

Assignment #2 Gravity

LO: To describe how gravity affects weight.

EQ: Why does the earth move in a circle around the sun?

LEVEL ZERO VOICE

CATALYST (10 minutes, individual work):

1. Draw two isotopes of nitrogen. What is the atomic mass of each isotope?
2. A car travels at 10 mi/hr for 2 hours. How far does it go?
3. A scientist adds a 15g object to a graduated cylinder filled with 100 mL of water. The object displaces the water to 105 mL. What is the density of the object?
4. Sarah and Tom are pushing a car in same direction. Sarah pushes with 50 N and Tom pushes with 20 N. What is the net force on the car?

4/14-4/15

AGENDA

1. Lecture
2. Chem Review

HOMEWORK

1. Worksheets

Part 1: Gravity



Force – a push or pull

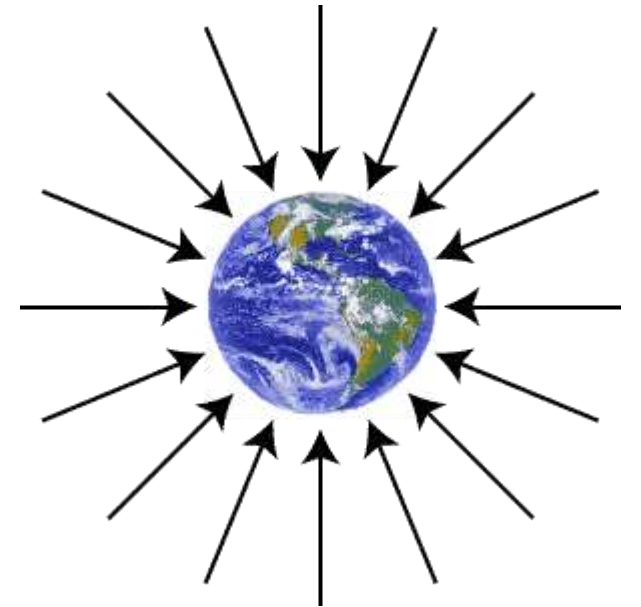


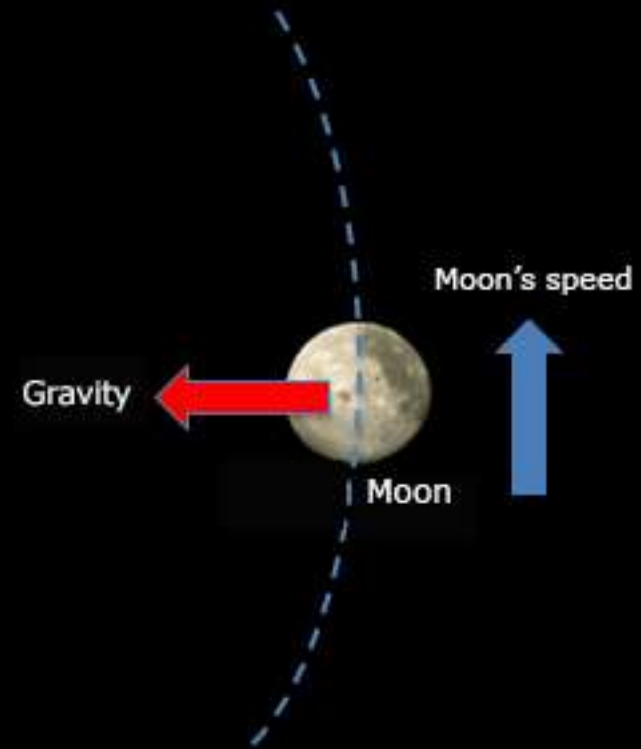
note how the
force applied
by my hands
overcomes your
inertia

Gravity – a force that attracts
all objects toward each other

- Measure in Newtons (N)

Gravity – attractive force
between two objects





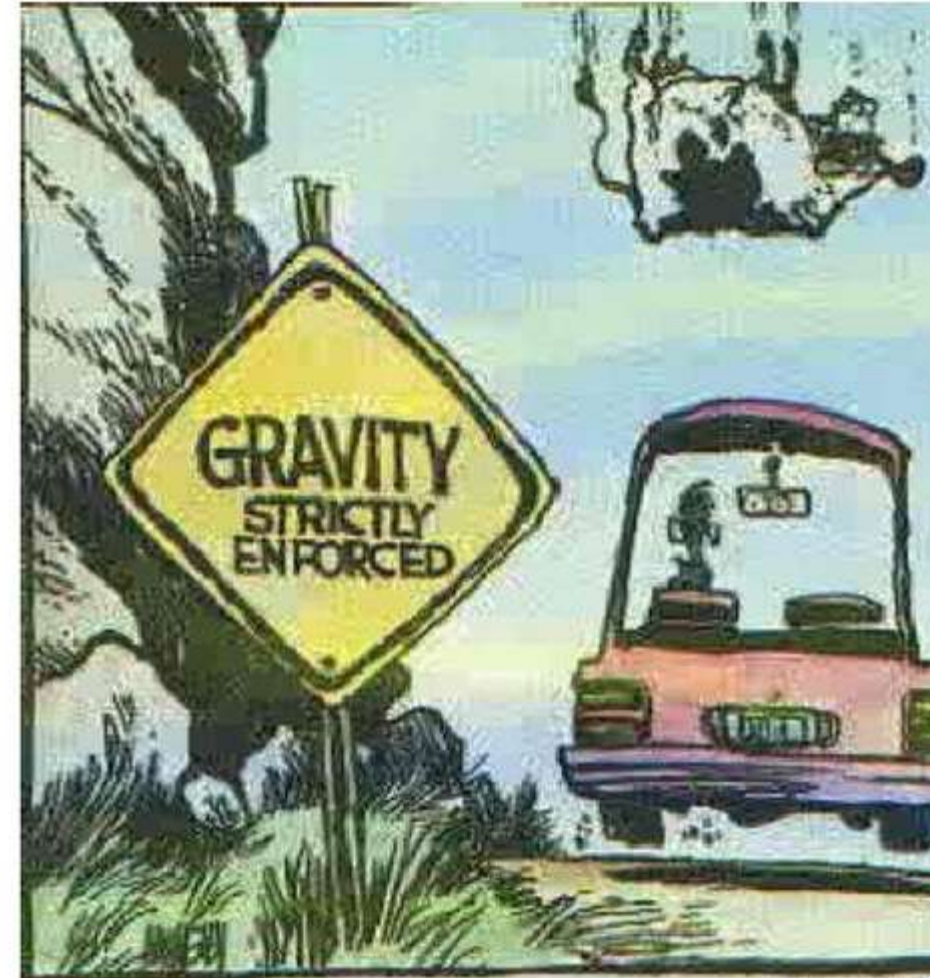
Gravity – a force that attracts all objects toward each other

