

## Withdrawn NIST Technical Series Publication

### Warning Notice

The attached publication has been withdrawn (archived), and is provided solely for historical purposes. It may have been superseded by another publication (indicated below).

#### Withdrawn Publication

<b>Series/Number</b>	NBS Miscellaneous Publication 234
<b>Title</b>	Household Weights and Measures
<b>Publication Date(s)</b>	November 15, 1960
<b>Withdrawal Date</b>	March 1978
<b>Withdrawal Note</b>	Superseded by NBS Special Publication (SP) 430

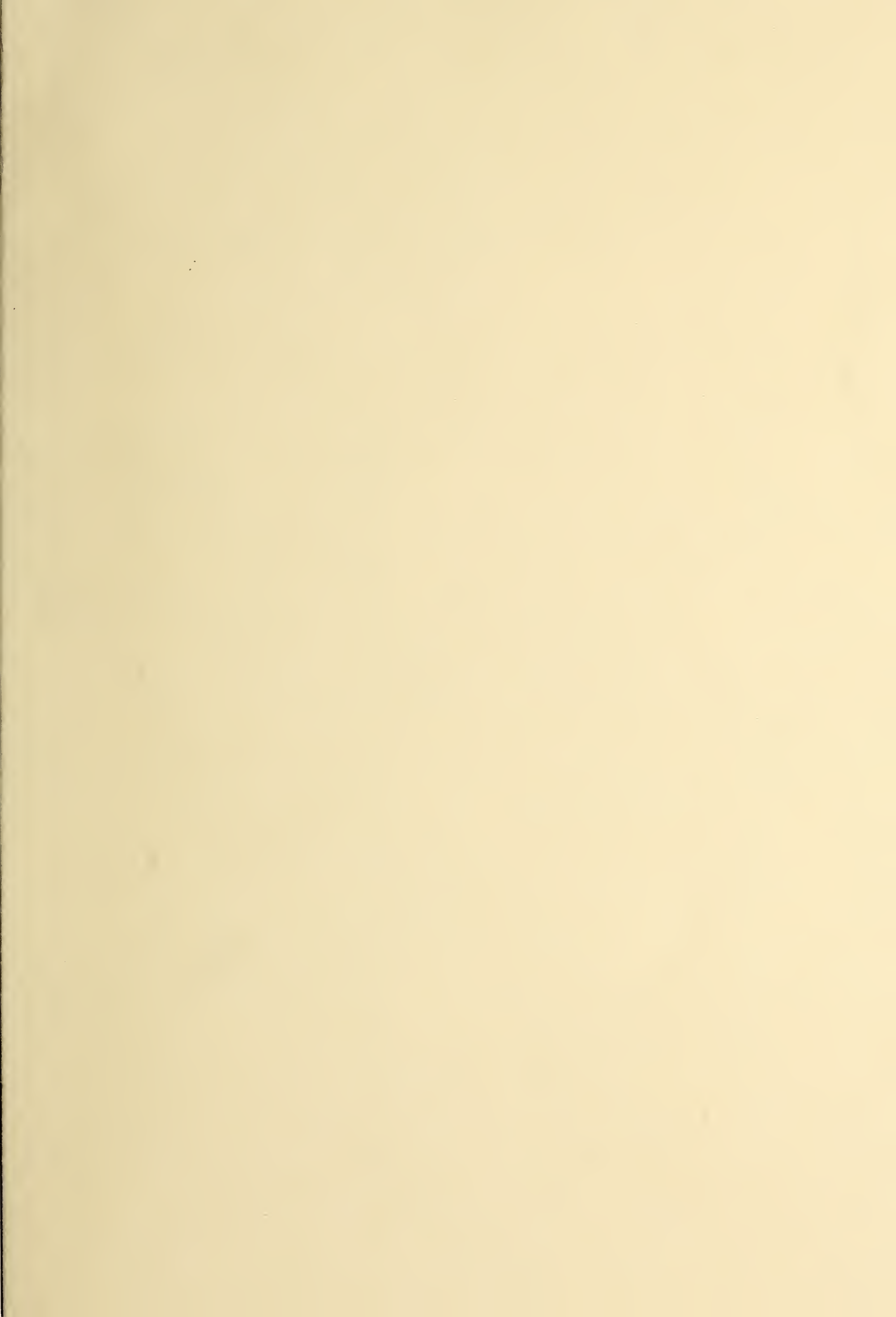
#### Superseding Publication(s) *(if applicable)*

