

What's My Rule? Addition Facts

Author: Mary Elizabeth Escalante
Date created: 04/12/2014 8:42 AM PDT ; Date modified: 04/25/2014 9:28 PM PDT

VITAL INFORMATION

Total Number of Students	24
Area(s) Students Live In	
Free/Reduced Lunch	
Ethnicity of Students	
English Language Learners	
Students with Special Needs	
Subject(s)	Mathematics
Topic or Unit of Study	Addition Facts Practice
Grade/Level	Grade 1

KEY CONCEPTS & STANDARDS

Big Idea & Essential Questions	The objective is to provide an extension for the "What's My Rule?" routine which includes finding missing input numbers.
Learning Outcome(s)	<ul style="list-style-type: none">- Count forward and backward by 1s.- Find the missing input and output numbers in "What's My Rule?" problems.
Summary	Students will review finding the rule for a "What's My Rule?" table in which pairs of numbers are given. They find the output numbers in tables for which the rule and input numbers are given, and they find the input numbers in tables which the rule and the output numbers are given. Students will complete "What's My Rule?" tables independently and with table groups that they sitting in as their previously assigned seating arrangements. The lesson will then be concluded with the Upstairs Downstairs game where students will have additional practice with counting forwards by ones or addition of single-digit numbers.
Standards	<p>CA- California Common Core State Standards (2012) Subject: Mathematics Grade: Grade 1 Domain: Operations and Algebraic Thinking 1.OA Area: Work with addition and subtraction equations. Standard: 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 $8 + ? = 11$, $5 = ?? - 3$, $6 + 6 = ??$.</p>

ASSESSMENTS

Assessment/Rubrics	All written work from the student sheet group activity and the Filling in Frames sheet can be collected for a formative assessment. During whole group instruction, students will be writing their ideas on individual white boards that can be held up for the teacher to see how students are progressing. Verbal assessments will be conducted from students who share their thinking processes throughout the lesson.
--------------------	---

MATERIALS AND RESOURCES

Instructional Materials & Technology (handouts, etc.)	Individual white boards, student sheets from their math journals/workbooks Tens and ones manipulatives Laminated number line strips/number line stickers posted on each of the students' desks/ or number line cards which students can refer to For Upstairs Downstairs activity - Pre-made paper houses, crayons/colored pencils, dice
---	---

IMPLEMENTATION

Sequence of Activities	Before beginning the lesson, have a short discussion about what a "rule" is and how does it function in places such as a classroom, at home, or during a game. How else can a rule function when we are doing math? How is that the same as the kind of rules we follow at school? Ask students to do a think-pair-share with a partner in their table groups to talk
------------------------	---

about this. Allow at least one minute. Give examples of different rules that are usually followed in math. For example, when a problem asks us to add, this means it is asking to add *more* to the number we started with. Allow up to 5 minutes for discussion.

1.) Have a list of equations that are missing their addends but have their sum. For example:

$$1 + \underline{\quad} = 3$$

$$2 + \underline{\quad} = 4$$

$$3 + \underline{\quad} = 5$$

and so on.

Display these on the projector or have them written on the board. Discuss the rule that fits the table with the whole class. *The rule is to "add 2," "count up by 2," or "2 more."* What number do we need to fill in the blank to complete the math sentence?

If a student offers an incorrect rule, test it on several input numbers to show that it doesn't work. You can also try putting in a different rule to show students why the rule does not work. Be sure to "think out loud" as you are trying out the different rule and testing the new input numbers. Discuss why it does not work. How could $1+3$ not equal 3? Ask students to do a think-pair-share with a partner in their table group to talk about why $1+3$ cannot equal 3 for a minute.

Have at least 10 randomly selected students stand up to form a number line. Then have another randomly selected student stand up to act as the "marker" that will go along the number line. The ten students who are in the number line can label themselves as their designated numbers by writing their number onto an individual white board and hold it up. The "marker" student will then have to apply the "count up by 2" rule to prove that $1+3$ does not equal 3 by moving up the number line starting at the "1" on the student number line. As the marker is moving up the number line, all students must participate by counting all together as a class.

Call for another "marker" student to go up to the number line and prove that if you start at "2" on the number line and then count up by 2, you will land on "4" on the number line. All students must count together as the marker moves up the number line. Explain that the rule is to "count up by 2" and that is how $2+2=4$.

Write the rule in the rule box. Then extend the table and reveal two more problems with missing addends, labeling these missing addends as the "in" column (these would be filled in with the rule they have previously identified as the correct one) and the missing sums as the "out" column. Have the volunteer students sit back down at their table groups. Ask the students to write the output numbers on their white boards. Check with all students on their progress.

2.) Reveal another four to five more problems with missing addends to extend the table. Repeat the procedure with several other input numbers and solve for the new output numbers. Call for another 10 random student volunteers to form a number line and two new students who will be the markers for the number line. As you are progressing with the input numbers, the number may not be labeled as "1 - 10" but perhaps "11 - 20" depending on how far you go. All students will have the chance to get up and participate in the number line by either being a marker or a number in the line. Continue to use the model student number line to demonstrate how beginning input numbers such as 9 will add up to 11 when you count up by two using the number line. Remember to have all students count together out loud as the markers move up the number line. Students who are seated at the desks must continue filling in missing output numbers on their white boards by following along with the number line demonstration.

