Measures & Interventions for Numeracy Development: Computation

Student: _____ Reason for Referral: _____ Grade: ____ Date: _____

Step 1 – Identify the Problem.

Use RIOT procedures to obtain data to identify, define, and validate referral concern.

- R – Complete file review
- I – Conduct teacher interview
- O – Observe the student
- T – Test using Curriculum Based Measurement
    - Basic Facts
        - Addition (0+0 to 9+9)
        - Subtraction (0-0 to 18-9; all single digit answers)
        - Multiplication (0x0 to 9x9)
        - Division (0÷0 to 81÷9; all single digit answers)
    - Operations
        - Addition (3+3 digit no regrouping; 2+1 digit & 3+3 digit w/ regrouping)
        - Subtraction (3-3 digit no regrouping; 2-1 digit & 3-3 digit w/ regrouping)
        - Multiplication (2x1 digit, 3x2 digit, 4x3 digit)
        - Division (3÷1 digit, 3÷1 w/ remainder, 3÷2 digit w/ decimals to hundredths)

Measures & Interventions for Numeracy Development (M.I.N.D.): Computation consists of assessment and intervention resources to build both basic facts and multi-digit operations across +, -, x, & ÷. Basic fact and operations should only be assessed if a student has received instruction or is expected to have learned the target skill. Assessment should start with grade level skills. If the student fails to score in the instructional level (as determined by DC/M scores) then previously taught skills should be assessed to determine the student's development across computation skills. Once these data have been collected the team will review student performance and decide if additional data are necessary to determine the appropriate target skill(s) and decide if the problem is significant enough to warrant Tier2 services.

Parents were contacted (Date & Time): _____ Contacted by:_____

Student Performance Summary Completed (Date): _____ Student Performance Summary Reviewed (Date): _____

Screening Decision:

□ No – Continue with classroom differentiation and weekly progress monitoring.

□ Yes – Collect additional data to analyze problem and determine target skills & instructional level.

***Although computation skills are only one aspect of mathematics nearly all application and/or word problems contain numbers and operations. This being the case skill proficiency (i.e., fluency) in these areas is essential for students to benefit from instruction targeting conceptual understanding and associated skills such as problem solving, critical thinking, and math reasoning. Using CBM procedures with this scope and sequence of computation facts and operations was designed to support teachers to screen and identify students with computation deficiencies and align student performance with empirically-validated interventions to remediate these deficits.

Test Using Curriculum Based Measurement: Overview

Curriculum Based Measurement (CBM) was developed by Deno & Mirkin (1977) and can best be thought of as an assessment that uses a standardized set of administration and scoring procedures with probes that contain foundational grade-level skills for reading, math, and writing. There are a variety of entities that provide these types of materials and related support (e.g., AIMSweb, DIBELS) across various skills. These different providers have assessments that produce data to address four primary purposes. The first is screening. Data from CBM assessments rank order students from lowest to highest and can be used to identify students in need of additional instruction to increase skills. The second is establishing level. Data are obtained to establish the level that the student is performing at. This data point is used to anchor goal lines. The third is progress monitoring. When intervening with a student it is imperative that teachers evaluate student progress, or response to intervention, to validate that the intervention is increasing the student's rate of learning. The fourth (if all students in a school or district are assessed using CBM) is systemic problem solving. This occurs when teachers compile student data and look for patterns across the system. Regardless of the provider and/or purpose, it is essential that educators assessing students using CBM procedures strictly adhere to the administration directions. Examples include reading directions verbatim, observing exact time limits, and using uniform scoring procedures.

The M.I.N.D.:CBM-C packet provides 8 sequenced sets of probes that target basic facts and operations across addition, subtraction, multiplication, & division. CBM-C probes were created in an effort to ensure alignment between assessment and the interventions contained in the M.I.N.D. Computation packet. The following chart and description defines the skills that are represented across the CBM-C probe sets. Basic fact computation probes target each of the four skill areas and contain problems that need to be automatically recalled (i.e., memorized). Multi-Digit computation probes combine facts learned from the basic fact computation worksheets with procedural skills across each of the skill areas and contain a wide range of multi-digit problems. Using CBM procedures with these probes will provide data that can be used to evaluate student proficiency across each of these skills and will isolate deficiencies that need remediated. Patterns in student responding across these probes can be explicitly matched to specific interventions located in the M.I.N.D.: Computation packet.

Probe Set	Skill	Problem Type(s)	Time	Mastery
Basic Fact Computation: These single skill probes consist of basic number combinations.	+	0+0 to 9+9	1 min	40 DC/M
	-	0-0 to 18-9 single digit answers	1 min	40 DC/M
	x	0x0 to 9x9	1 min	40 DC/M
	÷	0÷0 to 81÷9 single digit answers	1 min	40 DC/M
Multi-Digit Computation: These probes target a single skill (e.g., addition) and combine operations with the targeted skill.	+	Mixed Addition	3 min	20 DC/M
	-	Mixed Subtraction	3 min	20 DC/M
	x	Mixed Multiplication	3 min	20 DC/M
	÷	Mixed Division	3 min	20 DC/M

CBM consists of a set of standardized procedures that can be used with the aforementioned skill areas. In order to produce data valid for the purposes of screening and determining level & trend it is imperative that educational professionals using CBM-C are proficient in the administration & scoring procedures for both the Basic Fact Computation & Multi-Digit Computation probe sets (see M.I.N.D.: CBM-C Manual). This is important as recommendations for scoring procedures across entities can vary. Although many scoring approaches focus on fluency scores, we also recommend to collect data on accuracy. This is done in an effort to best match student responding to intervention.

Deno, S. L., & Mirkin, P. (1977). *Data-based program modification: A manual.* Reston, VA: Council for Exceptional Children.

Test Using Curriculum Based Measurement: Procedures

Step 1: Determine which basic fact computation skills have been taught.

Step 2: Using CBM procedures assess all basic fact areas that have been taught & document DC/M scores.

Step 3: Record student performance on basic facts & compare to performance standards.

Basic Fact Computation	□ Addition	□ Subtraction	□ Multiplication	□ Division
DC/M Performance Standards w/ Accuracy > 95%	Frus: 0-20 DC/M Inst: 20-40 DC/M Mast: > 40 DC/M	Frus: 0-20 DC/M Inst: 20-40 DC/M Mast: > 40 DC/M	Frus: 0-20 DC/M Inst: 20-40 DC/M Mast: > 40 DC/M	Frus: 0-20 DC/M Inst: 20-40 DC/M Mast: > 40 DC/M
What is the student's level of behavior?	____ DC/M ____ % Acc	____ DC/M ____ % Acc	____ DC/M ____ % Acc	____ DC/M ____ % Acc
What about behavior is problematic?	□ Accuracy □ Fluency	□ Accuracy □ Fluency	□ Accuracy □ Fluency	□ Accuracy □ Fluency
What is the discrepancy?				

Step 4: Determine which multi-digit computation skills have been taught.

Step 5: Using CBM procedures assess multi-digit skill areas that have been taught & document DC/M scores.

Step 6: Record student performance on multi-digit computation skills & compare to performance standards.

Multi-Digit Computation	□ Addition	□ Subtraction	□ Multiplication	□ Division
DC/M Performance Standards w/ Accuracy > 90%	Frus: 0-15 DC/M Inst: 16-30 DC/M Mast: > 31 DC/M	Frus: 0-10 DC/M Inst: 11-20 DC/M Mast: > 21 DC/M	Frus: 0-15 DC/M Inst: 16-30 DC/M Mast: > 31 DC/M	Frus: 0-10 DC/M Inst: 11-20 DC/M Mast: > 21 DC/M
What is the student's level of behavior?	____ DC/M ____ % Acc	____ DC/M ____ % Acc	____ DC/M ____ % Acc	____ DC/M ____ % Acc
What about behavior is problematic?	□ Accuracy □ Fluency	□ Accuracy □ Fluency	□ Accuracy □ Fluency	□ Accuracy □ Fluency
What is the discrepancy?				

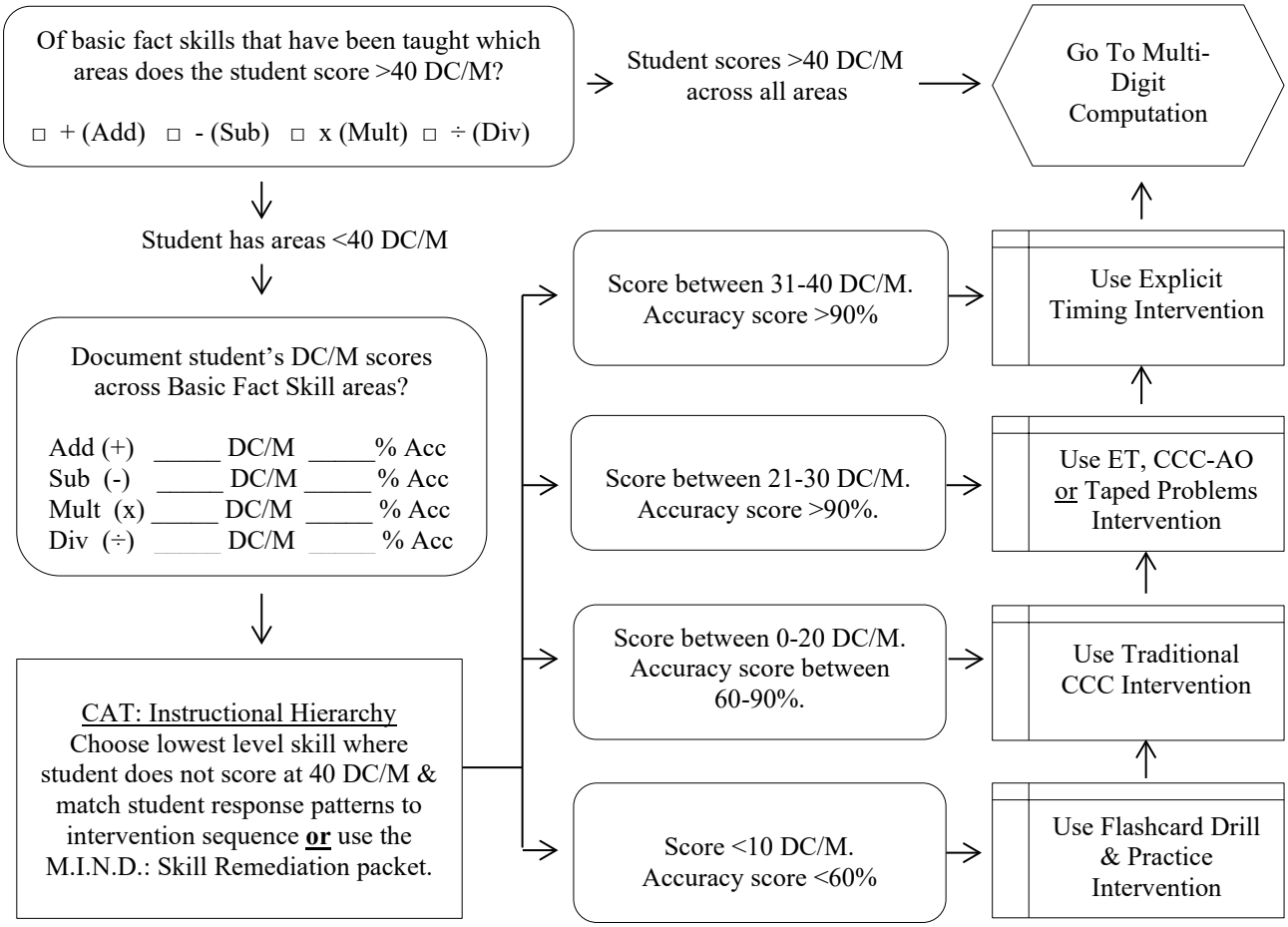
Step 7: Determine whether the student has a problem significant enough to warrant Tier 2 services?

