

Chapter 5: Mass, Temperature, and Volume

We will look at further conversions between the metric and imperial systems in this chapter and learn how to apply them to real life situations.



**Chapter 5 Project - "More than just π..."**

- self selected groups of 4 students.
- meal must have an appetizer, main course and desert.
- we will randomly draw a country to decide the theme of the menu as well as the featured measurement system.
- two tables must be submitted... 1) conversion table with home country measurements along corresponding measurements in the other system and 2) a shopping list with required amounts.
- we will be use proportions so that we serve a group of 8.
- must present a menu with pictures along with a recipe booklet.
- work on the project will be ongoing throughout the chapter.
- the presentation will be at the end of the chapter.

[Geo\\_Mea\\_Fin 10 - Chp. 5 Project Checklist.docx](#)

[Geo\\_Mea\\_Fin 10 - Chp. 5 Conversion Table.docx](#)

[Geo\\_Mea\\_Fin 10 - Chp. 5 Shopping List.docx](#)

[Geo\\_Mea\\_Fin 10 - Chp. 5 Judging Criteria.docx](#)

Temperature

Have you ever noticed how cooking temperatures for most frozen meals are given in °F yet we measure the outside temperature in °C? How do we compare the temperatures in these two systems of measurement?



BAKE	MICROWAVE
<p>1. Preheat oven to 400°F. Remove plastic wrap from meatballs and place meatballs in a baking dish. Heat meatballs thoroughly according to times below or until internal temperature reaches 160°F.</p> <p><b>Defrosted:</b> 20-25 minutes <b>Frozen:</b> 30-35 minutes</p>	<p>1. Remove plastic wrap from meatballs and place meatballs in a microwave safe dish. Heat meatballs thoroughly according to times below or until internal temperature reaches 160°F.</p> <p><b>Defrosted:</b> 3-5 minutes <b>Frozen:</b> 5-7 minutes</p>
CROCKPOT	STOVETOP
<p>1. Remove plastic wrap from meatballs. Place meatballs in crockpot and heat on highest setting according to times below or until internal temperature of meatballs reaches 160°F.</p> <p><b>Defrosted:</b> 1.5-2 hours, stirring periodically for even heating <b>Frozen:</b> 2-2.5 hours, stirring periodically for even heating</p>	<p>1. Preheat nonstick skillet to medium low heat. Remove plastic wrap from meatballs and place meatballs in skillet. Panfry over medium low heat, covered, according to times below or until internal temperature reaches 160°F.</p> <p><b>Defrosted:</b> 16-20 minutes, turn frequently for even heating <b>Frozen:</b> 20-25 minutes, turn frequently for even heating</p>

Appliances vary. Heating times approximate.

**Degrees in Fahrenheit versus Degrees in Celsius**

ACTIVITY 5.1 p. 189

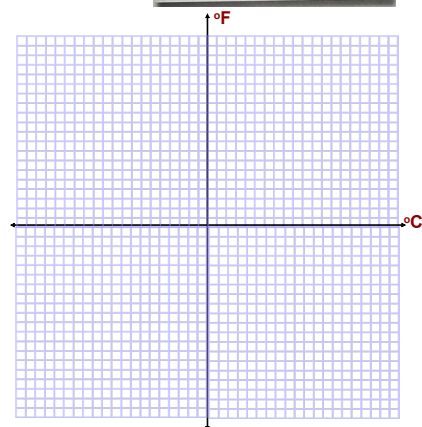
EQUIVALENCES IN FAHRENHEIT AND CELSIUS UNITS		
Example	°F	°C
Bitterly cold day	-22	-30
Mild day	59	15
Hot day	81	27
Normal body temperature	98.6	37
Boiling water	212	100

**5.1 - Temperature Conversions**

- Read Math on the Job p. 188

**FACTS...**

- most North Americans use cooking temperatures in Fahrenheit.
- stoves and recipes are usually in °F.
- SI system came into play in 1970's...before that was Fahrenheit only.



- Can we develop an equation to model the relationship?

COMPARISONS...

- 100° Celsius is the same temperature as 212° Fahrenheit, and 0° Celsius is the same temperature as 32° Fahrenheit.
- Thus, there is a 100-degree difference between the freezing and boiling points on the Celsius scale, while on the Fahrenheit scale there is a 180-degree difference.
- Therefore, the relationship between the size of the degrees can be expressed as

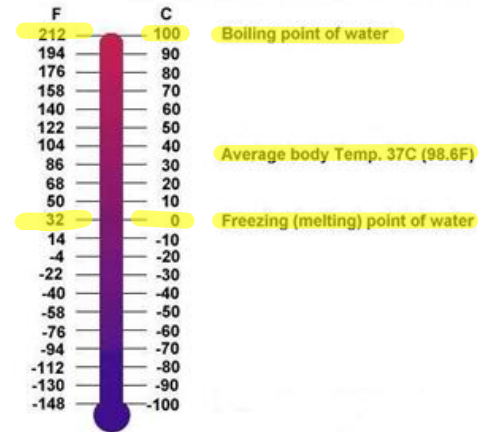
$$\frac{C}{F} = \frac{100}{180} = \frac{5}{9}$$

This means that each degree Fahrenheit is  $\frac{5}{9}$  of a degree Celsius.

