Move, Play, and Read Through Algebra in First Grade

Margaret Hershey-Mason

Introduction

The rationale for developing my unit is to provide an engaging math curriculum for first grade students in which every student enjoys, understands, and makes meaningful connections to the foundational math concepts outlined in the Common Core State Standards. When I first thought about the concept of "entertaining in math" I thought about a curriculum that had to simply just be fun. However, in the dictionary the definition of "*entertain*" means to "hold the attention of pleasantly or agreeably; to divert." [i] Hence, being entertained is about being engaged, challenged, thinking, and applying "the math" involved in daily activities at school and at home. Isn't this what we ultimately want for our students? Specifically, our goal is for students to learn to their fullest potential. My unit is about students being interested and engaged in mathematical instruction while performing activities that will help them develop and grow in early childhood. Hands-on activities, manipulatives, and games are used to teach math in many K-3 classrooms. This unit introduces strategies that broaden instructional methods with the goal of capturing students who might be missed by the aforementioned techniques.

Overview and Objectives

Young children today hold many misconceptions about mathematics and their ability to succeed in the classroom. Have you ever heard comments like, "Math in just not my thing" or "My parents are not very good in math, and so neither am I"? Many children lose confidence in math because they feel they are not always quick or accurate at solving math problems.[ii] Subsequently, there is the myth that girls are not as capable as boys when it comes to doing well in mathematics. As they get older, some children even come to believe that they don't really need to know math to be successful later in life. Think about it, if you went to the movies with some friends and couldn't read the movie listings then you would probably would feel embarrassed, but if you couldn't add up the total amount for all the tickets you probably wouldn't feel as bad. We have gotten to the point where many people think that it is "alright" not to be good in math; consequently, math literacy has become unimportant.[iii]

Negative feelings about math have been circulating for some time in school systems. Many students are less engaged during math instruction and activities. This anxiety is causing a huge dilemma in our schools. What can we do now to alter these feelings about mathematics so that students and teachers set high standards in math, and so that students enter the workforce with the 21st century skills they need to compete and succeed? [iv]

First, as teachers and parents we need to develop instructional strategies, a strong mindset, and expectations around the Common Core State Standards that all children can achieve high standards in math. If we continue to feel that only boys, or students who are good with numbers or who are gifted will thrive, then we are setting our children up for failure.[v] Second, we need to incorporate more rigorous and relevant instruction in the classroom by offering students opportunities to apply and adapt mathematical content to real-world situations.[vi] Students need activities and tools to help them problem solve, reason logically, and communicate their thinking. Third, we need to differentiate instruction and target all learners by considering student readiness, learning styles, interests, and developmental needs. Such instruction also includes some integration with other academic areas to developing well-rounded students.

Theories on Cognitive Development in Early Childhood

This year I am teaching first grade. Children at this grade level are still in the early childhood stage of development. In order to create a curriculum with relevance, one must consider the activities and materials that will enhance the learning and proper development for this stage of growth. Exploration, sociodramatic play, hands-on learning, physical activity, games (including technology), language and verbal discussion, and reading are all important during this phase of cognitive development in a child's life. Many theorists on child development agree that play and the proper environment are critical for young children. Prior to the Twentieth Century, John Locke and Friedrick Froebel emphasized that the people and experiences in a child's environment had great influence on how a child's mind developed, and that guided play was an appropriate method of learning.[vii] During the past hundred years, other theorists also voiced similar beliefs. John Dewey and Maria Montessori both suggested that early childhood education should be based on the child's interests, and that children learn best though play and real-life experiences.[viii]

Research during the twentieth century by Jean Piaget, Lev Vygotsky, and Howard Gardner dramatically shaped the philosophy for how young children are taught in the classroom today. Piaget stressed the importance of real world experiences and the need for open-ended questions and activities to enable children to think for themselves and expand their minds.[ix] Vygotsky's "zone of proximal development" helped teachers understand the cognitive level of each child (what a child could do with and without help) to clarify a starting point to help advance individual learning. Vygotsky also emphasized that teachers need to encourage conversation and provide opportunities for children to play and work together to help clarify, hear, and organize new ideas.[x] Finally, it was Gardner's theory of multiple intelligences that emphasized eight different ways that children take in, process, and produce information.[xi] In current society, most schools only focus on a few of these intelligences, yet in order for every child to meet high standards we need to observe students and be able to teach them in a manner they can learn best.

