

## Math at work 11 (Curriculum outcomes)

### Measurement

**General Curriculum Outcome:** Students will be expected to develop spatial sense through direct and indirect measurement.

**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.

**M02.01** 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.

## Geometry

**General Curriculum Outcome:** Students will be expected to develop spatial sense.

**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.

**G02.01** 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.

**G03.01** Draw a 2-D representation of a given 3-D object.

**G03.02** Draw, using isometric dot paper, a given 3-D object.

**G03.03** Draw to scale top, front, and side views of a given 3-D object.

**G03.04** Construct a model of a 3-D object, given the top, front, and side views.

**G03.05** Draw a 3-D object, given the top, front, and side views.

**G03.06** Determine if given views of a 3-D object represent a given object, and explain the reasoning.

**G03.07** Identify the point of perspective of a given one-point perspective drawing of a 3-D object.

**G03.08** Draw a one-point perspective view of a given 3-D object.

**G04.01** Draw the components of a given exploded diagram, and explain their relationship to the original 3-D object.

**G04.02** Sketch an exploded view of a 3-D object to represent the components.

**G04.03** Draw to scale the components of a 3-D object.

**G04.04** Sketch a 2-D representation of a 3-D object, given its exploded view.

### **Number Sense**

**General Curriculum Outcome:** Students will be expected to develop number sense and critical thinking skills.

**N01.01** Determine, explain, and verify a strategy to solve a puzzle or to win a game; for example,

- 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.

**N01.02** Identify and correct errors in a solution to a puzzle or in a strategy for winning a game.

**N01.03** Create a variation on a puzzle or a game, and describe a strategy for solving the puzzle or winning the game.

**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.

**N03.01** 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.

**N04.01** 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).

**N05.01** 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.

## Algebra

**General Curriculum Outcome:** Students will be expected to develop algebraic reasoning.

**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.

**A02.01** 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  $4^\circ$ ).

**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.

**A03.01** Explain the process of unit analysis used to solve a problem (e.g., given kmh and time in hours, determine how many km; 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  $1 \text{ h}/60 \text{ min.}$  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.).

### **Statistics**

**General Curriculum Outcome:** Students will be expected to develop statistical reasoning.

**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.