The attached publication has been **superseded by** the following publication(s):

<b>Series/Number</b>	Superseded by NBS Special Publication (SP) 430
<b>Title</b>	Household Weights and Measures
<b>Author(s)</b>	
<b>Publication Date(s)</b>	March 1978
<b>URL/DOI</b>	<a href="https://doi.org/10.6028/NBS.SP.430">https://doi.org/10.6028/NBS.SP.430</a>

#### Additional Information *(if applicable)*

<b>Contact</b>	Elizabeth Benham, Office of Weights and Measures
<b>Latest revision of the attached publication</b>	
<b>Related Information</b>	
<b>Withdrawal Announcement Link</b>	



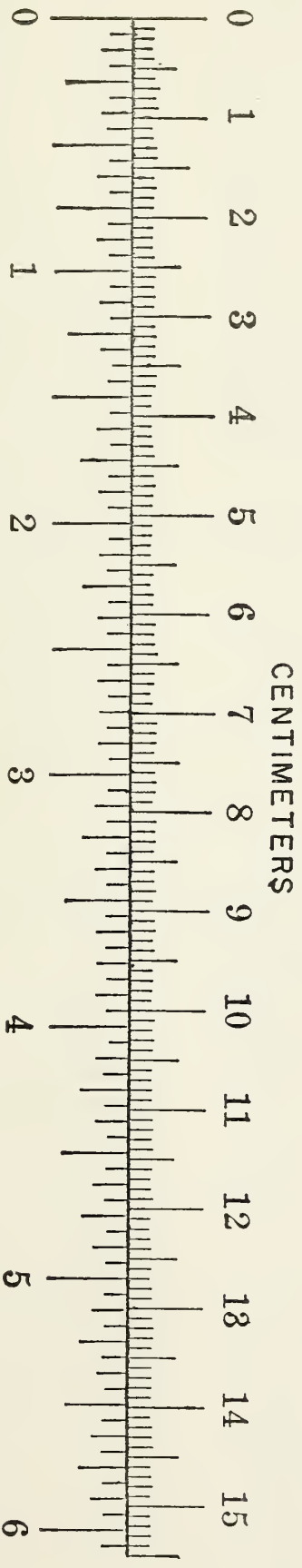


1 fathom =  $\frac{6}{7}$  mile = 6 feet = 1 fluid ounce, U.S. = 1.04 fluid ounces, British = 1 quart, British = 1.20 quarts, liquid, U.S.

### METRIC SYSTEM

The principal units of the metric system are the meter, which is the unit of length, the gram, which is the unit of mass (weight), and the liter, which is the unit of capacity. (There is also a unit of area, the are, which is equal to 100 square meters.) Other units in the metric system are the decimal subdivisions and multiples of the basic units, named by combining the proper prefix with the name of the basic unit to form self-defining terms. The recognized prefixes are "milli-," meaning the one-thousandth part; "centi-," meaning the one-hundredth part; "deci-," meaning the one-tenth part; "deka-," meaning ten times; "hecto-,"

meaning one hundred times; and "kilo-," meaning one thousand times. Not all of these prefixes are in general use; those most commonly employed are "centi-," "milli-," and "kilo-." Thus, for example, "milliliter" means the one-thousandth part of a liter, "centimeter" means the one-hundredth part of a meter, and "kilogram" means 1000 grams. A very small metric weight subdivision frequently used is the microgram, equal to 1 thousandth of a milligram. In formulas for pharmaceuticals, the abbreviation "mcg" is often used for microgram; in scientific work the recognized abbreviation is  $\mu\text{g}$ .



