MATH INTERACTIVE LEARNING EXPERIENCE

Instructor Guide

MILE

Math Interactive Learning Experience Instructor Guide

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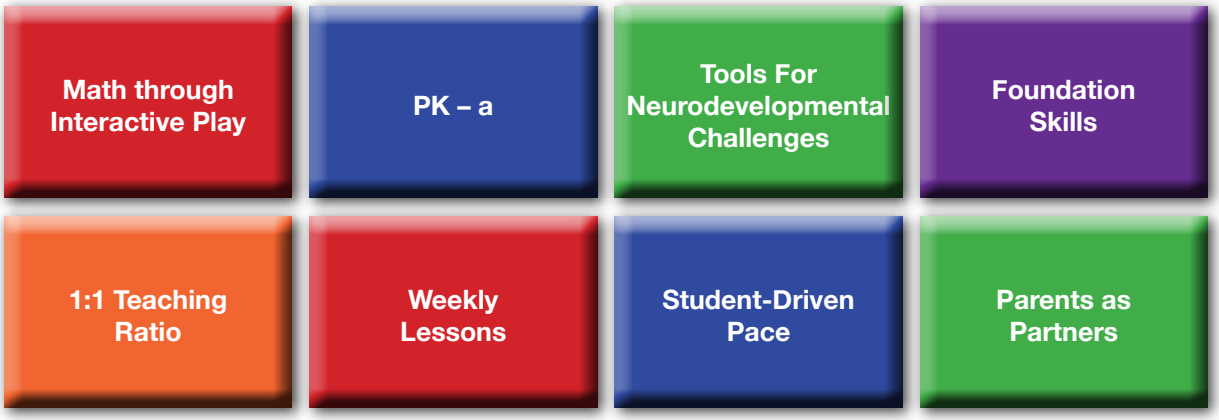
- What is MILE?
- Who are the MILE Instructors?

What is MILE?

The Math Interactive Learning Experience (MILE) program is a program that teaches math in an interactive learning environment. Children are encouraged to learn the fundamental principles of math through interactive play experiences implemented in a one-on-one teaching environment conducted in weekly instructional lessons. The program focuses on building the foundations of math skills by advancing the child through the curriculum at his or her own pace using tools and strategies developed to compensate for neurodevelopmental problems that impede learning these concepts. The curriculum is developed for children functioning between 3-10 years of age or between a Pre-K to 5th grade level. The program also incorporates parents as partners in the educational process. Parents are encouraged to provide mathematical enrichment in the home using weekly activities that augment the instruction in weekly tutoring sessions.

The graphic below recaps MILE's key features:



Who are the MILE Instructors?

MILE instructors undergo an extensive training process so that they can effectively implement the program. Instructors are taught to understand fundamental math skills and to conduct on-going assessment of these skills in the children with whom they are working. This allows them to carefully target their educational goals for the tutoring sessions. See Section 2: Instructor Training Process for more information on MILE instructor training.

Who Can Benefit from MILE?

The program was designed for use with alcohol-affected children who have specific neurodevelopmental difficulties that interfere with learning basic math concepts. In a randomized clinical trial with such children, this program was found to be successful in facilitating math development. The MILE program may be utilized with any child with math difficulties, but there is no available evidence regarding the efficacy of the program with other groups of children at this time.

Notes and Questions

Section 2: Instructor Training Process

Topics:

- Overview of the Instructor Training Process
- Instructor Training Modules

Overview of the Instructor Training Process

Instructor training includes:

- Two group seminars and
- Online instructor training modules (self-study)

The first group seminar introduces the MILE instructors to the program, concepts, and methods. It also answers initial questions participants may have.

MILE instructors then complete a series of self-study training modules on the MILE program content.

After the self-study modules, MILE instructors have an additional group seminar to resolve any questions or concerns they may have before implementing the program. This second session also includes more process instruction to aid in understanding the implementation of the program. During the second seminar, MILE instructors have a chance to role play the teaching concepts using the MILE methodology.

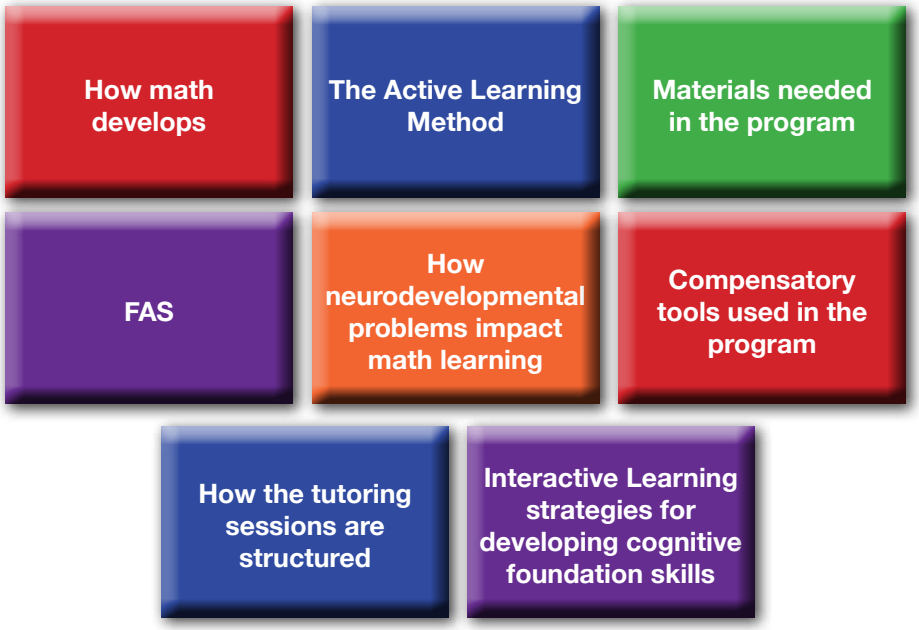
The total training experience is estimated to take approximately 20 hours, but will vary from person to person.

Instructor Training Modules

The instructor training modules of the program are designed to make sure instructors understand math development, what the Active Learning Method is, and what materials will be needed. The modules also provide basic information about FAS and how neurodevelopmental problems impact learning math concepts. They include discussion of the various compensatory tools used in the program. Finally, the modules conclude with guidelines regarding the structuring of the tutoring session and strategies for helping the children develop cognitive foundation skills through a process of Interactive Learning.

To recap, the instructor training modules help the instructor understand:

List of Modules



The complete list of modules is as follows:

1. Math Development
2. Understanding FAS
3. Active Learning
4. Neurodevelopmental Problems that Impact on Learning
5. Tools and Strategies to Overcome Neurodevelopmental Problems Impacting Math Learning
6. The Instructional Session
7. Materials
8. Cognitive Foundation Skills
9. Interactive Learning

Notes and Questions

Section 3: The MILE Curriculum Pages

Topics:

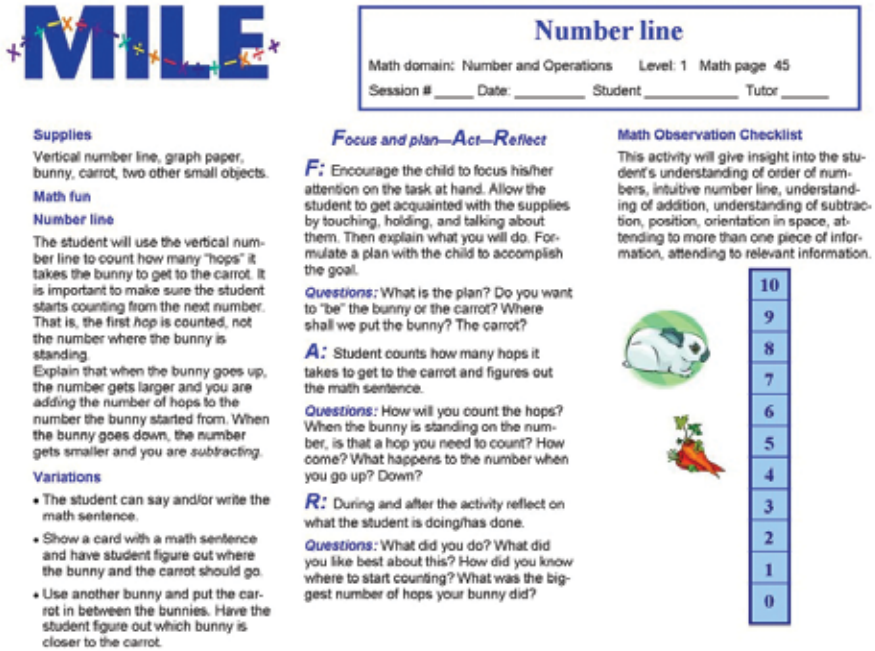
- Getting Familiar with the Curriculum Pages
- Sorting Curriculum Pages

Getting Familiar with the Curriculum Pages

Curriculum pages have been placed into Adobe Acrobat .pdf file. If you do not have this software on your computer, you should be able to download a reader version free of charge.

Each curriculum file contains two pages:

1. The actual Math lesson for the MILE instructor, and
2. A parent handout that describes the family's Fun Work to do at home to reinforce the day's lesson.



MILE

Number line

Math domain: Number and Operations Level: 1 Math page 45

Session # ____ Date: _____ Student _____ Tutor _____

Supplies

Vertical number line, graph paper, bunny, carrot, two other small objects.

Math fun

Number line

The student will use the vertical number line to count how many "hops" it takes the bunny to get to the carrot. It is important to make sure the student starts counting from the next number. That is, the first *hop* is counted, not the number where the bunny is standing.

Explain that when the bunny goes up, the number gets larger and you are *adding* the number of hops to the number the bunny started from. When the bunny goes down, the number gets smaller and you are *subtracting*.

Variations

- The student can say and/or write the math sentence.
- Show a card with a math sentence and have student figure out where the bunny and the carrot should go.
- Use another bunny and put the carrot in between the bunnies. Have the student figure out which bunny is closer to the carrot.

Focus and plan—Act—Reflect

F: Encourage the child to focus his/her attention on the task at hand. Allow the student to get acquainted with the supplies by touching, holding, and talking about them. Then explain what you will do. Formulate a plan with the child to accomplish the goal.

Questions: What is the plan? Do you want to "be" the bunny or the carrot? Where shall we put the bunny? The carrot?

A: Student counts how many hops it takes to get to the carrot and figures out the math sentence.

Questions: How will you count the hops? When the bunny is standing on the number, is that a hop you need to count? How come? What happens to the number when you go up? Down?

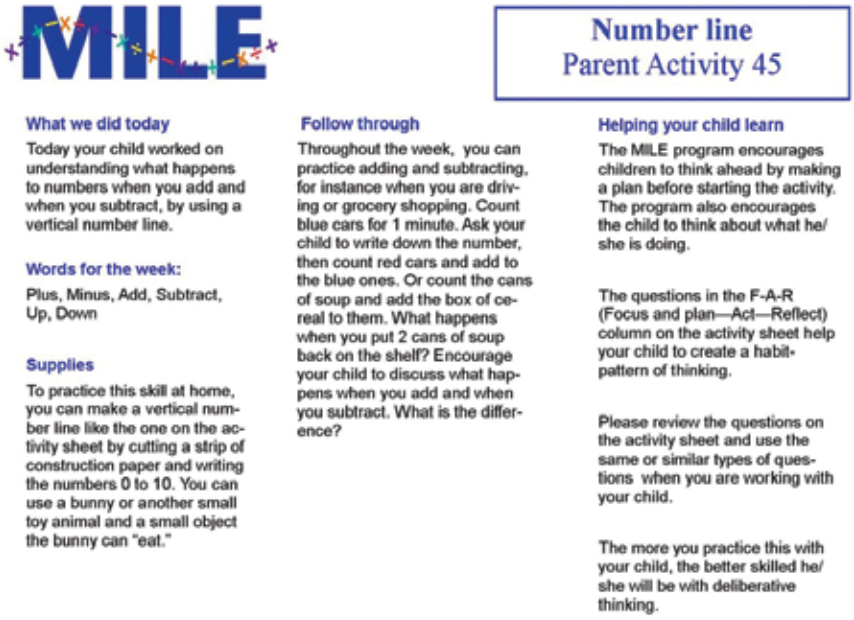
R: During and after the activity reflect on what the student is doing/has done.

Questions: What did you do? What did you like best about this? How did you know where to start counting? What was the biggest number of hops your bunny did?

Math Observation Checklist

This activity will give insight into the student's understanding of order of numbers, intuitive number line, understanding of addition, understanding of subtraction, position, orientation in space, attending to more than one piece of information, attending to relevant information.

Example of a Math Lesson for the MILE Instructor (Instructor Page)



MILE

Number line
Parent Activity 45

What we did today

Today your child worked on understanding what happens to numbers when you add and when you subtract, by using a vertical number line.

Words for the week:

Plus, Minus, Add, Subtract, Up, Down

Supplies

To practice this skill at home, you can make a vertical number line like the one on the activity sheet by cutting a strip of construction paper and writing the numbers 0 to 10. You can use a bunny or another small toy animal and a small object the bunny can "eat."

Follow through

Throughout the week, you can practice adding and subtracting, for instance when you are driving or grocery shopping. Count blue cars for 1 minute. Ask your child to write down the number, then count red cars and add to the blue ones. Or count the cans of soup and add the box of cereal to them. What happens when you put 2 cans of soup back on the shelf? Encourage your child to discuss what happens when you add and when you subtract. What is the difference?

Helping your child learn

The MILE program encourages children to think ahead by making a plan before starting the activity. The program also encourages the child to think about what he/she is doing.

The questions in the F-A-R (Focus and plan—Act—Reflect) column on the activity sheet help your child to create a habit-pattern of thinking.

Please review the questions on the activity sheet and use the same or similar types of questions when you are working with your child.

