

**GRE565: Elementary Mathematics  
Final Project – Lesson Plan**

(Due 11/28/2016)

**Grade Level:** Grade 1

**Subject:** Mathematics

**Topic or Unit of Study:** Solving put together/take apart math stories with addend unknown.  
(Note: Based off Common Core Module / Topic H, Lesson 32 – adjusted in a variety of ways)

**Pre-Requisite Knowledge / Skills:** Fluency adding and subtracting within 10; Number Bonds & Fact Families; Understanding of the turnaround – order doesn't matter when you add; Solving take from with change unknown math stories.

**Time Allotment:** 40 minutes

**Objectives:**

- 1) Students will solve put together / take apart with addend unknown math stories.
- 2) Students will write number sentences that show the relationship between subtraction and addition.

**MATERIALS / RESOURCES NEEDED:**

- Individual white boards (1 per student)
- Marker to write on white board (1 per student)
- Technology Resources: SmartBoard
- 1 computer required
- Linking cubes (5 red, 3 green – per small group)
- Dice activity worksheet (1 per student)
- 1 pair of 6 sided dice per student (2 pairs of 12-sided dice, 1 pair 20 sided)

**ANTICIPATORY SET:**

Students will watch animated video / song about addition and subtraction:

<https://www.youtube.com/watch?v=NHIOePgwlgU>

The video explores addition and subtraction math stories, and is a fun way to get students thinking about the basic concepts that are the foundation of the lesson. Whenever the song calls for an answer to a math story, students will be signaled to call out a response.

**PROCEDURE:**

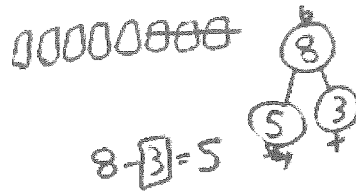
1) Students will sit on the rug with individual white boards, which they will use to write answers to the questions below and simultaneously show to the teacher. All questions utilize strategies learned to solve *take from with change unknown problems*. All questions include names of real students in class and things they can relate to.

**Question #1:**

There are 8 juice boxes in the cubbies. Some children drink their juice. Now, there are only 5 juice boxes. How many juice boxes were taken from the cubbies?

Students are encouraged to use whichever strategy they've learned and like the most to solve the problem (i.e. Make a number bond, write a subtraction sentence and a statement to match the story, make a box around the solution in your number sentence, or a math drawing).

Have students who used different strategies to get to the same answer stand up and show their white boards / answers to the class. Children benefit from seeing different ways to approach a problem.



3 boxes were taken.

**Question #2:**

Ellie has 10 chips for snack. She gives some to friends. Now, there are only 7 chips. How many chips did Ellie give away?

Like with Question #1, students are able to choose their preferred strategy, and then show their answers to the class. This will lead to a discussion of how some students used different methods than on the last problem, which shows they're learning from each other.

2) Linking cubes will be distributed to the students, who will work in small groups on the floor. Each group will get 8 linking cubes (5 red, and 3 green), and will be asked to do the following:

- Write a number bond to find out how many linking cubes are green. Label each box, even the mystery box.
- Create a math drawing to show how you can solve the mystery number. Remember to line up your pictures in a straight row.
- Write a number sentence to solve. Be sure to circle the solution.

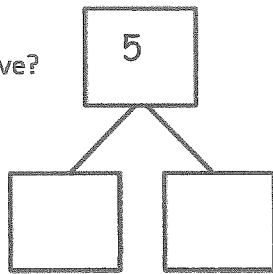
Teacher will then circulate and observe answers, choosing two students to share different strategies and number sentences. Possibilities include counting up, counting back, and writing addition or subtraction sentences. Answers could include  $5 + \underline{\quad} = 8$ , and  $8 - 5 = \underline{\quad}$ . Teacher will write various strategies / student answers on the SmartBoard so the class can see them written in larger print, and discuss them in more detail.

Students will discuss with their group which is the faster and most efficient way to solve? Counting up or counting back? While guiding students to notice that counting on 3 (up from 5) is more efficient, teacher accepts all explanations. Some students may know their -5 facts and find 8-5 a better strategy.

General consensus is Counting Up is the best way. You only need to count on 3 times from 5 to get 8. Taking away 5 takes longer.

- 3) Teacher interactively solves the problems below on the SmartBoard, asking children for help along the way. Exploration focuses on how simple math drawings can be used to solve math problems with addition and subtraction, how they're related, and how to label with a number bond.

1. There are 5 apples.  
Four are Sam's.  
The rest are Jim's.  
How many apples does Jim have?  
Jim has \_\_\_\_\_ apple.



