

**South Slave Divisional Education Council**

**Math 20-2**  
**Curriculum Package**  
**February 2012**



**2012**

**Strand: Measurement**

**General Outcome:** Develop spatial sense and proportional reasoning.

Specific Outcomes	Achievement Indicators – Measurable outcomes
<p><i>It is expected that students will:</i></p>	<p><i>The following set of indicators may be used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:</i></p>
<p>Solve problems that involve the application of rates.</p>	<ul style="list-style-type: none"> <li>• Interpret rates in a given context, such as the arts, commerce, the environment, medicine or recreation.</li> <li>• Solve a rate problem that requires the isolation of a variable.</li> <li>• Determine and compare rates and unit rates.</li> <li>• Make and justify a decision, using rates.</li> <li>• Represent a given rate pictorially.</li> <li>• Draw a graph to represent a rate.</li> <li>• Explain, using examples, the relationship between the slope of a graph and a rate.</li> <li>• Describe a context for a given rate or unit rate.</li> <li>• Identify and explain factors that influence a rate in a given context.</li> <li>• Solve a contextual problem that involves rates or unit rates.</li> </ul>
<p>Solve problems that involve scale diagrams, using proportional reasoning.</p>	<ul style="list-style-type: none"> <li>• Explain, using examples, how scale diagrams are used to model a 2-D shape or a 3-D object.</li> <li>• Determine, using proportional reasoning, the scale factor, given one dimension of a 2-D shape or a 3-D object and its representation.</li> <li>• Determine, using proportional reasoning, an unknown dimension of a 2-D shape or a 3-D object, given a scale diagram or a model.</li> <li>• Draw, with or without technology, a scale diagram of a given 2-D shape, according to a specified scale factor (enlargement or reduction).</li> <li>• Solve a contextual problem that involves a scale diagram.</li> </ul>
<p>Demonstrate an understanding of the relationships among scale factors, areas, surface areas and volumes of similar 2-D shapes and 3-D objects.</p>	<ul style="list-style-type: none"> <li>• Determine the area of a 2-D shape, given the scale diagram, and justify the reasonableness of the result.</li> <li>• Determine the surface area and volume of a 3-D object, given the scale diagram, and justify the reasonableness of the result.</li> <li>• Explain, using examples, the effect of a change in the scale factor on the area of a 2-D shape.</li> <li>• Explain, using examples, the effect of a change in the scale factor on the surface area of a 3-D object.</li> <li>• Explain, using examples, the effect of a change in the scale factor on the volume of a 3-D object.</li> <li>• Explain, using examples, the relationships among scale factor, area of a 2-D shape, surface area of a 3-D object and volume of a 3-D object.</li> <li>• Solve a spatial problem that requires the manipulation of formulas.</li> <li>• Solve a contextual problem that involves the relationships among scale factors, areas and volumes.</li> </ul>

**Strand: Geometry****General Outcome:** Develop spatial sense.

Specific Outcomes	Achievement Indicators – Measurable outcomes
<i>It is expected that students will:</i>	<i>The following set of indicators may be used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:</i>
Derive proofs that involve the properties of angles and triangles.	<ul style="list-style-type: none"> <li>• Generalize, using inductive reasoning, the relationships between pairs of angles formed by transversals and parallel lines, with or without technology.</li> <li>• Prove, using deductive reasoning, properties of angles formed by transversals and parallel lines, including the sum of the angles in a triangle.</li> <li>• Generalize, using inductive reasoning, a rule for the relationship between the sum of the interior angles and the number of sides (n) in a polygon, with or without technology.</li> <li>• Identify and correct errors in a given proof of a property that involves angles.</li> <li>• Verify, with examples, that if lines are not parallel, the angle properties do not apply.</li> <li>• Prove, using deductive reasoning, that two triangles are congruent.</li> </ul>
Solve problems that involve properties of angles and triangles.	<ul style="list-style-type: none"> <li>• Determine the measures of angles in a diagram that includes parallel lines, angles and triangles, and justify the reasoning.</li> <li>• Identify and correct errors in a given solution to a problem that involves the measures of angles.</li> <li>• Solve a contextual problem that involves angles or triangles.</li> <li>• Construct parallel lines, given a compass or a protractor, and explain the strategy used.</li> <li>• Determine if lines are parallel, given the measure of an angle at each intersection formed by the lines and a transversal.</li> </ul>
Solve problems that involve the cosine law and the sine law, excluding the ambiguous case.	<ul style="list-style-type: none"> <li>• Draw a diagram to represent a problem that involves the cosine law or the sine law.</li> <li>• Explain the steps in a given proof of the sine law or cosine law.</li> <li>• Solve a contextual problem that requires the use of the sine law or cosine law, and explain the reasoning.</li> <li>• Solve a contextual problem that involves more than one triangle.</li> </ul>