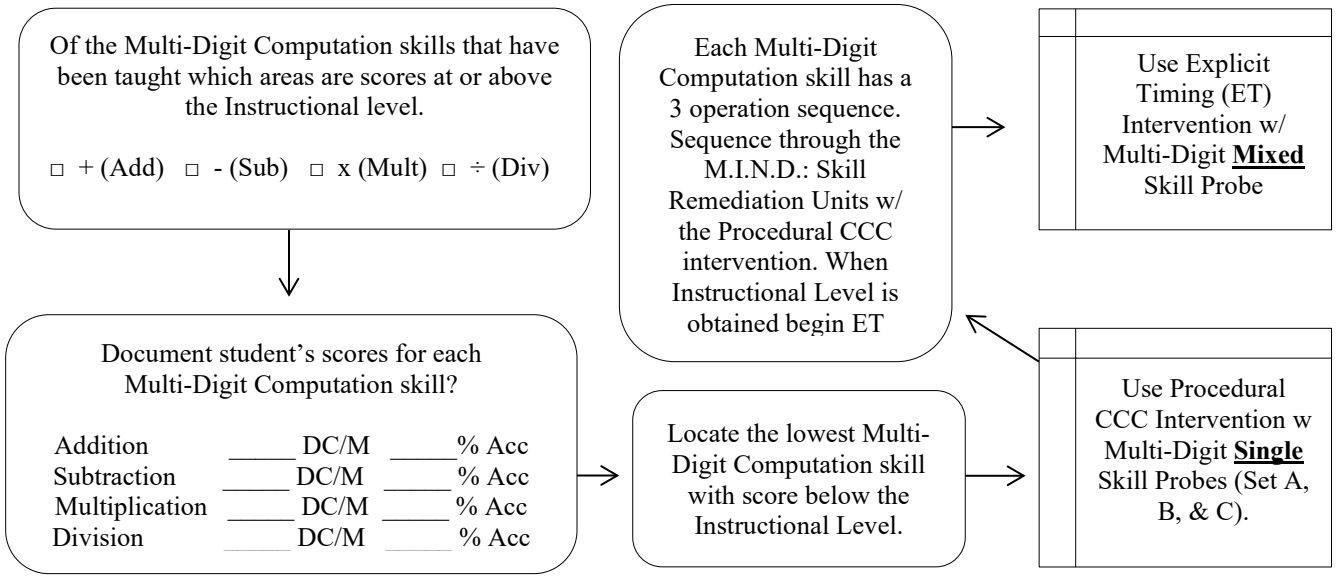
□ No – Continue with classroom differentiation and weekly progress monitoring.

□ Yes – Collect additional data to analyze problem and determine target skills & instructional level.

Step 2 – Analyze the Problem

Task: Follow flowchart to answer relevant questions and identify an appropriate intervention.





Computation Assessment Task: Instructional Hierarchy

The use of empirically-validated interventions is essential to the RTI process; that being said, for an intervention to be effective procedures must be appropriately matched to the needs of the student. An approach that provides recommendations to match patterns in student responding with intervention selection is the Instructional Hierarchy (IH; Haring & Eaton, 1978). The IH is a heuristic that breaks learning into four stages: Acquisition, Fluency, Generalization, & Adaption. This conceptualization supports the notion that learning a skill necessitates fluent responding and the ability of the student to perform the skill across various tasks and contexts (see table below).

<table>
<tr><th>Stage</th><th>Student Response Patterns</th><th>Instructional Components</th><th>Interventions</th></tr>
<tr><td>Adaption: Transferring skills to new problems & new situations.</td><td>Student is taught procedures to identify problem types and systematic approaches to finding solutions</td><td>□ Simulations
□ Problem Solving
□ Reinforcement</td><td>□ Schema Training</td></tr>
<tr><td>Generalization: Combining skills & procedures to increase responding across time & problem types.</td><td>Although student has mastered skills, they have difficulty accurately responding when applying learned skills to altered contexts.</td><td>□ Differentiation Training
□ Discrimination Training
□ Procedural Skills
□ Reinforcement</td><td>□ Procedural CCC
• Operations
• Strategies
□ Explicit Timing:
• Cloze
• Mixed Skill</td></tr>
<tr><td rowspan="2">Fluency: Once a skill is acquired, practice is needed to increase speed of responding. Fluent responding has been shown to benefit generalization across time & skills</td><td>Functional Fluency: Student is developing automaticity across all items. Facts are becoming memorized. CBM scores range from 30-40 DC/M.</td><td rowspan="2">□ Performance Feedback
□ Reinforcement
□ Practice
□ Drill</td><td>□ Explicit Timing</td></tr>
<tr><td>Initial Fluency: Student is slow but accurate. Often strategy dependent. CBM scores range from 20-30 DC/M.</td><td>□ CCC: Answer Only
□ Taped Problems
□ Explicit Timing</td></tr>
<tr><td rowspan="2">Acquisition: First stage of learning, emphasis on promoting accurate responding. Necessitates demonstration or model, a narrow curricular scope (limited items), & high rates of feedback w/ reinforcement</td><td>Functional Acquisition: Accuracy of target item set ranges from 60-100%. CBM scores <20 DC/M.</td><td rowspan="2">□ Performance Feedback
□ Corrective Feedback
□ Prompts & Cues
□ Models
□ Demonstration
□ Reinforcement</td><td>□ CCC: Traditional</td></tr>
<tr><td>Initial Acquisition: Student is first learning a skill. Accuracy of target item set ranges from 0-60%.</td><td>□ Flashcard Drill
□ Folding In Technique
□ Incremental Rehearsal</td></tr>
</table>

To ensure an appropriate student-intervention match use the DC/M and ACC data obtained using CBM-C

Step 1: Begin with Basic Fact Skills and in order (+, -, x, & ÷) compare student DC/M to standard (40 DC/M)

Step 2: Select first skill where student scores <40 DC/M and document DC/M & ACC score

Step 3: Use DC/M & ACC scores and match to appropriate intervention using criteria defined in the IH.

Step 4: Implement & monitor the intervention. When expectations are met progress through the intervention sequence until the student exceeds 40 DC/M using ET intervention.

Step 5: Target Multi-Digit Computation problems for skill (if previously taught). If not, move to next basic fact skill.

Step 3 – Define & Implement Math Intervention

Task: Specify logistics of intervention delivery

Problem:

Goal:

Solution:

Intervention Plan

<table>
<tr><td>Intervention Procedure</td><td>Arrangements
Interventionist:
Time & Location:
Days Per Week: Minutes Per Day/Week:</td></tr>
<tr><td rowspan="2"></td><td>Materials
Math Worksheet(s):
Progress Monitoring Probes:
Progress Monitoring Graph:</td></tr>
<tr><td>Integrity Procedures
Integrity Checklist:
Integrity Observation:
Permanent Products:</td><td>Measurement Procedures</td></tr>
<tr><td></td><td>Decision Making Plan</td></tr>
</table>

Parents were contacted (Date & Time): _____

Follow up Date (i.e., Proceed to Step 4: Evaluate Student Progress/Intervention Effectiveness): _____

Step 4 – Evaluate Student Progress/Intervention Effectiveness

Problem Summary:

Intervention Summary:

Integrity Summary:

Measurement Summary:

Intervention Evaluation

Pre-Intervention Goal:	
Post-Intervention Performance:	
Pre-Intervention (Date: _____) Expected Behavior = _____ DCPM Actual Behavior = _____ DCPM Growth Needed = _____ DCPM Rate Goal = _____ DPW growth	Post Intervention (Date: _____) Expected Behavior = _____ DCPM Actual Behavior = _____ DCPM Growth Needed = _____ DCPM Rate Obtained = _____ DPW growth

Decision

□ Problem Resolved – Reintegrate to Tier 1. Progress monitor to validate acceptable growth.

□ Problem Still Exists – Continue current intervention. Student growth is trending towards problem resolution.

□ Problem Still Exists – Revise/change intervention. Student growth is insufficient to resolve problem. In an effort to increase growth instruction will be intensified (e.g., add frequency, components, target skills).

M.I.N.D.: Computation Interventions

1. Flashcard Drill & Practice: Use with students scoring below 60% ACC. Flashcard D&P uses a small target set (approximately 8 items) and incorporates individualized corrective and/or performance feedback.

2. Cover, Copy, & Compare: Use with students scoring between 60-100% ACC and above 10 DCPM. It is recommended that students use CCC procedures with a limited target set (approximately 12-24 items). Three worksheet sets (Set A, Set B, & Set C) containing 24 problems have been created for each of the three variations of CCC interventions: 1) CCC: Traditional; 2) CCC: Answer Only; & 3) CCC: Fact Triangles

3. Detect-Practice-Repair: Use with students scoring at least 20 DCPM. Students go through a daily four step sequence: 1) A paced pre-assessment is used to identify problems that can't be completed within 2 seconds; 2) Students take the first 5 dysfluent problems and practice them 5 times each using CCC procedures; 3) A 2-min math sprint is completed; & 4) Students graph their DCPM performance.

4. Taped Problems: Use with students scoring at least 20 DCPM. Students work on worksheet with a corresponding audio file that reads the problem, pauses for 1-2 seconds, and provides the answer. The intervention combines visual and audio cues, brisk pacing, and immediate feedback.

5. Explicit Timing: Use with students scoring at least 20 DCPM. Students independently practice a math worksheet to build fact fluency. This antecedent timing procedure is most effective when combined with self-graphing and/or reward. Once students can complete the facts at 40-60 DCPM, they are ready to be taught procedures to complete same operation multi-digit problems. Worksheets are available with both standard and cloze problems.

6. Procedural Cover, Copy, & Compare: This set of guided worksheets was designed for students who can fluently complete basic fact skills (>40 DC/M) but are unable to complete multi-digit computation problems above 20 DC/M. This pattern of responding is indicative of a student who lacks automaticity with the procedural skills needed to complete multi-digit problems. P-CCC is a multi-component intervention that incorporates teacher demonstration, guided practice using visual cues, independent practice, and performance feedback with re-teaching (if needed). This same instructional sequence can be used across all skills.

a. Multi-Digit Addition
   - 3+3 digit no regrouping; 2+1 digit & 3+3 digit w/ regrouping

b. Multi-Digit Subtraction
   - 3-3 digit no regrouping; 2-1 digit & 3-3 digit w/ regrouping.

c. Multi-Digit Multiplication
   - 2x1 digit, 3x2 digit, 4x3 digit.

d. Multi-Digit Division
   - 3÷1 digit, 3÷1 w/ remainder, 3÷2 digit w/ decimals to hundredths.

Flashcard Drill & Practice (D&P)

Target Behavior

Flashcard Drill & Practice (D&P) has been used extensively in educational settings and provides opportunities for students to acquire and practice discrete skills. Examples of such skills include letter naming, letter sound-correspondence, number identification, and sight words. In this intervention, students repeatedly practice target skills (e.g., sight words, letters, numbers) from selected materials several times until accurate responding is reached. Flashcard practice consists of the teacher showing a flashcard, eliciting a response, and providing performance feedback. Daily use of this intervention has been shown to result in increased accuracy. Although on the surface flashcard practice appears to be a simple intervention, student learning rates depend on many factors. A crucial part of a successful flashcard D&P intervention is the use of formative assessment methods to continually adapt and alter aspects of the flashcard practice intervention.

Materials

Target Skill Assessment record form, Intervention record form, flashcards, stopwatch, clipboard, pencil, graph (optional), rewards (optional)

Target Skill Assessment Procedures

1. Define the scope of what skills need to be taught (e.g., numbers 1-20, all uppercase letters, first 100 literacy first sight words). Obtain flashcards that account for the target skill (e.g., use your schools sight word list by grade)

2. Prior to starting the flashcard D&P intervention, assess the student to determine known and unknown items from the targeted set. Items are defined as known when the student can accurately respond within 2 seconds and items are unknown if the student cannot accurately respond within 2 seconds. This will result in two groups of flashcards (known and unknown).

    a. The teacher will use these data to determine what skills the student has and what skills the student needs to acquire. During the target skill assessment, identify unknown items by marking an "X" on a corresponding record sheet containing the items that make up the target skill set.

3. Assess each of the items included in the Target Skill Assessment three times. Assessments should be separated by time, meaning an interval of 30 minutes to a day.

4. After the third Target Skill Assessment, fill in the "Unknown Item Bank" column on the Target Skill Assessment record form. Items marked as unknown at least two out of three days should be marked with an "X." The unknown items in this column will contain the items that need to be taught.

Intervention Procedures

Pre-Intervention Assessment

1. The teacher will begin the Flashcard D&P Intervention by administering a Pre-Intervention Assessment. The teacher should select the Intervention record form that corresponds to the previously administered Target Skill Assessment. For skills including an excess of 30 items, limit the Pre-Intervention Assessment to a manageable set of items, usually somewhere between 20-30 items per set (for an example see the OTISS website with the literacy first sight words). As the student masters items fold in previously unknown items.

