

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???

$$\$ 2.06$$

$$\frac{2.2}{5} \text{ kg} = 0.44 \text{ kg} \quad 440\text{g}$$

$$\frac{0.8}{2} = 0.4 \text{ kg} \quad 400\text{g}$$

$$3.50 \times 5 = 17.50$$

$$3.25 \times 2 = \underline{6.50}$$
$$\$ 26.06$$

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.

1. Use your understanding of weights to determine a referent for:
 - a) 1 tonne (t)
 - b) 1 kilogram (kg)
 - c) 1 gram (g)
 - d) 1 milligram (mg)
2. 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?
3. 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.

SOLUTION

1. Students may come up with a number of different referents, but some examples are:
 - a) A small car weighs about 1 tonne. Also a large Clydesdale or large Shire draft horse can weigh up to 1 tonne.
 - b) A math textbook may weigh about 1 kilogram. You might buy a kilogram of ground meat for a family dinner.
 - c) A paper clip or a thumbtack weighs about 1 gram.
 - d) A couple of grains of salt or sugar weigh about 1 milligram.
2. Although all are correct, a truck's mass would likely be expressed as 2800 kilograms or 2.8 tonnes.
3. This may help students relate to the chapter project.

Students should realize that they would not want 250 tonnes of flour since this would be a very large amount. Comparatively, a fully grown male elephant weighs only 5 or 6 tonnes. Similarly, 250 kg is still an unreasonable amount. This weight would be equivalent to a couple of large football players.

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?**

$$3016 - 2255 - 160 = 601 \text{ kg}$$

$$\frac{601 \text{ kg}}{2.7 \text{ kg}} = 222 \text{ bricks}$$

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?

Solution is...

$$\begin{array}{r} 2(120) = 240 \\ 2(170) = 340 \\ 2(50) = \frac{100}{680 \text{ g}} \end{array}$$

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

$$6 \text{ lbs} \times \frac{1 \text{ kg}}{2.2 \text{ lb}} = 2.72 \text{ kg}$$

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...

$$\cancel{\$} 1.03 / \text{kg} \times \frac{1 \text{ kg}}{2.2 \text{ lb}} = \cancel{\$} 0.468\bar{1} / \text{lb}$$

Sobey's is the best buy.

Work on these...

5.3 Worksheet - Mass in a SI System.docx



Remember...

SI (metric)...

1 g = 1000 mg
1 kg = 1000 g
1 t = 1000 kg

1 kg = 2.2 lbs

Imperial...

1 lb = 16 oz
1 tn = 2000 lb

Section 5.3 - Mass in a SI System

PRACTISE YOUR NEW SKILLS**HOMEWORK QUESTIONS???**

1. Convert the following weights.

a) $2.5 \text{ t} = \underline{\hspace{2cm}} \text{ kg}$

b) $2.8 \text{ kg} = \underline{\hspace{2cm}} \text{ g}$

c) $125 \text{ g} = \underline{\hspace{2cm}} \text{ kg}$

d) $2.4 \text{ g} = \underline{\hspace{2cm}} \text{ kg}$

e) $1 \text{ t} = \underline{\hspace{2cm}} \text{ lb}$

f) $3.6 \text{ tn} = \underline{\hspace{2cm}} \text{ kg}$

2. How many tons are in 1 tonne?

3. What is the total weight in grams of 3 packages of nuts weighing 1.2 kg, 0.75 kg, and 1.5 kg?

4. 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?

5. 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?

6. If a 10-lb bag of grass seed costs \$75.45, how much does the seed cost per kilogram?

7. How many quarter-pound (before cooking) hamburgers can you make from 1.9 kg of ground beef?

PRACTISE YOUR NEW SKILLS, P. 200

1. a) 2500 kg b) 2800 g
 c) 0.125 kg d) 0.0024 kg
 e) 2200 lb f) 3272.4 kg

2. 1 tonne (t) = 1.1 tons (tn)

3. 3450 g

4. 2045 kg

5. 6.6 lb

6. \$16.61/kg

7. 16 hamburgers

DISCUSS THE IDEAS**MASS/WEIGHT CONVERSION BETWEEN IMPERIAL AND SI**

1. 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.
2. 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.
3. Sometimes the price for items is listed as dollars per 100 grams.
 - a) Why would the store price items this way rather than per kilogram?
 - b) What types of items would likely be priced in this way?
4. 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).

SOLUTION

1. Yes, it is appropriate because a kilogram is approximately 2.2 pounds.
2. Since 1 kg is approximately 2.2 lb, multiply the price of 1 lb by 2.2.
3. a) For some items, 1 kilogram is often more than you would want to buy. Also, the price looks much less if listed per 100 g.
b) Among other things, deli meats, postage, and precious metals may be priced per 100 g.

4.

$$\frac{x \text{ kg}}{1 \text{ lb}} = \frac{20 \text{ kg}}{44 \text{ lb}}$$
$$x = 0.4545$$

$$1 \text{ lb} = 0.5 \text{ kg}$$

$$\frac{x \text{ kg}}{1 \text{ lb}} = \frac{44 \text{ lb}}{20 \text{ kg}}$$
$$x = 2.2$$

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

5. Imperial units have been eliminated on road signs throughout Canada, and although measured products must be priced in metric units, the imperial units can also be stated. Height and weight are often given in imperial on driver's licences and passports. See, for example, the following websites:

[www.absoluteastronomy.com/topics/Imperial_](http://www.absoluteastronomy.com/topics/Imperial_unit)
[unit](http://www.absoluteastronomy.com/topics/Imperial_unit) (search for Canada)

[http://wikipedia.org/wiki/Metrication_in_](http://wikipedia.org/wiki/Metrication_in_Canada)
Canada

HOMEWORK...

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NEED ANSWERS???

Section 5.3 Detailed Solutions.pdf



Attachments

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 Worksheet - Mass in a SI System.docx

Section 5.3 Detailed Solutions.pdf