2.5 Mass Conversions

The **mass** of an object refers to the quantity of matter in it, and it remains constant, no matter where the object is located.

In the metric system, the kilogram is the basic unit of mass. We also use its derivatives: grams, milligrams and metric tonnes. The basic unit of mass in the imperial system is the pound, but we also have tons and ounces.

Imperial	Imperial to Metric	Metric
1 T = 2000 lb 1 lb = 16 oz Abbreviations: ton (imperial) = T pound = lb ounce = oz	1 T ≈ 907 kg 2.2 lb ≈ 1 kg 1 lb ≈ 454 g 1 oz ≈ 28.35 g	1 t = 1000 kg 1 kg = 1000 g 1 g = 1000 mg Abbreviations: tonne (metric) = t kilogram = kg gram = g milligram = mg

Examples

Ex 1. Convert the following:

(a) 5½ lb to oz

(b) 2.4 kg to g

(c) 800 lb to imperial tons

(d) 22 150 kg to metric tonnes

Ex 2. Manuela needs 1 pound 2 ounces of Gruyère cheese, 12 ounces of cheddar cheese, and 10 ounces of Swiss cheese for a fondue recipe. How many **pounds** of cheese does she need in all?

$2oz + 12oz + 10oz = 24oz$

$\frac{24\,oz}{1} \times \frac{1\ lb}{16\,oz} = \frac{24\,lb}{16} = 1.5\,lb$

$+1.0\,lb$

2.5 lbs of cheese

Ex 3. Lorinda is baking apple pies. According to her recipe, she needs 6 pounds of apples. The bag of apples she bought only shows the mass in kilograms. How many **kilograms** of apples does she need?

lbs → kg

$\frac{6\text{ lbs}}{1} \times \frac{1\text{ kg}}{2.2\text{ lbs}} = \frac{6\text{ kg}}{2.2} = 2.73\text{ kg}.$

Ex 4. A baby boy had a mass of 7 pounds 12 ounces at birth. What was his mass in **kilograms**?

$\frac{7\text{ lb}}{1} \times \frac{1\text{ kg}}{2.2\text{ lb}} = \frac{7\text{ kg}}{2.2} = 3.18\text{ kg}.$

① oz → g → kg
② oz → lb → kg

$\frac{12\text{ oz}}{1} \times \frac{28.35\text{ g}}{1\text{ oz}} \times \frac{1\text{ kg}}{1000\text{ g}} = \frac{340.2\text{ kg}}{1000} = 0.3402\text{ kg}$

$3.18\text{kg} + 0.3402\text{ kg} = 3.5202\text{kg}$
$\approx 3.52\text{kg}$

2.5 Practice

1. Convert:

a) 22 oz to pounds

b) 7890 lb to tons

c) 54 oz to pounds and leftover ounces

d) 6 lb, 2 oz to ounces

2. Kris needs to transport 5 slabs of concrete to an apartment work site. If each slab has a mass of 46 pounds, Kris is 195 pounds, and the truck is 1.5 tons, what is the total mass of the loaded truck in **pounds**?