- Measure in Newtons (N)
- Every object in the universe has an attractive pull



Strength of gravity depends on:

- Mass of objects
- Distance between objects



Every object in the universe has an attractive pull

- Bigger things have stronger pull
- Closer things have a stronger pull

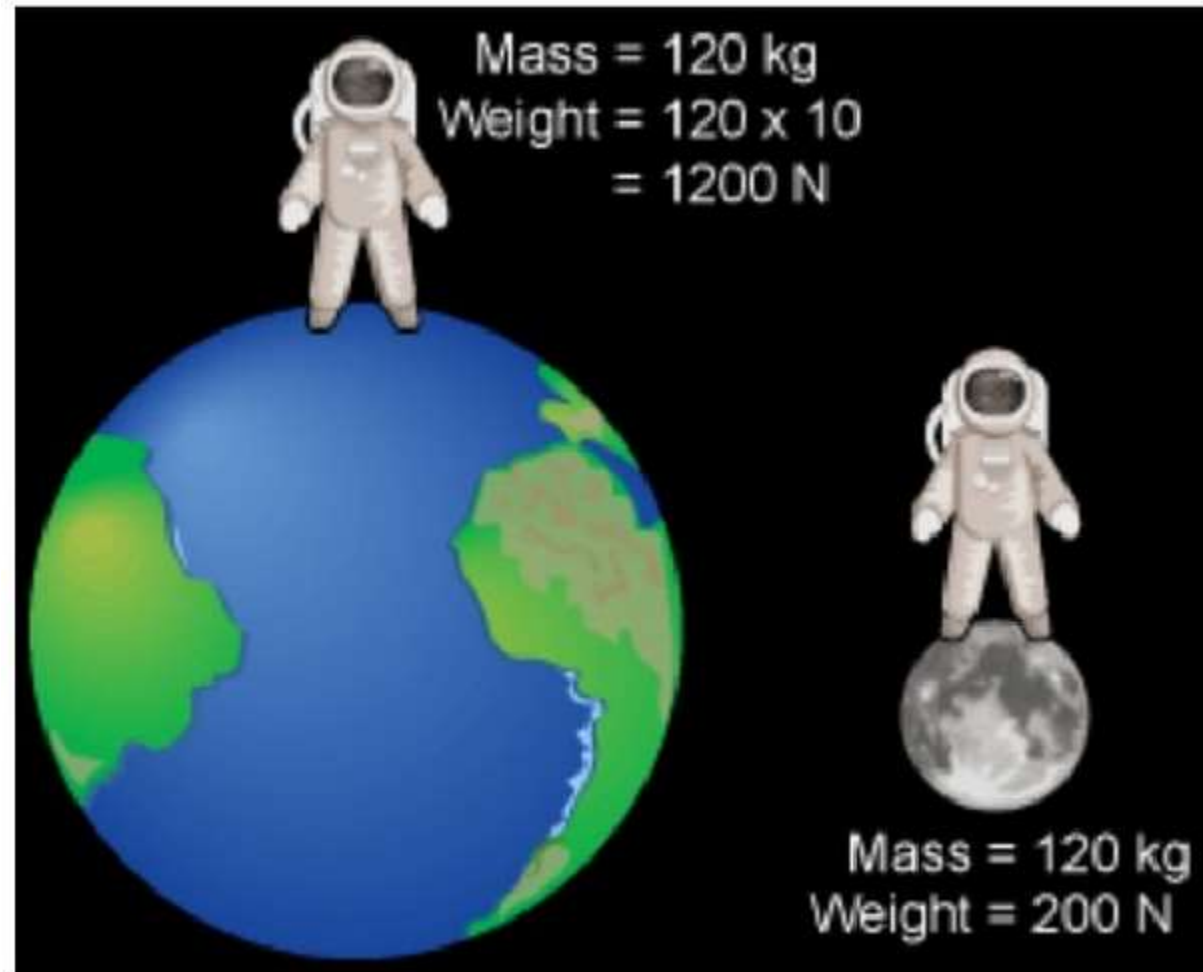


Mass: amount of matter in an object

Weight: force of gravity on an object

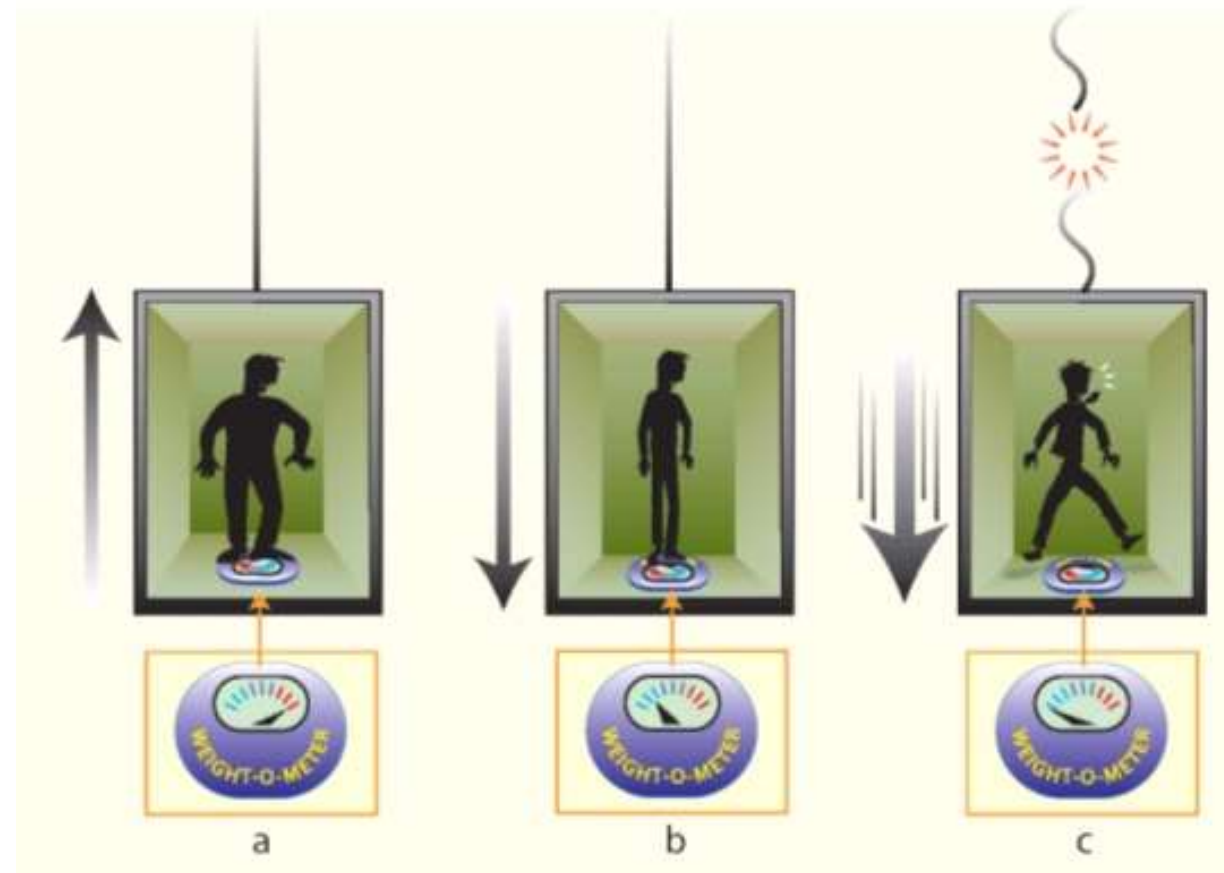
Mass: amount of matter in an object

Weight: force of gravity on an object



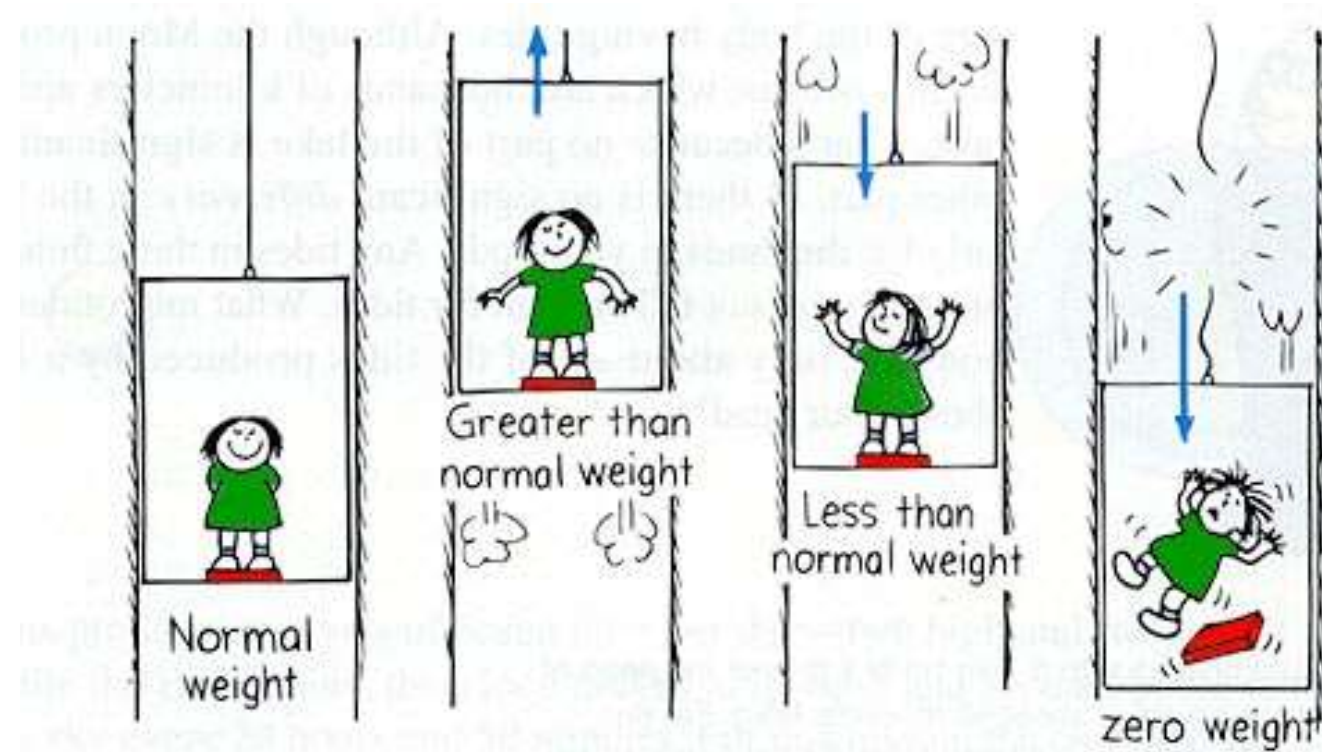