Mathematics Curriculum

Investigations in Number, Data, and Space will provide the core content in which my unit will be centered in teaching the Common Core Standards. *Investigations* was developed to meet the needs of all learners by allowing students time to explore, discuss, and express their mathematical thinking. Children work individually, with a partner, or in small groups as they choose appropriate mathematical tools to solve problems, make connections, and play games. My unit will combine some of these strategies with those related to child development.

Meeting the cognitive and social/emotional needs of students is equally important for children to learn at their highest potential.[xii] Many times it is how we group or separate students that makes them feel less confident or inferior to their peers. Why not give every child the same chance to collaborate, model with math, discuss concepts, and help their peers?[xiii] It is also important that students observe how math is used in the real world, and how it is integrated into other modes of learning, to help alleviate some of the insecurities they have about math.

Common Core State Standards in Mathematics

Having a strong understanding in algebraic thinking, numbers, and operations is critical in any K-3 classroom. Without a solid foundation in these areas, students will be less successful when they begin learning about other rational numbers such as fractions and decimals. Actually, the word "successful" may not quite describe what I mean, because students can be somewhat successful in math without truly understanding what they are doing. They can memorize steps, a formula, or "little tricks" and still be successful. My goal is for children to understand the math and the number concepts behind their work and thinking.

Currently, the Common Core State Standards in mathematics for first grade includes 21 mathematical standards, 67% of which are focused on algebraic thinking, numbers, and operations in Base 10. Another 33% is on measurement, data, and geometry.[xiv] However, within these categories there are several standards that interconnect with number sense (telling time, fractions, counting and adding non-standard units of measure, and terms such as half and quarter circle in geometry). It is important that the bulk of instruction and student learning be applied to number sense and algebra to ensure that students can explain and use such concepts towards other applications and future content.

Reasoning Algebraically in First Grade: Connections to the Mathematical Practice Standards

My unit will focus on the algebra standards for first grade in the Common Core State Standards. Algebra is a dynamic and necessary concept for describing a changing world, and a critical concept that should be introduced early in elementary school.[xv] When I look through the *Common Core Mathematical Practice Standards*, I realize that each standard is connected to algebra. One could say that understanding algebra is extremely important

in making sense of all the critical content areas in mathematics. For example, modeling might entail using the equation 30 + ? = 82. A child making sense of the problem might say, “I know 8 tens are in 80, and I have 3 tens already, so I need 5 tens and 2 ones”. The student is identifying the relationship between numbers. To reason algebraically students are looking at a problem and determining what they know and what they need to find out. They investigate what certain numbers have in common and if there is a pattern in those numbers. They then go back and “test” their thinking to make sure that their ideas are reasonable based on their current knowledge of how operations and functions work, and the rules that apply to each.[xvi] As students explore and think through a problem, they also have to be able to explain and represent ideas logically. Also, students with a high-level of algebraic thinking need to be able to find solutions from a top-down or bottom-up approach. For example; some students can determine how many 5’s are in 125 by skip counting (although that would take a long time), or through reasoning that there are 10 fives in 50, so there are 20 fives in 100. Twenty-five is half of 50, so there are another 5 fives in 25. That makes 25 fives in 125. But can the same student determine how many packs of t-shirts Mr. Jones can ship to “T-Shirts Unlimited” if they are shipped in packs of 5 and he has 125 total? This involves reasoning abstractly and quantitatively, which is also algebraic thinking.

Understanding algebra allows students to identify relationships between quantities and the ways in which quantities change relative to one another.[xvii] Since the introduction of the Common Core and adopting *Investigations* I have seen how algebra is, and can be, embedded in many mathematical content areas. The curriculum provides hands-on exploration and game-like activities for children to learn and stay engaged in the classroom. The games can easily be modified or extended for deeper comprehension in a particular skill, or to become more “algebraic” for the student. Algebra is not a separate math concept, but a way of thinking that should be integrated throughout any elementary math curriculum.

