Patterns and Relations (Patterns)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
General Learning Outcome Use patterns to describe the world and solve problems.	**General Learning Outcome** Use patterns to describe the world and solve problems.	**General Learning Outcome** Use patterns to describe the world and solve problems.	**General Learning Outcome** Use patterns to describe the world and solve problems.	**General Learning Outcome** Use patterns to describe the world and solve problems.
Specific Learning Outcomes	Specific Learning Outcomes	Specific Learning Outcomes	Specific Learning Outcomes	Specific Learning Outcomes
K.PR.1. Demonstrate an understanding of repeating patterns (two or three elements) by ■ identifying ■ reproducing ■ extending ■ creating patterns using manipulatives, sounds, and actions. [C, CN, PS, V]	1.PR.1. Demonstrate an understanding of repeating patterns (two to four elements) by ■ describing ■ reproducing ■ extending ■ creating patterns using manipulatives, diagrams, sounds, and actions. [C, PS, R, V] 1.PR.2. Translate repeating patterns from one representation to another. [C, R, V]	2.PR.1. Predict an element in a repeating pattern using a variety of strategies. [C, CN, PS, R, V] 2.PR.2. Demonstrate an understanding of increasing patterns by ■ describing ■ reproducing ■ extending ■ creating patterns using manipulatives, diagrams, sounds, and actions (numbers to 100). [C, CN, PS, R, V]	3.PR.1. Demonstrate an understanding of increasing patterns by ■ describing ■ extending ■ comparing ■ creating patterns using manipulatives, diagrams, and numbers (to 1000). [C, CN, PS, R, V] 3.PR.2. Demonstrate an understanding of decreasing patterns by ■ describing ■ extending ■ comparing ■ creating patterns using manipulatives, diagrams, and numbers (starting from 1000 or less). [C, CN, PS, R, V]	4.PR.1. Identify and describe patterns found in tables and charts, including a multiplication chart. [C, CN, PS, V] 4.PR.2. Reproduce a pattern shown in a table or chart using concrete materials. [C, CN, V] 4.PR.3. Represent and describe patterns and relationships using charts and tables to solve problems. [C, CN, PS, R, V] 4.PR.4. Identify and explain mathematical relationships using charts and diagrams to solve problems. [CN, PS, R, V]

Patterns and Relations (Patterns)

[C] Communication	**[PS]** Problem Solving
[CN] Connections	**[R]** Reasoning
[ME] Mental Mathematics and Estimation	**[T]** Technology
	[V] Visualization

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
General Learning Outcome Use patterns to describe the world and solve problems.	**General Learning Outcome** Use patterns to describe the world and solve problems.	**General Learning Outcome** Use patterns to describe the world and solve problems.	**General Learning Outcome** Use patterns to describe the world and solve problems.	**General Learning Outcome** Use patterns to describe the world and solve problems.
Specific Learning Outcomes	Specific Learning Outcomes	Specific Learning Outcomes	Specific Learning Outcomes	Specific Learning Outcomes
5.PR.1. Determine the pattern rule to make predictions about subsequent elements. [C, CN, PS, R, V]	6.PR.1. Demonstrate an understanding of the relationships within tables of values to solve problems. [C, CN, PS, R] 6.PR.2. Represent and describe patterns and relationships using graphs and tables. [C, CN, ME, PS, R, V]	7.PR.1. Demonstrate an understanding of oral and written patterns and their corresponding relations. [C, CN, R] 7.PR.2. Construct a table of values from a relation, graph the table of values, and analyze the graph to draw conclusions and solve problems. [C, CN, R, V]	8.PR.1. Graph and analyze two-variable linear relations. [C, ME, PS, R, T, V]	9.PR.1. Generalize a pattern arising from a problem-solving context using linear equations, and verify by substitution. [C, CN, PS, R, V] 9.PR.2. Graph linear relations, analyze the graph, and interpolate or extrapolate to solve problems. [C, CN, PS, R, T, V]

Patterns and Relations (Variables and Equations)

	[C]	Communication	[PS]	Problem Solving
	[CN]	Connections	[R]	Reasoning
	[ME]	Mental Mathematics and Estimation	[T] [V]	Technology Visualization

