Problem Posing with Addition and Subtraction Word Problems in Kindergarten

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Introduction

Have you ever wondered why some students just "get" math? These so-called "math people" seem to be able to calculate answers to problems in their head and typically enjoy doing math because it comes easily to them. However, what if I told you there is a way for all students to become "math people?" Well, there is a way, and it all begins in kindergarten. There is no magical solution, but there are many crucial steps that teachers can take in the younger grades to help students with number sense and problem solving to positively impact their future math careers.

All students can become "math people" starting in kindergarten. Students who gain a conceptual understanding related to number sense and problem solving at a young age are able to comprehend problems and solve them effectively later in mathematics. Problem posing and Cognitively Guided Instruction (CGI) are two strategies that teachers can utilize to help students gain a concrete conceptual understanding of numbers 1-20. My unit will address both concepts as well as the background knowledge necessary for being able to successfully pose problems.

Overview of School Characteristics

Richardson Park Elementary School serves K-5 students with and without disabilities. Students at Richardson Park Elementary School (RPES) identify themselves as: African American (31.1%), Asian American (0.4%), Hispanic (38.8%), White (27.1%), and Multi-Racial (2.1%). 61.4% identify as low-income, 13.4% identify as English Language Learner (ELL) and 10.9% identify as Special Education. In 2014-15, there were 77 kindergarten students and 479 students total at RPES. In 2015-16, there are 100 kindergarten students and 586 students total at RPES. The numbers in each grade level and total at RPES increased due to the district's model for full inclusion of all students in their neighborhood schools. RPES received many special education students as well as many ELL students as a result of full inclusion.

My class consists of 20 students. 4 students are identified as special education and have Individualized Education Programs (IEPs), 10 students are classified as English Language Learners (ELL), and 1 student has an IEP for speech only. My students have a wide-range of needs varying from coming into kindergarten already being able to read, write their name, and complete math addition and subtraction problems while other students are still working on identifying letter names and letter sounds, writing their

name, and identifying numbers and counting. The disparity among students is greater than in previous years due to the increasing number of special education students and ELL students at RPES, as well as in my classroom.

Previously, Red Clay Consolidated School District used a variety of curriculum materials to address the Common Core State Standards. Some materials include: Trailblazers, Engage NY, and fraction units, as well as teacher-created materials based on the Common Core State Standards (CCSS). For the 2014-2015 school year, I, along with 4-5 classroom teachers from each grade level trialed Houghton Mifflin Harcourt's *Math Expressions* program in various Red Clay elementary schools. This year, all kindergarten through fifth grade classrooms are utilizing the *Math Expressions* materials. My unit includes additional materials and resources that teachers can utilize to explore story problems in a more in-depth manner in conjunction with the *Math Expressions* curriculum or as a stand-alone two-week unit.

How Addition and Subtraction Are Currently Taught in Kindergarten at RPES

Currently, addition and subtraction story problems are taught through a variety of methods such as through short, interactive video clips and games, using picture scenes, hands-on manipulatives, paper and pencil tasks, and in using math talk to work with a partner to create and solve math story problems. Students begin learning addition and subtraction simultaneously in Unit 1 Lesson 7 in the *Math Expressions* curriculum. However, some students still struggle to learn and make meaning to build a strong foundation for their future math careers. Some topics that students have difficulty with are: learning math partners, understanding the properties of commutativity, i.e. a+b=b+a, and associativity, i.e. (a+b)+c=a+(b+c), creating their own story problem using both pictures/manipulatives and number statements, stating whether a problem is asking the student to add/subtract when read a story problem with less or no visual representation, as well as adding and subtracting when more than two numbers are being added and/or subtracted.

Background Information For Kindergarten Students' Learning Sequence

Students in my kindergarten classroom begin the school year by learning to recognize, write, and count numbers 1-20. Students learn to count objects using 1 to 1 correspondence to answer the question "how many?" and learn to make groups of a given number with manipulatives to answer the phrase "give me…" in order to either to check for accuracy when handed a group of objects or to make their own group of objects. Once numbers 1-10 are mastered, students begin to work on teen numbers using tens and ones blocks, counting using 10 and the additional number of ones and number statements that include ten plus more (i.e. 10+8 = 18) in order to stress place value. Students are introduced to the concepts of addition and subtraction simultaneously at the beginning of the year. By the middle of kindergarten, students are expected to create and solve

addition and subtraction story problems using drawings, manipulatives, and number statements.