2. Assess the student to determine known and unknown items on the Intervention record form. Items are defined as known when the student can accurately respond within 2 seconds and items are unknown if the student cannot accurately respond within 2 seconds. This will result in two groups of flashcards (known and unknown).

    a. The teacher will use these data to determine what skills the student has and what skills the student needs to acquire. Identify unknown items by marking an "X" on the Intervention record form in the "Pre" column for that day.

3. Using the unknown items marked with an "X" in the "Pre" column on the Intervention Record Form, select and highlight 8 unknown items to start the flashcard D&P intervention. Once an item is mastered (student responds accurately within 2 seconds across three days during the Pre-Intervention Assessment) the item is considered known and is replaced in the intervention by another unknown item.

Intervention Cycles

1. The teacher will begin the flashcard D&P intervention using the 8 items selected during the Pre-Intervention Assessment. Given the items are unknown, begin by providing an accurate model to prevent inaccurate responding or guessing and to promote accurate responding. Specifically, the teacher should hold up the flashcard and say, "This (letter/sound/number/word) is _____. What (letter/sound/number/word) is this?" Once the student correctly responds, provide verbal praise and go to the next item.

2. After the student has accurately responded to each item. The teacher should hold up the flashcard and wait for 2 seconds for the student to respond. If the student says the correct answer within 2 seconds provide praise and move to the next item. If the student says an incorrect response or fails to respond within the 2 second time duration provide feedback by pointing to the item and saying the correct response, "This (letter/sound/number/word) is _____." and then prompt the student to try again, "What (letter/sound/number/word) is this?" Repeat this until the student gives the correct response. Once the correct response is given provide the student with verbal praise and go to the next item.

3. Repeat step 2 for the set of eight items a minimum of five cycles. The duration of the intervention session and the number of cycles through the item set will depend on factors such as allotted time, student fatigue, and attention. After three days of the intervention the opportunity to replace taught items with unknown items will begin.

Post-Intervention Assessment

1. The intervention ends with a Post-Intervention Assessment that is identical to the Pre-Intervention Assessment administered at the beginning of the session. The teacher should again use the Intervention Record form that corresponds to the previously administered Target Skill Assessment. This form will be the same one used in the Pre-Intervention Assessment.

2. Assess the student to determine known and unknown items on the Intervention record form. Items are defined as known when the student can accurately respond within 2 seconds and items are unknown if the student cannot accurately respond within 2 seconds. This will result in two groups of flashcards (known and unknown).

    a. Record unknown items by marking an "X" on the Intervention record form in the "Post" column for that day.

3. If using self-graphing have the student graph performance and describe progress. This can be done both within session (comparing number of known items from first trial to final trial) and across session (comparing number of known items from first trial from that day to the previous day). For more information of self-graphing see the M.I.N.D.: Self-Graphing module.

Differentiating Instruction: Flashcard Drill & Practice

The flashcard D&P intervention increases student learning rates due to the use of a complete learning trial (i.e., stimulus-response-feedback) and repeated practice on a targeted item set (e.g., numbers, math facts, words). The M.I.N.D.: Flashcard D&P protocol describes a set procedures to be repeated 3-5 times in a session across 8 unknown items. That being said, to maximize the effectiveness of the flashcard D&P intervention teachers may need to differentiate procedures to increase effectiveness. Three ways to differentiate flashcard D&P is to 1) alter the number of items that make up the target set; 2) alter how many times the set is presented during a session; and 3) alter the ratio of known to unknown items included in the set?

1. When doing a flashcard D&P intervention the teacher must determine the size of the intervention target set (i.e., the amount of items taught during the intervention session). The OTISS Flashcard D&P intervention suggests that teachers begin using 8 unknown items. For some students, these items will be learned quickly and the intervention may become boring. For others, practicing too many items will lead to small amounts of learning and cause frustration. Depending on how the student responds the teacher may want to change the amount of items taught.

2. Another facet of the Flashcard D&P intervention that can influence learning rates is how many times the teacher cycles through the targeted set. The Flashcard D&P intervention suggests that teachers begin using 3-5 cycles during a session. However, if students are not learning taught items then the teacher can increase the amount of cycles during the session that the student is exposed to (e.g., go from 5 cycles per session to 8 cycles per session). Note that this will increase the required instructional time.

    a. These two facets of intervention (set size and cycles) can be mixed and matched depending on student response to learning. For example, if the standard approach (8 items, 5 cycles) fails to produce learning the teacher could alter instruction by decreasing the item set and increasing the number of cycles (5 items, 8 cycles).

3. In an effort to keep planning time for teachers at a minimum while maintaining strong learning rates the M.I.N.D. Flashcard D&P intervention recommends identifying and practicing all unknown items. However, an additional way to differentiate flashcard D&P is to intersperse known and unknown items. Examples of this include the Folding-In (7 knowns to 3 unknowns) and Incremental Rehearsal (9 knowns to 1 unknown) approaches.

Flashcard Drill & Practice: Student Training Protocol

Use this to train students in the Flashcard Drill & Practice procedures. It is meant to ensure adherence to treatment and should be used the first few times when you are administering this intervention or when you feel the student needs a refresher.

1. Introduce the intervention, "We are meeting so we can work to improve your (skill). You will identify some (letters/sounds/numbers/words) on flashcards. Sometimes I will say the (letter/sound/number/word) first, then ask you to repeat me, and sometimes I will ask you to say the (letters/sounds/numbers/words) without my help. You will say the (letters/sounds/numbers/words) on the flashcards several times. Are there any questions?"

2. For an unknown item, hold up a flashcard and say, "This (letter/sound/number/word) is _____. What (letter/sound/number/word) is this?" If the student correctly responds, praise and move to the next flashcard. If the student responds incorrectly, provide corrective feedback and repeat model and prompt saying, "No, the (letter/sound/number/word) is _____. What (letter/sound/number/word) is this?" Repeat until student correctly responds. Record student responding.

    a. If revisiting a known item hold up the flashcard and say, "What (letter/sound/number/word) is this?" If the student correctly responds, praise and move to the next flashcard. If the student responds incorrectly, provide corrective feedback and present a model and prompt saying, "The (letter/sound/number/word) is _____. What (letter/sound/number/word) is this?" Repeat until student correctly responds. Record student responding.

3. Tell the student, "Now you should know all the items on the flashcards. You are going to read all the flashcards ___ (e.g., 5) more times. I want you to do your best to say all the (letters/sounds/numbers/words) correctly."

4. After the final flashcard trial say to the student, "Good job, now let's compare your final flashcard trial to your first. It looks like you increased __ (letters/sounds/numbers/words) read correctly today, great job. We will be charting how well you did the first time you said the (letters/sounds/numbers/words) on the flashcards and compare it to the last time you said them to see how much you improved. This will also let us compare how you are doing from day to day and week to week."

5. Summarize the intervention, "Each day we meet we will do the same set of activities. You will begin by saying (letters/sounds/numbers/words) on flashcards, I will help you with (letters/sounds/numbers/words) you have trouble with, then you will read the flashcards eight more times. Lastly we will graph how many (letters/sounds/numbers/words) you said correctly and compare it to other times you read to see how much you improved. Do you have any questions?"

This template should provide you with procedures to train students the steps they will use when meeting with you to practice using Flashcard D&P approaches.

Flashcard Drill & Practice: Treatment Integrity Protocol

This protocol is to be used by teachers when working with students using the Flashcard D&P procedures. It is meant to ensure adherence to treatment and should be used when you are administering the intervention to document how often and for how long the intervention is ran.

Student:_____ Date: _____ Start/End Time: _____

Materials

Required: □ Unknown and known item flashcards □ Scoring sheet □ Pencil □ Timer

Optional: □ Graph (for self-graphing) □ Rewards

Intervention Procedures

1. Document date, start time, & end time: This is useful when investigating student response to intervention. You can answer how often and consistently the Flashcard D&P intervention was done and how many instructional minutes were spent with the student engaged in the procedure. □

2. Prepare flashcards for use: Using the Target Assessment and/or Pre-Assessment data identify unknown items to be used during the intervention session. In addition, specify the number of cycles to be used with these items. □

    a. If using performance feedback and/or reward, instruct them to see if they can beat their score from the previous day and what reward they may be able to obtain. □

3. For an unknown item, hold up a flashcard and say, "This (letter/sound/number/word) is _____. What (letter/sound/number/word) is this?" If the student correctly responds, praise and move to the next flashcard. If the student responds incorrectly, provide corrective feedback and repeat model and prompt saying, "No, the (letter/sound/number/word) is _____. What (letter/sound/number/word) is this?" Repeat until student correctly responds. Record student responding.

    a. If revisiting a known item hold up the flashcard and say, "What (letter/sound/number/word) is this?" If the student correctly responds, praise and move to the next flashcard. If the student responds incorrectly, provide corrective feedback and present a model and prompt saying, "The (letter/sound/number/word) is _____. What (letter/sound/number/word) is this?" Repeat until student correctly responds. Record student responding.

4. Tell the student, "Now you should know all the items on the flashcards. You are going to read all the flashcards ___ (e.g., 5) more times. I want you to do your best to say all the (letters/sounds/numbers/words) correctly."

5. After the final flashcard trial say to the student, "Good job, now let's compare your final flashcard trial to your first. It looks like you increased __ (letters/sounds/numbers/words) read correctly today, great job. We will be charting how well you did the first time you said the (letters/sounds/numbers/words) on the flashcards and compare it to the last time you said them to see how much you improved. This will also let us compare how you are doing from day to day and week to week."

6. Summarize the intervention, "Each day we meet we will do the same set of activities. You will begin by saying (letters/sounds/numbers/words) on flashcards, I will help you with (letters/sounds/numbers/words) you have trouble with, then you will read the flashcards eight more times. Lastly we will graph how many (letters/sounds/numbers/words) you said correctly and compare it to other times you read to see how much you improved. Do you have any questions?"

When providing feedback remember to attribute increased reading skills to effort & practice. □

Cover Copy Compare (CCC)

Target Behavior

CCC was designed to be used with an individual or group of students who need to increase accuracy and fluency when completing basic math facts (i.e., addition, subtraction, multiplication, division). For students who respond inaccurately, CCC provides procedures that ensure errorless learning and for students who respond accurately but slowly (e.g., less than 30 correct digits per minute) CCC provides repeated practice. While CCC will primarily be used in elementary grades, older students with accuracy and/or fluency deficiencies in basic fact skills can benefit as well.

Materials

CCC Worksheet, Implementation Checklist, Pencil, Timer (optional)

CCC Procedures: Student

1. Student looks at the problem and answer (e.g., a math fact problem) and says it.
2. Student covers the problem.
3. Student writes the problem and answer in space provided.
4. Student uncovers the model and checks for accuracy.

CCC Procedures: Teacher

1. Teacher training: Read M.I.N.D.: Computation packet & watch CCC training clips.
2. Select CCC approach: A) Standard, B) Paired Responding, or C) Fact Families.
3. Obtain probes: Select probes to match student needs on fact operation, problem set size, & number of repetitions.
4. Give student probe, read directions, provide student with procedural feedback as needed, collect completed probe, provide student with feedback on performance

CCC Variations

1. CCC-Standard (use with students scoring < 20 DCPM)
2. CCC-Answer Only (use with student scoring 21-30 DCPM)

CCC: Standard – Student Training Protocol

Use this to train students how to use CCC: Standard procedures. This training script was written for a class wide application; however, it should be fairly easy to adapt to either a small group or individual student. The steps are as follows:

1. Pass out the CCC sheets to students and instruct them to write their names at the top of the paper.

2. Read the following directions, "Today we are going to do something new. We are going to do math problems using something called Cover, Copy, and Compare. (Pause) Look at your worksheets. On the worksheet you will see columns of math problems with an empty space next to each problem, you are going to use Cover, Copy, and Compare to complete these".

