

DETERMINING THE CORRECT INTERVENTION  
BASED ON INTIAL FLUENCY: A COMPARISON OF  
EXPLICIT TIMING AND COVER, COPY, COMPARE.

By

CARROL A. SMITH

Bachelor of Arts in Psychology  
University of Arkansas  
Fayetteville, AR  
2012

Master of Science in Educational Psychology  
Oklahoma State University  
Stillwater, OK  
2013

Submitted to the Faculty of the  
Graduate College of the  
Oklahoma State University  
in partial fulfillment of  
the requirements for  
the Degree of  
DOCTOR OF PHILOSOPHY  
May, 2017

DETERMINING THE CORRECT INTERVENTION  
BASED ON INTIAL FLUENCY: A COMPARISON OF  
EXPLICIT TIMING AND COVER, COPY, COMPARE.

Dissertation Approved:

Brian Poncy

---

Dissertation Adviser

Gary Duhon

---

Terry Stinnett

---

Robert Davis

---

## ACKNOWLEDGEMENTS

I would like to acknowledge several people for the contributions to my dissertation. First I would like to the Stillwater Public Schools and its administrators, students, and teachers for providing me with the opportunity to conduct my study in their classrooms. I would also like to thank my research assistants, Chase Kitterman, Justin Bullard, Daniel Anderson, Angela Taylor, Meredith Webber, Sam Mason, Hannah Rowsey, and Justine Celoni for assisting in the data collection process.

I would particularly like to thank the members of my committee and my professors at Oklahoma State University. Dr. Solomon for his statistical advise, expertise and guidance throughout this process. Dr. Duhon for his continued support and mentorship throughout my graduate career. Dr. Davis for his continued support throughout this process. Dr. Stinnett and Dr. Rich for their guidance in teaching me about integrity and defensibility in the realm of clinical assessment. Dr. Yetter for her continued support throughout my graduate career and insistence upon continuing. I would especially like to thank my advisor Dr. Poncy for his expertise in mathematic intervention, research, and support through this process.

Name: CARROL A. SMITH

Date of Degree: MAY, 2017

Title of Study: DETERMINING THE CORRECT INTERVENTION BASED ON  
INITIAL FLUENCY: A COMPARISON OF EXPLICIT TIMING AND  
COVER, COPY, COMPARE.

Major Field: SCHOOL PSYCHOLOGY

Abstract: There has been an increase of students falling below proficient on mathematics assessments. This increases the demand for high quality interventions to address these issues. Previous research by Coddling et al. (2007), has suggested that intervention selection could be made based upon a student's pattern of responding. The current study attempted to replicate that study and validate those findings. The instructional hierarchy model was used to inform the progression of student's skill mastery. It was assumed that all students had already achieved the first step in the instructional hierarchy and the focus was placed upon the second step, fluency. Students were randomly assigned to one of two treatment conditions: Cover, Copy and Compare or Explicit Timing. The findings of the current study did not provide sufficient evidence to support the claim made by Coddling et al. (2007).



## TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION.....	1
Purpose .....	2
II. REVIEW OF LITERATURE .....	4
Instructional Hierarchy .....	4
Interventions .....	8
Cover, Copy, and Compare .....	8
Explicit Timing .....	11
CCC vs. ET .....	12
III. METHODOLOGY .....	14
Participants .....	14
Experimental Design and Analysis .....	14
Independent Variables and Dependent Variables.....	15
Materials .....	16
Procedures .....	17

Chapter	Page
IV. RESULTS.....	20
V. DISCUSSION.....	25
Research Questions .....	25
Implications for Practice.....	26
Limitations and Future Research.....	27
REFERENCES .....	29
APPENDICES .....	32

## LIST OF FIGURES

Figure	Page
1 .....	22
2 .....	23
3 .....	24
4 .....	24

## CHAPTER I

### INTRODUCTION

The prevention and remediation of academic skills is an essential component of Response to Intervention (RtI) models. An academic area where students often show skill deficits is mathematics (Skinner, Bamberg, Smith & Powell, 1993). In 2013, fifty-eight percent of fourth grade students who completed National Assessments of Educational Programs (NAEP) assessment in mathematics fell below proficient (The Nation's Report Card, 2013). The NAEP assesses students' ability to apply their knowledge and acquired skills in mathematics to problem solving (The Nation's Report Card, 2015). This assessment measures five different domains of mathematics: number properties and operations, measurement, geometry, data analysis, statistics, and probability, and algebra. For eighth graders who also participated in the NAEP assessments, sixty-four percent fell below proficient (TNRC, 2013).

As of 2015 the percentage of students falling below on assessments in mathematics has increased. According to the Nations report card for 2015 sixty percent of fourth graders fell below proficient on national mathematics assessments, an increase of an additional two percent of students falling below proficient. For eighth graders this percentage has increased to sixty-seven percent from sixty-four percent in 2013, an increase of three percent (TNRC, 2015). This increase may seem like a very small number but when considered that these percentages are

nation-wide, this is quite concerning. These results suggest that achievement in mathematics is steadily declining and raises concern for educators across the nation. Given the amount of students not meeting goals in mathematics achievement it is important that educators be given tools to appropriately match student needs with intervention strategies that can prevent these students from falling further behind. These tools should include high quality interventions with extensive research to support their effectiveness in remediating deficits in mathematics.

## **Purpose**

Although studies have been done that suggest the interaction between initial level of basic fact fluency and intervention efficacy, this hypothesis has never been directly tested. Defining initial level of basic fact fluency does not have a recognized criterion nor is there a standardized sequence in which mathematics skills should be instructed. Previous research conducted by Coddington et al., (2007) has investigated this post-hoc but did not randomize groups to test the hypothesis prior to intervention implementation. Coddington et al. (2007) used a fluency criterion suggested by Deno and Mirkin (1977) for their post-hoc investigation. Deno and Mirkin (1977) suggested that students had reached mastery if their digits correct per minute (DCPM) were 20 or more with no more than two errors and those students with 10-19 DCPM with three-seven errors were in the instructional range and DCPM less than or equal to nine with more than eight errors was considered frustrational. Due to the lack of standardized scope and sequence, educators are unsure of the best interventions to implement to decrease deficits. The purpose of the current study was to extend this line of research by conducting a study that experimentally investigates the interaction between fluency level and intervention selection. Specifically, it is hypothesized that students with an initial level of fluency below 20 DCPM would be more successful in the Cover, Copy, and Compare (CCC) treatment condition; whereas students with an initial fluency level above 20 DCPM would be more successful in the Explicit Timing (ET) treatment condition.

The current study attempted to validate the claims made by Coddington et al. (2007). However the data obtained from the current study did not provide sufficient evidence to support those claims. The Instructional Hierarchy (IH) was used to inform the progression of skill development. There is a multitude of prior research to support the progression of skill development in the IH, beginning with acquisition and moving through to adaptation. Research conducted by Lannie and Martens (2008) provided evidence that supports that a student must first be accurate with a skill before they can become fluent. Data obtained by Lalli and Shapiro (1990) support the use of modeling as a useful technique for increasing students accuracy. Results from a study conducted by Ardoin, McCall, and Klubnik (2007) supports the IH for using techniques of drill, practice and reinforcement for building generalization.

There are a multitude of math interventions used for students with deficits in mathematics. Some that have an extensive research base include CCC and ET. There are several different versions of CCC including those with cognitive, vocal or written components. Cover, Copy, and Compare provides student with a model and immediate feedback, preventing the practice of incorrect responses. Explicit Timing includes variations of time given to complete problems. For both CCC and ET reinforcement and goal setting can be paired as additional tools to increase a student's rate of responding.

For this study all students must have first completed the first stage of the IH, acquisition, to participate in the study. The main focus of the current study was to increase students' fluency level. Seventy-six third grade students were randomly assigned to one of two treatment conditions: CCC or ET. Based on students' initial accuracy they worked on either addition or subtraction. Students were first trained in the condition they were assigned to and the administrators checked for understanding. The intervention was conducted five days a week. This intervention occurred first thing in the morning before class began. Intervention assessments were conducted in the afternoons on an average of every three days.

## CHAPTER II

### REVIEW OF LITERATURE

#### **Instructional Hierarchy**

One approach to match patterns of student responding with specific instructional strategies is the Instructional Hierarchy (IH; Haring & Eaton, 1978; Lannie & Martens, 2008). The IH suggests that there are four stages children go through to fully develop a skill. According to Haring and Eaton (1978) the first of these stages is acquisition, where children start to show they can accurately perform a skill. During this phase it is important that accuracy be stressed to aid in skill development. When developing a skill in the acquisition stage, one can use techniques such as demonstration, cues, modeling, and immediate feedback. Demonstration occurs when the teacher shows the student how to execute a particular skill. Cues are things in the student's environment that assist them in correctly performing a skill. Modeling is the presentation of an example of a particular skill or a sequence of steps to follow (p. 26) and immediate feedback occurs when the teacher provides the student with whether he/she correctly responded to the problem.

The next step in developing a skill is to build fluent (i.e., accurate and fast) responding. During this stage the child performs skills slowly albeit accurately. Haring and Eaton (1978) provide several different definitions for fluency. One of these is the ability to carry out a task in a manner similar to peers with a focus on the speed, or automaticity, of responding. The level of

fluency demonstrated by the student is not the same across all skills and is a product of the behavior and setting in which it occurs (Daly, Lentz & Boyer, 1996). During this stage of skill development, instructional techniques such as drill and repeated practice need to be used to increase the rate of student responding (Haring and Eaton, 1978). Another helpful component that can be added during this stage is reinforcement. Reinforcement is useful as it is used to increase a student's motivation when doing repetitive activities (Haring and Eaton, 1978). This stage is followed by generalization.

Generalization is the student's ability to produce a correct response to a new stimulus that is similar to those in the original learning environment (Haring and Eaton, 1978). The authors suggest that students who are in this stage will benefit from two types of structured practice activities to increase the generalization of a skill: discrimination training and differentiation. Discrimination training consists of teaching a student to give a particular response when presented with a specific stimulus (Catania, 1968). For example, a student is taught to do subtraction when presented with " - " in a math problem; however, they would not respond by using subtraction if they were presented with " + " in a math problem. When using discrimination practice the student should be given multiple opportunities to provide the correct response. Differentiation can be observed when providing reinforcement for an accurate response to a stimulus, even though an important part of the stimulus has been changed (i.e. the amount of time presented). One can examine the effect of practice on generalization by presenting the student with a similar but different task (Haring and Eaton, 1978). For example, one may assess if a student can do addition problems that are presented horizontally on a page, as well as vertically. If the student can accurately complete the addition problems, regardless of presentation, then one can confidently say that generalization has occurred.



The final stage of the Instructional Hierarchy is adaptation. Haring and Eaton (1978) describe adaptation as the stage where children develop the ability to perform a skill in the way required by the situation they are in, even if it is different from how they have performed the same skill in the past. It is suggested that techniques such as problem solving and simulations be used to increase skill adaptation. The third and fourth stages of the instructional hierarchy are argued by Haring and Eaton (1978) to be the most important, because student will encounter many different situations in life where they will need to generalize and adapt the skills they have learned in order to respond appropriately to each situation. There is no possible way for a teacher to instruct students on how to appropriately respond to each situation they will face in their lives.

Knowing these stages of skill development can be very beneficial in choosing an appropriate intervention. If a student were in the acquisition stage one would not want to choose an intervention that only included instructional components used to build fluency. In their special series article, Ardoin and Daly (2007) stress the importance of using relevant data to inform intervention selection per the IH. Moreover, they state that IH allows researchers to “analyze the conditions under which empirically based or scientifically supported practices apply to individual students...” (p.4).