Common Core State Standards (CCSS)

Operations and Algebraic Thinking

<u>CC.K.OA.1</u> - *Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.*
Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g. claps), acting out situations, verbal explanations, expressions, or equations.

<u>CC.K.OA.2</u> - *Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.*
Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.

Objectives

1. Students will be able to use multiple modalities (i.e. drawings, manipulating objects, acting out problems) to show understanding of addition and subtraction story problems.
2. Students will be able to write number sentences to show understanding of addition and subtraction story problems up to 20.
3. Students will be able to create story problems for their fellow peers to solve in order to increase number sense.
4. Students will be able to respond to problem posing situations using a variety of ways to show understanding.

Essential Questions
1. How can students use visuals such as objects, drawings, and acting out story problems to make meaning of addition and subtraction story problems?
2. What strategies, through the use of CGI, can students use to determine if a story problem is addition or subtraction?
3. In what ways can story problems be created by students so that they are involved in the process of creating, solving, and checking their work and the work of their peers?
4. How can problem posing be utilized in the kindergarten classroom to address students' understanding of addition and subtraction?

My Unit Plan

This unit will be taught in collaboration with *Math Expressions* after students have a mathematical background in partners of numbers up to 10, have a foundation in addition

and subtraction, and can fluently add and subtract within 5. Students will begin by acting out story problems as a whole group using Cognitively Guided Instruction (CGI) strategies such as direct modeling, counting on/counting back, and using anchor charts to help with initially learning key words. Students will practice writing number statements based on the story problems they acted out or used manipulatives for the addition or subtraction of 2 numbers.

Students will gain an understanding of addition and subtraction problems through the use of Cognitively Guided Instruction (CGI) to engage students in understanding key words and what makes a problem addition or subtraction. Anchor charts should be utilized for key words for addition and subtraction. Addition key words are: sum, total, in all, all together, and, increased by, combine, join, both, add, plus. Subtraction key words are: difference, subtract, less than, minus, take away, fewer, left over, how many more, how many are left, and remain. The teacher will also demonstrate that problems can be solved in multiple ways such as when there is a part-part-whole problem that involves putting together or taking apart. One example of a part-part-whole problem that can be solved multiple ways is: “There are eight cakes on a table. Five cakes are pink and the rest are blue. How many cakes are blue?” This problem can either be solved by addition, 3+?=5, or subtraction, 5-3=?.

I will use CGI as described below to engage students in each stage of instruction to ensure students understanding. Students will be solving problems such as: join, separate, compare, and part-part whole where the initial, the change, or the result are unknown. See Appendix B for all problem types and examples of each.

When students are ready, they will be using the problem posing method after CGI. Problem posing will allow the teacher to gauge which students understand problem solving because it involves creating your own story problem when provided with a given scenario. For example, students might be given information such as: There are 4 red fish, 5 blue fish, and 3 green fish. Students would be asked to tell me as many story problems as you can to discuss the different fish. All lessons will use scaffolding so that students first gain an understanding of the differences in addition and subtraction, key words/phrases used in each, then make sense of problem solving and problem posing as a whole group, and finally try problem posing in pairs.

Content

Types of Addition and Subtraction Problems

There are different types of addition and subtraction problems. Join problems (add to) and separate (take from) problems can have a result unknown, change unknown, or initial unknown. A part-part-whole problem (put together/take apart) can have a total unknown or a part unknown. Comparing problems can have a difference unknown, quantity

unknown, or referent unknown. Refer to Appendix B for the chart and examples of each type of problem.

Cognitively Guided Instruction

Cognitively Guided Instruction (CGI) involves multiple steps by both the teacher as well as the students to ensure student success as well as management within the CGI classroom. First, the teacher needs to choose an appropriate problem that allows the students to engage with. Second, the problem should be read aloud so that all students have a chance to hear the problem before working on it. Third, the teacher will check for understanding by unpacking the problem to engage students in discussion. Unpacking the problem helps students comprehend and relate to the given situation so that they understand the story without giving away the mathematical concepts need to solve the problem. Fourth, students will be asked how they solved the problem so that the teacher and other students are able to listen to student reasoning. Fifth, the teacher will ask a series of follow-up questions to determine student reasoning in solving the problem. This step is important because the follow-up questions allow the student to verbalize an understanding to make sense of what they actually did and it helps the class to learn about how to explain their own reasoning when solving a problem. When there are times that a student cannot explain their reasoning, it is important for the teacher to ask the question in a different way such as showing written work instead of verbally explaining their response or having the student show how they solved the problem using manipulatives and asking questions. When a student does not answer a question correctly, the teacher should pose questions in order to see where the student made a mistake. However, the mistake is corrected by guiding the student to think about how they solved the problem through a series of questions and then having the student finish the problem again using the correct information.[1]

