

## GRADE 12 ESSENTIAL MATHEMATICS (40S)

Grade 12 Essential Mathematics (40S) is intended for students whose post-secondary planning does not include a focus on mathematics and science-related fields. Grade 12 Essential Mathematics (40S) is a one-credit course consisting of two half-credits each emphasizing consumer applications, problem solving, decision making, and spatial sense.

Students are expected to work both individually and in small groups on mathematical concepts and skills encountered in everyday life in a technological society.

Assessment of Grade 12 Essential Mathematics should be a balance of assessment *for* learning, assessment *as* learning and assessment *of* learning. Assessment tools used in

Grade 12 Essential Mathematics should be varied and may include observation, homework, learning conversations or interviews, summative unit essays, demonstrations, presentations, performance tasks, learning logs, projects, investigations, reflective journals, portfolios, quizzes, tests, and examinations. An appropriately prepared portfolio requires a consistent effort throughout the school term and a commitment to completing quality work on a daily basis.

The following tables list the units of study for each half-course along with an estimated number of hours for each unit. The time for each unit includes instructional and assessment time.

Grade 12 Essential Mathematics (45S) Half Course V		Grade 12 Essential Mathematics (45S) Half Course VI	
Unit	Suggested hours	Unit	Suggested hours
Analysis of Games and Numbers	7	Analysis of Games and Numbers	7
Vehicle Finance	17	Home Finance	12
Statistics	7	Geometry and Trigonometry	10
Precision Measurement	12	Business Finance	15
Career Life	12	Probability	11
<b>Total</b>	<b>55</b>	<b>Total</b>	<b>55</b>



## General and Specific Learning Outcomes with Achievement Indicators by Course

### Grade 12 Essential Mathematics – Half Course V

<b>[C]</b> Communication	<b>[PS]</b> Problem Solving
<b>[CN]</b> Connections	<b>[R]</b> Reasoning
<b>[ME]</b> Mental Mathematics and Estimation	<b>[T]</b> Technology
	<b>[V]</b> Visualization

#### Analysis of Games and Numbers

**General Outcome:**  
Develop critical thinking skills.

#### Specific Outcomes

*It is expected that students will:*

#### Achievement Indicators

*The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*

12E5.A.1. Analyze puzzles and games that involve logical reasoning, using problem-solving strategies.

[C, CN, PS, R]

*(It is intended that this outcome be integrated throughout the course by using puzzles and games such as Sudoku, Mastermind, Nim, and logic puzzles.)*

- Determine, explain, and verify a strategy to solve a puzzle or to win a game such as
  - 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.

<b>[C]</b> Communication	<b>[PS]</b> Problem Solving
<b>[CN]</b> Connections	<b>[R]</b> Reasoning
<b>[ME]</b> Mental Mathematics and Estimation	<b>[T]</b> Technology
	<b>[V]</b> Visualization

Vehicle Finance	<b>General Outcome:</b> Develop an understanding of owning and operating a vehicle.
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**Specific Outcomes**  
*It is expected that students will:*

**Achievement Indicators**  
*The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*

- 12E5.V.1. Solve problems that involve the acquisition, operation, and maintenance of a vehicle, when
- buying
  - leasing
  - leasing to buy
- [C, CN, PS, R, T]

- Describe and explain various options for buying, leasing, or leasing to buy a vehicle.
- Determine costs associated with buying, leasing, or leasing to buy a new or used vehicle.
- Solve, with or without technology, problems that involve the purchase, lease, or lease to purchase of a vehicle.
- Determine costs associated with operating a vehicle including regular maintenance, repairs, fuel consumption, or depreciation.
- Determine the costs of insuring a vehicle for various uses.
- Justify a decision related to buying, leasing or leasing to buy a vehicle, based on factors such as personal finances, intended use, maintenance, warranties, mileage, insurance, or safety considerations.

## Grade 12 Essential Mathematics – Half Course V

<b>[C]</b> Communication	<b>[PS]</b> Problem Solving
<b>[CN]</b> Connections	<b>[R]</b> Reasoning
<b>[ME]</b> Mental Mathematics and Estimation	<b>[T]</b> Technology
	<b>[V]</b> Visualization

### Statistics

**General Outcome:**  
Develop statistical reasoning.

#### Specific Outcomes

*It is expected that students will:*

#### Achievement Indicators

*The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*

12E5.S.1. Solve problems that involve measures of central tendency, including

- mean
- median
- mode
- weighted mean
- trimmed mean

[C, CN, PS, R]

- Explain, using examples, the advantages and disadvantages of each measure of central tendency.
- Determine the mean, median, and mode for a set of data.
- Identify and correct errors in a calculation of a measure of central tendency.
- Identify the outlier(s) in a set of data.
- Explain the effect of outliers on mean, median, and mode.
- Determine the trimmed mean for a set of data, and justify the removal of the outliers.
- Explain, using examples such as course marks, why some data in a set would be given a greater weighting in determining the mean.
- Determine the weighted mean of a set of data and justify the different weightings
- Explain, using examples from print or other media, how measures of central tendency and outliers are used to provide different interpretations of data.
- Solve a contextual problem that involves measures of central tendency.

