Recipe Amount Conversions & Formula Cost

VANCOUVER COMMUNITY COLLEGE

There are two systems used for measurements: the U.S. system of measurement (which includes pounds, ounces, gallons, pints, etc.) and the metric system of measurement (which includes grams, liters, meters).

U.S. system of measurement

Weight	
	1 lb = 16 oz
Volume	
	1 gal = 4 qt
	1 qt = 2 pt
	= 4 cups
	= 32 fl oz
	1 pt = 2 cups
	= 16 fl oz
	1 cup = 8 fl oz
	= 48 tsp
	1 fl oz = 2 tbsp
	1 tbsp = 3 tsp

Unit Abbreviations
Pound = lb
Ounce = oz
Gallon = gal
Quart = qt
Pint = pt
Fluid ounce = fl oz
Tbsp = tablespoon
Tsp = teaspoon

Metric system of measurement

Quantity	Unit (abbreviation)
Weight	gram (g)
Volume	liter (L)
Length	meter (m)
Temperature	Celsius (°C)
Common conversions	
1 kg = 1000 g	Kilo = 1000
1 cm = 100 cm	Centi = 100
1 dg = 0.10 g	Deci = 1/10
1 mL = 0.001 L	Milli = 1/1000
These prefixes (kilo-, deci-, centi-, milli-) can be applied to any metric unit.	

Conversion fractions are used to convert between different units within the same system of measurement (for example, gram to kilograms, or gallons to fluid ounces), or between different systems of measurement (gallons to Litres). This worksheet focuses on conversions within one system of measurement, either metric or imperial, but the same strategy can be applied if you need to convert from metric to imperial.

Example 1:   A recipe calls for 4 fluid ounces (fl oz) of milk. You only have a set of measuring cups to work with. How many cups of milk do you need?

Answer: We set up a conversion fraction to go from the unit we *have* to the unit we *want*. We *have* fluid ounces, but we *want* cups. The unit you have goes on the bottom of the fraction, the unit you want goes on the top.

$$4 \text{ fl oz} \times \frac{1 \text{ cup}}{8 \text{ fl oz}} = 0.5 \text{ cup milk}$$

This math says that we should multiply 4 by 1, and then divide by 8. This gives us ½ cup of milk or 0.5 cup of milk.

Example 2: A bread recipe calls for 2500 g of flour. How much flour is this in kg?

Answer: Set up a conversion fraction to translate between the unit we *have* and the unit we *want*. The prefix kilo- means 1000, so we use the following fraction:

$$2500 \text{ g} \times \frac{1 \text{ kg}}{1000 \text{ g}} = 2.5 \text{ kg}$$

Example 3:   A recipe calls for 18 cups of apple juice. You can buy apple juice in gallons at the store. How many gallons do you need to buy?

Answer: We don't have a direct conversion from cups to gallons in the table on page 1, but we can still use conversion fractions. We can convert to quarts, and then to gallons to get our answer. Again check that each unit that you want to cancel (cups and quarts) is present on both the top and the bottom.

$$18 \text{ cups} \times \frac{1 \text{ qt}}{4 \text{ cups}} \times \frac{1 \text{ gal}}{4 \text{ qt}} = 1.125 \text{ gal apple juice}$$

Determining Formula Costs

You may also be asked to convert between a measurement given in 2 units, for instance 1 lb 12 oz, into a single unit (lb or oz). This is important to understand as this type of conversion is used when costing the ingredients of a formula. The cost of an ingredient will be given in money per kg or money per lb or money per oz (e.g., bread flour costs $0.40/lb). For this reason we need to be able to convert to the single unit of weight or volume that is used in the EP cost of an ingredient.

Example 4: What is 1 lb 4 oz converted to the single unit of lb?

Answer: We have a weight in *both pounds and ounces*, but we want the weight only in *pounds*. Whatever part of the weight that is already in the unit we want, we set aside for now. So we set the 1 lb aside. The 4 oz need to be converted to lb and then we add the two weights together.

1 lb 4 oz   → $4 \text{ oz.} \times \frac{1 \text{ lb}}{16 \text{ oz.}} = 0.25 \text{ lb}$

| 1 lb | + | 0.25lb | = 1.25 lb |

Example 5: You need to cost the formula for making biscuit dough. The recipe calls for 14 oz of butter (EP unit cost is $2.80/lb) and 1 lb, 10 oz milk (EP unit cost is $0.40/lb). Determine the total cost for these two ingredients.

Answer: First we look at the EP unit cost and see what unit of weight or volume is used. This is the unit we want to convert to. For butter and milk, the cost is given per pound, so we want to convert our ingredient amounts into pounds.