Mass: amount of matter in an object

Weight: force of gravity on an object



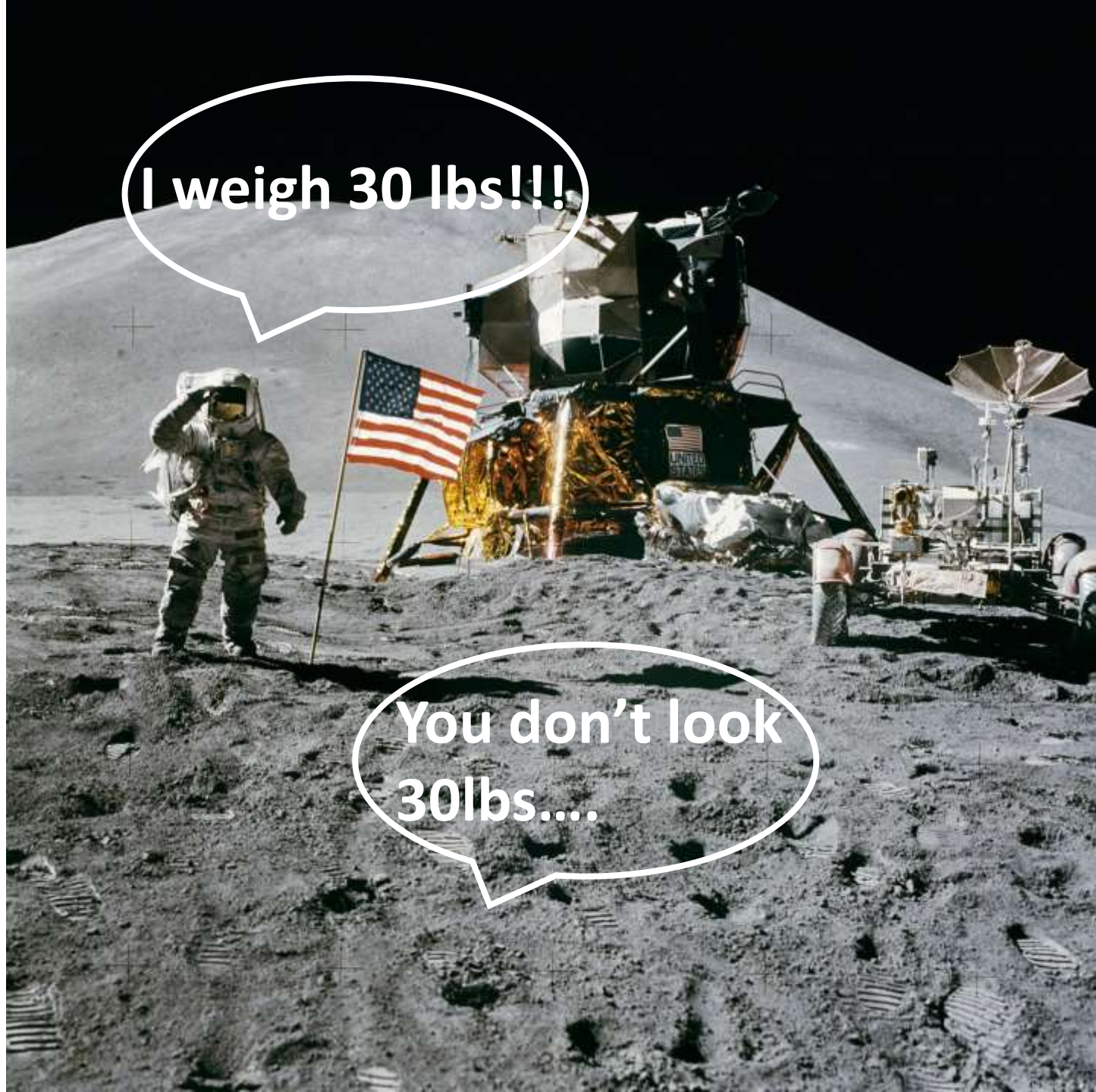
Mass: amount of matter in an object

Weight: force of gravity on an object



I weigh 30 lbs!!!

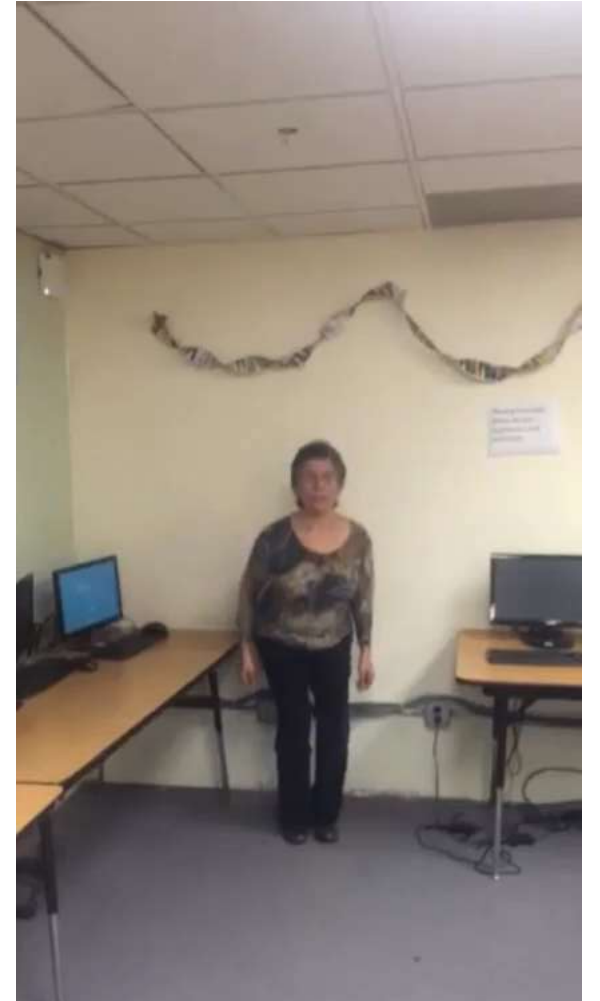
You don't look 30lbs....







