruction in: • counting strategies • mathematical specialized vocabulary (i.e., addition, subtraction, multiplication, division and mathematical symbols)
Place Value Understanding	• place value, often putting numbers in wrong column • comparing numbers	• system of least/most prompts • time delay Explicit instruction in: • adaptive paper • counting strategies • organization using grid paper
Properties of operations	• recognizing properties of operations (commutative, associative, etc.) • applying properties of operations • order of operations	• concrete (manipulatives), semi-concrete (pictures), abstract (symbols) approach (CSA) • simultaneous prompting • time delay Explicit instruction in: • use of abacus • decomposing and recomposing numbers • specialized mathematical vocabulary (i.e., addition, subtraction, multiplication, division and mathematical symbols)

Math Fact Fluency	• efficiently recalling basic math facts (addition, subtraction, multiplication, division)	• concrete (manipulatives), semi-concrete (pictures), abstract (symbols) approach (CSA) • cover, copy, compare • incremental rehearsal • multi-sensory instruction • spaced/distributed practice Explicit instruction in: • self-administered folding-In technique
Fractions	• reading, naming, or writing fractions • attending to equal size pieces when interpreting an image • attending to equal sized pieces when drawing representations (e.g., partitioning a shape or number line) • thinking the numerator and denominator are separate • fraction equivalence and/or comparison • thinking bigger fraction numbers mean larger number	• choral counting • concrete (manipulatives), semi-concrete (pictures), abstract (symbols) approach (CSA) • system of least/most prompts ○ physical prompting (hand over hand) Explicit instruction in: • number lines • specialized mathematical vocabulary (i.e., addition, subtraction, multiplication, division and mathematical symbols)
Ratios & Proportional Thinking	• multiplicative thinking vs. additive thinking • Iterating • considering two quantities	• concrete (manipulatives), semi-concrete (pictures), abstract (symbols) approach (CSA) Explicit instruction in: • double number lines • skip counting • graphic organizers

Algorithms	• solving multi-digit calculations that require regrouping • ignoring decimal points or not aligning decimals • knowing what to do first or where to start • following procedures, rules, or formulas • sequencing multiple steps	• cover, copy, compare • focus on first steps • forward/backward chaining • incremental rehearsal • spaced/distributed practice Explicit instruction in: • use of model cards • organization using grid paper • use of abacus
Word, Situation, or Context Problems	• identifying relevant aspects of a mathematical situation, particularly in word problems or other problem solving situations where some information is irrelevant • ordering the steps used to solve a problem, particularly when information is given out of sequence • determining the best solution to a word problem • gauging the appropriateness or reasonableness of solutions generated and estimate • paying attention to units • translating word problems into equations	• concrete (manipulatives), semi-concrete (pictures), abstract (symbols) approach (CSA) • schema-based instruction Explicit instruction in: • attack strategies • drawing a picture to illustrate the problem • structured notes/organizers • specialized mathematical vocabulary (i.e., addition, subtraction, multiplication, division and mathematical symbols) • worked examples

PROCESS: ***Align goal and potential AREAS OF CONCERNS. Align to PROBLEM INDICATORS. Consider individual student's abilities, select most appropriate SDI suggestions, examine examples and background information before implementing.***

Sample Goals:

When given 8 tasks with up to 20 objects, (the student) will count using one to one correspondence with 75% accuracy on 4 out of 5 trials as measured by a teacher developed probe (direct measure) given weekly.
(direct measure) sample probe

When given 5 word problems, (student name) will correctly set up an equation to solve the problem with 80% accuracy on three consecutive sessions, as measured by a teacher-created probe given weekly.
(indirect measure) sample probe and recording sheet, generated from https://www.math-drills.com/mathwordproblems/word_problems_multi-step_easy.1493213101.pdf

When given 5 multi-digit (up to 3 digits) addition and subtraction problems requiring regrouping, (student name) will model how to solve the problem using manipulatives or drawings with 80% accuracy in 4 out of 5 weekly sessions, as measured by teacher observation and checklist.
(direct measure) sample probe

Algebra and Functions (KY Academic Standards for Mathematics Domains: EE, A, F)

Areas of Concern	Problem Indicators (compared to same age peers)	SDI (Evidence- or Research-Based strategies)
Using structure to rewrite and evaluate expressions or formulas	• applying properties of arithmetic (addition, subtraction, multiplication, division) to rewrite expressions • applying order of operations correctly • substitution • evaluating composite functions • applying properties of operations to polynomials • applying properties of exponents	• forward/backward chaining Explicit instruction in: • model cards • graphic organizers • worked examples
Solving equations	• applying properties of inverse operations • knowing what to do first • ordering steps to solve equations	• incremental rehearsal • concrete (manipulatives), semi-concrete (pictures), abstract (symbols) approach (CSA) • cover, copy, compare • focus on first steps • scaffolded instruction (e.g., chunking) • spaced/distributed practice Explicit instruction in • model cards • worked examples
Coordinate graphing	• plotting points • creating a table of values • identifying and interpreting key features of graphs (slope, intercepts, intersection points, periodicity, etc.) • interpreting units in context • using a graphing calculator	• system of least/most prompts ○ physical prompting (hand over hand) Explicit Instruction in: • anchor charts • expanded tables • graphic organizers

		• model cards • visual prompts • adaptive paper • use of accessible calculators, talking calculators, and graphing calculator technology (e.g., basic calculations and function keys)
Translating between multiple representations	• translating between verbal and symbolic form of expressions • using data from a table to write a function • writing a function based on a contextual situation • translating a graph to an equation	Explicit Instruction in: • graphic organizers • model cards • tape diagrams • visual prompts

Process: Align goal and potential AREAS OF CONCERNS. Align to PROBLEM INDICATORS. Consider individual student's abilities, select most appropriate SDI suggestions, examine examples and background information before implementing.