Multiple studies in the past have attempted to validate the use of the IH for informing intervention. Among these, was a study conducted by Lannie and Martens (2008) with four African American fifth-grade students. Each student was given multiplication probes based on baseline performance. Each participant was then trained to self-monitor on-task behavior, accuracy, and productivity, each at a different phase. Lannie and Martens used the IH to inform the sequence for skills in the study. Results supported that accuracy in a skill should be accomplished before building fluency (Lannie & Martens, 2008).

A study conducted by Lalli and Shapiro (1990) found that there was no significant differences between self-monitoring with contingent reward for increasing accuracy of sight words. In this study, self-monitoring incorporated a modeling component and was shown to increase accuracy of responding to sight words (Lalli & Shapiro, 1990). This finding supports Haring and Eaton's (1978) suggestion of modeling as a useful technique in increasing skill acquisition. Because there was not a significant difference between the two treatment groups, one can infer that reward/reinforcement was not required for the participants to increase their accuracy of the targeted skill.

Ardoin, McCall, and Klubnik (2007) conducted a study comparing two reading interventions on the level of generalization seen across reading passages. Their study included six regular education students at a third-grade instructional level for reading. The students' instructional level was determined by administering Curriculum-Based Measurement (CBM). The researchers used an alternating treatment design that included two treatment conditions: RR and modified RR; and each condition included six sets of passages (p. 58).

In the RR condition of the Ardoin et al. 2007 study, the students first read passage C followed by a listening passage preview (LPP) of passage A read by the experimenter. They then read passage A four times, 2-minutes each. After each read the experimenter then conducted a phase drill error correction (PD) on words read incorrectly. If students continued to miss the same words on the 2<sup>nd</sup> – 4<sup>th</sup> reads, the experimenter would conduct syllable segmenting and blending. A post reading of passage C followed this. Each time the student read passage C, they were given a goal criterion of words read correct per minute (WRCM) and a specific number of errors they could make if they beat the goal they were offered reinforcement. In the modified RR condition of the same study, the students also performed a pre and post read of passage C with a goal criterion, exactly like the RR condition (Ardoin, McCall, & Klubnik, 2007). Following the pre-reading, the experimenter conducted a LPP of passage A. Each student then read passage A two

times and passage B two times. For both passages, A and B, error correction was carried out in the same manner as the RR condition (p.60).

Results showed that the RR condition produced better generalization across similar passages (Ardoin et al., 2007). The researchers attributed this to the increased amount of drill in the RR condition. These findings support Haring and Eaton's (1978) suggestions that drill, practice and reinforcement can be used to increase fluency and generalization (p.69). The results also support the need for fluency to be developed before generalization will occur.

## **Interventions**

There are several different types of math interventions available to help children become more proficient. Two empirically-validated interventions include Cover, Copy, and Compare (CCC) and Explicit Timing (ET). Both of these are popular interventions because they can be administered in a group or individual context and are low effort tasks for teachers. Consistent with the recommendations of the IH, CCC has been shown to increase both accurate and fluent responding, while ET has been shown to increase fluent but not accurate responding. Although never directly compared it is assumed that selecting the correct approach between CCC and ET will depend on the response pattern of the child (i.e. accuracy or fluency).

### **Cover Copy and Compare**

Although there are numerous variations of CCC the basic procedures are the same. Specifically, the student is presented with a model, looks at the model and says it, covers the model, completes a problem, and uncovers the model to check for accuracy. The CCC intervention has been validated across populations, skills, and settings.

One Version of CCC is Cognitive-Cover, Copy, and Compare (C-CCC). Skinner, Bamberg, Smith and Powell (1993) explain that C-CCC occurs when students look at the problem

and answer, cover the problem and answer, say the problem and answer to themselves, and uncover the model to see if they were correct. Skinner et al. (1993) also discusses other version of CCC. A second version of CCC is Vocal-Cover, Copy, and Compare (V-CCC). Vocal-Cover, Copy, and Compare is similar to C-CCC except that the students say their response out loud. A third variation is Written-Cover, Copy, and Compare (W-CCC). With W-CCC, the first two steps are the same as the other versions of CCC already mentioned. However, when students get to the third step they write the problem and answer on a sheet of paper and then compare to the original (Skinner et al., 1993; Skinner, McLaughlin & Logan, 1997). Written-CCC is the only version of these three that allows for permanent products to be collected to evaluate the students' responses.

Cover, Copy, and Compare has other versions such as answer only and paired responding. Answer only CCC consists of the problem and answer being shown in the left column and the problem only being presented in the right column, without the answer. This intervention requires that the students write the answer after covering the original problem. The final version of CCC is paired responding. Paired responding is similar to W-CCC except for an additional step is required; the student must say the problem and answer to themselves two times and put a check mark in one box to the right of the problem after each time they say the problem and answer.

Cover, Copy, and Compare is designed in such a way that students get immediate feedback on their performance, which in turn prohibits the practice of inaccurate responses (Skinner, McLaughlin, and Logan, 1997). Another strength of CCC is that it is not time consuming and offers students the opportunity to complete learning trials in a small amount of time (Skinner et al., 1997). This intervention can be used to improve upon other skills besides math, such as spelling and geography (Skinner, Belfair, & Pierce, 1991; McLaughlin, Mabee, Reiter, & Byram, 1991).

In a study conducted by Poncy, Skinner, and Jaspers (2007), the researchers compared the effectiveness of two math fact fluency building interventions: CCC (traditional) and Taped Problems (TP). Taped problems is an intervention designed to increase accuracy and automaticity on basic math facts (Poncy et al., 2007). During TP the student(s) will have an audio recording played for them with someone reading a series of math problems and answers. The student's goal is to write down the answer to the problem before it is stated in the recording. For this study, the student was instructed to cross out incorrect answers and write the correct answer (Poncy et al., 2007). This student was conducted with a 10-year old female diagnosed as moderate Intellectually Disabled. She received both treatment conditions, in which she worked on simple addition skills (3 sets). Baseline was take over four sessions, following with another session was conducted to explain and model the treatment conditions for her. The treatment conditions were counterbalanced across two daily sessions: morning and afternoon. After each treatment session her performance was assessed. She was also assessed on the control set of problems every other day.

The researchers found that both treatment conditions increased their performance. They also found that TP was as effective as CCC at increasing her accuracy and automaticity (Poncy et al., 2007). For the student, TP took her 30% less time to complete compared to CCC (Poncy et al., 2007). Although this study shows that TP is just as effective as CCC at increasing accuracy and automaticity on math facts, TP may not always be a feasible option for intervention. The availability of resources and the environment will greatly influence the type of intervention chosen to use.

Cover, Copy, and Compare has also been combined with goal setting to increase fluent responding (Coddington, Chan-Iannetta, Palmer, & Lukito, 2009). In this study, there were two different forms of goal setting in this study: goal setting based on problems correct and goal setting based on errors made. One hundred seventy three third-grade students participated in this

study; all students were in the beginning stages of fluency building on subtraction before implementation of the intervention. Participants were assigned to one of three groups: control, CCC + GSC (goal-setting correct) and CCC + GSE (goal-setting errors). The control group was given a 2-minute probe twice weekly to assess their skill progress. The two treatment conditions were given a graph that either represented the number of correct responses or the number of errors made, depending upon treatment group. Once they were then shown their new goal, they were then administered a 2-minute probe, followed by a 3-minute CCC-answer only packet. Coddington et al. (2009) found that those in the CCC + GSC treatment condition overall had higher scores by the end of the intervention period, made greater gains between treatment sessions, and made faster progress. In terms of retention and generalization, this group was also more successful. All groups made some gains but the CCC + GSC group had the most significant gains in all areas.

### **Explicit Timing**

Explicit Timing (ET) is an antecedent timing procedure that has been used to increase a person's rate of responding to academic stimuli, such as, math facts (Schutte et al., 2015). Explicit Timing is used in conjunction with instructional components such as drill, practice, and reinforcement. When using ET procedures, a student is given a task that they can carry out accurately, and the student is told they will be given a certain amount of time to complete as much of the task as possible (Schutte et al., 2015). Variations of ET can include differences in the length of time given, how much to split up a time period, how feedback is given to students and how reinforcement is paired with the intervention. Explicit Timing simply consists of adding a time limit to the work being completed by a student, and having the student mark where they stopped. Similar to CCC, instructional components such as goal setting, performance feedback, and reinforcement can be combined with ET to increase learning rates. That being said research has shown that simply telling a student they are being timed will increase problem completion

rates (Rhymer & Morgan, 2005; Van Houten & Thompson, 1976). Rhymer, Henington, Skinner, and Looby, (1999), conducted an experiment to evaluate whether or not an explicit timing procedure would result in similar increases in fluency rates for Caucasian and African American students. There were 86 participants; 68 were African American and 18 were Caucasian. There were two conditions: Control (no time limit) and Explicit Timing. All participants received both conditions. Students were divided into two groups: one group received the ET condition followed by the Control condition and the other group received the conditions in reverse order. The results showed that ET produced a higher rate of problems completed regardless of ethnicity. Overall, ET was more effective for increasing the number of problems completed than the Control condition (Rhymer et al., 1999).

Rhymer et al. (1999) set out to evaluate the effect of the level of skill difficulty on the effectiveness of ET. Three types of skills were assessed: single digit addition, 3 x 3 digit subtraction, and 3 x 3 multiplication. There were two timing conditions: timed vs. untimed. Participants consisted of 154 sixth-grade students, of which there were 28 males and 26 females. All students were assessed on all three math skills and participated in both timing conditions. The results indicated that student performance was better when the skill was easier. The results also indicated that ET was effective for increasing the number of problems completed per minute.

### **CCC vs. ET**

Codding et al. (2007) conducted a study comparing CCC, ET, and a control condition to determine if either CCC or ET produced a higher increase in digits correct per minute (DCPM). This study include 98 second- and third- grade students. The researchers conducted a survey level curriculum-based assessment (CBA) to determine what the target skill would be for all students. After conducting the CBA, it was determined that the students' highest need was in the skill of

subtraction. The participants were randomly assigned to one of three conditions: CCC, ET, or control. The intervention was conducted two times per week for six weeks.

Codding et al. (2007) had students in all three treatment groups complete one 2-minute probe each day without receiving feedback on performance. Then the students in the intervention conditions receive their CCC or ET intervention. The CCC group was given CCC-answer only probes to work on for five minutes. The ET group was given a packet of probes containing single-digit subtraction problems. They completed five 1-minute ET trials. Both treatment groups received the same amount of intervention time.

The study was designed to compare CCC to ET with no significant difference in results. However, a subsequent analysis was done splitting student scores based off of initial fluency rates. These results showed that students' initial level of fluency prior to intervention had a significant impact on their overall performance. This interaction was shown to be a significant predictor of the students overall performance and of their rate of improvement across the intervention. They also found that students with a higher number of errors at the beginning of the study experienced faster rates of improvement. Codding et al. (2007) found that ET was effective for students whose fluency fell within the instructional range at the beginning of the study, while CCC was found to be a better intervention for students whose fluency at the beginning was in the frustrational range. Although this study was not designed to evaluate the effect of initial fluency rates with CCC and ET, results suggest that practitioners may want to differentiate which approach they use based on students' rate of fluency before beginning intervention.