12E5.S.2. Analyze and describe percentiles.

[C, CN, PS, R]

- Explain, using examples, percentile ranks in a context.
- Explain decisions based on a given percentile rank.
- Explain, using examples, the difference between percent and percentile rank.
- Explain the relationship between median and percentile.
- Solve a contextual problem that involves percentiles.
- Determine the percentile rank of a given score using a formula.

<b>[C]</b> Communication	<b>[PS]</b> Problem Solving
<b>[CN]</b> Connections	<b>[R]</b> Reasoning
<b>[ME]</b> Mental Mathematics and Estimation	<b>[T]</b> Technology
	<b>[V]</b> Visualization

Precision Measurement	<b>General Outcome:</b> Develop spatial sense relating to the limitations of measuring instruments.
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**Specific Outcomes**  
*It is expected that students will:*

**Achievement Indicators**  
*The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*

12E5.P.1. Demonstrate an understanding of the limitations of measuring instruments, including

- precision
- accuracy
- uncertainty
- tolerance

[C, PS, R, T, V]

- Explain why, in a given context, a certain degree of precision is required.
- Explain why, in a given context, a certain degree of accuracy is required.
- Explain, using examples, the difference between precision and accuracy.
- Compare the degree of accuracy of two instruments used to measure the same attribute.
- Relate the degree of accuracy to the uncertainty of a given measure.
- Analyze precision and accuracy in a contextual problem.
- Determine maximum and minimum values, using a degree of tolerance in context.
- Describe, using examples, the limitations of measuring instruments such as tape measure, micrometer or Vernier caliper, used in a specific trade or industry.
- Solve a problem that involves precision, accuracy, or tolerance.

Grade 12 Essential Mathematics– Half Course V

<b>[C]</b> Communication	<b>[PS]</b> Problem Solving
<b>[CN]</b> Connections	<b>[R]</b> Reasoning
<b>[ME]</b> Mental Mathematics and Estimation	<b>[T]</b> Technology
	<b>[V]</b> Visualization

Career Life **General Outcome:**  
Develop a plan for the future.

**Specific Outcomes**  
*It is expected that students will:*

**Achievement Indicators**  
*The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*

12E5.C.1 Create a plan for the future including possible career choices and their requirements.  
[C, CN, PS, R]

- Describe factors important in selecting careers, including job description, educational requirements and costs, aptitude, values, salary/wage levels, employment opportunities, opportunities for advancement, and work/life balance.
- Prepare a monthly budget for the preparatory period for a chosen career.
- Prepare a monthly budget for the lifestyle achievable for a chosen career.
- Analyze the lifestyle one specific career could entail in terms of monthly budget, lifestyle appropriate to the career, and any negative factors of the job.
- Prepare a resume for your career choice.

<b>[C]</b> Communication	<b>[PS]</b> Problem Solving
<b>[CN]</b> Connections	<b>[R]</b> Reasoning
<b>[ME]</b> Mental Mathematics and Estimation	<b>[T]</b> Technology
	<b>[V]</b> Visualization

Analysis of Games and Numbers	<b>General Outcome:</b> Develop critical-thinking skills.
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**Specific Outcomes**

*It is expected that students will:*

**Achievement Indicators**

*The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*

12E6.A.1. Analyze puzzles and games that involve logical reasoning, using problem-solving strategies.  
[C, CN, PS, R]

*(It is intended that this outcome be integrated throughout the course by using puzzles and games such as Sudoku, Mastermind, Nim, and logic puzzles.)*

- Determine, explain, and verify a strategy to solve a puzzle or to win a game such as
  - 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.

Grade 12 Essential Mathematics– Half Course VI

<b>[C]</b> Communication	<b>[PS]</b> Problem Solving
<b>[CN]</b> Connections	<b>[R]</b> Reasoning
<b>[ME]</b> Mental Mathematics and Estimation	<b>[T]</b> Technology
	<b>[V]</b> Visualization

Home Finance **General Outcome:**  
Develop an understanding of housing costs.

