# Mathletics

## Saskatchewan Program of Studies

### Understanding Practice and Fluency (UPF)


**Grades 7 – 8**

October, 2021

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Understanding, Practice and Fluency (UPF)
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# Grade 7

## 1 Number

| Outcome | Quests | Content |
|---|---|---|
| 1. Demonstrate an understanding of division through the development and application of divisibility strategies for 2, 3, 4, 5, 6, 8, 9, and 10, and through an analysis of division involving zero. | Divisibility rules | Introducing divisibility rules for dividing by 2 |
| | | Introducing divisibility rules for dividing by 3 |
| | | Introducing divisibility rules for dividing by 4 |
| | | Introducing divisibility rules for dividing by 5 |
| | | Introducing divisibility rules for dividing by 6 |
| | | Introducing divisibility rules for dividing by 8 |
| | | Introducing divisibility rules for dividing by 9 |
| | | Introducing divisibility rules for dividing by 10 |
| | | Divisibility rules: dividing by 2, 3, 4, 5, 6, 10 |
| 2. Expand and demonstrate understanding of the addition, subtraction, multiplication, and division of decimals to greater numbers of decimal places, and the order of operations. | Operations with decimals | Solving decimal word problems, 4 operations |
| | | Adding decimals |
| | | Subtracting decimals |
| | | Multiplying decimals |
| | | Multiplying decimals, place value |
| | | Dividing decimals |
| | | Order of operations, decimals |
| 3. Demonstrate an understanding of the relationships between positive decimals, positive fractions (including mixed numbers, proper fractions and improper fractions), and whole numbers. | Decimals & fractions | Investigating terminating & repeating decimals |
| | | Ordering fractions & decimals on a number line |
| | | Converting terminating decimals to fractions |
| | | Converting repeating decimals to fractions |
| | | Converting fractions to terminating decimals |
| | | Converting fractions to repeating decimals |
| | | Identifying a number between 2 given numbers |

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|---|---|---|
| | | Comparing & ordering proper fractions |
| | | Ordering terminating & repeating decimals |
| 4. Expand and demonstrate an understanding of percent to include fractional percents between 1% and 100%. | Percents, fractions & decimals | Solving word problems involving percentages |
| | | Converting percents into fractions & decimals |
| 5. Develop and demonstrate an understanding of adding and subtracting positive fractions and mixed numbers, with like and unlike denominators, concretely, pictorially, and symbolically (limited to positive sums and differences). | Add fractions & mixed numbers | Adding fractions, like denominator |
| | | Adding a whole number & a fraction |
| | | Adding improper fractions, like denominator |
| | | Adding with mixed numbers, like denominator |
| | | Adding fractions, unlike denominator |
| | | Adding improper fractions, unlike denominator |
| | | Adding with mixed numbers, unlike denominator |
| | Subtract fractions & mixed numbers | Subtracting fractions, like denominator |
| | | Subtracting a fraction from a whole number |
| | | Subtracting improper fractions, like denominator |
| | | Subtracting with mixed numbers, like denominator |
| | | Subtracting fractions, unlike denominator |
| | | Subtracting improper fractions, unlike denominator |
| | | Subtracting with mixed numbers, unlike denominator |
| | Add & subtract fractions, word problems | Adding & subtracting fractions, word problems |
| 6. Demonstrate an understanding of addition and subtraction of integers, concretely, pictorially, and symbolically. | Understand integers | Investigating integers |
| | | Comparing & ordering integers |
| | | Understanding opposites in context |
| | Add & subtract integers | Adding & subtracting negative integers |
| | | Adding & subtracting integers, word problems |
| | | Adding integers with two-coloured counters |

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|---|---|---|
| | | Adding & subtracting integers, number line |
| | | Adding integers |
| | | Subtracting integers |
| | | Adding & subtracting integers, order of operations |