In a study conducted by Rhymer et al. (1998) ET procedures were used to determine if ET would increase both, problem completion and accuracy levels, in third-grade African American students. They found that the ET procedure increased the number of problems completed for all groups, but it also decreased the groups' accuracy for problems completed. This



study did not address students' accuracy, therefore, the decrease in accurate math facts (Rhymer et al., 1998). The results of this study support the importance of choosing the correct intervention to use with students based upon their current skill levels.

## CHAPTER III

### METHODOLOGY

#### **Participants**

Participants included 76, third-grade students from a Title One elementary school in the Midwest region of the United States. There were 28 females and 48 males between the ages of 8 years old to 10 years old. Of the students that participated in this study there were 10 Hispanic/Latino, one American Indian, seven African American, 49 Caucasian, and nine that identified as being two or more races. There were a total of 11 students that were excluded from the study. The nutrition department indicated that 57% of the students in third grade were on free/reduced lunch. The school in which this study was conducted was already participating in a math intervention that is run daily. This study replaced that intervention.

#### **Experimental Design and Analysis**

This was a 2 x 4 randomized block design in which all students practiced for the same period of time regardless of treatment condition. The data were analyzed using hierarchical linear modeling (HLM). “Hierarchical linear modeling is a complex form of ordinary least squares (OLS) regression that is used to analyze variance in the outcome variables when the predictor variables are at varying hierarchical levels” (Woltman, Feldstain, MacKay, & Rocchi, 2012, p.52). This model is useful because the variance shared among the hierarchically structured data is taken into account (Hoffman, 1997). This type of model is often seen across many different disciplines including but not limited to business, education, and social work (Woltman et al.,

2012).

### **Independent and Dependent Variables**

Independent variables in this study included the time limit (4 minutes), treatment condition (CCC or ET), students' initial level of fluency, and the math probes (addition or subtraction). Dependent variables included DCPM and accuracy. Digits correct per minute was a measure of student's rate of fluency. Accuracy was measured by dividing the number of digits correct by the number of digits completed and then multiplying by 100.

### **Materials**

A computer program was used to randomly generate intervention and assessment materials for this study. The target skills were subtraction from 18 and addition to 18. A set of 12 problems was used with reciprocals, totaling 24 problems. Initial assessment materials were ET sheets of which each student completed three per skill. All students were assessed on addition and subtraction. Students were given ET worksheets with eight columns by nine rows of problems, totaling 72 problems per page. The subtraction pages were 4A, 3A, and 1A in that order. The Addition pages were 6A, 2A, and 3A in that order. See appendix J. Scripts were provided to the administrators to follow when conducting the initial assessment. See appendix A. The observer was given a copy of the script to follow and check off as completed by the administrator. See appendix B.

Training materials consisted of student training protocols for both CCC and ET groups, a practice worksheet and checklist for the observer. See appendices C and D for training protocols. The CCC group received one CCC worksheet with four columns by six rows of problems, totaling 24 problems. See appendices I and K. The ET group received one ET practice worksheet with eight columns by nine rows of problems, totaling 72 problems per page. See appendices J and L. The checklist for the observer contained the directions being read by the administrator,

blank space for start time, end time, date, name of administrator, and name of observer. See appendix.

Intervention materials were similar to that of the training materials. The CCC sheets were four columns by six rows of problems, totaling 24 problems per page. See appendices I and K. The ET sheets were eight columns by nine rows of problems, totaling 72 problems per page. See appendices J and L. Administrators were given a script to read the directions from daily. See appendix E. Observers were given a checklist to follow that included the directions on the administrator's script, blank space for start time, end time, date, name of administrator, and name of observer. See appendix F.

Intervention assessment materials were similar to that of the initial assessment materials. The ET sheets were eight columns by nine rows of problems, totaling 72 problems per page. See appendices J and L. Administrators were given a script to read the directions from. See appendix G. Observers were given a checklist to follow that included the directions on the administrator's script, blank space for start time, end time, date, name of administrator, and name of observer. See appendix H.

## **Procedures**

Curriculum based measurement (CBM) procedures were used to determine the students' initial level of fluency. During the first session students were given three math probes with subtraction problems and given one minute per probe to complete as many problems as they could. The number of DCPM was calculated by counting up the number digits correctly completed for each probe. Accuracy was calculated by counting up the number of digits correctly completed for each probe and divided by the number attempted, then multiplied by 100 to get their percentage correct. During the second session students were given three math probes with addition problems and given one minute per probe to complete as many problems as they could.

The number of DCPM was calculated by counting up the number digits correctly completed for each probe. Accuracy was calculated by counting up the number of digits correctly completed for each probe and divided by the number attempted, then multiplied by 100 to get their percentage correct. Students were assigned to skill (subtraction or addition) based on their initial performance. This was determined by an accuracy level of 85% or higher. Students with accuracy rates below 85% on both subtraction and addition were excluded from the study.

Students were randomly assigned to one of two treatment conditions: CCC or ET. This was done by rank ordering the students based on their initial fluency level: greatest to least. Then using a random generator to split the students into the two treatment conditions. This resulted in a total of four groups. One CCC group working on addition skills, one CCC group working on subtraction skills, one ET group working on addition skills, and one ET group working on subtraction skills.

Training was completed in about 30-minutes. The groups were split up into two different classrooms. During this time each group was trained on the procedures they used during the intervention. If students missed this day they were trained individually by one of the experimenters. The experimenters were graduate students trained in both ET and CCC interventions.

The ET group received a packet of worksheets; containing six pages each, with subtraction or addition problems. The CCC (traditional) group received a packet of worksheets, containing six pages each, with problem and answer on the left and a space to write the problem and answer on the right side. Students in the CCC group worked on either addition or subtraction. Worksheets for both groups were put together in a randomized order to avoid students working on the exact same problems in the same order each time. The administrator read the directions to the students and explained that they had four minutes to complete as many problems as they

could. During the intervention the administrator walked around the room to ensure that all students were working and following procedures correctly. Any students seen doing intervention procedures incorrectly were immediately corrected. In some cases re-teacher was necessary. The interventions were run five days a week and the assessments were conducted on an average of every three days.

During the assessment students were given an ET worksheet with subtraction or addition problems. The administrator read the directions to them and informed them that they had one minute to complete as many problems as they could. The DCPM were used to track progress as compared to the initial fluency level before the intervention. Digits correct per minute were calculated by totaling the number of digits completed correctly.

An independent observer was brought in for 50% of the initial fluency assessments and given a checklist that matched the initial assessment protocol used by the administrator. Integrity for the initial assessments was 100%. An independent observer was brought in for 100% of the training sessions. The observer was given a checklist that matched the training protocol used by the administrator. Integrity for the training sessions was 100%. An independent observer was brought in for 23.5% of the intervention sessions to measure treatment integrity. The observer was given a checklist that matched the intervention protocol used by the administrator. This was done for both conditions. The percentage of integrity was calculated by dividing the number of items checked off by the number of possible items and multiplied by 100. Integrity for intervention deliver was 75%. The observers counted off for re-wording and skipping steps. An independent observer was brought in for 100% of the assessment sessions and given a checklist that matched the assessment protocol used by the administrator. This was done for both conditions. Integrity for assessment deliver was 92.5%.

Inter-scorer agreement (ISA) was evaluated by having another administrator score 50% of the probes (25% per condition). Inter-scorer agreement was calculated for DCPM by totaling the number of probes scored and subtracting the number of scored probes disagreed upon and dividing by the total number of probes and multiplying by 100. Anytime that two scorers had a different score, another scorer was given the probes to score and the matching scores were recorded. The inter-scorer agreement was 79.4%.

## CHAPTER IV

### RESULTS

Linearity and quadratic models were tested to determine which trend best fit the pattern of results. It was found that a linear model was the best fit for the two addition groups ( $p < 0.001$ ). However, for the subtraction groups, when the quadratic was added, the linear slope was no longer significant ( $p = 0.054$  and  $p = 0.810$ ). Therefore it was found that a quadratic model was a better fit for the two subtraction groups than a linear model. Hierarchical linear modeling was run on the addition and subtraction groups. Hierarchical linear modeling accounts for the nested nature of the data- individual observations are nested within students. Data was recentered on the final data point. This allowed for comparisons in regards to slope differences and post-test performance. The model was as follows:

$$\text{Level-1 Model- } DV_{ij} = \beta_{0j} + \beta_{1j} * (\text{LINCEN}_{ij}) + r_{ij}$$

$$\text{Level-2 Model- } \beta_{0j} = y_{00} + y_{01} * (A1_j) + u_{0j}$$

$$B_{1j} = y_{10} + y_{11} * (A1_j)$$

Here, growth in the dependent variable is explained by the presence of a linear slope in level 1. However, differences in those slopes are best explained by group assignment (i.e., A1). This variable is a dummy coded variable, where 0 represents the CCC group and 1 represents the fluency group. When addition CCC was compared to addition ET, there was not a significant



difference at the final data point ( $p = 0.105$ ). When the slope of addition CCC was compared to the slope of addition ET, there was no significant difference, but it was approaching significance ( $p = 0.088$ ). Below are two graphs comparing the data obtained for the addition group. Figure one shows the average DCPM for each treatment condition at baseline compared to the last data point obtained during this study.

Figure 1

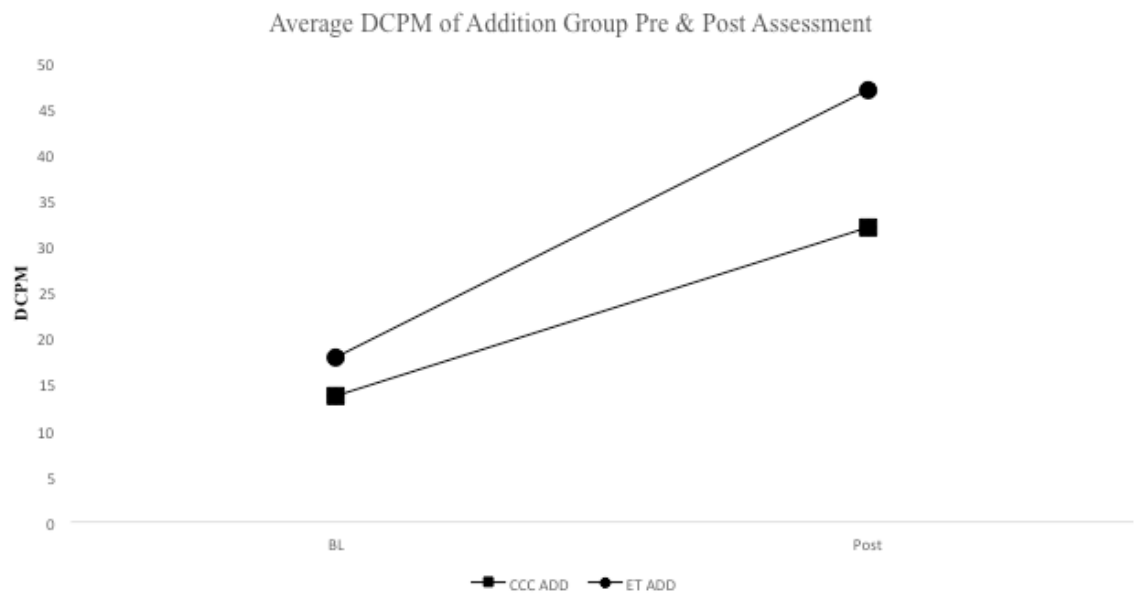
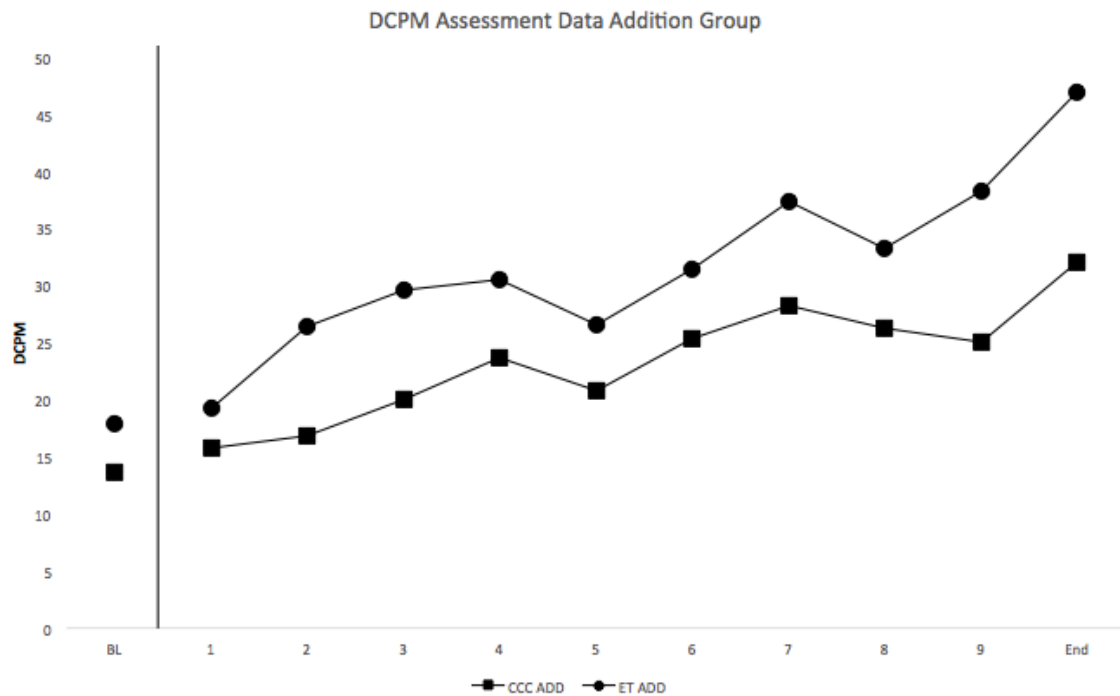


