Unit 4

4.2 + 4.3 Mass in the two different systems

David Guenther

Objective [needs internet to complete]

Understand the differences between mass and weight in both the Imperial and SI system.

Start

Definitions

mass: the amount of something

weight: the force that gravity is pulling on that amount of something

kilogram: one litre of water at exactly 4 degrees celsius.

tonne: in metric: 1000 kilograms

Intro

> Q: How much do you weigh? Q: What do you think about when I say I am 65 kilos, or that car is a tonne (1000 kilos)?

At least for me, I think of how much stuff there is. I know that stuff, due to the force of gravity, is pulled downward. So when I think of how much I weigh (which is how much I'm being pulled towards the earth), I think of how much there is of me!

However, this way of thinking if fundamentally flawed. What happens if I go to space, where I weigh nothing, or if I go to the moon, where I weigh less? Is there less of me? No, but the amount I am pulled towards something is less or none at all.

Science needs a way to tell the difference between the two, because both are really important to science.

It is important to know how much of something there is, but it is equally as important to know the force of gravity on that object. If you lived on mercury, you would have different lengths of time for days, but you would also have a different weight for masses. If you went to the store, and bought the equivalent of 16 liters of milk here on earth, you might easily carry them back to your house while jumping and skipping.

here on earth there are two methods to work with mass, the SI system and the imperial system.

Weight is measured in pounds for the Imperial system, and Newtons for the SI (which is used like bread in science).

Mass is measured in slugs (hardly ever used) for the Imperial system, and Kilograms for the SI.

However, because we are on earth, mass and weight tend to become synonomous, and difficult to separate. We we commonly use pounds and kilos for weight.

- There are 2000 pounds in one ton
- and 16 ounces in one pound
- A football is roughly 1 pound

In the SI, it is much simpler

- 1000 grams in one kilogram
- 1000 kilograms in one tonne
- 1000 milligrams in one gram :)

But remember, the kilogram (SI) is measurement of mass, and not weight. So while a pound on earth and a pound on mars will be the same weight, a kilogram here on earth and a kilogram on mars will not be!

If you pursue science, you will learn about the Newton. Suffice to say it is defined as such

$$1Newton = \frac{1Kg/timesm}{seconds^2}$$

So with these new conversions, we can begin to work with problems involving mass.

Example 1

pg. 150 (pay attention to what the units are doing!)

Example 2

pg. 155

Assignment

- pg. 151: 3 - 5
- pg. 159: 3 - 5

End

Puzzle it out pg. 160