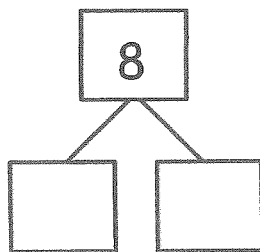
$$\square + \square = 5$$

$$5 - \square = \square$$

2. 8 students have sandwiches for lunch. 5 are peanut butter and jelly.

The rest are cheese. How many students have cheese?

\_\_\_\_\_ sandwiches are cheese.



$$\square + \square = 8$$

$$8 - \square = \square$$

**Reinforcement Exercise / Closure:**

Each student gets one worksheet and a pair of 6-sided dice. More advanced students will get 12 or 20-sided dice depending on their level. Teacher will demonstrate Question 1, and students will do the rest of the problems on their own. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning effectively for future lessons. *Questions are on the worksheet on the next page*

Name \_\_\_\_\_

Date \_\_\_\_\_

Directions: Roll 1 pair of dice. As shown in Question 1, write 4 number sentences (2 addition, 2 subtraction) based on the 2 numbers you roll.

1)   5                          2    
Dice 1                      Dice 2

$$\underline{5} + \underline{2} = 7$$

$$\underline{2} + \underline{5} = 7$$

$$\underline{7} - \underline{2} = 5$$

$$\underline{7} - \underline{5} = 2$$

2) \_\_\_\_\_                      \_\_\_\_\_  
Dice 1                      Dice 2

$$\underline{\quad} + \underline{\quad} =$$

$$\underline{\quad} + \underline{\quad} =$$

$$\underline{\quad} - \underline{\quad} =$$

$$\underline{\quad} + \underline{\quad} =$$

3) \_\_\_\_\_                      \_\_\_\_\_  
Dice 1                      Dice 2

$$\underline{\quad} + \underline{\quad} =$$

$$\underline{\quad} + \underline{\quad} =$$

$$\underline{\quad} - \underline{\quad} =$$

$$\underline{\quad} + \underline{\quad} =$$

4) \_\_\_\_\_                      \_\_\_\_\_  
Dice 1                      Dice 2

$$\underline{\quad} + \underline{\quad} =$$

$$\underline{\quad} + \underline{\quad} =$$

$$\underline{\quad} - \underline{\quad} =$$

$$\underline{\quad} + \underline{\quad} =$$

## **STANDARDS:**

1) OPERATIONS AND ALGEBRAIC THINKING 1.OA.1 : **Represent and solve problems involving addition and subtraction.** 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.

2) OPERATIONS AND ALGEBRAIC THINKING 1.OA.1: **Understand and apply properties of operations and the relationship between addition and subtraction.** 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.

## **UNIVERSAL DESIGN FOR LEARNING:**

### **Principle 1: Provide Multiple Means of Representation**

**Guideline 3: Provide options for comprehension:** Checkpoint 3.3 Guide information processing, visualization, and manipulation: Facilitating discussion between students is an opportunity for ELL's to practice and grow more comfortable with math language. It's also a way to check for understanding of math concepts and vocabulary.

### **Principle II: Provide Multiple Means of Action and Expression**

**Guideline 4: Provide options for physical action:** Checkpoint 4.1 – Vary the methods for response and navigation: - Personal white boards are a beneficial way to involve different learners. Some students who may not feel comfortable participating orally can still show their answers on their individual boards. Visual learners may also benefit from writing out the answers / strategies themselves, creating their own visual representation

## **Principle II: Provide Multiple Means of Action and Expression**

**Guideline 5: Provide Options for Expression and Communication: Checkpoint 5.1 - Use multiple media for communication**: Students will watch an animated video. Math stories will be explored through a combination of the SmartBoard and personal white boards. Students will have opportunities to use manipulatives including linking cubes and dice as an alternate, more kinesthetic way to approach addition and subtraction math stories.

## **Principle III: Provide Multiple Means of Engagement**

**Guideline 8: Provide Options for Sustaining Effort and Persistence: Checkpoint 8.2 Vary demands and resources to optimize challenge**: Students will have the option to complete the final worksheet with dice containing 6, 12 or 20 sides. For those who are advanced and comfortable with the math concepts, using the dice with 12 or 20 sides will provide a greater challenge.