The more you practice this with your child, the better skilled he/she will be with deliberative thinking.

Example of a Parent Handout Describing the Fun Work Assignment (Parent Page)

Sorting Curriculum Pages

Each curriculum page can be sorted by content area and grade level in an electronic database on the accompanying CD. Once the Curriculum Menu is displayed, select the content area or category to be covered (i.e. Addition, Subtraction, etc.). Once you have identified the content area of interest, you may then examine all the curriculum pages by grade level and select the exercise you wish to complete with the child. The child's current grade level should never be used to identify the appropriate grade level because many children are not functioning at their current grade level in math. This results in over-estimating the child's math skills. After the grade level is selected the document is made available by clicking the "Display Document" button.

Section 4 discusses how to determine the appropriate content area and skill level needed for each student.

Notes and Questions

Section 4: Identifying the Student's Math Skills and Setting Goals

Topics:

- The Importance of Preliminary Math Skills
- Preliminary Math Skills and Children with Neurodevelopmental Challenges
- How to Use the MILE Math Observation Checklist
- Scoring the MILE Math Observation Checklist
- Setting Math Goals for the Student

The Importance of Preliminary Math Skills

When a child reaches school-age it is often taken for granted that he/she has the preliminary skills that are required to do the academic work. Unfortunately, this is not true for children who have neurodevelopmental problems or cognitive delays. These children need a more focused approach to teach them the skills that ordinarily just seem to "happen" in students without learning problems. Students who have trouble with math may have gaps in their understanding of the pre-math concepts. These foundation gaps make it difficult to develop solid math skills.

Before a young student is ready to work on "real" math, certain preliminary math skills need to be in place. These skills are developed through systematic exploration of the environment and through the help of adults who mediate the child's experiences. Such early concepts include for instance:

- Understanding and linking the visual-spatial experiences of size, shape and quantity with the appropriate verbal labels
- Sorting and categorizing
- Recognizing and constructing patterns

Being able to recognize the size and the shape of an object is necessary before the skills of sorting and categorizing can be developed. These basic concept skills are part of the foundation the student needs in order to understand and develop the higher math skills such as addition, subtraction, multiplication and division, and eventually algebra and geometry.

Besides the preliminary math skills, the student also needs to have adequate levels of basic cognitive foundation skills. Cognitive foundation skills include for instance:

- Focused perception
- The ability to attend to more than two pieces of information at the same time
- The ability to attend to relevant information
- The ability to make inferences

These skills may be thought of as prerequisite skills for manipulating pieces of information, which are required for later math skills. Many students have not learned these skills yet and an effort needs to be made during the math sessions to help the student in developing them.

Children may have some foundation gaps where they may lack understanding of such things as patterns or symbolic understanding; or they may not be able to determine the relevant information that will allow them to solve a math problem. It is therefore, important to use the MILE Math Observation Checklist on page 52 to discover the child's knowledge gaps and use curriculum pages that allow for practice of those skills.

Preliminary Math Skills and Children with Neurodevelopmental Challenges

Often, no conscious attention is paid to the development of preliminary- and problem-solving skills when math is taught to young students. Rote memorization of the math facts is often deemed sufficient in the early grades. Children with neurodevelopmental problems may, eventually, be able to master the math facts by rote memory; however they will lack an understanding. As they are prone to increased rates of forgetting and memory retrieval problems, their performance in these areas will be unstable and they will experience problems with acquiring future skills that require understanding of these lower level skills. When they have memorized something, it may be "there" one day and "gone" the next.

Children with neurodevelopmental problems may, eventually, be able to master the math facts by rote memory; however they will lack an understanding.

Poor understanding of the fundamental principles will result in errors such as: 72 – 6 = 74, or "upside down subtracting" (the 2 is subtracted from the 6). This type of error indicates that the student does not have an understanding that when subtracting a number from a larger number (in the example 6 from 72), the larger number becomes less. However, it appears that the student knows the math fact: 6 – 2 is indeed 4, so more math drills to increase rote memory of math facts are not going to solve the problem.

The MILE program strongly emphasizes teaching problem solving skills, understanding the concepts, and "filling the skill gaps" before math fact drills are utilized. It is perfectly acceptable to work on a page at the Kindergarten level with a student who is in 3rd grade, in order to build the necessary skills. The program recommends using such tools as flash-cards and minute-math only after the student demonstrates an understanding of the math concepts.

How to Use the MILE Math Observation Checklist

The MILE Math Observation Checklist on page 52 is a checklist of math skills ranging from the basic concepts of size and shape, to the higher math skills of multiplication and division. The checklist was developed for two purposes:

1. To give the MILE Instructors a guideline to choose the curriculum pages that help the student develop math skills.

2. To keep track of the student's development in math skills.

Additionally, the checklist can be used to do an informal math assessment at the beginning of the MILE program if giving the student a formal math pre-test is not possible.

While working on the curriculum pages, the MILE instructor observes the work of the student and fills out the MILE Math Observation Checklist. It will be most accurate to mark the checklist during the session when a weak skill is noticed. However, if this distracts the student, the checklist can be filled out at the end.

It is important to observe all the skills on the checklist for all children, even the skills that the student presumably ought to possess according to their age or grade-level because there may be deficiencies in those skills. The checklist will thus give an indication as to the "gaps in the foundation" that need to be remediated. For the younger children, the checklist will provide a guideline to determine which skills still need to be developed.

Scoring the MILE Math Observation Checklist

A score of "Absent" is given when the child has not acquired the skill yet. For instance, the student simply does not know a shape.

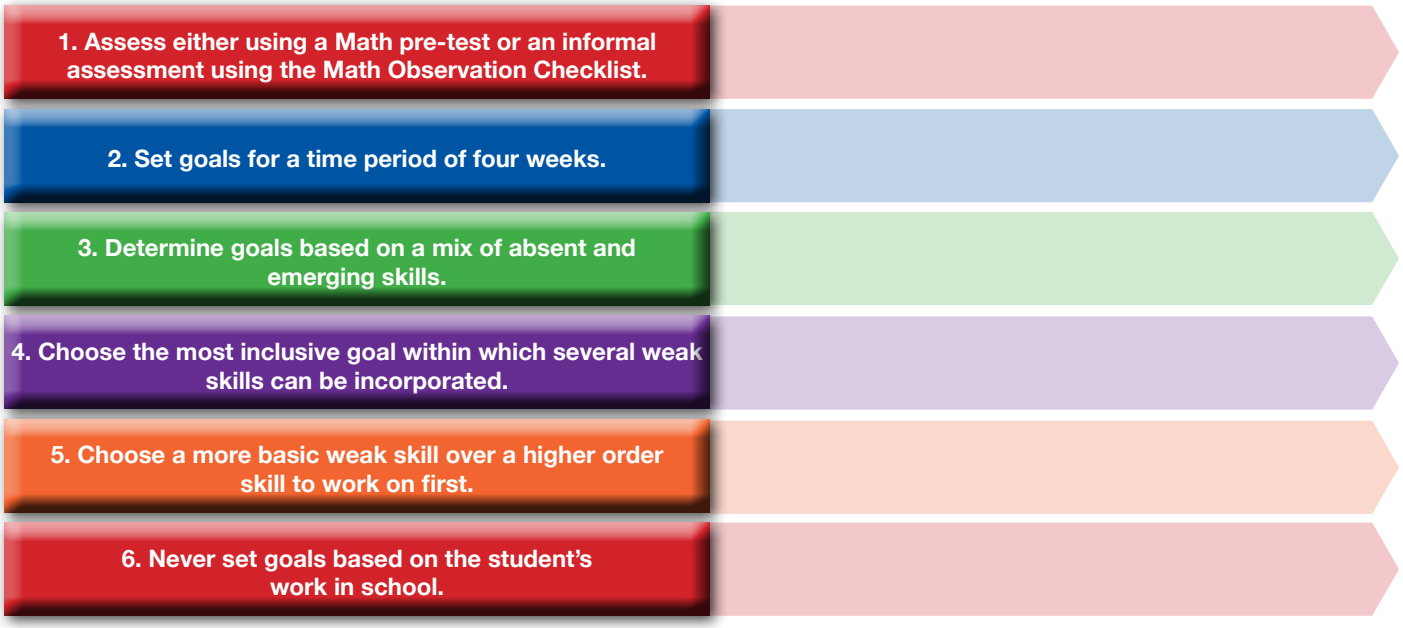
A score of "Emerging" is given when the student is not consistent in demonstrating a skill. For instance, he/she recognizes a square in one situation, but fails to recognize and name it in another. In other words, sometimes a skill is there, sometimes it is not.

A score of "Present" is given when the student consistently demonstrates the skill. It is important to occasionally review the "Present" skills. Children with neurodevelopmental problems are not consistent, even in the skills that appear to be solidly present. Periodically the student may need a booster session to strengthen skills.

A score of "N/A" (not applicable) is given when something is clearly out of the developmental realm of the student. For instance, a student in Kindergarten cannot be expected to work on multiplication or division.

Setting Math Goals for the Student

Following are the guidelines for setting math goals for the students:



1. Assess either using a Math pre-test or an informal assessment using the MILE Math Observation Checklist.

   Before starting the MILE sessions it is optimal to do a math pre-test with the student to find out where they are in math. If that is not an option, the MILE instructor can utilize the Math Observation Check list to go through all the concepts in an informal way with the math materials at hand and mark the strengths and weaknesses. Based on this informal assessment, the instructor can set goals for the first period.

2. Set goals for a time period of four weeks.

   Setting math goals for the student needs to be done for short periods of time. The MILE program recommends four weeks. The reason is that frequently reviewing the goals will give the instructor an opportunity to change them when they appear too easy or too far-fetched for the student.

3. Determine goals based on a mix of "Absent" and "Emerging" skills.

   Goals need to be based on the "Absent" skills as well as on the "Emerging" skills. Starting with strengthening and "Emerging" skill will lead to early success which is motivational for the student. Therefore, for the initial goals a mix of "Absent" skills and emerging skills need to be incorporated.

4. Choose the most inclusive goal within which several weak skills can be integrated.

   When determining the math goals, some priorities need to be set. A general rule of thumb is to choose a goal that covers several of the weak skills. For instance, if a student scores "Emerging" on several items in the skills sections of "Size"" "Shape", "Quantity", "Counting" and "Patterns", the priority would be the category of "Patterns". The reason for this is that within the context of the pattern-goal, the instruction can also focus on size, shape, quantity and counting.

5. Choose a more basic weak skill over a higher order skill to work on first.

   Another rule of thumb is to choose goals that address the most basic skills that get a score of "Absent". In that manner, the foundation will be built from the bottom up. For instance, if the student scores "Absent" for the shape of a square or circle and "Absent" in patterns, he/she needs to work on shape recognition first.

6. Never set goals based on the student's work in school.

   It may be tempting with older students to set goals based on math they are doing in class. Grade level math may be beyond where the child's actual math skills are and trying to work on that level while attemping to build math skills is counter-productive.

By keeping score with the MILE Math Observation Checklists during the initial four sessions, the MILE instructor can decide if the goals have been reached or if additional time needs to be spent on mastering the concepts. The MILE instructor will then set goals for the next four sessions, which may be the same or different from the initial ones. It is very important to set the goals for periods of four weeks and get materials ready for that period, rather than just picking some pages at the day of the session. We want to stress here again that goals need to be based on the skill level of the student rather than on the age or grade level. The Appendix 6: Student Goals Sheets for 4 Sessions worksheet on page 76 provides a sheet to prepare the goals for each 4-session period.

The guidelines in Section 5 follow the sequence of the MILE Math Observation Checklist and are intended to provide insight into how to assess the different skills of the student. They are also intended to help choose curriculum pages in the appropriate areas of remediation.

Notes and Questions

Section 5: Guidelines for Assessment and Choice of Curriculum Pages

Topics:

- Size
- Shape
- Quantity
- Categorizing, Sorting, and Patterning
- Counting
- Sequencing and Planning
- Number Writing
- Position
- Symbolic Understanding
- Addition
- Subtraction
- Multiplication
- Division
- Cognitive Foundation Skills

The following sections delineate specific math skills that are taught using the MILE curriculum and that can be assessed using the MILE Observation Checklist. Each of the sections contains: (1) a brief description of the topic area; (2) a checklist for assessing development of the skills; and (3) the categories for the pages that can be chosen to remediate this area of weakness.

It is important to work on each skill until the assessment shows that the student demonstrates mastery.

Size

1. The concepts of *size* and *relative size* (bigger than, smallest) is a preliminary math skill that needs to be well-established in the student.

   In order to determine if the student has mastered the concept of size, he/she needs to demonstrate the following:

   - Be able to recognize and identify Big, Large, Little, Small, Medium
   - Be able to recognize and identify Bigger, Larger, Smaller.
   - Be able to recognize and identify Biggest, Largest, Smallest
   - Be able to recognize that size is relative and that the "Biggest" in one group can become the "Smallest" when larger items are added

2. Assessment of **Size Skills**:

   To give you an indication of the student's level of mastery, the MILE Math Observation Checklist assesses the following Size skills:

Big ☐	Bigger ☐	Biggest ☐
Small ☐	Smaller ☐	Smallest ☐
Large ☐	Larger ☐	Largest ☐
Little ☐	Medium ☐	

3. Building and Remediating Size skills:

   If the MILE Math Observation Checklist for the student shows a knowledge gap in Size skills, use the student pages under the categories Measurement-height/length and Ordering.

Shape

1. The ability to recognize and name Shapes is the foundation for the skills of sorting and categorizing all the way to geometry and trigonometry. Therefore it is an important early concept.

   In order to determine if the student has mastered the concept of shape he/she needs to demonstrate the following:

   - Be able to recognize and identify the basic shapes.
   - Be able to tell what makes a certain shape, for instance a square (4 equal sides and 4 corners), a triangle (3 sides and 3 corners).