Figure two shows the average DCPM for each treatment condition for the addition group starting with the baseline and continuing through all assessment points.

Figure 2



For the subtraction groups when subtraction CCC was compared to subtraction ET, the final data points were found to be significantly different ( $p = 0.029$ ), but the slopes were not significantly different ( $p = 0.353$ ). These results for the subtraction group indicate that the CCC group grew 0.04 DCPM slower than ET group. For the subtraction group ET showed to be more effective at increasing students' DCPM. Below are two graphs comparing the data obtained for the subtraction group. Figure three shows the average DCPM for each treatment condition at baseline compared to the last data point obtained during this study.

Figure 3

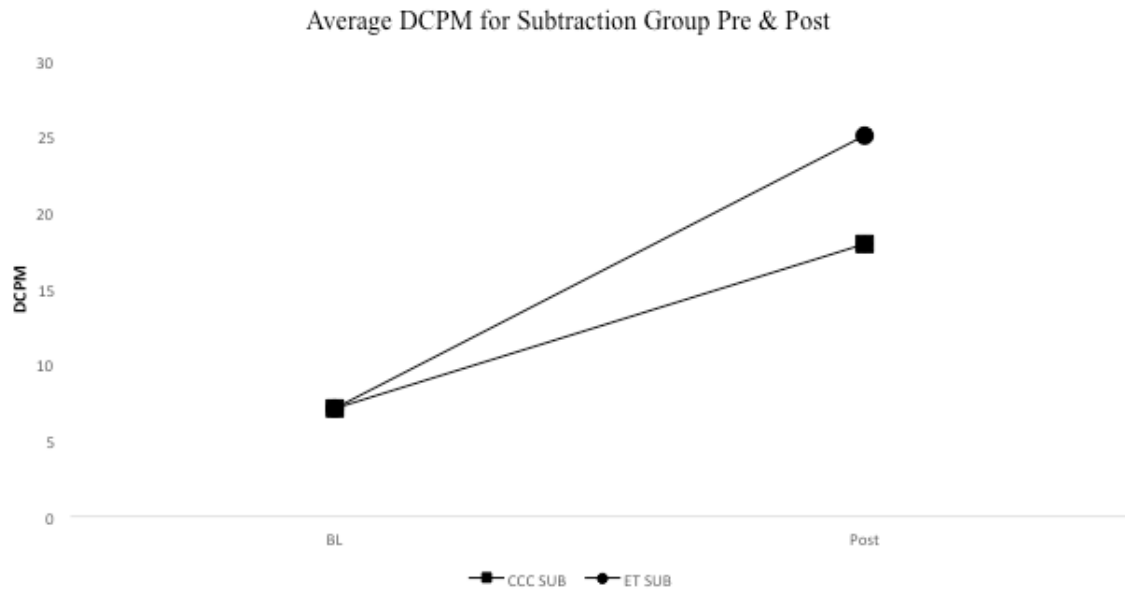
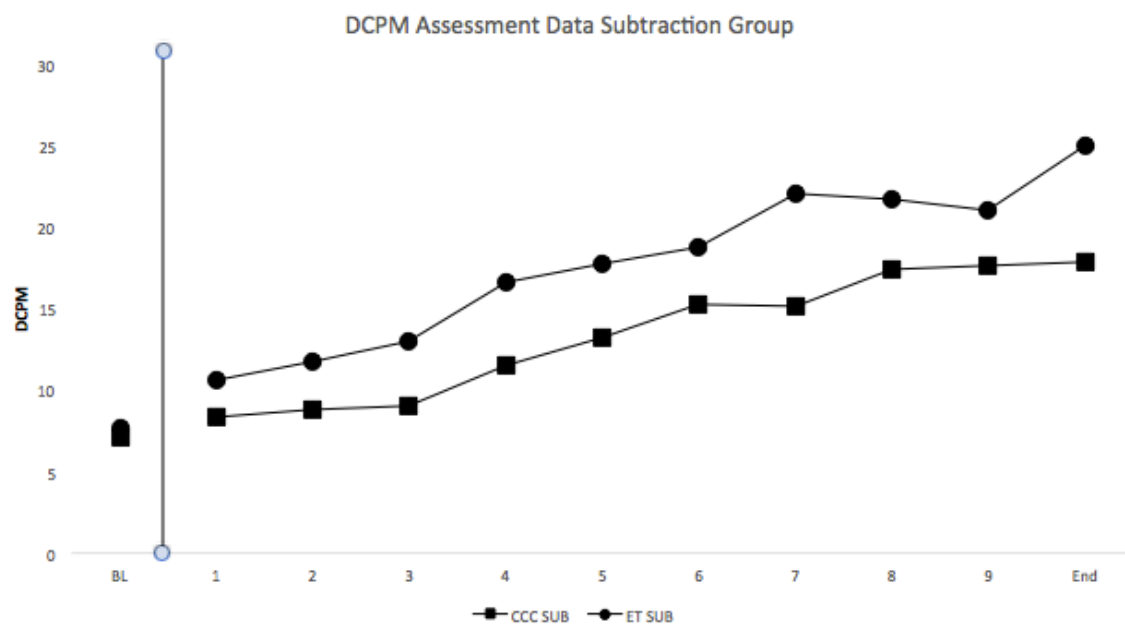


Figure four shows the average DCPM for each treatment condition for the subtraction group starting with the baseline and continuing through all assessment points.

Figure 4



## CHAPTER V

### DISCUSSION

The purpose of the current study was to extend research on this line of research by conducting a study that experimentally investigates the interaction between fluency level and intervention selection. This study was an attempt to validate the Coddington et al. (2007) article. Coddington et al. (2007) was the first to claim that a match between students' pattern of responding and intervention selection could be made. If this claim could be validated it would provide information regarding whether or not there are predictive aspects of student responding that would allow practitioners and teachers to identify the appropriate intervention to match a student's specific needs. If this were the case teachers and practitioners would spend much less time trying to find an intervention to match student needs. Which in turn would allow the student to participate in more intervention time that is effective rather than ineffective intervention time.

This study examined the differences between two groups, a CCC intervention group and an ET intervention group, targeting math fact fluency. The particular math skill each student worked on during this study was not of concern. Students that scored below 85% accuracy on subtraction during the initial assessment were given addition probes if they scored at least 85% accuracy on addition.

#### **Research Questions**

First, it was hypothesized that students with an initial level of fluency below 20 DCPM would be more successful in the CCC treatment condition, whereas students with an initial

fluency level above 20 DCPM would be more successful in the ET treatment condition. However, the researcher was unable to separate out the students in high vs. low fluency groups. The majority of the students in the study fell below 20 DCPM indicating that the interaction between initial fluency level and selected intervention could not be determined.

Previous research conducted by Coddington et al. (2007), suggested that students with an initial fluency level below 20 DCPM would benefit more from a CCC intervention to increase basic math skills rather than an ET intervention. Applying this to the current study one would expect that CCC would have been more effective for the current group of students than ET. However, the data indicated no significant difference between the CCC and ET groups for students working on addition probes. For the students working on subtraction probes, ET showed to be more effective than CCC. The data did indicate that both groups made gains in level of fluency, indicating that both interventions worked to increase the students' fluency on basic math skills.

### **Implications for Practice**

Further research is needed to assist practitioners and educators in appropriately matching students' needs with effective and efficient intervention strategies for remediating skill deficits in mathematics. Because recent statistics have shown very high percentages of students falling below proficient on mathematics assessments, it is imperative that the research community provide data that furthers knowledge on matching skill deficits to appropriate interventions. There is an overwhelming need to provide high quality interventions to students and teachers. Unfortunately the results of the current study did not provide sufficient evidence to support the claim made by Coddington et al. (2007).

The instructional hierarchy model was used for the current study to inform the progression of a student's skill mastery. By using this model it was assumed that students had

already achieved the first step in the instructional hierarchy, acquisition. Therefore, allowing the researcher to focus on the second step of fluency building. According to Haring and Eaton (1978), a student must first acquire a skill before they can become fluent.

For the current study it was imperative to select evidence-based interventions that specifically target fluency building in mathematics. Research by Poncy et al. (2007) and Coddington et al. (2009) both indicated the effectiveness of CCC for increasing fluent responding. Van Houten and Thompson (1976) indicated the effectiveness of ET for increasing fluent responding. Previous studies combined with the current study suggest that both CCC and ET are effective interventions for increasing math fact fluency.

### **Limitations and Future Research**

There are several limitations that should be considered with the current study. The first would be the lack of differentiation among the population obtained on initial level of fluency. It was anticipated by the researcher that the population obtained would be more differentiated allowing for a separation of high vs. low groups. The lack of differentiation made it impossible to analyze the interaction of initial fluency level and intervention effectiveness, only allowing the researcher the ability to look at whether or not there was improvement in both groups. The current study attempted to prevent this lack of differentiation by switching some students to a lower addition skill rather than having all of the students focus solely on subtraction. Having the students in the intervention groups working on different skills could have impacted the results of the study. The sample size obtained for this study could have also impacted the results. It is possible that there was a lack of power due to few participants and variance within groups. Future researchers may have the ability to obtain a larger sample size or have fewer time constraints to allow their population the ability to focus solely on one skill across groups.

