

Part III

Scope and Sequence



This article has been reprinted from *Think Metric - A Workshop on the Metric System of Measurement*, a publication of the Alberta Department of Education

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As the strand of metric measurement is developed into the mathematics program, teachers should have in mind a scope and sequence format upon which to build their activities, projects and exercises. There are, of course, many ways to formulate a scope and sequence organization and there are many variables, such as the nature of the class, the general organization of the whole school program. The following chart is one suggestion intended to serve as a referent for discussion on this topic. It is *not* a "prescribed" course of study.

It is fairly easy to have a consensus on what the overall content should be in the elementary school, that is, the content up to the end of Grade VI. In general, it should include the common units of length, area, volume, capacity, mass, temperature, and money. In addition to the commonly used units, it should include, for cognitive reasons, one complete example of a system of subunits from the milli- units to the kilo- units in order to have a complete understanding of the decimal structure of the metric system.

There are many ways to accomplish this overall result. For example, we could sequence the linear units from the smallest (millimetre) to the largest (kilometre). This would be a rational, logical sequence, but a millimetre is a very tiny unit to begin with so the sequence is probably not psychologically sound. Therefore, some decision must be made whether to begin with a centimetre or with a metre.

Another example is the question of *when* to introduce decimal notation. There are several possibilities. We could continue to call the length of this page 2 dm and 8 cm, or 28 cm, for an extended period of time (two or three years) without difficulty, or we could introduce the notation of 2.8 dm as another way of expressing the distance.

In the following chart no attempt has been made to designate the vertical sequence into "grades" by putting in horizontal divisions. "Continuous progress" and/or "individualized" programs suggest that such a designation would be inappropriate. However, consideration has been given to the horizontal articulation of various concepts from one measurement attribute to another, e.g. millimetre, millilitre and milligrams are included at the same horizontal level.

THE MEASUREMENT STRAND IN ELEMENTARY MATHEMATICS
SCOPE AND SEQUENCE

SEQUENCE

Kindergarten

SCOPE

1. Activities that involve making comparisons - long, short; thick, thin; tall, taller; heavy, light; warm, warmer; big, small; etc.
2. Ordering a set of objects by some measure attribute, especially by length.
3. Use of non-standard units.

	<u>LINEAR</u>	<u>AREA</u>	<u>VOLUME</u>	<u>CAPACITY</u>	<u>MASS</u>	<u>TEMPERATURE</u>	
	<ol style="list-style-type: none"> 1. Non-standard units - tooth picks, paper clips 2. Standard unit - The centimetre (cm) (a) Familiarization (b) Centimetre scale (ruler) (c) Measuring to nearer centimetre 3. Standard unit - The decimetre (dm) (a) Familiarization (b) Decimetre scale (c) Measuring using dm and cm (d) Decimal notation to one place of decimal, eg. for "1 dm and 3 cm" write "1.3 dm" and say "one point three decimetres" 4. Standard unit - The metre (m) (a) Familiarization (b) Metre scale (c) Measuring using m, dm and cm (d) Decimal notation to two places of decimal, e.g. for "7 m, 4 dm, 2 cm" write "7.42 m" and say "seven point four, two metres" 5. Standard unit - The kilometre (km) (a) Familiarization (b) Road maps, etc. 	<ol style="list-style-type: none"> 1. Meaning (a) Use of non-standard units (b) "Counting" units of area 2. Standard unit - The square centimetre (cm²) (a) Familiarization of regions by "counting" square centimetres 	<ol style="list-style-type: none"> 1. Standard unit - The cubic centimetre (cm³) (a) Familiarization by "counting" cubes 	<ol style="list-style-type: none"> 1. Non-standard units - cups, cans, bottles 2. Standard unit - The litre (L) (a) Familiarization (b) Measuring with a litre 3. Standard unit - The decilitre (dL) (a) Familiarization (b) Measuring with litres and decilitres 4. Use of 5 dL containers 	<ol style="list-style-type: none"> 1. Meaning (a) Examples (b) Comparisons 2. Standard units - The kilogram (kg), The gram (g), (small) 3. Reading a scale e.g., "2.7 kg" means "2 kilograms and 700 grams" 	<ol style="list-style-type: none"> 1. Meaning (a) Familiarization (b) Appropriate unit selection (c) Measuring 2. Standard units - (large) The kilogram (kg), (small) The gram (g) 3. Reading a scale e.g., "2.7 kg" means "2 kilograms and 700 grams" 	<ol style="list-style-type: none"> 1. Meaning (a) Familiarization (b) Appropriate unit selection (c) Measuring 2. Standard units - (large) The kilogram (kg), (small) The gram (g) 3. Reading a scale e.g., "2.7 kg" means "2 kilograms and 700 grams"
			<ol style="list-style-type: none"> 5. Standard unit - The millilitre (mL) (a) Familiarization (b) Relationships to cm³ 	<ol style="list-style-type: none"> 4. Standard unit - The milligram (mg) (a) Familiarization (b) Uses 	<ol style="list-style-type: none"> 4. Reading a scale e.g., "2.7 kg" means "2 kilograms and 700 grams" 	<ol style="list-style-type: none"> 4. Reading a Celsius scale 	

6. Standard unit -
The millimetre (mm)
(a) Familiarization
(b) Measuring to precision of nearer millimetre
(c) Decimal notation of three places of decimal.
e.g., for "3 m, 0 dm, 6 cm, 5 mm" write "3.065 m" and say "three point zero, six, five metres"
7. Standard units -
The hectometre (hm) and the decametre (dam)
(a) Familiarization
(b) Measuring fields, etc.
(c) Scale drawings (road maps)
(d) Decimal notation to three places of decimal, e.g., for "6 km, 5 dm, 0 dam, 2 m" write "6.502 km" and say "six point five, zero, two kilometres"
8. Using linear units to show metric system from "milli-" to "kilo-"
(a) Decimalization
(b) Conversion of units by shifting decimal point
(c) Consideration of "ragged decimals"
(d) Precision
3. Standard unit -
The cubic decimetre (dm³) (relationship to a litre)
Volume of rectangular prisms
(a) Length X width X height formula
4. Area of rectangles
(a) Length X width formula
5. Standard unit -
The cubic metre (m³)
The kilolitre (kl)
(a) Familiarization
(b) Relationship to a cubic metre
6. Relationship of a litre to a cubic decimetre
7. Standard unit -
The megagram (Mg)
1 tonne (t)
(a) Uses
6. Reading a Celsius scale to one place of decimal (clinical therm)

INTERRELATIONSHIPS

(Activities and problems involving interrelationships among different measurement attributes)

