

# Kepler/Newton Study Guide

Heath Earth Science Text Pages 405-407

Name \_\_\_\_\_ Block \_\_\_\_\_

## Johannes Kepler - Laws of Planetary Motion

**Law 1.** Planets travel in \_\_\_\_\_.

a. Perihelion - \_\_\_\_\_

b. Aphelion - \_\_\_\_\_

c. Draw Fig. 22.10. Draw in the earth and label Earth at its perihelion and aphelion.

**Law 2.** Planets sweep out equal areas in \_\_\_\_\_.

The speed of a planet is faster at its \_\_\_\_\_.

**Law 3.** Harmonic Law -  $P^2 = D^3$

P = Period - time for planet to \_\_\_\_\_

D = \_\_\_\_\_

This means that: a. The farther a planet is from the sun, \_\_\_\_\_

b. Astronomers could predict the \_\_\_\_\_

## Sir Isaac Newton - Universal Law of Gravitation

1. The force of gravity between any two objects is:

a. Directly related to the \_\_\_\_\_.

b. Inversely related to the square of the distance \_\_\_\_\_

2. So... what is the relationship between mass of objects and the force of gravity?

3. What is the relationship between distance between objects and the force of gravity?

4. Why does the speed of a planet increase as a planet approaches perihelion?

5. Why does Mercury have a greater speed than Pluto?

6. Define Escape Velocity:

7. Compare the escape velocity of Mars to Jupiter.

8. Name some phenomena caused by gravity.

## **Newton's Laws of Motion**

For each demonstration, explain below in your own words what is happening and why.

**First Law: Teacher Note:** this is your chance to do magic! Find a tablecloth without a hem or a piece of shiny cotton about the size of a small tablecloth. Use plastic dishes. Or just use a textbook! Pull quickly and straight toward you. Practice before hand. After the students observe, have them write their own description of what happened and then copy down the textbook definition. this isn't in any of my texts so I put it up on the overhead.

Your Definition:

Textbook Definition:

**Second Law: Teacher Note:** Put a small girl in a chair and push across the room. Then get the largest kid - football player? - and ask him to sit down. The kids will start chuckling. Try to push the larger student. After the students observe, have them write their own description of what happened and then copy down the textbook definition. this isn't in any of my texts so I put it up on the overhead.

Your Definition:

Textbook Definition:

**Third Law: Teacher Note:** Blow up a balloon slightly and let it go. Blow up a balloon almost to the breaking point. Let it go. After the students observe, have them write their own description of what happened and then copy down the textbook definition. This isn't in any of my texts so I put it up on the overhead. **Alternate:** You could have students try this in teams. Except: have them figure out how to attach to a line you've run across the room above their heads. Run races if you can put up two lines!

Your Definition:

Textbook Definition: