Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Chapter 4 Notes

**Eureka**

1. What does it take to overcome inertia?
2. Force varies with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and change of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. Why do you exert a force of zero at top speed?
4. What is the other physics word for rate of change of speed?
5. How fast is 36 kilometers per hour in meters per second?
6. How is acceleration measured?
7. Do falling objects accelerate?
8. What is the rate of acceleration of falling objects?
9. Give an example of something that weighs 1 newton.
10. What is weight?
11. Why do things weigh less on the moon?
12. List 2 ways to lose weight.

**Forces Cause Acceleration**

From Newton’s First law, zero force implies \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Therefore, if the net force is **NOT** zero, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is not \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the object \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Net Force: The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of all \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that act on an object

The\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of an object is directly related to the \_\_\_\_\_\_\_ -\_\_\_\_\_\_\_\_\_\_\_ on an object and is in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the \_\_\_\_\_\_\_\_\_\_\_\_.



Acceleration is directly proportional force means that if you

1. \_\_\_\_\_\_\_\_\_\_\_\_ the force you \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the acceleration
2. \_\_\_\_\_\_\_\_\_\_\_\_ the force you \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the acceleration
3. \_\_\_\_\_\_\_\_\_\_\_\_ the force you \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the acceleration

Check yourself: If you push a crate with 100 Newtons of force and there is 100 Newtons of friction, does the crate accelerate? \_\_\_\_\_\_\_\_\_\_\_ Does that mean that the crate is not moving? \_\_\_\_\_\_\_\_ What does it mean?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Now you push with 150 Newtons of force and the friction force is still 100 Newtons. Does the crate accelerate?\_\_\_\_\_\_\_\_\_\_\_\_\_ What if a friend also supplied 150 Newtons of force? What would happen to the acceleration?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_ the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the less it \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ when acted on by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Mass Resists Acceleration**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is **inversely** proportional to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Inversely:**  The values change in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ directions

As mass \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, acceleration \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for a given force

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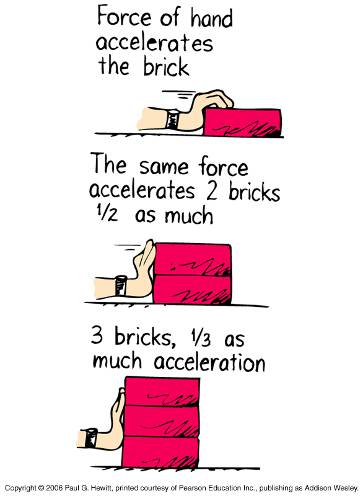
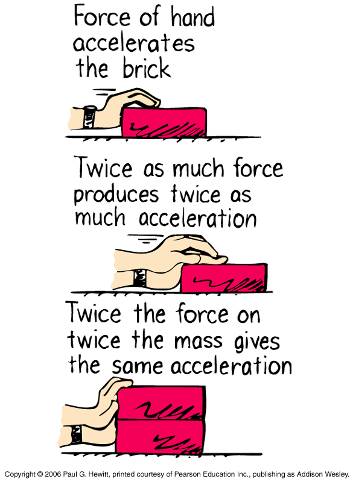
Acceleration is inversely proportional to mass means that if you

a \_\_\_\_\_\_\_\_\_\_\_\_ the mass you \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the acceleration

b\_\_\_\_\_\_\_\_\_\_\_\_ the mass you \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the acceleration

c\_\_\_\_\_\_\_\_\_\_\_\_ the mass you \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the acceleration

Check Yourself

**Newton’s Second Law of Motion**

Also called the \_\_\_\_\_\_\_\_\_ \_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\*The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ produced by a net force on an object is \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_ to the magnitude of the \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_, is in the same \_\_\_\_\_\_\_\_\_\_\_\_\_\_ as the net force, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the \_\_\_\_\_\_\_\_\_\_\_ of the body.

EQUATION

Acceleration goes as \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Acceleration goes as \_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Acceleration is in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Weight**

From the last section, weight was the force of gravity acting on an object. On earth, since the acceleration due to gravity is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the equation for weight is

Newton’s Third Law-

* Interactions Produce \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Forces occur in \_\_\_\_\_\_\_\_\_\_\_\_-they are part of an **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
    - **\_\_\_\_\_\_\_\_\_\_\_\_\_\_**-a mutual action
    - For example-Consider a hammer striking a nail.
    - The hammer imparts a \_\_\_\_\_\_\_\_\_\_\_ on the nail, driving it into the wood.
    - The nail imparts \_\_\_\_\_\_\_\_\_\_\_\_ on the hammer, stopping the motion of the hammer.
    - The forces are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* **Newton’s Third law** states that
  + Whenever one object exerts a \_\_\_\_\_\_\_\_\_ on a second object, the second object exerts an \_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ force on the first.

or

* + For every \_\_\_\_\_\_\_\_\_\_\_\_\_, there is an equal and opposite \_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Simple recipe for treating forces
  + Object \_\_\_\_\_\_\_\_\_\_\_ a \_\_\_\_\_\_\_\_\_\_\_ on object B
  + Object B \_\_\_\_\_\_\_\_\_\_\_ a\_\_\_\_\_\_\_\_\_\_ on object A
    - Car exerts a force on tree
    - Tree exerts an equal but opposite force on the car

A 2 ton car, going 60 m.p.h. hits a 5 ton truck, going 20 m.p.h..

The force of impact is greatest on which vehicle, the car or the truck?

The change in velocity (the acceleration) is greatest for which vehicle?

By what principle of physics?



Skydiving example C:\Documents and Settings\rquinn\Local Settings\Temporary Internet Files\Content.IE5\N1BM8UM1\MCj04360510000[1].wmf

* Action-The earth is pulling down on the skydivers
* Reaction-The skydivers are pulling up on the earth

So why doesn’t the earth move?

Answer-The earth **DOES** fall up toward the skydivers. However, the earth is MUCH MUCH larger than the skydivers so the acceleration is MUCH MUCH less

* + From Newton’s second law, the acceleration is equal to the force divided by the mass or

A=F/M

Skydiver’s Acceleration

Force/small mass=large acceleration

Earth’s Acceleration

Force/Large mass=small acceleration

Even though the same force acts on both objects, the acceleration of the earth is much smaller because its mass is so much bigger