

## 3-5 Grade Mathematics Lesson

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Grade: 5th Instructor:

Katherine Albers Lesson plan

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**1 Title of the Lesson:** Problem Solving with Multi-Step Number Stories

**2 Goal of the Lesson:**

- Students will determine the appropriate operation to solve the problem.
- Students will solve multi-step number stories using reasoning.
- Students will write the correct number model that correlates with the problem.

**3 Relationship of the Lesson in the Illinois Learning Standards for Mathematics**

State Goal 6, Illinois Standard B2

Solve one and two step problems involving whole numbers, fractions, and decimals using addition, subtraction, multiplication, and division.

State Goal 6, Illinois Standard C2a

Select and perform computational procedures to solve problems with whole numbers, fractions, and decimals.

**4 Instruction of the Lesson**

Through discussions, we noticed that students either use wrong operations, get frustrated easily, and/or don't follow through with all of the appreciate steps when doing word problems. Therefore, we decided to focus on multi-step problem solving and reasoning.

According to research gathered by Margaret Taplins from the Institute of Sathya Sai Education in Hong Kong.

### **What Is A 'Problem-Solving Approach'?**

As the emphasis has shifted from teaching problem solving to teaching via problem solving (Lester, Masingila, Mau, Lambdin, dos Santon and Raymond, 1994), many writers have attempted to clarify what is meant by a problem-solving approach to teaching mathematics.

The focus is on teaching mathematical topics through problem-solving contexts and enquiry-oriented environments which are characterized by the teacher 'helping students construct a deep understanding of mathematical ideas and processes by engaging them in doing mathematics: creating, conjecturing, exploring, testing, and verifying' (Lester et al., 1994 p.154). Specific characteristics of a problem-solving approach include:

- Interactions between students/ students and teacher/ students (Van Zoest et al., 1994)

- Mathematical dialogue and consensus between students (Van Zoest et al., 1994)
- Teachers providing just enough information to establish background/ intent of the problem, and students clarifying, interpreting, and attempting to construct one or more solution process (Cobb et al., 1991)
- Teachers accepting right/ wrong answers in a non- evaluative way (Cobb et al., 1991)
- Teachers guiding, coaching, asking insightful questions and sharing in the process of solving problems (Lester et al., 1994)
- Teachers knowing when it is appropriate to intervene, and when to step back and let the pupils make their own way (Lester et al., 1994)
- A further characteristic is that a problem-solving approach can be used to encourage students to make generalizations about rules and concepts, a process which is central to mathematics (Evan and Lappin, 1994)

## 5 Unit Overview

Day One: Research Lesson (See lesson plan)

Day Two: Multiplication and division using multi-step number stories.

Students will expand upon their research lesson using more difficult number stories.

Day Three: Math Extended Response

Students will complete two math extended response multi-step problems. They'll write how they solved the problem and why they completed the steps they did in order to derive to the answer.

## 6 Learning Process (Lesson Plan)

Steps, Learning Activities Teachers Questions	Teacher's Support and Expected Student Reactions	Points of Evaluation
<p><b>1. Introduction:</b></p> <p>The Students are told the following:</p> <p><i>I have a box of chocolates.</i></p> <p><i>Someone ate 3 of them.</i></p> <p><i>There are 5 in the box now.</i></p> <p><i>How many chocolates did I start with? I think I had 2 to start with. What do you think?</i></p>	<p>Teacher will display the question on a poster in the front of the room.</p> <p>Students will work individually to solve the problem and write a number model.</p> <p>Teacher will walk around and observe.</p> <p>Students are asked to explain their number model</p>	<p>Can students figure out that there were 8 pieces of chocolate to begin?</p> <p>Can students develop a number model?</p>

	and reasoning.	
<p><b>2. Poising the problem:</b></p> <p><i>Now, I have 3 boxes of chocolate with 12 pieces of candy in each box. I gave away one box of candy. How many pieces remain?</i></p>	<p>Teacher will display the question on a poster in the front of the room.</p> <p>Students will work independently for 5 minutes and write down their number model.</p> <p>Students will discuss within their groups their number models.</p> <p>Students are strategically chosen to explain their number model and reasoning.</p>	<p>Do Students find the answer of 24?</p> <p>Can students develop a number model?</p>
<p><b>3. Solving the Problem:</b></p> <p>Anticipated Students' solutions:</p> <p>a.) <math>3 - 1 = 2</math> Therefore <math>12 + 12 = 24</math></p> <p>b.) <math>12 * 3 = 36</math> Therefore <math>36 - 12 = 24</math></p> <p>c.) <math>(12 + 12 + 12) - 12 = 24</math></p> <p>d.) 3 boxes = 36 pieces of candy <math>36 - 12 = 24</math> pieces</p> <p>e.) <math>(3 * 12) = 36</math></p>		
<p><b>4. Extending the Problem:</b></p> <p><i>Now, I have 3 boxes of this chocolate. 5 of us are going to share the candy equally. How many whole pieces will each person get?</i></p>	<p>Teacher will display the question on poster in the front of the room.</p> <p>Students will work independently 5 minutes and write down their number model.</p> <p>Students will have 5 minutes to discuss with their group.</p> <p>Students are strategically to explain their number model reasoning.</p>	<p>Can Students find that there are 36 pieces of candy to start? Can they divide 36 by 5 and realize that each person receives 7 pieces of candy with 1 piece left over?</p> <p>Can students write a number model?</p> <p>Students will be asked to write an exit slip. "What did you notice about the steps you and your classmates took to solve the problem?"</p>

## Student Seat Map

**Table #4**  
Devon  
Alex  
Taylor

**Table #5**  
Sayvaughn  
Janai  
Adrian

**Table #1**  
Ian  
Aaron  
Kailah

**Table #2**  
Monica  
Evan  
Nashawanda

**Table #3**  
Michael  
Endria  
Sam

**Front**