3. Continue reading, "Doing Cover, Copy, and Compare is easy. Look at the first problem. It is (read problem & answer). When doing Cover, Copy, and Compare you begin by looking at the problem and saying it to yourself. With this problem it is (read problem & answer). Next, you cover the problem and answer with your hand, everybody cover it. After it is covered, then you write the problem and answer in the space directly next to it, now everybody write the problem and answer. After you have written the problem and answer uncover it and check to see if what you wrote is correct. (Pause) Did everyone write the correct problem & answer? If you have written the wrong problem and answer then cross it out and write in the correct problem or answer. Does anyone have any questions? (Pause)

4. Continue reading, "Now let's try the next problem it is (read problem & answer). Remember look at the problem, say it to yourself, and then cover it. Next, write the problem and answer (Pause for students to complete the step). Lastly, uncover the problem to see if you did it correctly. When you have written the problem and answered it correctly then go to the next problem. Complete these until you have finished the sheet.

5. If anyone has any questions, or is unsure of how to do Cover, Copy, and Compare then raise your hand and I will come to your desk and show you how to do this.

6. Repeat as necessary

This training script is generally successful for a majority of students. As you are reading the directions cycle though the room to check for adherence to protocol. In addition, point out students who are doing the steps correctly and provide behavior specific praise for correctly implementing CCC steps.

CCC: Standard – Treatment Integrity Protocol

This is to be used by teachers when they are prompting students to use the CCC: Standard procedure. It is meant to ensure adherence to treatment and should be used when administering CCC: Standard throughout the course of the treatment. Pay special attention to accurately record the amount of instructional time that the student engages in the CCC procedure.

Student(s):_____ Date: _____ Start/End Time: _____

Materials

Required: □ CCC: Standard Worksheet □ Implementation Checklist □ Pencil

Optional: □ Timer □ Graph (for self-graphing) □ Rewards

Intervention Procedures

1. Document date, start time, & end time: This is useful when investigating student response to intervention. You can answer how often and consistently CCC: Standard was done and how many instructional minutes were spent with the student engaged with CCC. □

2. Pass out the CCC: Standard worksheet(s) to students and have them put their name at the top of the paper. If using performance feedback and/or reward, instruct them to see if they can beat their score from the previous day and what reward they may be able to obtain. □

3. Read the following directions if giving the student unlimited time to complete the CCC: Standard worksheet, "Here is/are your CCC worksheet(s), I want you to complete all of the problems. When you have finished all of the problems, raise your hand and I will collect your worksheet(s). Ready, Begin." □

If you are timing the student read these directions, "Here are your worksheets. You will have ___ minutes to do as many problems as you can using the Cover, Copy, Compare worksheet. If you finish with all of the problems, raise your hand and I will bring you another worksheet. When I say stop, put down your pencil and I will collect your paper. Ready, Begin". □

If timing, stop them after x minutes and have them hand in their worksheet. □

Remember to constantly be walking around the room to prompt and/or help students who are not working. Look for any mistakes and give students feedback so they can correct any incorrect response(s). □

M.I.N.D.: Computation CCC Standard Worksheet Addition 1A Name: _____ Date: ___

9 + 8 = 17		5 + 3 = 8		6 + 9 = 15		3 + 5 = 8	
3 + 3 = 6		6 + 7 = 13		8 + 9 = 17		9 + 4 = 13	
5 + 2 = 7		3 + 8 = 11		7 + 7 = 14		8 + 3 = 11	
7 + 7 = 14		6 + 5 = 11		3 + 3 = 6		4 + 4 = 8	
9 + 6 = 15		4 + 4 = 8		5 + 6 = 11		2 + 5 = 7	
2 + 8 = 10		9 + 4 = 13		7 + 6 = 13		8 + 2 = 10	

CCC: Answer Only – Student Training Protocol

Use this to train students how to use CCC: Answer Only procedures. This training script was written for a class wide application; however, it should be fairly easy to adapt to either a small group or individual student. The steps are as follows:

1. Pass out the CCC: Answer Only sheets to students and instruct them to write their names at the top of the paper.

2. Read the following directions, "Today we are going to do something new. We are going to do math problems using something called Cover, Copy, and Compare. (Pause) Look at your worksheets. On the worksheet you will see columns of math problems. In the space next to it you will see the problem with no answer. You are going to use Cover, Copy, and Compare to complete these".

3. Continue reading, "Doing Cover, Copy, and Compare is easy. Look at the first problem. It is (read problem & answer). When doing Cover, Copy, and Compare you begin by looking at the problem and saying it to yourself. With this problem it is (read problem & answer). Next, you cover the problem and answer with your hand, everybody cover it. After it is covered, then you write the answer under the pre-written problem in the space directly next to it, now everybody write the answer. After you have written the answer uncover the model and check to see if what you wrote is correct. (Pause) Did everyone write the correct answer? If you have written the wrong answer, cross it out and write in the correct answer. Does anyone have any questions? (Pause)

4. Continue reading, "Now let's try the next problem it is (read problem & answer). Remember look at the problem, say it to yourself, and then cover it. Next, write the answer (Pause for students to complete the step). Lastly, uncover the problem to see if you did it correctly. When you have written the correct answer go to the next problem. Complete these until you have finished the sheet.

5. If anyone has any questions, or is unsure of how to do Cover, Copy, and Compare then raise your hand and I will come to your desk and show you how to do this.

6. Repeat as necessary

This training script is generally successful for a majority of students. As you are reading the directions cycle though the room to check for adherence to protocol. In addition, point out students who are doing the steps correctly and provide behavior specific praise for correctly implementing CCC steps.

CCC: Answer Only – Treatment Integrity Protocol

This is to be used by teachers when they are prompting students to use the CCC: Answer Only procedure. It is meant to ensure adherence to treatment and should be used when administering CCC: Answer Only throughout the course of the treatment. Pay special attention to accurately record the amount of instructional time that the student engages in the CCC procedure.

Student(s):_____ Date: _____ Start/End Time: _____

Materials

Required: □ CCC: Answer Only Worksheet □ Implementation Checklist □ Pencil

Optional: □ Timer □ Graph (for self-graphing) □ Rewards

Intervention Procedures

4. Document date, start time, & end time: This is useful when investigating student response to intervention. You can answer how often and consistently CCC: Answer Only was done and how many instructional minutes were spent with the student engaged with the procedure. □

5. Pass out the CCC: Answer Only worksheets to students and have them put their name at the top of the paper. If using performance feedback and/or reward, instruct them to see if they can beat their score from the previous day and what reward they may be able to obtain. □

6. Read the following directions if giving the student unlimited time to complete the CCC: Answer Only worksheet, "Here is/are your CCC worksheet(s), I want you to complete all of the problems. When you have finished all of the problems, raise your hand and I will collect your worksheet(s). Ready, Begin." □

If you are timing the student read the following directions, "Here are your worksheets. You will have (x amount) minutes to do as many problems as you can using the Cover, Copy, Compare worksheet. If you finish all the problems, raise your hand and I will bring you another worksheet. When I say stop, put down your pencil and I will collect your paper. Ready, Begin". □

If timing, stop them after x minutes and have them hand in their worksheet. □

Remember to constantly be walking around the room to prompt and/or help students who are not working. Look for any mistakes and give students feedback so they can correct any incorrect response(s). □

M.I.N.D.: Computation CCC-AO Worksheet Multiplication 1A Name: _____ Date: ____

9 x 8 = 72	9 x 8 =	5 x 3 = 15	5 x 3 =	6 x 9 = 54	6 x 9 =	3 x 5 = 15	3 x 5 =
3 x 3 = 9	3 x 3 =	6 x 7 = 42	6 x 7 =	8 x 9 = 72	8 x 9 =	9 x 4 = 36	9 x 4 =
5 x 2 = 10	5 x 2 =	3 x 8 = 24	3 x 8 =	7 x 7 = 49	7 x 7 =	8 x 3 = 24	8 x 3 =
7 x 7 = 49	7 x 7 =	6 x 5 = 30	6 x 5 =	3 x 3 = 9	3 x 3 =	4 x 4 = 16	4 x 4 =
9 x 6 = 54	9 x 6 =	4 x 4 = 16	4 x 4 =	5 x 6 = 30	5 x 6 =	2 x 5 = 10	2 x 5 =
2 x 8 = 16	2 x 8 =	4 x 9 = 36	4 x 9 =	7 x 6 = 42	7 x 6 =	8 x 2 = 16	8 x 2 =

CCC: Fact Families – Student Training Protocol

Use this to train students how to use the CCC: Fact Families procedures. This training script was written for a classwide application; however, it should be fairly easy to adapt to either a small group or individual student. The steps are as follows:

1. Pass out the CCC sheets to students and instruct them to write their names at the top of the paper.

2. Read the following directions, "Today we are going to do something new. We are going to do math problems using Cover, Copy, and Compare. (Pause) Look at your worksheets. On the worksheet you will see columns of math fact families with two empty spaces next to each fact family, you are going to use Cover, Copy, and Compare to complete these".

3. Continue reading, "Doing Cover, Copy, and Compare is easy. Look at the first fact family. It is (read fact family). When doing Cover, Copy, and Compare you begin by looking at the fact family, making a problem from the family, and saying it to yourself. With this fact family a possible problem is (read problem & answer). Next, you cover the fact family with your hand, and you write the problem and answer in the space directly next to it, now everybody write the problem and answer. After you have written the problem and answer uncover it and check to see if what you wrote is correct. (Pause) Now, in the space next to the problem you just wrote, I want you to write the reciprocal fact (teacher will need to preteach what this is, terminology can be changed). Did everyone write the two correct problems from the fact family? If you have written a wrong problem and answer then cross it out and write in the correct problem or answer. Does anyone have any questions? (Pause)

4. Continue reading, "Now let's try the next family, it is (read problem & answer). Remember look at the family, make a problem from the family, say it to yourself, and then cover it. Next, write the problem and answer (Pause for students to complete the step). Lastly, uncover the problem to see if you did it correctly. When you have written the problem and answered it correctly then write the reciprocal problem. Go to the next family and complete these until you have finished the sheet.

5. If anyone has any questions, or is unsure of how to do Cover, Copy, and Compare then raise your hand and I will come to your desk and show you how to do this.

6. Repeat as necessary

This training script is generally successful for a majority of students. As you are reading the directions cycle though the room to check for adherence to protocol. In addition, point out students who are doing the steps correctly and provide behavior specific praise for correctly implementing CCC steps.

CCC: Fact Families – Treatment Integrity Protocol

This is to be used by teachers when they are prompting students to use the CCC: Fact Families procedure. It is meant to ensure adherence to treatment and should be used the first few times when you are administering CCC: standard or when you feel you may need a refresher on the procedures.

Student(s):_____ Date: _____ Start/End Time: _____

Materials

Required: □ CCC: Fact Families Worksheet □ Implementation Checklist □ Pencil

Optional: □ Timer □ Graph (for self-graphing) □ Rewards

Intervention Procedures

1. Document date, start time, & end time: This is useful when investigating student response to intervention. You can answer how often and consistently CCC: Fact Families was done and how many instructional minutes were spent with the student engaged in the procedure. □

2. Pass out the CCC: Fact Families worksheets to students and have them put their name at the top of the paper. If using performance feedback and/or reward, instruct them to see if they can beat their score from the previous day and what reward they may be able to obtain. □

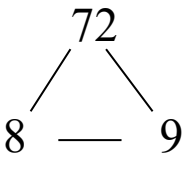
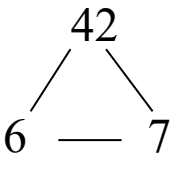
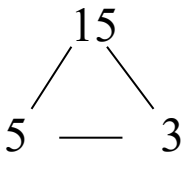
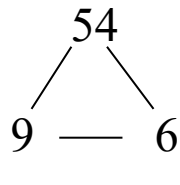
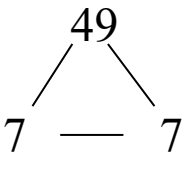
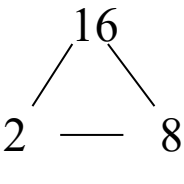
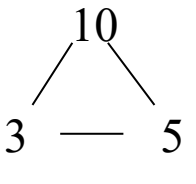
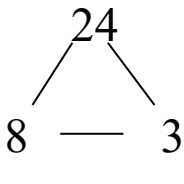
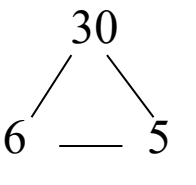
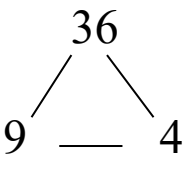
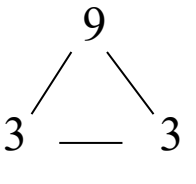
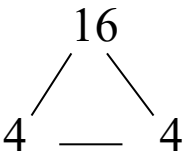
3. Read the following directions if giving the student unlimited time to complete the CCC: Fact Families worksheet, "Here is/are your CCC: Fact Families worksheet(s), I want you to complete all of the problems. When you have finished all of the problems, raise your hand and I will collect your worksheet(s). Ready, Begin." □

If you are timing the student read the following directions, "Here are your worksheets. You will have (x amount) minutes to do as many problems as you can using the Cover, Copy, Compare worksheet. If you finish with all of the problems, raise your hand and I will bring you another worksheet. When I say stop, put down your pencil and I will collect your paper. Ready, Begin". □

4. If timing, stop them after x minutes and have them hand in their worksheet. □

Remember to constantly be walking around the room to prompt and/or help students who are not working. Look for any mistakes and give students feedback so they can correct any incorrect response(s). □

M.I.N.D.:CCC - Fact Families Multiplication Name: _____ Date: _____

Taped Problems (TP)

Target Behavior

Taped Problems (TP) was designed to be used with both individual and groups of students who need to increase accuracy and/or fluency when completing basic math facts (i.e., addition, subtraction, multiplication, division). This intervention is appropriate for students who conceptually grasp basic number/operation concepts (e.g., number identification, equal interval, more, less) and who use counting strategies to arrive at accurate answers. For students who respond inaccurately, TP provides procedures that provides corrective feedback and for students who respond accurately but slowly (e.g., less than 20 correct digits per minute) TP provides high rates of repeated practice. While TP will primarily be used in elementary grades, older students with fluency deficiencies in basic fact skills can also benefit.