Differentiated tasks, based on student needs and learning styles, also play an important role in student achievement. Games certainly engage young children. Several games will be used in my unit to promote algebraic thinking and number sense. A second mode of learning in early childhood is dramatic play. My unit will include a dramatic play activity for each algebraic standard from the Common Core. The third strategy will infuse movement activities into the classroom to help students develop counting strategies and comprehend operations within numbers. Last, a literacy component using math stories by Stuart Murphy, and other authors, will be included to appeal to verbal and visual learners. I feel that intertwining these four specific strategies in my unit will engage students, and help them develop better mathematical understanding.

Strategies

Integrating subject matter can help increase student engagement. Students make cross connections and develop meaningful information that can be used in the surrounding

world. They are able to apply what they have learned to different subject areas and find a purpose for their learning. A well-planned integrated curriculum enables students to use higher order skills in Bloom's Taxonomy to collaborate, explore, analyze, and construct new information as they relate it to other applications.[xviii]

When students are engaged, they are less likely to have behavior issues and they often work beyond expectations.[xix] Part of successful engagement is making sure the learning styles of the students in the classroom have been indentified through teacher observations. The eight learning styles (multiple intelligences) include; kinesthetic-bodily, musical, interpersonal-social, intrapersonal-self, naturalist, linguistic-language, logical-mathematical, and visual-spatial.[xx]

Strategy One: Literature and Math
Learning Styles: Visual, logical, and linguistic
Resource: Math story books that teach a key concept

Using literature can help clarify math topics for students who are visual and/or linguistic learners. A fictional book with a math theme provides information and captivates the interest of many students. Cognitive ideas are embedded in imaginary stories, as well as in non-fiction text.[xxi]

Strategy Two: Sociodramatic play

Learning Styles: Visual, logical, interpersonal, and linguistic
Resource: Play scripts/Dramatic play props

Research by early childhood theorists reflects that engaging in prolonged sociodramatic play is an important activity to child development (to the cognitive, social, emotional, creative, and physical domains). Sociodramatic play is when each child takes on the role of a person, and follows the rules established by the group. Children share information, learn to hear and accept the perspectives of others, and develop cognitively in areas of problem solving, literacy, planning, and organizing information.[xxii] Unfortunately, pretend play is not common today in the K-2 classrooms [xxiii], yet past research supports its place in developing language, knowledge, and social skills. We need to take the initiative and create more opportunities in the classroom for this forgotten activity that provides so much for our children.

Strategy Three: Movement and Math
Learning Styles: Kinesthetic, logical, visual, and intrapersonal.
Resources: *Math and Movement; Brain Gym*

Physical activity is important for learning, staying focused and on task, and for processing new information. Regular exercise stimulates a brain chemical called BDNF (Brain Derived Neurotropic Factor). [xxiv] BDNF helps the neurons of the brain grow faster and make stronger connections. These stronger connection enable humans, especially

children, to learn, store, and recall information. [xxv] I incorporated two movement programs into my unit. *Brain Gym* involves using cross-body movements (think of touching your right hand to your left knee and crossing the mid-line of your body) to integrate the functioning of the right and left hemispheres of the brain.[xxvi] *Math and Movement* uses physical activity to help children practice math concepts while they engage in fun activities that keep them moving and alert. [xxvii]

Strategy Four: Games (including technology)

Learning Styles: Visual, kinesthetic, interpersonal, intrapersonal, and logical
Resources: (1) *Investigations, (2) NCTM Illuminations: Online Resources for Teaching Math*

Most every child enjoys playing games. Good math games offer a challenge and have a specific math objective to be learned.[xxviii] There are benefits to using games to help students learn math skills and concepts. First, games provide a meaningful situation for the child to use math.[xxix] Second, there are so many different games available to meet the interest levels of children so they stay motivated and increase learning. Third, there are usually different levels of the game to meet the ongoing needs of the child while providing a non-threatening way for students to practice and be assessed on math based on their decisions made during the game.[xxx] Last, most games can be played with the teacher and there are few language barriers.[xxxi] Most of the time, children are having so much fun interacting with peers and playing the actual game that they forget it's math time. Games played on the computer are also beneficial for the same reasons listed above, especially for those students who have strong intrapersonal skills. A computer game can allow children to learn, but also have a safe place to be able to make mistakes and learn from them independently.[xxxii]

