**MATHEMATICS 30-1**

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

| **Trigonometry** | |
|---|---|
| **General Outcome** | **Specific Outcomes**<br>*It is expected that students will:* |
| Develop trigonometric reasoning. | 1. Demonstrate an understanding of angles in standard position, expressed in degrees and radians.<br>[CN, ME, R, V]<br><br>2. Develop and apply the equation of the unit circle.<br>[CN, R, V]<br><br>3. Solve problems, using the six trigonometric ratios for angles expressed in radians and degrees.<br>[ME, PS, R, T, V]<br>[ICT: C6–4.1]<br><br>4. Graph and analyze the trigonometric functions sine, cosine and tangent to solve problems.<br>[CN, PS, T, V]<br>[ICT: C6–4.1, C6–4.3]<br><br>5. Solve, algebraically and graphically, first and second degree trigonometric equations with the domain expressed in degrees and radians.<br>[CN, PS, R, T, V]<br>[ICT: C6–4.1, C6–4.4]<br><br>6. Prove trigonometric identities, using:<br>• reciprocal identities<br>• quotient identities<br>• Pythagorean identities<br>• sum or difference identities (restricted to sine, cosine and tangent)<br>• double-angle identities (restricted to sine, cosine and tangent).<br>[R, T, V]<br>[ICT: C6–4.1, C6–4.4] |

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## Relations and Functions

| General Outcome | Specific Outcomes |
|---|---|
| | *It is expected that students will:* |
| Develop algebraic and graphical reasoning through the study of relations. | 1. Demonstrate an understanding of operations on, and compositions of, functions.<br>[CN, R, T, V]<br>[ICT: C6–4.1] |
| | 2. Demonstrate an understanding of the effects of horizontal and vertical translations on the graphs of functions and their related equations.<br>[C, CN, R, V] |
| | 3. Demonstrate an understanding of the effects of horizontal and vertical stretches on the graphs of functions and their related equations.<br>[C, CN, R, V] |
| | 4. Apply translations and stretches to the graphs and equations of functions.<br>[C, CN, R, V] |
| | 5. Demonstrate an understanding of the effects of reflections on the graphs of functions and their related equations, including reflections through the:<br>• $x$-axis<br>• $y$-axis<br>• line $y = x$.<br>[C, CN, R, V] |
| | 6. Demonstrate an understanding of inverses of relations.<br>[C, CN, R, V] |
| | 7. Demonstrate an understanding of logarithms.<br>[CN, ME, R] |
| | 8. Demonstrate an understanding of the product, quotient and power laws of logarithms.<br>[C, CN, ME, R, T]<br>[ICT: C6–4.1] |
| | 9. Graph and analyze exponential and logarithmic functions.<br>[C, CN, T, V]<br>[ICT: C6–4.3, C6–4.4, F1–4.2] |

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| **Relations and Functions** (continued) | |
|---|---|
| **General Outcome** | **Specific Outcomes** |
| | *It is expected that students will:* |
| Develop algebraic and graphical reasoning through the study of relations. | 10. Solve problems that involve exponential and logarithmic equations. [C, CN, PS, R] |
| | 11. Demonstrate an understanding of factoring polynomials of degree greater than 2 (limited to polynomials of degree $\leq 5$ with integral coefficients). [C, CN, ME] |
| | 12. Graph and analyze polynomial functions (limited to polynomial functions of degree $\leq 5$ ). [C, CN, T, V] [ICT: C6–4.3, C6–4.4] |
| | 13. Graph and analyze radical functions (limited to functions involving one radical). [CN, R, T, V] [ICT: C6–4.1, C6–4.3] |
| | 14. Graph and analyze rational functions (limited to numerators and denominators that are monomials, binomials or trinomials). [CN, R, T, V] [ICT: C6–4.1, C6–4.3, C6–4.4] |

| **Permutations, Combinations and Binomial Theorem** | |
|---|---|
| **General Outcome** | **Specific Outcomes** |
| | *It is expected that students will:* |
| Develop algebraic and numeric reasoning that involves combinatorics. | 1. Apply the fundamental counting principle to solve problems. [C, PS, R, V] [ICT: C6–2.3] |
| | 2. Determine the number of permutations of *n* elements taken *r* at a time to solve problems. [C, PS, R, V] |
| | 3. Determine the number of combinations of *n* different elements taken *r* at a time to solve problems. [C, PS, R, V] |
| | 4. Expand powers of a binomial in a variety of ways, including using the binomial theorem (restricted to exponents that are natural numbers). [CN, R, V] |

## MATHEMATICS 20-2

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

| **Measurement** | |
|---|---|
| **General Outcome** | **Specific Outcomes**<br>*It is expected that students will:* |
| Develop spatial sense and proportional reasoning. | 1. Solve problems that involve the application of rates. [CN, PS, R]<br>2. Solve problems that involve scale diagrams, using proportional reasoning. [CN, PS, R, V]<br>3. Demonstrate an understanding of the relationships among scale factors, areas, surface areas and volumes of similar 2-D shapes and 3-D objects. [C, CN, PS, R, V] |

| **Geometry** | |
|---|---|
| **General Outcome** | **Specific Outcomes**<br>*It is expected that students will:* |
| Develop spatial sense. | 1. Derive proofs that involve the properties of angles and triangles. [CN, R, V]<br>2. Solve problems that involve properties of angles and triangles. [CN, PS, V]<br>3. Solve problems that involve the cosine law and the sine law, excluding the ambiguous case. [CN, PS, R] |