Compare and contrast jumping on the moon and earth... how and why are they different??



Weight: how much gravity pulls on you

Would my weight be different on the moon?

Earth: 60 lbs



Moon 10 lbs



Pluto



8 pounds

Moon



10 pounds

Mercury



21 pounds

Earth

60 pounds



Uranus

64 pounds



Saturn

68 pounds



Neptune

85 pounds



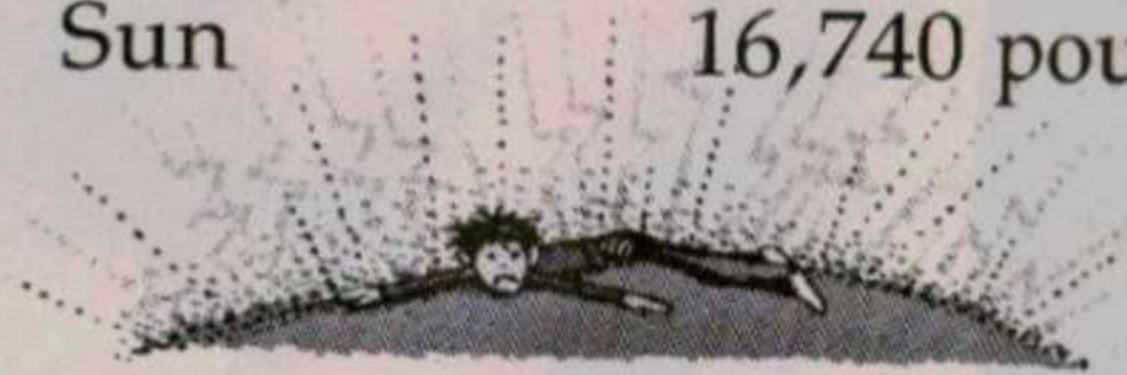
Jupiter

158 pounds

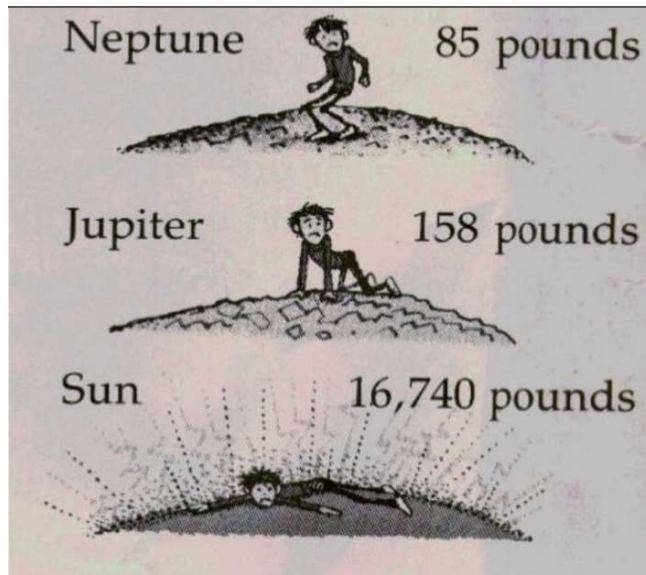


Sun

16,740 pounds



On Jupiter it's like carrying a 100lb backpack around all day long...



Inertia – tendency of an object to resist a change in motion

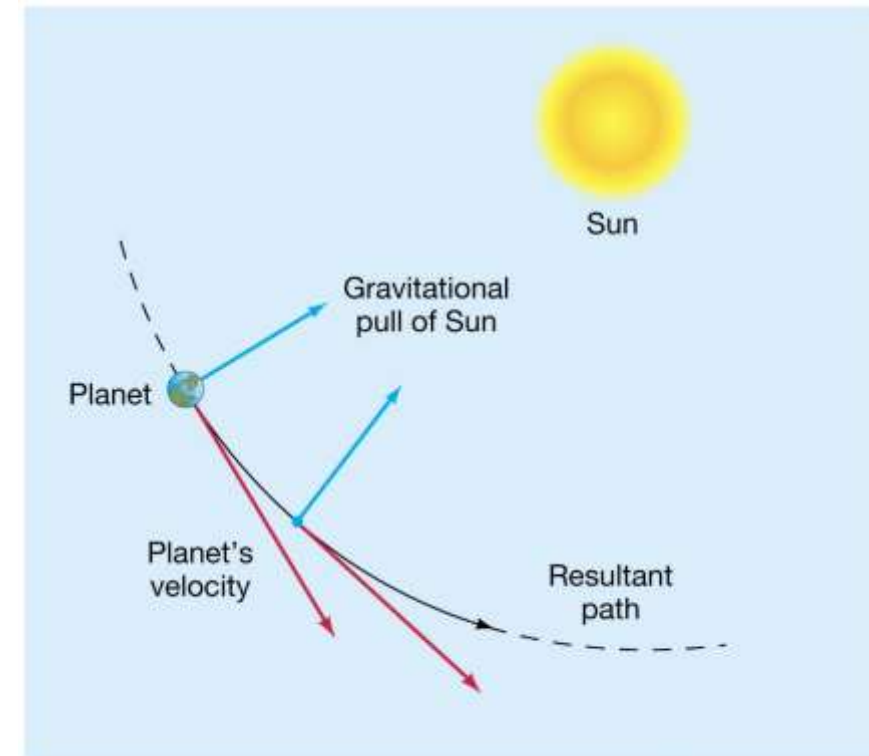
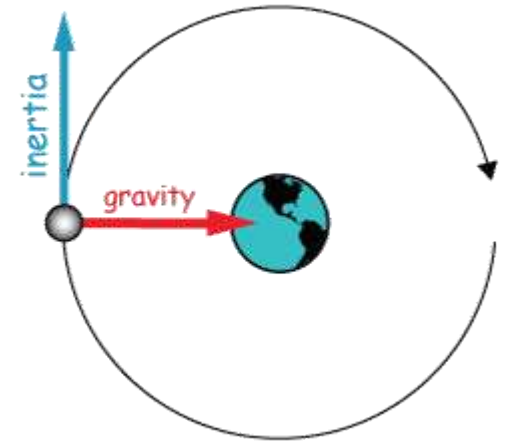
Ex: egg in glass trick