### METRIC—U.S. EQUIVALENTS (To second decimal place)

LENGTH		CAPACITY		WEIGHT	
1 millimeter	= 0.04 inch	1 cubic centimeter	= 0.27 fluid dram	1 gram	= 0.04 ounce avoirdupois
1 centimeter	= 0.39 inch	1 liter	= 1.06 liquid quarts	1 kilogram	= 2.20 pounds avoirdupois
1 meter	= 39.37 inches			1 metric ton	= 1000 kilograms
1 kilometer	= 1.09 yards				= 2204.62 pounds avoirdupois
	= 0.62 statute mile				= 1.10 tons



# HOUSEHOLD WEIGHTS AND MEASURES

The purpose of this card is to present in convenient form the weights and measures tables most useful for household purposes, together with associated weights and measures information of general household interest.

## ADVICE TO THE HOUSEWIFE

Buy solid commodities by weight whenever possible. In any event, buy by definite quantity whenever practicable, and not by money's worth.  
Learn the price per pound, per quart, etc., of what you buy. Learn to read the scale indications, and observe the weighing of your purchases. Check your purchases for price extension and quantity received. Mere package size may be deceptive. Read and compare labeled quantities in relation to price.

Demand accurate weight and measure in your purchases just as you demand accurate change from the cashier. Some stores provide scales on which you can check the weights of your purchases. Use them!  
Become acquainted with your local or State weights and measures official, and consult him if in doubt on any weights and measures matter.  
Report suspected inaccuracies or violations of the weights and measures laws and regulations to your weights and measures official.

## CALORIES

The "calorie" is basically a unit of measure of heat. The large, or great, calorie is defined as the amount of heat required to raise the temperature of one kilogram of water one degree centigrade. This calorie is used as the unit for expressing the heat-producing or energy-producing value of food. When it is said that a certain amount of a particular food contains so many calories, this statement means that the specified amount of that food is capable of releasing to the body the specified amount of energy, through oxidation in the tissues of the digested protein, fat, and carbohydrate constituents of the food.

Energy values in excess of those expended for bodily activities are stored in the body as fat.  
A 30-page pamphlet published by the U.S. Department of Agriculture and entitled "Nutritive Value of Foods," presents tabular information on the nutritive value of a large number of foods, including calorie values. Copies of this publication, which is designated by the number H & G Bulletin 72, may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., at 20 cents a copy.

## EQUIVALENTS OF THE COMMON CAPACITY UNITS USED IN THE KITCHEN

Units	Fluid drams	Tea- spoon- fuls	Table- spoon- fuls	Fluid ounces	¼ cup- fuls	Gills (½ cup- fuls)	Cup- fuls	Liquid pints	Liquid quarts	Milli- liters*	Liters	Units
1 fluid dram equals.....	1	¾	¼	⅙	⅓	⅙	⅙	⅙	⅙	3.7	0.004	Equals 1 fluid dram
1 teaspoonful equals.....	1½	1	½	⅙	⅓	⅙	⅙	⅙	⅙	4.9	0.005	Equals 1 teaspoonful
1 tablespoonful equals.....	4	3	1	⅙	⅓	⅙	⅙	⅙	⅙	15	0.015	Equals 1 tablespoonful
1 fluid ounce equals.....	8	6	2	1	½	⅓	⅙	⅙	⅙	30	0.030	Equals 1 fluid ounce
¼ cupful equals.....	16	12	4	2	1	½	⅙	⅙	⅙	59	0.059	Equals ¼ cupful
1 gill (½ cupful) equals.....	32	24	8	4	2	1	⅙	⅙	⅙	118	0.118	Equals 1 gill (½ cupful)
1 cupful equals.....	64	48	16	8	4	2	1	½	¼	237	0.237	Equals 1 cupful
1 liquid pint equals.....	128	96	32	16	8	4	2	1	½	473	0.473	Equals 1 liquid pint
1 liquid quart equals.....	256	192	64	32	16	8	4	2	1	946	0.946	Equals 1 liquid quart
1 milliliter* equals.....	0.27	0.20	0.068	0.034	0.017	0.0084	0.0042	0.0021	0.0011	1	⅓ <sub>1000</sub>	Equals 1 milliliter*
1 liter equals.....	270	203	67.6	33.8	16.9	8.45	4.23	2.11	1.06	1000	1	Equals 1 liter