2. Assessment of Shape Skills:

The MILE Math Observation Checklist assesses the following **Shape-skills**:

Square	☐	Triangle	☐	Circle	☐
Rectangle	☐	Diamond	☐	Oval	☐
+	☐	×	☐	★	☐

3. Building and Remediating Shape Skills:

   If the MILE Math Observation Checklist for the student shows a knowledge gap in Shape-skills, use the student pages under the category of Shapes.

Quantity

1. The concept of Quantity underlies just about everything in math. In order to understand such concepts as Addition and Subtraction the student needs to understand "more" and "less".

   In order to determine if the student has mastered the concept of quantity he/she needs to demonstrate the following:

   - Be able to identify (and know the words for) such quantities as "many", "lots", "few", "some", "all", "none".
   - Be able to compare and determine "more and less", "same as" and "equal".

2. Assessment of Quantity Skills:

The MILE Math Observation Checklist assesses the following **Quantity** skills:

Many	☐	Lots	☐	Few	☐
More	☐	Less	☐	Most	☐
Some	☐	All	☐	None	☐
Same as	☐	Equal	☐		

3. Building and Remediating Quantity Skills:

If the MILE Math Observation Checklist for the student shows a knowledge gap in Quantity skills, use the student pages under the categories Measurement-quantity, Measurement-weight, and Sorting-matching.

Categorizing, Sorting, and Patterning

1. For the student to be able to do higher level math problems, he/she needs to be able to construct patterns, sort, and categorize objects. Developing these skills is therefore an important foundation for subsequent math abilities.

   In order to determine if the student has mastered the concepts of Categorizing, Sorting, and Patterning he/she needs to demonstrate the following:

   - Be able to recognize that items may fit in more than one category, for instance a lion could fit into the category "animal", "predator", "dangerous", "zoo", "circus".
   - Be able to identify categories and sort items to fit the category.
   - Sort items according to a dimension, for instance size.
   - Re-sort items according to a different dimension, for instance color.
   - Recognize that patterns can be formed using different categories, for instance size, color, texture, and number.
   - Be able to begin and continue patterns.

2. The MILE Math Observation Checklist assesses the following **Categorizing, Sorting, and Patterning Skills**:

Sorting	☐	A – B	☐		
Categorizing	☐	A – A – B	☐		
Ordering	☐	A – B – C	☐	A – B – C - D	☐

3. Building and Remediating Categorizing, Sorting, and Patterning Skills:

   If the MILE Math Observation Checklist for the student shows a knowledge gap in Categorizing skills, use the student pages under the categories Graphs, Ordering, Sorting, Sorting-matching, and Sorting-same/different.

   If the MILE Math Observation Checklist for the student shows a knowledge gap in Sorting skills, use the student pages under the category Sorting.

   If the MILE Math Observation Checklist for the student shows a knowledge gap in Pattern skills, use the student pages under the categories Patterns, and Ordering.

Counting

1. Counting is a fundamental math skill the student needs to have before the higher order math skills can be developed. This skill goes beyond being able to recite a series of numbers. Many parents believe their toddlers can count because they can "sing the song" from one to ten. Although rote-reciting the numbers in the correct order is a necessary first step in counting, it is not enough to be considered true counting.

   In order to determine if the student has mastered the concept of **number and counting**, he/she needs to demonstrate the following:

   - Recognize number symbols as distinct from letter symbols.
   - Know the names of the numbers (able to rote-recite).
   - Know the names for 11, 12, and 13 (thirteen rather than three-teen).
   - Know the correct name for 0 (zero).
   - Use the number names in a stable order.
   - Use only one number name for each object (one-to-one correspondence).
   - Use the last number spoken to describe how many items there are (Cardinality).
   - Be able to count different objects within a larger group of objects. (For example count the bunnies in a group of bunnies and baskets).
   - Recognize that 10 items stay 10 items, no matter at which item you start counting or how far you spread them out. (Conservation).
   - Know the appropriate name for, e.g. 61 (sixty one – read from left to right) and 16 (sixteen – read from right to left).
   - Be able to order items as first, second, third, etc. (Ordinality). The student needs to be able to recognize that "number one" is the same as "first".
   - Skip count by twos.
   - Skip count by fives.
   - Skip count by tens.
   - Count by tens when starting at, for instance 36.
   - Recognize patterns of dots, as on dice, as representing a number (Subitizing).
   - Recognize transitions (19 – 20, 29 – 30, etc.)

2. Assessment of Counting Skills:

   The MILE Math Observation Checklist assesses the following **Counting** skills:

Rote counting from _____ to _____						☐
Correct names of numbers						☐
Correct order of numbers						☐
Transition to next decade (19-20, 29-30….)						☐
Ordinality (1st, 2nd, 3rd)						☐
One-to-one correspondence						☐
from _____ to _____						☐
Cardinality						☐
Conservation						☐
Counting subsets in large set						☐
Skip counting by…	2	☐	5	☐	10	☐
Subitizing	3	☐	4	☐	5	6 ☐

3. Building and Remediating Counting Skills:

   If the MILE Math Observation Checklist for the student shows a knowledge gap in Counting skills, use the student pages under the category "Counting". This category covers the levels Pre-K, Kindergarten, and first grade.

   For information on why the student may make certain counting errors, and additional suggestions to remediate the knowledge gaps, please refer to the Appendix 2: Error Analysis and Suggestions for Remediation chart on page 56.

Sequencing and Planning

1. Developing sequencing and planning skills helps the student to develop the capacity to make connections between events. When the student is able to make connections, he/she will be able to recognize that events are related and do not happen in a vacuum. In this manner an insight into cause and effect is established. This will help him/her to figure out things rather than relying on memory skills alone. For instance, if the student can recognize that in the math problem 2 + 5 = 7, the numbers 2, 5 and 7 are all related to each other, he/she can figure out that 5 + 2 also must equal 7. So, instead of having to remember 2 separate math facts, only one needs to be memorized. With the MILE program, sequencing and planning, in one way or another, is a thread that runs through the whole of each math tutoring session.

In order to determine if the student has mastered the concept of **Sequencing and Planning**, he/she needs to demonstrate the following:

- Be able to order items as first, second, third, etc. (ordinality).
- Recognize cause and effect.
- Understand the logic of "first things first".
- Understand the relationship between events

2. Assessment of Sequencing and Planning Skills:

   The MILE Math Observation Checklist assesses the following **Sequencing and Planning-skills**:

First – next – last	☐
Before – after	☐
Yesterday – today – tomorrow	☐

3. Building and Remediating Sequencing and Planning Skills:

   If the MILE Math Observation Checklist for the student shows a knowledge gap in Sequencing and Planning skills, use the student pages under the categories Ordering and Patterns. These categories cover the levels Pre-K to 3rd grade.

   However, it is very important to emphasize the sequence and order in everything that you do with the student. The tutoring sessions are designed to teach sequencing and planning skills. Every session starts with the link between what was done in the week before and ends with a discussion of what will be done in the week ahead helping the student to make connections between past, present and future.

Number Writing

1. In order to develop good math skills, the student needs to be able to correctly write the numbers. The inability to write the numbers from 1 to 10 may be due to several factors. The most obvious one is that the child is too young and simply has not learned how to do it yet. However, even older children who, according to their age would be expected to properly write the numbers without reversals, may not be able to do so. This may be caused by poor motor control, poor habit formation, poor visual spatial ability, or poor number recognition.

   In order to determine if the student has mastered **writing the numbers** from 1 to 10, he/she needs to demonstrate the following:

- Accurately write the numbers.
- Write the numbers in the correct order.
- Write the numbers without reversals.

2. Assessment of Number Writing Skills:

   To give you an indication of the student's level of mastery use the "**I Can Write Numbers**" assessment sheet (Appendix 3). The MILE Math Observation Checklist assesses the following **Number Writing** skills:

   Write numbers from 1 to 10 ☐
   Write numbers from __ to __ ☐

3. Building and Remediating Number Writing Skills:

   If the MILE Math Observation Checklist for the student shows a knowledge gap in Number writing skills, use the "Teaching Numbers" program as part of each of the tutoring sessions. This program is based on the "Handwriting Without Tears" program. Work on each number until the student demonstrates the ability to write that number before moving on to the next number.

Position

1. The ability to correctly describe where an object is located may not seem to be a math skill. However, it is a very important early skill that is needed for later work in "real" math. For instance, when doing vertical subtraction, the student has to be able to determine what the "top number" is and work from the top down. Furthermore, the position of a number indicates whether it is in the tens-column or the ones-column. And the position of a number can be "closer to" or "further away" from another number.

   In order to determine if the student has mastered the concept of **Position**, he/she needs to demonstrate the following:

   - Accurately point at the appropriate position when asked to.
   - Accurately describe the location or position of an object when asked to.
   - Be able to put an object in the appropriate location when asked to.
   - Determine the place of a number relative to others (higher, lower, in between, next to, closer to).

2. Assessment of Position Skills:

The MILE Math Observation Checklist assesses the following **Position** skills:

Up	☐	Down	☐	Above	☐
Under	☐	Below	☐	Between	☐
Next to	☐	Beneath	☐	In front of	☐
Behind	☐	Beside	☐	Near	☐
Far	☐	Beginning	☐	Middle	☐
End	☐	Right	☐	Left	☐

3. Building and Remediating Position Skills:

There are no actual curriculum pages for teaching Position skills. However, if the MILE Math Observation Checklist for the student shows a knowledge gap in these skills, you can use the student pages under the categories Ordering and Patterns. Furthermore, you can work on the weaker position-skills while doing exercises you chose for improving other skills. For instance, while working on patterns, you can ask the student "which bead is *between* the two blue beads?" When working on building block towers, you can ask "what color block is *beneath(or under)* the red block?" or, "Put the yellow block beside the green one." These types of questions and instructions can be worked into any of the curriculum pages you choose for the student. To practice the relative position of numbers the category Number Line will be useful.

Symbolic Understanding

1. There are many symbols in our everyday life that convey messages to us such as letters, numbers and math signs. Some students do not have a solid understanding of the signs or do not recognize the difference between, for instance a + (plus sign) and a – (minus sign).

   Another symbol that is often difficult for students to comprehend is the = (equal sign). This sign is often interpreted as: "when I see the = sign I am asked to give the answer." In reality, the equal sign means that the amounts on both sides of the sign are equal. Thus, a student who answers 6 + 3 = 8 may believe that he/she has followed the instructions because an answer was given and will continue to the next problem. The student who truly understands the = sign will be more motivated to check if the answer that was given is correct; is there indeed an equality on both sides of the sign?

   In order to determine if the student has mastered the **Symbolic Understanding**, he/she needs to demonstrate the following:

- Able to recognize the + and – signs.
- Understand the meaning of the + and – signs.
- Understand the meaning of the = sign.
- Recognize and understand the signs for multiplication and division.
- Recognize number signs as distinct from letter signs.
- Know the number signs.

2. Assessment of Symbolic Understanding:

To give you an indication of the student's level of mastery, the MILE Math Observation Checklist assesses the following **Symbols**:

+ means: "to put together" (plus)	☐
– means: "to take away" (minus)	☐
= means: "same as" (equals)	☐
x means: "counting by equal groups" (times)	☐
./. means: "separate into equal groups" (divide)	☐
Recognize number vs. letter	☐
Recognize number shapes 1 to 10	☐
Recognize numbers shapes 1 to 100	☐
Recognize number shapes up to 100	☐
Recognize number shapes up to 1000	☐

3. Building and Remediating Symbolic Understanding:

There are no actual curriculum pages for teaching **Symbolic Understanding**. However, if the MILE Math Observation Checklist for the student shows a knowledge gap in understanding symbols, you can work on the weaker symbol skills while doing exercises you chose for improving other skills. For instance, when working on addition or subtraction pages put a strong emphasis in teaching recognition and understanding of the signs. For further suggestions to remediate the knowledge gaps, please refer to the Math Error Analysis and Remediation Chart in Appendix 2.

Addition

Addition is a "real-math" skill the young student needs to develop. The MILE program places great importance on the *understanding* of addition. What happens when you add two numbers? You get a *higher number*, or more. In order to help the student understand the concepts "higher number" and "more", the MILE

program uses a vertical number line as well as manipulatives. When adding with a vertical number line it is visually clear to the student that "adding goes up" and "subtracting goes down". Although, eventually it is important to know the addition facts, it is even more important that the student understands addition first.

In order to determine if the student has mastered **Addition** he/she needs to demonstrate the following:

- Understand that when adding the number gets higher, you get more.
- Know addition facts (up to 10; up to 20)
- Recognize that 5 + 2 is the same as 2 + 5
- Be able to write an addition number sentence when presented with manipulatives
- When carrying, the "tens" are carried rather than the "ones".
- Regroup the numbers by carrying, rather than writing down the whole number for each column added.
- Work from right to left when adding double/triple digits.
- Be able to use the relevant information to interpret addition word problems, and find the number sentence.

1. Assessment of Addition:

   The MILE Math Observation Checklist assesses the following **Addition skills**:

   Understand: adding you get more ☐
   Vertical addition: from Right to Left ☐
   Addition facts: up to 10 ☐
   Addition facts: up to 20 ☐
   Regrouping – carrying ☐
   Word problems ☐
   Place value: 10's ☐
   Place value: 100's ☐
   Place value: 1000's ☐

2. Building and Remediating Addition Skills:

   If the MILE Math Observation Checklist for the student shows a knowledge gap in Addition skills, use the student pages under the categories Addition, Number Line, and Regrouping. When you find addition knowledge gaps you do need to "dig a little deeper" and assess the underlying skills of counting and symbol recognition. If these are also weak, the priority is to firmly establish those skills first.