2 factors that keep Earth in orbit

1. **Inertia** – moves Earth in straight line
2. **Gravity** – Pulls Earth

Result: Earth moves in circle!!!



Falling!



Part 2: Terminal Velocity



Imagine a dog being thrown out of an airplane.



Woof!
(help!)



Force of gravity means the dog accelerates



- To start, the dog is falling slowly.
- There is really only one force acting on the dog, the force of **gravity**.
- The dog falls faster (**accelerates**) due to this force.



Gravity is still bigger than air resistance



Air resistance



gravity

- As the dog falls faster, another force becomes bigger – **air resistance**.
- The force of gravity on the dog of course stays the same

The force of gravity is still **bigger** than the air resistance, so the dog continues to accelerate (get faster)

Terminal speed: When force of Gravity = air resistance



Air resistance



gravity

As the dog falls faster and air resistance increases, eventually the **air resistance** becomes as big as (**equal to**) the force of **gravity**.

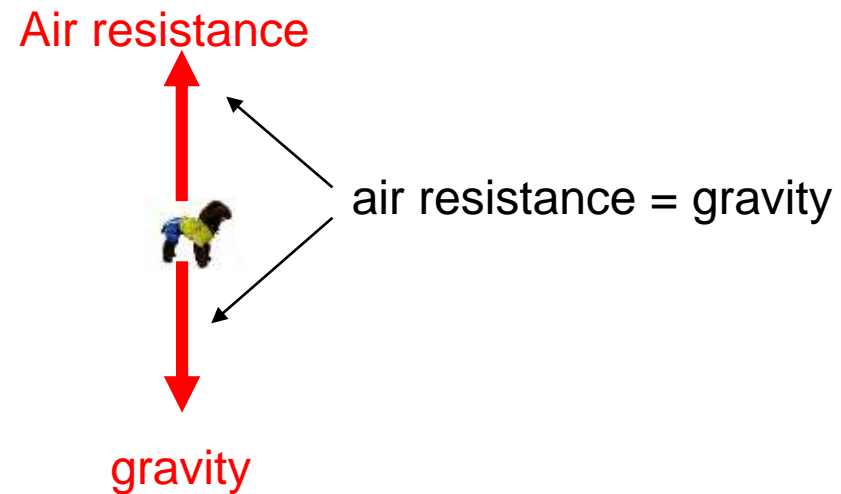
The dog stops getting faster (accelerating) and falls at constant velocity, or **terminal velocity**.



Terminal Speed



The dog will continue to fall at constant speed (called the terminal speed) until.....



Terminal Speed



Air resistance



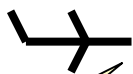
gravity





Oooooops!