\*For all household purposes 1 milliliter may be considered as equal to 1 cubic centimeter.

NOTE.—Values in italics are correct to the number of significant figures shown; all others are exact values.

## APPROXIMATE WEIGHTS OF SOME COMMODITIES IN AVOIRDUPOIS OUNCES PER CUP

Beans (dry).....	6½	Flour (cake, sifted).....	3½	Raisins (seedless).....	5
Butter, margarine, cooking oils.....	8	Milk (whole, fluid).....	8½	Rice.....	7
Citrus fruit juice (fresh).....	8½	Milk (dry).....	4½	Shortening (vegetable).....	7
Cornflakes.....	1	Oatmeal.....	3	Sugar (brown, moist, firmly packed).....	7½
Corn meal.....	5	Pancake mix.....	5	Sugar (granulated).....	7
Eggs (whole).....	8½	Prunes (dried).....	5½	Water.....	8½
Flour (wheat, all-purpose, sifted).....	4				

The foregoing weights are approximate only, and should not be used for determining whether or not correct weight is received when commodities are bought.

## RULES FOR COMPUTING CIRCUMFERENCE, AREAS, AND VOLUMES

NOTE.—Express all dimensions in terms of the same unit—for example, in terms of feet. A computed area will then be in terms of the square of the dimensional unit used—for example, square feet—and a computed volume will be in terms of the cube of the dimensional unit used—for example, cubic feet.

Circumference of circle:  $3.1416 \times \text{diameter}$ .  
Area of circle:  $0.7854 \times \text{diameter} \times \text{diameter}$ .  
Area of rectangle:  $\text{Length} \times \text{width}$ .  
Capacity of rectangular bin:  $\text{Length} \times \text{width} \times \text{depth}$ .

Volume of cylinder:  $0.7854 \times \text{diameter} \times \text{diameter} \times \text{height}$ .  
Approximate capacity of container having sloping sides:  
 $\text{Vertical height} \times \text{one-half the sum of top area and bottom area}$ .

## WEIGHTS AND MEASURES TABLES

(Including some metric equivalents, to second decimal place)

### AVOIRDUPOIS WEIGHT

1 dram	=	27 <sup>11</sup> / <sub>32</sub> grains
1 ounce	=	$\left\{ \begin{array}{l} 16 \text{ drams} \\ 437\frac{1}{2} \text{ grains} \end{array} \right\}$ = 28.35 grams
1 pound	=	$\left\{ \begin{array}{l} 16 \text{ ounces} \\ 7000 \text{ grains} \end{array} \right\}$ = $\left\{ \begin{array}{l} 453.59 \text{ grams} \\ 0.45 \text{ kilogram} \end{array} \right\}$
1 hundred-weight	=	100 pounds
1 ton	=	2000 pounds = $\left\{ \begin{array}{l} 907.18 \text{ kilograms} \\ 0.91 \text{ metric ton} \end{array} \right\}$
1 long gross ton	=	2240 pounds

Note.—The "grain" is the same in avoirdupois, troy, and apothecaries weight.