Work on different levels of addition skills until your assessment shows that the student demonstrates mastery. Check the Math Error Analysis and Remediation Chart in Appendix 2 to find out why the student may make certain addition errors and how to remediate them.

Subtraction

1. As with Addition, the MILE program places great importance on the *understanding* of Subtraction. What happens when you subtract two numbers? The highest number in the equation becomes *lower* or *less*. In order to help the student understand the concepts "lower number" and "less", the MILE program uses a vertical number line as well as manipulatives. When subtracting with a vertical number line it is visually clear to the student that subtracting goes down and adding goes up. Although, eventually it is important to know the addition facts, it is even more important that the student understands subtraction first.

   In order to determine if the student has mastered **Subtraction** he/she needs to demonstrate the following:

   - Understand that when subtracting you get less – the number gets lower.
   - Know subtraction facts (up to 10; up to 20).
   - Be able to write a subtraction number sentence when presented with manipulatives.
   - Be able to subtract from the top down, even if the bottom number is higher than the top number.
   - Regrouping: Recognize when to borrow
   - Correctly rename and use the regrouped numbers
   - Work from right to left when subtracting double/triple digits.
   - Be able to use the relevant information to interpret subtraction word problems and find the number sentence.

2. Assessment of Subtraction:

   The MILE Math Observation Checklist assesses the following **Subtraction skills**:

   Understand: subtracting you get less ☐
   Subtraction facts: to 10 ☐
   Subtraction facts: to 20 ☐
   Regrouping – borrowing ☐
   Vertical subtraction: from top down ☐
   Vertical subtraction: from R to L ☐
   Word problems ☐

3. Building and Remediating Subtraction Skills:

   If the MILE Math Observation Checklist for the student shows a knowledge gap in Subtraction skills, use the student pages under the categories Subtraction, Number Line, and Regrouping. Just like with Addition problems, when you find problems with subtraction you do need to dig a little deeper and assess the underlying skills of counting and symbol recognition. If these are also weak, the priority is to firmly establish those skills first.

   The Math Error Analysis and Remediation Chart in Appendix 2 gives additional information on how to remediate subtraction problems.

Multiplication

1. Before the student can benefit from the rote-memorization of times-tables, he/she needs to have an understanding that Multiplication is nothing more than an efficient way of adding the same number over and over. Many children appear to be afraid of multiplication and shut down when the word is mentioned. Multiplication takes on another meaning once they understand that it is much shorter to say "5 times 8 equals 40" than it is to say "8 + 8 + 8 + 8 + 8 equals 40". Therefore, just as with addition and subtraction, the MILE program emphasizes understanding before rote memory.

   In order to determine if the student has mastered **Multiplication** he/she needs to demonstrate the following:

   - Understand that multiplication is repeated addition.
   - Be able to recognize units in groups, and groups as units
   - Be able to skip count
   - Know multiplication tables.
   - Be able to write multiplication sentences.
   - Know the correct steps (procedure) when doing a vertical, multi-digit multiplication problem.

2. Assessment of Multiplication:

   To give you an indication of the student's level of mastery, the MILE Math Observation Checklist assesses the following **Multiplication skills**:

   Understand: multiplication = repeated addition ☐
   Multiplication tables up to ☐
   Procedure for single digit multiplication ☐
   Procedure for multiple digit multiplication ☐

3. Building and Remediating Multiplication Skills:

   If the MILE Math Observation Checklist for the student shows a knowledge gap in Multiplication skills, use the student pages under the categories Multiplication, Division and Graphs. These categories cover the third grade level and up. However, when you find a multiplication knowledge gap you do need to "dig a little deeper" and assess the underlying skills of skip-counting, symbol recognition, sorting and addition. If these are also weak, the priority is to firmly establish those skills first.

   For information on common errors and additional suggestions to strengthen multiplication skills please refer to the Math Error Analysis and Remediation Chart in Appendix 2.

Division

1. Once the student understands that Division means "dividing things into equal groups" it does not need to be a fearful thing anymore. As with the other math concepts, the MILE program uses manipulatives to help the student "see" division in order to build an understanding.

   In order to determine if the student has mastered **Division** he/she needs to demonstrate the following:

   - Understand that division is "multiplication in reverse".
   - Understand that division is equally sharing units into groups.
   - Understand that a certain number can be split up into groups of a known size.
   - Understand that when everything has been divided equally, there may be a remainder.
   - Be able to write division sentences.
   - Know the correct steps (procedure) when doing a vertical, multi-digit division problem.

2. Assessment of Division:

   To give you an indication of the student's level of mastery, the MILE Math Observation Checklist assesses the following **Division skills**:

   - Understand: Division = multiplication in reverse ☐
   - Divide a number among equal groups ☐
   - Equal groups with remainder ☐
   - Procedure for single digit division ☐
   - Procedure for long division ☐

3. Building and Remediating Division Skills:

   If the MILE Math Observation Checklist for the student shows a knowledge gap in Division skills, use the student pages under the categories Division, Graphs, and Sorting. However, when you find a division knowledge gap you do will need to find out if the student has the underlying skills of symbol recognition, sorting and addition. If these are also weak, the priority is to firmly establish those skills first.

   The Math Error Analysis and Remediation Chart in Appendix 2 gives additional suggestions.

Cognitive Foundation Skills

1. The Instructional Module on Cognitive Foundation Skills discusses the underlying skills a student needs to have before they can successfully do academic work, including math. These foundation skills pertain to how the student takes in information, processes it and then communicates it. Appendix 4 gives an overview of the behaviors to look for when assessing Cognitive Foundation Skills; and Appendix 5 provides suggestions for helping the student to overcome the difficulties.

   In order to determine if the student has mastered **Cognitive Foundation** skills he/she needs to demonstrate the following:

   - Focus on the material and maintain the focus (focused perception).
   - Systematically explore information (systematic exploration).
   - Correct spatial perception (orientation in space).
   - Able to follow instructions with more than 2 steps (2+ pieces of information).
   - Able to take in all available information.
   - Able to determine what needs to be done when presented with an age-appropriate problem (recognize problem).
   - Able to attend to relevant information and ignore parts that are not relevant.
   - Able to think before responding.

2. Assessment of Cognitive Foundation Skills:

   To give you an indication of the student's level of mastery, the MILE Math Observation Checklist assesses the following **Cognitive Foundation skills**:

   Take in Information

   Focused perception ☐
   Systematic Exploration ☐
   Correct orientation in space ☐
   2+ pieces of info ☐
   Take into account all available information ☐

   Process Information

   Recognize problem – spontaneously ☐
   Recognize problem – after being told ☐
   Attend to relevant information ☐

   Communicate Information

   Responds after thinking it through ☐

3. Building and Remediating Cognitive Foundation Skills:

   There are no actual curriculum pages for teaching Cognitive Foundation skills. However, if the MILE Math Observation Checklist for the student shows a knowledge gap in these skills you can work on the weak skills while doing exercises you chose for improving other skills. The Appendix 4: Eight Cognitive Foundation Skills chart on page 73 and the Appendix 5: Suggestions For Remediating Cognitive Foundation Skills on page 74 give suggestions for observing and remediating Cognitive Foundation skills.

Notes and Questions

Section 6: Session Procedures

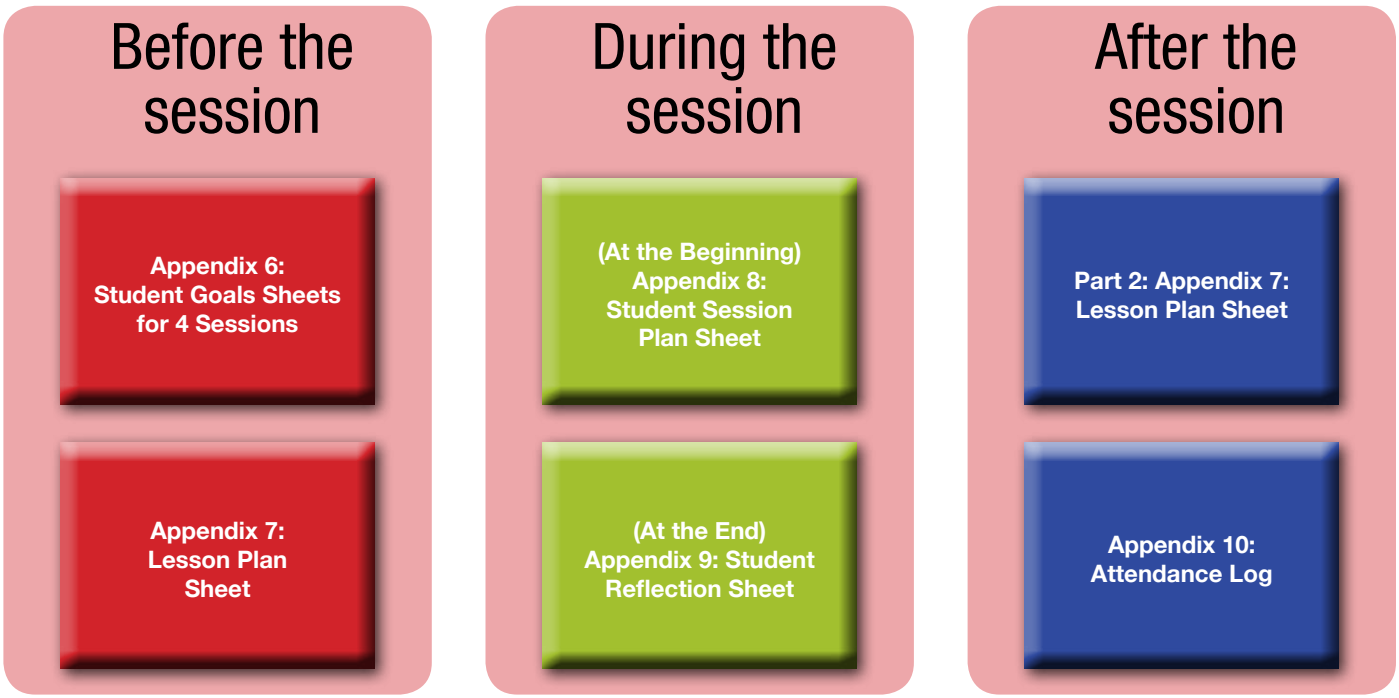
Topics:

- Session Forms
- Structure of the Session

This section will discuss the forms and the structure of a math session.

Session Forms

The session forms are designed to make it easier for the instructor to structure the session and keep on track with the progress of the student. Some of the forms are completed before the session, some together with the child during the session, and some after the session:



It is important for the success of the student that the instructor is well organized and prepared for the math session. Therefore, it is essential that the instructor carefully fills out the forms before, during and after each session.

Before the Session

- Appendix 6: Student Goals Sheets for 4 Sessions
  Before starting a series of sessions with a student, the MILE instructor needs to make a plan for the first 4 sessions. This plan needs to include the goals for the student and the curriculum pages that will help the student work towards the goals. It also should give a description of the materials that are required to do the math tasks. See page 76

- Appendix 7: Lesson Plan Sheet
  Before each session the MILE instructor needs to prepare a lesson plan (see page 77) with specific objectives for the session. The objectives are based on the goals that were set in the 4-session-plan. The MILE instructor needs to prepare all materials and know the lesson of the curriculum page before the session, so that the session can take place without the interruption of having to look for materials or trying to figure out what to do next. It is also important to link the present session to the previous one, so a quick review of the previous session and how the student performed is in order.

During the Session

- Beginning of the session: Appendix 8: Student Session Plan Sheet
  The Student Session Plan Sheet (page 78) is filled out together with the student at the beginning the math session. This is the Focus-and-plan phase. The student and the instructor formulate a plan on how to accomplish the objective that was set for the session. It is important for the student to make a contribution and to have a choice. He or she may contribute, for instance, by selecting the order of activities if more than one is planned. The student also selects from an array of materials to be used during the exercise. The student is encouraged to verbalize the plan, or some portion of it because this will provide a model of how to engage in meta-organizational thinking.

- End of the session: Appendix 9: Student Reflection Sheet
  The Reflect phase is completed at the end of the session. Page 79 contains the form to be used with the student for this task. This form with the stickers, is for the student to keep and serves as a "show-and-tell" during the review session with the caregiver. The Reflect phase ought to include a discussion of the initial goals and an evaluation of what was done in the session. The student should be encouraged to contribute as much as possible during this phase of the process. One way to show the student that "reflecting" is closely related to "planning", is to fill out the reflect sheet together with the planning sheet at the beginning of the session.

It is essential that the Reflect sheet always serves the purpose of Reflecting. It may be tempting to see it as a reward sheet for good behavior because there are stickers involved. This is not the case. It is merely intended to help the student think back on what was done and to encourage making connections and to strengthen working memory.

After the Session

- Part 2 of the Appendix 7: Lesson Plan Sheet
  This part of the lesson plan provides the opportunity to record what went well and what needs to be repeated and can be referred to when preparing the lesson plan for the following session. It is important that this part is filled out immediately after the session when the memory of the session is still fresh. (See page 77).

- Appendix 10: Attendance Log
  Page 80 contains the Appendix 10: Attendance Log sheet that needs to be completed after each session. This is done to document the completion of the necessary sessions that the child needs in order to complete the program.

Structure of the Session

Discuss with the student and the caregiver that each session has a Beginning, a Middle, and an End.

Beginning

The initial 5 or 10 minutes of each session are spent discussing with the student and the caregiver what was done for fun-work (the math "assignment" the caregiver is supposed to work on with the student) during the previous week. The student needs to be encouraged (if necessary through prompting) to describe what he/she did. During the first session this time can be spent on going over the initial goals for the student.

