

## Mathematics 21 Math Rubrics

**M21.1** Extend and apply understanding of the preservation of equality by solving problems that involve the manipulation and application of formulae within home, money, recreation, and travel themes.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I create, solve, and verify the reasonableness of solutions to questions that involve the use of a formula.	<p>I can verify whether given forms of the same formula are equivalent.</p> <p>I can solve, with or without the use of technology, questions that involve the application of a formula that:</p> <ul style="list-style-type: none"> <li>• does not require manipulation</li> </ul>	<p>I describe, using examples, how a given formula is used in a home, money, recreation, and travel context.</p> <p>I can solve, with or without the use of technology, questions that involve the application of a formula that:</p> <ul style="list-style-type: none"> <li>• requires manipulation.</li> </ul>	<p>I can verify whether given forms of the same formula are equivalent and <b>justify the conclusion.</b></p> <p>I analyze solutions to questions that involve formulae to verify the preservation of equality, correct if necessary, and explain their reasoning.</p>

**M21.2** Demonstrate understanding of numerical reasoning and problem solving strategies by analyzing puzzles and games.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I participate or play a game or puzzle.	<p>I can explain how to play the game.</p> <p>I can observe patterns and/or strategies for a game.</p> <p>I can solve questions that involve numerical reasoning.</p>	I can determine strategies for solving puzzles or winning games and explain these strategies.	<p>I am able to observe, analyze, and explain errors in a solution to a puzzle or compare/contrast strategies for winning a game.</p> <p>I can create a variation of a puzzle or a game, and describe a strategy for solving the puzzle or winning the game.</p>

**M21.3** Extend and apply understanding of measures of central tendency to analyze data.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
Given a set of data in order, I can find the smallest and largest value, frequency, value in the middle and patterns.	Given a set of data in order, I can calculate mean, median, and mode.	Given a set of data not in order I can use mean, median, and mode to solve problems	<p>I can Explain the appropriate use of emeasures of central tendency, including mean, mode, and median.</p> <p>I can explain, using examples, the advantages and disadvantages of each measure of central tendency.</p> <p>I can compare two or more sets of data, using measures of central tendency.</p>

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**M21.4** Demonstrate and extend understanding of similarity and proportional reasoning related to scale factors, scale drawing, scale models, surface area, and volume.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I know the difference between an enlargement and a reduction when given the scale.	I can determine the scale factor from scale drawings.	I can draw enlargements and reductions to scale given a scale factor. I can draw a scale drawing of a familiar setting. I can find the ratio of surface areas, and volumes given the scale factor.	I can explain how scale factor is related to similarity, ratios, and proportionality. I can describe the relationship between scale factors, scale drawings, and maps. I am able to determine distances represented on maps using given scales. Given directions, I am able to find locations using scale factors and scale drawings of maps. I can find the scale factor given the ratio of surface areas or volumes.

**M21.5** Demonstrate understanding of angles created by parallel, perpendicular, and transversal lines and solve problems within the home theme.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I can identify pairs of lines as perpendicular, parallel, or neither.	I can apply relationships between pairs of angles formed by parallel lines and a transversal, to find a missing angle including: <ul style="list-style-type: none"> <li>• corresponding angles</li> <li>• vertically opposite angles</li> <li>• alternate interior angles</li> <li>• alternate exterior angles</li> <li>• interior angles on the same side of the transversal</li> <li>• exterior angles on the same side of the transversal.</li> </ul>	I am able to identify <ul style="list-style-type: none"> <li>• corresponding angles</li> <li>• vertically opposite angles</li> <li>• alternate interior angles</li> <li>• alternate exterior angles</li> <li>• interior angles on the same side of the transversal</li> <li>• exterior angles on the same side of the transversal.</li> </ul> given the name and a picture  I am able to use angle relationships to find multiple missing angles.	I provide concrete and pictorial examples that show that there are no angle relationships (excluding vertically opposite angles) when two lines that are not parallel are crossed by a transversal.  I can use angle relationships to determine if 2 lines are parallel or not.

