

**CIHM
Microfiche
Series
(Monographs)**

**ICMH
Collection de
microfiches
(monographies)**



Canadian Institute for Historical Microreproductions / Institut canadien de microreproductions historiques

© 1998

Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming are checked below.

- ☒ Coloured covers / Couverture de couleur
- ☐ Covers damaged / Couverture endommagée
- ☐ Covers restored and/or laminated / Couverture restaurée et/ou pelliculée
- ☐ Cover title missing / Le titre de couverture manque
- ☐ Coloured maps / Cartes géographiques en couleur
- ☐ Coloured ink (i.e. other than blue or black) / Encre de couleur (i.e. autre que bleue ou noire)
- ☐ Coloured plates and/or illustrations / Planches et/ou illustrations en couleur
- ☐ Bound with other material / Relié avec d'autres documents
- ☐ Only edition available / Seule édition disponible
- ☐ Tight binding may cause shadows or distortion along interior margin / La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure.
- ☐ Blank leaves added during restorations may appear within the text. Whenever possible, these have been omitted from filming / Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.
- ☐ Additional comments / Commentaires supplémentaires:

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- ☐ Coloured pages / Pages de couleur
- ☐ Pages damaged / Pages endommagées
- ☐ Pages restored and/or laminated / Pages restaurées et/ou pelliculées
- ☒ Pages discoloured, stained or foxed / Pages décolorées, tachetées ou piquées
- ☐ Pages detached / Pages détachées
- ☒ Showthrough / Transparence
- ☐ Quality of print varies / Qualité inégale de l'impression
- ☐ Includes supplementary material / Comprend du matériel supplémentaire
- ☐ Pages wholly or partially obscured by errata slips, tissues, etc., have been refilmed to ensure the best possible image / Les pages totalement ou partiellement obscurcies par un feuillet d'errata, une pelure, etc., ont été filmées à nouveau de façon à obtenir la meilleure image possible.
- ☐ Opposing pages with varying colouration or discolourations are filmed twice to ensure the best possible image / Les pages s'opposant ayant des colorations variables ou des décolorations sont filmées deux fois afin d'obtenir la meilleure image possible.

This item is filmed at the reduction ratio checked below /
Ce document est filmé au taux de réduction indiqué ci-dessous.

A horizontal number line with 16 equal segments. The top of the line is labeled with values: 10x, 14x, 18x, 22x, 26x, and 30x. The bottom of the line is labeled with values: 12x, 16x, 20x, 24x, 28x, and 32x. A checkmark (✓) is placed above the 7th segment from the left, which corresponds to the 16x mark on the bottom line.

The copy filmed here has been reproduced thanks to the generosity of:

Université de Montréal

The images appearing here are the best quality possible considering the condition and legibility of the original copy and in keeping with the filming contract specifications.

Original copies in printed paper covers are filmed beginning with the front cover and ending on the last page with a printed or illustrated impression, or the back cover when appropriate. All other original copies are filmed beginning on the first page with a printed or illustrated impression, and ending on the last page with a printed or illustrated impression.

The last recorded frame on each microfiche shall contain the symbol \rightarrow (meaning "CONTINUED"), or the symbol ∇ (meaning "END"), whichever applies.

Maps, plates, charts, etc., may be filmed at different reduction ratios. Those too large to be entirely included in one exposure are filmed beginning in the upper left hand corner, left to right and top to bottom, as many frames as required. The following diagrams illustrate the method:

1	2	3
---	---	---

1	
4	

L'exemplaire filmé fut reproduit grâce à la
générosité de:

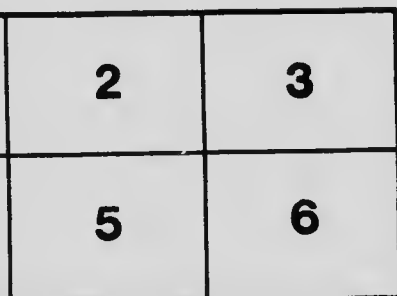
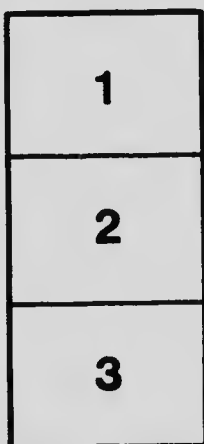
Université de Montréal

Les images suivantes ont été reproduites avec le
plus grand soin, compte tenu de la condition et
de la netteté de l'exemplaire filmé, et en
conformité avec les conditions du contrat de
filmage.

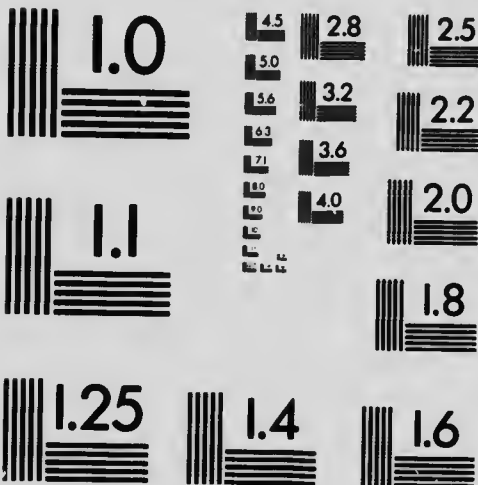
Les exemplaires originaux dont la couverture en
papier est imprimée sont filmés en commençant
par le premier plat et en terminant soit par la
dernière page qui comporte une empreinte
d'impression ou d'illustration, soit par le second
plat, selon le cas. Tous les autres exemplaires
originaux sont filmés en commençant par la
première page qui comporte une empreinte
d'impression ou d'illustration et en terminant par
la dernière page qui comporte une telle
empreinte.

