

# 1. Using Patterns to Promote Algebra

**Summary:** Both early algebra and patterns are emphasized in elementary math, yet it can be difficult to use patterns to build true algebraic thinking. In an article for *Teaching Children Mathematics*, Ball State University instructor Sheryl Stump discusses how to design problems such that they lay the foundation for students to think algebraically.

## Practical Applications

Stump suggests that the main distinction between less and more effective algebra problems is whether they focus on “stasis” or “change.” Stasis problems are concerned with manipulation of symbols and variables that arrive at a single conclusion. Her example:

“Bethany bought tickets for three of her friends to go to a movie. Once inside, she also spent a total of \$5 on popcorn for her friends. She spent \$27.50 altogether on her friends. Solve to find the cost of one movie ticket,” and then asking the students to write an equation using ‘x’ and solve for ‘x’.

In contrast, change problems are concerned with moving from patterns to rules. Her example:

“Jennie decides to open a savings account. She first deposits \$50 from her birthday, and she plans to add \$7 each week. 1) How much will Jennie have in her savings account after 1 week?” and so on – after 3 weeks? After 10 weeks? Then, students are asked to write a rule with words, create an equation and finally apply the equation to a problem about the savings account.

Stump offers that change problems, which are in essence algebra, have these characteristics:

- They methodically change with each step
- A mathematical rule can be applied to find the value at any step
- They generalize from the specific to the abstract (the rule)

In this conception, patterns become less about specific symbolic description and more about the ability to extend and manipulate the pattern, whether a simple pattern of shapes or a more complicated pattern like a crossing-the-river brain teaser.

## Conclusion and Citation

It can be difficult for elementary students to grasp the basics of algebra, and using stasis-based problems reinforces a view of algebra that can be viewed by students as a “senseless enterprise.” Stump suggests that teachers consider how to design change-based problems that teach students how to generalize patterns and begin to understand the richness of algebra.

Stump, S. “Patterns to Develop Algebraic Reasoning.” *Teaching Children Mathematics*, March 2011, pp. 410-418. <http://tinyurl.com/3r9ezgn> (subscription only).