## 2 Patterns and Relations

| Outcome | Quests | Content |
|---|---|---|
| 1. Demonstrate an understanding of the relationships between oral and written patterns, graphs and linear relations. | Discrete linear relations | Graphing discrete linear relations using a table |
| | | Matching graphs & linear relations |
| | | Creating tables of values for linear relations |
| 2. Demonstrate an understanding of equations and expressions by: distinguishing between equations and expressions, evaluating expressions, verifying solutions to equations. | Equations & expressions | Evaluating expressions using substitution |
| | | Checking solutions of two-step equations |
| | | Distinguishing between expressions & equations |
| | | Identifying parts of expressions & equations |
| 3. Demonstrate an understanding of one- and two-step linear equations of the form $ax/b + c = d$ (where a, b, c, and d are whole numbers, $c \leq d$ and $b \neq 0$) by modeling the solution of the equations concretely, pictorially, physically, and symbolically and explaining the solution in terms of the preservation of equality. | Linear equations, whole numbers | Understanding the preservation of equality |
| | | Solving 2-step equations |
| | | Modeling & solving 2-step equations, algebra tiles |
| | | Modeling real-life scenarios using equations |
| | | Solving 1-step equations |
| | | Solving 1-step equations using a balance |
| | | Solving 1-step equations using algebra tiles |
| 4. Demonstrate an understanding of linear equations of the form $x + a = b$ (where a and b are integers) by modeling problems as a linear equation and solving the problems concretely, pictorially, and symbolically. | Linear equations, integers | Solving linear equations with integers |
| | | Modeling & solving 1-step equations, algebra tiles |

## 3 Shape and Space

| Outcome | Quests | Content |
|---|---|---|
| 1. Demonstrate an understanding of circles including circumference and central angles. | Circles | Finding the circumference of circles |
| | | Introducing the parts of a circle |
| | | Introducing circumference |
| | | Sum of the central angles of a circle |
| 2. Develop and apply formulas for determining the area of: triangles, parallelograms, circles. | Determine the area | Determining the area of a triangle |
| | | Determining the area of a parallelogram |
| | | Determining the area of a circle |
| 3. Demonstrate an understanding of 2-D relationships involving lines and angles. | Lines & angles | Identifying parallel & perpendicular lines |
| 4. Demonstrate an understanding of the Cartesian plane and ordered pairs with integral coordinates. | The Cartesian plane | Introducing Cartesian coordinates |
| | | Drawing shapes on the coordinate plane |
| 5. Expand and demonstrate an understanding of transformations (translations, rotations, and reflections) of 2-D shapes in all four quadrants of the Cartesian plane. | Transformations on the Cartesian plane | Successive translations on the coordinate plane |
| | | Rotations on the coordinate plane |
| | | Reflections on the coordinate plane |
| | | Combinations of transformations |

## 4 Statistics and Probability

| Outcome | Quests | Content |
|---|---|---|
| 1. Demonstrate an understanding of the measures of central tendency and range for sets of data. | Measures of central tendency & range | Understanding mean |
| | | Understanding median |
| | | Understanding mode |
| | | Understanding range |
| | | Choosing statistical measures for data |
| | | Investigating the effect of outliers |
| 2. Demonstrate an understanding of circle graphs. | Circle graphs | Interpreting & constructing circle graphs |
| 3. Demonstrate an understanding of theoretical and experimental probabilities for two independent events where the combined sample space has 36 or fewer elements. | Theoretical & experimental probability | Understanding independent events |
| | | Determining theoretical probability, tree diagrams |
| | | Identifying the sample space |
| | | Exploring fair games |
| | | Probability: decimals, fractions & percents |

# Grade 8

## 1 Number

| Outcome | Quests | Content |
|---|---|---|
| 1. Demonstrate understanding of the square and principle square root of whole numbers concretely or pictorially and symbolically. | Squares & square roots | Perfect squares |
| | | Finding square roots |
| | | Finding square roots, fractions |
| | | Estimating square roots |
| 2. Expand and demonstrate understanding of percents greater than or equal to 0% (including fractional and decimal percents) concretely, pictorially, and symbolically. | Percents greater than or equal to 0% | Percents greater than 100% |
| | | Converting percents to fractions & mixed numbers |
| | | Converting percents to decimals |
| | | Solving problems involving consecutive percents |
| | | Increasing & decreasing amounts by percents |
| | | Solving problems involving combined percents |
| 3. Demonstrate understanding of rates, ratios, and proportional reasoning concretely, pictorially, and symbolically. | Rates, ratios & proportional reasoning | Unit rate |
| | | Introduction to ratios |
| | | Simplifying & comparing rates |
| | | Solving rate problems |
| | | Dividing a quantity in a given ratio |
| | | Solving ratio problems |
| | | Solving proportions |
| 4. Demonstrate understanding of multiplying and dividing positive fractions and mixed numbers, concretely, pictorially, and symbolically. | Multiply fractions & mixed numbers | Multiplying unit fractions by whole numbers |
| | | Multiplying proper fractions by whole numbers |
| | | Multiplying mixed numbers by whole numbers |
| | | Multiplying fractions |
| | | Multiplying mixed numbers |
| | Divide fractions & mixed numbers | Dividing fractions & whole numbers |
| | | Dividing fractions |
| | | Dividing whole numbers & mixed numbers |
| | | Dividing mixed numbers & fractions |
| | | Dividing mixed numbers |
| | | Dividing fractions, word problems |