Problem Posing

Problem posing is an essential part of mathematics. Often, this portion of mathematics is overlooked due to the many challenges it poses. However, there are many benefits to problem posing. First, teachers will want to include instructional time when the whole class begins to generate problems in relation to a given mathematical topic. Next, teachers will have students work in groups to come up with problems. Finally, students may have the opportunity to share their problems and solve other students' problems to come up with unique and creative solutions.[2]

The problem posing method allows the teacher or the students to propose a problem that has multiple solutions. One example is: Tommy has 5 gumballs, Marissa has 7 gumballs, and Alexis has 2 gumballs. How many different problems can you pose and solve using the example above? The example would allow for students to talk about addition (for example, how many altogether, how many do two people have together) as

well as subtraction (for example, how many more does one person have than another, posing that another student has a different amount of gumballs to compare).[3]

Benefits of Problem Posing

For one, problem posing promotes students' engagement because it allows them to think creatively about a number of problems and solutions. It also increases engagement because each group creates a varied set of problems, which may allow for diverse methods for solving problems and differing solutions. Secondly, problem posing is used as an activity in the classroom, which allows for decreased teacher-directed instruction and more time for students to talk with one another. Thirdly, problem posing has a positive effect on students' attitudes towards problem solving and also increases achievement. Finally, problem posing can be used in assessment as a way to check students' understanding of the given mathematical topic.[4]

The Importance of Problem Solving

Through research, many teachers indicate that problem posing is important and that they would like to incorporate it into their daily practices. However, they find it challenging because, like myself, we have a specific curriculum to follow and the practice of problem posing is not directly embedded in the instructional materials. It is important to include problem posing with curriculum materials as problem solving is taught. In addition, the tasks given should be meaningful to students.

Posing problems in the younger grades is especially important for a variety of reasons. One study found that 30% of problems posed by middle school students were either problems with no mathematical context or a non-problem statement. It is important to model and guide students through the process of solving problems in the younger grades in order for them to understand what questions constitute a mathematical problem.

Problem posing has direct correlation between being able to effectively problem pose and problem solve. When comparing less effective problem solvers with effective problems solvers, it is noted that the latter were able to create more complex, mathematical problems than the former.[5] It is essential for teachers to make sure that all students understand problem solving in kindergarten and first grade in order to solve more advance problems, as well as pose problems, in the upper elementary and middle school grades.

Assessment with Problem-Posing

When teachers incorporate problem posing into their instruction, they can also begin to think of ways to assess students using that same method. Teachers can think about the following criteria when assessing and grading problem posing: quantity of the response,

originality of the response, and complexity of the response. First, quantity of the problem can refer to the number of generated answers. However, it can also imply that the problems have asked varied questions and cannot just be worded differently but ultimately ask the same question (i.e. asking an addition problem in three different ways is only considered one problem, not three). Second, originality of the problem allows for creativity. Teachers can use the whole class' answers to see which are considered typical versus creative. Teachers can also work on a team or can look back at previous years' responses to see which problems are truly unique. Lastly, it is important for the complexity to be a part of the assessment. Complexity can be judged by students' words, mathematic complexity and problems that are not solvable.[6]

Teaching Strategies

There are many different teaching strategies that can be utilized throughout my unit. I am going to talk about a few that I prefer to use based on my students' varying needs and abilities. It is important to have a balance between teacher-directed and student-initiated learning.[7]

Cooperative Learning

Cooperative learning is important and effective for children. Cooperative learning allows two or more children to work together to listen to each other's mathematical reasoning to make sense of the given problem. Even when students are matched heterogeneously, it will benefit both students because the student who is able to make sense and understand the given problem is able to teach and work through the problem with the student who may be struggling. Teamwork is often frowned upon in mathematics when it is widely-accepted in music and sports. However, this misconception must be addressed beginning with teachers and extending to students and parents.[8]

Teacher-Directed Instruction

Teacher-directed instruction is utilized in CGI to make sure that students understand the given problem by unpacking it. There will also be times when the teacher will need to give an example and show how to solve the problem to help students make sense of the given mathematical task.