- Since 0°C is equivalent to 32°F, we must subtract 32 from the Fahrenheit temperature before we multiply by  $\frac{5}{9}$ .
- Thus, the formula for converting degrees Fahrenheit to degrees Celsius is:

$$C = \frac{5}{9}(F - 32)$$

Ch 5 - Temperature



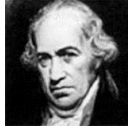

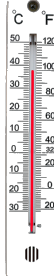


Conversions

Convert from °F into °C...  
 $C = \frac{5}{9}(F - 32)$   
 $\frac{9}{5}C = F - 32$   
 $\frac{9}{5}C + 32 = F$   
 $50^\circ F = \dots^\circ C$   
 $C = \frac{5}{9}(50 - 32)$   
 $C = \frac{5}{9}(18)$   
 $C = 10$

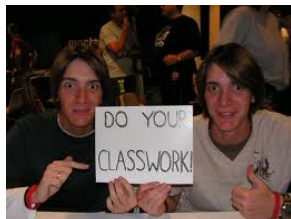
Convert from °C into °F...  
 Let's rearrange to get the formula!  
 $F = \frac{9}{5}C + 32$   
 $(-4^\circ C) \rightarrow ^\circ F$   
 $F = \frac{9}{5}(-4) + 32$   
 $F = -7.2 + 32$   
 $F = 24.8$   
 Formula??  
 $4^\circ C = 24.8^\circ F$   
 $50^\circ F = 10^\circ C$   
 $75^\circ F = \dots^\circ C$   
 $C = \frac{5}{9}(75 - 32)$   
 $C = \frac{5}{9}(43)$   
 $C = 24^\circ$

Roots of Temperature

<p><b>Galileo Thermoscope</b> 1592</p>  <p>Galileo Galilei (1564 - 1642)</p> 	<p><b>Fahrenheit Scale</b> 1714</p>  <p>Daniel Gabriel Fahrenheit (1686 - 1736)</p>	<p><b>Celsius Scale</b> 1742</p>  <p>Anders Celsius (1701 - 1744)</p> 
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Activity 5.1 on Page 189

Working in partners you will complete questions 1, 3, 5, and 6 on page 189. You will have 30 minutes to complete this and pass it in. All questions can be completed on graph paper as well.



Temperature Conversion Worksheet

Fahrenheit	Celsius	Comments
350°F	= 100°C	Standard cooking temperature
...	=	Water boils
170°F	=	Well done steak
98.6°F	=	Normal body temperature
	= 20°C	Room temperature
	= 0°C	Water freezes
	= -40°C	School closures
	= -196°C	Boiling point of nitrogen

To convert from Celsius to Fahrenheit:  
 $T_F = \frac{9}{5}T_C + 32$       $F = \frac{9}{5}C + 32$

- You can convert a temperature from Celsius to Fahrenheit in 3 steps:
1. Take your Celsius temperature \_\_\_\_\_ and multiply it by 9.  
 \_\_\_\_\_ x 9 = \_\_\_\_\_
  2. Take the answer from step one and divide it by 5.  
 \_\_\_\_\_ ÷ 5 = \_\_\_\_\_
  3. Take the answer from step two and add 32 to it.  
 \_\_\_\_\_ + 32 = \_\_\_\_\_

To convert from Fahrenheit to Celsius:  
 $T_C = \frac{5}{9}(T_F - 32)$

- You can convert a temperature from Fahrenheit to Celsius in 3 steps:
1. Take your Fahrenheit temperature \_\_\_\_\_ and subtract 32 from it.  
 \_\_\_\_\_ - 32 = \_\_\_\_\_
  2. Take the answer from step one and multiply it by 5.  
 \_\_\_\_\_ x 5 = \_\_\_\_\_
  - Take the answer from step two and divide it by 9.  
 \_\_\_\_\_ ÷ 9 = \_\_\_\_\_

Converting Temperatures in °Celsius to °Fahrenheit and vice versa!

Formula for converting °C to °F:

$^{\circ}\text{C} = 5/9 * (^{\circ}\text{F} - 32)$

$C = \frac{5}{9}(F - 32)$

Formula for converting °F to °C:

$^{\circ}\text{F} = 9/5 * ^{\circ}\text{C} + 32$

$F = \frac{9}{5}C + 32$

1e)  $-40^{\circ}\text{C}$

$F = \frac{9}{5}(-40) + 32$

$F = -72 + 32$

$F = -40^{\circ}$

$C = \frac{5}{9}(F - 32)$

2.  $80^{\circ}\text{F} \rightarrow \text{ }^{\circ}\text{C}$

$C = \frac{5}{9}(80 - 32)$

$C = 26.6^{\circ} \approx 27^{\circ}$

$80 - (32 \times \frac{5}{9})$   
 $80 - 32$  Enter  
 $\times \frac{5}{9}$

8.  $2300^{\circ}\text{F}$

$C = \frac{5}{9}(F - 32)$

$C = \frac{5}{9}(2300 - 32)$

$C = 1260^{\circ}$   
 $1260^{\circ}\text{C}$

HOMework...

