

## Strand V – Patterns, Functions and Algebraic Concepts:

The student demonstrates an understanding of algebraic skills and concepts through experiences with meaningful mathematical problems that focus on discovering, describing, modeling, and generalizing patterns and functions, representing and analyzing relationships, and finding and supporting solutions.

**Benchmark (K – 5):** The student sorts and classifies objects by properties, extends, analyzes, and generalizes patterns, and models the result using appropriate tools. The student understands qualitative and quantitative change and begins to use number properties.

### Performance Standards:

#### Kindergarten:

##### Patterns

- **Identifies, describes, and extends** patterns with familiar objects in both classroom and real-life situations.
- **Creates, describes, and extends** patterns.

#### First Grade:

##### Patterns

- **Identifies, describes, creates, and extends** patterns observed in familiar objects in real-life situations (e.g. 1 child = 2 eyes, 2 children = 4 eyes).
- **Describes** how a pattern develops, repeats, and builds toward more complex patterns.

#### Second Grade:

##### Patterns

- **Describes, creates, and extends** a wide variety of patterns.
- **Identifies** patterns in the number system (e.g., 5, 10, 15...).
- **Develops and applies** more complex patterns and relationships in real-life and mathematical problem situations.

#### Third Grade:

##### Patterns

- **Identifies and creates** patterns in all areas of math.
- **Finds, invents, and uses** patterns to solve problems.
- **Describes and extends** patterns numerically (e.g., on a 100s chart).

#### Fourth Grade:

##### Patterns

- **Explains** patterns in factors, multiples, and unit fractions, emphasizing the anchor numbers 10 and 100 (e.g.,  $100 = 25 \times 4$ ;  $100 = 10 \times 10$ ).
- **Identifies and extends** a growing pattern with symbols, patterns and numbers and **writes** a numerical description.
- **Finds** patterns by organizing data in T-charts and **describes** the growing pattern numerically.

## Pre-Algebra

- **Represents** the idea of a variable as an unknown quantity using a letter or a symbol (e.g.,  $3 + ? = 7$ ;  $3 + \underline{\quad} = 7$ ;  $3 + a = 7$ ).
- **Selects** appropriate operational and relational symbols to make an expression true (e.g.,  $4 \underline{\quad} 3 = 7$ ;  $4 + 3 = 7$ ).

## **Fifth Grade:**

### Patterns

- **Predicts** a slot in a sequence or growing pattern of numbers (e.g., 2, 4, 6, 8, ... Give the next number.).
- **Describes and graphs** the difference between patterns with the same (constant) rate of change and those with unsteady (varying) rates of change.
- **Forms** a hypothesis about and **tests** a rule for the pattern in a sequence of numbers (e.g., What is the 10<sup>th</sup> number in this sequence: 4, 9, 14, 19...?).
- **Uses** T-charts to represent patterning with functions.
- **Uses** patterns and numerical rules to represent and solve problems.

### Pre-Algebra

- **Uses** variables and open sentences to express simple, single-step algebraic equations (e.g.,  $2 + n = 5$ ).
- **Investigates** the concept of balance in equations (e.g.,  $7 + 3 = 3 + x$ ).

## **Strand V – Patterns, Functions, and Algebraic Concepts:**

The student demonstrates an understanding of algebraic skills and concepts through experiences with meaningful mathematical problems that focus on discovering, describing, modeling, and generalizing patterns and functions, representing and analyzing relationships, and finding and supporting solutions.

**Benchmark (6 – 8):** The student uses tables, graphs, and symbolic representations of patterns. The student understands and uses variables and linear equations in algebraic problem solving.

### **Performance Standards:**

#### **Sixth Grade:**

##### Patterns

- **Predicts** sequences and patterns involving varying rates of change (e.g., growth over time).

##### Functions

- **Compares and contrasts** models of continuous functions (e.g., plant growth over time) in real-life applications.

##### Variables, Expressions, and Equations

- **Analyzes** the use of variables to represent quantities (e.g., area of a rectangle:  $A = lw$ ).
- **Explains** how expressions are used to model functions and patterns [e.g., 2, 4, 6, 8 represents  $f(x) = 2n$ ].
- **Explains** that equations are symbolic representations of relationships, patterns, and functions.
- **Solves** one-step equations using the concept of balance when quantities are added, subtracted, or divided to both sides of an equation.

## Seventh Grade:

### Variable Expressions

- **Identifies and uses** variable expressions and formulas to solve a variety of real-life situations (e.g., Simple Interest:  $I = prt$ ).
- **Represents, describes, and analyzes** numerical patterns and linear relationships using tables, graphs, words, and standard algebraic notation.

### Functional Relationships

- **Develops and tests** strategies for solving two-step equations.
- **Translates** hypotheses into formal methods of solving algebraic equations.
- **Recognizes and applies** the properties of equality.

## Eighth Grade:

### Functions

- **Uses** graphs to analyze the nature of change in linear relationships.
- **Compares and contrasts** properties of linear and nonlinear functions.
- **Develops** exponential functions to represent real-life situations (e.g., compound interest problem).
- **Represents, describes, and analyzes** numerical patterns and relationships using tables, graphs, words, and standard algebraic notation.

### Linear Equations and Inequalities

- **Identifies and models** real-life situations using multiple representations.
- **Simplifies** algebraic expressions including rational expressions.
- **Investigates and applies** the basic mathematical properties (e.g., commutative, associative, distributive, identity, and zero) in a variety of situations.
- **Develops and tests** strategies for solving multi-step equations.
- **Solves** equations for specified variables (e.g., solve for  $h$  if  $A = bh/2$ ).
- **Represents** inequalities on a number line.
- **Solves** inequalities and **represents** the solution in a variety of ways (e.g., number line, algebraically, in writing, orally).
- **Identifies and interprets** the slope and y-intercept of a line from a graph and from an equation.