Lastly, due to scheduling conflicts with the research team, the timing of the assessments was disrupted. As a requirement of the study the researcher needed to obtain 100% integrity for the assessments, meaning that there must be two individuals in each of the four classrooms during the assessments. Although all assessments were given to the students on an average of every three days this could have had an effect on the results. Scheduling conflicts also created an issue with obtaining 30% integrity checks for the intervention days. The researcher was only able to get 23.5% of the integrity check completed. Future researchers may have the ability to work with other team members to create a better schedule for implementation, allowing for a more consistent implementation of assessments.

## REFERENCES

- Ardoyn, S. P. & Daly, E. J. III. (2007). Introduction to the special series: Close encounters of the instructional kind- How the instructional hierarchy is shaping instructional research 20 years later. *Journal of Behavioral Education, 16*, 1-6.
- Ardoyn, S. P., McCall, M. & Klubnik, C. (2007). Promoting generalization of oral reading fluency: Providing drill versus practice opportunities. *Journal of Behavioral Education, 16*, 55-70.
- Catania, C. A., *Contemporary research in operant behavior*. Glenview, Illinois: Scott, Foresman & Co., 1968.
- Codding, R. S., Shiyko, M., Russo, M., Birch, S., Fanning, E., & Jaspen, D. (2007)
- Codding, R. S., Chan-Iannetta, L., Palmer, M., & Lukiot, G. (2009). Examining a classwide application of cover-copy-compare with and without goal setting to enhance mathematics fluency. *School Psychology Quarterly, 24* (3), 173-185.
- Deno , S. L., & Mirkin, P. K. (1977). *Data-based modification: A manual*. Reston, VA: Council for Exceptional Children.
- Haring, N. G., & Eaton, M. D. (1978). Systematic instructional procedures: An instructional hierarchy. In N. G. Haring, T. C. Lovitt, M. D. Eaton, & C. L. Hansen (Eds.), *The fourth R: Research in the classroom* (pp. 23-40). Columbus, OH: Merrill.



- Hoffman, D. A. (1997). An overview of the logic and rationale of hierarchical linear models. *Journal of Management*, 23, 723-744.
- Lalli, E. P. & Shapiro, E. S. (1990). The effects of self-monitoring and contingent reward on sight word acquisition. *Education and Treatment of Children*, 13, 129-141.
- Lannie, A. L. & Martens, B. K., (2008). Targeting performance dimensions in sequence according to the instructional hierarchy: Effects on children's math work within a self-monitoring program. *Journal of Behavioral Education*, 17, 356-375.
- McCurdy, M., Daly, E., Gortmaker, V., Bonfiglio, C., & Persampieri, M. (2007). Use of brief instructional trials to identify small group reading strategies: A two experiment study. *Journal of Behavioral Education*, 16, 7-26.
- McLaughlin, T. F., Mabee, W. S., Reiter, S. M., & Byram B. (1991). An analysis and replication of the add-a-word spelling program with mildly handicapped middle school students. *Journal of Behavioral Education*, 1, 413-426.
- Rhymer, K. N., Skinner, C. H., Henington, C., D'Reaux, R. A., & Sims, S. (1998). Effects of explicit timing on mathematics problem completion rates in African-American third-grade elementary students. *Journal of Applied Behavior Analysis*, 31, 673-677.
- Rhymer, K. N., & Morgan, S. K. (2005). Comparison of the explicit timing and interspersal interventions: Analysis of problem completion rates, student preference, and teacher acceptability. *Journal of Behavioral Education*, 14(4), 283-303.
- Schutte, G. M., Duhon, G. J., Solomon, B. G., Poncy, B. C., Moore, K., & Story, B. (2015). A comparative analysis of massed vs. distributed practice on basic math fact fluency growth rates. *Journal of School Psychology*, 53, 149-159.

- Skinner, C. H., Belfiore, P. J., & Pierce, N. (1992). Cover, copy and compare: Increasing geography accuracy in students with behavior disorders. *School Psychology Review*, 21, 73-81.
- Skinner, C. H., Bamber, H. W., Smith, E. S., & Powell, S. S. (1993). Cognitive cover, copy and compare: Subvocal responding to increase rates of accurate division responding. *Remedial and Special Education*, 14(1), 49-56.
- Skinner, C. H., McLaughlin, T. F., & Logan, P. (1997). Cover, copy and compare: A self-managed academic intervention effective across skills, students, and settings. *Journal of Behavioral Education*, 7(3), 295-306.
- The Nation's Report Card. A First Look: 2013 Mathematics and Reading. (2013). Retrieved from <https://nces.ed.gov/nationsreportcard/subject/publications/main2013/pdf/2014451.pdf>.
- The Nation's Report Card. Both fourth- and eighth- grade students score lower in mathematics than in 2013; scores higher than in 1990. Retrieved from [https://www.nationsreportcard.gov/reading\\_math\\_2015/#mathematics?grade=4](https://www.nationsreportcard.gov/reading_math_2015/#mathematics?grade=4).
- Van Houten, R., & Thompson, C. (1976). The effects of explicit timing on math performance. *Journal of Applied Behavior Analysis*, 9, 227-230.
- Woltman, H., Feldstain, A., MacKay, J. C., & Rocchi, M. (2012). An introduction to hierarchical linear modeling. *Tutorials in Quantitative Methods for Psychology*, 8(1), 52-69.

## APPENDICES

Appendix A  
Initial Fluency Protocol

1. Pass out folders.
2. "Students, today we are going to do some math problems. You will have 3 worksheets. Please do your best and work as fast as you can."
3. "Open your folders and take out your packet of worksheets."
4. "When I say begin start with the first problem and work across the row, when you finish a row go to the next one. If you come to one you don't know you may skip it but try to work all of the problems."
5. "Are there any questions?"
6. Answer any questions there may be.
7. "Ready, Begin." Time for 1 minute.
8. After 1 min: "Stop put your pencils down."
9. "Please turn to the 2<sup>nd</sup> page in your packet"
10. Repeat steps 7-8.
11. "Please turn to the 3<sup>rd</sup> page in your packet."
12. Repeat steps 7-8.

## Appendix B

### Initial Fluency Assessment Integrity

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ Finish Time: \_\_\_\_\_  
Admin. Name: \_\_\_\_\_ Integrity Checker Name: \_\_\_\_\_

1. Pass out folders.
2. "Students, today we are going to do some math problems. You will have 3 worksheets. Please do your best and work as fast as you can."
3. "Open your folders and take out your packet of worksheets."
4. "When I say begin start with the first problem and work across the row, when you finish a row go to the next one. If you come to one you don't know you may skip it but try to work all of the problems."
5. "Are there any questions?"
6. Answer any questions there may be.
7. "Ready, Begin." Time for 1 minute.
8. After 1 min: "Stop put your pencils down."
9. "Please turn to the 2<sup>nd</sup> page in your packet"
10. Repeat steps 7-8.
11. "Please turn to the 3<sup>rd</sup> page in your packet."
12. Repeat steps 7-8.

## Appendix C

### CCC: Standard – Student Training Protocol

Use this to train students how to use CCC: Standard 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 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. 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.
5. Repeat as necessary
6. "Now you will have 2 minutes to complete as many problems as you can."
7. "Ready, Begin."
8. After 2 minutes, "Stop, put your pencils down."

This training script is generally successful for a majority of students. As you are reading the directions cycle through 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.

## Appendix D

### Explicit Timing – Student Training Protocol

Use this to train students how to use ET 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 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”.
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 2 minutes to complete as many problems as you can. Are there any questions? Ready. Begin!”
5. After x minutes goes by, stop students and collect their 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.

## Appendix E

### Daily Intervention- Protocol

1. Make sure each student has a folder with math packets
2. "Please get out your packets and get ready to begin."
3. "Please put your name at the top of your packet."
4. You will have 4 minutes to complete as many problems as you can, remember to work as quickly as you can, without making any mistakes, if you do make a mistake, cross it out and keep going."
5. "Ready, begin."
6. Start the timer. After 4 minutes, say "Stop, put your pencils down and draw a line where you stopped, then put your packets back in your folders."



## Appendix F

### Daily Intervention- Integrity Checklist

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ Finish Time: \_\_\_\_\_  
Admin. Name: \_\_\_\_\_ Integrity Checker Name: \_\_\_\_\_

1. Make sure each student has a folder with math packets
2. "Please get out your packets and get ready to begin."
3. "Please put your name at the top of your packet."
4. You will have 4 minutes to complete as many problems as you can, remember to work as quickly as you can, without making any mistakes, if you do make a mistake, cross it out and keep going."
5. "Ready, begin."
6. Start the timer. After 4 minutes, say "Stop, put your pencils down and draw a line where you stopped, then put your packets back in your folders."

## Appendix G

### Intervention Assessment – Protocol

1. Make sure each student has a math worksheet with their name on it.
2. You will have 1 minute to complete as many problems as you can, remember to work as quickly as you can, without making any mistakes, if you do make a mistake, cross it out and keep going."
3. "Ready, begin."
4. Start the timer. After 1 minute, say "Stop, put your pencils down."

## Appendix H

### Intervention Assessment- Integrity Checklist

Date: \_\_\_\_\_ Start Time: \_\_\_\_\_ Finish Time: \_\_\_\_\_  
Admin. Name: \_\_\_\_\_ Integrity Checker Name: \_\_\_\_\_

1. Make sure each student has a math worksheet with their name on it.
2. You will have 1 minute to complete as many problems as you can, remember to work as quickly as you can, without making any mistakes, if you do make a mistake, cross it out and keep going."
3. "Ready, begin."
4. Start the timer. After 1 minute, say "Stop, put your pencils down."

## Appendix I

### Cover, Copy, and Compare Addition Intervention Worksheets

Measures & Interventions for Numeracy Development

MIND: Computation CCC Standard Worksheet Addition 1A Name: \_\_\_\_\_ Date: \_\_\_\_

$\begin{array}{r} 9 \\ + 8 \\ \hline 17 \end{array}$		$\begin{array}{r} 5 \\ + 3 \\ \hline 8 \end{array}$		$\begin{array}{r} 6 \\ + 9 \\ \hline 15 \end{array}$		$\begin{array}{r} 3 \\ + 5 \\ \hline 8 \end{array}$	
$\begin{array}{r} 3 \\ + 3 \\ \hline 6 \end{array}$		$\begin{array}{r} 6 \\ + 7 \\ \hline 13 \end{array}$		$\begin{array}{r} 8 \\ + 9 \\ \hline 17 \end{array}$		$\begin{array}{r} 9 \\ + 4 \\ \hline 13 \end{array}$	
$\begin{array}{r} 5 \\ + 2 \\ \hline 7 \end{array}$		$\begin{array}{r} 3 \\ + 8 \\ \hline 11 \end{array}$		$\begin{array}{r} 7 \\ + 7 \\ \hline 14 \end{array}$		$\begin{array}{r} 8 \\ + 3 \\ \hline 11 \end{array}$	
$\begin{array}{r} 7 \\ + 7 \\ \hline 14 \end{array}$		$\begin{array}{r} 6 \\ + 5 \\ \hline 11 \end{array}$		$\begin{array}{r} 3 \\ + 3 \\ \hline 6 \end{array}$		$\begin{array}{r} 4 \\ + 4 \\ \hline 8 \end{array}$	
$\begin{array}{r} 9 \\ + 6 \\ \hline 15 \end{array}$		$\begin{array}{r} 4 \\ + 4 \\ \hline 8 \end{array}$		$\begin{array}{r} 5 \\ + 6 \\ \hline 11 \end{array}$		$\begin{array}{r} 2 \\ + 5 \\ \hline 7 \end{array}$	
$\begin{array}{r} 2 \\ + 8 \\ \hline 10 \end{array}$		$\begin{array}{r} 9 \\ + 4 \\ \hline 13 \end{array}$		$\begin{array}{r} 7 \\ + 6 \\ \hline 13 \end{array}$		$\begin{array}{r} 8 \\ + 2 \\ \hline 10 \end{array}$	