**M21.6a** Demonstrate understanding of **primary trigonometric ratios** (sine, cosine, and tangent) and slope.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I am able to label the opposite, adjacent, and hypotenuse of a right angle triangle.	Given the trig ratio I can determine the unknown side when it is in the numerator.	Given a trig ratio I can determine the missing angle in a triangle.  Given a trig ratio I can determine the unknown side when it is in the denominator.	I can solve problems using trig ratios.

**M21.6b** Demonstrate understanding of primary trigonometric ratios (sine, cosine, and tangent) and slope.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I can identify positive, negative, and zero slopes.	I can identify the rise and run of a sloped line given a diagram.	I can determine the slope of an object using rise and run given a diagram.	I can solve situational questions involving slope. I can explain the relationship between slope and a trig ratio.

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### M21.7 Demonstrate understanding of the mathematics involved in an area of interest.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I can organize and create a presentation/report on the chosen location.	I can list at least one mathematical fact/view about my area of interest.	I can explain the mathematical fact(s)/view(s) of mathematics related to the location of interest.	<p>I can analyze the influences that historically significant events have had on the current field of mathematics.</p> <p>I can Identify and describe situations, experiences, or locations around the area of interest that are relevant to self, family, or community.</p> <p>I can compare social justice issues that are present in the location of choice to those present in your community or another community.</p> <p>I can identify controversial issues or historical events that are or have occurred at the location of interest.</p>

### M21.8 Demonstrate understanding of budgets.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I can identify fixed and variable expenses that could be included in a personal budget.	<p>I can record and monitor purchases to determine personal expenditures.</p> <p>I can explain the advantages and challenges of creating personal budgets.</p>	<p>I can analyze and modify a budget to achieve a set of personal goals.</p> <p>I can create a monthly transportation budget of owning and operating a vehicle.</p> <p>I can investigate and analyze, with or without technology, "what if ..." questions related to personal budgets.</p>	<p>I can explain considerations that must be made when developing a budget.</p> <p>I can research the costs of expenses to create and justify a personal budget.</p>

### M21.9a Demonstrate understanding of financial institution services. (personal banking)

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I can describe methods taken to ensure the security of personal and financial information and their effectiveness.	<p>I can discuss the use of cheques and determine how to write them.</p> <p>I can identify some services that banking institutes and financial advisors offer to assist in personal budgeting.</p> <p>I can describe various types of banking services available from various financial institutions, such as online services, different types of accounts, telephone banking, mobile banking, ATM banking, or cheques.</p>	<p>I can describe the advantages and disadvantages of online banking, debit card purchases, chequing accounts, and savings accounts.</p> <p>I can explain various charges acquired when using chequing accounts, ATMs, and savings accounts.</p>	I can analyze the type of account that best meets the criteria for the provided examples and personal situations.

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### M21.9b Demonstrate understanding of financial institution services. (investments)

<b>Beginning (1)</b>	<b>Approaching (2)</b>	<b>Proficiency (3)</b>	<b>Mastery (4)</b>
<p>I can identify various investment options, such as savings accounts, Canada Savings Bonds, Guaranteed Investment Certificates, term investments, RRSPs, and RESPs.</p> <p>I can estimate, using the Rule of 72, the time required for a given investment to double in value.</p>	<p>I can determine simple interest using <math>I=Prt</math>.</p>	<p>I can use the simple interest formula to determine the unknown value.</p> <p>I can determine compound interest using a formula.</p>	<p>I can compare and contrast simple interest and compound interest.</p> <p>I can explain, using examples, the effect of changing different factors on compound interest.</p>

### M21.10 Demonstrate understanding of financial decision making including analysis of renting, leasing, and buying on credit.

<b>Beginning (1)</b>	<b>Approaching (2)</b>	<b>Proficiency (3)</b>	<b>Mastery (4)</b>
<p>I can define credit and determine its appropriate use.</p>	<p>I can define renting, leasing and buying on credit.</p>	<p>I can solve questions based on financial problems involving renting, leasing, buying or credit.</p>	<p>I can demonstrate my understanding of financial decisions to be made involving borrowing money.</p>