

Alberta's Program of Studies (Curriculum) - Mathematics - Patterns and Relations (Strand and Sub-strands)

Note: These strands are not intended to be discrete units of instruction. The integration of outcomes across strands makes mathematical experiences meaningful. Students should make the connection between concepts both within and across strands.

PROGRESSION IS HIGHLIGHTED IN THE FOLLOWING DOCUMENT VIA **BOLDED** TEXT.

MATHEMATICAL PROCESSES							
There are critical components that students must encounter in a mathematics program in order to achieve the goals of mathematics education and embrace lifelong learning in mathematics.							
MATHEMATICAL PROCESS	Communication [C]	Connections [CN]	Mental Mathematics and Estimation [ME]	Problem Solving [PS]	Reasoning [R]	Technology [T]	Visualization [V]
Students are expected to	communicate in order to learn and express their understanding	connect mathematical ideas to other concepts in mathematics, to everyday experiences and to other disciplines	demonstrate fluency with mental mathematics and estimation	develop and apply new mathematical knowledge through problem solving	develop mathematical reasoning	select and use technologies as tools for learning and for solving problems	develop visualization skills to assist in processing information, making connections and solving problems

Sub-strand: Patterns									
Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
General Outcome: Use patterns to describe the world and to solve problems.									
Specific Outcome	Specific Outcome	Specific Outcome	Specific Outcome	Specific Outcome	Specific Outcome	Specific Outcome	Specific Outcome	Specific Outcome	Specific Outcome
<i>It is expected that students will:</i>	<i>It is expected that students will:</i>	<i>It is expected that students will:</i>	<i>It is expected that students will:</i>	<i>It is expected that students will:</i>	<i>It is expected that students will:</i>	<i>It is expected that students will:</i>	<i>It is expected that students will:</i>	<i>It is expected that students will:</i>	<i>It is expected that students will:</i>
<p>1. Demonstrate an understanding of repeating patterns (two or three elements) by:</p> <ul style="list-style-type: none"> • identifying • reproducing • extending • creating <p>patterns using manipulatives, sounds and actions.</p> <p>[C, CN, PS, V] [ICT: P2-1.1]</p>	<p>1. Demonstrate an understanding of repeating patterns (two to four elements) by:</p> <ul style="list-style-type: none"> • describing • reproducing • extending • creating <p>patterns using manipulatives, diagrams, sounds and actions.</p> <p>[C, PS, R, V] [ICT: P2-1.1]</p>	<p>1. Demonstrate an understanding of repeating patterns (three to five elements) by:</p> <ul style="list-style-type: none"> • describing • extending • comparing • creating <p>patterns using manipulatives, diagrams, sounds and actions.</p> <p>[C, CN, PS, R, V]</p>	<p>2. Demonstrate an understanding of repeating patterns by:</p> <ul style="list-style-type: none"> • describing • extending • comparing • creating <p>numerical (numbers to 1000) and non-numerical patterns using manipulatives, diagrams, sounds and actions.</p> <p>[C, CN, PS, R, V]</p>	<p>1. Identify and describe patterns found in tables and charts.</p> <p>[C, CN, PS, V] [ICT: C6-2.3]</p>	<p>1. Determine the pattern rule to make predictions about subsequent elements.</p> <p>[C, CN, PS, R, V]</p>	<p>1. Represent and describe patterns and relationships, using graphs and tables.</p> <p>[C, CN, ME, PS, R, V] [ICT: C6-2.3]</p>	<p>1. Demonstrate an understanding of oral and written patterns and their equivalent linear relations.</p> <p>[C, CN, R]</p>	<p>1. Graph and analyze two-variable linear relations.</p> <p>[C, ME, PS, R, T, V] [ICT: P2-3.3]</p>	<p>1. Generalize a pattern arising from a problem-solving context, using a linear equation, and verify by substitution.</p> <p>[C, CN, PS, R, V]</p>
<p>2. Sort a set of objects based on a single attribute, and explain the sorting rule.</p> <p>[C, CN, PS, R, V]</p>	<p>2. Sort objects, using one attribute, and explain the sorting rule.</p> <p>[C, CN, R, V]</p>	<p>3. Sort a set of objects, using two attributes, and explain the sorting rule.</p> <p>[C, CN, R, V]</p>	<p>3. Sort objects or numbers, using one or more than one attribute.</p> <p>[C, CN, R, V]</p>	<p>2. Translate among different representations of a pattern, such as a table, a chart or concrete materials.</p> <p>[C, CN, V]</p>	<p>2. Translate among different representations of a pattern, such as a table, a chart or concrete materials.</p> <p>[C, CN, V]</p>	<p>2. Demonstrate an understanding of the relationships within tables of values to solve problems.</p> <p>[C, CN, PS, R] [ICT: C6-2.3]</p>	<p>2. Create a table of values from a linear relation, graph the table of values, and analyze the graph to draw conclusions and solve problems.</p> <p>[C, CN, PS, R, V] [ICT: C7-3.1]</p>	<p>2. Graph a linear relation, analyze the graph, and interpolate or extrapolate to solve problems.</p> <p>[C, CN, PS, R, T, V] [ICT: C7-3.1, P2-3.3]</p>	<p>2. Graph a linear relation, analyze the graph, and interpolate or extrapolate to solve problems.</p> <p>[C, CN, PS, R, T, V] [ICT: C7-3.1, P2-3.3]</p>
	<p>3. Translate repeating patterns from one representation to another.</p> <p>[C, CN, R, V]</p>	<p>2. Demonstrate an understanding of increasing patterns by:</p> <ul style="list-style-type: none"> • describing • reproducing • extending • creating <p>numerical (numbers to 100) and non-numerical patterns using manipulatives, diagrams, sounds and actions.</p> <p>[C, CN, PS, R, V]</p>	<p>1. Demonstrate an understanding of increasing patterns by:</p> <ul style="list-style-type: none"> • describing • extending • comparing • creating <p>numerical (numbers to 1000) and non-numerical patterns using manipulatives, diagrams, sounds and actions.</p> <p>[C, CN, PS, R, V]</p>	<p>3. Represent, describe and extend patterns and relationships, using charts and tables, to solve problems.</p> <p>[C, CN, PS, R, V] [ICT: C6-2.3]</p>	<p>4. Identify and explain mathematical relationships, using charts and diagrams, to solve problems.</p> <p>[CN, PS, R, V] [ICT: C6-2.3]</p>				