TEXT p. 193 # 1 - 6

5.1 Worksheet - Temperature Conversions.docx



NEED ANSWERS???

Section 5.1 Detailed Solutions.pdf

Converting Fahrenheit and Celsius (B)		
10 °C = ___ °F	78 °F = ___ °C	-128 °F = ___ °C
-31 °F = ___ °C	208 °F = ___ °C	5 °F = ___ °C
21 °F = ___ °C	61 °F = ___ °C	-89 °C = ___ °F
98 °C = ___ °F	-143 °F = ___ °C	-133 °F = ___ °C
-30 °F = ___ °C	141 °F = ___ °C	-46 °C = ___ °F
-31 °C = ___ °F	62 °C = ___ °F	5 °C = ___ °F
12 °C = ___ °F	-102 °F = ___ °C	44 °C = ___ °F
-91 °C = ___ °F	51 °F = ___ °C	-21 °C = ___ °F
185 °F = ___ °C	-83 °F = ___ °C	-2 °C = ___ °F
6 °C = ___ °F	88 °C = ___ °F	206 °F = ___ °C
-96 °C = ___ °F	86 °C = ___ °F	75 °F = ___ °C

Converting Fahrenheit and Celsius (B) Answers			
10 °C =	50 °F	78 °F =	25.55 °C
-128 °F =	-88.88 °C	-31 °F =	-35 °C
208 °F =	97.77 °C	5 °F =	-15 °C
21 °F =	-6.11 °C	61 °F =	16.11 °C
-89 °C =	-128.2 °F	98 °C =	208.4 °F
-143 °F =	-97.22 °C	-133 °F =	-91.66 °C
-30 °F =	-34.44 °C	141 °F =	60.55 °C
-46 °C =	-50.8 °F	-31 °C =	-23.8 °F
62 °C =	143.6 °F	5 °C =	41 °F
12 °C =	53.6 °F	-102 °F =	-74.44 °C
44 °C =	111.2 °F	-91 °C =	-131.8 °F
51 °F =	10.55 °C	-21 °C =	-5.8 °F
185 °F =	85 °C	-83 °F =	-63.88 °C
-2 °C =	28.4 °F	6 °C =	42.8 °F
88 °C =	190.4 °F	206 °F =	96.66 °C
-96 °C =	-140.8 °F	86 °C =	186.8 °F
75 °F =	23.88 °C		

## EXTRA PRACTICE???

Worksheet - Converting Temperatures.docx

Worksheet - Converting Temperatures.pdf

### WARM-UP...

Chinook winds are known to cause great changes in temperature over a short period of time. The most extreme temperature change in a 24-hour period occurred in Loma, Montana, on January 17, 1972. The temperature rose from -54 °F to 49 °F.

a) What was the change in temperature in degrees Fahrenheit?

Solution?

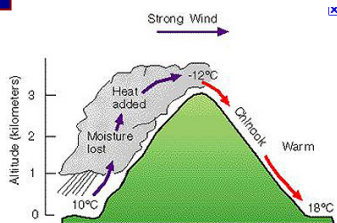
A Chinook wind is a warm, dry wind that blows east of the Rocky Mountains, often causing significant temperature increases in a short time in winter.

b) What was the maximum/minimum temperatures in degrees Celsius?

Solution?

c) What was the change in temperature in degrees Celsius?

Solution?



### 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



$$150 \text{ lb} \times \frac{1 \text{ kg}}{2.2 \text{ lbs}} = 68.18 \text{ kg}$$

#### 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?



I wonder who weighs 170lbs?



$$170 \text{ lbs} \times \frac{1 \text{ kg}}{2.2 \text{ lbs}} = 77.3 \text{ kg}$$



Let's help Pierre with Math on the Job... p. 196

- Calculate the square footage...

Pierre will need...

Calculate how many pounds of sand...

Conversions Between Imperial Mass Units

16 oz = 1 lb

Try these conversions:

1 tn = 2000 lbs

a)  $250 \text{ oz} \times \frac{1 \text{ lbs}}{16 \text{ oz}} = 15.625 \text{ lbs}$

250 oz = 15.625 lbs

b)  $75 \text{ lbs} \times \frac{16 \text{ oz}}{1 \text{ lbs}} = 1200 \text{ oz}$

75 lbs = 1200 oz

c)  $750 \text{ lbs} \times \frac{1 \text{ tn}}{2000 \text{ lbs}} = 0.375 \text{ tn}$

750 lbs = 0.375 tn

d)  $4 \text{ tn} \times \frac{2000 \text{ lbs}}{1 \text{ tn}} = 8000 \text{ lbs}$

4 tn = 8000 lbs

EXERCISE: Copy and Complete the following Conversions!