In games, students have to think at a higher level by applying, comparing, and evaluating their play and choices in the game.[xxxiii] Even when students are trying to learn math facts, a game is a more engaging approach than drill and practice. [xxxiv]

Implementation of each strategy: There are several ways to implement the strategies in a first grade classroom. The teacher can introduce any strategy to students during an initial lesson for a specific mathematical standard. A teacher may also choose to teach a concept and then use the strategies within practice activities during the course of several days to help facilitate student understanding. A strategy can be used as part of a lesson that includes other problem solving activities. Strategies can be used with individual students, pairs of students, small groups, and full classroom groups. Using strategies in pairs (a math story with dramatic play, or a movement activity with a game) during one math period is another way to help strengthen skills for students with particular learning styles. Implementing a math workshop, with each strategy incorporated into a fun workstation, would allow differentiation as students rotate through activities during math time. Adult

assistance would be needed in a workshop model to guide students and informally assess understanding.

First Grade Math Standards and Activities for Operations and Algebraic Thinking

Common Core Standard 1.OA.1: Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

1- Literature options: *Equal Shmequal: A Math Adventure by* Virginia Kroll (what does *equal* mean?), *Jack the Builder* by Stuart Murphy (counting on), *Animals on Board* by Stuart Murphy (addition), *Ready, Set, Hop* by Stuart Murphy (building equations)

2- Dramatic play activity: **Birthday Party** (See Appendix A for student handout)

3- Movement options

Number Line Hop: Use a number line floor mat or 8x8 squares (hopscotch-like) with the numbers 0-20. Give a student a number and that many counting chips. Students will start on that number and add-on/subtract from that number. For example; give the student 4 counting chips. They start on the number 4. Ask, "How many more chips do you need to have 12 chips?" The student will hop with two-feet on each number and count-on until they get to 12. Students can then count-back to 4 as they hop on and say each number.

Picking Apples: You have 4 apples. You need 12. How many more do you need to pick? Reach with your right hand across your body and high up in the air. Grab an apple from the tree (say 1). Next, reach with your left hand across your body and high up in the air. Grab an apple from the tree (say 2). The teacher will model the student's counting on the board using a number line.[xxxv]

4- Game options

How Many Am I Hiding? (*Investigation*s - See Appendix I)

Ten Frame (*NCTM Illuminations*)

How Many Under the Shell? (*NCTM Illuminations)*

Common Core Standard 1.OA.2: Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

1- Literature options: *Animals on Board* by Stuart Murphy (addition), *Mall Mania* by

Stuart Murphy (addition strategies), *Every Buddy Counts* by Stuart Murphy (counting).

2- Dramatic Play Activity: **Candy Factory** (See Appendix B for students handout)

3- Movement options

Number Line Hop: Use a number line floor mat or 8x8 squares (hopscotch-like) with the numbers 0-20. Put three single-digit numbers on the board (example; 4 + 3 + 2). Give a student 4 counting chips. Have them start on the number 4 and count three spaces…1, 2, 3 to get to 7, (give them 3 more chips). Have them count two more spaces… 1, 2 to get to 9 (give them 2 more chips).

Kangaroo Hop: Put a three-digit equation on the board (6 + 5 + 4). Using a large number line or twenty-frame on the board, have students count on from 6 as they hop side to side (they will say 1, 2, 3, 4, 5) as the teacher moves a marker across the number line or ten frame to number 11. They will repeat the same movement and counting until they get to 15.

4- Game options

Close to 20 (Investigations - See Appendix I)

Beat the Calculator (Investigations - See Appendix I)

Grouping and Grazing (*NCTM Illuminations*)

Common Core Standard 1.OA.3: Apply properties of operations as strategies to add and subtract. Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.)

1- Literature options: *Elevator Magic* by Stuart Murphy (subtraction), *Ready, Set, Hop* by Stuart Murphy (building equations), *Lizzy's Dizzy Day* by Sheila Keenan (addition and subtraction), *The Sundae Scoop* by Stuart Murphy (combinations), *Mall Mania* by Stuart Murphy.