Middle

This is the actual math session. During the first session the F-A-R procedure is discussed with the student (see page 83 for a sample dialog to introduce F-A-R). In subsequent sessions, the F-A-R cards are discussed in the beginning in a shortened version. This sets up the framework for each session and makes it possible for the student to predict what will be happening. Being able to predict what will happen is reassuring for children who cannot make connections and who feel that things just "happen" outside their control.

In addition to using the FAR procedures for the overall session, the steps should also be used as the student attempts to solve each math problem. This is an important aspect of teaching the child to be reflective rather than to respond impulsively. Many children have little or no skills in this area and need considerable practice and support from the instructor as they learn to use this metacognitive strategy.

End

During the last 5 minutes, the caregiver again joins the student and the instructor. The student will tell the caregiver what he/she did during the lesson and the instructor gives the caregiver the activity sheet and goes over the fun work for the coming week.

Notes and Questions

Section 7: Behavioral Regulation and Accessing Support

Topics:

- What is Behavioral Regulation?
- What is Arousal Regulation?
- Controlling the Setting Before the Session
- Helping the Student Regulate Behavior During the Math Session

What is Behavioral Regulation?

Behavioral regulation involves changing behavior to meet the demands of a situation. These demands vary across settings. Children with behavioral regulation problems have difficulties meeting demands. For instance, they may have difficulty sitting still in a classroom, throw frequent temper tantrums, or they may become too excited at the grocery store.

Behavioral regulation includes regulating emotions and behaviors to meet environmental and social expectations.

Regulating behavior is the result of a combination of things. These include prior learning experiences, brain development, and physiology. Problems in any one area may cause behavior regulation problems.

Children with FAS or pFAS are vulnerable to having behavioral regulation problems because of the impact of alcohol on their brain development. These children may also have experienced neglect, physical, and/or sexual abuse or multiple changes in caregivers, which also may be linked to behavioral regulation problems.

What Is Arousal Regulation?

Behavior regulation is directly linked to arousal regulation. Arousal regulation problems may occur if the child is either hyper-aroused (crying or temper-tantrum), under-aroused (drowsy or sleeping), or has difficulty transitioning between arousal levels. In between these two is the calm-alert state.

In order for children to benefit from learning experiences, they must be in a calm-alert state. This means when trying to teach students they must be in the appropriate state of arousal. Failure to make sure students are in a calm-alert state means that they will not benefit from the teaching experience. Therefore, the first step with a child with arousal regulation difficulties is to get him/her to a calm or alert state. Then proceed with teaching.

Controlling the Setting Before the Session

Great effort should be put on preventing behavioral and arousal problems. One way to do this is to be aware of the antecedents. (Antecedents are the surroundings, events and behaviors that come before and may trigger the problem behavior). Many behavioral management programs tend to focus on the behaviors and the consequences rather than the antecedents. Research has shown that controlling the setting in which behaviors occur and working to prevent negative behaviors is a much more effective way of changing behavior.

Antecedents are the surroundings, events and behaviors that come before, and may trigger the problem behavior.

By being positive and upbeat during the instructional session and by having positive expectations about the student, the instructor has a good chance to prevent triggers and subsequent negative behaviors. We will discuss positive supports that can be used to make the instructional session successful.

Helping the Student Regulate Behavior During the Math Session

While working with the student, the instructor should always be on the look-out for signs of frustration and over/under-arousal that may lead toward disregulated behavior. These signs include such things as fidgeting, whining, putting head down, staring into space and refusing to stay in the chair. When these signs appear, some action other than the present activity should be taken in order to break the pattern and distract the child.

If at any time an instructor feels it is not possible to regulate the student's behavior with any of the suggestions below, we suggest involving the caregiver. However, make sure this is never used in a punitive manner. Simply, in a matter of fact kind of way, tell the student that he/she seems upset about something and that mom/dad will be asked to come into to room and help out. If things don't get better, the session may be

terminated. It is in the best interest of both the instructor and the student to ask for assistance. Remember that some students may have behavior issues that are hard to deal with and it does not reflect on the skills of the instructor if additional support is needed. At any time, it is okay to have the caregiver sit in on the session, either for the comfort of the student or the instructor.

Tools and Suggestions for Behavior Regulation

The following are tools and suggestions that can be utilized to regulate the behavior of the student and to help him/her learn to self-regulate. These tools and suggestions rely heavily on setting the right environment to **prevent** negative behavior.

- Focus and plan
  Many children with neurodevelopmental problems have the feeling that things just happen and that they do not have any control. This can be very frustrating and can be a cause of unwanted behavior. The Focus and plan-Act-Reflect model offers an opportunity to get input from the student as to what will be done in the session. The instructor should be very careful about the choices that are offered to the student and should be able to "live with" the choices made. This means that the choices ought to be honest choices and the activity will actually be done the way the student chooses. The responsibility of the instructor is to provide a few choices that are within the parameters of the work-pages. The responsibility of the student is to perform the activity according to the choice they made. The plan may serve as a type of contract: "you chose to do this. Let's do it."

  Keeping the sequence of the math session the same for all sessions is useful because this way the student is able to predict what will happen. This lessens potential frustration.

- Use of a timer
  Young children do not recognize the passage of actual time and older children with neurodevelopmental delays may not have developed this skill yet. Because of that, if an activity is perceived as unpleasant it will seem to the student that it goes on forever and the student may react with unwanted behavior. If, on the other hand, the activity is great fun the student may react with a strong negative emotion when the instructor attempts to terminate it.

  The use of a sand-timer or a time-timer© is useful in this situation. The child can actually "see" the passage of time and can recognize how long the activity will last. If a sand-timer is used, discuss with the student that he/she will be working on an activity and that after a little while they get a break. Show them how the sand-timer works and let them flip it a few times. Then the student is given a choice of how many "flips" of the timer he/she wants to work on an activity before getting a break. Most sand-timers only take two or three minutes so, depending on the attention span of the student the timer needs to be turned anywhere between 1 and 5 times. When you want the student to work for, for instance, 10 minutes

without interruption and you have a two minute sand-timer, you ask them "do you want to flip the sand-timer five or six times". If they choose five, you get what you want, if they choose six, you get a bonus. Make sure you do not give them an open-ended choice by asking, "How many times do you want to flip the sand-timer?" because you may get an answer you don't like.

In order to keep track of the number of times they turned the timer make a diagram with the numbers and a box under that number to put a sticker, a happy face or a check mark. Using an index card and stickers is a great tool because the child can keep the card with the stickers and show the caregiver. Put the student in charge of keeping track of the sand in the timer and whether or not it is time to turn it. Initially this may take up a lot of his/her attention, however after a while in most cases the student becomes so engrossed in the activities that he/she completely forgets to look at the timer. If you have used stickers on a card, just add some stickers to reward them for staying on task.

When it is time for a break, tell them that now it is your turn to choose and again depending on the student, take a two to five minute break. Make sure the break is not too long because you want to keep the focus. Do some stretching and moving around during the break or let the child color or play with some toys, or just chat a little with them. When the break time is over, draw the student's attention to the sand-timer and ask them how many times they want to flip the timer for the next activity (two choices – not open-ended.). A young child or a child with a very short attention span may need several breaks.

If a time-timer© is used, explain that when the red area is gone the time period is up. Give them a choice, for instance 10 or 15 minutes and set the time or have the student set the time.

Some students have a hard time shifting their attention from one activity to another. And some children do not want to stop the session. If the student has trouble shifting between activities or wants to continue after the session is over, use the timers to announce that the end is coming up. You may give them a 5-minute warning and count down the minutes.

- Use of voice
  When the child stops paying attention or "zones out", the voice is a great tool to bring them back. Do not raise your voice, but drop it. In many cases, when you start whispering, the student becomes curious as to what you are saying that they will actually start listening.

A student may also tune out when you speak too fast. Many children with neurodevelopmental problems cannot deal with more than one piece of information at a time. For instance you say:

> *We are going to do some addition today. Let's take these counters and put three red ones on this side and then put two blue ones next to it. How many counters do you have now?*

This may sound to the child like:

> *We are going to do someadditiontodayletstake thesecountersandput3redones onthissideandthenput2blue onesnexttoithow manycountersdoyouhavenow?*

Would you still be listening? Would you be frustrated? When you speak, pace the instructions by allowing a second in between. So, the above instruction should be paced as follows:

> *We are going to do some **addition** …….. let's take **these** counters ……. put **three red** ones on this side …… then put **two blue** ones next to it…… **How many** counters do you have now?*

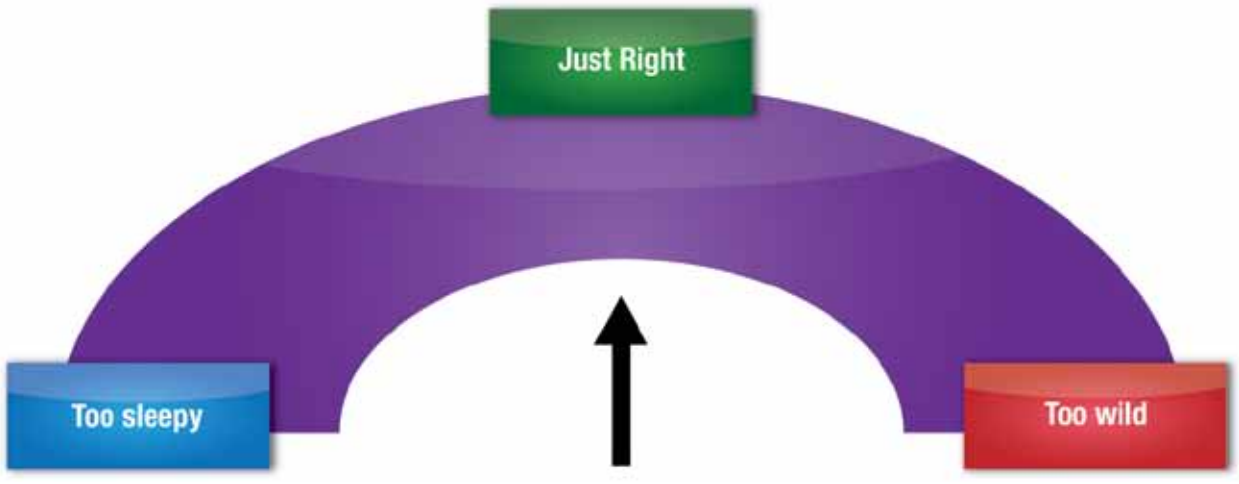
- Use of language
  Many children with neurodevelopmental problems are very literal in their understanding of language. They take the words you say at face-value and cannot detect innuendos or figures of speech that may give the actual words another meaning. If you tell them that it is "raining cats and dogs" they may look out the window to see them. Therefore, make sure your words are simple and straightforward. When you want them to give you an answer, ask a question. When you want them to do something, tell them. For instance, if you want them to write a number sentence, tell them: "write down 2 plus 2" rather than "could you write down 2 plus 2?" The latter is a question to which (in their literal interpretation) they might answer "No". In this case you need to do damage control and you lose some degree of credibility, while they may get frustrated because they gave you an honest answer. Therefore, giving instructions needs to be done with friendly, matter of fact statements – no questions, no choice. However, to avoid power-struggles, don't start an instruction with the words "I want you to …."

- Use of facial expression
  Often, unwanted behavior is a pattern they enter automatically and the environment responds in an equally automatic manner. When you respond in a way that is unexpected to the child, it may actually "crack the pattern" and give you an opening to redirect the focus. Noticing the early beginnings of a tantrum requires a high amount of alertness and vigilance from the instructor, but it is certainly worth the investment. If you notice the beginnings of something, you may express your "surprise" by facial expression. A big "what-are-you-doing-face" may be such an unexpected reaction that for a moment they forget they were working towards a tantrum. If you grab that moment and present them with a distraction of some kind, you may be able to redirect them.

Negative behavior is often a way of attracting attention. The more matter of fact you can be about it and the more you can ignore it, the less "fun" it is to act in a negative way.

- Ignore behavior
  Some behavior can be ignored. For instance, if you would rather have the student sit in a chair while working, but they would rather stand next to the table, this would be a behavior that could be ignored as long as they attend to the lesson. A rule of thumb is that behavior that does not interfere with the lesson or is not harmful to you, the student him/herself, or the property, can be ignored. If attention-seeking behavior takes place you may, in a very matter of fact voice, point out to the student what they are doing and then proceed with the lesson.

- The Energy Meter
  Children with arousal problems are often not aware of their own levels of arousal. Sometimes simply pointing out to them that they are over or under-aroused can help them regulate and come to the calm-alert state where learning can take place. A simple tool to use for this purpose is the "energy meter". You can make this by cutting a semi-circle out of cardboard and attaching an arrow to it with a butterfly pin. When the student gets too aroused you simply push the arrow to the area of "too wild" and indicate that the students needs to make the arrow go back to the middle.



- Use of praise

  Children with neurodevelopmental problems may have experienced many failures in their academic career. It is therefore very important to praise them a lot. Although sometimes it takes a little bit of looking for it, there is always something that can be praised. With an academically low functioning child or a very behaviorally challenged one, look for approximations of the correct behavior and praise it. Note that praise should always be honest and should always describe the behavior, not the child. For instance, a child who cannot write the number two, but manages to make a little curve, you can praise by saying: "wow, look at this little round curve you made. It is starting to look exactly like a two". Or, the child who cannot sit still for more than three minutes: after a few minutes say: "You stayed in the chair all the time while the sand-timer was running. Way to go." Do not praise by saying "good boy/girl".