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

- 48 ounces = 3 pounds
- 4 pounds = 64 ounces
- 1.5 pounds = 24 ounces
- 2 tons = 4000 pounds
- 6000 pounds = 3 tons
- 80 ounces = \_\_\_\_\_ pounds
- 8 pounds = \_\_\_\_\_ ounces
- 1.5 tons = \_\_\_\_\_ pounds
- 64 ounces = \_\_\_\_\_ pounds

tonne

8 lbs 8 oz

$8 \text{ lbs } 8 \text{ oz} = 8.5 \text{ lbs}$

$8 \text{ oz} \times \frac{1 \text{ lb}}{16 \text{ oz}} = 0.5 \text{ lbs}$

Conversions Between Imperial Mass Units

16 oz = 1 lb

1 tn = 2000 lbs

metric  
1 tonne = 1000 kg

\*\*\* Compared to the SI system...

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

$100 \text{ oz} \times \frac{1 \text{ lb}}{16 \text{ oz}} = 6.25 \text{ lbs}$

6 lbs 4 oz

$0.25 \times \frac{16 \text{ lb}}{1 \text{ oz}}$

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...

1 lb 2 oz

1 lb 25 oz

12 oz

11 oz

2 lbs 9 oz

2.56 lbs

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...

truck 8.7

trailer 6.4

21.3

- 15.3

6.0 tons

6 tons  $\times \frac{2000 \text{ lbs}}{1 \text{ tons}}$

12000 lbs

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)

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

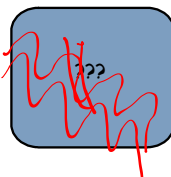
$\$0.124/\text{oz}$

$1 \text{ lb } 2 \text{ oz} = \$2.19$

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

$\$0.122/\text{oz}$

1.49	12	
	.	1241666667
2.19	18	
	.	1216666667



HOMEWORK...

p. 201 #1 - 5

5.2 Worksheet - Mass in an Imperial System.docx

# NEED ANSWERS???

Section 5.2 Detailed Solutions.pdf

**PRACTISE YOUR NEW SKILLS**

### Homework Questions???

- Calculate the conversions.
  - 24 oz = \_\_\_\_\_ lb
  - 7890 lb = \_\_\_\_\_ tn
  - 4.54 tn = \_\_\_\_\_ lb
  - 654 oz = \_\_\_\_\_ lb \_\_\_\_\_ oz
  - 54 oz = \_\_\_\_\_ lb \_\_\_\_\_ oz
  - 6 lb 2 oz = \_\_\_\_\_ oz
- 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?
- A bakery uses a recipe for oatmeal cookies that calls for 1 lb 4 oz of flour to make 0 dozens cookies. How many ounces of flour are needed to make 3 dozen cookies?
- 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?
- 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 lbs 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?
- U-pick organic blueberries sell for \$20.00 for a 12-pound box.
  - How much would 1 pound cost?
  - How much would 12 ounces cost?
- 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?

**Chapter 5.2 - Mass in an Imperial System**

**PRACTISE YOUR NEW SKILLS, P. 182**

- 1.5 lb
  - 3.945 tn
  - 3 lb 6 oz
  - 98 oz
  - 9080 lb
  - 40 lb 14 oz
- 6 lb
- $6\frac{2}{3}$  oz
- 3425 lb
- The paint will weigh 13.5 lb, so Harinder can safely paint the structure.
- \$1.67/lb
  - \$1.25/12 oz
- \$1.73/lb

## EXTRA PRACTICE???

Converting weights in an imperial system



### Chapter 5 Project...page 211

- group members, homeland country.
- research into system of measurement in homeland country
- menu/recipes for appetizer, main course and desert.
- conversion tables...

Geo\_Mea\_Fin 10 - Chp. 5 Project Checklist.docx

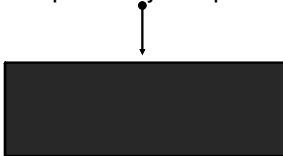
Geo\_Mea\_Fin 10 - Chp. 5 Conversion Table.docx

Geo\_Mea\_Fin 10 - Chp. 5 Shopping List.docx

## 5.3 Mass in the Systeme International

- Mass** - a measure of the quantity of matter in an object.
  - "the amount of *stuff*".
  - in the SI system the kilogram is the 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 the SI system the Newton is the measure of weight.

Complete Activity 5.5 on p. 205



**NOTES:**

- 'kg' is the mass of one litre of water at 4°C
- a tonne (t) IS NOT THE SAME as a ton (tn).
- a tonne is often referred to as a 'metric ton'.

## Math on the Job... p. 204

What is the total cost to ship her envelopes???

**ACTIVITY 5.6**  
**EQUIVALENT MASSES**

Work with a partner to discuss the following situations. Note that the megagram is generally referred to as a tonne, a metric ton, or a long ton.

- Use your understanding of weights to determine a referent for:
  - 1 tonne (t)
  - 1 kilogram (kg)
  - 1 gram (g)
  - 1 milligram (mg)
- The masses 2.8 t, 2800 kg, and 2 800 000 g are equivalent. Each represents the mass of a truck. Which would be the most appropriate unit to use if you were discussing the mass of a truck? Why?
- When you are cooking, there is more than one way to determine how much of an ingredient to use. Some recipes give amounts in volume and others use mass, especially those from Europe. If you use a measuring cup, you are measuring volume. To measure mass, you need a scale.
 