2- Dramatic Play Activity: **Decorating Cookies** (See Appendix C for student handout)

3- Movement options

Basketball Score: Tell students they are going to play a basketball game. Every time they shoot, they score 2 points. Have students spread around the classroom. Choose any number 1-100. If you choose 24, for example, tell students that is how many points the team has and when they shoot they will add 2 each time, skip counting by 2's. Tell

students that they need to skip count until they get to the number 40. That is how many points they had at the end of the game. Students will jump and shoot like basketball players as they count 26, 28, 30, 32, 34, 36, 38, 40. The movement can be repeated with other numbers.

Ants are Awesome: Skip counting by 2's: An ant can lift 20 times its body weight. If a first grader was as strong as an ant, they could lift a motorcycle. Have students pretend to lift a motorcycle over their head while counting by 2's all the way to 20.[xxxvi]

4- Game options

Builder's Choice: You will need a set of ten blue Unifix cubes, and a set of ten red Unifix cubes (or any two colors of your choice). Choose any number between 3 and 10. Record the number and build that number with a cube train of one color. Write an equation to match (for example, if I chose the number 4, I would build a cube train with 4 blue cubes and write 4 + 0 = 4). Next, take one blue cube and replace it with a red cube. Record the new equation as 3 + 1 = 4. Repeat finding as many different ways to make the sum of 4 (4+0, 3+1, 2+2, 1+3, 0+4). Record all equations. Repeat with a new number.

The game can be played with a partner or as a full class. After students are finished, have them record their equations with a missing part or sum on individual index cards. They will give the cards to a classmate to solve. For example, if I have 4 equations I would write 4 + __ = 4, __+ 1 = 4, __+ 2 = 4, 0 + 4 = __ on index cards and have a classmate find the missing number.

Three Towers of 10 (Investigations - see Appendix I)

Ten Plus (Investigations - see Appendix I)

Grouping and Grazing (NCTM Illuminations)

Ten Frame (*NCTM Illuminations)*

Common Core Standard 1.OA.4: Understand subtraction as an unknown-addend problem. For example, subtract 10 – 8 by finding the number that makes 10 when added to 8. Add and subtract within 20.

1- Literature options: *Elevator Magic* by Stuart Murphy (subtraction), *Ready, Set, Hop* by Stuart Murphy (building equations), *Tally O'Malley* by Stuart Murphy (tallying), *The Sundae Scoop* by Stuart Murphy.

2- Dramatic Play Activity: **Mailing Letters** (see Appendix D)

3- Movement options

Number Line Hop: Give students a subtraction problem, such as 15 minus 6. Have students start at 6 and jump forward as they count to 15 (1, 2, 3, 4, 5, 6, 7, 8, 9). As they jump and count, have a partner put a chip on each number. They can count the chips to check their answer (15 – 6 = 9 or 6 + 9 = 15).

Whisper/Loud Criss Cross for 5's: Stand and spread feet shoulder width apart. Touch right hand to left foot and whisper "one". Touch left hand to right foot and whisper "two". Touch right hand to left knee and whisper "three". Touch left hand to right knee and whisper "four". Clap and yell "FIVE" (continue to fifteen). Students will see that they count to 5 three times to get to 15. Next, have students subtract by 5's using the whisper/loud method.[xxxvii]

4- Game options

Roll and Tally: Roll one dice. Record the amount rolled with a number and tally marks. Repeat for 3 more rolls. Count the total number of tallies and compare to your partner's tallies. Who has more? How many more? Repeat three times. Best 2 out of 3 wins.

Ten Frame (*NCTM Illuminations)*

Common Core Standard 1.OA.5. Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).

1- Literature options: *Jack the Builder* by Stuart Murphy (counting on), *A Fair Bear Share* by Stuart Murphy (regrouping), *Ready, Set, Hop* by Stuart Murphy (building equations), *Elevator Magic* by Stuart Murphy (subtraction), *Monster Musical Chairs* by Stuart Murphy (subtracting one).

2- Dramatic Play Activity: **How Many Sandwiches?** (see Appendix E for student handout)

3- Movement option

Swaying Trees: The teacher marks a number on a hundreds board/number line (for example, 24). Next, the teacher says, "add 13 to the number". Students pretend to be a tree with swaying branches in the wind. They sway to the right with hands together and crossing over the mid-line of their body and say "1", they sway to the left with hands together crossing the mid-line of their body and say "2". They repeat counting by ones, along with the swaying movement, until they get to 13. As they count, the teacher is moving a marker or pointer to show one-to-one correspondence. This movement can also be done using subtraction.[xxxviii]

4- Game options

*Collect 25 (*Investigations - see Appendix I)

*Get to 100 (*Investigations - see Appendix I)

Common Core Standard 1.OA.6: Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13). Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Problem: 8+6 = 8+2+4 = 10+4 = 14 / 13-4 = 13-3=10-1 =9.