**Specific Outcomes**  
*It is expected that students will:*

**Achievement Indicators**  
*The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*

12E6.H.1. Solve problems involving the purchase and maintenance of a house.  
[C, CN, ME, R, T]

- Solve a problem involving mortgages.
- Describe the costs involved in purchasing a home such as closing costs, land transfer tax, lawyer’s fees, house insurance, and moving expenses.
- Solve a problem involving home insurance options.
- Discuss the difference between preventative maintenance and emergency repair costs.
- Compare the benefits of owning and renting a house.
- Discuss energy efficiency options and the immediate and long term impact on your housing costs.
- Discuss the daily costs involved with home maintenance.
- Determine the property tax for a house.
- Determine the economic feasibility of a home purchase using the Gross Debt Service Ratio

Grade 12 Essential Mathematics – Half Course VI

<b>[C]</b> Communication	<b>[PS]</b> Problem Solving
<b>[CN]</b> Connections	<b>[R]</b> Reasoning
<b>[ME]</b> Mental Mathematics and Estimation	<b>[T]</b> Technology
	<b>[V]</b> Visualization

Geometry and Trigonometry	<b>General Outcome:</b> Develop spatial sense involving polygons.
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**Specific Outcomes**  
*It is expected that students will:*

**Achievement Indicators**  
*The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*

12E6.G.1. Solve problems by using the sine law and cosine law, excluding the ambiguous case.  
[CN, PS, V]

- Identify and describe the use of the sine law or cosine law in construction, industrial, commercial, or artistic applications.
- Solve a problem, using the sine law or cosine law, when a diagram is given.

12E6.G.2. Solve problems that involve

- triangles
- quadrilaterals
- regular polygons

[C, CN, PS, V]

- Describe and illustrate properties of triangles, including isosceles or equilateral.
- Describe and illustrate properties of quadrilaterals in terms of angle measures, side lengths, diagonals, or angles of intersection.
- Describe and illustrate properties of regular polygons.
- Explain, using examples, why a given property does or does not apply to certain polygons.
- Identify and explain an application of the properties of polygons in construction, industrial, commercial, domestic, or artistic contexts.
- Solve a contextual problem that involves the application of the properties of polygons.

Grade 12 Essential Mathematics – Half Course VI

<b>[C]</b> Communication	<b>[PS]</b> Problem Solving
<b>[CN]</b> Connections	<b>[R]</b> Reasoning
<b>[ME]</b> Mental Mathematics and Estimation	<b>[T]</b> Technology
	<b>[V]</b> Visualization

Business Finance	<b>General Outcome:</b> Develop an understanding of business finance.
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<p><b>Specific Outcomes</b> <i>It is expected that students will:</i></p>	<p><b>Achievement Indicators</b> <i>The following set of indicators <b>may</b> be used to determine whether students have met the corresponding specific outcome.</i></p>
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<p>12E6.B.1. Critique the viability of small business options by considering</p> <ul style="list-style-type: none"> <li>■ expenses</li> <li>■ sales</li> <li>■ profit or loss</li> </ul> <p>[C, CN, R]</p>	<ul style="list-style-type: none"> <li>■ Identify expenses in operating a small business, such as a hot-dog stand or a lawn maintenance company.</li> <li>■ Identify feasible small business options for a given community.</li> <li>■ Generate options that might improve the profitability of a small business.</li> <li>■ Determine the break-even point for a small business.</li> <li>■ Explain factors, such as seasonal variations and hours of operation, that might impact the profitability of a small business.</li> </ul>
<p>12E6.B.2. Demonstrate an awareness of the government taxation forms and procedures involved in owning a business.</p> <p>[C, CN]</p>	<ul style="list-style-type: none"> <li>■ Identify receipts needed to be retained for income tax forms.</li> <li>■ Identify appropriate deductions that can be claimed under business expenses but not under personal expenses.</li> <li>■ Identify the major sections of the T-1 General Income Tax Form and related schedules.</li> </ul>

Grade 12 Essential Mathematics – Half Course VI

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

Probability **General Outcome:**  
Develop critical thinking skills related to uncertainty.

**Specific Outcomes**  
*It is expected that students will:*

**Achievement Indicators**  
*The following set of indicators **may** be used to determine whether students have met the corresponding specific outcome.*

12E6.P.1. Analyze and interpret problems that involve probability.  
[C, CN, PS, R]

- Describe and explain the applications of probability such as medication, warranties, insurance, lotteries, weather prediction, 100-year flood, failure of a design, failure of a product, vehicle recalls, or approximation of area.
- Determine the probability of an event based on a data set.
- Express a given probability as a fraction, decimal, percent, or in a statement.
- Determine the expected gain or loss of a situation.
- Explain the difference between odds and probability.
- Determine the probability of an event, given the odds for or against.
- Explain, using examples, how decisions may be based on a combination of theoretical probability calculations, experimental results, and subjective judgments.
- Solve a contextual problem that involves a probability.