Un des symboles suivants apparaîtra sur la
dernière image de chaque microfiche, selon le
cas: le symbole \rightarrow signifie "A SUIVRE", le
symbole ∇ signifie "FIN".

Les cartes, planches, tableaux, etc., peuvent être
filmés à des taux de réduction différents.
Lorsque le document est trop grand pour être
reproduit en un seul cliché, il est filmé à partir
de l'angle supérieur gauche, de gauche à droite,
et de haut en bas, en prenant le nombre
d'images nécessaire. Les diagrammes suivants
illustrent la méthode.



(ANSI and ISO TEST CHART No. 2)



1653 East Main Street
Rochester, New York 14609 USA
(716) 482 - 0300 - Phone
(716) 288 - 5989 - Fax

THE Metric System

BY

ROBERT GOLTMAN, PRINCIPAL

AND

MAURICE LEBOV,

Graduate of the University of France,
Professor of Mathematics at Goltman's Metropolitan
Business College, Montreal.

MONTREAL:
JOHN LOVELL & SON
1903.

GC
97
12
PAa

2615
1903

University of Bishop's College,

FACULTY OF MEDICINE, MONTREAL.

FRANCIS W. CAMPBELL,
M.D., L.R.C.P., LOND., D.C.I., DEAN.

The Medical Faculty of Bishop's will, on the 15th September next, enter upon its thirty-third Session.

The course consists of four years, nine months' Session each year.

The teaching staff comprises 15 Professors, 13 Lecturers, 4 Instructors and 7 Demonstrators.

The Faculty of Medicine of Bishop's aims at imparting a thoroughly practical Medical education and its facilities for doing so are unequalled in Canada.

The Woman's Hospital of Montreal is entirely under its control, and as an Obstetrical Hospital, furnishes Bishop's students with abundant clinical midwifery.

Bishop's students have the entree, the same as students of other schools, into the Royal Victoria, Montreal General, Hotel-Dieu and Western Hospitals.

The degree from Bishop's is recognized as qualifying for examination before all the English, Scotch and Irish Colleges, also by the London University.

The Dental College of the Province of Quebec is affiliated with Bishop's College.

Fees, \$100 yearly.

A calender will be sent on application and any further information that may be required can be had by applying to

J. M. JACK, M.D., REGISTRAR. GEORGE FISK, M.D.,
Assistant Registrar.
101 Union Ave. Montreal.

THE Metric System

BY

ROBERT GOLTMAN, PRINCIPAL,

AND

MAURICE LE ROY,

Graduate of the University of France,
Professor of Mathematics at Goltman's Metropolitan
Business College, Montreal.

MONTREAL;
JOHN LOVELL & SON
1903.

Entered according to the Act of the Parliament of
Canada, in the year one thousand nine hundred and
three, by ROBERT GOLTMAN and MAURICE LE ROY, in
the Office of the Minister of Agriculture.

PREFACE.

THE importance of the Metric System cannot be disputed. This very valuable system is being adopted by all countries. At the last Conference of British Colonies, that took place in London in October, the following resolution was adopted :—

“ That it is advisable to adopt the Metric System of Weights and Measures for use within the Empire, and the Prime Ministers urge the Governments represented at this Conference to give consideration to the question of its early adoption.”

The following appeared in the daily newspapers last November :—

“ The Hon. M. E. Bernier, Minister of Inland Revenue, Ottawa, since taking office, has given considerable attention to the spread of information regarding the Metric System of weights and measures. He said : ‘ I am satisfied that the

Metric System is infinitely superior to that at present in vogue here, and as long as I occupy this portfolio I will do what I can to educate public sentiment in regard to its advantages. I have been distributing to high schools charts and material to illustrate the plan on which the Metric System is based, and at present I am in correspondence with the Quebec authorities to have the distribution extended to the common schools. Later, I will also bring the matter before the attention of the Ontario Government. The Imperial Conference in London recently adopted, as you know, a resolution in favor of the metric system. It is permissible in Canada, the United Kingdom and the United States, to make contracts involving its use, and I have reason to believe that at the next Congress in Washington a Bill will be pressed by prominent men to wipe out the old order of measurement, and bring the metric plan to be the law of the land. In Canada we will be content to move slowly, as the public is educated to the convenience that

v

would result from the employment of this superior mode of calculating weight, bulk and distance."

From the above it will be observed that it is unnecessary to comment on the value of the metric system, and that its universal adoption in all parts of the world is already assured.

Our aim in presenting this book to the public is to give a complete and practical knowledge of its use, including the different primary units, with all their higher and lower denominations. The numerous exercises contained in this book will enable the student to promote efficiency in actual transactions.

We are not aware of the existence of a similar book. Some arithmetic books give one or two pages on the subject, but nothing further.

The different tables placed at the end of this work will be appreciated by business men, as well as students attending universities, and graduates, the information contained in them being for daily use.

Another feature, and not the least, is the very low price of this book. Everybody

is obliged, or will be obliged, to understand the metric system. Up to the present time all who studied this system had to buy arithmetic books, which, as a rule, are expensive, and contain only the old method of weights and measures, with, as stated, merely an outline of the standard system to be employed in future, as given in the following pages.

For these and many other reasons we consider that this work is a much needed one, and are confident that it will meet with the hearty approval of the public.