1- Literature options: *Monster Musical Chairs* by Stuart Murphy (subtracting one), *Just Enough Carrots* by Stuart Murphy (Comparing Amounts), *Jack the Builder* by Stuart Murphy (counting on), *A Fair Bear Share* by Stuart Murphy (regrouping).

2- Dramatic Play Activity: **Orange Options** (see Appendix F for student handout)

3- Movement options

Musical chairs: Play the traditional game of musical chairs. Record subtracting by one with number equations throughout the game (10 – 1 = 9, 9 – 1 = 8, etc.).

Jumping Jack Ten: The teacher says and records a number from 0-9. Students will add-on to the number by performing jumping jacks as they count to 10. For example, if the number is 4, the teacher marks 4 on a number line and students count by 1's until they get to ten while performing jumping jacks. As they count, the teacher is moving a marker or pointer to show one-to-one correspondence on the number line. This movement can also be done using subtraction (Math and Movement).

4- Game options:

*Close to 20 (*Investigations- see Appendix I)

*Ten Plus (*Investigations – see Appendix I)

Ten Frame (*NCTM Illuminations)*

Common Core Standard 1.OA.7: Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 – 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2. Understand the meaning of the equal sign and determine if equations involving addition and subtraction problems are true or false.

1- Literature options: *Equal Shmequal: A Math Adventure by* Virginia Kroll (what does *equal* mean?), *The Sundae Scoop* by Stuart Murphy, *Ready, Set, Hop* by Stuart Murphy.

2- Dramatic Play Activity: **Equal Brownies** (see Appendix G for student handout)

3- Movement option

A Balancing Act: Mark off two 6 x 6 squares with masking tape on the floor in the classroom. Choose 5 students to stand in one square (Square A). Next, choose a different amount of students (maybe 7) to stand in the other square (Square B). Ask the remaining students if the two groups are equal. Next, ask how they can move the students in one group so that the two groups are equal. For example, they can take away two students from Square B and then both squares would have 5 students. Have the students complete the task by writing an equation 5 = 7 – 2. Repeat with different students and numbers.

4- Game options

*Ten Plus (*Investigations – see Appendix I)

Pan Balance Numbers (*NCTM Illuminations)*

Common Core Standard 1.OA.8: Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = _ – 3, 6 + 6 = _. Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. Example: 5 + 7 = ?, ____ - 7 = 5

1- Literature options: *Equal Shmequal: A Math Adventure by* Virginia Kroll (what does *equal* mean?), *Jack the Builder* by Stuart Murphy (counting on), *Animals on Board* by Stuart Murphy (addition), *Ready, Set, Hop* by Stuart Murphy (building equations

2- Dramatic Play Activity: **Carnival Tickets** (see Appendix H for student handout)

3- Movement option

Number Line Hop: Use a number line floor mat or 8x8 squares (hopscotch-like) with the numbers 0-20. Put two single-digit numbers on the board (example; 8 + 5). Give a student 8 counting chips. Have them start on the number 8 and count five spaces…1, 2, 3, 4, 5, to get to 13, (give them 5 more chips). Ask them to tell you an equation to represent their movement (8 + 5 = 13). This movement can also be done with subtraction.

4- Game options

What's My Number? Choose 2 cards. Make an equation with a missing number. Have a partner solve for the missing number. For example, if I choose cards with numerals 2 and 9, I could make a problem 2 + 9 = ___ , 2 + ___ = 9, or 9 - ___ = 2. The person who creates the problem will check the solution given by their partner. Record and repeat.

Grouping and Grazing (*NCTM Illuminations)*

Pan Balance Numbers (*NCTM Illuminations)*

How Many Under the Shell? (*NCTM Illuminations)*

Ten Frame (*NCTM Illuminations)*

Appendix A

Birthday Party

1.OA.1

What you need:

Paper plates, napkins, cupcakes liners, counters

Math Act:

You are having a birthday party for your grandma.