Notes and Questions

Appendices

MILE Math Observation Checklist

Name: _____ Age: _____ Date _____Session # _____

Ø = absent ⌀= emerging ☑ = present N/A = not applicable

Size

Big ☐	Bigger ☐	Biggest ☐
Small ☐	Smaller ☐	Smallest ☐
Large ☐	Larger ☐	Largest ☐
Little ☐	Medium ☐	

Shape

Square ☐	Triangle ☐	Circle ☐
Rectangle ☐	Diamond Ø	Oval Ø
+ ☐	X ☐	Star ☐

Quantity

Many ☐	Lots ☐	Few ☐
More ☐	Less ☐	Most ☐
Some ☐	All ☐	None ☐
Same as ☐	Equal ☐	

Patterns – Sorting – Categorizing

A – B ☐	Sorting ☐
A – A – B ☐	Categorizing ☐
A – B – C ☐	Ordering ☐
A – B – C – D ☐	

Counting

- Rote counting from __to __ ☐
- Correct names of numbers ☐
- Correct order of numbers ☐
- Transition to next decade (19-20, 29-30 etc.) ☐
- Ordinality (1st, 2nd, 3rd) ☐
- One-to-one correspondence ☐
- from __to __ Cardinality ☐
- Conservation ☐
- Counting subsets in large set ☐
- Skip counting by: 2 ☐ 5 ☐ 10 ☐
- Subitizing: 3 ☐ 4 ☐ 5 ☐ 6 ☐

Sequencing/Planning

- First – next – last ☐
- Beginning – middle – end ☐
- Before – after ☐
- Yesterday – today – tomorrow ☐

Number Writing

- Write numbers from 1 to 10 ☐
- Write numbers from __to __ ☐

Position

Up ☐	Down ☐	Above ☐
Under ☐	Below ☐	Between ☐
Next to ☐	Beneath ☐	In front of ☐
Behind ☐	Beside ☐	Near ☐
Far ☐	Beginning ☐	Middle ☐
End ☐	Right ☐	Left ☐

Symbolic Understanding

- + means: “to put together” (plus) ☐
- – means: “to take away” (minus) ☐
- = means: “same as” (equals) ☐
- x means: “counting by equal groups” (times) ☐
- ./. means: “separate in equal groups”(divide) ☐
- Recognize number vs. letter ☐
- Recognize number shapes 1 to 10 ☐
- Recognize numbers shapes 1 to 100 ☐
- Recognize number shapes > 100 ☐

MILE Math Observation Checklist • page 2

Name: _____ Age: _____ Date _____ Session # _____

Ø = absent ⊘= emerging ☑ = present N/A = not applicable

Addition

- Understand: adding you get more ☐
- Vertical addition: from Right to Left ☐
- Addition facts: up to 10 ☐
- Addition facts: up to 20 ☐
- Regrouping – carrying ☐
- Word problems ☐
- Place value: 10's ☐
- Place value: 100's ☐
- Place value: 1000's ☐

Subtraction

- Understand: subtracting you get less ☐
- Subtraction facts: to 10 ☐
- Subtraction facts: to 20 ☐
- Regrouping – borrowing ☐
- Vertical subtraction: from top down ☐
- Vertical subtraction: from R. to L ☐
- Word problems ☐

Multiplication

- Understand: multiplication= repeated addition ☐
- Multiplication tables up to ☐
- Procedure for single digit multiplication ☐
- Procedure for multiple digit multiplication ☐

Division

- Understand: Division = multiplication. in reverse ☐
- Divide a number among equal groups ☐
- Equal groups with remainder ☐
- Procedure for single digit division ☐
- Procedure for long division ☐

Cognitive Foundation Skills

Take in Information

- Focused perception ☐
- Systematic Exploration ☐
- Correct orientation in space ☐
- 2+ pieces of information ☐
- Take into account all available information ☐

Processing Information

- Recognize problem - spontaneously ☐
- Recognize problem - after being told ☐
- Attend to relevant information ☐

Communicate Information

- Responds after thinking it through ☐

Appendix 2: Error Analysis and Suggestions for Remediation

Required Knowledge and Skill	Math Domain/ Category	Potential Errors	What Errors May Mean	How to Teach/ Remediate the Skill
Recognize number symbols as distinct from letter symbols.	Counting	• Cannot point at appropriate symbol when asked to indicate which is "a number" and which is "a letter."	• May not have been learned yet because child is too young. • Child has not had sufficient exposure. • Child does not make the connection between sounds of letters and number symbols.	• Watch shows such as Sesame Street. • Read early number books • Pick a number and spend all day looking around in the environment to find it. • Expose child to numbers as much as possible verbally cueing the child that "this is a number."
Know the names of the numbers (able to rote recite).	Counting	• Is not able to count to 10	• May not have been learned yet because child is too young. • Child has not had sufficient exposure. • Memory difficulties	• Same as above • Sing counting songs • Count everything: steps taken, cars, cheerios on plate

Appendix 2: Error Analysis and Suggestions for Remediation Cont.d

Required Knowledge and Skill	Math Domain/ Category	Potential Errors	What Errors May Mean	How to Teach/ Remediate the Skill
Know names for 11, 12, and 13	Counting	• Child may call it "two-teen, three-teen". • May reverse the numbers when writing them.	• May not have been learned yet because child is too young. • Child has not had sufficient exposure. • Child is very literal and cannot shift to more abstract terminology. • Difficulty with spatial orientation.	• Teach the proper names while acknowledging they are different from all the other numbers. • Use manipulatives to put the numbers in the correct order.
Know the correct name for 0 (zero)	Counting	• Does not know the name for zero. • Confused the zero with the letter O.	• May not have been learned yet. • Child has not had sufficient exposure. • No understanding of the concept.	• Teach the proper name while acknowledging that it is funny that "nothing" has its own number name.
Use the number names in a stable order.	Counting	• Uses number word in random and inconsistent order.	• May not have been learned yet because child is too young. • Does not understand the concept of number and quantity.	• Read early number books • Watch shows such as Sesame Street. • Sing counting songs • Count everything: steps taken, cars, cheerios on plate

Appendix 2: Error Analysis and Suggestions for Remediation Cont.d

Required Knowledge and Skill	Math Domain/ Category	Potential Errors	What Errors May Mean	How to Teach/ Remediate the Skill
Use only one name for each object (one-to-one correspondence).	Counting	• When child counts, for instance, 5 objects, he/she may end up counting 4 or 6 or 7.	• May not have been learned yet because child is too young. • Does not understand the concept of quantity. • Does not link the number words with objects counted (still at the rote-counting stage).	• Count everything: steps taken, cars, cheerios , showing the child that each object gets its own number. • Use movement: point with finger; jump to things counted; pick up each thing that is counted.
Use the last number spoken to describe how many items there are (cardinality).	Counting	• When child has counted something and is asked “how many are there”, he/she has to recount rather than repeating the last number spoken.	• May not have been learned yet because child is too young. • Does not understand the concept of number and quantity.	• Explain that counting again is “too much work”. Then practice cardinality by making a big show out of naming the last number (Gestures – tone of voice – mouthing the correct number so child can then say it)
Be able to count different objects within a larger group of objects. (for example count the bunnies in a group of bunnies and baskets)	Counting	• Child may consistently count all the objects.	• Not able to recognize the different objects in the mass of objects. • Does not understand the instructions.	• Sort out the different objects. Talk about them, count them, and then mix them up again and count. • Model the behavior and explain what you are doing.

Appendix 2: Error Analysis and Suggestions for Remediation Cont.d

Required Knowledge and Skill	Math Domain/ Category	Potential Errors	What Errors May Mean	How to Teach/ Remediate the Skill
Recognize that 10 items stays 10 items, no matter at which item you start counting them or how far you spread them out. (conservation)	Counting	• When counting starts at a place different from "the beginning" child only counts the remainder of the objects. • When items are spread out further, child may interpret this as "more".	• Does not take all the information into account. • Does not understand the instructions • Has not developed conservation yet. • May not have developed cardinality.	• Make sure child understands cardinality, otherwise teach (see above) • Model the behavior, using objects that can be handled. • Explain the "logic" that when nothing is added or taken away things remain the same
Know the appropriate name for, e.g. 62 (sixty two – read from left to right) and 16 (sixteen – read from right to left)	Counting	• This is an inconsistency in math and a very literal (FAS) child may have difficulty with this. • The error will most likely come out in written work. Numbers may be reversed: 16 written as 61, 56 written as 65.	• Not developed rote-counting. • Inability to shift. • Memory problems. • Inability to make a mental representation of the number.	• Make sure the teen-numbers are solid, both in understanding and in the ability to write them, before going on to the higher numbers. Repeat often. • Practice counting and writing/ creating the number with as many different media as possible – for instance markers – colored pencils – computer - clay – sand.

Appendix 2: Error Analysis and Suggestions for Remediation Cont.d

Required Knowledge and Skill	Math Domain/ Category	Potential Errors	What Errors May Mean	How to Teach/ Remediate the Skill
Be able to order items as first, second, third, etc. (ordinality). Child needs to be able to recognize that "number one" is the same as "first".	Counting	• Does not know the order-names. • Does not understand the concept of order.	• Too young. • Lack of understanding. • Cannot learn the concept without specific teaching.	• Teach planning skill (plan-do-review; beginning-middle-end; first-next-last) • Specifically teach the names with manipulatives • Use the words as much as possible as you speak to the child.
Skip count by two's	Counting	• When counting by two's, whispers the number in between.	• Does not understand the "shortcut".	• With manipulatives show counting by two's while practicing memorization. • Use manipulatives to practice memorizing.
Recognize sets of 5 – skip count by fives	Counting	• Cannot count by fives • Cannot divide sets of five up into, for instance 3 + 2 or 4 + 1.	• Does not have intuitive number knowledge. • Does not understand the concept.	• Use manipulatives with different colors to show how to "build" a set of 5 in different ways.
Recognize decades (10, 20, 30, etc.) – skip count by tens	Counting	• May be able to rote-count by tens, but when presented with groups of tens, child will start counting from one for each group.	• May not know the names for the decades. • Inability to shift from counting by ones to counting by groups of 10.	• Practice rote-counting by 10's to establish the names • Use manipulatives to make groups of 10 and practice counting them.

Appendix 2: Error Analysis and Suggestions for Remediation Cont.d

Required Knowledge and Skill	Math Domain/ Category	Potential Errors	What Errors May Mean	How to Teach/ Remediate the Skill
Count by tens when starting at, for instance 36.	Counting	• Counts 36, 37, 38, 39, 40, 50, 60. • Says it cannot be done.	• Does not understand the concept that 10 can be added to any number.	• Use manipulatives to show how the numbers progress
Recognize transitions to next decade (19 – 20, 29 – 30, etc.)	Counting	• May not have been learned yet.	• Too young • Memory problems	• While teaching rote-counting, show with manipulatives how the number transitions into the next decade. • Repeat often.
Subitize (recognize a pattern of dots, as on dice, as representing a number)	Counting	• Counts when presented with a common pattern of dots.	• Does not understand the concept. • Has not learned to take a "shortcut".	• Play matching games with dot-cards and numbers. • Play board-games with dice.
Sort/group items according to a dimension	Counting	• Cannot sort at all • Can only sort according to a very simple dimension, for instance color.	• Does not understand the instructions • Is not flexible enough to recognize more than one dimension. • Cannot shift from one to another.	• Use manipulatives and discuss the different aspects such as shape, color and size. Then pick one aspect and have child sort them.

Appendix 2: Error Analysis and Suggestions for Remediation Cont.d

Required Knowledge and Skill	Math Domain/ Category	Potential Errors	What Errors May Mean	How to Teach/ Remediate the Skill
Patterns	Counting; Patterns; Ordering	• Does not recognize patterns	• Does not understand the concept or instructions. • Does not attend long enough or to relevant cues.	• Play rhythmical games with alternating movements. • Use manipulatives to build patterns while verbally pointing out what is happening.
Be able to write the number symbols.	Number writing	• Cannot write numbers	• Does not know numbers. • Poor motor control.	• Handwriting without tears number program.
Understand that when adding you get more – the number gets higher	Addition	• When adding answers with a lower number.	• Does not understand the concept.	• Use a vertical number line. • Show with manipulatives that when adding you get more.

Appendix 2: Error Analysis and Suggestions for Remediation Cont.d

Required Knowledge and Skill	Math Domain/ Category	Potential Errors	What Errors May Mean	How to Teach/ Remediate the Skill
Be able to utilize a vertical number line: 1. To determine the place of a number relative to others (higher, lower, in between, closer to …. then to …..) 2. When adding a number, start counting at the correct number 3. When adding you go up; when subtracting you go down.	Counting; Addition; Number line	• Cannot recognize/verbalize where a number is as related to other numbers. • For instance: add 2 to the number 3 – starts counting at 3 rather than at 4.	• Does not have a solid understanding of numbers and/or counting. • Has not learned yet what to do	• Play games with the number line, such as having the bunny hop to two different items and determine which is closer. • Use gestures, rhythm and tone of voice to indicate where to start counting.
Know addition facts (up to 10; up to 20)	Addition	• Does not know number facts	• May have trouble with underlying skills, such as counting. • Has not learned the number facts yet.	• Check if child has the underlying skills. • Work on the weak skills using manipulatives. • Practice number facts after you are sure the child understands
Recognize the + (plus) sign and knowing it means adding	Addition	• Cannot distinguish between plus and minus signs.	• Memory issues • Visual spatial issues	• Use gestures to indicate adding, forming a plus sign with the arms or clapping hands together. • Use mnemonics

Appendix 2: Error Analysis and Suggestions for Remediation Cont.d

Required Knowledge and Skill	Math Domain/ Category	Potential Errors	What Errors May Mean	How to Teach/ Remediate the Skill
Be able to write an addition number sentence when presented with manipulatives	Addition	• Cannot write a number sentence.	• Cannot move from the concrete to the more abstract.	• Break up the task by writing down and discussing each element separately. • Use graph paper.
Recognize that in the addition sentences 23 + 4 and 53 + 4, the only thing that is relevant is adding the 3 and the 4	Addition	• Recalculates the whole sum, rather than recognizing that if 23 + 4 = 27, then 53 + 4 must be 57.	• Does not make connections between what is known already and what is new. • Does not recognize how things are related. • May not have a solid understanding of decades yet.	• Specifically point out what is the same and what is different. • Draw attention to the relevant aspects of the problem and discuss the logic.
When carrying –the "tens" are carried rather than the "ones".	Addition; Regrouping	• When the addition is, for instance, 17 the 7 is carried rather than the 1. 19 8 + 81 that is, "write the 1, carry the 7", instead of "write the 7 carry the 1".	• Does not understand the concept of regrouping.	• Use manipulatives to show what happens when a number changes from 9 to 10. • Use manipulatives to show what happens with regrouping.