### TROY WEIGHT

(Used for precious metals)

1 pennyweight	=	24 grains
1 ounce	=	$\left\{ \begin{array}{l} 20 \text{ pennyweights} \\ 480 \text{ grains} \end{array} \right\}$ = 31.10 grams
1 pound	=	$\left\{ \begin{array}{l} 12 \text{ ounces} \\ 5760 \text{ grains} \end{array} \right\}$ = 373.24 grams

### APOTHECARIES WEIGHT

1 scruple	=	20 grains
1 dram	=	3 scruples
1 ounce	=	$\left\{ \begin{array}{l} 8 \text{ drams} \\ 480 \text{ grains} \end{array} \right\}$ = 31.10 grams
1 pound	=	$\left\{ \begin{array}{l} 12 \text{ ounces} \\ 5760 \text{ grains} \end{array} \right\}$ = 373.24 grams

### LINEAR MEASURE

1 foot	=	12 inches = 2.54 centimeters
1 yard	=	3 feet = 30.48 centimeters
1 rod	=	$\left\{ \begin{array}{l} 5\frac{1}{2} \text{ yards} \\ 16\frac{1}{2} \text{ feet} \end{array} \right\}$ = 0.91 meter
1 statute mile	=	$\left\{ \begin{array}{l} 320 \text{ rods} \\ 1760 \text{ yards} \\ 5280 \text{ feet} \end{array} \right\}$ = 1609.34 meters

(1 furlong =  $\frac{1}{8}$  statute mile).  
 (1 international nautical mile = 1852 meters = 6076.11549 feet).  
 (The "knot" is a unit of speed, equal to 1 nautical mile per hour).

### AREA MEASURE

1 square foot	=	144 square inches
1 square yard	=	9 square feet
1 square rod	=	$30\frac{1}{4}$ square yards
1 acre	=	$\left\{ \begin{array}{l} 160 \text{ square rods} \\ 4840 \text{ square yards} \\ 43560 \text{ square feet} \end{array} \right\}$ = 0.40 hectare
1 square mile	=	$\left\{ \begin{array}{l} 640 \text{ acres} \\ 259.00 \text{ hectares} \end{array} \right\}$
1 section of land	=	1 mile square

### CUBIC MEASURE

1 cubic foot	=	1728 cubic inches = 28.32 cubic decimeters
1 cubic yard	=	27 cubic feet = 0.76 cubic meter

### LIQUID MEASURE

1 fluid ounce	=	8 fluid drams = 29.57 milliliters
1 gill	=	4 fluid ounces
1 pint	=	$\left\{ \begin{array}{l} 4 \text{ gills} \\ 16 \text{ fluid ounces} \end{array} \right\}$ = 473.16 milliliters
1 quart	=	$\left\{ \begin{array}{l} 2 \text{ pints} \\ 32 \text{ fluid ounces} \end{array} \right\}$ = 0.95 liter
1 gallon	=	$\left\{ \begin{array}{l} 4 \text{ quarts} \\ 231 \text{ cubic inches} \end{array} \right\}$ = 3.79 liters

### DRY MEASURE

1 quart	=	2 pints = 1.10 liters
1 peck	=	8 quarts = 8.81 liters
1 bushel	=	$\left\{ \begin{array}{l} 4 \text{ pecks} \\ 2150.42 \text{ cubic inches} \end{array} \right\}$ = 3.52 dekaliters

## MISCELLANEOUS EQUIVALENTS

(To second decimal place)