You are measuring the amount of flour you need to make a cake, but some of your batter has splashed on your recipe and hidden the unit of measurement. You can see that the number is 250. Would this be tonnes, kilograms, grams, or milligrams? Give examples of items that might weigh each of these amounts. Do not use the same referents you suggested in question 1.

**DISCUSS THE IDEAS**

**GROSS VEHICLE WEIGHT RATING**

Truckers and others who transport loads in their vehicles need to be aware of their Gross Vehicle Weight Rating (GVWR). The GVWR is the maximum recommended weight of a vehicle, including everything it is carrying: the vehicle itself, cargo, passengers, other accessories, and fuel. The base curb weight is the weight of the vehicle with a full tank of fuel. The difference between these two weights is the cargo capacity.

You and your friend rent a truck with a 3016 kg GVWR and a base curb weight of 2255 kg, so that you can help your friend haul a load of bricks for a construction project. The combined weight of you, your friend, and your accessories is 160 kg. If one brick weighs 2.7 kg, **how many bricks can you truck carry?**

**EXAMPLE 1:**

A recipe for cornbread calls for 120 g of flour, 170 g of cornmeal, and 50 g of sugar. If you want to double the recipe, what is the total weight of the dry ingredients?

tion is... 68C

**EXAMPLE 2:**

Mrs. MacAllister is baking apple pies. According to her recipe, she needs 6 pounds of apples. The bag of apples she bought only shows the weight in kilograms. Can you help her out???

Solution is...

Remember... 1 kg = 2.2 lbs

**NOTE:** To estimate a conversion from pounds to kilograms you can think of a pound being about 1/2 kg.

**EXAMPLE 3:**

The cost of bananas at the Irving is \$0.49/lb, but you see an advertisement for bananas on sale at Sobey's for \$1.03/kg. **Which is a better buy?**

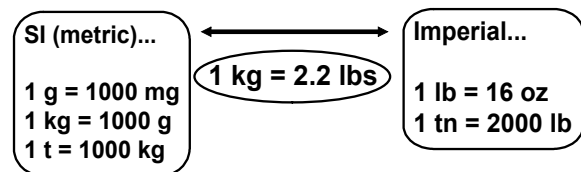
Solution is...

**Work on these...**

5.3 Worksheet - Mass in a SI System.docx

Worksheet - Converting Imp\_Metric Masses.pdf

**Remember...**





SOLUTIONS...

Name : \_\_\_\_\_ Score : \_\_\_\_\_  
 Teacher : \_\_\_\_\_ Date : \_\_\_\_\_

**Converting English and Metric**

1 )	16.53	pounds	=	7.5	kilograms
2 )	0.63	ounces	=	18	grams
3 )	13.5	pounds	=	6.12	kilograms
4 )	15	ounces	=	425.24	grams
5 )	35.27	pounds	=	16	kilograms
6 )	12.5	pounds	=	5.67	kilograms
7 )	8	ounces	=	226.8	grams
8 )	0.51	ounces	=	14.5	grams
9 )	8.82	pounds	=	4	kilograms
10 )	0.65	ounces	=	18.5	grams
11 )	47.4	pounds	=	21.5	kilograms
12 )	2.5	ounces	=	70.87	grams
13 )	0.34	ounces	=	9.5	grams
14 )	0.69	ounces	=	19.5	grams
15 )	20	pounds	=	9.07	kilograms
16 )	17	pounds	=	7.71	kilograms
17 )	8.5	pounds	=	2.95	kilograms
18 )	15.43	pounds	=	7	kilograms
19 )	8.5	ounces	=	240.97	grams
20 )	22	ounces	=	623.69	grams

Geometry, Measurement & Finance 10 Math-Aids.Com

Section 5.3 - Mass in a SI System

**PRACTISE YOUR NEW SKILLS**

**HOMEWORK QUESTIONS???**

- Convert the following weights.
 

a) 2.5 t = _____ kg	b) 2.8 kg = _____ g
c) 125 g = _____ kg	d) 2.4 g = _____ kg
e) 1 t = _____ lb	f) 3.6 tn = _____ kg
- How many tons are in 1 tonne?
- What is the total weight in grams of 3 packages of nuts weighing 1.2 kg, 0.75 kg, and 1.5 kg?
- Win weighs 78 kg and his dog weighs 18 kg. If his truck weighs 1.9 t and there are 5 boxes of books each weighing 9.8 kg in the truck, what is the total weight of the truck, including Win, his dog, and the books?
- Karen is making a batch of potato soup. She needs 8 potatoes, and each potato weighs about 375 g. How many pounds of potatoes does she need?
- If a 10-lb bag of grass seed costs \$75.45, how much does the seed cost per kilogram?
- How many quarter-pound (before cooking) hamburgers can you make from 1.9 kg of ground beef?

