

Math 30-2
Curriculum Package
February 2012



2012

Strand: Logical Reasoning

General Outcome: Develop 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 puzzles and games that involve numerical and logical reasoning, using problem-solving strategies. [CN, ME, PS, R]	<ul style="list-style-type: none"> • Determine, explain and verify a strategy to solve a puzzle or to win a game; e.g., <ul style="list-style-type: none"> ○ guess and check ○ look for a pattern ○ make a systematic list ○ draw or model ○ eliminate possibilities ○ simplify the original problem ○ work backward ○ develop alternative approaches. • Identify and correct errors in a solution to a puzzle or in a strategy for winning a game. • Create a variation on a puzzle or a game, and describe a strategy for solving the puzzle or winning the game.
Solve problems that involve the application of set theory.[CN, PS, R, V] [ICT: C6–2.3]	<ul style="list-style-type: none"> • Provide examples of the empty set, disjoint sets, subsets and universal sets in context, and explain the reasoning. • Organize information such as collected data and number properties, using graphic organizers, and explain the reasoning. • Explain what a specified region in a Venn diagram represents, using connecting words (and, or, not) or set notation. • Determine the elements in the complement, the intersection or the union of two sets. • Explain how set theory is used in applications such as Internet searches, database queries, data analysis, games and puzzles. • Identify and correct errors in a solution to a problem that involves sets. • Solve a contextual problem that involves sets, and record the solution, using set notation.

Strand: Probability

General Outcome: Develop critical thinking skills related to uncertainty.

Interpret and assess the validity of odds and probability statements.[C, CN, ME]	<ul style="list-style-type: none"> • Provide examples of statements of probability and odds found in fields such as media, BIOLOGY, sports, medicine, sociology and psychology. • Explain, using examples, the relationship between odds (part-part) and probability (part-whole). • Express odds as a probability and vice versa. • Determine the probability of, or the odds for and against, an outcome in a situation. • Explain, using examples, how decisions may be based on probability or odds and on subjective judgments. • Solve a contextual problem that involves odds or probability.
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Strand: Probability

General Outcome: Develop critical thinking skills related to uncertainty.

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 the probability of mutually exclusive and non-mutually exclusive events.[CN, PS, R, V] [ICT: C6–2.3]	<ul style="list-style-type: none"> • Classify events as mutually exclusive or non-mutually exclusive, and explain the reasoning. • Determine if two events are complementary, and explain the reasoning. • Represent, using set notation or graphic organizers, mutually exclusive (including complementary) and non-mutually exclusive events. • Solve a contextual problem that involves the probability of mutually exclusive or non-mutually exclusive events. • Solve a contextual problem that involves the probability of complementary events. • Create and solve a problem that involves mutually exclusive or non-mutually exclusive events.
Solve problems that involve the probability of two events. [CN, PS, R]	<ul style="list-style-type: none"> • Compare, using examples, dependent and independent events. • Determine the probability of an event, given the occurrence of a previous event. • Determine the probability of two dependent or two independent events. • Create and solve a contextual problem that involves determining the probability of dependent or independent events.
Solve problems that involve the fundamental counting principle.[PS, R, V] [ICT: C6–2.3]	<ul style="list-style-type: none"> • Represent and solve counting problems, using a graphic organizer. • Generalize, using inductive reasoning, the fundamental counting principle. • Identify and explain assumptions made in solving a counting problem. • Solve a contextual counting problem, using the fundamental counting principle, and explain the reasoning.
Solve problems that involve permutations. [ME, PS, R, T, V]	<ul style="list-style-type: none"> • Represent the number of arrangements of n elements taken n at a time, using factorial notation. • Determine, with or without technology, the value of a factorial. • Simplify a numeric or an algebraic fraction that contains factorials in both the numerator and denominator. • Solve an equation that involves factorials. • Determine the number of permutations of n elements taken r at a time. • Determine the number of permutations of n elements taken n at a time where some elements are not distinct. • Explain, using examples, the effect on the total number of permutations of n elements when two or more elements are identical. • Generalize strategies for determining the number of permutations of n elements taken r at a time. • Solve a contextual problem that involves probability and permutations.
Solve problems that involve combinations. [ME, PS, R, T, V]	<ul style="list-style-type: none"> • Explain, using examples, why order is or is not important when solving problems that involve permutations or combinations. • Determine the number of combinations of n elements taken r at a time. • Generalize strategies for determining the number of combinations of n elements taken r at a time. • Solve a contextual problem that involves combinations and probability.