Materials

Audio Player (e.g., computer, CD player), Audio File or CD, TP Worksheets, Pencil,

Implementation Checklist, stopwatch

TP Procedures: Student

1. Student looks at the problem and tries to write the answer before the tape provides the answer.

2. Student listens to the answer and checks to see if he/she is correct. If incorrect the student crosses out the wrong answer and writes in the correct answer.

3. Student follows and works in conjunction with the tape until the audio file instructs the student to stop.

TP Procedures: Teacher

1. Teacher training: Read M.I.N.D.: Computation packet.

2. Obtain TP worksheets and corresponding audio file for the selected operation (+,- x,÷).

3. Give student TP worksheets, start audio file, provide student(s) with procedural feedback as needed, collect completed probe, provide student with feedback on performance

Taped Problems – Student Training Protocol

Use this to train students how to use TP procedures. This training script was written for a classwide application; however, it should be fairly easy to adapt to either a small group or individual student. The steps are as follows:

1. Pass out the TP worksheets to students and instruct them to write their names at the top of the paper.

2. Read the following directions, "Today we are going to do something new. We are going to do math problems using something called Taped Problems. (Pause) Look at your worksheets. On the worksheet you will see rows of math problems. I am going to start the computer and it is going to read each problem going across the page. Specifically, the computer will read the problem (2+2), pause, and give the answer (4). It is your job to try and beat the computer by writing down the answer before the computer says the answer. If you write down a different answer, cross out what you wrote and write down the correct answer. Make sure to follow along with the computer, do not speed past it or fall behind it. Are there any questions? Ok, let's practice.

3. Continue, "I am going to start the computer and we are going to do the first row and then stop. Ready, begin". (Start audio file). After the first row, stop the file. "If anyone is unsure of how to do TP then raise your hand and I will come to your desk and help you. I am going to restart the computer and we will finish the page. Ready, begin.

4. Repeat as necessary until students can independently follow the tape

    a. If student is unable move to different skill (this is rarely a problem if student is at or above 20 DCPM.

This training script is generally successful for a majority of students. As you are reading the directions cycle though the room to check for adherence to protocol. In addition, point out students who are doing the steps correctly and provide behavior specific praise for correctly implementing TP steps.

Taped Problems – Treatment Integrity Protocol

This is to be used by teachers when they are implementing the TP procedure. It is meant to ensure adherence to treatment and should be used when administering TP. Pay special attention to accurately record the amount of instructional time that the student engages in the TP procedure.

Student(s):_____ Date: _____ Start/End Time: _____

Materials

Required: □ TP Worksheets □ Implementation Checklist □ Pencil

□ Audio File & Player

Intervention Procedures

1. Document date, start time, & end time: This is useful when investigating student response to intervention. You can answer how often and consistently TP was done and how many instructional minutes were spent with the student engaged with the procedure. □

2. Pass out the TP worksheets to students and have them put their name an date at the top of the paper. Start the audio file. It will read a brief set of directions and then begin to read the problems and answers. The audio file will instruct students when to stop □

3. Cycle around the room to ensure that students are following along with the tape, trying to beat the tape (not just writing answers with the tape), and to provide behavior specific praise to students who are adhering to TP procedures □

M.I.N.D.: Computation TP/ET Worksheet Addition 1C Name: _____ Date: _____

4 + 2	8 + 7	4 + 6	9 + 2	7 + 4	7 + 3	2 + 6	5 + 5	3 + 2
8 + 5	6 + 8	9 + 9	2 + 4	6 + 2	2 + 9	6 + 4	8 + 6	4 + 7
5 + 5	9 + 9	2 + 3	5 + 8	7 + 8	3 + 7	4 + 6	9 + 2	4 + 2
8 + 7	2 + 6	7 + 4	6 + 8	5 + 5	3 + 2	7 + 3	8 + 5	9 + 9
4 + 7	6 + 2	8 + 6	2 + 4	2 + 3	5 + 5	7 + 8	5 + 8	3 + 7
6 + 4	2 + 9	9 + 9	2 + 6	8 + 7	7 + 4	4 + 2	5 + 5	9 + 2
4 + 6	3 + 2	6 + 8	8 + 5	7 + 3	9 + 9	2 + 9	2 + 3	6 + 2
7 + 8	5 + 5	6 + 4	9 + 9	5 + 8	3 + 7	8 + 6	2 + 4	4 + 7

Explicit Timing (ET)

Target Behavior

ET was designed to be used with both individual and groups of students who need to increase fluent responding when completing basic math facts (i.e., addition, subtraction, multiplication, division). This antecedent timing procedure is appropriate for students who accurately respond to fact problems but do so slowly. ET procedures were designed to increase rates of responding and consequently speed of responding to basic fact problems and works best when paired with performance feedback (e.g., self-graphing) and reward. While ET will primarily be used in elementary grades, older students with fluency deficiencies in basic fact skills can also benefit.

Materials

ET Worksheets, Pencil, Implementation Checklist, stopwatch, reward

ET Procedures: Student

1. Student writes name and date at the top of the paper. If using self-graphing student marks on graph his/her previous days performance.

2. Student begins completing problems when teacher says start and stops when instructed to stop

ET Procedures: Teacher

1. Teacher training: Read M.I.N.D.: Computation packet & watch ET training clips.

2. Assess students to find appropriate target operation (+,- x,÷) that the student scores at or above 31 DCPM.

3. Obtain ET worksheets for the selected operation (+,- x,÷).

4. Give student probes, instruct them to write name and date, tell them they have __ minutes to complete as many problems as possible, begin & start timer, stop students after specified amount of time.

5. Repeat as needed (works well when breaking larger practice periods into smaller, timed durations. Distributing across the day increases learning rates as well (e.g., doing ET in the morning and then in the afternoon).

6. As students are working cycle through the class and provide student(s) with procedural feedback as needed and encourage students to do their best work (i.e., don't go and set at desk).

Explicit Timing – Student Training Protocol

Use this to train students how to use ET procedures. This training script was written for a class-wide application; however, it should be fairly easy to adapt to either a small group or individual student. The steps are as follows:

1. Pass out the ET worksheets to students and instruct them to write their names at the top of the paper.

2. Read the following directions, "Today we are going to complete math worksheets using explicit timing. With explicit timing I am going to give you x minutes to complete as many problems as you can. Your first goal is to complete each problem correctly and to not skip around. In addition push yourself to work as quickly as possible".

    a. If using self-graphing add, "As you practice you should see your scores go up. To chart your performance you will be given a graph and each day before your math practice you will put your last score on the graph".

3. Are there any questions? Ok, let's practice.

4. Continue, "When I say 'Begin' start answering the problems on your worksheet. Start at the top and work across the page and then go to the next row. Try each problem and do not skip any problems. I am going to give you __ minutes to complete as many problems as you can. Are there any questions? Ready. Begin!

5. After x minutes goes by, stop students. Repeat as needed. When finished collect the ET worksheets.

6. This training script is generally successful for a majority of students. As you are reading the directions cycle through the class and provide student(s) with procedural feedback as needed and encourage students to do their best work.

Explicit Timing – Treatment Integrity Protocol

This is to be used by teachers when they are prompting students to use the ET procedure. It is meant to ensure adherence to treatment and should be used the first few times when you are administering ET or when you feel you may need a refresher on the procedures.

Student(s):_____ Date: _____ Start/End Time: _____

Materials

Required: □ ET probe(s) □ Implementation Checklist □ Pencil □ Stopwatch

Optional: □ Graph □ Reward

Intervention Procedures

1. Document date, start time, & end time: This is useful when investigating student response to intervention. You can answer how often and consistently ET was done and how many instructional minutes were spent with the student engaged with the procedure. □

2. Pass out worksheets or ET folder. □

3. If doing self-graphing, read the following, "class, please open your folder and locate your graph and score from yesterday's practice. Mark your score on your graph and see whether you beat your previous score (pause). Now take out today's math worksheet". □

4. Read directions, "Today we are going to complete math worksheets using explicit timing. With explicit timing I am going to give you x minutes to complete as many problems as you can. Your first goal is to complete each problem correctly and to not skip around. In addition push yourself to work as quickly as possible. Ready, begin". □

5. Start stopwatch and stop students after x minutes have elapsed. Repeat as needed. When finished collect the ET worksheets. □

M.I.N.D.: Computation TP/ET Worksheet Subtraction 3A Name: _____ Date: _____

10 - 2	15 - 9	11 - 6	13 - 6	6 - 3	17 - 9	14 - 7	13 - 4	7 - 5
8 - 4	11 - 3	8 - 5	11 - 5	8 - 4	17 - 8	15 - 6	13 - 7	10 - 8
11 - 8	7 - 2	6 - 3	14 - 7	8 - 3	13 - 9	10 - 2	13 - 6	8 - 4
11 - 6	17 - 9	15 - 9	11 - 3	8 - 5	6 - 3	7 - 5	13 - 4	14 - 7
8 - 4	15 - 6	13 - 7	17 - 8	6 - 3	13 - 9	11 - 8	11 - 5	14 - 7
8 - 3	7 - 2	10 - 8	8 - 4	13 - 6	10 - 2	17 - 9	7 - 5	13 - 4
8 - 5	15 - 9	11 - 3	6 - 3	11 - 6	14 - 7	7 - 2	13 - 9	17 - 8
8 - 4	13 - 7	11 - 5	11 - 8	10 - 8	6 - 3	15 - 6	14 - 7	8 - 3

Procedural Cover Copy Compare (P-CCC)

Target Behavior

Procedural Cover, Copy, & Compare (P-CCC) was designed to be used with students who can fluently complete basic fact skills (>40 DC/M) but are unable to complete multi-digit computation problems above 20 DC/M. This pattern of responding is indicative of a student who lacks the procedural skill set needed to apply his/her prior knowledge of fact skills. P-CCC is a multi-component intervention that incorporates teacher demonstration, guided practice using visual cues, independent practice, and performance feedback with re-teaching (if needed). This same instructional sequence can be used across all skills (i.e., +, -, x, ÷). The combination of these approaches integrates modeling, cueing, and feedback to encourage errorless learning but also fades supports so students independently apply and practice the taught procedural skills.

Materials

P-CCC Teacher Script w/ matched multi-digit computation probe, P-CCC Implementation Checklist, Pencil, Timer (optional)

P-CCC Procedures: Teacher

1. Teacher training: Read M.I.N.D.: Computation packet & watch P-CCC training clips.

2. Select Skill (+, -, x, ÷) and obtain subskill worksheets for sets A, B, & C for that skill. Begin using the P-CCC intervention with set A, then set B, and lastly set C (move to next skill when student scores >20 DC/M w/ 90% ACC across 3 days).

