Hello!

- Please take out a calculator, your notebook and a pencil.
- In your notes: draw the FBD for a car that is moving at a constant velocity.

This Week: Newton's 2nd Law

- Monday: Determining Acceleration and forces.
- Tuesday: Begin Multi-body Problems.
- Wednesday: Egg Drop.
- Thursday: Continue Multi-body Problems.
- Friday: Core 1: F=ma.

Today

- Determine the forces acting on an object that is accelerating.
- Determine the acceleration of objects with unbalanced forces.

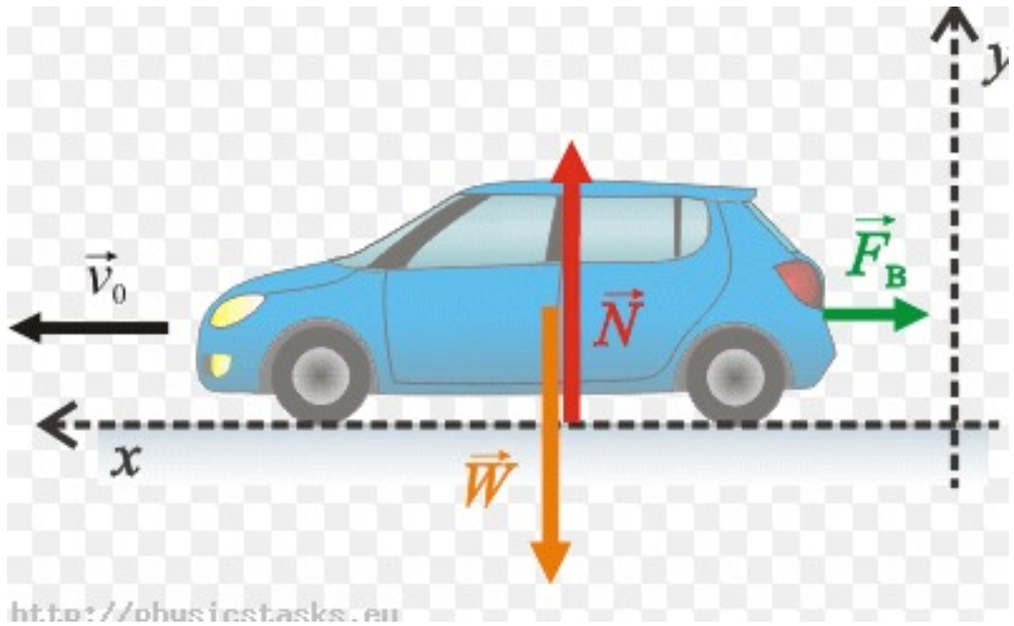
Homework Tonight

- physicsclassroom.com: Newton's Laws. Lesson 3. Sections a-d.
- Intro to net force worksheet.
- You will also begin your "Egg Drop" project.

So Far...

- All of our FBDs have been about objects with balanced forces.

- Our FBDs have had equally sized arrows.



Accelerating Objects

- Sum of forces not equal to zero.

F=ma

- Newton's 2nd Law of Motion.
- Force is equal to mass times acceleration.
- Units: Force [Newtons] = mass [kg] x acceleration [meters/seconds^2]

Conceptual Understanding

- Inertia is the resistance to change of velocity.
- The more massive something is, the more force is required to accelerate it.
- The greater the force, the greater the acceleration.

Determining Acceleration

- If we know the net force acting on an object, we can calculate the acceleration.
- Solve for the sum of the forces and use F=ma to solve for the acceleration.

The space shuttle weighed about 2 million kg at launch. If the engines produce 2.96x10^7N of thrust. What is the acceleration of the shuttle?

A bicycle has a mass of 13.1kg. The rider has a mass of 71.3kg. The rider applies a 9.78N force. With no drag, what is the acceleration of the bike?