(1) Butter: 14 oz → ? lbs   Use the conversion fraction to solve.

$$14 \text{ oz.} \times \frac{1 \text{ lb}}{16 \text{ oz.}} = 0.875 \text{ lb}$$

(2) Milk: 1 lb 10 oz → ? lbs   Separate into two parts: the weight already in the desired unit and the weight that needs to be converted.

1 lb 10   → $10 \text{ oz.} \times \frac{1 \text{ lb}}{16 \text{ oz.}} = 0.625 \text{ lb}$

| 1 lb | + | 0.625lb | = 1.625 |

(3) To find the cost of butter and milk, we multiply the amount of ingredient by its EP unit cost. Similar to the conversion fraction, the weights will cancel and we will be left with money as the unit.

$$0.875 \text{ lb butter} \times \frac{\$2.80}{1 \text{ lb}} = \$2.45 \qquad 1.625 \text{ lb milk} \times \frac{\$0.40}{1 \text{ lb}} = \$0.65$$

The total cost of butter and milk is $2.45 + $0.65 = $3.10

Practice Exercises

1. Fill in each row of the table below with the conversion fraction needed to convert to the new unit listed. Then calculate what the recipe amount would be in the new unit.

Recipe amount	Conversion Fraction	Convert to:
(a) 4 tbsp		tsp
(b) 2.25 cups		fl oz
(c) 6.5 pints		qt
(d) 10 lb		oz
(e) 15 cups		pt
(f) 9 fl oz		tbsp
(g) 218 oz		lb
(h) 12 tbsp		cup
(i) 352 fl oz		gal
(j) 2640 g		kg
(k) 36 cm		m
(l) 0.85 L		mL
(m) 420 dg		g

2. Convert the amounts given to the new units specified:

(a) 6 lb 13 oz → lb
(b) 3 cups 12 tsp → cups
(c) 2 lb 4 oz → oz
(d) 4 lb 18 oz → lb
(e) 1 gal 2 pt → gal

(f) 5 cups 12 fl oz → cups
(g) 1 kg 473 g → kg
(h) 1 L 280 mL → L
(i) 1 m 950 cm → m

3. Determine the total cost for the croissant formula by filling in the table below:

Ingredient	Amount	Amount in Converted Units	EP Unit Cost	Total
Milk	1 lb 14 oz		$0.38/lb	
Yeast	2 oz		$0.20/oz	
Sugar	2 oz		$0.55/lb	
Salt	1 oz		$0.48/lb	
Butter, softened	6 oz		$2.80/lb	
Bread flour	3 lb 8 oz		$0.40/lb	
Butter	2 lb		$2.80/lb	
			Total Cost	

Answers

1.

Recipe amount	Conversion Fraction	Convert to new unit of:
(a) 4 tbsp	3 tsp/1 tbsp	12 tsp
(b) 2.25 cups	8 fl oz/1 cup	18 fl oz
(c) 6.5 pints	1 qt/2 pints	3.25 qt
(d) 10 lbs	16 oz/1 lb	160 oz
(e) 15 cups	1 pt/2 cup	7.5 pt
(f) 9 fl oz	2 tbsp/fl oz	18 tbsp
(g) 218 oz	1 lb/16 oz	13.625 lb
(h) 12 tbsp	(1 fl oz/2 tbsp)(1 cup/8 fl oz)	0.75 cups
(i) 352 fl oz	(1 qt/32 fl oz)(1 gal/4qt)	2.75 gal
(j) 2640 g	1kg/1000 g	2.64 kg
(k) 36 cm	1 m/100 cm	0.36 m
(l) 0.85 L	1 mL/0.001 L	850 mL
(m) 420 dg	0.1 g/1 dg	42 g

2. (a) 6.822 lb
    (b) 3.25 cups
    (c) 36 oz
    (d) 5.125 lb
    (e) 1.25 gal
    (f) 6.5 cups
    (g) 1.473 kg
    (h) 1.280 L
    (i) 10.5 m

3.

Ingredient	Amount	Amount in Converted Units	EP Unit Cost	Total
Milk	1 lb 14 oz	1.875 lb	$0.38/lb	$0.71
Yeast	2 oz	2 oz	$0.20/oz	$0.40
Sugar	2 oz	0.125 lb	$0.55/lb	$0.07
Salt	1 oz	0.0625 lb	$0.48/lb	$0.03
Butter, softened	6 oz	0.375 lb	$2.80/lb	$1.05
Bread flour	3 lb 8 oz	3.5 lb	$0.40/lb	$1.40
Butter	2 lb	2 lb	$2.80/lb	$5.60
			Total Cost	$9.26