CONTENTS,

	PAGE
Primary Units.....	2
Higher Denominations.....	3
Lower “.....	3
Measures of Length and Examples.....	5
“ Surface “ “.....	7
“ Land “ “.....	10
“ Cubic “ “.....	12
“ Capacity “ “.....	14
“ Wood “ “.....	15
“ Weight “ “.....	18
Table of Recapitulation.....	20
Miscellaneous Problems.....	21
Angular Measure.....	26
Table of Specific Gravities.....	27
Temperature Measure.....	32
Table of Equivalents.....	36
Money Measure.....	38
Table of Currency.....	39

METRIC SYSTEM.

THE Metric System is a decimal system of weights and measures, which has for its basis a certain unit of length called the Meter.

The meter is $\frac{1}{10000000}$ of the distance from the equator to either pole.

PRIMARY UNITS.

The Primary Units of the Metric System are :

KIND OF MEASURE.	PRIMARY UNIT.	PRONUNCIATION.
Measure of Length . . .	Meter	Meéter.
Ordinary Surface Measure .	Square meter	Square mééter.
Land Measure	Ar	Air.
Ordinary Cubic Measure .	Cubic meter	Cubic mééter.
Measure of Capacity . . .	Liter	Lééter.
Wood Measure	Ster	Stair.
Measure of Weight . . .	Gram.	Gram.

HIGHER DENOMINATIONS.

Higher denominations than the above primary units are denoted by prefixing the following Greek numerals: Deka, 10 primary units; hekto, 100 primary units; kilo, 1,000 primary units; myria, 10,000 primary units.

LOWER DENOMINATIONS.

Lower denominations than the primary units are denoted by prefixing the fol-

lowing Latin numerals: Deci, $\frac{1}{10}$ of a primary unit; centi, $\frac{1}{100}$ of a primary unit; milli, $\frac{1}{1000}$ of a primary unit.

REMARK 1.—The above numeral prefixes indicate the decimal value of the derivative units as compared with the primary units.

Thus 3 centimeters denote 0.03 of a meter.

15 centiliters denote 0.15 of a liter, etc., etc.

REMARK 2.—Metric quantities other than surfaces or solids are written and

read like other decimals on a scale of 10, each denomination being allotted one place. In square measure, however, denominations are expressed on a scale of 100, each denomination being allotted two places. In cubic measure denominations are expressed on a scale of 1000, each denomination being allotted three places.

The whole system is based on these two remarks.

MEASURES OF LENGTH.

Myriameter, Mm	- - -	10,000 m.
Kilometer, Km	- - -	1,000 "
Hectometer, Hm	- - -	100 "
Decameter, Dm	- - -	10 "

METER OR PRIMARY UNIT.

Decimeter, dm	- - - -	$\frac{1}{10}$	in.
Centimeter, cm	- - -	$\frac{1}{100}$	"
Millimeter, mm	- - -	$\frac{1}{1000}$	"

Write :—

1. 3 meters 257 millimeters.
Ans. 3.257 m.
2. 57 meters 31 millimeters
Ans. 57.031 m.
3. 21 decameters 257 centimeters.
Ans. 21.257 Dm.
4. 37 hectometers 27 meters.
Ans. 37.27 Hm.
5. 257 kilometers 257 meters.
Ans. 257.257 Km.
6. 378 kilometers 27 meters.
Ans. 378.027 Km.

EXAMPLES.

1. How many meters in 12 Dm ?
Ans. 120.
2. How many hectometers in 17 Mm ?
Ans. 1700.
3. How many decimeters in 17 Dm ?
Ans. 1700.
4. How many centimeters in 4 Hm ?
Ans. 40000.
5. How much does 12 Dm of cloth cost
at 75c. a meter ?
Ans. \$90.
6. How much does 12.25 m. cost at 55c.
a meter ?
Ans, \$6.74.
7. How many millimeters in 1.25 m ?
Ans. 1250.
8. How many decimeters in 675 mm ?
Ans. 6.75.
9. How many decameters in 12.5 Km ?
Ans. 1250.

SQUARE MEASURE.

Square Myriameter sq. Mm.	100,000,000 sq. m.
Square Kilometer sq. Km	1,000,000 "
Square Hectometer sq. Hm	10,000 "
Square Decimeter sq Dm	100 "

SQUARE METER, PRIMARY UNIT.

Square decimeter sq. dm	$\frac{1}{100}$ sq. m.
Square centimeter sq. cm	$\frac{1}{10000}$ "
Square millimeter sq. mm	$\frac{1}{1000000}$ "

The Sq. Myriameters and Sq. Kilometers are used for the measurement of continents and countries.

Write :—

1. 257 sq. meters 27 sq. decimeters.
Ans. 257.27 sq. m.
2. 367 sq. meters 375 sq. centimeters.
Ans. 367.0375 sq. m.
3. 227 sq. decameters 37 sq. decimeters.
Ans. 227.0037 sq. Dm.
4. 37 sq. decimeters 2 sq. millimeters.
Ans. 37.0002 sq. dm.
5. 428 sq. meters 5 sq. millimeters.
Ans. 428.000005 sq. m.
6. 48 sq. hectometers 37 sq. meters.
Ans. 48.0037 sq. Hm.

EXAMPLES.

1. How many square centimeters in 2.37 sq. dm ?
Ans. 237.
2. How many square decameters in 2.3750 sq. Km ?
Ans. 23750.
3. How many square millimeters in 12.25 sq. cm ?
Ans. 1225.
4. What is the surface of a room 12.25 m. by 5.31 m ?
Ans. 65.0475 sq. m.

5. What is the surface of a field 2.3 Dm
by 32 m?

Ans. 736 sq. m.

6. What is the surface of a yard 27 m
by 12.50 m?

Ans. 337.50 sq. m.