**PRACTISE YOUR NEW SKILLS # 200**

- |             |              |
|-------------|--------------|
| a) 2300 kg  | b) 2880 g    |
| c) 0.125 kg | d) 0.0024 kg |
| e) 2200 lb  | f) 3272.4 kg |
- 1 tonne (t) = 1.1 tons (tn)
- 3450 g
- 2045 kg
- 6.6 lb
- \$16.67/kg
- 16 hamburgers

DISCUSS THE IDEAS

MASS/WEIGHT CONVERSION BETWEEN IMPERIAL AND SI

- In Europe, the term "pound" is often used to mean half a kilogram. Is this an appropriate use of the term? Why or why not? Use your understanding of pound and kilogram to discuss the relationship between them. List three items you sometimes hear talked about in pounds.
- Stores sometimes list prices of vegetables by both the pound and by the kilogram. If they only gave the price per pound, how would you determine the price per kilogram? Explain your reasoning.
- Sometimes the price for items is listed as dollars per 100 grams.
  - Why would the store price items this way rather than per kilogram?
  - What types of items would likely be priced in this way?
- A bag of sand is labelled as 20 kg and also as 44 lb. Use this information to develop a conversion formula from kilogram to pound and pound to kilogram (round to the nearest tenth).

HOMEWORK...

p. 209 #1 - 7

NEED ANSWERS???

Section 5.3 Detailed Solutions.pdf

Making Conversions

During class today you will learn how to convert a unit of volume to a unit of weight.



$1 \text{ cm}^3 = 1 \text{ g}$

From your textbook... Page 212. Read "Math on the Job". Once you reach the bottom portion attempt to answer the questions about bushels of barley.

• **Bushel:** - is a measurement of volume (equal to about 2220 in<sup>3</sup>)  
- abbreviated as 'bu'

**Question a)** Note the conversion factor for converting bushels of barley to metric tonnes is 45.9. Also, be aware of the difference in weight between a loaded truck and an empty truck.



**Question b)** Use your answer from (a) to determine the correct price.

**Math on the Job Solution**

a) Calculate the weight of the barley  
12,100 kg - 5,500 kg = 6,550 kg

Convert kg to tonnes  
6,550 kg / 1000 kg/t = 6.55 t

Convert tonnes to bushels

6.55 t X 45.9 bu/t = 300.65 bu (rounded off)

About 301 bushels were loaded onto the truck.

b) 300.65 bu X \$3.59/bu = \$1079.33

301 bu x \$3.59/bu = \$1080.59

✓ 1 tonne = 1000 kg

✗ 1 ton = 2000 lbs

6550 kg x  $\frac{1 \text{ tonne}}{1000 \text{ kg}} =$

6.55 t x 45.9 bu/t =

<p><b>Imperial</b></p> <p>1 ton = 2000 pounds</p> <p>1 tn = 2000 lbs</p>	}	<p><b>Metric</b></p> <p>1 tonne = 1000 kg</p> <p>1 t = 1000 kg</p>
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**One More Example...**

How many bushels (bu) of flax seed are there in 2.4 tonnes, if the conversion factor is 39.368 bushels/tonne?

2.4 tonnes x  $\frac{39.368 \text{ bu}}{1 \text{ tonnes}}$

Solution:

2.4 t X 39,368 bu/t = 94.5 bu

**Try this one!**

Laila bought 5 bushels of sunflower seeds. If the conversion is 73.487 bu/t, what is the weight of sunflower seeds:

- a) in kilograms?
- b) in pounds?

Remember: 1000 kg = 1 t  
1 kg = 2.2 lbs

5 bushels x  $\frac{1 \text{ tonne}}{73.487 \text{ bushels}} = 0.06807 \text{ tonnes}$   
 $0.06807 \text{ tonnes} \times \frac{1000 \text{ kg}}{1 \text{ tonne}} = 68.07 \text{ kg}$   
 $68.07 \text{ kg} \times \frac{2.2 \text{ lbs}}{1 \text{ kg}} = 149.7 \text{ lbs}$

5 bu x  $\frac{1 \text{ tonne}}{73.487 \text{ bu}} \times \frac{1000 \text{ kg}}{1 \text{ tonne}} \times 2.2 \text{ lbs}$

page 213 #1.2

$V = lwh$

1 bushel = 2220 in<sup>3</sup>

1620 ft<sup>3</sup> x  $\frac{(1 \text{ ft})^3}{2220 \text{ in}^3}$  = 279.9360 in<sup>3</sup> / 2220 in<sup>3</sup> = 1260 bushels x  $\frac{1 \text{ tonne}}{45.9 \text{ bushels}}$  = 27.5 tonnes

page 215 #1.2

1 kg = 2.2 lb

box: 266 oz = 1 lb  
2660 oz = 160 lb  
250 oz x  $\frac{1 \text{ lb}}{16 \text{ oz}} = 15.625 \text{ lbs}$   
 $15.625 \text{ lbs} \times \frac{1 \text{ kg}}{2.2 \text{ lbs}} = 7.10 \text{ kg}$   
 $7.10 \text{ kg} \times \frac{1000 \text{ g}}{1 \text{ kg}} = 7100 \text{ g}$   
 $7100 \text{ g} \times \frac{1 \text{ kg}}{1000 \text{ g}} = 7.1 \text{ kg}$   
 2500 x  $\frac{1 \text{ lb}}{16 \text{ oz}} \times \frac{1 \text{ kg}}{2.2 \text{ lbs}} = 71.0 \text{ kg}$   
 7102.34 = 50  
 142.09  
 pel  
 Paul

page 215 #1-6

How many ounces are in a gram...  
The conversion factor!