**Strand: Number and Logic****General Outcome:** Develop number sense and logical reasoning.

Specific Outcomes	Achievement Indicators – Measurable outcomes
<i>It is expected that students will:</i>	<i>The following set of indicators may be used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:</i>
Analyze and prove conjectures, using inductive and deductive reasoning, to solve problems.	<ul style="list-style-type: none"> <li>• Make conjectures by observing patterns and identifying properties, and justify the reasoning.</li> <li>• Explain why inductive reasoning may lead to a false conjecture.</li> <li>• Compare, using examples, inductive and deductive reasoning.</li> <li>• Provide and explain a counterexample to disprove a given conjecture.</li> <li>• Prove algebraic and number relationships such as divisibility rules, number properties, mental mathematics strategies or algebraic number tricks.</li> <li>• Prove a conjecture, using deductive reasoning (not limited to two column proofs).</li> <li>• Determine if a given argument is valid, and justify the reasoning.</li> <li>• Identify errors in a given proof; e.g., a proof that ends with <math>2 = 1</math>.</li> <li>• Solve a contextual problem that involves inductive or deductive reasoning.</li> </ul>
Analyze puzzles and games that involve spatial reasoning, using problem-solving strategies.	<ul style="list-style-type: none"> <li>• Determine, explain and verify a strategy to solve a puzzle or to win a game; e.g.,               <ul style="list-style-type: none"> <li>○ guess and check</li> <li>○ look for a pattern</li> <li>○ make a systematic list</li> <li>○ draw or model</li> <li>○ eliminate possibilities</li> <li>○ simplify the original problem</li> <li>○ work backward</li> <li>○ develop alternative approaches.</li> </ul> </li> <li>• Identify and correct errors in a solution to a puzzle or in a strategy for winning a game.</li> <li>• Create a variation on a puzzle or a game, and describe a strategy for solving the puzzle or winning the game.</li> </ul>
Solve problems that involve operations on radicals and radical expressions with numerical and variable radicands (limited to square roots).	<ul style="list-style-type: none"> <li>• Compare and order radical expressions with numerical radicands.</li> <li>• Express an entire radical with a numerical radicand as a mixed radical.</li> <li>• Express a mixed radical with a numerical radicand as an entire radical.</li> <li>• Perform one or more operations to simplify radical expressions with numerical or variable radicands.</li> <li>• Rationalize the monomial denominator of a radical expression.</li> <li>• Identify values of the variable for which the radical expression is defined.</li> </ul>
Solve problems that involve radical equations (limited to square roots or cube roots).	<ul style="list-style-type: none"> <li>• Determine any restrictions on values for the variable in a radical equation.</li> <li>• Determine, algebraically, the roots of a radical equation, and explain the process used to solve the equation.</li> <li>• Verify, by substitution, that the values determined in solving a radical equation are roots of the equation.</li> <li>• Explain why some roots determined in solving a radical equation are extraneous.</li> <li>• Solve problems by modelling a situation with a radical equation and solving the equation.</li> </ul>