Tell students that they will now learn how to figure out missing input numbers today. They can use tools such as a number line and manipulatives to figure out missing input numbers as they have done with missing output numbers.

Allow up to 20 to 25 minutes for Steps 1 and 2.

3.) Review the "What's My Rule?" routine. Set up an "in" and "out" column and a rule box. List some numbers in the "in" column and in the "out" column. Some numbers should be missing in the "in" column.

In	Out
1	
4	
	7
	10
27	
	39

The rule for this table is to "add 1." Write out the "math sentences" that correspond to the input numbers and the output. For example, " $1+1=2$, and $9+1=10$." Also - " $7-1=6$, $10-1=9$ " Using an ELMO projector or document camera, demonstrate how you can solve for the missing input and output numbers using ones and tens manipulatives.

Point out that this table is different from the last one we practiced on because some input numbers are missing. Distribute a set of tens and ones manipulatives to each table group. Students will follow along with a teacher-guided practice of the use of the manipulatives for the next few missing input and output numbers. Align seven of the ones manipulatives. All students will do the same. If the rule for this table was to add 1, how many ones do you think there was before we added one more? Have all students do a think-pair-share to discuss this with someone next to them in their table groups for a minute before calling on student volunteers to share their ideas. Continue with filling in the table while demonstrating how to figure out the missing input and output numbers with the use of the manipulatives. All students must continue to follow along with using the manipulatives. Students will now work with a partner sitting next to them in their table groups to continue filling the rest of the chart with their white boards. Have a whole-class discussion on how did they find the missing input numbers. Students should say that they found the number that comes before the output number, then subtracted 1 from the output number.

Explain that the numbers can be checked by applying the rule to the input number, the result should be the output number.

Change the rule to "add 3." Students will continue working with their partners using the manipulatives and writing down the missing numbers onto their white boards. Have students name the missing numbers and describe what they did to find the missing input numbers (by using a math sentence or writing the rule such as "taking away 3 from the output number") on their white boards. Use the following table:

<u>In</u>	<u>Out</u>
	5
	6
	9
	3
	12
	10

Be sure to write out the math sentences too. $3+2=5$, $3+3=6$, and so on. Also show math sentences such as $5-2=3$, $6-3=3$, and so on. Discuss - what are the patterns that can be seen in the math sentences?

Allow for another 20 to 25 minutes for Step 3. (about 10 minutes for the teacher-guided practice and another 10 minutes for the partner work)

4.) Students will now work in their table groups to complete a student page from their math journals. These student pages have input and output tables with various rules that are assigned to each table. Students will also then make up their own rules and charts for the last two sets. Students must write a separate table for math sentences that correspond to the input and output numbers. For students who are having difficulty finding the input numbers, have these students use the guess-and-check strategy as mentioned before. Students will also have the options to use their manipulatives to find the missing input and output numbers. They can also use their own number lines - can be a laminated number line strip that the table group shares, a sticker that is on their desks, or they can draw their own. Allow students 20 minutes to complete this. Early finishers can visit other table groups to see if they have any classmates that could use their help.

5.) After all students are completed with the page from their math journals, they can move onto the Upstairs Downstairs activity for further practice on counting by ones and simple addition of single-digit numbers. Each student will have their own "house" but will complete them in their table groups. The following are the steps for Upstairs Downstairs:

Have paper houses cut out and ready for students. These houses should open up like a book and have four sides.

- Choose an animal you can draw. This animal will be the resident in your house.
- Roll the die to find out how many of your animals live upstairs in the house. Draw them.
- Roll the die to find out how many of your animals live downstairs in the house. Draw them.
- Count the total number of animals in your house and write that number on the front door of the house.
- On the inside cover of your house book, write a number sentence for the total number of animals in your house.

Students can roll the die again for an additional number of animals living in the backyard of the house, and the frontyard. If they choose to do so, they must write a corresponding math sentence for the number of times they roll and how many animals they draw.

Allow the remaining 15 minutes of the math period for students to complete the activity as well as decorate their houses to their liking after they have gotten their math sentence.

Grouping Strategies

Students will be seated in heterogeneous groups, with mixed abilities. Struggling students will be seated with peers who can help them, and English Language Learners will be seated with students who are fluent in English. They will already be assigned in these table groups for group work. They will also be together for whole-class instruction.

For the partner activity, students will be choosing a partner from their own table groups. As they are working with their partners, they will be in their table groups as well.

Differentiated Instruction

To help students who have learning disabilities and those who are at-risk of failing, they will be grouped with peers who can help them through the activities they will do together. Struggling students will also be encouraged to do the guess-and-check strategy as taught to them in the lesson, where they test out different rules and input numbers and see if they are correct in the math sentences they will write out after completing the tables.

Advanced students will be encouraged to create more input/output tables and make up their own rules to complete the tables. They can also be encouraged to try larger numbers and compute those into the tables.

REFLECTIONS

Prior to Lesson

Post-Lesson