Determining Net Force

- If we know the mass of the object (system) and it's acceleration, we can solve for force.
- We can use kinematics to find the acceleration.

Force and Kinematics

- A person is pushed in an office chair and then let go.
- Friction will eventually stop them.
- Draw an FBD for the chair after it is let go.

$\Delta x = 1/2(Vi+Vf)t$ & $a=(Vf-Vi)/t$

- How are we going to determine the variables we need to solve for acceleration?
- Take a moment and make a game plan with your lab partner.

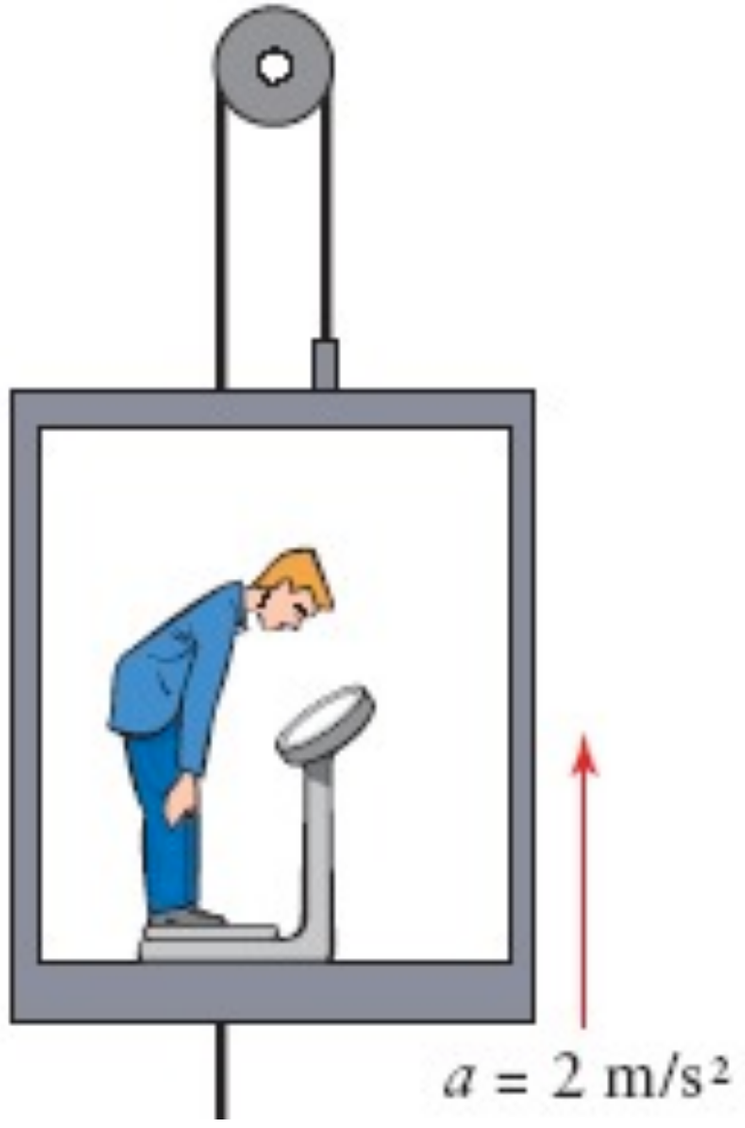
Common Misconception

- Two objects of different masses accelerate at the same rate.

- Is the same force applied to each object.

Misconceptions About Falling Objects

A 75 kg person gets into an elevator. When the elevator accelerates upward at 2m/s^2, what is the normal force acting on the person?



A 1100kg car is going 25m/s. A squirrel runs across the road and the driver slams on the breaks. The car comes to a stop in 1.5 seconds. What is the breaking force of the car.

A 3500kg limo is experiencing 600N of air resistance and it goes down the highway. What force does the car have to use to accelerate at 1.3m/s^2?

Egg Drop: Wednesday

- Read over the handout and begin planning your contraption.
- Review the restrictions.