Math Language and Math Talk

Mathematical language and math talk are important parts of learning how to solve problems as well as posing problems. Teachers need to express how to use math talk. This is utilized heavily in the *Math Expressions* curriculum and should be utilized as necessary.

Small Groups

For students with learning disabilities, it is important to include additional teacher-directed time that allows students to understand how to solve math problems and how to successfully pose them. In my classroom, a student with a disability may be paired with a typical peer and supported by a paraprofessional or teacher during times when students are asked to work in pairs to solve problems or pose problems.

Classroom Learning Activities

Activity 1: Cognitively Guided Instruction (CGI) of key terms

Objective: Students will be able to identify key terms for addition and subtraction.

Materials: markers, chart paper, addition and subtraction key terms, addition and subtraction story problem examples
Addition key words are: sum, total, in all, all together, and, increased by, combine, join, both, add, plus. Subtraction key words are: difference, subtract, less than, minus, take away, fewer, left over, how many more, how many are left, remain.

Procedure: The teacher will teach this lesson at the beginning of working on word problems. The teacher will give examples of word problems that include addition and subtraction. Students will be asked to determine if you would add or subtract for the given problem. When students begin to develop a pattern of the words they might hear for addition, the teacher can work with students to create an addition anchor chart and then a subtraction anchor chart. This lesson may be taught over multiple days or as word problems are addressed in the curriculum.

Examples of Word Problems:
1. Kevin has 4 gumballs and gets 2 more gumballs. How many in all? How many total?
2. Maya has 6 gumballs and eats 2 gumballs. How many are left? How many remain?
3. Kevin had 4 blue gumballs and 3 red gumballs. How many gumballs did he have altogether? How many more blue gumballs than red gumballs? What is the difference between blue and red gumballs?
4. Maya had 10 gumballs. 3 are blue and the rest are red. How many red gumballs does she have? How many more red gumballs does she have than blue gumballs?

Activity 2: Problem solving for teacher-created addition and subtraction word problems

Objective: Students will be able to write a number statement for teacher-created problems for addition and subtraction.

Materials: manipulatives, word problems, key word anchor charts for addition and subtraction, park scene from *Math Expressions*

Procedure: Students will work in pairs to solve teacher-created word problems. The problems could be made up on the SMART board in the form of pictures or words. Students could also use a picture, such as the Park Scene in *Math Expressions* (Unit 3 Lesson 1), to write a number statement related to a given set of objects. For example, the trees could be discussed and then the word problem could be "There are 5 trees on the right side of the park and 5 trees on the left side of the park. How many trees are there total?" Another example is, "There are 9 birds. Some birds fly away. Now there are 4 birds. How many birds flew away?" Students should be exposed to both addition and subtraction story problems with multiple key words embedded throughout. This lesson could be one or more days depending on how much time is given for mathematics as well as how quickly students grasp the concept. Addition problems might be taught first, then subtraction, and then a combination of the two to determine that students understand both.

Activity 3: Pose problems when given a set of numbers (Example: 4, 2, and 6)

Objective: Students will be able to work in pairs to create word problems when given a specific set of numbers.

Materials: manipulatives, a piece of paper with boxes divided up (students will draw pictures, write number statements, and write out their story problems in the boxes), pencils, crayons

Procedure: Students will begin the lesson by guessing three numbers the teacher is thinking of. Once the students have guessed based on hints given by the teacher (i.e. it is a number bigger than 3 but less than 8), the students will use the 3 numbers given to generate number statements and word problems using manipulatives, verbally stating their word problems, through pictures, and in writing out their number statements. Students will work in partners to generate word problems and number statements.

Activity 4: Generate problems when given a scenario

Objective: Students will be able to generate addition and subtraction word problems when given a specific scenario via verbally stating problems or writing out problems using words.

Materials: manipulatives, pencils, paper, scenarios

Examples of Scenarios:

1. Joe has 4 pears, 6 apples, and 3 bananas. Generate as many word problems as you can verbally or by writing out the problems.

