

Math Lesson Plan: Can You Balance?

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Mathematics: Algebraic Concepts

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Grade Level: 3

Pa Academic Standards/Assessment Anchors: M3.A.1.1—Apply place value concepts and numeration to counting, ordering, grouping, and equivalency. M3.A.3.1—Solve problems using addition, subtraction, and multiplication (Straight computation and word problems). M3.D.1—Demonstrates an understanding of patterns, relations, and functions. M3.D.2—Represent and/or analyze mathematical situations using numbers, symbols, words, tables, and/or graphs. M3.D.2.1—Create/model expressions, equations, and inequalities to match a problem situation. M3.D.2.2—Determine the missing number or symbol in a number sentence.

Objectives:

- The students will be able to state orally and in writing the difference between an expression and an equation.
- The students will be able to state orally and in writing the meaning of the equal sign.
- The students will be able to demonstrate the solutions to different algebraic equations using manipulatives.
- The students will be able to describe orally and in writing the pre-algebra concept of finding an unknown.

Cross-Curricular Integration: Writing/Language Arts

Materials: Pan Balance and manipulative weights, Paper, Pencils, Crayons, Chalk, Large magnetic equal sign, Counters, Rules on a poster board.

New Vocabulary:

- **Balance:** A state of equality, equal weight or measure on both sides
- **Equation:** A mathematical statement that is in an equally balanced state.
- **Expression:** A number or combination of numbers joined by operation symbols such as + for add, and – for subtract.
- **Equal Sign:** A symbol in math that means the same as or that a balanced mathematical statement exists.
- **Algebra:** A branch of mathematics that uses symbols to show relationships in numbers.

Instructional Procedure:

- **Anticipatory Set:** I will start the lesson by asking the students if they have ever been on a see-saw. I will ask the students to recall what happens when two individuals of the same weight ride a see-saw. I will draw a picture of a see-saw with two children of equal weight on the board. I would ask the students what would happen if I added another child to one side of the see-saw. Because of the fact that I will be using a real life example of the children's lives and experiences, this will activate prior knowledge and spark, students' interest, and keep them

engaged. I will then demonstrate the concept of balance with a pan balance and a variety of manipulatives. I will show the children that you need the same amount of the same item on both sides in order to keep the scale balanced. I will review what the students already know about adding and subtracting, the concept of balance, the concept of greater than and less than, and tell the students that today's lesson will be about the meaning of the equal sign and how to keep mathematical equations in balance.

Developmental Activities:

- I will write $2 + 4$ and $2 + 4 = 6$ on the board and have a student read aloud the expression $2 + 4$ and the equation $2 + 4 = 6$.
- I will ask the students *What is the difference between $2 + 4$ and $2 + 4 = 6$?*
- I will say that $2 + 4$ is called an expression. I will write the new vocabulary on the board. *An expression is a number or combination of numbers joined by operation symbols such as +/- and it does not have an equal sign.*
- I will then erase the **expression** $2 + 4$ and then point to the equation $2 + 4 = 6$.
- I will ask *what is on the left side of the equals sign? The right side?*
- I will explain to the students that an expression is on both sides of the equals sign.
- I will ask the students *what do you think $2 + 4 = 6$ is called?*
- Yes, it is an **equation**. *The left side of the equation equals the right side.*
- I will then tell the students that we will be looking at the equal sign in a new way today. I will then explain to the students that an **equation** is like a balanced see-saw. I will ask the students to try to describe how it is like a balanced see-saw.
- I will write $10 = 10$ on the board and ask the students if that equation is true.

As soon as I see that everyone can agree on the truth in that particular equation, I will write $10 = 10 + 0$ on the board. I will ask with a show of hands if that equation is also true. I will then write $10 + 0 = 10 + 0$ on the board. I will draw the see-saw once again on the board and illustrate the equation like it was a balanced see-saw.

- I will then write $5 + 5 = 10$ on the board. I will ask the students if they agree on the truth to that equation.
- I will then ask the students to say true or false when I write each equation on the board:

$$5 + 5 = 5 + 5$$

$$3 + 2 = 5$$

$$5 = 3 + 2$$

$$1 + 10 = 11$$

- I will then have 3 children come up to the board and stand on one side of the equal sign. I will ask 4 more to join the original 3. I will ask the students *what symbol would we put in-between the students to make an expression that show that we added?* I will then have 2 children come up to the board on the other side of the equals sign. I will then say *if this were a see-saw, would it be balanced? What do you think we will have to do to balance out the see-saw?* We will have to add (Draw another plus sign and a box) *What number of children do we need to make this number sentence true?*
- I will then tell the class that I have a problem that needs to be solved. I will share the problem after the task and rules are gone over with the class.

- Use poster to describe today's task:
 - (a) Students will work in assigned groups
 - (b) Students will be required to defend their answers and to answer in written form.
 - (c) Students will draw a picture and make a number sentence.
 - (d) Counters may be used or any other means for determining an answer. Strategies and reasoning will be stressed.
 - (e) One person from each group should collect the counters for the activity, and the students will need pencils, paper, and crayons.
 - (f) Go over rules for working together—(1) All Participate (2) All listen to speaker. (3) Attempt to solve your own problem before contacting the teacher. (4) Keep noise to a minimum
 - (g) Students will have about 10 minutes to solve the problem and write their answer.
- Read the problem aloud: There are eight bears on one side of the see-saw; four more bears decide to join the eight bears that are already there. The see-saw remained tilted. The bears thought about the lesson they had in math class about balance. They wanted the see-saw to be balanced. They called some of their friends over to sit on the other side of the see-saw to balance it out. Five teddy bears sat on the other side. The see-saw was still not balanced. In order to balance the see-saw, how many more bears are needed to sit on the other side of the see-saw.

- Circulate while the students are working to assess strategies and collaboration skills as well as to question students and encourage their work.
- Remind students of problem solving strategies.

Closure:

- Tell the students that the groups will be asked to come to the front of the class and share their math story and explain how they got their answer.
- Let each group share their strategy for solving the problem, and draw out student questions and comments.
- Ask the students: *Do you remember the little problem that I gave you last week to answer? Well, I would like you to think hard about what I taught you today, and I would like you to take a few minutes to answer the same question. Put your notebooks up like you are taking a quiz, and put your name on your paper. Put your thinking caps on and do your best to answer this problem.*

Assessment:

- Observe students as they participate during the anticipatory set and developmental activities.
- Observe students as they work in groups on a strategy for solving the problem and listen for math comprehension.
- Collect and assess all written explanations.
- Listen to the students as they present their problem to the class.
- Collect the ending problem.
- I will ask questions such as “What is an equation”? “What does it mean to be in balance”? “What is the meaning of the equals sign”?

Special Needs Adaptations: I will group the higher level workers with students that have difficulty comprehending mathematical concepts and trouble staying on tasks.

Extension : Have the students visit <http://www.mathplayground.com/M1BB01a-ns4.html> to work on interactive balance scales. Another wonderful website to visit to work with Pan Balances is: <http://illuminations.nctm.org/ActivityDetail.aspx?ID=33>
Give the students the Early Algebra Worksheets to work on at their own pace.