Strand: Relations and Functions

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

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>
Determine equivalent forms of rational expressions (limited to numerators and denominators that are monomials and binomials). [C, ME, R]	<ul style="list-style-type: none"> • Compare the strategies for writing equivalent forms of rational expressions to writing equivalent forms of rational numbers. • Explain why a given value is non-permissible for a given rational expression. • Determine the non-permissible values for a rational expression. • Determine a rational expression that is equivalent to a given rational expression by multiplying the numerator and denominator by the same factor (limited to a monomial or a binomial), and state the non-permissible values of the equivalent rational expression. • Simplify a rational expression. • Explain why the non-permissible values of a given rational expression and its simplified form are the same. • Identify and correct errors in a given simplification of a rational expression, and explain the reasoning.
Perform operations on rational expressions (limited to numerators and denominators that are monomials and binomials). [CN, ME, R]	<ul style="list-style-type: none"> • Compare the strategies for performing a given operation on rational expressions to the strategies for performing the same operation on rational numbers. • Determine the non-permissible values when performing operations on rational expressions. • Determine, in simplified form, the sum or difference of rational expressions that have the same denominator. • Determine, in simplified form, the sum or difference of two rational expressions that have different denominators. • Determine, in simplified form, the product or quotient of two rational expressions.
Solve problems that involve rational equations (limited to numerators and denominators that are monomials and binomials). [C, CN, PS, R]	<ul style="list-style-type: none"> • Determine the non-permissible values for the variable in a rational equation. • Determine, algebraically, the solution to a rational equation, and explain the strategy used to solve the equation. • Explain why a value obtained in solving a rational equation may not be a solution of the equation. • Solve a contextual problem that involves a rational equation.
Demonstrate an understanding of logarithms and the laws of logarithms. [C, CN, ME, R] [ICT: C6–4.1]	<ul style="list-style-type: none"> • Express a logarithmic equation as an exponential equation and vice versa. • Determine the value of a logarithmic expression, such as $\log_2 8$, without technology. • Develop the laws of logarithms, using numeric examples and the exponent laws. • Determine an equivalent expression for a logarithmic expression by applying the laws of logarithms. • Determine the approximate value of a logarithmic expression, such as $\log_2 9$, with technology.
Solve problems that involve exponential equations. [C, CN, PS, R, T] [ICT: C6–4.1, C6–4.3]	<ul style="list-style-type: none"> • Determine the solution of an exponential equation in which the bases are powers of one another; e.g., $2^{x-1} = 4^{x-2}$. • Determine the solution of an exponential equation in which the bases are not powers of one another; e.g., $2^{x-1} = 3^{x+1}$. • Solve problems that involve the application of exponential equations to loans, mortgages and investments. • Solve problems that involve logarithmic scales, such as the Richter scale and the pH scale.

Strand: Relations and Functions

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

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>
Represent data, using exponential and logarithmic functions, to solve problems. [C, CN, PS, T, V] [ICT: C6–4.1, C6–4.3, C6–4.4]	<ul style="list-style-type: none"> • Describe, orally and in written form, the characteristics of an exponential or logarithmic function by analyzing its graph. • Describe, orally and in written form, the characteristics of an exponential or logarithmic function by analyzing its equation. • Match equations in a given set to their corresponding graphs. • Graph data, and determine the exponential or logarithmic function that best approximates the data. • Interpret the graph of an exponential or logarithmic function that models a situation, and explain the reasoning. • Solve, using technology, a contextual problem that involves data that is best represented by graphs of exponential or logarithmic functions, and explain the reasoning.
Represent data, using polynomial functions (of degree ≤ 3), to solve problems. [C, CN, PS, T, V] [ICT: C6–4.1, C6–4.3, C6–4.4]	<ul style="list-style-type: none"> • Describe, orally and in written form, the characteristics of a polynomial function by analyzing its graph. • Describe, orally and in written form, the characteristics of a polynomial function by analyzing its equation. • Match equations in a given set to their corresponding graphs. • Graph data, and determine the polynomial function that best approximates the data. • Interpret the graph of a polynomial function that models a situation, and explain the reasoning. • Solve, using technology, a contextual problem that involves data that is best represented by graphs of polynomial functions, and explain the reasoning.
Represent data, using sinusoidal functions, to solve problems. [C, CN, PS, T, V] [ICT: C6–4.1, C6–4.3, C6–4.4]	<ul style="list-style-type: none"> • Describe, orally and in written form, the characteristics of a sinusoidal function by analyzing its graph. • Describe, orally and in written form, the characteristics of a sinusoidal function by analyzing its equation. • Match equations in a given set to their corresponding graphs. • Graph data, and determine the sinusoidal function that best approximates the data. • Interpret the graph of a sinusoidal function that models a situation, and explain the reasoning. • Solve, using technology, a contextual problem that involves data that is best represented by graphs of sinusoidal functions, and explain the reasoning.

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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>Research and give a presentation on a current event or an area of interest that involves mathematics. [C, CN, ME, PS, R, T, V] [ICT: C1–4.2, C1–4.4, C2–4.1, C3–4.1, C3–4.2, C7–4.2, F2–4.7, P2–4.1]</p>	<ul style="list-style-type: none"> • Collect primary or secondary data (statistical or informational) related to the topic. • Assess the accuracy, reliability and relevance of the primary or secondary data collected by: <ul style="list-style-type: none"> ○ identifying examples of bias and points of view ○ identifying and describing the data collection methods ○ determining if the data is relevant ○ determining if the data is consistent with information ○ obtained from other sources on the same topic. • Interpret data, using statistical methods if applicable. • Identify controversial issues, if any, and present multiple sides of the issues with supporting data. • Organize and present the research project, with or without technology.