2. Melissa has 15 gumballs. 5 are pink. 3 are blue. The rest are yellow. Generate as many word problems as you can verbally or by writing out the problems.

Procedure: Students will work in partners to determine different problems that they could create based on the given scenario. Students should be encouraged to write down as many as they can. At the end of the lesson, the students should each share one story problem that they created with their partner. The goal of this culminating activity is to see who understands problem solving enough to be able to effectively problem pose.

Teacher Resources

1. Math Expressions Program (Houghton Mifflin Harcourt)
   http://www-k6.thinkcentral.com/ePCLandingPage/#math

2. Starfall
http://more2.starfall.com/m/math/word-problems-demo/load.htm?f&filter=first

3. Teachers Pay Teachers
https://www.teacherspayteachers.com/Browse/Grade-Level/Kindergarten/Search:word+problems/Page:1

4. Brain Pop Jr.
https://jr.brainpop.com/math/additionandsubtraction/

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Notes

[1] Carpenter, Thomas P., Elizabeth Fennema, Megan Loef Franke, Linda Levi, and Susan B. Empson. "Developing Classroom Practice: Posing Problems and Eliciting Thinking." In *Children's Mathematics Cognitively Guided Instruction*, 134-152. Second ed. Portsmouth: Heinemann, 2014.

[2] Cai, Jinfa, and Edward A. Silver. "Assessing Students' Mathematical Problem Posing." *Teaching Children Mathematics* 12, no. 5 (2005): 129-35. doi:http://www.researchgate.net/publication/258510514.

[3] Ibid.

[4] Ibid.

[5] Singer, Florence Mihaela, Nerida Ellerton, and Jinfa Cai (Eds.) (in press). *Mathematical Problem Posing: From Research to Effective Practice* (pp.3-34). New York, NY: Springer.

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[8] Cai, Jinfa. "Principles of Indirect Proof." Lecture, DTI Seminar, University of Delaware, Newark, October 5, 2015.

[9] The Nature and Role of Reasoning and Proof (no citation because I do not have the information)

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[12] Ibid.

[13] Ibid.

Appendix A

Proof Definitions

In order to explain proofs, I will be defining the following proof terms to make sense.

A statement is defined as a sentence that can be either true or false but cannot be both. A counterexample is an example that is the opposite of the original statement. A conditional statement is written as: If P then Q where the P is a hypothesis and the Q is a conclusion. A direct proof is a statement that follows logically based on other previous statements as well as definitions.[8] An indirect proof is something we "assume what you need to prove is false (the negation is true), and then show that something contradictory happens."[9]

There are many types of proofs discussed such as a direct proof, proof by exhaustion, proof by contradiction, existence proof, and proof by mathematical induction.[10] Dr. Jinfa Cai, my seminar leader, focused mostly on indirect proofs during seminar.

Indirect Proof

During seminar with Dr. Jinfa Cai, the class discussed indirect proof and completed truth tables for various statements. The principles of indirect proofs are: "(1) Every statement is either true or false (Law of the Excluded Middle) and (2) No statement can be both true and false (Law of Non-Contradiction)." The steps for writing an indirect proof are: "1. List givens; 2. Write the negation of what you are trying to prove; 3. Use logical reasoning to show that the assumption leads to a contradiction within the proof; 4. Write what you were originally proving for your final statement, with the reason being contradiction with the appropriate steps that were contradicted."[11]

Mathematical Reasoning

Reasoning is an important part of students' lives and continues into adulthood. Children need to learn how to reason in order to make sense of all of the experiences they see, hear, think about, and try to make sense of. In mathematics, students explain their answers as way to justify their understanding.

There are two types of reasoning, deductive and inductive. Deductive reasoning is when there are statements in a sequence that are logically connected and is usually used in mathematical proofs. Inductive reasoning is when we look to generalize information based on a number of cases. Young children use inductive reasoning when they see a pattern and check to see if the rule holds true for other examples. It is important for students to be exposed to proof, even at an early age, to argue their answers by using diagrams or number lines because it establishes mathematical reasoning. Though the idea

that children will be proving their work may seem overwhelming, they are able to use their mathematical language and thinking to describe why their method for solving a problem works and is correct.[12]