Multi-Digit Computation Subskill Probes

	Skill	Set	Problem Type(s)	Time	Mastery
Multi-Digit Addition:	+	A	3+3 digit	2 min	20 DC/M
	+	B	2+1 digit w/ regrouping	2 min	20 DC/M
	+	C	3+3 digit w/ regrouping	2 min	20 DC/M
Multi-Digit Subtraction:	-	A	3-3 digit	2 min	20 DC/M
	-	B	2-1 digit w/ regrouping	2 min	20 DC/M
	-	C	3-3 digit w/ regrouping	2 min	20 DC/M
Multi-Digit Multiplication:	x	A	2x1 digit	2 min	20 DC/M
	x	B	4x2 digit	2 min	20 DC/M
	x	C	4x3 digit	2 min	20 DC/M
Multi-Digit Division:	÷	A	3÷1 digit no remainder	2 min	20 DC/M
	÷	B	3÷1 digit w/ remainder	2 min	20 DC/M
	÷	C	3÷1 digit w/ decimals	2 min	20 DC/M

3. Implement P-CCC intervention

    a. Have relevant materials organized and ready (P-CCC script & integrity checklist, multi-digit computation worksheets, & score key)

    b. Give student probe, document date, record start/end time.

    c. Read script to demonstrate procedures, model completion using visual cues.

        i. Scripts are included for each of the three subskills across +, -, x, & ÷.

    d. Have student complete problem and verbally describe procedures. Provide feedback as needed and repeat until student accurately completes problem.

    e. Have student complete problems containing visual cues.

        i. Provide behavior specific praise as needed.

    f. Have student complete remaining problems (no visual cues).

        i. Problems on second page will require student to discriminate when and when not to use the taught procedure (monitor carefully).

    g. After student finishes, present student with scoring key. Review completed probe and provide student with feedback on accuracy. Provide error correction & re-teaching as necessary.

        i. Progress monitor and incorporate self-graphing w/ reward as needed.

P-CCC Procedures: Student

1. Student records information on daily probe (name, date, start/end time).

2. Student watches and listens to teacher who completes the first problem, describes procedures, and defines the purpose of visual cues.

3. Student completes problem and verbally describes procedures to teacher w/ support of visual cues (teacher provides feedback and re-teaching as needed). Repeat as needed.

4. Student completes problems independent of teacher using visual cues.

5. Student completes problems independent of both teacher and visual cues & discriminates when and when not to use taught procedure.

6. Student receives feedback (teacher led review of score key) on accuracy of performance and corrects inaccurate problems using Step 2.

P-CCC: Multi-Digit Addition Teacher Scripts

Addition Subskill Set A: 3+3 Digit w/out Regrouping

Teacher Script.

Today we are going to work on some bigger, multi-digit addition problems. Your packet contains 2 pages. On the first page you will find four rows of problems. The first two rows has lines that show columns that you can use with the multi-digit problems. For example, on the first problem you start by adding __ + __ in the one's column, then move to the ten's column and add __+__. Lastly, you move to the hundreds column and compute __ + __.

The rest of the problems on the first and second row have lines to show the columns, but the last two rows have multi-digit problems without the columns but you do them in the same way. For example, on the first problem of the 3rd row, begin with the ones column and add __+__, then move to the tens column and add __+__, and finish with __+__ in the hundreds column. The second page has problems but no lines, work as fast as you can to correctly complete all the problems. After you are done, raise your hand and we will check your work to see how many you answered correctly! Are there any questions?

Multi-Digit Addition Worksheet 1A

362 +535	426 +453	634 +354	243 +545
426 +453	362 +535	243 +545	643 +345
346 +543	436 +453	623 +355	236 +553
453 +436	364 +534	355 +623	253 +536

Multi-Digit Addition Worksheet 1B

426 + 453	362 + 535	243 + 545	634 + 354
234 + 554	643 + 345	462 + 435	326 + 553
236 + 553	436 + 453	623 + 355	346 + 543
453 + 436	253 + 536	355 + 623	364 + 534

Addition Subskill Set B: 2+1 Digit w/ Regrouping

Teacher Script.

Today we are going to work on some multi-digit addition problems that require regrouping. Your packet contains 2 pages. On the first page you will find four rows of problems. The first two rows each has two problems in bold with the answer. I am going to explain how to get the answer then you will cover it and do the problem next to it by yourself. As you complete the problem I want you to tell me what you are doing to solve the problem. If you are unsure or do something incorrectly I will help you. When you can correctly complete a problem and describe your steps I will have you complete rows 3 and 4 by yourself. Let's start.

Locate the first problem and point to the ones column. You start by adding this column (__+__) to get an answer of __. You can only write down one number in this column (in this case a __) so you have to carry the 1. To do this you move the one to the box in the next column and carry the 1 and place it in the box above the __, please point to the box. Now locate the number in the tens column and then add the 1 that was carried to get __. You write down __ to get an answer of __.

Now cover the problem and answer with this piece of paper and attempt the problem next to it. As you are working the problem I want you to tell me what you are doing. If you are unsure or do something incorrectly I will help you. When you are finished, uncover the problem and we will see if your answer is correct. If you can't do the problem correctly or you need my help I will help you with the steps and I will have you do the next problem and tell me what you are doing. When you can get the right answer without my help I will have you complete rows 3 and 4 by yourself. These problems have boxes to reM.I.N.D. you to carry. The second page contains multi-digit problems but there are no boxes. You will complete these by yourself but be careful some problems you will have to regroup and others you will not. If you need help or are unsure what to do, raise your hand and I will help you. After you are done we will check your work to see how many you answered correctly! If you miss any we will correctly work the problem! Let's start.

Addition 2+1 Digit w/ Regrouping Worksheet 1A

☐ **66** **+ 9** **75**	☐ 66 + 9	☐ **84** **+ 7** **91**	☐ 84 + 7
☐ **97** **+ 5** **102**	☐ 97 + 5	☐ **78** **+ 2** **80**	☐ 78 + 2
☐ 59 + 2	☐ 65 + 6	☐ 78 + 3	☐ 39 + 4
☐ 47 + 6	☐ 27 + 7	☐ 95 + 9	☐ 16 + 9

Addition 2+1 Digit w/ Regrouping Worksheet 1B

67 + 6	98 + 9	75 + 4	47 + 4
76 + 3	65 + 6	68 + 2	52 + 3
98 + 9	84 + 5	59 + 3	28 + 4
73 + 3	69 + 9	54 + 5	57 + 9

Addition Subskill Set C: 3+3 Digit w/ Regrouping

Teacher Script.

Today we are going to work on some multi-digit addition problems that require regrouping. Your packet contains 2 pages. On the first page you will find four rows of problems. The first two rows each has two problems in bold that have the answer. I am going to explain how to get the answer then you will cover it and do the problem next to it by yourself. As you complete the problem I want you to tell me what you are doing to solve the problem. If you are unsure or do something incorrectly I will help you. When you can correctly complete a problem and describe your steps I will have you complete rows 3 and 4 by yourself. Let's start.

Locate the first problem and point to the ones column. You start by adding this column (__+__) to get an answer of __. You can only write down one number in this column (in this case a __) so you have to carry the 1. To do this you move the one to the box in the next column and carry the 1 and place it in the box above the __, please point to the box. Now you add __+__ and get __, then add the 1 that was carried to get __. You write down __ and carry the one to the next column and place it above the __. Now you come to the final column of numbers. You add __+__ and get __, then add 1 to get __. Since there are no other numbers to add you write down __. This results in an answer of _____.

Now cover the problem and answer with this piece of paper and attempt the problem next to it. As you are working on the problem I want you to tell me what you are doing. If you are unsure or do something incorrectly, I will help you. When you are finished, uncover the problem and we will see if your answer is correct. If you can't do the problem correctly or you need my help I will help you with the steps and then have you do the next problem and tell me what you are doing. When you can get the right answer without my help I will have you complete rows 3 and 4 by yourself. These problems have boxes to remind you to carry. The second page contains multi-digit problems but there are no boxes. You will complete these by yourself but be careful because some problems you will have to regroup all the numbers and other problems only some of the problems. If you need help or are unsure what to do, raise your hand and I will help you. After you are done we will check your work to see how many you answered correctly! If you miss any we will correctly work the problem! Let's start.

Addition 3+3 Digit w/ Regrouping Worksheet 1A

876 **+979** **1855**	876 +979	**898** **+349** **1247**	898 +349
967 **+496** **1463**	967 +496	**787** **+627** **1414**	787 +627
888 +392	659 +964	787 +736	798 +643
578 +669	876 +279	958 +463	867 +997

Addition 3+3 Digit w/ Regrouping Worksheet 1B

967 + 426	898 + 302	875 + 236	787 + 627
876 + 924	659 + 932	748 + 792	528 + 693
271 + 669	197 + 736	754 + 964	488 + 392
748 + 643	861 + 997	948 + 463	311 + 279

P-CCC: Multi-Digit Subtraction Teacher Scripts

Subtraction Subskill Set A: 3-3 Digit w/out Regrouping

Teacher Script.

Today we are going to work on some bigger, multi-digit subtraction problems. Your packet contains 2 pages. On the first page you will find four rows of problems. The first two rows has lines that show the columns that you can use to line up the multi-digit problems. For example, on the first problem you start by adding __ - __ in the one's column, then move to the ten's column and add __-__. Lastly, you move to the hundreds column and compute __ - __.

The rest of the problems on the first and second row have lines to show the columns, but the last two rows have multi-digit problems without the columns but you do them in the same way. For example, on the first problem of the 3rd row, begin with the ones column and add __-__, then move to the tens column and add __-__, and finish with __-__ in the hundreds column. The second page has problems but no lines, work as fast as you can to correctly complete all the problems. After you are done, raise your hand and we will check your work to see how many you answered correctly! Are there any questions?

Multi-Digit Subtraction Worksheet 1A

669 - 535	426 - 153	687 - 354	647 - 545
966 - 452	469 - 235	743 - 541	897 - 345
989 - 657	548 - 137	896 - 355	967 - 553
566 - 436	986 - 534	738 - 623	689 - 536

Multi-Digit Subtraction Worksheet 1B

865 - 453	687 - 535	826 - 513	459 - 354
978 - 554	489 - 345	745 - 435	684 - 553
573 - 431	684 - 453	462 - 351	563 - 543
694 - 436	897 - 536	943 - 623	736 - 534

Subtraction Subskill Set B: 2-1 Digit w/ Regrouping

Teacher Script.

Today we are going to work on some multi-digit subtraction problems that require regrouping. Your packet contains 2 pages. On the first page you will find four rows of problems. The first two rows each has two problems in bold with the answer. Below the problem you will see the Begin, Bigger, and Borrow strategy written to help you correctly borrow. There is also a box above the tens column to remind. you to rename the ten that you borrowed from. I am going to explain and show you how to correctly complete the first problem, then you will cover the completed problem and do the problem next to it by yourself. As you complete the problem I want you to tell me what you are doing to solve the problem. If you are unsure or do something incorrectly I will help you. When you can correctly complete a problem and describe your steps I will have you complete row 3 by yourself. These problems have the Begin, Bigger, and Borrow strategy written below them to help you and contain the box above the tens column to help you rename. The problems on the fourth row do not have any of the cues so you can show me how to do them by yourself. If you miss any we will correctly work the problem! Let's start.

Locate the first problem and point to the ones column. You start with the bottom number of the ones column and you see if it is bigger than the top number. If it is you will need to borrow. On the first column the bottom number is __, is this bigger than __? Since it is you will need to borrow from the __ in the tens place. Cross out the __ and write one number below it in the box. Then write a 1 beside the __ in the ones column. Now subtract __-__ and place the numeral in the ones column. Then move to the tens column and drop the re-named number to arrive at the correct answer. For this problem the answer is __.

Now cover the problem and answer with this piece of paper and attempt the problem next to it. As you are working the problem I want you to tell me what you are doing. If you are unsure or do something incorrectly I will help you. Use the Begin, Bigger, and Borrow strategy to help you complete the problem. When you are finished, uncover the problem and we will see if your answer is correct. If you can't do the problem correctly or you need my help I will help you with the steps and I will have you do the next problem and tell me what you are doing. When you can get the right answer without my help I will have you complete rows 3 and 4 by yourself.

The second page contains multi-digit problems but only the first row has a box and the Begin, Bigger, Borrow strategy to help you. You will complete these by yourself but be careful some problems you will have to borrow and others you will not. If you need help or are unsure what to do, raise your hand and I will help you. After you are done we will check your work to see how many you answered correctly! If you miss any we will correctly work the problem! Let's start.

