

BALANCES, WEIGHTS AND MEASURES

ACCURATE DISPENSING REQUIRES THE USE OF ACCURATE BALANCES, WEIGHTS AND MEASURES.

HISTORY

Balances in the form of equal arm beam scales have been used from as early as 4000 BC. The accuracy of the basic idea of a stick with pans at each end across a pivot was limited until the introduction, during the 1500s, of friction reducing metal knife-edge pivots at the centre and beam ends. Until the mid-1800s, pharmacists used hand scales in the preparation and selling of medicines. More accurate and more convenient pillar-mounted bench scales replaced these.

Man's first weights were stones (the name still exists as a weight on the older personal weighing machine - 1 stone = 14 pounds). Original Mediterranean weights were based on the seeds of the liquorice plant and the carob plant and stone weights graduated to these. In ancient Greece lead was used.

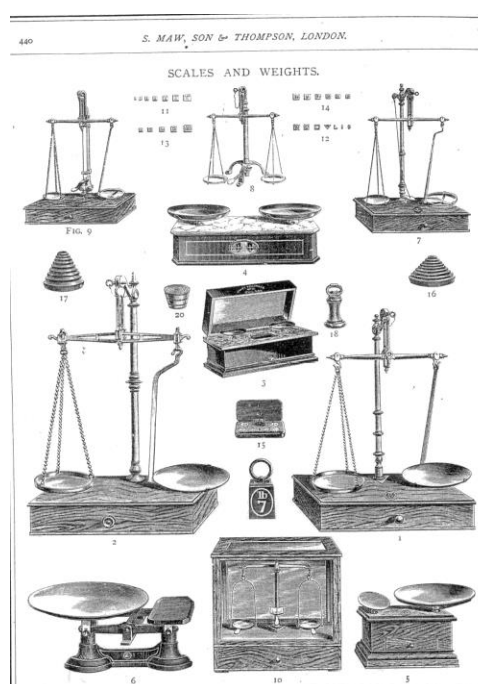
English weights were evolved by the Romans (ounce = oncia, pound = Libra pondo) using a grain of wheat as the standard. Apothecaries' weight, a variation of the Troy weight system, was used in Europe for the measurement of pharmaceutical ingredients from as early as 1270. Henry VIII decreed Troy weights (5,760 grains to a pound) to test coins. Elizabeth I decided that a pound of 7,000 grains should be used for selling ordinary goods and that Troy weights were to be used for precious metals and stones.

In 1758 Parliament legalised only the Troy pound. However, traders preferred the 7,000-grain Avoirdupois pound which they continued to use. It was standardised in 1824.

Despite formal adoption of the Avoirdupois weights and measures under the Medicinal Act of 1858, Troy weights remained in general use for prescribing and dispensing. The British Pharmacopoeia of 1914 adopted the Metric system for all but medicinal doses. Dispensing continued in the Apothecary system until 1 January 1971 when metric weights and measures were adopted.

Measures of volume have been used for solids and liquids, although pharmaceutical use has been mostly for liquids. Until the 1600s, measures were mainly manufactured from wood which gave way to pewter, horn and, by the 1800s, to glass.

The 1618 London Pharmacopoeia adopted the Roman gallon as its basic liquid measure and gives a table for the conversion of units of liquid capacity into Apothecary weight. The Imperial Gallon was defined as the volume occupied by 10 Imperial pounds of water and was confirmed as the standard in 1824.



BALANCES

Pharmacists have normally used two sizes of balance weighing up to 2 ounces for small quantities and up to 2 pounds for larger quantities. In modern pharmacies digital electronic instruments have largely superseded these balances.

APOTHECARY WEIGHTS

The basis of the Apothecary system was the grain. Dispensing and selling were permitted using this system. Weights were as follows:

One grain	gr.	
One scruple	℥	= 20 grains
One drachm	ʒ	= 60 grains
One ounce	℥	= 480 grains
One pound	℔	= 12 ounces = 5760 grains

The only capacity measure in the Apothecary system was the liquid grain, the volume of one grain of water, which was introduced in 1885 as a "metric equivalent" but little used.



Nesting Weights
Museum of the RPSGB

IMPERIAL WEIGHTS (Avoirdupois)

This system, used for the bulk of counter sales, was based on the Imperial pound of 7,000 grains which was subdivided as follows:

One pound	lb.	= 16 oz.
One ounce	oz.	= 437.5 grains

Until the end of the 1800s there was also a dram equivalent to one-sixteenth of an ounce or 27.3 grains.

IMPERIAL MEASURES.

Based on the Imperial gallon and subdivided as follows:

One gallon	C	= 8 pints
One pint	O	= 20 fluid ounces
One fluid ounce	℥	= 8 fluid drachms
One fl. drachm	ʒ	= 60 minims
One minim	℥	



From *Art of Dispensing*, 1926

METRIC WEIGHTS AND MEASURES

Although legalized for use in 1897, Metric weights and measures were not used on a large scale in pharmacies until 1971. Prescriptions around this time will often show grammes indicated as G to distinguish from gr (grains) and the use of cc (a cubic centimetre), equivalent to the ml (millilitre).

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The illustration overleaf shows a selection of scales and weights. From S Maw, Son and Thompson's 1882 wholesale catalogue.

This information sheet is also available in a large font size.
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