1 oz = 28.4 g


New copy  




**What does a conversion factor tell you???**

EXAMPLE #1...

The conversion factor for white beans is 36.744 bu/t, and for corn it is 39.368 bu/t. Which weighs more per unit volume?

$\frac{1 \text{ tonne}}{36.744 \text{ b}} = 0.027$  

$\frac{1 \text{ tonne}}{39.368} = 0.025$

$1 \text{ bu} = 2220 \text{ oz}^3$

3 o'clock  
Start  
M.C

page 269

EXERCISE: Convert the following...

a) 56 g = 1.97 oz  
 $56 \text{ g} \times \frac{1 \text{ oz}}{28.4 \text{ g}}$

$1 \text{ oz} = 28.4 \text{ g}$

b) 120 lbs = 54.55 kg  
 $120 \text{ lbs} \times \frac{1 \text{ kg}}{2.2 \text{ lbs}}$

$1 \text{ kg} = 2.2 \text{ lbs}$

c) 34 oz = 965.6 g  
 $34 \text{ oz} \times \frac{28.4 \text{ g}}{1 \text{ oz}}$

EXAMPLE #2

Alphonse is making chicken kebabs for 14 people. His recipe suggests about 7 oz of chicken per person. At the grocery store, the weight of the chicken is labelled in kilograms. How much chicken does Alphonse need to buy?

Remember: 1 kg = 2.2 lbs  
1 oz = 28.4 g

$7 \text{ oz} \times 14 = 98 \text{ oz}$

①  $98 \text{ oz} \times \frac{28.4 \text{ g}}{1 \text{ oz}} \times \frac{1 \text{ kg}}{1000 \text{ g}} = 2.8 \text{ kg}$

②  $98 \text{ oz} \times \frac{1 \text{ lb}}{16 \text{ oz}} \times \frac{1 \text{ kg}}{2.2 \text{ lbs}} = 2.8 \text{ kg}$

Homework:

Worksheet - Converting Weights.docx

**Converting English and Metric**

1 ) 16.53	pounds	=	7.5	kilograms
2 ) 0.63	ounces	=	18	grams
3 ) 13.5	pounds	=	6.12	kilograms
4 ) 15	ounces	=	425.24	grams
5 ) 35.27	pounds	=	16	kilograms
6 ) 12.5	pounds	=	5.67	kilograms
7 ) 8	ounces	=	226.8	grams
8 ) 0.51	ounces	=	14.5	grams
9 ) 8.82	pounds	=	4	kilograms
10 ) 0.65	ounces	=	18.5	grams
11 ) 47.4	pounds	=	21.5	kilograms
12 ) 2.5	ounces	=	70.87	grams
13 ) 0.34	ounces	=	9.5	grams
14 ) 0.69	ounces	=	19.5	grams
15 ) 20	pounds	=	9.07	kilograms
16 ) 17	pounds	=	7.71	kilograms
17 ) 6.5	pounds	=	2.95	kilograms
18 ) 15.43	pounds	=	7	kilograms
19 ) 8.5	ounces	=	240.97	grams
20 ) 22	ounces	=	623.69	grams

Geometry, Measurement & Finance 10 Math-Aids.Com

**EXAMPLE #3:**

$2000 \text{ lb} = 1 \text{ ton}$

A crane can lift a maximum of 5 t. Sandstone weighs about 150 lb per cubic foot, and a container contains 70 cubic feet of sandstone. Can the crane be used to load the container onto a train?

$70 \text{ ft}^3 \times \frac{150 \text{ lb}}{1 \text{ ft}^3} = 10500 \text{ lbs}$

$10500 \text{ lbs} \times \frac{1 \text{ kg}}{2.2 \text{ lb}}$

4.8 t so yes

$4772.72 \text{ kg} \times \frac{1 \text{ tonne}}{1000 \text{ kg}} =$



**EXAMPLE #4:**

Josephine is sending a gift of a bottle of maple syrup that weighs 3 lb, and 3 packages of smoked salmon that each weigh 100 g. If the package's total weight is less than 2 kg, she can ship it at a cheaper rate. Will she be able to do so?