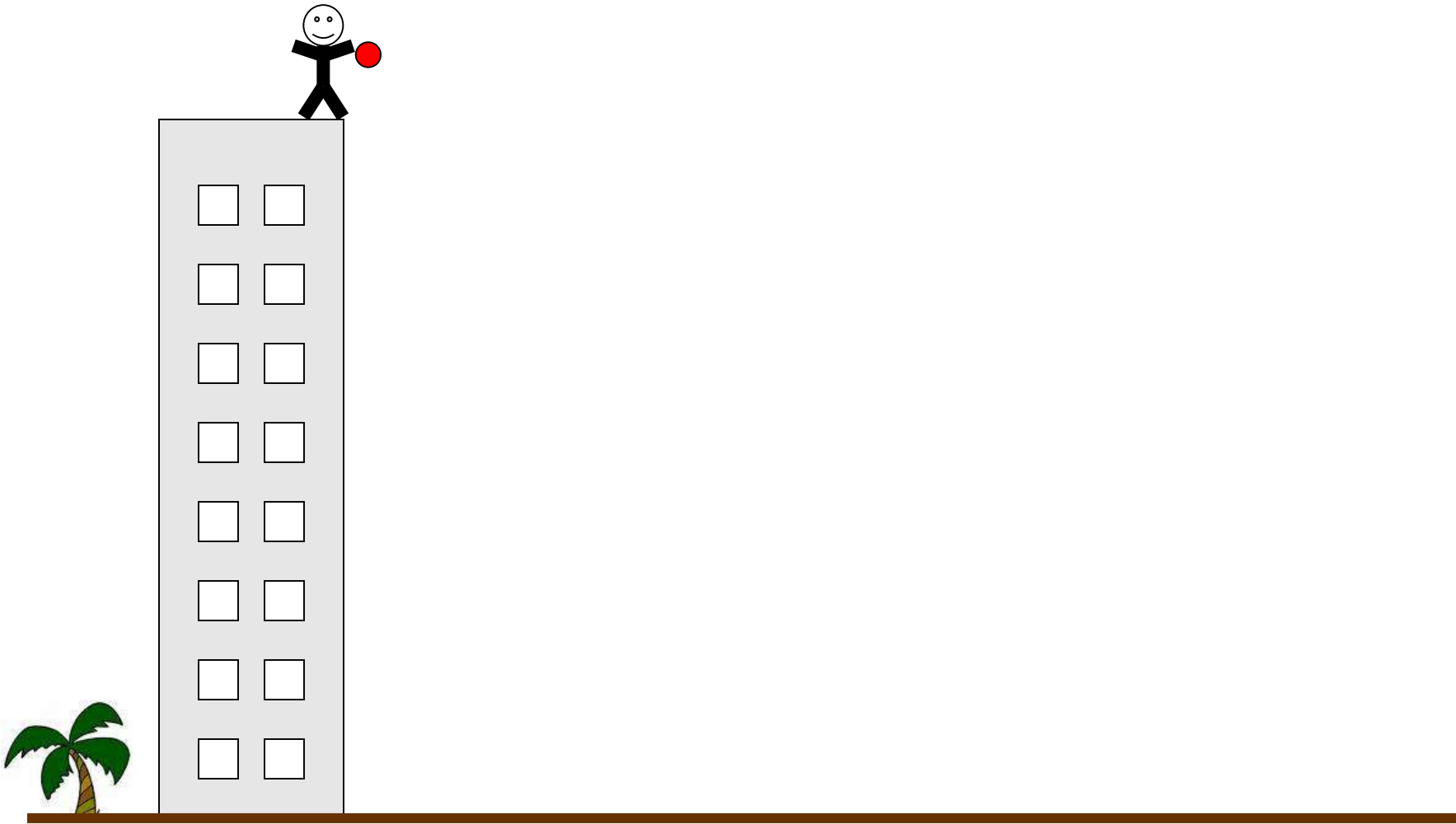


That definitely was
terminal!

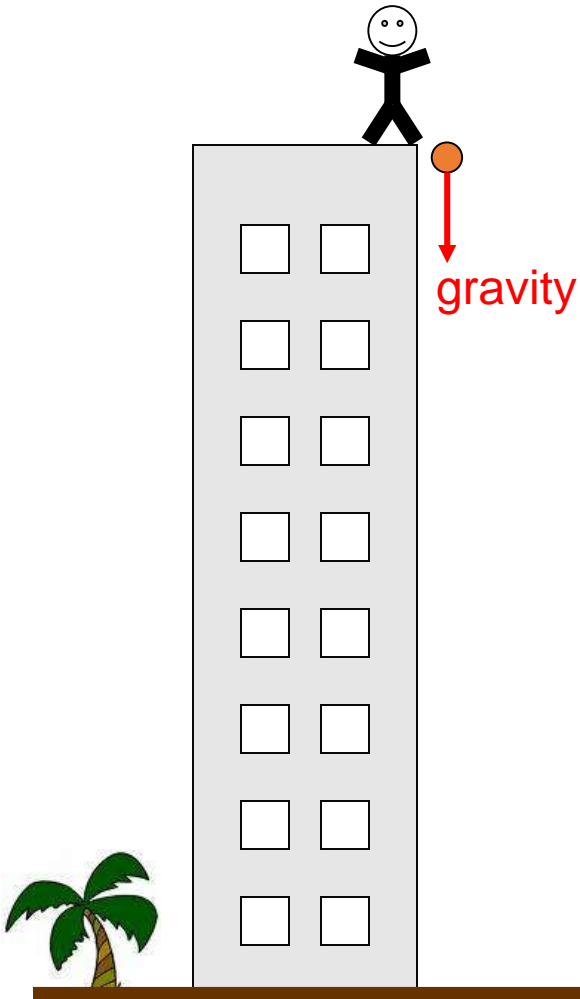


Terminal velocity: when air resistance becomes equal to the force of gravity and the object's speed stays the same