7. Give in square centimeters the surface
of a table 1.25 m. by 0.55 m?

Ans. 6875.



LAND MEASURE.

For the Land Measure a special unit is generally used.

This unit is called Ar.

The Ar is equal to 100 sq. m.

Hectar, Ha 100 ar.

AR PRIMARY UNIT.

deciar, da $\frac{1}{10}$ ar.

cantiar, ca $\frac{1}{100}$ “

The deciar is never used.

Write :—

1. 3 Hectars 22 centiars.
Ans. 3.0022 Ha.
2. 15 Hectars 19 ars 2 centiars.
Ans. 15.1902 Ha.
3. 18 Hectars 4 ars 4 centiars.
18.0404 Ha.

EXAMPLES.

1. How many centiars in 3 ars?
Ans. 300.
2. How many ars in 235 Hectars?
Ans. 23500.

3. What is the surface of a county having 150 kilometers by 130 kilometers? Give the answer in Square Hectometers.

Ans. 1,950,000.

4. How many centiars in 12 square decameters?

Ans. 1,200.

5. A country has a surface of 31475 square kilometers. Give answer in hectars.

Ans. 3147500.

6. What is the surface in ars of a property having 1050 meters by 352 meters?

A. 3696.



CUBIC MEASURE.

Cubic Myriameter, Cu. Mm.....	1,000,000,000,000	c. m.
Cubic Kilometer, Cu. Km	1,000,000,000	"
Cubic Hectometer, Cu. Hm.....	1,000,000	"
Cubic Decameter, Cu. Dm.....	1,000	"

CUBIC METER, PRIMARY UNIT.

Cubic decimeter, Cu. d.....	$\frac{1}{1000}$	c.m.
Cubic centimeter, Cu. c.....	$\frac{1}{1000000}$	"
Cubic millimeter, Cu. m.....	$\frac{1}{1000000000}$	"

The higher denominations are never used except the Cubic Decameter.
 The cubic meter and the lower denominations are in current use.

The cubic meter and the lower denominations are in current use.

Write :—

1. 307 cubic meters 27 cubic centimeters.

Ans. 307.000027 Cu. m.

2. 28 cubic decimeters 3 cubic millimeters.

Ans. 28.000003 Cu. dm.

3. 27 cubic decimeters 3 cubic centimeters.

Ans. 27.003 Cu. dm.

4. 3 cubic decameters 27 cubic centimeters.

Ans. 3.000000027 Cu. Dm.

5. 3 cubic meters 27 cubic millimeters.

Ans. 3.000000027 Cu. m.

6. 27 cubic centimeters 22 cubic millimeters.

Ans. 27.022 Cu. cm.

EXAMPLES.

1. How many cubic centimeters in 12 cubic meters?

Ans. 12,000,000.

2. How many cubic decimeters in 13 cubic meters?

Ans. 13,000.

3. How many cubic millimeters in 1 cubic decimeters?

Ans. 17,000,000.

4. A room is 13 meters by 6 meters and 3 meters; what is its capacity in cubic decimeters?

Ans. 234,000.

5. A room is 13.25 meters by 6.7 meters and 3.75 meters; what is its capacity in cubic meters?

Ans. 335 390625.

6. How many cubic millimeters in 137 cubic centimeters?

Ans. 137,000.

7. How many cubic centimeters in 17,378 cubic millimeters?

Ans. 17.378.

For liquids a special measure is used, the Liter.

The Liter is equal to the cubic decimeter.

Myrialiter, Ml.....	10,000	liters
Kiloliter, Kl.....	1,000	"
Hectoliter, Hl.....	100	"
Decaliter, Dl.....	10	"

LITER PRIMARY UNIT.

deciliter, dl.	$\frac{1}{10}$	liter
centiliter, cl.	$\frac{1}{100}$	"
milliliter, ml.	$\frac{1}{1000}$	"

The Myrialiter and Kiloliter are never used.

The Kiloliter being the same as the cubic meter, the latter is used when it becomes necessary to measure large quantities.

The lower units are used daily.

A special unit is used for Wood measure.

This measure is called Ster. one ster being equal to one cubic meter.

Decuster, 'Dst 10 ster

Decister, dst. $\frac{1}{10}$ ster

Centister, cst $\frac{1}{100}$ "

Write :—

1. 1 Hectoliter 23 liters 18 milliliters.

Ans. 1.23018 Hl.

2. 4 Decaliters 23 centiliters.

Ans. 4.023 Dl.

3. 17 Liters 23 milliliters.

Ans. 17.023 l.

EXAMPLES.

1. How many centiliters in 12 liters?

Ans. 1,200.

2. How many deciliters in 137 centiliters?

Ans. 13.7.

3. How many liters in 112 decaliters?

Ans. 1,120.

4. How many cubic decimeters in 13 decaliters?

Ans. 130.

5. How many cubic decimeters in 270 deciliters?

Ans. 27.

6. How many cubic meters in 11 decastars?

Ans. 110.

7. How many cubic decimeters in 1720 sters?

Ans. 1720000.

8. How many cubic meters in 211 decisters?

Ans. 21.1.

9. What is the surface of a floor having 17.5 meters by 12.75? What is the capacity of the room if it is 4.25 high? Give capacity in liters.

Ans. 1 : 223,1250 Sq. m.

2 : 948281.25 l.

10. How many liters in a square cistern having 2.75 m by 3.70 m by 2.50 m?

Ans. 25437.50.



MEASURE OF WEIGHT.

The unit of weight is the gram.