Sample Goal:
When given a set of 5 algebraic expressions with two variables, (student name) will correctly evaluate 80% of the expressions in 4 out of 5 consecutive trials as measured by a teacher-made probe weekly.
(indirect measure) sample probe and recording sheet

When given 5 multi-step equations with one variable, (student name) will apply a step-by-step process with 80% accuracy over 3 consecutive opportunities as measured by a process checklist weekly.
(indirect measure) sample checklist

Geometry and Measurement (KY Academic Standards for Mathematics Domains: MD, G)

Areas of Concern	Problem Indicators (compared to same age peers)	SDI (Evidence- or Research-Based strategies)
Money	• identifying coins • determining the value of coins • determining total amount	• community-based instruction • system of least/most prompts • time delay Explicit instruction in • hundred chart for coins • multi-sensory teaching strategies (i.e., visual, auditory, kinesthetic and tactile) • next dollar up strategy • skip counting • strategies for generalization
Time	• reading clocks or telling time • understanding the concept of elapsed time • measuring elapsed time	• community-based instruction • concrete (manipulatives), semi-concrete (pictures), abstract (symbols) approach (CSA) • system of least/most prompts • time delay Explicit instruction in: • model cards • skip counting • strategies for generalization • two column tables
Shapes	• categorizing shapes based on properties • composing/decomposing shapes • visualizing objects in 3 dimensions • drawing a shape given its properties	• concrete (manipulatives), semi-concrete (pictures), abstract (symbols) approach (CSA) • Identify similarities and differences in shapes • system of least/most prompts ○ Physical prompting (hand over hand)

		• time delay Explicit instruction in: • mathematical specialized vocabulary (i.e., various shapes and properties)
Measuring	• using a ruler, protractor, compass • selecting the appropriate strategy or formula (perimeter, area, volume, circumference, etc.) • unit analysis (choosing correct units) • unit conversions	• community-based instruction • graduated guidance • scaffolded instruction (e.g., chunking) • system of least/most prompts • Physical prompting (hand over hand) Explicit instruction in: • anchor charts • model cards
Constructing an argument	• knowing and applying definitions and theorems • sequencing steps of a logical argument (informal and formal proof)	• scaffolded instruction (e.g., think alouds, chunking) Explicit instruction in: • constructing an argument • mathematical specialized vocabulary (i.e., definitions, theorems, etc.) • sentence starters

Process: Align goal and potential AREAS OF CONCERNS. Align to PROBLEM INDICATORS. Consider individual student's abilities, select most appropriate SDI suggestions, examine examples and background information before implementing.

Sample Goal:
When given 10 different times on an analog clock, (student name) will say the time to the minute at 80% accuracy on 4 out of 5 weekly probe sessions.
(direct measure) sample probe, generated from https://worksheets.theteacherscorner.net/make-your-own/telling-time/telling-time-worksheet.php

When given 5 two-dimensional figures, (student name) will classify the figures based on their properties with 80% accuracy on 3 consecutive sessions, as measured by a weekly probe.
(indirect measure) sample probe, generated from https://www.commoncoresheets.com/Shapes.php

When asked to construct a proof of a given geometry problem, (student name) will construct a two-column proof with at least 80% accuracy on four consecutive attempts, as measured by a weekly checklist.
(indirect measure) sample checklist

Data, Statistics and Probability (KY Academic Standards for Mathematics Domains: MD, SP)

Areas of Concern	Problem Indicators (compared to same age peers)	SDI (Evidence- or Research-Based strategies)
Data displays	• interpreting key features of data displays (histograms, line plots, scatterplots, etc.) • selecting an appropriate data display • creating data displays	• multi-sensory teaching strategies (i.e., visual, auditory, kinesthetic and tactile) • scaffolded instruction (e.g., chunking) Explicit instruction in: • anchor charts • interpret, select or create data display • process charts • question-answer relationships
Interpreting data	• choosing appropriate statistical measures given a set of data • Interpreting the meaning of a statistical measure • using statistical calculations to make inferences • selecting appropriate fit of model	• providing multiple opportunities for review and practice Explicit instruction in: • anchor charts • structured overview
Probability	• computing probabilities	• concrete (manipulatives), semi-concrete (pictures), abstract (symbols) approach (CSA) Explicit instruction in: • graphic organizers • mathematical specialized vocabulary • worked examples

Process: Align goal and potential AREAS OF CONCERNS. Align to PROBLEM INDICATORS. Consider individual student's abilities, select most appropriate SDI suggestions, examine examples and background information before implementing.

Sample Goal:
When given a set of bivariate data with 5 data points, (student name) will construct a scatterplot that displays the data with 80% accuracy on three consecutive sessions, as measured by a weekly checklist.
(indirect measure) sample checklist