Subtraction 2-1 Digit w/ Regrouping Worksheet 1A

☐ **7 6** **- 9** **6 7** **B**egin w/ 9 **B**igger? Y or N **B**orrow from 7	☐ 7 6 - 9 **B**egin w/ 9 **B**igger? Y or N **B**orrow from 6	☐ **8 4** **- 7** **7 7** **B**egin w/ 7 **B**igger? Y or N **B**orrow from 8	☐ 8 4 - 7 **B**egin w/ 7 **B**igger? Y or N **B**orrow from 8
☐ **9 2** **- 5** **8 7** **B**egin w/ 5 **B**igger? Y or N **B**orrow from 9	☐ 9 2 - 5 **B**egin w/ 5 **B**igger? Y or N **B**orrow from 9	☐ **7 8** **- 2** **8 0** **B**egin w/ 9 **B**igger? Y or N **B**orrow from 6	☐ 7 8 - 2 **B**egin w/ 9 **B**igger? Y or N **B**orrow from 6
☐ 5 4 - 6 **B**egin w/ ____ **B**igger? Y or N **B**orrow from ____	☐ 6 8 - 6 **B**egin w/ ____ **B**igger? Y or N **B**orrow from ____	☐ 7 1 - 3 **B**egin w/ ____ **B**igger? Y or N **B**orrow from ___	☐ 3 7 - 8 **B**egin w/ ____ **B**igger? Y or N **B**orrow from ___
☐ 4 2 - 6	☐ 6 1 - 7	☐ 9 5 - 9	☐ 3 6 - 8

Subtraction 2-1 Digit w/ Regrouping Worksheet 1B

□ 60 - 6 **B**egin w/ ____ **B**igger? Y or N **B**orrow from ____	□ 98 - 9 **B**egin w/ ____ **B**igger? Y or N **B**orrow from ____	□ 71 - 4 **B**egin w/ ____ **B**igger? Y or N **B**orrow from ____	□ 47 - 4 **B**egin w/ ____ **B**igger? Y or N **B**orrow from ____
76 - 9	65 - 6	68 - 2	50 - 3
98 - 9	82 - 5	53 - 3	34 - 9
70 - 3	65 - 9	54 - 5	57 - 5

Subtraction Subskill Set C: 3-3 Digit w/ Regrouping

Teacher Script.

Today we are going to work on some multi-digit subtraction problems that require regrouping. Your packet contains 2 pages. On the first page you will find four rows of problems. The first two rows each has two problems in bold that have the answer. Below the problem you will see the Begin, Bigger, and Borrow strategy is written to help you correctly borrow. There is also a box above the tens and hundreds columns to remind you to rename the ten and/or hundred that you borrowed from. I am going to explain and show you how to correctly complete the first problem, then you will cover the completed problem and do the problem next to it by yourself. As you complete the problem I want you to tell me what you are doing to solve the problem. If you are unsure or do something incorrectly I will help you. When you can correctly complete a problem and describe your steps I will have you complete row 3 by yourself. Remember to use the Begin, Bigger, and Borrow (BBB) strategy you learned before and use the boxes above the tens and hundreds column to help you rename. The problems on the fourth row do not have any of the cues so you can show me how to do them by yourself. If you miss any we will correctly work the problem! Let's start.

Locate the first problem and point to the ones column. You start with the bottom number of the ones column and you see if it is bigger than the top number. If it is you will need to borrow. On the first column the bottom number is __, is this bigger than __? Since it is you will need to borrow from the __ in the tens place. Cross out the __ and write one number below it in the box and write a 1 beside the __ in the ones column. Now subtract __-__ and place the numeral in the ones column. If it is you will need to borrow from the hundreds column. Rename the hundreds column, place a 1 beside the number in the tens column, and subtract __-__ and place the numeral in the tens column. Lastly subtract the __-__ in the hundreds column and write down the numeral. This results in an answer of ___.

Now cover the problem and answer with this piece of paper and attempt the problem next to it. As you are working the problem I want you to tell me what you are doing. If you are unsure or do something incorrectly I will help you. Use the Begin, Bigger, and Borrow strategy to help you complete the problem. When you are finished, uncover the problem and we will see if your answer is correct. If you can't do the problem correctly or you need my help I will help you with the steps and I will have you do the next problem and tell me what you are doing. When you can get the right answer without my help I will have you complete rows 3 and 4 by yourself.

The second page contains multi-digit problems without cues to help you. You will need to complete these by yourself but be careful as sometimes you will have to borrow and other times you will not. If you need help or are unsure what to do, raise your hand and I will help you. After you are done we will check your work to see how many you answered correctly! If you miss any we will correctly work the problem! Let's start.

Subtraction 3-3 Digit w/ Regrouping Worksheet 1A

□□ **856** **-559** **297** BBB	□□ 856 -559 BBB	□□ **534** **-349** **185** BBB	□□ 534 -349 BBB
□□ **662** **-479** **583**	□□ 662 -479	□□ **731** **-697** **34**	□□ 731 -697
□□ 882 -395	□□ 655 -168	□□ 813 -736	□□ 710 -444
978 -669	876 -279	952 -463	863 -697

Subtraction 3x3 Digit w/ Regrouping Worksheet 1B

967 - 426	898 - 302	475 - 236	787 - 627
816 - 624	659 - 292	748 - 672	828 - 693
671 - 269	997 - 736	354 - 164	488 - 392
742 - 643	861 - 597	948 - 463	311 - 279

P-CCC: Multi-Digit Multiplication Teacher Scripts

Multiplication Subskill Set A: 2x1 Digit

Teacher Script.

Today we are going to work on some multi-digit multiplication problems. Your packet contains 2 pages. On the first page you will find four rows of problems. The first two rows each has two problems in bold that have the answer. I am going to explain how to get the answer then you will cover it and do the problem next to it by yourself. As you complete the problem I want you to tell me what you are doing to solve the problem. If you are unsure or do something incorrectly I will help you. When you can correctly complete a problem and describe your steps I will have you complete rows 3 and 4 by yourself. These problems have boxes to remind you to regroup. Let's start.

Locate the first problem and point to the ones column. You start by multiplying this column (__x__) to get an answer of __. You can only write down one number in this column (in this case a __) so you have to carry the __. To do this you move the __ to the box above the next column and carry the __ and place it in the box above the __, please point to the box. Next you multiply the __ by the number in the tens column and then add the __ that was carried to get __. You write down __ to get an answer of __.

Now cover the problem and answer with this piece of paper and attempt the problem next to it. As you are working the problem I want you to tell me what you are doing. If you are unsure or do something incorrectly I will help you. When you are finished, uncover the problem and we will see if your answer is correct. If you can't do the problem correctly or you need my help I will help you with the steps and I will have you do the next problem and tell me what you are doing. When you can get the right answer without my help I will have you complete rows 3 and 4 by yourself. These problems have boxes to remind you to carry. The second page contains multiplication problems but there are no boxes. If you need help or are unsure what to do, raise your hand and I will help you. After you are done we will check your work to see how many you answered correctly! If you miss any we will correctly work the problem! Let's start.

Multiplication 2x1 Digit Worksheet 1A

□ **76** **x 9** **684**	□ 66 x 9	□ **84** **x 7** **588**	□ 84 x 7
□ **97** **x 5** **485**	□ 97 x 5	□ **78** **x 2** **156**	□ 78 x 2
□ 59 x 2	□ 65 x 6	□ 78 x 3	□ 39 x 4
□ 47 x 6	□ 27 x 7	□ 95 x 9	□ 16 + 9

Multiplication 2x1 Digit Worksheet 1B

67 x 6	98 x 9	75 x 4	47 x 4
76 x 3	65 x 6	68 x 2	52 x 3
98 x 9	84 x 5	59 x 3	28 x 4
73 x 3	69 x 9	54 x 5	57 x 9

Multiplication Subskill Set C: 3x2 Digit

Teacher Script.

Today we are going to work on multi-digit multiplication problems. Your packet contains 2 pages. On the first page you will find four rows of problems. The first two rows each has two problems in bold that have the answer. I am going to explain how to get the answer then you will cover it and do the problem next to it by yourself. As you complete the problem I want you to tell me what you are doing to solve the problem. If you are unsure or do something incorrectly I will help you. When you can correctly complete a problem and describe your steps I will have you complete rows 3 and 4 by yourself. Row 3 will have boxes to remind you to regroup and Row 4 you will need to do it by yourself. Let's start.

Locate the first problem and point to the ones column. You start by multiplying this column (__x__) to get an answer of __. You can only write down one number in this column (in this case a __) so you have to carry the __. To do this you move the __ to the box above the next column and carry the __ and place it in the box above the __. Next you multiply __ by __ in the tens column and then add the __ that was carried to get __. You write down __ and carry the __ to the hundreds column.to get an answer of __. Next you multiply __ by the number in the hundreds column and then add the __ that was carried to get __. You write down __. Make a line through the numbers you carried this should leave you with one set of empty boxes.

You follow the same procedures with the number in the tens column in this case the __. But before you start you have to use a place holder (we will use PH to cue this). To do this you put a "0" in the ones column. Next you take the numeral in the tens place of the multiplier (in this case the __) and use the same steps I just used. This will result in two rows of numbers that you will need to add. This results in a final answer of ____.

Now cover the problem and answer with this piece of paper and attempt the problem next to it. As you are working the problem I want you to tell me what you are doing. If you are unsure or do something incorrectly I will help you. When you are finished, uncover the problem and we will see if your answer is correct. If you can't do the problem correctly or you need my help I will help you with the steps and I will have you do the next problem and tell me what you are doing. When you can get the right answer without my help I will have you complete rows 3 and 4 by yourself. We will check these problems to make sure you got the right answers. After this I will have you do the second page of multi-digit problems by yourself. If you need help or are unsure what to do, raise your hand and I will help you. After you are done we will check your work to see how many you answered correctly! If you miss any we will correctly work the problem!

Multiplication 3x2 Digit Worksheet 1A

 **876** **x 34** **2704** **+26280** (PH) **28984**	 876 x 34 (PH)	 **254** **x 46** **1524** **+10160** (PH) **11684**	 254 x 46 (PH)
 **193** **x 57** **1351** **+9650** (PH) **11001**	 193 x 57 (PH)	 **237** **x 28** **1896** **+4740** (PH) **6636**	 237 x 28 (PH)
 888 x 92 (PH)	 659 x 64 (PH)	 787 x 36 (PH)	 798 x 43 (PH)
578 x 61 (PH)	876 x 73 (PH)	958 x 24 (PH)	867 x 95 (PH)

Multiplication 3x2 Digit Worksheet 1B

967 x 26	898 x 42	875 x 36	787 x 57
876 x 24	659 x 32	748 x 92	528 x 93
271 x 69	197 x 36	754 x 64	488 x 92
748 x 43	861 x 97	948 x 63	311 x 79

Multiplication Subskill Set C: 4x3 Digit

Teacher Script.

Today we are going to work on multi-digit multiplication problems. Your packet contains 2 pages. On the first page you will find 4 rows of problems. The first two rows each has two problems in bold that have the answer. I am going to explain how to get the answer then you will cover it and do the problem next to it by yourself. As you complete the problem I want you to tell me what you are doing to solve the problem. If you are unsure or do something incorrectly I will help you. When you can correctly complete a problem and describe your steps I will have you complete row 3 by yourself. Row 3 will have boxes to remind you to regroup. Let's start.

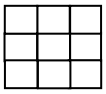
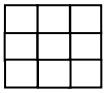
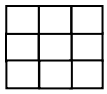
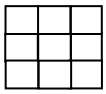
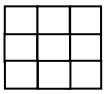
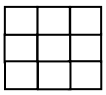
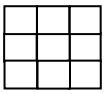
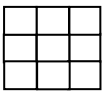
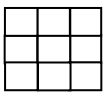
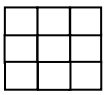
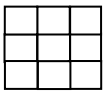
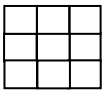
Locate the first problem and point to the ones column. You start by multiplying this column (__x__) to get an answer of __. You can only write down one number in this column (in this case a __) so you have to carry the __. To do this you move the __ to the box above the next column and carry the __ and place it in the box above the __. Next you multiply __ by __ in the tens column and then add the __ that was carried to get __. You write down __ and carry the __ to the hundreds column.to get an answer of __. Next you multiply __ by the number in the hundreds column and then add the __ that was carried to get __. Next you multiply __ by the number in the thousands column and then add the __ that was carried to get __. You write down __. Make a line through the numbers you carried this should leave you with two sets of empty boxes.