Measures & Interventions for Numeracy Development

MIND: Computation CCC Standard Worksheet Addition 2A Name: \_\_\_\_\_ Date: \_\_\_\_

$\begin{array}{r} 2 \\ + 8 \\ \hline 10 \end{array}$		$\begin{array}{r} 7 \\ + 7 \\ \hline 14 \end{array}$		$\begin{array}{r} 4 \\ + 4 \\ \hline 8 \end{array}$		$\begin{array}{r} 5 \\ + 6 \\ \hline 11 \end{array}$	
$\begin{array}{r} 3 \\ + 3 \\ \hline 6 \end{array}$		$\begin{array}{r} 3 \\ + 8 \\ \hline 11 \end{array}$		$\begin{array}{r} 7 \\ + 7 \\ \hline 14 \end{array}$		$\begin{array}{r} 8 \\ + 3 \\ \hline 11 \end{array}$	
$\begin{array}{r} 5 \\ + 3 \\ \hline 8 \end{array}$		$\begin{array}{r} 4 \\ + 9 \\ \hline 13 \end{array}$		$\begin{array}{r} 8 \\ + 2 \\ \hline 10 \end{array}$		$\begin{array}{r} 3 \\ + 5 \\ \hline 8 \end{array}$	
$\begin{array}{r} 9 \\ + 8 \\ \hline 17 \end{array}$		$\begin{array}{r} 5 \\ + 2 \\ \hline 7 \end{array}$		$\begin{array}{r} 6 \\ + 9 \\ \hline 15 \end{array}$		$\begin{array}{r} 7 \\ + 6 \\ \hline 13 \end{array}$	
$\begin{array}{r} 9 \\ + 6 \\ \hline 15 \end{array}$		$\begin{array}{r} 6 \\ + 7 \\ \hline 13 \end{array}$		$\begin{array}{r} 8 \\ + 9 \\ \hline 17 \end{array}$		$\begin{array}{r} 9 \\ + 4 \\ \hline 13 \end{array}$	
$\begin{array}{r} 6 \\ + 5 \\ \hline 11 \end{array}$		$\begin{array}{r} 4 \\ + 4 \\ \hline 8 \end{array}$		$\begin{array}{r} 2 \\ + 5 \\ \hline 7 \end{array}$		$\begin{array}{r} 3 \\ + 3 \\ \hline 6 \end{array}$	

Measures & Interventions for Numeracy Development

MIND: Computation CCC Standard Worksheet Addition 3A Name: \_\_\_\_\_ Date: \_\_\_\_

$\begin{array}{r} 7 \\ + 7 \\ \hline 14 \end{array}$		$\begin{array}{r} 3 \\ + 8 \\ \hline 11 \end{array}$		$\begin{array}{r} 6 \\ + 9 \\ \hline 15 \end{array}$		$\begin{array}{r} 2 \\ + 5 \\ \hline 7 \end{array}$	
$\begin{array}{r} 9 \\ + 8 \\ \hline 17 \end{array}$		$\begin{array}{r} 5 \\ + 2 \\ \hline 7 \end{array}$		$\begin{array}{r} 4 \\ + 4 \\ \hline 8 \end{array}$		$\begin{array}{r} 7 \\ + 6 \\ \hline 13 \end{array}$	
$\begin{array}{r} 4 \\ + 9 \\ \hline 13 \end{array}$		$\begin{array}{r} 4 \\ + 4 \\ \hline 8 \end{array}$		$\begin{array}{r} 5 \\ + 6 \\ \hline 11 \end{array}$		$\begin{array}{r} 9 \\ + 4 \\ \hline 13 \end{array}$	
$\begin{array}{r} 2 \\ + 8 \\ \hline 10 \end{array}$		$\begin{array}{r} 9 \\ + 6 \\ \hline 15 \end{array}$		$\begin{array}{r} 8 \\ + 3 \\ \hline 11 \end{array}$		$\begin{array}{r} 3 \\ + 5 \\ \hline 8 \end{array}$	
$\begin{array}{r} 3 \\ + 3 \\ \hline 6 \end{array}$		$\begin{array}{r} 6 \\ + 5 \\ \hline 11 \end{array}$		$\begin{array}{r} 3 \\ + 3 \\ \hline 6 \end{array}$		$\begin{array}{r} 8 \\ + 9 \\ \hline 17 \end{array}$	
$\begin{array}{r} 5 \\ + 3 \\ \hline 8 \end{array}$		$\begin{array}{r} 6 \\ + 7 \\ \hline 13 \end{array}$		$\begin{array}{r} 8 \\ + 2 \\ \hline 10 \end{array}$		$\begin{array}{r} 7 \\ + 7 \\ \hline 14 \end{array}$	

© Brian C. Poncy & Gary J. Duhon (2015)

Measures & Interventions for Numeracy Development

MIND: Computation CCC Standard Worksheet Addition 4A Name: \_\_\_\_\_ Date: \_\_\_\_

$\begin{array}{r} 2 \\ + 8 \\ \hline 10 \end{array}$		$\begin{array}{r} 6 \\ + 5 \\ \hline 11 \end{array}$		$\begin{array}{r} 8 \\ + 9 \\ \hline 17 \end{array}$		$\begin{array}{r} 3 \\ + 5 \\ \hline 8 \end{array}$	
$\begin{array}{r} 5 \\ + 2 \\ \hline 7 \end{array}$		$\begin{array}{r} 4 \\ + 9 \\ \hline 13 \end{array}$		$\begin{array}{r} 6 \\ + 9 \\ \hline 15 \end{array}$		$\begin{array}{r} 2 \\ + 5 \\ \hline 7 \end{array}$	
$\begin{array}{r} 9 \\ + 6 \\ \hline 15 \end{array}$		$\begin{array}{r} 3 \\ + 8 \\ \hline 11 \end{array}$		$\begin{array}{r} 7 \\ + 7 \\ \hline 14 \end{array}$		$\begin{array}{r} 7 \\ + 6 \\ \hline 13 \end{array}$	
$\begin{array}{r} 4 \\ + 4 \\ \hline 8 \end{array}$		$\begin{array}{r} 7 \\ + 7 \\ \hline 14 \end{array}$		$\begin{array}{r} 4 \\ + 4 \\ \hline 8 \end{array}$		$\begin{array}{r} 5 \\ + 6 \\ \hline 11 \end{array}$	
$\begin{array}{r} 5 \\ + 3 \\ \hline 8 \end{array}$		$\begin{array}{r} 9 \\ + 8 \\ \hline 17 \end{array}$		$\begin{array}{r} 8 \\ + 2 \\ \hline 10 \end{array}$		$\begin{array}{r} 9 \\ + 4 \\ \hline 13 \end{array}$	
$\begin{array}{r} 6 \\ + 7 \\ \hline 13 \end{array}$		$\begin{array}{r} 3 \\ + 3 \\ \hline 6 \end{array}$		$\begin{array}{r} 3 \\ + 3 \\ \hline 6 \end{array}$		$\begin{array}{r} 8 \\ + 3 \\ \hline 11 \end{array}$	

Measures & Interventions for Numeracy Development

MIND: Computation CCC Standard Worksheet Addition 5A Name: \_\_\_\_\_ Date: \_\_\_\_

$\begin{array}{r} 3 \\ + 8 \\ \hline 11 \end{array}$		$\begin{array}{r} 5 \\ + 2 \\ \hline 7 \end{array}$		$\begin{array}{r} 5 \\ + 6 \\ \hline 11 \end{array}$		$\begin{array}{r} 7 \\ + 7 \\ \hline 14 \end{array}$	
$\begin{array}{r} 2 \\ + 8 \\ \hline 10 \end{array}$		$\begin{array}{r} 6 \\ + 7 \\ \hline 13 \end{array}$		$\begin{array}{r} 8 \\ + 3 \\ \hline 11 \end{array}$		$\begin{array}{r} 2 \\ + 5 \\ \hline 7 \end{array}$	
$\begin{array}{r} 3 \\ + 3 \\ \hline 6 \end{array}$		$\begin{array}{r} 9 \\ + 8 \\ \hline 17 \end{array}$		$\begin{array}{r} 8 \\ + 9 \\ \hline 17 \end{array}$		$\begin{array}{r} 3 \\ + 3 \\ \hline 6 \end{array}$	
$\begin{array}{r} 4 \\ + 4 \\ \hline 8 \end{array}$		$\begin{array}{r} 4 \\ + 9 \\ \hline 13 \end{array}$		$\begin{array}{r} 6 \\ + 9 \\ \hline 15 \end{array}$		$\begin{array}{r} 8 \\ + 2 \\ \hline 10 \end{array}$	
$\begin{array}{r} 9 \\ + 6 \\ \hline 15 \end{array}$		$\begin{array}{r} 6 \\ + 5 \\ \hline 11 \end{array}$		$\begin{array}{r} 4 \\ + 4 \\ \hline 8 \end{array}$		$\begin{array}{r} 7 \\ + 6 \\ \hline 13 \end{array}$	
$\begin{array}{r} 5 \\ + 3 \\ \hline 8 \end{array}$		$\begin{array}{r} 7 \\ + 7 \\ \hline 14 \end{array}$		$\begin{array}{r} 3 \\ + 5 \\ \hline 8 \end{array}$		$\begin{array}{r} 9 \\ + 4 \\ \hline 13 \end{array}$	



Measures & Interventions for Numeracy Development

MIND: Computation CCC Standard Worksheet Addition 6A Name: \_\_\_\_\_ Date: \_\_\_\_

$\begin{array}{r} 4 \\ + 9 \\ \hline 13 \end{array}$		$\begin{array}{r} 5 \\ + 2 \\ \hline 7 \end{array}$		$\begin{array}{r} 8 \\ + 3 \\ \hline 11 \end{array}$		$\begin{array}{r} 7 \\ + 6 \\ \hline 13 \end{array}$	
$\begin{array}{r} 5 \\ + 3 \\ \hline 8 \end{array}$		$\begin{array}{r} 6 \\ + 7 \\ \hline 13 \end{array}$		$\begin{array}{r} 8 \\ + 9 \\ \hline 17 \end{array}$		$\begin{array}{r} 3 \\ + 3 \\ \hline 6 \end{array}$	
$\begin{array}{r} 3 \\ + 8 \\ \hline 11 \end{array}$		$\begin{array}{r} 9 \\ + 8 \\ \hline 17 \end{array}$		$\begin{array}{r} 9 \\ + 4 \\ \hline 13 \end{array}$		$\begin{array}{r} 4 \\ + 4 \\ \hline 8 \end{array}$	
$\begin{array}{r} 4 \\ + 4 \\ \hline 8 \end{array}$		$\begin{array}{r} 3 \\ + 3 \\ \hline 6 \end{array}$		$\begin{array}{r} 6 \\ + 9 \\ \hline 15 \end{array}$		$\begin{array}{r} 3 \\ + 5 \\ \hline 8 \end{array}$	
$\begin{array}{r} 2 \\ + 8 \\ \hline 10 \end{array}$		$\begin{array}{r} 9 \\ + 6 \\ \hline 15 \end{array}$		$\begin{array}{r} 5 \\ + 6 \\ \hline 11 \end{array}$		$\begin{array}{r} 7 \\ + 7 \\ \hline 7 \end{array}$	
$\begin{array}{r} 6 \\ + 5 \\ \hline 11 \end{array}$		$\begin{array}{r} 7 \\ + 7 \\ \hline 14 \end{array}$		$\begin{array}{r} 2 \\ + 5 \\ \hline 7 \end{array}$		$\begin{array}{r} 8 \\ + 2 \\ \hline 10 \end{array}$	

