**Unit 8: Proportional Reasoning**

**Measurement:**

**Specific Outcome 1.**

Solve problems that involve the application of rates. [CN, PS, R]

1.1 Interpret rates in a given context, such as the arts, commerce, the environment, medicine or recreation.

1.2 Solve a rate problem that requires the isolation of a variable.

1.3 Determine and compare rates and unit rates.

1.4 Make and justify a decision, using rates.

1.5 Represent a given rate pictorially.

1.6 Draw a graph to represent a rate.

1.7 Explain, using examples, the relationship between the slope of a graph and a rate.

1.8 Describe a context for a given rate or unit rate.

1.9 Identify and explain factors that influence a rate in a given context. 1.10 Solve a contextual problem that involves rates or unit rates.

**Specific Outcome** 2.

Solve problems that involve scale diagrams, using proportional reasoning. [CN, PS, R, V]

2.1 Explain, using examples, how scale diagrams are used to model a 2-D shape or a 3-D object.

2.2 Determine, using proportional reasoning, the scale factor, given one dimension of a 2-D shape or a 3-D object and its representation.

2.3 Determine, using proportional reasoning, an unknown dimension of a 2-D shape or a 3-D object, given a scale diagram or a model.

2.4 Draw, with or without technology, a scale diagram of a given 2-D shape, according to a specified scale factor (enlargement or reduction).

2.5 Solve a contextual problem that involves a scale diagram.

**Specific Outcome 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

3.1 Determine the area of a 2-D shape, given the scale diagram, and justify the reasonableness of the result.

3.2 Determine the surface area and volume of a 3-D object, given the scale diagram, and justify the reasonableness of the result.

3.3 Explain, using examples, the effect of a change in the scale factor on the area of a 2-D shape.

3.4 Explain, using examples, the effect of a change in the scale factor on the surface area of a 3-D object.

3.5 Explain, using examples, the effect of a change in the scale factor on the volume of a 3-D object.

3.6 Explain, using examples, the relationships among scale factor, area of a 2-D shape, surface area of a 3-D object and volume of a 3-D object.

3.7 Solve a spatial problem that requires the manipulation of formulas.

3.8 Solve a contextual problem that involves the relationships among scale factors, areas and volumes.

**What do the Student know from Math 10-C?**

**Specific Outcome 1.**

Solve problems that involve linear measurement, using:

SI and imperial units of measure

estimation strategies

measurement strategies.

1.1 Provide referents for linear measurements, including millimetre, centimetre, metre, kilometre, inch, foot, yard and mile, and explain the choices.

1.2 Compare SI and imperial units, using referents.

1.3 Estimate a linear measure, using a referent, and explain the process used.

1.4 Justify the choice of units used for determining a measurement in a problem-solving context.

1.5 Solve problems that involve linear measure, using instruments such as rulers, calipers or tape measures.

1.6 Describe and explain a personal strategy used to determine a linear measurement; e.g., circumference of a bottle, length of a curve, perimeter of the base of an irregular 3-D object.

**Specific Outcome 2.**

Apply proportional reasoning to problems that involve conversions between SI and imperial units of measure. [C, ME, PS]

2.1 Explain how proportional reasoning can be used to convert a measurement within or between SI and imperial systems.

2.2 Solve a problem that involves the conversion of units within or between SI and imperial systems.

2.3 Verify, using unit analysis, a conversion within or between SI and imperial systems, and explain the conversion.

2.4 Justify, using mental mathematics, the reasonableness of a solution to a conversion problem.

**Specific Outcome 3.**

Solve problems, using SI and imperial units, that involve the surface area and volume of 3-D objects, including:

• right cones • right cylinders • right prisms • right pyramids

• spheres.

[CN, PS, R, V]

3.1 Sketch a diagram to represent a problem that involves surface area or volume.

3.2 Determine the surface area of a right cone, right cylinder, right prism, right pyramid or sphere, using an object or its labelled diagram.

3.3 Determine the volume of a right cone, right cylinder, right prism, right pyramid or sphere, using an object or its labelled diagram.

3.4 Determine an unknown dimension of a right cone, right cylinder, right prism, right pyramid or sphere, given the object’s surface area or volume and the remaining dimensions.

3.5 Solve a problem that involves surface area or volume, given a diagram of a composite 3-D object.

3.6 Describe the relationship between the volumes of:

* right cones and right cylinders with the same base and height
* right pyramids and right prisms with the same base and height.

**What do Student know from Math 20-1?**

**There is NO measurement unit in Math 20--1**

**What is Coming in Math 30-2**

**There is NO measurement unit in Math 30--2**