Appendix 2: Error Analysis and Suggestions for Remediation Cont.d

Required Knowledge and Skill	Math Domain/ Category	Potential Errors	What Errors May Mean	How to Teach/ Remediate the Skill
Regroup the numbers by carrying, rather than writing down the whole number for each column added.	Addition; Regrouping	• 18 16 + 214 that is: 8 + 6 = 14, 1 + 1 = 2	• Does not understand the concept of regrouping • May be working from left to right when adding numbers.	• Use manipulatives to show what happens when a number changes from 9 to 10. • Use manipulatives to show what happens with regrouping.
Work from right to left when adding double/triple digits.	Addition; Regrouping	• Starts at the left and adds the tens column first and then the ones column.	• Does not understand the concept of regrouping. • Has not learned the correct rules for adding multiple digits. • Impulsivity	• Use manipulatives to show what happens with regrouping. • Discuss the logic of starting at the ones column. • Work on inhibiting impulsivity when starting a math problem.
When adding single digits or objects by counting, utilize the "min procedure". That is: start counting at the number that follows the highest number.	Counting; Addition	• When adding, for instance, 5 objects and 2 objects, recounts all, rather than saying "6, 7". • When adding the number sentence 5 + 2, counts on fingers up to five and then two more.	• Does not have solid understanding of cardinality.	• Go back to teaching cardinality. • Use number line.

Appendix 2: Error Analysis and Suggestions for Remediation Cont.d

Required Knowledge and Skill	Math Domain/ Category	Potential Errors	What Errors May Mean	How to Teach/ Remediate the Skill
Recognize that 5 + 2 is the same as 2 + 5 ("commutativity principle"; conservation of constancies).	Addition	• Recalculates each problem as if they are unrelated.	• Does not look at all the information and to make a logical conclusion. • Sees everything as an event in itself without making connections.	• Using manipulatives, discuss "number families". • With manipulatives and big gestures show the logic that when you put something in another place, it still is the same. • Point out what is the same and what is different in the situation and discuss what is more relevant, the sameness or the difference.
Be able to interpret addition word problems to determine the number sentence by using the relevant information.	Addition	• Has no idea what to do when presented with word problems. • Says "cannot add the balls because some are red and some are blue."	• Does not know the clue words that point at the operation. • Cannot determine what is relevant and what is irrelevant to solving the problem.	• Teach the clue words. • Show with manipulatives that different objects can be added, while discussing the relevant and irrelevant dimensions.
Understand that when subtracting you get less – the number get lower.	Subtraction	• When subtracting, answers with a higher number	• Does not understand the concept.	• Use a vertical number line • Show with manipulatives that when subtracting you get less.

Appendix 2: Error Analysis and Suggestions for Remediation Cont.d

Required Knowledge and Skill	Math Domain/ Category	Potential Errors	What Errors May Mean	How to Teach/ Remediate the Skill
Be able to utilize a vertical number line: 1. When subtracting a number, start counting at the correct number 2. When subtracting you go down; when adding you go up.	Counting; Number line; Subtraction	• For instance: subtract 2 from the number 7 – starts counting at 7 rather than at 6.	• Does not have a solid understanding of numbers and/or counting. • Has not learned yet what to do	• Play games with the number line, such as having the bunny hop down the number line. • Use gestures, rhythm and tone of voice to indicate where to start
Know subtraction facts (up to 10; up to 20).	Subtraction	• Does not know number facts.	• May have trouble with underlying skills, such as counting. • Has not learned the number facts yet.	• Determine if child has the underlying skills and understands the subtraction concept, then work on the weak skills first, using manipulatives. • Practice the number facts but only after you are sure child UNDERSTANDS.
Be able to write a subtraction number sentence when presented with manipulatives.	Subtraction	• Cannot write a number sentence.	• Cannot move from the concrete to the more abstract.	• Break up the task by writing down and discussing each element separately. • Use graph paper to write the numbers.

Appendix 2: Error Analysis and Suggestions for Remediation Cont.d

Required Knowledge and Skill	Math Domain/ Category	Potential Errors	What Errors May Mean	How to Teach/ Remediate the Skill
Recognize the – (minus) sign.	Subtraction	• Cannot distinguish between plus and minus signs.	• Memory issues • Visual spatial issues	• Use gestures to indicate adding, forming a minus sign with the arms or hands. • Use mnemonics.
Be able to subtract from the top down, even if the bottom number is higher than the top number.	Subtraction	12 8 – 16 • Subtracts upside-down. • Just seems to make up any number. • Adds.	• Does not understand the subtraction concept. • Does not know the subtraction rules. • Does not understand regrouping.	• Explain that vertical subtraction always “goes down like the rain”. • Work on regrouping with manipulatives to show how borrowing works.
Regrouping 1. Recognize when to borrow. 2. Correctly rename and use the regrouped numbers.	Subtraction; Regrouping	• Subtracts upside-down. • Just seems to make up any number. • Adds.	• Does not understand borrowing. • Does not know the subtraction rules. • Does not understand regrouping.	• Work on regrouping with manipulatives to show how borrowing works.

Appendix 2: Error Analysis and Suggestions for Remediation Cont.d

Required Knowledge and Skill	Math Domain/ Category	Potential Errors	What Errors May Mean	How to Teach/ Remediate the Skill
Work from right to left when subtracting double/triple digits.	Subtraction	• Starts at the left and subtracts the tens column first and then the ones column	• Does not understand the concept of regrouping • Has not learned the correct rules for subtracting multiple digits. • Impulsivity	• Use manipulatives to show what happens with regrouping. • Discuss the logic of starting at the ones column • Work on inhibiting impulsivity when starting a math problem
Recognize that in the problems 5 + 2, 2 + 5, 7 – 5, and 7 – 2, the numbers 2, 5, and 7 form a "family", and be able to write 4 number sentences with any 3 different numbers.	Subtraction; Addition	• Recalculates each problem as if they are unrelated.	• Does not look at all the information and to make a logical conclusion. • Sees everything as an event in itself without making connections.	• Using manipulatives, discuss "number families". • With manipulatives and big gestures show the logic that when you put something in another place, it still is the same. • Point out what is the same and what is different in the situation and discuss what is more relevant, the sameness or the difference. • Show with manipulatives that adding and subtracting are different sides of the same coin.

Appendix 2: Error Analysis and Suggestions for Remediation Cont.d

Required Knowledge and Skill	Math Domain/ Category	Potential Errors	What Errors May Mean	How to Teach/ Remediate the Skill
Be able to interpret subtraction word problems to determine the number sentence by using the relevant information.	Subtraction	• Has no idea what to do when presented with word problems. • Says "cannot subtract the balls because some are red and some are blue."	• Does not know the clue words that point at the operation. • Cannot determine what is relevant and what is irrelevant to solving the problem.	• Teach the clue words. • Show with manipulatives that different objects can be subtracted, while discussing the relevant and irrelevant dimensions.
Understand that multiplication is repeated addition.	Multiplication	• Can add 3 + 3 + 3, but cannot do 3 x 3. • 3 x 3 = 6 • Adds instead of multiplies.	• Considers multiplication as totally separate from other operations. • Is fearful of multiplication.	• Use manipulatives to build arrays and explain and discuss that the objects can be added or that a "shortcut" can be taken.
Be able to recognize units in groups, and groups as units	Multiplication	• Cannot sort objects into groups and then consider the group as a unit in itself.	• Does not understand sorting and grouping.	• Use manipulatives to sort and group. Then count the objects in each group and discuss that there are X groups each with Y objects. How can you know how many objects in total?
Be able to skip count	Counting Multiplication	• When counting by two's, whispers the number in between. • Cannot skip count by 5's or 10's.	• Does not understand the "shortcut".	• With manipulatives show counting by two's while practicing memorization. • Use manipulatives to practice memorizing.

Appendix 2: Error Analysis and Suggestions for Remediation Cont.d

Required Knowledge and Skill	Math Domain/ Category	Potential Errors	What Errors May Mean	How to Teach/ Remediate the Skill
Know multiplication tables.	Multiplication	• Cannot recite the multiplication tables	• Not learned yet. • Cannot skip count. • Cannot transfer skip counting to tables.	• If you are satisfied that child understands multiplication, flash cards can be used to practice multiplication facts. • Use songs/music to practice tables. • Explain how skip counting is related to tables.
Be able to write multiplication sentences.	Multiplication	• Cannot write a proper multiplication sentence.	• Does not recognize the x-sign. • Does not understand multiplication. • Has not learned how to do it yet.	• Review the operation signs (+, -, x) and discuss their use. • Review multiplication-understanding and go back to the areas where the child has difficulty.
Understand that division is “multiplication in reverse”	Division	• Adds or subtracts	• Fear of division. • Does not understand the concept.	• With manipulatives, go back to sorting and sharing items. Discuss what child is doing and show the division sentences as well as the multiplication sentences that follow from it.

Appendix 2: Error Analysis and Suggestions for Remediation Cont.d

Required Knowledge and Skill	Math Domain/ Category	Potential Errors	What Errors May Mean	How to Teach/ Remediate the Skill
Understand that division is equally sharing units into groups.	Division	• Cannot do it.	• Does not understand the concept.	• With manipulatives, go back to sorting and sharing items. Discuss what child is doing and show the division sentences as well as the multiplication sentences that follow from it.
Understand that a certain number can be split up into groups of a known size.	Division	• Cannot do it.	• Does not understand the concept.	• With manipulatives, go back to sorting and sharing items. Discuss what child is doing and show the division sentences as well as the multiplication sentences that follow from it.
Understand that when everything has been divided equally, there may be a remainder.	Division	• Gets confused when there is a remainder. • Tries to squeeze in the extra items in the other groups.	• Does not understand the concept.	• With manipulatives, go back to sorting and sharing items. Discuss what child is doing and point out and explain the “leftovers”.
Be able to write division sentences.	Division	• Writes addition or subtraction sentences.	• Does not understand the concept. • Not learned yet.	• With manipulatives, go back to sorting and sharing items. Discuss what child is doing and show the division sentences as well as the multiplication sentences that follow from it.

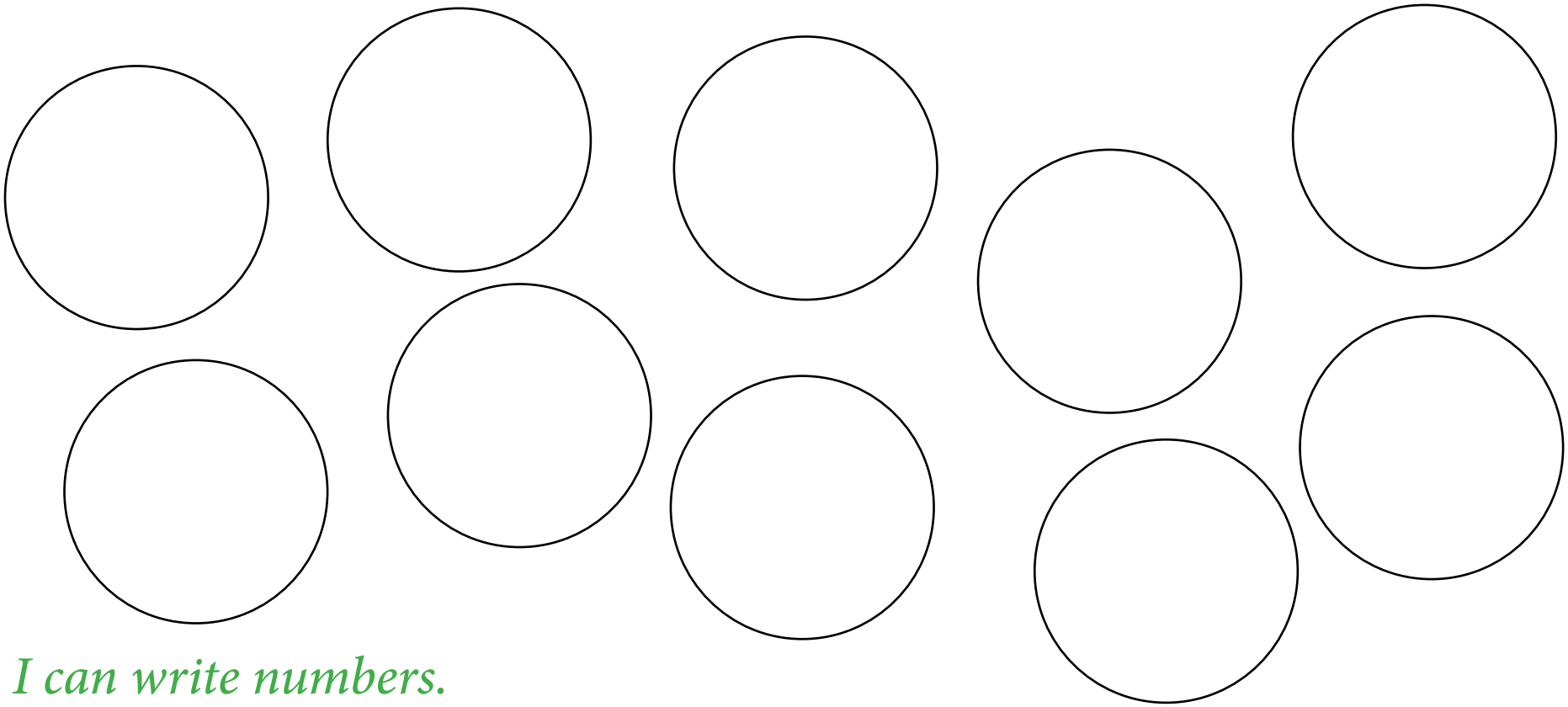
Appendix 2: Error Analysis and Suggestions for Remediation Cont.d

Required Knowledge and Skill	Math Domain/ Category	Potential Errors	What Errors May Mean	How to Teach/ Remediate the Skill
Know the correct steps when doing a vertical, multi-digit division problem.	Division	• Starts calculating from the right.	• Does not know the correct rules of division. • Does not understand the concept.	• Discuss that the long division rule is different from adding and subtracting and that it is the only one that starts on the left.

