

Formulas and Stories

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Summary	The students will be required to work with the relation between different mathematical expressions (formulas) and stories.
Goals	1. Analyze the correspondence between a word problem and different mathematical expressions.
Materials	Overheads, White Board or Chart Paper, Handouts
Keywords	Contextualized Situations Full Class Discussion Interpretation of Algebraic Expressions Interpretation of Stories Linear Functions Production of Table Small Group Work

Activity Plan:

1. Introducing the problem [Whole Class]

Show the problem on the overhead (page 1) and ask children to read it. Explain it to them.

Mention that we are using t to refer to the total number of baseball cards. [This is to minimize confusion between cards per day and total cards that the letter c might promote.]

Ask each child to vote for one of the given formulas.

Register the number of votes each formula received.

You may wish to have some students give their reasons for choosing the formula(s) they did.

2. Solving the Problem [Group Work]

Ask the students to work in groups of three on the handout (page 2). [Consider forming the groups yourself so that there is a strong student in each group, and so that less experienced students can learn from more experienced students.] Make it clear that the job is for everyone in the group to work together; it is not about one student working alone quickly to get the answer.

Give an introduction to the task but do not show them how you want them to solve the problem. The important thing is that they provide arguments that make sense to them.

While children are solving the problem walk around to check whether they have correctly understood the problem. In case someone hasn't, proceed to clarify.

During this group activity, encourage the students to discuss among themselves. Your role is that of moderator. Redirect questions to a group mate if you are asked to take a position. Don't convey your position in terms of the knowledge of the problem. Just highlight the necessary information and encourage the children to act together in solving the problem.

Pay special attention the ways they use to explore this relation and the knowledge they use to make a decision. For example they can make a decision based upon:

- a generalization of the places that the different parameters occupy (this can be in relation with the related place among numbers and letters or, it can be seen related to a special place in the formula),
- the role the different parameters play in terms of the meaning for that context,

- they can produce some values using the given story and then, check these values in the rules,
- alternatively, they can produce some values using one of the rules and then, they can check the story with that value,
- they can recall examples of past lessons and try to link those relations as a model for this problem,
- they can dismiss a formula by using counterexamples that don't satisfy the conditions.

Note that values of both parameters are only oscillating between the numbers 5 and 6. This is on purpose. If the story would deal with numbers 7 and 8 and, one of the three given formula has in its expression these two numbers, this election may be done without real interaction with the meaning of the numbers within the context. So, under the class problem conditions, this possibility may be minimized. Since the values of the parameters are the same in all the expressions then it is expected that they would have to produce some relations in terms of mathematical knowledge.

Children can have disagreements in some issues. Try to observe and to determine the basis for any disagreements.

We are assuming that this kind of activity is different from asking them to produce a story from a formula (or vice versa). It is different, at least, in terms of:

- the initial information: it is displayed in a written form and it alludes simultaneously to the formula, the story and the relation between them (since this is the object of the analysis)
- the nature of final product: they have to make a "decision about a correspondence" and give the reasons that supports their conclusion.

3. Discussion of what the groups concluded [Whole Class]

Ask the students to vote again. Ask each group whether they came to an agreement over which formula(s) work for the problem. Allow students to support their views as they wish.

Make comparisons between votes at the beginning of the class and votes at the end of the class.

4. Homework (Pages 3 & 4)

Students will solve a problem similar to the one they solved in class.

Here are three formulas:

Formula 1:	$n \times 5 + 6 \rightarrow k$
Formula 2:	$n \times 6 + 5 \rightarrow k$
Formula 3:	$6 + 5 \times n \rightarrow k$

And here is a story:

"Today John has six baseball cards in his collection. Starting tomorrow, he will buy five new cards each day."

Your job is to:

- 1) Choose one of the three formulas. Use that formula to fill in the table on the next page for different values you will choose for n .
- 2) Then decide whether the formula you have worked with matches the story or not and explain why.

Overhead and Handout: The Problem

(Page 2)

Name: _____ Date: _____

Partners' Name: _____

Formula 1: $k \times 5 + 6 \rightarrow t$

Formula 2: $k \times 6 + 5 \rightarrow t$

Formula 3: $6 + 5 \times k \rightarrow t$

Choose a formula.
Write it here as a
reminder.

<i>n</i>		<i>k</i>

Does the formula you used match the story?
Why or why not?

Which formula(s) match(es) the story? (circle the one(s) that match the story)

Formula 1

Formula 2

Formula 3

Name: _____ Date: _____

Given the three formulas:

Formula 1:	$p \times 4 + 7 \rightarrow t$
Formula 2:	$p \times 7 + 4 \rightarrow t$
Formula 3:	$7 + 4 \times p \rightarrow t$

And the following story:

*"Today Vanessa has four dolls.
Each month she will receive 7 dolls from her
uncle."*

Your job is to:

- 1) Choose one of the three formulas. Use that formula to fill in the table on the next page for different values you will choose for p .
- 2) Then decide whether the formula you have worked with matches the story or not and explain why.

Name: _____ Date: _____

Formula 1: $p \times 4 + 7 \rightarrow t$ Formula 2: $p \times 7 + 4 \rightarrow t$ Formula 3: $7 + 4 \times p \rightarrow t$

Choose a formula.
Write it here as a
reminder.

<i>p</i>		<i>t</i>

Does the formula you used match the story?
Why or why not?

Which formula(s) match(es) the story? (circle the one(s) that match(es) the story)

Formula 1

Formula 2

Formula 3