1 bushel, U.S.	=	$\left\{ \begin{array}{l} 2150.42 \text{ cubic inches} \\ 1.24 \text{ cubic feet} \end{array} \right\}$	1 gallon, British Imperial	=	$\left\{ \begin{array}{l} 1.20 \text{ gallons, U.S.} \\ 160 \text{ fluid ounces, British} \end{array} \right\}$	1 pound avoirdupois	=	1.22 pounds, troy or apothecaries
1 carat (precious stones)	=	200 milligrams	1 gallon, U.S.	=	$\left\{ \begin{array}{l} 0.13 \text{ cubic foot} \\ 0.83 \text{ gallon, British} \end{array} \right\}$	1 pound, troy or apothecaries	=	0.82 pound avoirdupois
1 carat (fineness of gold alloy)	=	$\frac{1}{24}$ part	1 hand	=	$\left\{ \begin{array}{l} 4 \text{ inches} \\ 0.96 \text{ fluid ounce, U.S.} \end{array} \right\}$	1 quart, dry, U.S.	=	$\left\{ \begin{array}{l} 67.20 \text{ cubic inches} \\ 1.16 \text{ quarts, liquid, U.S.} \end{array} \right\}$
1 cord (firewood)	=	128 cubic feet	1 fluid ounce, British	=	$\left\{ \begin{array}{l} 1 \text{ quart, liquid, U.S.} \\ 0.83 \text{ quart, British} \end{array} \right\}$	1 quart, liquid, U.S.	=	$\left\{ \begin{array}{l} 57.75 \text{ cubic inches} \\ 0.83 \text{ quart, British} \end{array} \right\}$
1 cubic foot	=	$\left\{ \begin{array}{l} 7.48 \text{ gallons} \\ 0.80 \text{ bushel} \end{array} \right\}$						
1 furlong	=	220 yards						





## WEIGHTS AND MEASURES TABLES

(Including some metric equivalents, to second decimal place)

AVOIRDUPOIS WEIGHT	
1 dram	= 27 <sup>11</sup> / <sub>32</sub> grains
1 ounce	= { 16 (drams) } = 28.35 grams
	= { 437 <sup>1</sup> / <sub>2</sub> grains }
1 pound	= { 16 ounces } = { 453.59 grams }
	= { 7000 grains } = { 0.45 kilogram }
1 hundred-weight	= 100 pounds
1 ton	= 2000 pounds = { 907.18 kilograms }
(1 long or gross ton	= 2240 pounds) = { 0.91 metric ton }

TROY WEIGHT	
(Used for precious metals)	
1 pennyweight	= 24 grains
1 ounce	= { 20 pennyweights } = 31.10 grams
	= { 480 grains }
1 pound	= { 12 ounces } = 373.24 grams
	= { 5760 grains }

APOTHECARIES WEIGHT	
1 scruple	= 20 grains
1 dram	= 3 scruples
	= 8 drams
1 ounce	= { 480 grains } = 31.10 grams
	= { 12 ounces } = 373.24 grams
1 pound	= { 5760 grains }

NOTE.—The "grain" is the same in avoirdupois, troy, and apothecaries weight.

LINEAR MEASURE	
1 foot	= 12 inches = 2.54 centimeters
1 yard	= 3 feet = 30.48 centimeters
	= 0.91 meter
1 rod	= { 5 <sup>1</sup> / <sub>2</sub> yards }
	= { 16 <sup>1</sup> / <sub>2</sub> feet }
1 statute mile	= { 1760 yards } = 1609.34 meters
	= { 5280 feet }
(1 furlong=	<sup>1</sup> / <sub>10</sub> statute mile).
(1 international nautical mile=	1852 meters=
	5976.11549 feet).
(The "knot" is a unit of speed, equal to 1 nautical mile per hour).	

AREA MEASURE	
1 square foot	= 144 square inches
1 square yard	= 9 square feet
1 square rod	= 30 <sup>1</sup> / <sub>4</sub> square yards
1 acre	= { 160 square rods } = 0.40 hectare
	= { 4840 square yards } = 259.00 hectares
1 square mile	= { 43560 square feet } = 259.00 hectares
	= { 640 acres }
1 section of land	= 1 mile square

CUBIC MEASURE	
1 cubic foot	= 1728 cubic inches = 28.32 cubic decimeters
1 cubic yard	= 27 cubic feet = 0.76 cubic meter

LIQUID MEASURE	
1 fluid ounce	= 8 fluid drams = 29.57 milliliters
1 gill	= 4 fluid ounces
1 pint	= { 4 gills } = 473.16 milliliters
	= { 16 fluid ounces }
1 quart	= { 2 pints } = 0.95 liter
	= { 32 fluid ounces }
1 gallon	= { 4 quarts } = 3.79 liters
	= { 231 cubic inches }