There are 15 people at the party and everyone gets 1 cupcake.

You are going to give each person a cupcake.

If you have 7 cupcakes on a plate, then how many more cupcakes do you need from the kitchen so that everyone has a cupcake?

Appendix B

Candy Store

1.OA.2

What you need:

Paper plates, Unifix cubes

Math Act:

A candy factory wants to sell 3 new kinds of candy.

They want you to try some for free. You get to try:

3 Yellow Yibbies

9 White Wonkers

7 Pink Pappies

How many total candies can you try for free?

Appendix C

Decorating Cookies

1.OA.3

What you need:

Paper plates, brown and red Unifix Cubes, red or yellow counting chips.

Math Act:

Jill and Betty are helping Jill's mom decorate cookies.

Jill puts 8  M&M's and 5  chocolate chips on her first cookie.

Betty puts 5  M&M's and 8  chocolate chips on her cookie.

* How many total candies did each girl put on her cookie?

* How are the cookies the same?

* How are the cookies different?

* What did you learn about the order of the numbers when you add them together?

Appendix D

Mailing Letters

1.OA.4

What you need:

24 envelopes or 24 Index cards

Math Act 1

The mailman has **11** letters in his mailbag.

He delivered **8** letters to people in town.

How many letters does he have left in his mailbag?

Math Act 2

Oh no! The mailman forgot to tally how many letters he delivered. He knows he has 3 letters left in his bag, but he needs to go back and count how many he delivered.

* Show what happened using tally marks.

* How many letters did he deliver?

* How many letters did he start with?

Appendix E

How Many Sandwiches? 

1.OA.5

What you need:

15 Base 10 Hundreds Flats (as sandwiches)

Math Act 1

A woman ordered **7**  sandwiches at ***McSandwich***.

A man ordered **6**  sandwiches at ***McSandwich***.

* How many sandwiches did they order altogether?

* Show how you would count to find the answer.

Math Act 2

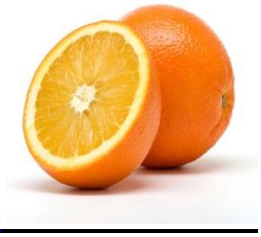
Mr. Jones ordered **15**  sandwiches at ***McSandwich***.

He gave **9**  sandwiches to his family.

* How many sandwiches does he have left?

* Show how you would count to find the answer?

Appendix F



Orange Options

1.OA.6

What you need:

- 5 baskets
- Large, medium, and small Geoblocks or premade oranges made of clay or Playdough in different sizes.

Math Act

A farmer sells oranges in baskets of 10. When the farmer picks his oranges he fills the baskets without counting the oranges.

You must make 3 baskets with 10 oranges in each basket. The baskets must have at least 2 different sizes (example; 5 small and 5 large).

Use the chart to help you form groups of 10 in each basket.

Take any leftover oranges and try to create more baskets of 10.

	Basket A	Basket B	Basket C
Small 	**3**	**6**	**7**
Medium 	**6**	**8**	**9**
Large 	**7**	**4**	**1**

Appendix G

Equal Brownies

1.OA.7

What you need:

- 3 shoe boxes
- Unifix cubes put together and labeled (thin & soft, thin & crispy, thick & chewy, and super thick)

Math Act

The baker at "Just Right Brownies" makes 4 different types of brownies.

1) Thin and soft
2) Thin and crispy
3) Thick and chewy
4) Super thick & moist

He ships his brownies by weight to different stores. Each box of brownies has to weigh the same (equal) amount for the post office to ship it.

How can you fill 3 boxes of brownies so that they all are equal in weight, but have a different assortment of brownies?

Use the weight chart to help you create your boxes.

Brownie Type	Weight
Thin & soft	2 ounces
Thin & crispy	3 ounces
Thick & chewy	4 ounces
Super thick & moist	8 ounces

Appendix H

Carnival Tickets 

1.OA.8

What you need:

Unifix Cubes or tickets

Math Act

At the carnival they sell tickets in bundles of 6.

Jose and his friends have some tickets left over from the day before:

Jose has 6  **tickets**

Maria has 8  **tickets**

Pete has 12  **tickets**

If they each buy a new bundle of 6 tickets then how many total tickets will they each have?

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