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Sub-Strand: Variables and Equations									
Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
General Outcome: N/A	General Outcome: Represent algebraic expressions in multiple ways.								
Specific Outcome <i>It is expected that students will:</i>	Specific Outcome <i>It is expected that students will:</i>	Specific Outcome <i>It is expected that students will:</i>	Specific Outcome <i>It is expected that students will:</i>	Specific Outcome <i>It is expected that students will:</i>	Specific Outcome <i>It is expected that students will:</i>	Specific Outcome <i>It is expected that students will:</i>	Specific Outcome <i>It is expected that students will:</i>	Specific Outcome <i>It is expected that students will:</i>	Specific Outcome <i>It is expected that students will:</i>
N/A	<p>4. Describe equality as a balance and inequality as an imbalance, concretely and pictorially (0 to 20).</p> <p>[C, CN, R, V]</p>	<p>4. Demonstrate and explain the meaning of equality and inequality, concretely and pictorially.</p> <p>[C, CN, R, V]</p>	<p>4. Solve one-step addition and subtraction equations involving a symbol to represent an unknown number.</p> <p>[C, CN, PS, R, V]</p>	<p>6. Solve one-step equations involving a symbol to represent an unknown number.</p> <p>[C, CN, PS, R, V]</p>	<p>3. Solve problems involving single-variable, one-step equations with whole number coefficients and whole number solutions.</p> <p>[C, CN, PS, R]</p>	<p>3. Represent generalizations arising from number relationships, using equations with letter variables.</p> <p>[C, CN, PS, R, V]</p>	<p>4. Explain the difference between an expression and an equation.</p> <p>[C, CN]</p>	<p>2. Model and solve problems concretely, pictorially and symbolically, using linear equations of the form:</p> <ul style="list-style-type: none"> $ax = b$ $\frac{x}{a} = b, a \neq 0$ $ax + b = c$ $\frac{x}{a} + b = c, a \neq 0$ $ax = b + cx$ $a(x + b) = c$ $ax + b = cx + d$ $a(bx + c) = d(ex + f)$ $\frac{a}{x} = b, x \neq 0$ <p>where a, b and c are integers.</p> <p>[C, CN, PS, V]</p>	<p>3. Model and solve problems, using linear equations of the form:</p> <ul style="list-style-type: none"> $ax = b$ $\frac{x}{a} = b, a \neq 0$ $ax + b = c$ $\frac{x}{a} + b = c, a \neq 0$ $ax = b + cx$ $a(x + b) = c$ $ax + b = cx + d$ $a(bx + c) = d(ex + f)$ $\frac{a}{x} = b, x \neq 0$ <p>where a, b, c, d, e and f are rational numbers.</p> <p>[C, CN, PS, V]</p>
	<p>5. Record equalities, using the equal symbol.</p> <p>[C, CN, PS, V]</p>	<p>5. Record equalities and inequalities symbolically, using the equal symbol or the not equal symbol.</p> <p>[C, CN, R, V]</p>		<p>5. Express a given problem as an equation in which a symbol is used to represent an unknown number.</p> <p>[CN, PS, R]</p>	<p>2. Express a given problem as an equation in which a letter variable is used to represent an unknown number (limited to whole numbers).</p> <p>[C, CN, PS, R]</p>	<p>4. Express a given problem as an equation in which a letter variable is used to represent an unknown number.</p> <p>[C, CN, PS, R]</p>	<p>5. Evaluate an expression, given the value of the variable(s).</p> <p>[CN, R]</p>		
						<p>5. Demonstrate and explain the meaning of preservation of equality, concretely and pictorially.</p> <p>[C, CN, PS, R, V]</p>	<p>3. Demonstrate an understanding of preservation of equality by:</p> <ul style="list-style-type: none"> modelling preservation of equality, concretely, pictorially and symbolically applying preservation of equality to solve equations. <p>[C, CN, PS, R, V]</p>		<p>4. Explain and illustrate strategies to solve single variable linear inequalities with rational coefficients within a problem-solving context.</p> <p>[C, CN, PS, R, V]</p>
							<p>6. Model and solve, concretely, pictorially and symbolically, problems that can be represented by one-step linear equations of the form $x + a = b$, where a and b are integers.</p> <p>[CN, PS, R, V]</p>		<p>5. Demonstrate an understanding of polynomials (limited to polynomials of degree less than or equal to 2).</p> <p>[C, CN, R, V]</p>
							<p>7. Model and solve, concretely, pictorially and symbolically, problems that can be represented by linear equations of the form:</p> <ul style="list-style-type: none"> $ax + b = c$ $ax = b$ $\frac{x}{a} = b, a \neq 0$ <p>where a, b and c are whole numbers.</p> <p>[CN, PS, R, V]</p>		<p>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).</p> <p>[C, CN, PS, R, V]</p>
									<p>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.</p> <p>[C, CN, R, V]</p>