# Mathematics at Work 11

*Outcomes*

NOVA SCOTIA
NOUVELLE-ÉCOSSE

2022

# Mathematics at Work Grade 11 Outcomes

**M01** Students will be expected to solve problems that involve SI and imperial units in surface area measurements and verify the solutions.

**Performance Indicators:**

M01.01 Explain, using examples, the difference between volume and surface area.
M01.02 Explain, using examples, including nets, the relationship between area and surface area.
M01.03 Explain how a referent can be used to estimate surface area.
M01.04 Estimate the surface area of a 3-D object.
M01.05 Illustrate, using examples, the effect of dimensional changes on surface area.
M01.06 Solve a contextual problem that involves the surface area of 3-D objects, including spheres, and that requires the manipulation of formulas.

**M02** Students will be expected to solve problems that involve SI and imperial units in volume and capacity measurements.

**Performance Indicators:**

M02.01 Explain, using examples, the difference between volume and capacity.
M02.02 Identify and compare referents for volume and capacity measurements in SI and imperial units.
M02.03 Estimate the volume or capacity of a 3-D object or container, using a referent.
M02.04 Identify a situation where a given SI or imperial volume unit would be used.
M02.05 Solve problems that involve the volume of 3-D objects and composite 3-D objects in a variety of contexts.
M02.06 Solve a problem that involves the capacity of containers.
M02.07 Write a given volume expressed as another unit in the same measurement system.
M02.08 Write a given capacity expressed as another unit in the same measurement system.
M02.09 Determine the volume of prisms, cones, cylinders, pyramids, spheres, and composite 3-D objects using a variety of measuring tools such as rulers, tape measures, calipers, and micrometers.
M02.10 Determine the capacity of prisms, cones, pyramids, spheres, and cylinders using a variety of measuring tools and methods, such as graduated cylinders, measuring cups, measuring spoons, and displacement.
M02.11 Describe the relationship between the volumes of
  - cones and cylinders with the same base and height
  - pyramids and prisms with the same base and height

M02.12 Illustrate, using examples, the effect of dimensional changes on volume
M02.13 Solve a contextual problem that involves the volume of a 3-D object, including composite 3-D objects, or the capacity of a container.
M02.14 Solve a contextual problem that involves the volume of a 3-D object and requires the manipulation of formulas.

**G01** Students will be expected to solve problems that involve two and three right triangles.

Performance Indicators:
G01.01    Identify all of the right triangles in a given illustration for a context.
G01.02    Determine if a solution to a problem that involves two or three right triangles is reasonable.
G01.03    Sketch a representation of a given description of a problem in a 2-D or 3-D context.
G01.04    Solve a contextual problem that involves angles of elevation or angles of depression.
G01.05    Solve a contextual problem that involves two or three right triangles, using the primary trigonometric ratios.

**G02** Students will be expected to solve problems that involve scale.

Performance Indicators:
G02.01    Describe contexts in which a scale representation is used.
G02.02    Determine, using proportional reasoning, the dimensions of an object from a given scale drawing or model.
G02.03    Construct a model of a 3-D object, given the scale.
G02.04    Draw, with and without technology, a scale diagram of a given object.
G02.05    Solve a contextual problem that involves scale.

**N02** Students will be expected to solve problems that involve personal budgets.

Performance Indicators:
N02.01    Identify income and expenses that should be included in a personal budget.
N02.02    Explain considerations that must be made when developing a budget (e.g., prioritizing, recurring and unexpected expenses).
N02.03    Create a personal budget based on given income and expense data.
N02.04    Collect income and expense data and create a budget.
N02.05    Modify a budget to achieve a set of personal goals.
N02.06    Investigate and analyze, with or without technology, "what if …" questions related to personal budgets.

**N03** Students will be expected to demonstrate an understanding of compound interest.

Performance Indicators:
N03.01    Solve a problem that involves simple interest, given three of the four values in the formula $I = Prt.$
N03.02    Compare simple and compound interest and explain their relationship.
N03.03    Solve, using a formula, a contextual problem that involves compound interest.
N03.04    Explain, using examples, the effect of different compounding periods on calculations of compound interest.
N03.05    Estimate, using the Rule of 72, the time required for a given investment to double in value.

**N04** Students will be expected to demonstrate an understanding of financial institution services used to access and manage finances.