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|---|---|---|
| 5. Demonstrate understanding of multiplication and division of integers concretely, pictorially, and symbolically. | Multiply & divide integers | Multiplying integers |
| | | Dividing integers |
| | | Multiplying & dividing integers |
| | | Multiplying integers using models |
| | | Dividing integers using models |

## 2 Patterns and Relations

| Outcome | Quests | Content |
|---|---|---|
| 1. Demonstrate understanding of linear relations concretely, pictorially (including graphs), physically, and symbolically. | Linear relations | Graphing discrete linear relations |
| | | Identify an equation from a discrete linear graph |
| | | Graphing a linear relation using a table of values |
| 2. Model and solve problems using linear equations of the form: $ax = b$, $x/a = b$, $a \neq 0$, $ax + b = c$, $x/a + b = c$, $a \neq 0$, $a(x + b) = c$ concretely, pictorially, and symbolically, where a, b, and c are integers. | Linear equations, integers | Modelling & solving 2-step linear equations |
| | | Solving linear equation word problems |
| | | Solving 2-step linear equations, mixed operations |
| | | Solving 1-step linear equations, add & subtract |
| | | Solving 1-step linear equations, multiply & divide |
| | | Solving 1-step linear equations, mixed operations |
| | | Solving linear equations, distributive property |
| | | Checking solutions using substitution |

## 3 Shape and Space

| Outcome | Quests | Content |
|---|---|---|
| 1. Demonstrate understanding of the Pythagorean Theorem concretely or pictorially and symbolically and by solving problems. | Pythagorean Theorem | Identifying the sides of a right triangle |
| | | Converse of the Pythagorean Theorem |
| | | Finding the length of the missing side, short side |
| | | Finding the length of the missing side, hypotenuse |
| | | Finding the length of the missing side |
| | | Matching right triangles to word problems |
| | | Identifying Pythagorean triples |
| 2. Demonstrate understanding of the surface area of 3-D objects limited to right prisms and cylinders (concretely, pictorially, and symbolically) by: analyzing views, sketching and constructing 3-D objects, nets, and top, side, and front views, generalizing strategies and formulae, analyzing the effect of orientation, solving problems. | Surface area | Finding the surface area of rectangular prisms |
| | | Finding the surface area of triangular prisms |
| | | Finding the surface area of cylinders |
| | Construction, views & nets: 3-D objects | Drawing top, front & side views of 3-D objects |
| | | Connecting prisms with their nets |
| | | Connecting 3-D objects with their nets |
| 3. Demonstrate understanding of volume limited to right prisms and cylinders (concretely, pictorially, or symbolically) by: relating area to volume, generalizing strategies and formulae, analyzing the effect of orientation, solving problems. | Volume | Finding the volume of cubes & rectangular prisms |
| | | Finding the volume of triangular prisms |
| | | Finding the volume of cylinders |
| | | Solving volume problems, right prisms & cylinders |
| 4. Demonstrate an understanding of tessellation by: explaining the properties of shapes that make tessellating possible, creating tessellations, identifying tessellations in the environment. | Tessellation | Investigating tessellations using transformations |
| | | Recognizing tessellations |

## 4 Statistics and Probability

| Outcome | Quests | Content |
|---|---|---|
| 1. Analyze the modes of displaying data and the reasonableness of conclusions. | Analyze data displays | Analyzing misleading data displays |
| 2. Demonstrate understanding of the probability of independent events concretely, pictorially, orally, and symbolically. | Probability of independent events | Finding the probability of 2 independent events |

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