$3 \text{ lb} + 3 \times (100 \text{ g})$   
 $3 \text{ lb} + 300 \text{ g}$   
 $3 \text{ lb} \times \frac{1 \text{ kg}}{2.2 \text{ lb}} + 300 \text{ g} \times \frac{1 \text{ kg}}{1000 \text{ g}}$   
 $1.36 \text{ kg} + 0.3 \text{ kg}$   
 $1.66 \text{ kg}$



**Homework:**

Page 215: Questions 1 - 7

Note: #4... 1 L of water = 1 kg

In groups of two... complete #8 and pass in ONE solution on looseleaf. (Due on \_\_\_\_\_)

# Need Answers???

Section 5.4 Detailed Solutions.pdf

Chp 5.4 - Extend Your Thinking #8 p. 217 Solutions.docx

**PROJECT—CULINARY COMPETITION**

**COMPLETE YOUR WORK AND PREPARE A PRESENTATION**

You will need have the following information for your project:

- a menu
- a recipe for each dish
- a conversion table for your ingredients
- a table that lists all of your ingredients with amounts

Design your menu. Be creative! Next, compile the last three items in the above list into a booklet that is both attractive and readable. You may want to look at a variety of cookbooks first to get some ideas for the layout. Will you include pictures? How will you organize the elements in your booklet? What page size will you use, and how many pages will your booklet have? Include your converted ingredient amounts with your recipes, not just in the notes. Also, be sure to provide conversions for any cooking temperatures that are given in the recipes.

Once you have completed and printed a copy of your menu and your booklet, it is time to start the judging. Evaluate your classmates' menus and booklets according to the judging criteria. May the best menu win!

Geo\_Mea\_Fin 10 - Chp. 5 Judging Criteria.docx

- PRESENTATION DATE:**  
 \*order will be drawn that day
- PRESENTATION CRITERIA:**  
 - can be of any form... video/powerpoint/SMART Notebook/poster/drama/etc...  
 - looking at a 2 to 3 minute advertisement of your "award winning meal".  
 - be sure to include some information on your country and meal theme.
- COMPONENTS TO BE PASSED IN:** - completed checklist  
 (after the presentation)- menu  
 - recipe booklet  
 - conversion table  
 - shopping list
- EVALUATION:** - presentation  
 - required components  
 - self reflection  
 - judging criteria  
 \* Bonus: most creative group name!
- \* The judge(s) will decide upon the most appealing meal and members of that group are asked to bring in sample(s) to share with their classmates.

**Conversions... Mass <-> Volume**

- materials have different conversion factors due to their density.
- we will have to use technology to help us out...

<http://www.convert-me.com/en/convert/weight2volume>

[http://www.onlineconversion.com/weight\\_volume\\_cooking.htm](http://www.onlineconversion.com/weight_volume_cooking.htm)

**READY FOR THE TEST ON... FRIDAY!!!**

Geo\_Mea\_Fin 10 - Conversion Tables and Formula Sheet (Chp4\_5).docx

Chapter 5 Sample Test.pdf

\*\*\* Corrections...

MC #3 → 7.2°C  
 OR #22 → 8.3°C & 80.6°C

**p. 219 Practise Your New Skills... #1 - 10**

Chapter 5 Mass, Temperature, and Volume, Practice Your New Skills.pdf (SOLUTIONS)

**EXTRA PRACTICE???**

5.4 - Practice Problems.doc

**Review - Chapter 5**

Temperature  
 Fahrenheit to Celsius  

$$C = \frac{5}{9}(F - 32)$$

Celsius to Fahrenheit  

$$F = \frac{9}{5}C + 32$$

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.

SI system: 1000mg = 1g  
 1000g = 1kg  
 1000kg = 1 t  
tonne - t

Imperial: 16oz = 1 lb  
 2000 lbs = 1 ton  
ton - tn

**1 kg = 2.2 lbs \***

**Bushel:**  
 - is a measurement of volume (equal to about 2220 in³)  
 - abbreviated as 'bu'

1 L of water = 1 kg  
 ~~~~~  
 4°C

**1 oz = 28.4 g**

Geo\_Mea\_Fin 10 - Chp. 5 Conversion Table.docx  
Geo\_Mea\_Fin 10 - Chp. 5 Group Assessment.docx  
Geo\_Mea\_Fin 10 - Chp. 5 Judging Criteria.docx  
Geo\_Mea\_Fin 10 - Chp. 5 Project Checklist.docx  
Geo\_Mea\_Fin 10 - Chp. 5 Shopping List.docx  
Worksheet - Converting Temperatures.docx  
Worksheet - EXTRA Practice Converting Temperatures.docx  
5.1 Worksheet - Temperature Conversions.docx  
Worksheet - Converting Temperatures.pdf  
Section 5.1 Detailed Solutions.pdf  
5.2 Worksheet - Mass in an Imperial System.docx  
Section 5.2 Detailed Solutions.pdf  
Worksheet\_5.2.pdf  
5.3 Worksheet - Mass in a SI System.docx  
Worksheet - Converting Imp\_Metric Masses.pdf  
Section 5.3 Detailed Solutions.pdf  
Worksheet - Converting Weights.docx  
Chp 5.4 - Extend Your Thinking #8 p. 217 Solutions.docx  
Section 5.4 Detailed Solutions.pdf  
5.4 - Practice Problems.doc  
Chapter 5 Mass, Temperature, and Volume, Practice Your New Skills.pdf  
Chapter 5 Sample Test.pdf  
Geo\_Mea\_Fin 10 - Conversion Tables and Formula Sheet (Chp4\_5).docx