The gram is the weight of one cubic centimeter of pure water at a temperature of 4° centigrade.

Myriagram, Mgr.....10,000 grams.

Kilogram, Kgr.....1,000 “

Hectogram, Hgr.....100 “

Decagram, Dgr.....10 “

GRAM, GR., PRIMARY UNIT.

decigram, dgr..... $\frac{1}{10}$ grams.

centigram, cgr..... $\frac{1}{100}$ “

milligram, mgr..... $\frac{1}{1000}$ “

Write :—

1. 8 Kilograms 327 milligrams.

Ans. 8.000327 Kgr.

2. 27 Hectograms 28 centigrams.

Ans. 27.0028 Hgr.

3. 21 grams 27 milligrams.

Ans. 21.027 gr.

The Myriagram is never used. The gram being a very small weight, the unit that is generally used is the Kilogram.

For the large weights, the Ton and Metric Quintal are generally used.

The Ton is 1000 Kilograms.

The Metric Quintal is 100 Kilograms.

EXAMPLES.

1. How many centigrams in 122 grams

Ans. 12200.

2. How many milligrams in 2 decigrams?

Ans. 200.

3. How many decagrams in 12 Kilograms?

Ans. 1200.

4. How many Kilograms in 10 Tons?

Ans. 10000.

5. What is the weight of 232 liters of water?

Ans. 232 Kgr.

6. What is the quantity of water contained in a cistern of 2 meters by 3.25 meters by 1.25 meter, and what would be the weight of this water?

Ans. 1. 8.125 Cu. m.

2. 8.125 T.

7. What is the weight in decagrams of 1253 liters of water?

Ans. 125300.

8. What is the weight of 201 cubic meter
of water? Give answer in tons.

Ans. 201 T.

9. How many cubic decimeters of water
in 3 tons of water?

Ans. 3000.

10. How many milligrams will weigh
3 cubic centimeters of water?

Ans. 3000.

TABLE OF RECAPITULATION AND CORRESPONDENTS.

Myriameter.

Kilometer.

Hectometer.

Decameter.

METER.

Decimeter.

Centimeter.

Millimeter.

Sq. Myriameter.

Sq. Kilometer.

Sq. Hectometer.....Hectar.

Sq. Decameter.....Ar.

SQ. METER centiar.

Sq. decimeter.

Sq. centimeter.

Sq. millimeter.

Cu. Myriameter.

Cu. Kilometer.

Cu. Hectometer.

Cu. Decameter.

CU. METER . . Ster . . Kiloliter . . Ton.

Cu. decimeter . . Liter Kilogram.

Cu. centimeter . . Milliliter . . Gram.

Cu. millimeter Milligram.

PROBLEMS.

1. I owe \$19.25 to one man, \$18.25 to another, and \$23.75 to a third. How much do I owe to all three?

2. Find the total weight of 5 carloads of coal weighing respectively 14 T 767 Kg, 11 T 237 Kg, 17 T 821 Kg, 11 T 248 Kg and 21 T 287 Kg.

3. Three fields gave an area respectively of 10 a 23 ca, 12 Ha and 427.35 a. What is the total area?

4. A merchant sold 145.25 l of coal

oil and sold 11.22 Dl. What quantity had he at first?

5. A crock of butter weighed 18 Kg and the crock weighed 3.25 Kg. How much did the butter weigh?

6. A man had a farm measuring 125.27 Ha, of which 3.23 Ha was cleared, the rest being in wood land. He sold 48.23 Ha of the cleared land and 1.25 Ha of the wood land. How many Ha of the wood land and of cleared land had he left?

7. A coal dealer agreed to deliver 25 T of coal between the 1st July and the 1st September. He delivered 17.37 T in July. How much had he to deliver in August?

8. A carriage wheel 3.08 m. in circumference made 3,600 revolutions in an hour. What distance did the carriage go during the hour?

9. A boy walks 1.237 Km to school each morning and the same distance home each afternoon on 211 days in each year for 5 years. How far does he walk during that time?

10. A drover bought 27 sheep at \$3.25

each and 37 others at \$4.21. How much will he gain by selling them at \$4.28 each?

11. What is the capacity of a cistern that holds 125 pails full of 9.235 l each?

12. A room is 6.25 m long and 5.23 m wide. What is the length around it?

13. The furnaces of a steamer burn 5.235 T. coal daily. How much will they burn in 14 days?

14. What is the length of 125 rails, each 3.57 m long?

15. A watch gains 1 min. 5 sec. per day. How much will it gain in a fortnight?

16. If a farm of 135.73 Ha is divided equally in three parts, what will be the area of each?

17. Four horses eat 252.27 l of oats in a week. What quantity does each horse eat per week?

18. How often can 77 sq. meters be subtracted from 4.71 Hectars?

19. How many sleepers laid 0.63 m from centre to centre will be required for a railway 56.23 Kilometers long?

20. How many bars ... lead, each

weighing 6.27 Kilograms, will be required to make up a weight of 2 Tons?

21. How long would it take to walk 18 Kilometers at the rate of 125 steps of 0.75 m each per minute?

22. A span of horses weighed 1240 Kilograms; one of them weighed 87 Kilograms more than the other. How much did each weigh?

23. Two parcels of tea together weighed 8 Kilograms, one being 1.25 Kilograms heavier than the other. How much does each weigh?

24. How many strips of carpeting 0.60 m wide will be required for a rectangular floor $4.50 \text{ m} \times 3.28 \text{ m}$, if the strips run lengthwise of the room?

25. How many meters of stair carpet will be required for a straight stair of 22 steps 0.29 m wide, 0.22 m rise, allowing 1 meter for extra at top?