There are a number of reasons that hinder mathematical reasoning which stem from adults' opinions regarding mathematics, teachers' views on learning, and how everyone's mathematical background affects the student. Often, teachers think of mathematics as a set of skills that students must learn and parents want their children to learn the basics before moving on to more difficult problems. Students' perceptions are that learning in mathematics is mostly memorization. With all of the various misconceptions and stereotypes surrounding mathematics, it is no wonder that many are confused about mathematical reasoning.[13]

Appendix B

Types of Addition and Subtraction Situations

Joining Problems			
	Joining - Result Unknown	Joining - Change Unknown	Joining - Initial Unknown
Add To	Jan had 4 apples. Her mom gave her 3 more apples. How many apples does Jan have now? 4 + 3 = ?	Jan had 4 apples. Her mom gave her some more. Now Jan has 7 apples. How many apples did her mom give her? 4 + ? = 7	Jan had some apples. Her mom gave her 3 more. Now Jan has 7 apples. How many apples did Jan have before her mom gave her any? ? + 3 = 7
Separating Problems			
	Separate – Result Unknown	Separate – Change Unknown	Separate – Initial Unknown
Take From	Max had 7 apples. He gave 4 apples to his mom. How many apples does he have left? 7 – 4 = ?	Max had 7 apples. He gave some to his mom. Now he has 4 apples left. How many apples did he give to his mom? 7 - ? = 4	Max had some apples. He gave 4 to his mom. Now he has 3 apples left. How many apples did Max have before he gave any to his mom? ? – 4 = 3
Part-Part-Whole Problems			
	Part-Part-Whole – Whole Unknown		Part-Part-Whole – Part Unknown
Put Together/Take Apart	Max has 7 red apples and 3 green apples. How many apples does Max have altogether? 7 + 3 = ?		Max has 10 apples. 7 are red apples and the rest are green. How many green apples does Max have? 10 – 7 = ? or ? + 7 = 10
Comparing Problems			
	Comparing – Difference Unknown	Comparing – Quantity Unknown	Comparing – Referent Unknown
Compare	Max has 7 apples. His mom has 4 apples. How many more apples does Max have than his mom? 7 – 4 = ? or 4 + ? = 7	Max has 4 apples. His mom has 3 more apples than Max. How many apples does his mom have? 4 + 3 = ?	Max has 7 apples. He has 3 more apples than his mom. How many apples does his mom have? 7 – 3 = ? or ? + 3 = 7

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KEY LEARNING, ENDURING UNDERSTANDING, ETC.

1. Students will gain a conceptual understanding of addition and subtraction word problems up to 20 through the use of Cognitively Guided Instruction (CGI) to identify and make sense of key words.
2. Students will pose problems when given a set of numbers.
3. Students will generate word problems when given a set of information for their peers to solve.

ESSENTIAL QUESTION(S) for the UNIT

1. How can students use visuals such as objects, drawings, and acting out story problems to make meaning of addition and subtraction story problems?
2. What strategies, through the use of CGI, can students use, to determine if a story problem is addition or subtraction?
3. In what ways can story problems be created by students so that they are involved in the process of creating, solving, and checking their work and the work of their peers?
4. How can problem posing be utilized in the kindergarten classroom to address students' understanding of addition and subtraction?

CONCEPT A	CONCEPT B	CONCEPT C
Solving Addition and Subtraction Word Problems	Pose Problems When Given a Set of Numbers	Generate Problems from a Set of Information
ESSENTIAL QUESTIONS A	**ESSENTIAL QUESTIONS B**	**ESSENTIAL QUESTIONS C**
1. How can students use visuals such as objects, drawings, and acting out story problems to make meaning of addition and subtraction story problems? 2. What strategies, through the use of CGI, can students use to determine if a story problem is addition or subtraction?	1. How can problem posing be utilized in the kindergarten classroom to address students' understanding of addition and subtraction?	1. In what ways can story problems be created by students so that they are involved in the process of creating, solving, and checking their work and the work of their peers?
VOCABULARY A	**VOCABULARY B**	**VOCABULARY C**
Cognitively Guided Instruction (CGI) Addition: sum, total, in all, all together, and, increased by, combine, join, both, add, plus Subtraction: difference, subtract, less than, minus, take away, fewer, left over, how many more, how many are left, remain	Problem Posing, Addition, Subtraction	Problem Posing, Addition, Subtraction

ADDITIONAL INFORMATION/MATERIAL/TEXT/FILM/RESOURCES