Appendix 3: Write Numbers Assessment Sheet

Student Name: _____ Age: ____ Instructor: _____ Date _____ Session # _____

☺☺ *I can write numbers.*



I can write numbers.

Appendix 4: Eight Cognitive Foundation Skills

Strong – Deficient – Observable Behavior

Strong Cognitive Foundation Skill	Deficient Cognitive Foundation Skill	Behavior To Look For When Assessing The Cognitive Foundation Skill
1. Focused perception	Sweeping perception	• Quick, fleeting glances at stimuli then looks away.
2. Systematic exploration, moving from left to right and from top to bottom	Impulsive exploration	• Eyes roam all over the page rather than systematically moving from left to right and from top to bottom. • Items are marked in an unsystematic manner, jumping all over the page • Short attention span
3. Correct orientation in space	Poor orientation in space	• When matching shapes points at shape in a reverse orientation • Poor use of space on paper when drawing • Reverses letters and/or numbers
4. Can follow complete instructions with multiple components	Cannot take more than 2 pieces of information into account	• Only responds to one part of instructions or stimulus • Perseverates on one item • Responds with negative affect to “busy pages”
5. All the available infor mation is taken into ac- count when solving a problem	Incomplete data gathering	• Utilizes or attends to only parts of instructions or stimuli • Ignores parts of the whole that are needed to solve the problem
6. Can recognize what needs to be done when presented with a problem	Unable to recognize problem	• Needs explicit instructions and explanations • Appears to understand but behavior has nothing to do with task • Does not know what to do even after instructions are given
7. Can recognize what is the relevant information needed to solve a problem	Does not attend to relevant information	• Cannot distinguish between relevant and irrelevant information • Looks at everything as if it is important • Reacts to unimportant stimuli
8. Can reflect and think before responding	Impulsivity	• Interrupts • Starts before complete instructions are given • “Does first, thinks later”

Appendix 5: Suggestions For Remediating Cognitive Foundation Skills

Cognitive Foundation Skill	Suggestions For Remediation
Focused perception ***vs***. Sweeping perception	• Redirect through verbal focusing. • Follow the text with your finger when you read it to child. • Have child follow your finger with his/her finger. • Have child follow the text with his/her finger. • Visually cue child where to look by pointing. • Give verbal cues: Look here"; Listen carefully now"; • "This is important".
Systematic exploration, ***vs.*** Impulsive exploration	• Use picture books such as "Where is Waldo" or "I spy". Cover up a large part of the page and have child start searching at the top with his/her finger following the rows from left to right. • Follow the text with your finger when you read it to child. • Have child follow your finger with his/her finger. • Have child follow the text with his/her finger. • Visually cue child where to look by pointing. • Give verbal cues: "Look here"; "Listen carefully now"; "This is important".
Correct orientation in space ***vs.*** Poor orientation in space	• Encourage child to accurately describe objects in his/her environment. This will benefit spatial perception. • Teach the concepts of right and left. One way to do this is to give child's right or left hand a little squeeze every time you say the word "right" or "left" Make sure you give the tactile stimulus on only one side and do it consistently. • Use the words "right" or "left" every time child has to make a turn in that direction.
Can follow complete instructions with multiple Components ***vs.*** Cannot take more than 2 pieces of information into account	• Break down instructions into smaller parts. • Check with child to make sure he/she understands what is required. • Teach him/her how to break down larger chunks of information into smaller parts. • Speak slowly and clearly and occasionally pause very briefly when giving instructions. This will give the child time to process what he/she hears. • Have child repeat the instructions rather indicate with head nodding that he/she understands what is required.
All the available information is taken into account when solving a problem ***vs***. Incomplete data gathering	• Ask child "What do you see in this picture?" then help him/her to look and talk about all the objects in the picture.

Suggestions For Remediating Cognitive Foundation Skills

Cognitive Foundation Skill	Suggestions For Remediation

Incomplete data gathering	• Help child focus and understand what the task is about by pointing (visual cue) at the appropriate information.
	• Refocus child with questions such as:
	  • "What else do you see"
	  • "Look here, what is that?"
	  • "I also see a bunny, can you find it?"
	  • "Let's check to see if we really saw everything."

Can recognize what needs to be done when presented with a problem vs.Unable to recognize problem	• Ask questions such as: "What do you think we need to do here?"; "How shall we go about doing that?"
	• Teach the student what to look for when a problem is presented by consistently having him/her answer the questions:
	  • "What do I need to do here?"
	  • "What information do I need to be able to do it?"
	  • "Where in this problem can I find the information?"
	• Teach the student "self-talk" in order to make the self-questioning an automatic process.

Can recognize what is the relevant information needed to solve a problem vs. Does not attend to relevant information	• Visually cue where to look by pointing at the appropriate information. • Have student start tasks with the question: "What do I need to do here?" • When doing a task, focus him/her attention by pointing and short verbal instructions such as: "Look here", "This is the same as …." "Look, here is the bunny," "This is a story about a cat. Can you find the cat in the picture?" • Make sure student attends and follows your instructions by having eye contact when you explain something to him/her. • Use a high-lighter to mark certain letters, numbers or words you want to attend to. • Present smaller chunks of a task and cover up part of the page.
Can reflect and think before responding vs. Impulsivity	• Teach student to think before responding. Have him/her take a deep breath and focus on the answer. • Model this behavior a few times and teach him/her a little "mantra" such as "Just a minute, let me think". • Play games like "Simon Says", "Red Light-Green Light" and "Statue" to regulate impulsive behavior. • Utilize the "brain-chart" to discuss "impulsive mouth and hands".

Appendix 6: Student Goals Sheets for 4 Sessions

Sessions 1-4 ☐ Sessions 5-8 ☐ Sessions 9-12 ☐ Sessions 13-15 ☐

Student: _____MILE Instructor: _____Date: _____

At the end of the 4th 8th 12th 15th session (circle one) student will be able to:

1. _____
2. _____
3. _____

Curriculum pages and materials to be used:

Session #	Curriculum page(s)	Materials

At the end of 4 sessions the following goals were…

- Reached: _____ (Need to be occasionally reviewed for permanence).
- *Not* reached: _____ (Need to be carried over into the next period of 4 sessions).

Appendix 7: Lesson Plan Sheet

Session #: _____

Student: _____MILE Instructor: _____Date: _____

Math Objectives for the Lesson:

1. _____ Reached: Yes No (circle one)
2. _____ Reached: Yes No
3. _____ Reached: Yes No
4.

Targeted Skills for the Lesson:

(For instance, a cognitive foundation skill or a behavior skill)

5. _____ Reached: Yes No (circle one)
6. _____ Reached: Yes No
7. _____ Reached: Yes No

Note: *Objectives and skills not reached need to be revisited in the next session using curriculum pages in the same categories*

Curriculum Page	Materials to be Prepared

Link This Lesson with Previous Session:

What was the lesson?_____

What needs to be repeated?_____

PART 2 After the Session:

Comments on session (what worked well – what did not work well – what to pay attention to next session): _____

_____

What needs to be carried over into the next session:_____

_____

_____

Appendix 8: Student Session Plan Sheet Session #: _____

Student: _____ MILE Instructor: _____Date: _____

Our Plan for Today

A: ACTIVITY (Instructor-determined):_____

B: STEPS (student-determined): _____

- **First** we will_____and use _____
- **Next** we will _____and use _____
- If we have time left we will _____and use_____
- **Then** we will **review** what we did and learned.

Note
MILE Instructor will fill out the following prior to session, based on goals set for the cognitive foundation skills as they apply to the math goals. For instance, "listen and look first" or "work systematically" or "think before I start". The student will answer the questions "why" and "how."

What do I need to do today?

7. _____

Why? _____

How do I do that?_____

8. _____

Why? _____

How do I do that? _____

9. _____

Why?_____

How do I do that?_____

Appendix 9: Student Reflection Sheet

GREAT JOB. _____

Date _____

☐ Did I _____?

☐ Did I _____?

☐ Did I _____?

☐ Did I _____?





Appendix 10: Attendance Log

Student: _____MILE Instructor: _____

Session #	Date	Time	Worksheet(s)	Comments
1				
2				
3				
4				
5				
6				
7				

Appendix 10: Attendance Log *Cont.d*

Student: _____MILE Instructor: _____

Session #	Date	Time	Worksheet(s)	Comments
8				
9				
10				
11				
12				
13				
14				
15				

Appendix 11: Phone Contacts

Date and Time	
Caller	
Person Called	
Spoke to	☐ Direct ☐ Machine (left message) ☐ Indirect (left message with other person)
Concerning	☐ Scheduling ☐ Behavior concerns ☐ Other
Conversation/Result	

Appendix 12: Sample Dialog to Introduce FAR to the Student

Notes
• This is an example and NOT a script. Do not try to learn this by heart or read from it in front of your student. • For younger students, adapt the language and read the cards for them, but make sure you go over the steps. With the very young ones, you may have to break up the discussion of the 3 elements and discuss each one when it actually will happen rather than at the beginning.

Instructor:	*Hi xxxxxxx, how are you? I am so glad you are here. We will be doing some work (fun stuff) together. (you can do some small-talk here to break the ice and to make the student feel comfortable with you). Let's get going.*
Student:	OK
Instructor:	*First I want to talk to you about how we will be setting up our time together. See this picture? Can you read what this says?*
Student:	Focus and plan?
Instructor:	*Very good. So the first thing we will do is Focus and plan. Right on. Now, what does "Focus" mean?*
Student:	I don't know.
Instructor:	*Well, let's figure it out. What are these, and what do you need to do with them? (Instructor points at the picture of the eyes).*
Student:	Eyes. You have to look carefully.
Instructor:	*All right. Show me how you look carefully at something.*
Student:	(looks at something).

Appendix 12: Sample Dialog to Introduce FAR to the Student *Cont.d*

Instructor:	*Exactly. You are looking at that pen very carefully. Now what are these and what do you do with them?*
Student:	Ears and you listen.
Instructor:	*Yep. When do you listen?*
Student:	When someone talks.
Instructor:	*So, when I talk you listen, and when you talk I listen. How is that?*
Student:	Yes.
Instructor:	*So, when you use your eyes and look at things carefully, and use your ears to listen carefully, you are doing what? (instructor points to the word "focus").*
Student:	Focus.
Instructor:	*Exactly, you are focusing. So, what does it mean to focus?*
Student:	Look carefully and listen.
Instructor:	*You got it. Now, what else does it say on here?*
Student:	And plan.
Instructor:	*Yes, what do you think that means?*
Student:	I don't know.
Instructor:	*OK, let's figure this one out too. You did so well figuring out what focus meant. Let's see what Plan means. Have you ever made a plan?*
Student:	Yes, for my birthday party.
Instructor:	*Wow, I bet that was fun to do. So you know what to do when you make a plan. You kind of figure out what you need to do. Right? Did you figure what you were going to do for your birthday?*

Appendix 12: Sample Dialog to Introduce FAR to the Student *Cont.d*

Student:	Yes.
Instructor:	*Well, we will figure out what we will do here and make our plan. How about that?*
Student:	OK
Instructor:	*So that is what we will do in the beginning when we start working together. Every time. We will focus and make a plan. After we do that we will do an activity (instructor pulls out the next card - Act). What does this say?*
Student::	Act. Do fun stuff and learn.
Instructor:	*What does that mean?*
Student:	We do things?
Instructor:	*That's it, we do things together and learn. And when we are all done we will ..? (shows the Reflect card)*
Student:	Reflect?
Instructor:	*Yes, we will reflect at the end. Now, Reflect is an awfully big word. What does it mean? (Instructor points at the sentence "what did we do and what did you learn?)*
Student:	(Reads the sentence)
Instructor:	*Very good. At the end we will talk about what we did and what you learned. Let's look at all the cards again what are we going to do at the beginning of our session?*
Student:	Focus and plan.
Instructor:	*Good. How do you do that? (pointing at cards)*
Student:	I look carefully and I listen.
Instructor:	*Why do you think you need to do that?*
Student:	So I can see what to do?

Appendix 12: Sample Dialog to Introduce FAR to the Student *Cont.d*

Instructor:	*You got it. Then what do we do (points at cards).*
Student	We do fun stuff.
Instructor:	*Yes, and last? (points at cards).*
Student:	We talk about what we did.
Instructor:	*Very good. So we will do that every time we work together. So, when I forget, will you remind me?*
Student	OK.
Instructor:	*That's great. Let's make a plan for today. We will be working on_____ What do you think we could use to do that, these _____or these _____? (What color marker? What paper? Paper or magnetic board? And so on.)*
Student	(chooses the materials he/she wants to work with).
Instructor:	*That looks like a good plan. Let's focus . How do you do that again?*

Notes
Start the activity while reiterating Focusing and Planning, and Reflecting during the activity.

Notes and Questions

Notes and Questions

Notes and Questions

Notes and Questions


MILE