Next, you follow the same procedures with the number in the tens column in this case the __. But before you start you have to use a place holder (we will use PH to cue this). To do this you put a "0" in the ones column. Next you take the numeral in the tens place of the multiplier (in this case the __) and use the same steps I just used.

For the final multiplier in the hundreds place you need to use two place holders. To do this you will put two 0's in, one in each the ones and tens column. Next you take the numeral in the hundreds place of the multiplier (in this case the __) and repeat the steps I just used. This will result in three rows of numbers that you will need to add. This results in a final answer of ____.

Now cover the problem and answer with this piece of paper and attempt the problem next to it. As you are working the problem I want you to tell me what you are doing. If you are unsure or do something incorrectly I will help you. When you are finished, uncover the problem and we will see if your answer is correct. If you can't do the problem correctly or you need my help I will help you with the steps and I will have you do the next problem and tell me what you are doing. When you can get the right answer without my help I will have you complete row 3 by yourself. We will check these problems to make sure you got the right answers. After this I will have you do the second page of multi-digit problems. If you need help or are unsure what to do, raise your hand and I will help you. After you are done we will check your work to see how many you answered correctly! If you miss any we will correctly work the problem!

Multiplication 4x3 Digit Worksheet 1A

 **6876** **x 354** **27504** **343800**(PH) **+2062800**(PH) **2434104**	 6876 x 354 (PH) (PH)	 **2541** **x 463** **7623** **152460** (PH) **+1016400** (PH) **1176483**	 2541 x 463 (PH) (PH)
 **4193** **x 357** **29351** **209650** (PH) **+1257900** (PH) **1496901**	 4193 x 357 (PH) (PH)	 **9237** **x 528** **73896** **184740** (PH) **+4618500** (PH) **4877136**	 9237 x 528 (PH) (PH)
 8388 x 292	 2659 x 364	 7587 x 436	 3798 x 743

Multiplication 4x3 Digit Worksheet 1B

7967 x 256	8198 x 472	8275 x 336	7487 x 517
3276 x 214	6159 x 342	7548 x 932	5128 x 543
2731 x 629	1927 x 376	7254 x 614	4878 x 912

P-CCC: Multi-Digit Division Teacher Scripts

Division Subskill Set A: 3÷1 Digit

Teacher Script.

Today we are going to work on some multi-digit division problems. Your packet contains 2 pages. On the first page you will find four rows of problems. The first two rows each has two problems in bold that have the answer. I am going to explain how to get the answer then you will cover it and do the problem next to it by yourself. As you complete the problem I want you to tell me what you are doing to solve the problem. If you are unsure or do something incorrectly I will help you. When you can correctly complete a problem and describe your steps I will have you complete rows 3 and 4 by yourself. The problems in row 3 have lines to help you correctly organize your columns and the problems in row 4 you will have to do by yourself. If you need help or are unsure what to do, raise your hand and I will help you. Let's start.

Multi-digit division problem are difficult for many students because we use some different strategies to solve them. For example, with most problems you work starting with the smallest number in the ones column and work to the left but with division, you start with the largest part of the number and work to the right. I will show you how to do it and you will use what you already know about multiplication to solve the division problems.

Locate the first problem. The larger number is called the dividend and the smaller number is called the divisor. To solve a division problem you begin by comparing the divisor to the first number to the right. If it is smaller then you begin, if it is larger you combine the first two numbers and begin. For this problem the divisor is __ and the first number to the right is __. It is smaller than the __ so we look at the first two numbers to the right and begin. Now you will use your skills of multiplication and estimation to solve this part of the problem. You take the divisor __ and calculate what number times the divisor either equals or comes closest to the dividend without going over. In this case __ x __ = __. You take the __ and place it directly above the tens column and take the value of the multiplied problem and place it under the __. You subtract the difference of the problem (__-__=__) and drop the __ in the ones column. Repeat these procedures to finish the problem. The divisor, __ x __ = __. You write the answer in the ones column and because the answer is zero the problem is solved.

Now cover the problem and answer with this piece of paper and attempt the problem next to it. As you are working the problem I want you to tell me what you are doing. If you are unsure or do something incorrectly I will help you. When you are finished, uncover the problem and we will see if your answer is correct. If you can't do the problem correctly or you need my help I will help you with the steps and I will have you do the next problem and tell me what you are doing. When you can get the right answer without my help I will have you complete rows 3 and 4 by yourself. These problems have lines to help you correctly align columns. The second page contains division problems but there are no boxes. If you need help or are unsure what to do, raise your hand and I will help you. After you are done we will check your work to see how many you answered correctly! If you miss any we will correctly work the problem! Let's start.

Division 3÷1 Digit Worksheet 1A

63 3|189 -18 09 -9 0	3|189 - -	56 6|336 -30 36 -36 0	6|336 - -
84 8|672 -64 32 -32 0	8|672 - -	127 7|889 -7 18 -14 49 -49 0	7|889 - - -
3|952	9|954	5|635	4|396
6|522	2|824	8|440	7|441

Division 3÷1 Digit Worksheet 1B

$3\overline{)285}$	$6\overline{)444}$	$4\overline{)408}$	$9\overline{)549}$
$7\overline{)273}$	$2\overline{)976}$	$5\overline{)995}$	$8\overline{)512}$
$6\overline{)744}$	$5\overline{)525}$	$2\overline{)122}$	$7\overline{)721}$
$9\overline{)882}$	$4\overline{)748}$	$3\overline{)723}$	$8\overline{)896}$

Division Subskill Set A: 3÷1 Digit w/ Remainder

Teacher Script.

Today we are going to work on some multi-digit division problems. Your packet contains 2 pages. On the first page you will find four rows of problems. The first two rows each has two problems in bold that have the answer. I am going to explain how to get the answer then you will cover it and do the problem next to it by yourself. As you complete the problem I want you to tell me what you are doing to solve the problem. If you are unsure or do something incorrectly I will help you. When you can correctly complete a problem and describe your steps I will have you complete rows 3 and 4 by yourself. The problems in row 3 have lines to help you correctly organize your columns and the problems in row 4 you will have to do by yourself. If you need help or are unsure what to do, raise your hand and I will help you. Let's start.

You just finished learning how to do multi-digit division. However, all the problems you practiced were able to be divided with exact answers. For many division problems to be solved you will need to use a remainder to represent left over amounts or use decimals to provide exact answers (more on decimals later).

Locate the first problem. Remember, to solve a division problem you begin by comparing the divisor to the first number to the right. If it is smaller then you begin, if it is larger you combine the first two numbers and begin. For this problem the divisor is __ and the first number to the right is __. It is smaller than the __ so we look at the first two numbers to the right and begin. Now you will use your skills of multiplication and estimation to solve this part of the problem. You take the divisor __ and calculate what number times the divisor either equals or comes closest to the dividend without going over. In this case __ x __ = __. You take the __ and place it directly above the tens column and take the value of the multiplied problem and place it under the __. You subtract the difference of the problem (__-__=__) and drop the __ in the ones column. Repeat these procedures to finish the problem. The divisor, __ x __ = __. You write the answer in the ones column. In the past this has always been zero because the divisor could be divided into an exact whole number amount. But with these problems you will need to write down the amount left over, called a remainder. This problem has a remainder of __. We write this next to the whole number after a capital R or R__.

Now cover the problem and answer with this piece of paper and attempt the problem next to it. As you are working the problem I want you to tell me what you are doing. If you are unsure or do something incorrectly I will help you. When you are finished, uncover the problem and we will see if your answer is correct. If you can't do the problem correctly or you need my help I will help you with the steps and I will have you do the next problem and tell me what you are doing. When you can get the right answer without my help I will have you complete rows 3 and 4 by yourself. These problems have lines to help you correctly align columns. The second page contains division problems but there are no boxes. If you need help or are unsure what to do, raise your hand and I will help you. After you are done we will check your work to see how many you answered correctly! If you miss any we will correctly work the problem! Let's start.

Division 3÷1 Digit Worksheet 1A

94 R 2 3 | 284 -27 14 -12 2	3 | 284 - -	39R3 6 | 237 -18 57 -54 3	6 | 237 - -
71R7 8 | 575 -56 15 -08 7	8 | 575 - -	126R2 7 | 884 -7 18 -14 44 -42 2	7 | 884 - - -
3 | 951	9 | 950	5 | 632	4 | 394
6 | 520	2 | 823	8 | 442	7 | 445

Division 3÷1 Digit Worksheet 1B

$3\overline{)283}$	$6\overline{)440}$	$4\overline{)406}$	$9\overline{)543}$
$7\overline{)278}$	$2\overline{)975}$	$5\overline{)991}$	$8\overline{)515}$
$6\overline{)743}$	$5\overline{)522}$	$2\overline{)123}$	$7\overline{)725}$
$9\overline{)888}$	$4\overline{)747}$	$3\overline{)725}$	$8\overline{)892}$

Division Subskill Set A: 3÷1 Digit w/ Decimals

Teacher Script.

Today we are going to work on some multi-digit division problems. Your packet contains 2 pages. On the first page you will find three rows of problems. The first two rows each have two problems in bold that have the answer. I am going to explain how to get the answer then you will cover it and do the problem next to it by yourself. As you complete the problem I want you to tell me what you are doing to solve the problem. If you are unsure or do something incorrectly I will help you. When you can correctly complete a problem and describe your steps I will have you complete row 3 by yourself. The problems in row 3 have lines to help you correctly organize your columns. If you need help or are unsure what to do, raise your hand and I will help you. Let's start.

You just finished learning how to do multi-digit division with a remainder. To arrive at a more exact answer you can continue to complete the problem using decimals. For the purposes of this task we will stop at either the tenths or the hundredths place (1 to 2 numbers to the right of the decimal). Locate the first problem. Remember, to solve a division problem you begin by comparing the divisor to the first number to the right. If it is smaller then you begin, if it is larger you combine the first two numbers and begin. For this problem the divisor is __ and the first number to the right is __. It is smaller than the __ so we look at the first two numbers to the right and begin. Now you will use your skills of multiplication and estimation to solve this part of the problem. You take the divisor __ and calculate what number times the divisor either equals or comes closest to the dividend without going over. In this case __ x __ = __. You take the __ and place it directly above the tens column and take the value of the multiplied problem and place it under the __. You subtract the difference of the problem (__-__=__) and drop the __ in the ones column. Repeat these procedures to finish the problem. The divisor, __ x __ = __. You write the answer in the ones column. In the past this has always been zero because the divisor could be divided into an exact whole number amount. But with these problems you will need to continue using these procedures until you arrive at a zero or write an answer in the hundreds place. Some of these problems could go on for much longer but we are focusing on the procedures of working left to right and keeping your columns even.

Now cover the problem and answer with this piece of paper and attempt the problem next to it. As you are working the problem I want you to tell me what you are doing. If you are unsure or do something incorrectly I will help you. When you are finished, uncover the problem and we will see if your answer is correct. If you can't do the problem correctly or you need my help I will help you with the steps and I will have you do the next problem and tell me what you are doing. When you can get the right answer without my help I will have you complete row 3 by yourself. These problems have lines to help you correctly align columns. The second page contains division problems but there are no boxes. If you need help or are unsure what to do, raise your hand and I will help you. After you are done we will check your work to see how many you answered correctly! If you miss any we will correctly work the problem! Let's start.

Division 3÷1 Digit Worksheet 1A

37.6 5 188.0 -15 38 -35 30 -30 0	5 188. -	88.76 3 266.22 -24 26 -24 22 -21 12 -12 0	3 266.22 -
94.28 2 188.56 -18 08 -8 05 -04 16 -16 0	2 188.56 -	71.28 7 499. -49 09 -7 20 -14 60 -56 4	7 499. -
8 589. -	3 121. -	6 388. -	9 128. -

Division 3÷1 Digit Worksheet 1B

$3\overline{)285.4}$	$2\overline{)553.74}$	$6\overline{)585.7}$	$9\overline{)585.5}$
$8\overline{)185.3}$	$4\overline{)385.6}$	$5\overline{)285.45}$	$7\overline{)685.5}$
$3\overline{)137.}$	$5\overline{)284.}$	$7\overline{)555.}$	$8\overline{)475.8}$