26. If a blackboard contains 4 sq. meters, and is 1 meter wide, what is its length?

27. A plasterer whose price was 25 c. per sq. meter charged \$8.00 for plastering

the ceiling of a room 5.30 m wide.
What was the length of the room?

28. What is the weight of a square piece of timber 9.25 meters long, 3.25 meters thick and 4.21 meters wide, at 22.5 Kilograms per 500 Cubic decimeters?

29. A merchant imported 10,000 Decaliters of wine at \$13.25 per Decaliter, and sold the same at \$1.10 per liter. What is his gain?

30. What is the cost of 14.035 Kilograms of sugar at \$80.07 per 500 grams?

31. Find the cost of 24 Decaliters of peaches at \$3.15 a basket of 12 liters.



ANGULAR MEASURE.

Angular Measure is used in measuring angles, the arcs of circle, latitude, longitude, the motions of heavenly bodies, etc.

100 Seconds grade ("gr.) = 1 Minute grade

100 Minutes grade ('gr.) = 1 Degree grade

100 Degrees grade ($^{\circ}$ gr.) = 1 Quadrant.

4 Quadrants = 1 Circle.

400 Degrees grade = 1 Circle.

The old measure of 360° of $60'$ in circle is yet in use.

EXAMPLES.

1. How many Minutes grade are there in 32 Degrees grade?

Ans. 3,200.

2. How many Seconds grade in 2 Degree grade?

Ans. 20,000.

3. How many Seconds grade in 88 Minutes grade?

Ans. 8,800.

TABLE OF SPECIFIC GRAVITIES.

Specific Gravity is the ratio of the weight of a body to that of an equal volume of some other substance adopted as a standard of reference.

For solids and liquids the standard is pure water at 60° Fahrenheit or 15°.5 centigrade.

Acid — Acetic,	. . .	1.008
“ — Arsenic,	. . .	3.391
“ — Nitric.	. . .	1.271
“ — Sulphuric,	. . .	1.841 to 2.125
Air,	. . .	.001227
Alabaster,	. . .	1.874
Alcohol of Commerce,	. . .	.835
Alcohol, Pure,	. . .	.794
Alder Wood,	. . .	.800
Ale,	. . .	1.035
Alum,	. . .	1.724
Aluminium,	. . .	2.560
Amber,	. . .	1.064
Ambergris,	. . .	.780
Apple Tree,	. . .	.793
Amethyst,	. . .	2.750
Ammonia,	. . .	.875
Ash,	. . .	.800
Blcdd, Human,	. . .	1.054

Bone of Ox,	1.656
Brass,	about 8.000
Brick,	2.000
Butter, . . . .	.942
Cedar, . . . .	.457 to .561
Cherry, . . . .	.715
Cider,	1.018
Coal — Bituminous,	about 1.250
“ — Anthracite,	1.500
Copper,	8.788
Coral,	2,540
Cork, . . . .	.240
Diamond,	3.530
Dolomite,	2.540
Earth (mean of the globe),	5.210
Elm, . . . .	.671
Emerald,	2.678
Ether, . . . .	.632
Fat of Beef, . . . .	.923
Feldspar,	2.400
Filbert, . . . .	.600
Fir, . . . .	.550
Glass — Bottle,	2.733
“ — Green,	2.642
“ — Flint,	2.760
“ — Plate,	2.760
Gold — Native,	15.600 to 19.500

1.656	Gold -- Pure cast,	. . .	19,258
8.000	“ -- Hammered,	. . .	19,362
2.000	“ -- Coin,	. . .	17.647
.942	“ -- 22 carats fine,	. . .	17.486
.561	“ -- 20 carats,	. . .	15.709
.715	Granite,		2.652
1.018	Graphite,		1.987
1.250	Gunpowder, . . . . .		.900
1.500	Gum Arabic,		1.452
8.788	Gypsum.		2.288
2,540	Hazel, . . . . .		.600
.240	Hematite Ore,		4.507
3.530	Honey,		1.456
2.540	Ice, . . . . .		.930
5.210	Iodine,		4.948
.671	Iridium,		23.000
2.678	Iron,		7.645
.632	“ Cast,		7.207
.923	“ Ore.		4.900
2.400	Ivory,		1,917
.600	Juniper, . . . . .		.556
.550	Lard, . . . . .		.947
2.733	Lead -- Cast,		11.350
2.642	“ -- White,		7.235
2.760	Lead Ore,		7.250
2.760	Lemon Tree, . . . . .		.703
9.500	Lignum Vitæ,		1.333

Lime, . . . . .	.804
Lime Stone,	2.386
Mahogany,	1.063
Malachite,	3.700
Manganese,	3.700
Maple, . . . . .	.750
Marble,	2.716
Men (living), . . . . .	.891
Mercury — Common,	13.568
“ — Pure,	14.000
Mica,	2.750
Milk,	1.032
Naptha, . . . . .	.700
Nickel,	8.279
Nitre,	1.900
Oak,	1.170
Oil — Castor, . . . . .	.970
“ — Linseed, . . . . .	.940
“ — Whale, . . . . .	.923
Opal,	2.114
Opium,	1.337
Pearl,	2.510
Pewter,	7.471
Phosphorus,	1.770
Pine, . . . . .	.540 to .683
Platinum — Native,	17.000
“ — Wire,	21.041

.804	Poplar, . . . . .	.383
2.386	Porcelain,	2.385
1.063	Potassium, . . . . .	.865
3.700	Plum, . . . . .	.785
3.700	Quartz.	2.500
.750	Rosin,	1.100
2.716	Salt,	2.130
.891	Silver — Cast,	10.474
3.568	“ — Coin,	10.534
4.000	Slate,	2.110
2.750	Steel,	7.816
.032	Stone,	2.000 to 2.700
.700	Sugar,	1.606
3.279	Sulphur, fused,	1.990
.900	Tallow, . . . . .	.941
.170	Tar,	1.015
.970	Tin,	7.291
.940	Turpentine, Spirits of, . . . . .	.870
.923	Vinegar,	1.013
.114	Walnut, . . . . .	.671
.337	Water, Sea,	1.028
.510	Wax, . . . . .	.897
.471	Willow, . . . . .	.585
.770	Wine, . . . . .	.992
.683	Zinc, Cast,	7.190

Aeriform bodies are referred to the air.

