DYNAMICS handout

III. **Dynamics** - study of the relationship between _____ and _____

A) Newton's Three Laws of Motion

1st Law Law of _____

"An object at rest tends to stay at _____.

An object in motion tends to stay in _____ in straight line unless acted on by an **unbalanced** _____."

Another words … If a moving object has no unbalanced force on it, it would

_____

The larger the mass, the _____ inertia

2nd Law Relationship between _____

Applying an **unbalanced force** on an object **causes** that

object to _____according to the equation

$$\frac{(m)}{(s^2)}\ a = \frac{\quad}{(Kg)}\ (N)$$

1. **Acceleration** is _____ related to the **force** exerted on that object.

a	F
	X 3
	x 2
	÷ 3
	÷ 2

$$a = \frac{F}{m}$$

2. The **acceleration** a given force will produce on an object is

_____ proportional to the mass of the object.

F = 10nt m = 2kg a = 5 m/s^2

F = 10nt m = 4kg a = _____ m/s^2

a	M
	÷2
	x2
	x3

3. Inertial mass (solve for m) You can calculate the mass of an object by

_____

Inertial mass **m =**

4. Standard equation $F = ma$

(N) (Kg) (m/s^2)

Newton - defined - force needed to give a _____ of mass an acceleration of _____

Derived unit - A unit that comes from the _____

_____

$N = Kg\ m/s^2$

Fundamental unit - (opposite) _____

Force Questions

Ex1) What is the force necessary to give a 3kg mass, initially at rest, an acceleration of 5 m/s^2 ?

F = ma

Ex2) A force of 30 nt accelerates an object by 15 m/s2. Find the objects mass.

F = ma

Ex 3) An unbalanced force of 100 nt acts on a 50kg mass for 5 seconds. Find the acceleration of the mass

Ex 4) A 10 kg cart moving with a velocity of 2m/s is brought to a stop in 2 sec. Find magnitude of the average force used to stop cart.

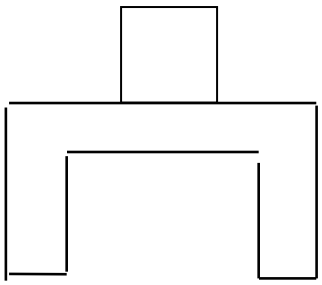
3rd Law of Motion

For every action there is _____

A lamp applies a force of 10 N to a table. What force does the table apply on the lamp? Which direction is this force applied?

B) Free Body Diagrams - diagrams that show the forces acting on an object

Ex1)



Weight = mg

About the Normal Force

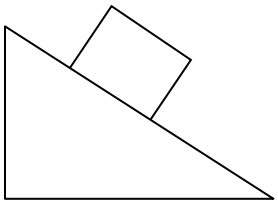
(1) _____ force supporting an object

(2) Always drawn _____to surface where 2 objects meet

(3) When an object is placed on a horizontal surface

_____

Ex 2) Object on an incline plane



Ex 3) Force on a falling object