**Strand: Statistics**

**General Outcome:** Develop statistical reasoning.

Specific Outcomes	Achievement Indicators – Measurable outcomes
<i>It is expected that students will:</i>	<i>The following set of indicators may be used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:</i>
Demonstrate an understanding of normal distribution, including: <ul style="list-style-type: none"> <li>• standard deviation</li> <li>• z-scores.</li> </ul>	<ul style="list-style-type: none"> <li>• Explain, using examples, the meaning of standard deviation.</li> <li>• Calculate, using technology, the population standard deviation of a data set.</li> <li>• Explain, using examples, the properties of a normal curve, including the mean, median, mode, standard deviation, symmetry and area under the curve.</li> <li>• Determine if a data set approximates a normal distribution, and explain the reasoning.</li> <li>• Compare the properties of two or more normally distributed data sets.</li> <li>• Explain, using examples representing multiple perspectives, the application of standard deviation for making decisions in situations such as warranties, insurance or opinion polls.</li> <li>• Solve a contextual problem that involves the interpretation of standard deviation.</li> <li>• Determine, with or without technology, and explain the z-score for a given value in a normally distributed data set.</li> <li>• Solve a contextual problem that involves normal distribution.</li> </ul>
Interpret statistical data, using: <ul style="list-style-type: none"> <li>• confidence intervals</li> <li>• confidence levels</li> <li>• margin of error.</li> </ul>	<ul style="list-style-type: none"> <li>• Explain, using examples, how confidence levels, margin of error and confidence intervals may vary depending on the size of the random sample.</li> <li>• Explain, using examples, the significance of a confidence interval, margin of error or confidence level.</li> <li>• Make inferences about a population from sample data, using given confidence intervals, and explain the reasoning.</li> <li>• Provide examples from print or electronic media in which confidence intervals and confidence levels are used to support a particular position.</li> <li>• Interpret and explain confidence intervals and margin of error, using examples found in print or electronic media.</li> <li>• Support a position by analyzing statistical data presented in the media.</li> </ul>

**Strand: Relations and Functions**

**General Outcome:** Develop algebraic and graphical reasoning through the study of relations.

Demonstrate an understanding of the characteristics of quadratic functions, including: <ul style="list-style-type: none"> <li>• vertex</li> <li>• intercepts</li> <li>• domain and range</li> <li>• axis of symmetry.</li> </ul>	<ul style="list-style-type: none"> <li>• Determine, with or without technology, the coordinates of the vertex of the graph of a quadratic function.</li> <li>• Determine the equation of the axis of symmetry of the graph of a quadratic function, given the x-intercepts of the graph.</li> <li>• Determine the coordinates of the vertex of the graph of a quadratic function, given the equation of the function and the axis of symmetry, and determine if the y-coordinate of the vertex is a maximum or a minimum.</li> <li>• Determine the domain and range of a quadratic function.</li> <li>• Sketch the graph of a quadratic function.</li> <li>• Solve a contextual problem that involves the characteristics of a quadratic function.</li> </ul>
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Specific Outcomes	Achievement Indicators – Measurable outcomes
<i>It is expected that students will:</i>	<i>The following set of indicators may be used to assess student achievement for each related specific learning outcome. Students who have fully met the specific learning outcomes are able to:</i>
Solve problems that involve quadratic equations.	<ul style="list-style-type: none"> <li>• Determine, with or without technology, the intercepts of the graph of a quadratic function.</li> <li>• Determine, by factoring, the roots of a quadratic equation, and verify by substitution.</li> <li>• Determine, using the quadratic formula, the roots of a quadratic equation.</li> <li>• Explain the relationships among the roots of an equation, the zeros of the corresponding function and the x-intercepts of the graph of the function.</li> <li>• Explain, using examples, why the graph of a quadratic function may have zero, one or two x-intercepts.</li> <li>• Express a quadratic equation in factored form, given the zeros of the corresponding quadratic function or the x-intercepts of the graph of the function.</li> <li>• Solve a contextual problem by modelling a situation with a quadratic equation and solving the equation.</li> </ul>

**Strand: Mathematics Research Project**

**General Outcome:** Develop an appreciation of the role of mathematics in society.

Research and give a presentation on a historical event or an area of interest that involves mathematics.	<ul style="list-style-type: none"> <li>• Collect primary or secondary data (statistical or informational) related to the topic.</li> <li>• Assess the accuracy, reliability and relevance of the primary or secondary data collected by:               <ul style="list-style-type: none"> <li>○ identifying examples of bias and points of view</li> <li>○ identifying and describing the data collection methods</li> <li>○ determining if the data is relevant</li> <li>○ determining if the data is consistent with information obtained from other sources on the same topic.</li> </ul> </li> <li>• Interpret data, using statistical methods if applicable.</li> <li>• Identify controversial issues, if any, and present multiple sides of the issues with supporting data.</li> <li>• Organize and present the research project, with or without technology.</li> </ul>
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