The general formula is : —

Weight = Volume × Specific Gravity.

TEMPERATURE.

The unit of Temperature Measure is the Degree.

The countries which have adopted the Metric System use generally the Centigrade Degree.

The Centigrade thermometer marks :

0 in melting ice.

100 in boiling water.

To find a Centigrade temperature when the Fahrenheit's temperature is given, use the general formula :—

$$T_c = (T_f - 32) \frac{5}{9}$$

EXAMPLE.

How many Centigrade Degrees are there in 57° Fahrenheit?

$$T_c = (57 - 32) \frac{5}{9}$$

$$T_c = 25 \times \frac{5}{9}$$

$$T_c = \frac{125}{9} = 13\frac{8}{9} = 13^{\circ}.88.$$

This formula is a general one, and can be used for temperatures below zero ; in this case the algebraical rule of signs must be followed.

TABLE OF COMPARISONS.
(Above Zero.)

CENTIGRADI.		FAHRENHEIT.
0°	=	32°
5°	=	41°
10°	=	50°
15°	=	59°
20°	=	68°
25°	=	77°
30°	=	86°
35°	=	95°
40°	=	104°
45°	=	113°
50°	=	122°
55°	=	131°
60°	=	140°
65°	=	149°
70°	=	158°
75°	=	167°
80°	=	176°
85°	=	185°
90°	=	194°
95°	=	203°
100°	=	212°

TABLE OF COMPARISONS.
(Below Zero.)

CENTIGRADE.		FAHRENHEIT.
0°	=	32°
— 5°	=	23°
— 10°	=	14°
— 15°	=	5°
— 20°	= —	4°
— 25°	= —	13°
— 30°	= —	22°
— 35°	= —	31°
— 40°	= —	40°
— 45°	= —	49°
— 50°	= —	58°
— 55°	= —	67°
— 60°	= —	76°
— 65°	= —	85°
— 70°	= —	94°
— 75°	= —	103°
— 80°	= —	112°
— 85°	= —	121°
— 90°	= —	130°
— 95°	= —	139°
— 100°	= —	148°

In some countries of North Europe and Germany they use the Reaumur Thermometer.

This thermometer marks :—

0° in melting ice.

80° in boiling water.

Thus :—

To find the corresponding Centigrade temperature when Reaumur's temperature is given, use the formula :—

$$T_c = T_r \times \frac{5}{4}$$

EXAMPLE.

How many Centigrade degrees are there in 28 Reaumur degrees ?

$$T_c = \frac{28 \times 5}{4} = 35.$$



TABLES OF EQUIVALENTS.

EQUIVALENTS OF LINEAR MEASURE.

- 1 inch = 2.54 centimeters.
 1 foot = 0.3048 of a meter.
 1 yard = 0.9144 of a meter.
 1 rod = 5.029 meters.
 1 mile = 1.6093 kilometer.
 1 centimeter = 0.3937 of an inch.
 1 decimeter = 0.328 of a foot.
 1 meter = 1.0936 yard.
 1 decameter = 1.9884 rod.
 1 kilometer = 0.62137 of a mile.
-

EQUIVALENTS OF SQUARE MEASURE.

- 1 sq. inch = 6.452 sq. centimeters.
 1 sq. foot = 0.0929 of a sq. meter.
 1 sq. yard = 0.8361 of a sq. meter.
 1 sq. rod = 25.293 sq. meters.
 1 acre = 40.47 ars.
 1 sq. mile = 259 hectars.
 1 sq. centimeter = 0.155 of a sq. inch.
 1 sq. decimeter = 0.1076 of a sq. foot.
 1 sq. meter = 1.196 sq. yard.
 1 ar = 3.954 sq. rods.
 1 hectar = 2.471 acres.
 1 sq. kilometer = 0.3861 of a sq. mile.

EQUIVALENTS OF CUBIC MEASURE.

1 cu. inch = 16.387 cu. centimeters.

1 cu. foot = 28.317 cu. decimeters.

1 cu. yard = 0.7645 of a cu. meter.

1 cord = 3.624 sters.

1 cu. centimeter = 0.061 of a cu. inch.

1 cu. decimeter = 0.035 of a cu. foot.

1 cu. meter = 1.308 cu. yard.

1 ster = 0.2759 of a cord.

EQUIVALENTS OF CAPACITY.

1 liquid quart = 0.9463 of a liter.

1 dry quart = 1.101 liter.

1 liquid gallon = 3.785 of a decaliter.

1 peck = 0.881 of a decaliter.

1 bushel = 3.524 of a hectoliter.

1 liter = 1.0567 liquid quarts.

1 liter = 0.908 of a dry quart.

1 decaliter = 2.6417 liquid gallons.

1 decaliter = 1.135 pecks.

1 hectoliter = 2.8375 bushels.

EQUIVALENTS OF WEIGHT.

