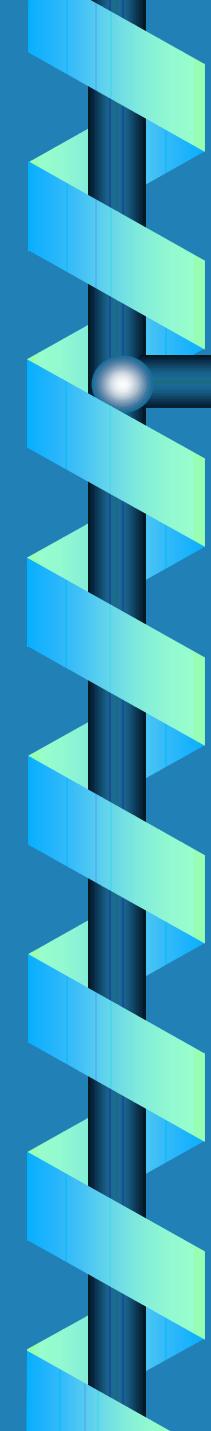




# **Chapter 2 – Section 2**

## **What's the Difference Between Mass and Weight?**





# Universal Law of Gravitation

All objects in  
the universe  
attract each  
other by the  
force of  
**gravity**



# What does gravity depend upon?

Gravity varies depending on two factors:

- 1) the mass of the object
- 2) the distance from the center of that object to the center of another object



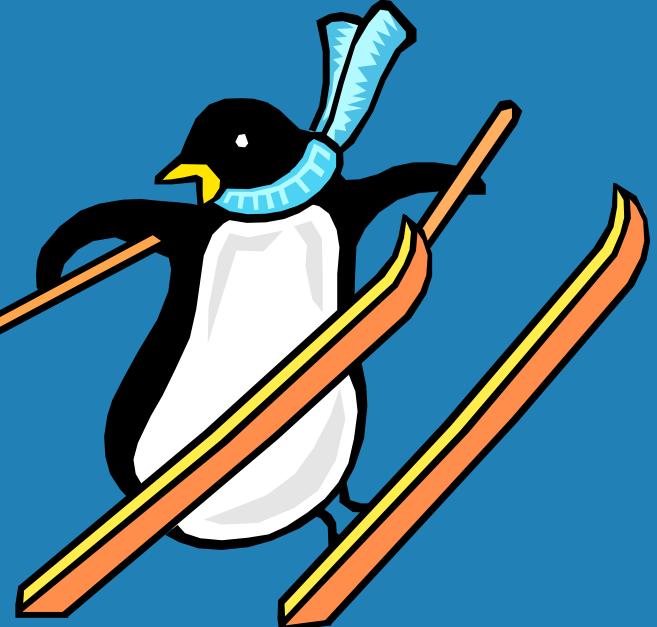
# Universal Law of Gravitation

- On Earth, the force of gravity accelerates objects by a rate of = **9.8 m/s<sup>2</sup> ( m/s/s )**
- This means that for every second **(/s)** that an object falls its speed increases by **9.8 m/s**



# Universal Law of Gravitation

- The acceleration due to gravity may be affected by the air resistance of the falling object.
- [We'll get into this more in our later units...]



# Universal Law of Gravitation



**Objects that have a large surface area and a small mass will fall much slower than objects with a small surface area and large masses (We'll get into this more in our later units...)**

# How Does Gravity Affect Mass?

Weight – the measure of the **FORCE** of attraction between object due to the pull of gravity.

An object's **mass will remain the same** no matter where it is, unless matter is added to it or taken away.

An object's **weight will vary** according to where it is in the universe and what objects are pulling on it by their gravity.



# Formula for Determining Weight

**Weight = Mass x Gravity**

Mass is measured in grams or kilograms

Gravity is measured in m/s<sup>2</sup>

So when we multiply them together, we get:

g x m/s<sup>2</sup>

or

kg x m/s<sup>2</sup>

only this one is a “Newton”

# Formula for Determining Weight

Force of gravity = 9.8 m/s/s ( $m/s^2$ )

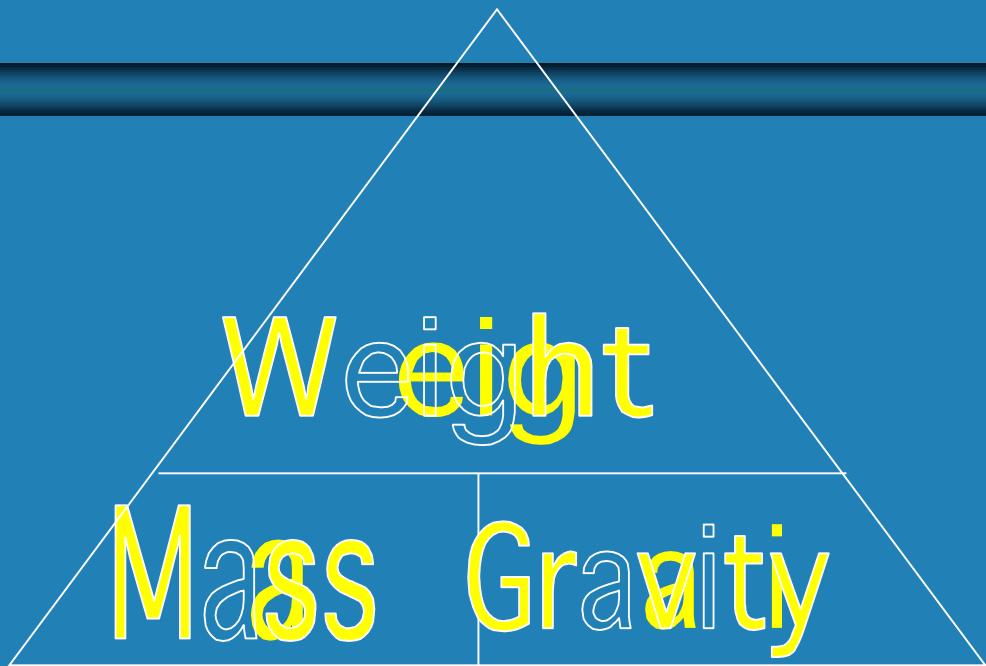


Unit of weight = **Newton (N)** ONLY when your original unit of mass is a **kg** because a **Newton** is a  **$kg \times m/s^2$**

- This means that a **Newton (N)** is the same as a “**kilogram meter per second squared**” ( $kg \times m/s^2$ )
- Unit of weight when your original unit of mass is grams is a “**gram meter per second squared**” ( $g \times m/s^2$ )
- Unit of weight when your original unit of mass is milligrams is “**milligram meter per second squared**” ( $mg \times m/s^2$ )

# Formula for Weight

The same  
trick that we  
used for the  
density  
formula  
works for  
weight too!



Think of a mnemonic device  
that helps you to remember the  
correct way to fill in this  
triangle trick!