## Appendix J

### Explicit Timing Addition Intervention Worksheets

Measures & Interventions for Numeracy Development

MIND: Computation TP/ET Worksheet Addition 1A Name: \_\_\_\_\_ Date: \_\_\_\_\_

$\begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 5 \\ \hline \end{array}$
$\begin{array}{r} 3 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 4 \\ \hline \end{array}$
$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline \end{array}$
$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 8 \\ \hline \end{array}$
$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 6 \\ \hline \end{array}$
$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$
$\begin{array}{r} 6 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 6 \\ \hline \end{array}$
$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 4 \\ \hline \end{array}$

© Brian C. Poncey & Gary J. Duhon (2015)

Measures & Interventions for Numeracy Development

MIND: Computation TP/ET Worksheet Addition 2A Name: \_\_\_\_\_ Date: \_\_\_\_\_

$\begin{array}{r} 8 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 6 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 8 \\ \hline \end{array}$
$\begin{array}{r} 5 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 5 \\ \hline \end{array}$
$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 2 \\ \hline \end{array}$
$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 5 \\ \hline \end{array}$
$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 4 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$
$\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$

© Brian C. Poncy & Gary J. Duhon (2015)

Measures & Interventions for Numeracy Development

MIND: Computation TP/ET Worksheet Addition 3A Name: \_\_\_\_\_ Date: \_\_\_\_\_

$\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$
$\begin{array}{r} 6 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 9 \\ \hline \end{array}$
$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 8 \\ \hline \end{array}$
$\begin{array}{r} 6 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 8 \\ \hline \end{array}$
$\begin{array}{r} 5 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$
$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$
$\begin{array}{r} 2 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 6 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 2 \\ \hline \end{array}$

© Brian C. Poncy & Gary J. Duhon (2015)

Measures & Interventions for Numeracy Development

MIND: Computation TP/ET Worksheet Addition 4A Name: \_\_\_\_\_ Date: \_\_\_\_\_

$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 3 \\ \hline \end{array}$
$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$
$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 9 \\ \hline \end{array}$
$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 5 \\ \hline \end{array}$
$\begin{array}{r} 2 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$
$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 3 \\ \hline \end{array}$
$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline \end{array}$
$\begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 8 \\ \hline \end{array}$

Measures & Interventions for Numeracy Development

MIND: Computation TP/ET Worksheet Addition 5A Name: \_\_\_\_\_ Date: \_\_\_\_\_

$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$
$\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 2 \\ \hline \end{array}$
$\begin{array}{r} 6 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 8 \\ \hline \end{array}$
$\begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$
$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$
$\begin{array}{r} 7 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 8 \\ \hline \end{array}$
$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 9 \\ \hline \end{array}$
$\begin{array}{r} 2 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 8 \\ \hline \end{array}$

© Brian C. Poncy & Gary J. Duhon (2015)

Measures & Interventions for Numeracy Development

MIND: Computation TP/ET Worksheet Addition 6A Name: \_\_\_\_\_ Date: \_\_\_\_\_

$\begin{array}{r} 7 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$
$\begin{array}{r} 3 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 8 \\ \hline \end{array}$
$\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$
$\begin{array}{r} 3 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 5 \\ \hline \end{array}$
$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$
$\begin{array}{r} 3 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ + 9 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ + 2 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 2 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ + 5 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$
$\begin{array}{r} 2 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 9 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ + 4 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ + 3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 8 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ + 6 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ + 7 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ + 3 \\ \hline \end{array}$

## Appendix K

### Cover, Copy, and Compare Subtraction Intervention Worksheets

Measures & Interventions for Numeracy Development

MIND: Computation CCC Standard Worksheet Subtraction 1A Name: \_\_\_\_\_ Date: \_\_\_\_

$\begin{array}{r} 13 \\ - 9 \\ \hline 4 \end{array}$		$\begin{array}{r} 10 \\ - 8 \\ \hline 2 \end{array}$		$\begin{array}{r} 8 \\ - 4 \\ \hline 4 \end{array}$		$\begin{array}{r} 10 \\ - 2 \\ \hline 8 \end{array}$	
$\begin{array}{r} 8 \\ - 4 \\ \hline 4 \end{array}$		$\begin{array}{r} 15 \\ - 6 \\ \hline 9 \end{array}$		$\begin{array}{r} 7 \\ - 5 \\ \hline 2 \end{array}$		$\begin{array}{r} 11 \\ - 3 \\ \hline 8 \end{array}$	
$\begin{array}{r} 11 \\ - 8 \\ \hline 3 \end{array}$		$\begin{array}{r} 14 \\ - 7 \\ \hline 7 \end{array}$		$\begin{array}{r} 8 \\ - 5 \\ \hline 3 \end{array}$		$\begin{array}{r} 14 \\ - 7 \\ \hline 7 \end{array}$	
$\begin{array}{r} 13 \\ - 7 \\ \hline 6 \end{array}$		$\begin{array}{r} 7 \\ - 2 \\ \hline 5 \end{array}$		$\begin{array}{r} 11 \\ - 6 \\ \hline 5 \end{array}$		$\begin{array}{r} 13 \\ - 4 \\ \hline 9 \end{array}$	
$\begin{array}{r} 11 \\ - 5 \\ \hline 6 \end{array}$		$\begin{array}{r} 6 \\ - 3 \\ \hline 3 \end{array}$		$\begin{array}{r} 13 \\ - 6 \\ \hline 7 \end{array}$		$\begin{array}{r} 15 \\ - 9 \\ \hline 6 \end{array}$	
$\begin{array}{r} 8 \\ - 3 \\ \hline 5 \end{array}$		$\begin{array}{r} 17 \\ - 8 \\ \hline 9 \end{array}$		$\begin{array}{r} 17 \\ - 9 \\ \hline 8 \end{array}$		$\begin{array}{r} 6 \\ - 3 \\ \hline 3 \end{array}$	



MIND: Computation CCC Standard Worksheet Subtraction 2A Name: \_\_\_\_\_ Date: \_\_\_\_\_

$\begin{array}{r} 17 \\ - 8 \\ \hline 9 \end{array}$		$\begin{array}{r} 7 \\ - 2 \\ \hline 5 \end{array}$		$\begin{array}{r} 13 \\ - 4 \\ \hline 9 \end{array}$		$\begin{array}{r} 10 \\ - 2 \\ \hline 8 \end{array}$	
$\begin{array}{r} 13 \\ - 7 \\ \hline 6 \end{array}$		$\begin{array}{r} 13 \\ - 9 \\ \hline 4 \end{array}$		$\begin{array}{r} 7 \\ - 5 \\ \hline 2 \end{array}$		$\begin{array}{r} 15 \\ - 9 \\ \hline 6 \end{array}$	
$\begin{array}{r} 6 \\ - 3 \\ \hline 3 \end{array}$		$\begin{array}{r} 15 \\ - 6 \\ \hline 9 \end{array}$		$\begin{array}{r} 17 \\ - 9 \\ \hline 8 \end{array}$		$\begin{array}{r} 8 \\ - 5 \\ \hline 3 \end{array}$	
$\begin{array}{r} 10 \\ - 8 \\ \hline 2 \end{array}$		$\begin{array}{r} 8 \\ - 4 \\ \hline 4 \end{array}$		$\begin{array}{r} 11 \\ - 6 \\ \hline 5 \end{array}$		$\begin{array}{r} 14 \\ - 7 \\ \hline 7 \end{array}$	
$\begin{array}{r} 11 \\ - 8 \\ \hline 3 \end{array}$		$\begin{array}{r} 11 \\ - 4 \\ \hline 7 \end{array}$		$\begin{array}{r} 11 \\ - 3 \\ \hline 8 \end{array}$		$\begin{array}{r} 13 \\ - 6 \\ \hline 7 \end{array}$	
$\begin{array}{r} 8 \\ - 3 \\ \hline 5 \end{array}$		$\begin{array}{r} 14 \\ - 7 \\ \hline 7 \end{array}$		$\begin{array}{r} 8 \\ - 4 \\ \hline 4 \end{array}$		$\begin{array}{r} 6 \\ - 3 \\ \hline 3 \end{array}$	

Measures & Interventions for Numeracy Development

MIND: Computation CCC Standard Worksheet Subtraction 3A Name: \_\_\_\_\_ Date: \_\_\_\_

$\begin{array}{r} 8 \\ - 3 \\ \hline 5 \end{array}$		$\begin{array}{r} 11 \\ - 8 \\ \hline 3 \end{array}$		$\begin{array}{r} 11 \\ - 6 \\ \hline 5 \end{array}$		$\begin{array}{r} 15 \\ - 9 \\ \hline 6 \end{array}$	
$\begin{array}{r} 7 \\ - 2 \\ \hline 5 \end{array}$		$\begin{array}{r} 13 \\ - 9 \\ \hline 4 \end{array}$		$\begin{array}{r} 17 \\ - 9 \\ \hline 8 \end{array}$		$\begin{array}{r} 6 \\ - 3 \\ \hline 3 \end{array}$	
$\begin{array}{r} 15 \\ - 6 \\ \hline 9 \end{array}$		$\begin{array}{r} 13 \\ - 7 \\ \hline 6 \end{array}$		$\begin{array}{r} 7 \\ - 5 \\ \hline 2 \end{array}$		$\begin{array}{r} 8 \\ - 5 \\ \hline 3 \end{array}$	
$\begin{array}{r} 6 \\ - 3 \\ \hline 3 \end{array}$		$\begin{array}{r} 10 \\ - 8 \\ \hline 2 \end{array}$		$\begin{array}{r} 13 \\ - 6 \\ \hline 7 \end{array}$		$\begin{array}{r} 13 \\ - 4 \\ \hline 9 \end{array}$	
$\begin{array}{r} 11 \\ - 5 \\ \hline 6 \end{array}$		$\begin{array}{r} 17 \\ - 8 \\ \hline 9 \end{array}$		$\begin{array}{r} 10 \\ - 2 \\ \hline 8 \end{array}$		$\begin{array}{r} 14 \\ - 7 \\ \hline 7 \end{array}$	
$\begin{array}{r} 8 \\ - 4 \\ \hline 4 \end{array}$		$\begin{array}{r} 14 \\ - 7 \\ \hline 7 \end{array}$		$\begin{array}{r} 11 \\ - 3 \\ \hline 8 \end{array}$		$\begin{array}{r} 8 \\ - 4 \\ \hline 4 \end{array}$	

© Brian C. Poncy & Gary J. Duhon (2015)

Measures & Interventions for Numeracy Development

MIND: Computation CCC Standard Worksheet Subtraction 4A Name: \_\_\_\_\_ Date: \_\_\_\_