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

## Number and Logic

| General Outcome | Specific Outcomes |
|---|---|
| | *It is expected that students will:* |
| Develop number sense and logical reasoning. | 1. Analyze and prove conjectures, using inductive and deductive reasoning, to solve problems. [C, CN, PS, R] |
| | 2. Analyze puzzles and games that involve spatial reasoning, using problem-solving strategies. [CN, PS, R, V] |
| | 3. Solve problems that involve operations on radicals and radical expressions with numerical and variable radicands (limited to square roots). [CN, ME, PS, R] |
| | 4. Solve problems that involve radical equations (limited to square roots or cube roots). [C, PS, R] |

## Statistics

| General Outcome | Specific Outcomes |
|---|---|
| | *It is expected that students will:* |
| Develop statistical reasoning. | 1. Demonstrate an understanding of normal distribution, including:<br>• standard deviation<br>• z-scores.<br>[CN, PS, T, V]<br>[ICT: C6–4.1, C7–4.2] |
| | 2. Interpret statistical data, using:<br>• confidence intervals<br>• confidence levels<br>• margin of error.<br>[C, CN, R]<br>[ICT: C1–4.2, C2–4.2, C7–4.2] |

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

| **Relations and Functions** | |
|---|---|
| **General Outcome** | **Specific Outcomes**<br>*It is expected that students will:* |
| Develop algebraic and graphical reasoning through the study of relations. | 1. Demonstrate an understanding of the characteristics of quadratic functions, including:<br>• vertex<br>• intercepts<br>• domain and range<br>• axis of symmetry.<br>[CN, PS, T, V]<br>[ICT: C6–4.1, C6–4.3]<br><br>2. Solve problems that involve quadratic equations.<br>[C, CN, PS, R, T, V]<br>[ICT: C6–4.1, C6–4.3] |

| **Mathematics Research Project** | |
|---|---|
| **General Outcome** | **Specific Outcomes**<br>*It is expected that students will:* |
| Develop an appreciation of the role of mathematics in society. | 1. Research and give a presentation on a historical event or an area of interest that involves mathematics.<br>[C, CN, ME, PS, R, T, V]<br>[ICT: C1–4.2, C1–4.4, C2–4.1, C3–4.1, C3–4.2, C7–4.2, F2–4.7] |

## MATHEMATICS 30-2

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

### Logical Reasoning

| General Outcome | Specific Outcomes |
|---|---|
| | *It is expected that students will:* |
| Develop logical reasoning. | 1. Analyze puzzles and games that involve numerical and logical reasoning, using problem-solving strategies. [CN, ME, PS, R] |
| | 2. Solve problems that involve the application of set theory. [CN, PS, R, V] [ICT: C6–2.3] |

### Probability

| General Outcome | Specific Outcomes |
|---|---|
| | *It is expected that students will:* |
| Develop critical thinking skills related to uncertainty. | 1. Interpret and assess the validity of odds and probability statements. [C, CN, ME] |
| | 2. Solve problems that involve the probability of mutually exclusive and non–mutually exclusive events. [CN, PS, R, V] [ICT: C6–2.3] |
| | 3. Solve problems that involve the probability of two events. [CN, PS, R] |
| | 4. Solve problems that involve the fundamental counting principle. [PS, R, V] [ICT: C6–2.3] |
| | 5. Solve problems that involve permutations. [ME, PS, R, T, V] |
| | 6. Solve problems that involve combinations. [ME, PS, R, T, V] |

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

## Relations and Functions

| General Outcome | Specific Outcomes |
|---|---|
| | *It is expected that students will:* |
| Develop algebraic and graphical reasoning through the study of relations. | 1. Determine equivalent forms of rational expressions (limited to numerators and denominators that are monomials and binomials). [C, ME, R] |
| | 2. Perform operations on rational expressions (limited to numerators and denominators that are monomials and binomials). [CN, ME, R] |
| | 3. Solve problems that involve rational equations (limited to numerators and denominators that are monomials and binomials). [C, CN, PS, R] |
| | 4. Demonstrate an understanding of logarithms and the laws of logarithms. [C, CN, ME, R] [ICT: C6–4.1] |
| | 5. Solve problems that involve exponential equations. [C, CN, PS, R, T] [ICT: C6–4.1, C6–4.3] |
| | 6. 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] |
| | 7. Represent data, using polynomial functions (of degree $\leq 3$), to solve problems. [C, CN, PS, T, V] [ICT: C6–4.1, C6–4.3, C6–4.4] |
| | 8. Represent data, using sinusoidal functions, to solve problems. [C, CN, PS, T, V] [ICT: C6–4.1, C6–4.3, C6–4.4] |

## Mathematics Research Project

| General Outcome | Specific Outcomes |
|---|---|
| | *It is expected that students will:* |
| Develop an appreciation of the role of mathematics in society. | 1. 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] |