5.2 Mass in the Imperial System

- **Mass -** a measure of the quantity of matter in an object.
  - "the amount of *stuff*".
  - in an imperial system the 'slug' is a measure of mass.
  * use of the pound is commonly used as a measure of mass.

- **Weight -** a measure of the force of gravity on an object.
  - in an imperial system the pound is a measure of weight.

16 ounces (oz) = 1 pound (lb)
1 ton (tn) = 2000 pounds (lb)

1 oz - a slice of bread
1 lb - football
1 tn - an adult bison

*** Compared to the SI system...

1 lb = 0.453 592 37 kg OR 1 kg = 2.2 lbs

Mass vs. Weight

Mass - a measure of the quantity of matter in an object.

Weight - a measure of the force of gravity on an object.

So does this mean your mass changes when you travel to the moon or does your weight change?

What does a scale measure?

Conversions Between Imperial Mass Units

16 oz = 1 lb

1 tn = 2000 lbs

$250\text{ oz} \times \frac{1\text{ lb}}{16\text{ oz}}$

$75\text{ lbs} \times \frac{16\text{ oz}}{1\text{ lbs}}$

$750\text{ lbs} \times \frac{1\text{ tn}}{2000\text{ lbs}}$

Try these conversions:

250 oz = 15.625 lbs

75 lbs = 1200 oz

750 lbs = 0.365 tn

4 tn = 8000 lbs

$4\text{ tn} \times \frac{2000\text{ lbs}}{1\text{ tn}}$

EXERCISE: Copy and Complete the following Conversions!

16 ounces (oz) = 1 pound (lb)
1 ton (tn) = 2000 pounds (lb)

48 ounces $\div 16$ = 3 pounds
4 pounds $\times 16$ 64 ounces
1.5 pounds $\times 16$ 24 ounces
2 tons = 4000 pounds
6000 pounds = 3 tons
80 ounces = 5 pounds
8 pounds = 128 ounces
1.5 tons = 3000 pounds
64 ounces = 4 pounds

EXAMPLE 1:

Kelly needs 1 pound 2 ounces of Gruyere cheese, 12 ounces of cheddar cheese, and 11 ounces of Swiss cheese for a fondue recipe. How many**pounds** of cheese does she need in all?

Solution is... 2 lb 9 oz

1 lb 2 oz
12 oz
11 oz
---
1 lb 25 oz
= 2 lb 9 oz

EXAMPLE 2:

The cab of Andy's semi-trailer weighs 8.7 tons and the trailer weighs 6.4 tons. If the loaded gross weight of the truck is 21.3 tons, what is the weight of load in...
a) tons?
b) pounds?

Solutions are... a) 6.2 tons & b) 12 400 lbs

a) $21.3 \text{ tons} - 8.7 - 6.4 = 6.2 \text{ tn}$

b) $6.2 \text{ tn} \times \frac{2000 \text{ lb}}{1 \text{ tn}} = 12\,400 \text{ lb}$

EXAMPLE 3:

A 12-ounce can of vegetables costs $1.49. A 1 lb 2-oz can of the same vegetables costs $2.19. Which is a better buy?

Solution is... 1 lb 2-oz ($0.1217/oz)

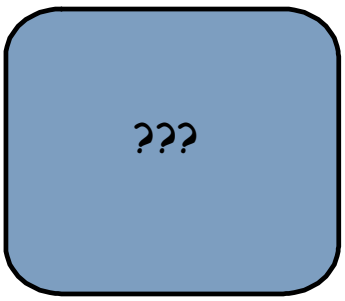
$\frac{\$1.49}{12 \text{ oz}} = \$0.124/\text{oz}$

1 lb 2 oz = 18 oz

$\frac{\$2.19}{18} = \$0.121/\text{oz}$

$2.19 is the better buy

1.49/12
.1241666667
2.19/18
.1216666667



PRACTISE YOUR NEW SKILLS

Homework Questions???

1. Calculate the conversions.
   a) 24 oz = _____ lb b) 7890 lb = _____ tn
   e) 4.54 tn = _____ lb f) 654 oz = _____ lb _____ oz
   c) 54 oz = _____ lb _____ oz d) 6 lb 2 oz = _____ oz
2. What is the total weight, in pounds and ounces, of six books on a shelf if they weigh 12 oz, 1 lb 7 oz, 1 lb 2 oz, 15 oz, 9 oz, and 1 lb 3 oz?
3. A bakery uses a recipe for oatmeal cookies that calls for 1 lb 4 oz of flour to make 9 dozen cookies. How many ounces of flour are needed to make 3 dozen cookies?
4. Kris needs to transport 5 slabs of concrete to an apartment work site. If each slab weighs 46 pounds, Kris weighs 195 pounds, and the truck weighs 1.5 tons, what is the total weight of the loaded truck in pounds?
5. Harinder is concerned about the weight that paint might add to a delicate structure he built. He estimates that he needs 1.5 gal of paint and that the structure can withstand 15 lb of weight. The weight of a particular paint is 9 lb/gal. When it dries, the weight is only 5.4 lb/gal. Can Harinder paint his structure without having it collapse?
6. U-pick organic blueberries sell for $20.00 for a 12-pound box.
   a) How much would 1 pound cost?
   b) How much would 12 ounces cost?
7. What is the true cost per pound of a 10-pound box of oranges if the original price of the box was $12.99 and $\frac{1}{4}$ of them had to be thrown away because they were mouldy?

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1. a) 1.5 lb b) 3.945 tn
   c) 3 lb 6 oz d) 98 oz
   e) 9080 lb f) 40 lb 14 oz
2. 6 lb
3. $6\frac{2}{3}$ oz
4. 3425 lb
5. The paint will weigh 13.5 lb, so Harinder can safely paint the structure.
6. a) $1.67/lb b) $1.25/12 oz
7. $1.73/lb