DRY MEASURE	
1 quart	= 2 pints = 1.10 liters
1 peck	= 8 quarts = 8.81 liters
1 bushel	= { 4 pecks } = 3.52 dekaliters
	= { 2150.42 cubic inches }

### MISCELLANEOUS EQUIVALENTS

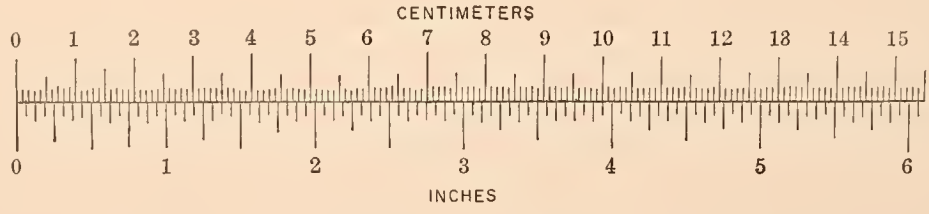
(To second decimal place)

1 bushel, U.S.	= { 2150.42 cubic inches }	1 gallon, British Imperial	= { 1.20 gallons, U.S. }	1 pound avoirdupois	= 1.22 pounds, troy or apothecaries
1 carat (precious stones)	= 1.24 cubic feet		= 160 fluid ounces, British	1 pound, troy or apothecaries	= 0.82 pound avoirdupois
1 carat (fineness of gold alloy)	= <sup>1</sup> / <sub>24</sub> part	1 gallon, U.S.	= { 0.13 cubic foot }		
1 cord (firewood)	= 128 cubic feet		= 0.83 gallon, British Imperial	1 quart, dry, U.S.	= { 67.20 cubic inches }
1 cubic foot	= { 7.48 gallons }	1 hand	= 4 inches		= { 1.16 quarts, liquid, U.S. }
	= { 0.80 bushel }	1 fluid ounce, British	= 0.96 fluid ounce, U.S.	1 quart, liquid, U.S.	= { 57.75 cubic inches }
1 furlong	= 220 yards	1 fluid ounce, U.S.	= 1.04 fluid ounces, British		= { 0.83 quart, British liquid, U.S. }
1 fathom	= <sup>3</sup> / <sub>2</sub> feet				

### METRIC SYSTEM

The principal units of the metric system are the meter, which is the unit of length, the gram, which is the unit of mass (weight), and the liter, which is the unit of capacity. (There is also a unit of area, the are, which is equal to 100 square meters.) Other units in the metric system are the decimal subdivisions and multiples of the basic units, named by combining the proper prefix with the name of the basic unit to form self-defining terms. The recognized prefixes are "milli-" meaning the one-thousandth part; "centi-" meaning the one-hundredth part; "deci-" meaning the one-tenth part; "deka-" meaning ten times; "hecto-,"

meaning one hundred times; and "kilo-," meaning one thousand times. Not all of these prefixes are in general use; those most commonly employed are "centi-," "milli-," and "kilo-." Thus, for example, "milliliter" means the one-thousandth part of a liter, "centimeter" means the one-hundredth part of a meter, and "kilogram" means 1000 grams. A very small metric weight subdivision frequently used is the microgram, equal to 1 thousandth of a milligram. In formulas for pharmaceuticals, the abbreviation "mcg" is often used for microgram; in scientific work the recognized abbreviation is  $\mu$ g.



### METRIC—U.S. EQUIVALENTS

(To second decimal place)

LENGTH		CAPACITY		WEIGHT	
1 millimeter	= 0.04 inch	1 cubic centimeter	= 0.27 fluid dram	1 gram	= 0.04 ounce avoirdupois
1 centimeter	= 0.39 inch	1 liter	= 1.06 liquid quarts	1 kilogram	= 2.20 pounds avoirdupois
1 meter	= { 39.37 inches }				= { 1000 kilograms }
	= { 1.09 yards }			1 metric ton	= 2204.62 pounds avoirdupois
1 kilometer	= 0.62 statute mile				= 1.10 tons