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
	General Learning Outcome Represent algebraic expressions in multiple ways.	**General Learning Outcome** Represent algebraic expressions in multiple ways.	**General Learning Outcome** Represent algebraic expressions in multiple ways.	**General Learning Outcome** Represent algebraic expressions in multiple ways.
	Specific Learning Outcomes	Specific Learning Outcomes	Specific Learning Outcomes	Specific Learning Outcomes
	1.PR.3. Describe equality as a balance and inequality as an imbalance, concretely and pictorially (0 to 20). [C, CN, R, V] 1.PR.4. Record equalities using the equal symbol (0 to 20). [C, CN, PS, V]	2.PR.3. Demonstrate and explain the meaning of equality and inequality by using manipulatives and diagrams (0 to 100). [C, CN, R, V] 2.PR.4. Record equalities and inequalities symbolically using the equal symbol or the not-equal symbol. [C, CN, R, V]	3.PR.3. Solve one-step addition and subtraction equations involving symbols representing an unknown number. [C, CN, PS, R, V]	4.PR.5. Express a problem as an equation in which a symbol is used to represent an unknown number. [CN, PS, R] 4.PR.6. Solve one-step equations involving a symbol to represent an unknown number. [C, CN, PS, R, V]

Patterns and Relations (Variables and Equations)

[C] Communication			**[PS]** Problem Solving	
[CN] Connections			**[R]** Reasoning	
[ME] Mental Mathematics and Estimation			**[T]** Technology	
			[V] Visualization	

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
General Learning Outcome Represent algebraic expressions in multiple ways.	General Learning Outcome Represent algebraic expressions in multiple ways.	General Learning Outcome Represent algebraic expressions in multiple ways.	General Learning Outcome Represent algebraic expressions in multiple ways.	General Learning Outcome Represent algebraic expressions in multiple ways.
Specific Learning Outcomes	Specific Learning Outcomes	Specific Learning Outcomes	Specific Learning Outcomes	Specific Learning Outcomes
5.PR.2. Solve problems involving single-variable (expressed as symbols or letters), one-step equations with whole-number coefficients, and whole-number solutions. [C, CN, PS, R]	6.PR.3. Represent generalizations arising from number relationships using equations with letter variables. [C, CN, PS, R, V] 6.PR.4. Demonstrate and explain the meaning of preservation of equality, concretely, pictorially, and symbolically. [C, CN, PS, R, V]	7.PR.3. Demonstrate an understanding of preservation of equality by - modelling preservation of equality, concretely, pictorially, and symbolically - applying preservation of equality to solve equations [C, CN, PS, R, V] 7.PR.4. Explain the difference between an expression and an equation. [C, CN] 7.PR.5. Evaluate an expression given the value of the variable(s). [CN, R] 7.PR.6. Model and solve problems that can be represented by one-step linear equations of the form $x + a = b$, concretely, pictorially, and symbolically, where a and b are integers. [CN, PS, R, V]	8.PR.2. Model and solve problems using linear equations of the form: $ax = b$ $\frac{x}{a} = b, a \neq 0$ $ax + b = c$ $\frac{x}{a} + b = c, a \neq 0$ $a(x + b) = c$ concretely, pictorially, and symbolically, where a, b, and c are integers. [C, CN, PS, V]	9.PR..3. Model and solve problems using linear equations of the form: $ax = b$ $\frac{x}{a} = b, a \neq 0$ $ax + b = c$ $\frac{x}{a} + b = c, a \neq 0$ $ax = b + cx$ $a(x + b) = c$ $ax + b = cx + d$ $a(bx + c) = d(ex + f)$ $\frac{x}{a} = b, x \neq 0$ where a, b, c, d, e, and f are rational numbers. [C, CN, PS, V] 9.PR.4. Explain and illustrate strategies to solve single variable linear inequalities with rational number coefficients within a problem-solving context. [C, CN, PS, R, V] 9.PR.5. Demonstrate an understanding of polynomials (limited to polynomials of degree less than or equal to 2). [C, CN, R, V]

Patterns and Relations (Variables and Equations) *(continued)*

[C]	Communication	[PS]	Problem Solving
[CN]	Connections	[R]	Reasoning
[ME]	Mental Mathematics and Estimation	[T]	Technology
		[V]	Visualization

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4

Patterns and Relations (Variables and Equations) *(continued)*

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
		General Learning Outcome Represent algebraic expressions in multiple ways.		**General Learning Outcome** Represent algebraic expressions in multiple ways.
		Specific Learning Outcomes		Specific Learning Outcomes
		7.PR.7. Model and solve problems that can be represented by linear equations of the form: ■ $ax + b = c$ ■ $ax = b$ ■ $\frac{x}{a} = b, a \neq 0$ concretely, pictorially, and symbolically, where a, b, and c are whole numbers. [CN, PS, R, V]		9.PR.6. Model, record, and explain the operations of addition and subtraction of polynomial expressions, concretely, pictorially, and symbolically (limited to polynomials of degree less than or equal to 2). [C, CN, PS, R, V] 9.PR.7. Model, record, and explain the operations of multiplication and division of polynomial expressions (limited to polynomials of degree less than or equal to 2) by monomials, concretely, pictorially, and symbolically. [C, CN, R, V]