

## Units of Measure for Precious Metals

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The precious metals industry uses distinct units to measure and sell metals that come from the *troy system* of weights compared to the more common *avoirdupois (avdp)* system of pounds and ounces we use on a regular basis. Dating back to the Middle Ages, the *troy ounce*, (toz or ozt) is still used today as the primary unit for the sale of precious metals such as gold, platinum, and palladium. <sup>[1]</sup>

The concept of an ounce is suggested to originally derive from the Roman monetary system, where the bronze bars they used as currency could be split into twelve “uncia,” or “ounce” in English.

Numerous theories have been put forth as to the origins of the *troy ounce*. One popular theory suggests the troy system gets its name from Troyes, France, a main trading center in Champagne County. Troyes was an intersection of a number of Roman roads, and became one of the six main hosts of the Champagne Fairs in the 10th century, most likely due to its central location. These annual trade markets operated at their height during the 12th and 13th centuries, promoted by the Counts of Champagne to enhance their wealth. The events attracted diverse merchants and trademen from England, Spain, Italy, Germany, and northern Africa. High traffic marketplaces such as this necessitated a clear-cut regulation for measuring goods such as standardized weights. It is therefore quite possible that the troy ounce was born at this medieval fair. <sup>[2]</sup>

The first suggestion of “troy” as a unit of weight is noted by King Henry IV of England in 1390, and it was made the official unit of measure for gold and silver in England in 1527 by King Henry VIII. <sup>[3]</sup> The British imperial weight system was established in 1824, and included the troy ounce. In 1828 the troy ounce was adopted by the United States as the official measure for coinage by the US Congress. <sup>[4]</sup> In the troy system there are:

- 24 *troy grains* to a *pennyweight (dwt)*
- 20 *pennyweights* to a *troy ounce (toz)*
- 12 *troy ounces* to a *troy pound (tlb)*

See **Figure 1** for a more complete list of conversion factors.

The troy system is distinct from the *avoirdupois system* that is customary in the United States. Importantly, the troy ounce is 1.1x greater than the avoirdupois ounce (oz avdp). In contrast, the troy pound is smaller, comprising only 82.3% of the avoirdupois pound. Today, the majority of prices for precious metals are given in currency per troy ounce. Those that deal with precious metal fabrication also still utilize the pennyweight, in addition to the troy ounce. The troy grain is believed to have derived its weight from a single seed of wheat, and is equal to the avoirdupois grain, both being equivalent to approximately 64.799 mg. <sup>[5]</sup>

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Continued from Page 1

The London Bullion Market Association (LBMA) manages the list of companies and refineries that sell gold and silver bullion to a set specification, ensuring the the quality of precious metal purchased. The specifications for London Good Delivery gold and silver bars set forth by the LBMA include weights of gold and silver in terms of troy ounces. <sup>[1]</sup> Therefore, most precious metal bullion exists today in a form with a precise number of troy ounces. This makes a change to modern units inconvenient and unlikely, as it would require many bars in existence to be melted down and recast.

The modern use of the troy ounce may appear outdated, but its persistence into the 21<sup>st</sup> century provides a fascinating tie to medieval times while also safeguarding the quality of precious metal transactions worldwide.

		To Convert to:						
By	Troy Ounce (toz)	Troy Pound (tlb)	Pennyweight (dwt)	Troy Grain	Ounce (oz avdp)	Pound (lb avdp)	Kilogram (kg)	Gram (g)
1 troy ounce	1	$8.333 \times 10^{-2}$	20	480	1.097	$6.857 \times 10^{-2}$	$3.110 \times 10^{-2}$	31.104
1 troy pound	12	1	240	5760	13.165	0.823	$3.732 \times 10^{-1}$	373.242
1 penny weight	$5 \times 10^{-2}$	$4.167 \times 10^{-3}$	1	24	$5.486 \times 10^{-2}$	$3.429 \times 10^{-3}$	$1.555 \times 10^{-3}$	1.555
1 troy grain	$2.083 \times 10^{-3}$	$1.736 \times 10^{-4}$	$4.167 \times 10^{-2}$	1	$2.286 \times 10^{-3}$	$1.428 \times 10^{-4}$	$6.479 \times 10^{-5}$	$6.479 \times 10^{-2}$
1 ounce (avdp)	0.912	$7.595 \times 10^{-2}$	18.229	437.5	1	$6.25 \times 10^{-2}$	$2.835 \times 10^{-2}$	28.349
1 pound (avdp)	14.583	1.215	291.667	7000	16	1	$4.536 \times 10^{-1}$	453.592
1 kilogram	32.151	2.679	643.015	15432.4	35.274	2.205	1	1000
1 gram	$3.215 \times 10^{-2}$	$2.679 \times 10^{-3}$	$6.430 \times 10^{-3}$	15.432	$3.527 \times 10^{-2}$	$2.205 \times 10^{-3}$	$1 \times 10^{-3}$	1

Figure 1. Common units used in the precious metals industry and their approximate conversions to more common units of mass.

### References

- [1] "The Guide, An Introduction to the Global Precious Metals OTC Market." Edited by Jonathan Spall & G Cubed Metals Ltd, LBMA, LBMA, LPPM, LPMCL, 2017, [www.lbma.org.uk/cn/downloads/LBMA\\_Interactive.pdf](http://www.lbma.org.uk/cn/downloads/LBMA_Interactive.pdf).
- [2] Longnon, Auguste. "Champagne." *The Encyclopedia Britannica: a Dictionary of Arts, Sciences, Literature and General Information*, by Hugh Chisholm, 11th ed., vol. 5, Cambridge University Press, 1911, p. 828.
- [3] Anderson, Anthony Allen. "What Is a Troy Ounce?" *GSI Exchange*, GSI Exchange, 18 May 2020, [gsiexchange.com/what-is-a-troy-ounce/](http://gsiexchange.com/what-is-a-troy-ounce/).
- [4] Continuing the Mint at Philadelphia, and for other purposes, United States of America 20<sup>th</sup> Congress. May 19, 1828.
- [5] Zupko, Ronald Edward. *A Dictionary of Weights and Measures for the British Isles: The Middle Ages to the Twentieth Century*. The American Philosophical Society, 1985.