$\begin{array}{r} 17 \\ - 8 \\ \hline 9 \end{array}$		$\begin{array}{r} 8 \\ - 3 \\ \hline 5 \end{array}$		$\begin{array}{r} 6 \\ - 3 \\ \hline 3 \end{array}$		$\begin{array}{r} 8 \\ - 4 \\ \hline 4 \end{array}$	
$\begin{array}{r} 13 \\ - 9 \\ \hline 4 \end{array}$		$\begin{array}{r} 14 \\ - 7 \\ \hline 7 \end{array}$		$\begin{array}{r} 8 \\ - 5 \\ \hline 3 \end{array}$		$\begin{array}{r} 13 \\ - 4 \\ \hline 9 \end{array}$	
$\begin{array}{r} 10 \\ - 8 \\ \hline 2 \end{array}$		$\begin{array}{r} 11 \\ - 5 \\ \hline 6 \end{array}$		$\begin{array}{r} 11 \\ - 3 \\ \hline 8 \end{array}$		$\begin{array}{r} 17 \\ - 9 \\ \hline 8 \end{array}$	
$\begin{array}{r} 15 \\ - 6 \\ \hline 9 \end{array}$		$\begin{array}{r} 6 \\ - 3 \\ \hline 3 \end{array}$		$\begin{array}{r} 14 \\ - 7 \\ \hline 7 \end{array}$		$\begin{array}{r} 15 \\ - 9 \\ \hline 6 \end{array}$	
$\begin{array}{r} 13 \\ - 7 \\ \hline 6 \end{array}$		$\begin{array}{r} 8 \\ - 4 \\ \hline 4 \end{array}$		$\begin{array}{r} 11 \\ - 6 \\ \hline 5 \end{array}$		$\begin{array}{r} 10 \\ - 2 \\ \hline 8 \end{array}$	
$\begin{array}{r} 7 \\ - 2 \\ \hline 5 \end{array}$		$\begin{array}{r} 11 \\ - 8 \\ \hline 3 \end{array}$		$\begin{array}{r} 7 \\ - 5 \\ \hline 2 \end{array}$		$\begin{array}{r} 13 \\ - 6 \\ \hline 7 \end{array}$	

© Brian C. Poncy & Gary J. Duhon (2015)

MIND: Computation CCC Standard Worksheet Subtraction 5A Name: \_\_\_\_\_ Date: \_\_\_\_\_

$\begin{array}{r} 7 \\ - 2 \\ \hline 5 \end{array}$		$\begin{array}{r} 14 \\ - 7 \\ \hline 7 \end{array}$		$\begin{array}{r} 8 \\ - 5 \\ \hline 3 \end{array}$		$\begin{array}{r} 15 \\ - 9 \\ \hline 6 \end{array}$	
$\begin{array}{r} 11 \\ - 8 \\ \hline 3 \end{array}$		$\begin{array}{r} 8 \\ - 4 \\ \hline 4 \end{array}$		$\begin{array}{r} 8 \\ - 4 \\ \hline 4 \end{array}$		$\begin{array}{r} 6 \\ - 3 \\ \hline 3 \end{array}$	
$\begin{array}{r} 13 \\ - 9 \\ \hline 4 \end{array}$		$\begin{array}{r} 15 \\ - 6 \\ \hline 9 \end{array}$		$\begin{array}{r} 13 \\ - 6 \\ \hline 7 \end{array}$		$\begin{array}{r} 10 \\ - 2 \\ \hline 8 \end{array}$	
$\begin{array}{r} 17 \\ - 8 \\ \hline 9 \end{array}$		$\begin{array}{r} 13 \\ - 7 \\ \hline 6 \end{array}$		$\begin{array}{r} 7 \\ - 5 \\ \hline 2 \end{array}$		$\begin{array}{r} 13 \\ - 5 \\ \hline 8 \end{array}$	
$\begin{array}{r} 11 \\ - 5 \\ \hline 6 \end{array}$		$\begin{array}{r} 8 \\ - 3 \\ \hline 5 \end{array}$		$\begin{array}{r} 14 \\ - 7 \\ \hline 7 \end{array}$		$\begin{array}{r} 11 \\ - 6 \\ \hline 5 \end{array}$	
$\begin{array}{r} 10 \\ - 8 \\ \hline 2 \end{array}$		$\begin{array}{r} 6 \\ - 3 \\ \hline 3 \end{array}$		$\begin{array}{r} 11 \\ - 3 \\ \hline 8 \end{array}$		$\begin{array}{r} 17 \\ - 9 \\ \hline 8 \end{array}$	

MIND: Computation CCC Standard Worksheet Subtraction 6A Name: \_\_\_\_\_ Date: \_\_\_\_

$\begin{array}{r} 17 \\ - 8 \\ \hline 9 \end{array}$		$\begin{array}{r} 7 \\ - 2 \\ \hline 5 \end{array}$		$\begin{array}{r} 15 \\ - 9 \\ \hline 6 \end{array}$		$\begin{array}{r} 6 \\ - 3 \\ \hline 3 \end{array}$	
$\begin{array}{r} 8 \\ - 4 \\ \hline 4 \end{array}$		$\begin{array}{r} 14 \\ - 7 \\ \hline 7 \end{array}$		$\begin{array}{r} 14 \\ - 7 \\ \hline 7 \end{array}$		$\begin{array}{r} 8 \\ - 4 \\ \hline 4 \end{array}$	
$\begin{array}{r} 15 \\ - 6 \\ \hline 9 \end{array}$		$\begin{array}{r} 13 \\ - 7 \\ \hline 6 \end{array}$		$\begin{array}{r} 7 \\ - 5 \\ \hline 2 \end{array}$		$\begin{array}{r} 13 \\ - 4 \\ \hline 9 \end{array}$	
$\begin{array}{r} 11 \\ - 8 \\ \hline 3 \end{array}$		$\begin{array}{r} 11 \\ - 5 \\ \hline 6 \end{array}$		$\begin{array}{r} 11 \\ - 6 \\ \hline 5 \end{array}$		$\begin{array}{r} 10 \\ - 2 \\ \hline 8 \end{array}$	
$\begin{array}{r} 13 \\ - 9 \\ \hline 4 \end{array}$		$\begin{array}{r} 8 \\ - 3 \\ \hline 5 \end{array}$		$\begin{array}{r} 8 \\ - 5 \\ \hline 3 \end{array}$		$\begin{array}{r} 13 \\ - 6 \\ \hline 7 \end{array}$	
$\begin{array}{r} 6 \\ - 3 \\ \hline 3 \end{array}$		$\begin{array}{r} 10 \\ - 8 \\ \hline 2 \end{array}$		$\begin{array}{r} 11 \\ - 3 \\ \hline 8 \end{array}$		$\begin{array}{r} 17 \\ - 9 \\ \hline 8 \end{array}$	

## Appendix L

### Explicit Timing Subtraction Intervention Worksheets

Measures & Interventions for Numeracy Development

MIND: Computation TP/ET Worksheet Subtraction 1A Name: \_\_\_\_\_ Date: \_\_\_\_\_

$\begin{array}{r} 17 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 6 \\ \hline \end{array}$
$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 8 \\ \hline \end{array}$
$\begin{array}{r} 7 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 6 \\ \hline \end{array}$
$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array}$
$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 5 \\ \hline \end{array}$
$\begin{array}{r} 13 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$
$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$

Measures & Interventions for Numeracy Development

MIND: Computation TP/ET Worksheet Subtraction 2A Name: \_\_\_\_\_ Date: \_\_\_\_\_

$\begin{array}{r} 7 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$
$\begin{array}{r} 17 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$
$\begin{array}{r} 7 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 2 \\ \hline \end{array}$
$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 5 \\ \hline \end{array}$
$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 9 \\ \hline \end{array}$
$\begin{array}{r} 15 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$
$\begin{array}{r} 17 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 6 \\ \hline \end{array}$

Measures & Interventions for Numeracy Development

MIND: Computation TP/ET Worksheet Subtraction 3A Name: \_\_\_\_\_ Date: \_\_\_\_\_

$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 5 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$
$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$
$\begin{array}{r} 11 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 8 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$

© Brian C. Poncy & Gary J. Duhon (2015)



Measures & Interventions for Numeracy Development

MIND: Computation TP/ET Worksheet Subtraction 4A Name: \_\_\_\_\_ Date: \_\_\_\_\_

$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 5 \\ \hline \end{array}$
$\begin{array}{r} 13 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 5 \\ \hline \end{array}$
$\begin{array}{r} 17 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$
$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 5 \\ \hline \end{array}$
$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$

Measures & Interventions for Numeracy Development

MIND: Computation TP/ET Worksheet Subtraction 5A Name: \_\_\_\_\_ Date: \_\_\_\_\_

$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 5 \\ \hline \end{array}$
$\begin{array}{r} 13 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$
$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$
$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 5 \\ \hline \end{array}$
$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 9 \\ \hline \end{array}$
$\begin{array}{r} 15 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$
$\begin{array}{r} 17 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 6 \\ \hline \end{array}$

Measures & Interventions for Numeracy Development

MIND: Computation TP/ET Worksheet Subtraction 6A Name: \_\_\_\_\_ Date: \_\_\_\_\_

$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 5 \\ \hline \end{array}$
$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 9 \\ \hline \end{array}$
$\begin{array}{r} 15 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$
$\begin{array}{r} 17 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 6 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 4 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ - 2 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 9 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ - 8 \\ \hline \end{array}$
$\begin{array}{r} 8 \\ - 4 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 5 \\ \hline \end{array}$	$\begin{array}{r} 11 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ - 8 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ - 3 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ - 6 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ - 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ - 3 \\ \hline \end{array}$

## Appendix M

### IRB Approval Letter

#### Oklahoma State University Institutional Review Board

Date: Monday, August 17, 2015 Protocol Expires: 8/16/2016  
IRB Application No: ED10121  
Proposal Title: The Impact of School Wide Tiered Interventions on the Math Fluency and Accuracy Performance of Students  
Reviewed and Processed as: Expedited Continuation  
Status Recommended by Reviewer(s): Approved  
Principal Investigator(s):  
Gary J Duhon  
423 Willard  
Stillwater, OK 74078

---

Approvals are valid until the given expiration date, after which time a request for continuation must be submitted. Any modifications to the research project approved by the IRB must be submitted for approval with the advisor's signature. The IRB office MUST be notified in writing when a project is complete. Approved projects are subject to monitoring by the IRB. Expedited and exempt projects may be reviewed by the full Institutional Review Board.

- ☒ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

Signature :

  
\_\_\_\_\_  
Hugh O'Leary, Chair, Institutional Review Board

Monday, August 17, 2015  
\_\_\_\_\_  
Date

# VITA

Carrol A. Smith

Candidate for the Degree of

Doctor of Philosophy

Thesis: DETERMINING THE CORRECT INTERVENTION BASED ON INITIAL FLUENCY: A COMPARISON OF EXPLICIT TIMING AND COVER, COPY, COMPARE.

Major Field: Educational Psychology (Option: School Psychology)

Biographical:

Education:

Completed the requirements for the Doctor of Philosophy in Educational Psychology (Option: School Psychology) at Oklahoma State University, Stillwater, Oklahoma in May 2017.

Completed the requirements for the Master of Science in Educational Psychology (Option: School Psychometrics) at Oklahoma State University, Stillwater, Oklahoma in 2013.

Completed the requirements for the Bachelor of Arts in Psychology at University of Arkansas, Fayetteville, Arkansas in 2012.

Experience:

August 2016-May 2017- Pre-Doctoral Intern at Broken Arrow Public Schools

June 2015- June 2016- Systems Level Consultant for Oklahoma Tiered Intervention System of Support (OTISS), State Dept. of Education

June 2015- June 2016-400 Hour Clinic-Based Practicum at the School Psychology Center, Oklahoma State University

August 2012-May 2015- Graduate Teaching Assistant at Oklahoma State University, School of Applied Health and Educational Psychology

Professional Memberships:

American Psychological Association (APA)

National Association of School Psychologists (NASP)

Oklahoma School Psychology Association (OSPA)