

Dimensional Analysis: Introduction

Measures

1 fluid drachm	60 minims
1 fluid ounce	8 fluid drachms
1 pint	20 fluid ounces
1 pint	4 gills
1 quart	2 pints
1 gallon	4 quarts
1 peck	2 gallons
1 kenning	2 pecks
1 bushel	4 pecks
1 strike	2 bushel
1 coomb	2 strikes
1 quarter	2 coombs
1 thou	$\frac{1}{1000}$ in
1 barleycorn	4 poppyseeds
1 inch	3 barleycorns
1 foot	12 inches
1 yard	3 feet
1 mile	5280 feet

1 chaldron	36 bushels
1 pin	4.5 gallons
1 firkin	2 pins
1 kilderkin	2 firkins
1 barrel	2 kilderkins
1 puncheon	2 barrels
1 tun	3 puncheons
1 hogshead	2 coombs
1 butt	2 hogshead
1 furlong	10 chains
1 mile	8 furlongs
1 league	3 miles
1 link	7.92 inches
1 rod	25 links
1 pole	
1 perch	
1 chain	100 links
1 mile square	640 acres

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Dimensional analysis relies on analyzing units for proper position and not on numerical value. Complete the following questions using the table above and what you know of the US and SI units of measure.

1. Aanan's house is on a quarter-acre lot. How many square feet is it?
2. A race horse can run at a sustained rate of 32 mph. How long will it take for the horse to complete a 12 furlong race?
3. The muzzle velocity of an ancient cannon was about 420 ft/s. What is the cannonball's speed in miles per hour?
4. A fast walk is considered to be a sustained rate of about 4 mph. How many steps per second is that?
5. Les Misérables has 2783 pages. An average typist can type at 38 words per minute. Assuming an average of 235 words per page, how many hours would it take to type the manuscript for Les Misérables?
6. The circumference of a circle is given by $C = 2\pi r$ where r is the radius. How fast is a 34" diameter bicycle wheel turning when the bicycle is moving at 32 mph?
7. A rain gauge with a cross sectional area of 1 sq.in. will measure 1 inch of rain for every 1 inch depth. If the gauge records $\frac{1}{4}$ in. of rain, how many gallons of water fell on one acre of land?
8. If each person takes 2 ft^2 of land to stand upright, how many people will fit into the state of Texas?
9. How many pins are in one tun?
10. What is the distance to the sun in terms of lunar orbits?