

## Dram Firkins!

Name \_\_\_\_\_

### Dimensional Analysis (Factor-Label Method)

Use the information from the conversion factor table to complete each of the conversions indicated. **Show your work** by multiplying by the appropriate labeled factor(s). **Show the unit cancellation, round to the correct number of significant figures and label your answers!**

1. 28.92 bolts = ? Furlongs
2. 1034 Gills = ? Firkins
3. 27.00 Hands = ? Bolts
4. 1000.2 Drams = ? Grains
5. 112 Rods = ? Hands
6. 27.8 Firkins = ? Hogsheads
7. 598 Fathoms = ? Furlongs
8. 27 Barrels = ? Hogsheads
9. 1.09 leagues = ? Furlongs
10. 87.0 Chaldrons = ? Pecks
11. 999 Drams = ? Pounds
12. 1.0 miles = ? Furlongs

**Dimensional Analysis (Factor-Label Method)**

Most calculation in physics and chemistry involve measured quantities. In such calculations, **the units must be treated mathematically just as the numerical parts of the measurements.** For example: Multiply  $1.2 \text{ cm} \times 2.0 \text{ cm} = 2.4 \text{ cm}^2$ . You multiply the numbers, and you multiplied the units.

**A conversion factor is a ratio that always equals ONE that is used to convert a measurement into different units. (The numerator and denominator both represent the same measurement.)** You can multiply or divide by one as many times as you want and you will always end up with the same measurement—but possibly different units; therefore different numbers.

Example of a conversion factor: 1 meter = 1000 millimeters;  $\frac{1 \text{ meter}}{1000 \text{ mm}} = \frac{1000 \text{ mm}}{1 \text{ meter}} = 1$

When converting a measurement, the number of significant figures stays the same in your final answer no matter the conversion factor, because conversions are usually considered “pure” numbers, and pure numbers have an infinite number of significant figures.

Example of a Dimensional Analysis Problem, solved using the Factor-Label Method:

**Conversion Factors: The Good Old English System!**

- |  |                                  |
|--|----------------------------------|
| 1. 1 firkin = 9 gallons                        | 14. 1 furlong = 40 rods          |
| 2. 1 dram = .125 liquid ounces (or just ounce) | 15. 1 peck = 8 quarts            |
| 3. 1 bolt = 120 feet                           | 16. 1 fathom = 6 feet            |
| 4. 1 hogshead = 63 gallons                     | 17. 1 gill = 4 liquid ounces     |
| 5. 1 quarter = 500 pounds                      | 18. 5280 feet = 1 mile           |
| 6. 1 hand = 4 inches                           | 19. 2 pints = 1 quart            |
| 7. 3 feet = 1 yard                             | 20. 1 ton = 2000 pounds          |
| 8. 16 ounces = 1 pound                         | 21. 1 barrel = 42 gallons        |
| 9. 1 gallon = 4 quarts                         | 22. 1 league = 4.828 kilometers  |
| 10. 1 bushel = 4 pecks                         | 23. 1 gallon = 128 liquid ounces |
| 11. 1 chaldron = 36 bushels                    | 24. 2.54 cm = 1 inch             |
| 12. 1 grain = 0.065 grams                      | 25. 454 g = 1 pound              |
| 13. 1 rod = 16.5 feet                          | 26. 2.2 pounds = 1 kg            |