## **CONCEPTUAL DEVELOPMENT:**

According to NCTM's Principles and Standards for School Mathematics (pg. 21), procedural fluency and conceptual understanding can be developed through problem solving, reasoning, and argumentation. In this math lesson, students develop fluency and conceptual understanding in solving addition and subtraction problems with math stories they can relate to. They are encouraged to find solutions using different strategies as they solve various problems. Students also share different strategies with the class. These techniques support individual child-centered learning and the value of thinking through a solution rather than memorizing a procedure with no conceptual understanding behind it. The use of pictures, number sentences, and number bonds allows students to explore the relationship between subtraction and addition. By using their own strategies to find solutions to math stories, students are better able to understand these relationships. In the first activity of the lesson, the students solve two math stories. They show and discuss their answers; specifically, how

they used different methods and why they did not use the same methods with a different math story. This activity gives students freedom to ask questions and learn from others. By asking prompt questions, such as “Is there a faster or easier way of getting to the answer? (counting up or counting back),” students are guided to think about their answers, subsequently grasping a deeper understanding of the math concepts and relationships.

The use of manipulatives (linking cubes) reinforces their understanding of addition and subtraction. They are able to visually and concretely problem solve and then represent it in a math sentence form. Misconceptions are addressed and clarified when more math stories are explored interactively with the use of the SmartBoard. The dice game is a fun way children can explore math ideas. It deepens their understanding of the relationship between addition and subtraction, and also strengthens their fluency with numbers.

#### **REFLECTIVE INQUIRY:**

As already mentioned above, students in this math lesson are given math stories to solve using their own strategies. From the onset, they are given the freedom to explore which strategies they feel comfortable with or which strategies they might choose to solve a math story. No one strategy is deemed better than another. The students are also asked to discuss these math stories and the strategies they used with their peers. Students share their strategies and explain why they chose that approach.

After free inquiry, we can introduce the idea of a better or more efficient way of getting to a result. This is only after the students have explored the different possibilities of using addition and or subtraction to solve and represent math stories. While students are guided to notice the more efficient way, all explanations are accepted. For example, when we use the linking cubes, students are asked to write addition and subtraction sentences. They are given the freedom to think through the problem on their own, even though we want students to understand that there might be faster or more efficient way to solve this problem (

$5 + \underline{\quad} = 8$  or  $8 - 5 = \underline{\quad}$  ). In this case, counting up 3 to get to 8 is the faster and more efficient option, but some students may know their minus 5 facts, making  $8 - 5$  a better strategy for them. This ensures that we create a reflective learning environment, and that students are able to understand for themselves why one method is chosen over another. Throughout the math lesson, opportunity for reflective inquiry is encouraged when we ask prompt questions and guide students to think about the math concepts of addition and subtraction.

### **MAKING CONNECTIONS AMONG DIFFERENT CONCEPTS:**

In this math lesson, students are making connections with addition and subtraction. They are exploring the relationship between the two functions as they develop strategies to solve their math stories. The different strategies and the different ways of solving these math problems reveal the relationship between addition and subtraction. They are able to see it in their math sentences. The relationship is also represented in their pictures and number bonds. Students explore the inverse relationship between addition and subtraction in the math stories (i.e. 8 juice boxes, take away some unknown number, leaves you with 5 juice boxes). In this math story when children start exploring various strategies, they develop the understanding that  $8 - \underline{\quad} = 5$  and that inversely  $5 + 3 = 8$ . To break it down further, five juice boxes are left and you had 8 to begin with, so counting up will give you the number of juice boxes that some children drank. Inversely, 8 juice boxes were in the cubbies and a certain amount is now gone. You are left with 5 (  $8 - \underline{\quad} = 5$  ). This concept is reinforced and practiced in all of the math activities of this lesson through visual representation, the writing of math sentences and number bonds, through manipulatives and through the dice game.

### **THE USE OF TECHNOLOGY:**

Students utilize a variety of technology through the lesson (i.e. physical manipulatives including linking cubes and dice, the SmartBoard, and individual white boards). Students use



individual white boards to explore math stories, by writing number sentences, and representing math stories with pictures and number bonds. They use their white boards to quickly and easily show their answers to their teacher and their peers, and then discuss the strategies with each other. The SmartBoard is used to further explore math stories interactively and provides a larger visual representation of the math activities. On the SmartBoard, we are able to address misconceptions and clarify any questions students might have. The use of the manipulatives provides a hands-on, concrete way of looking at the math problems the children worked on using their white boards. This is very useful in deepening their understanding by allowing them to see and handle objects physically that represent the math concepts of addition and subtraction, and their relationship to each other. The use of the dice is beneficial for fluency in numbers, conceptual understanding, and addresses diversity in students. A 6-sided, 12-sided or 20-sided dice can be used depending on the student's level. This is particularly important to students who need to be challenged and find the 6-sided dice too easy or boring.

**Resources:**

Common Core Mathematics Curriculum. (2013) *Lesson 32: Solve put together / take apart with addend unknown math stories*. Grade 1, Module 1, Topic H. Engage NY.

National Council of Teachers of Mathematics. (2000). *Principles and Standards for School Mathematics*. Reston, VA: National Council of Teachers of Mathematics.