1 ounce, A.	= 28.35 grams.
1 ounce, T.	= 31.104 grams.
1 pound, A.	= 0.4536 of a kilogram.
1 pound, T.	= 0.3732 of a kilogram.
1 grain, T.	= 0.0648 of a gram.
1 ton (2000 lbs.)	= 0.9072 of a tonneau.
1 gram	= 0.03527 of an ounce, A.
1 gram	= 0.03215 of an ounce, T.
1 gram	= 15.432 grains, T.
1 kilogram	= 2.2046 pounds, A.
1 kilogram	= 2.679 pounds, T.
1 tonneau	= 1.1023 ton of 2,000 lbs.

MONEY MEASURE.

The unit of money is the dollar. The dollar has no higher denomination. The lower denomination in use is the cent.

One dollar is equal to 100 cents.

The abbreviation of dollar is \$.

TABLE OF CURRENCY.

Country.	Unit of Currency.	Standard.	Value in Canadian Money.
Argentine Republic.	Peso of 100 centavos.....	*G. and S.	\$.965
Austria	Florin of 100 kreutzers	S.	.336
Belgium.....	Franc of 100 centimes	G. and S.	.193
Bolivia.....	Boliviano of 100 centavos.....	S.	.68
Brazil	Milreis of 1,000 reis	G.	.546
Chili	Peso of 100 centavos.....	G. and S.	.912
Cuba.....	Peso of 100 centavos.....	G. and S.	.926
Denmark	Crown of 100 ore.....	G.	.268
Equador	Sucre of 100 centavos.....	S.	.68
Egypt.....	Pound of 100 piastres.....	G.	4.943
France	Franc of 100 centimes	G. and S.	.193

* G. and S. mean Gold and Silver.

TABLE OF CURRENCY.—*Continued.*

Country.	Unit of Currency.	Standard.	Value in Canadian Money.
Great Britain	Pound sterling of 20 shillings..	G.	4.8665
Greece	Drachma of 100 lepta	G. and S.	.193
German Empire	Mark of 100 pfennige	G.	.238
Guatemala	Peso of 100 centavos	S.	.68
Hayti	Gourde	G. and S.	.965
Honduras	Peso of 100 centavos	S.	.68
India	Rupee of 16 annas	S.	.323
Italy	Lira of 100 centesimi	G. and S.	.193
Japan	Yen of 100 sen	G.	.997
Liberia	Dollar of 100 cents	G.	1.00
Mexico	Dollar of 100 centavos	S.	.739
Netherlands	Florin of 100 cents	G. and S.	.402

Nicaragua.....	Peso of 100 centavos.....	S.	.68
Norway.....	Crown of 100 ore.....	G.	.268
Peru.....	Sol of 100 centavos.....	S.	.68
Portugal.....	Milreis of 1,000 reis.....	G.	1.08
Russia.....	Rouble of 100 copeks.....	S.	.544
Spain.....	Peseta of 100 centimes.....	G. and S.	.193
Sweden.....	Crown of 100 ore.....	G.	.268
Switzerland.....	Franc of 100 centimes ...	G. and S.	.193
Turkey.....	Piaster of 40 paras.....	G.	.044
United States.....	Dollar of 100 cents.....	G. and S.	1.00
Venezuela.....	Bolivar.....	G. and S.	.136

+

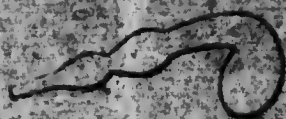
1/11

1/11

1/11

1/11

1/11



**Chemical and
Assay Apparatus.**

**Metric Weights,
Measures and Charts.**

Apparatus of all kinds for
Colleges, Schools, Chem-
ists and Assayers.



Write for Catalogue

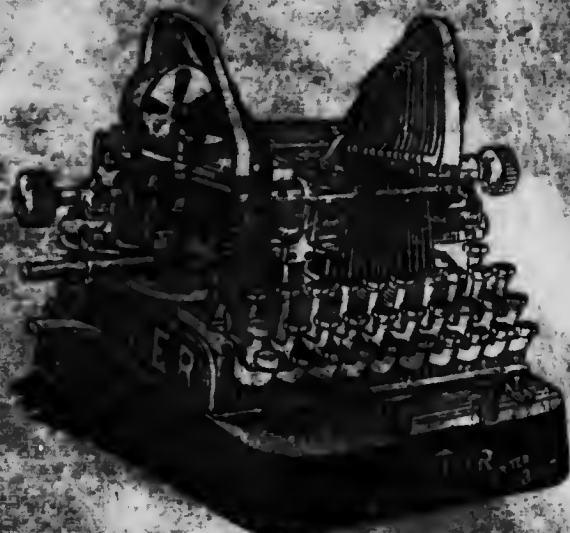
Lyman, Sons & Co., Montreal.

John Lovell & Son,

FINE BOOK and
JOB PRINTERS,

33 to 31 St. Nicholas St.,
MONTREAL.

"When in doubt tell the Truth."



New ideas prevail in weights and measures and in Typewriters.

The OLIVER Typewriter possesses all the new ideas, including visible writing, writing in colors, direct ruling on the Machine.

LINOTYPE COMPANY,
156 St. Antoine Street, MONTREAL.

Le Stenographe Canadien and Canadian Shorthand Journal

Founded in 1880, is the only
up-to-date Shorthand Journal
in the Dominion, published in
English and French, contain-
ing everything of interest to
stenographers and typewriters

Price \$1.00 a year.

Telephone Main 2515

J. O. LAROCHELLE,

PUBLISHER,

MONTREAL.