Falling without air resistance

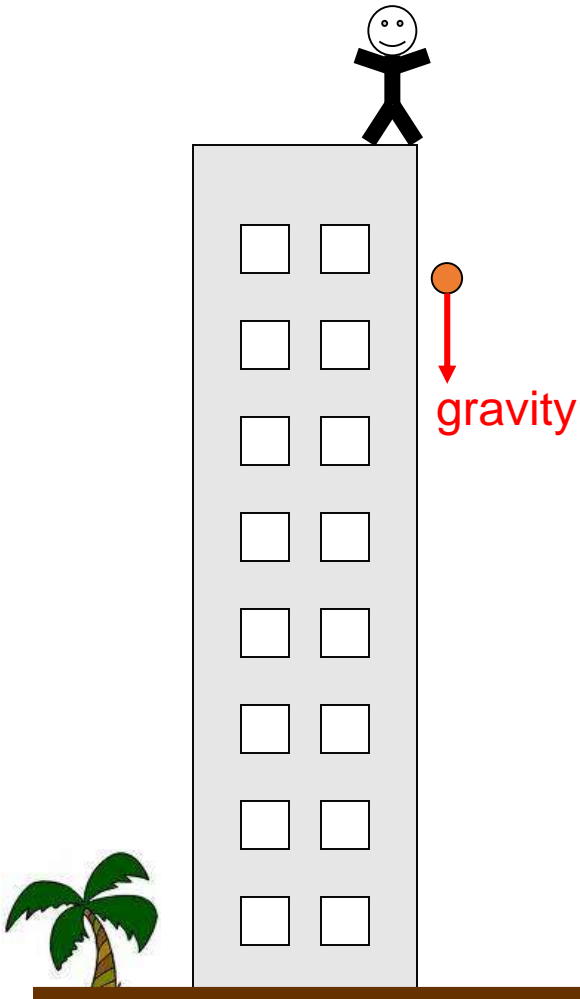


Falling without air resistance



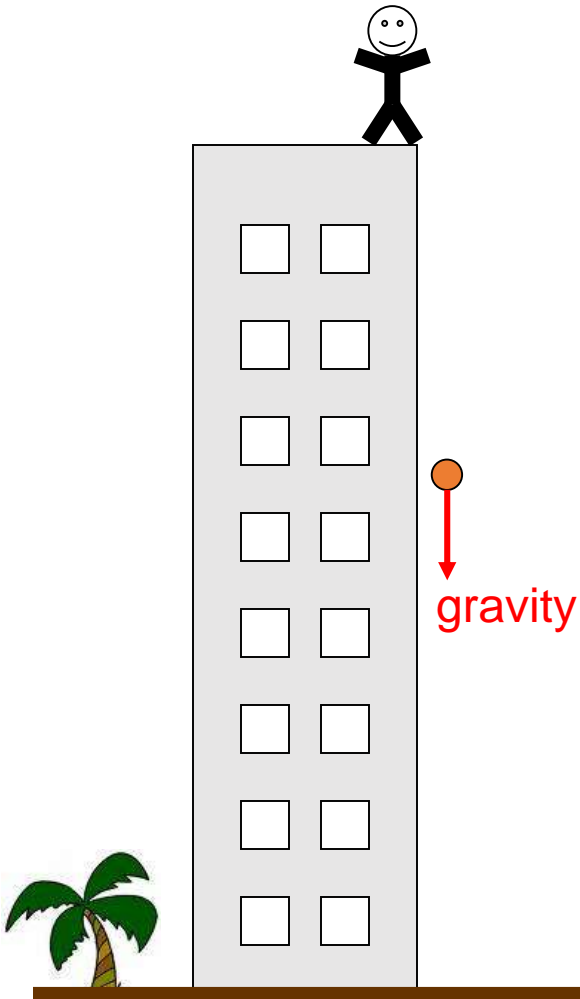
This time there is only one force acting in the ball - gravity

Falling without air resistance



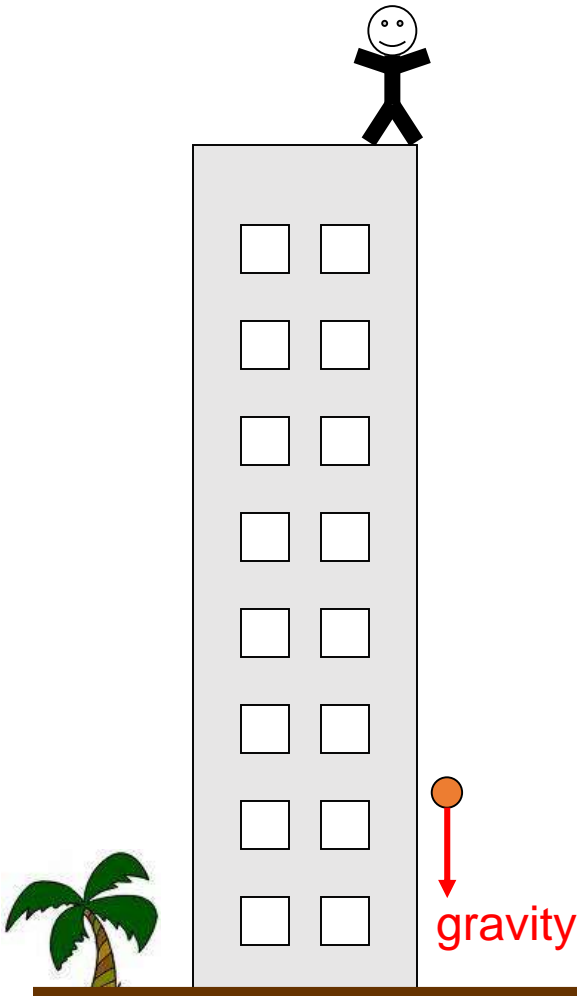
The ball falls faster....

Falling without air resistance



The ball falls faster and faster.....

Falling without air resistance



The ball falls faster and faster and faster.....

It gets faster by 9.81 m/s every second (9.81 m/s²)

This number is called “g”, the acceleration due to gravity.

$g = 9.8 \text{ m/s}^2$ (acceleration caused by gravity)

A ball is dropped from the top of a tall building. As the ball falls, the upward force of air resistance becomes equal to the downward pull of gravity. When these two forces become equal in magnitude, the ball will

- A** flatten due to the forces.
- B** fall at a constant speed.
- C** continue to speed up.
- D** slow to a stop.

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- C** continue to speed up.
- D** slow to a stop.

B. Fall at a constant speed

Terminal velocity occurs when
_____ balances the force of
gravity.

- a. Mass
- b. Weight
- c. Air resistance
- d. Friction

Terminal velocity occurs when
_____ balances the force of
gravity.

a. Mass

b. Weight

c. Air resistance

d. Friction

Assignment #2 Gravity

LO: To describe how gravity affects weight.

EQ: Why does the earth move in a circle around the sun?

LEVEL ZERO VOICE

PROCESSING TASK (10 minutes, individual work):

Part 1:

Create a flip for the definition of gravity.

Create two flips:

Flip 1: Gravity is stronger when... (write the answer on the back)

Flip 2: Gravity is weaker when... (write the answer on the back)

Part 2:

Describe the motion of a toy boat as it falls from a tall building. Discuss velocity and acceleration.

4/14-4/15

AGENDA

1. Lecture
2. Chem Review

HOMEWORK

1. Worksheets

Assignment #9 Terminal Velocity

LO: To describe how terminal velocity is reached.

EQ: Describe the motion of a toy boat as it falls from a tall building. Discuss velocity and acceleration.

3/19-3/20

AGENDA

1. Lecture
2. Processing Task
3. Processing Task p 2

HOMEWORK

1. Worksheets

LEVEL ZERO VOICE

PROCESSING TASK part 2(10 minutes, individual work):

1. Go to the computer
2. Log onto Zingy Learning
3. Do the Zingy for FORCES (yup the whole thing)