Performance Indicators:

N04.01  Describe the type of banking services available from various financial institutions, such as online services.
N04.02  Describe the types of accounts available at various financial institutions.
N04.03  Identify the type of account that best meets the needs for a given set of criteria.
N04.04  Identify and explain various automated teller machine (ATM) service charges.
N04.05  Describe the advantages and disadvantages of online banking.
N04.06  Describe the advantages and disadvantages of debit card purchases.
N04.07  Describe ways that ensure the security of personal and financial information (e.g., passwords, encryption, protection of personal identification number [PIN] and other personal identity information).

**N05** Students will be expected to demonstrate an understanding of credit options, including credit cards and loans.

Performance Indicators:

N05.01  Compare advantages and disadvantages of different types of credit options, including bank and store credit cards, personal loans, lines of credit, and overdraft.
N05.02  Make informed decisions and plans related to the use of credit, such as service charges, interest, payday loans, and sales promotions, and explain the reasoning.
N05.03  Describe strategies to use credit effectively, such as negotiating interest rates, planning payment timelines, reducing accumulated debt, and timing purchases.
N05.04  Compare credit card options from various companies and financial institutions.
N05.05  Solve a contextual problem that involves credit cards or loans.
N05.06  Solve a contextual problem that involves credit linked to sales promotions.

**A01** Students will be expected to solve problems that require the manipulation and application of formulas related to
- volume and capacity
- surface area
- slope and rate of change
- simple interest
- finance charges

Performance Indicators:

A01.01  Solve a contextual problem involving the application of a formula that does not require manipulation.
A01.02  Solve a contextual problem involving the application of a formula that requires manipulation.
A01.03  Explain and verify why different forms of the same formula are equivalent.
A01.04  Describe, using examples, how a given formula is used in a trade or an occupation.
A01.05  Create and solve a contextual problem that involves a formula.
A01.06  Identify and correct errors in a solution to a problem that involves a formula.

**A02** Students will be expected to demonstrate an understanding of slope
- as rise over run
- as rate of change
- by solving problems

Performance Indicators:

A02.01    Describe contexts that involve slope (e.g., ramps, roofs, road grade, flow rates within a tube skateboard parks, ski hills).

A02.02    Explain, using diagrams, the difference between two given slopes (e.g., a 3:1 and a 1:3 roof pitch), and describe the implications.

A02.03    Describe the conditions under which a slope will be either 0 or undefined.

A02.04    Explain, using examples and illustrations, slope as rise over run.

A02.05    Verify that the slope of an object, such as a ramp or a roof, is constant.

A02.06    Explain, using illustrations, the relationship between slope and angle of elevation (e.g., for a ramp with a slope of 7:100, the angle of elevation is approximately 4°).

A02.07    Explain the implications, such as safety and functionality, of different slopes in a given context.

A02.08    Explain, using examples and illustrations, slope as rate of change.

A02.09    Solve a contextual problem that involves slope or rate of change.

**A03** Students will be expected to solve problems by applying proportional reasoning and unit analysis.

Performance Indicators:

A03.01    Explain the process of unit analysis used to solve a problem (e.g., given kmh and time in hours, determine how many kilometres; given revolutions per minute, determine the number of seconds per revolution).

A03.02    Solve a problem, using unit analysis.

A03.03    Explain, using an example, how unit analysis and proportional reasoning are related (e.g., to change kmh to km/min., multiply by 1 h/60 min. because hours and minutes are proportional [constant relationship]).

A03.04    Solve a problem within and between systems using proportions or tables (e.g., km to m or km/h to ft./sec.).

**S01** Students will be expected to solve problems that involve creating and interpreting graphs, including bar graphs, histograms.

Performance Indicators:

S01.01    Determine the possible graphs that can be used to represent a given data set and explain the advantages and disadvantages of each.

S01.02    Create, with and without technology, a graph to represent a given data set.

S01.03    Describe the trends in the graph of a given data set.

S01.04    Interpolate and extrapolate values from a given graph.

S01.05    Explain, using examples, how the same graph can be used to justify more than one conclusion.

S01.06    Explain, using examples, how different graphic representations of the same data set can be used to emphasize a point of view.

S01.07    Solve a contextual problem that involves the interpretation of a graph.