

4.2

Newton's 1st Law

Objectives

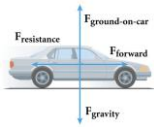
- **Explain** the relationship between the motion of an object and the net external force acting on the object.
- **Determine** the net external force on an object.
- **Calculate** the force required to bring an object into equilibrium.

Newton's 1st Lab

- An object at rest remains at rest, and an object in motion continues in motion with constant velocity unless the object experiences a net external force.

Net Force

- **Newton's first law** refers to the **net force** on an object. The net force is the **vector sum** of all forces acting on an object.
- The **net force** on an object can be found by finding resultant vectors



Although several forces are acting on this car, the vector sum of the forces is zero. Thus, the net force is zero, and the car moves at a constant velocity.

Newton's 1st Law

- **Newton's first law** is sometimes called the law of inertia.
- **Inertia** is the tendency of an object to resist change.
- If an object is at rest.....
- If it is moving at a constant velocity.....

Example

- Which would hurt more (assume they are thrown with the same speed), getting hit by a...
 - Baseball
 - Bowling Ball
 - Ping Pong Ball
- Rank according to mass
- How does inertia relate to the mass?

Newton's 1st Law

- If the net force on an object is zero, then the object is in **equilibrium**
- An object is in equilibrium if it is at rest or if it is moving at a constant velocity.
- Newton's first law says net force is something that disrupts the state of equilibrium.
- So, if there is no net force acting on the object, then the object does not experience a change in speed or direction and is in equilibrium.

Equilibrium

- Think of Tug-o-War, when is the rope in equilibrium?

An example of a field force is...

1. Friction
2. Pushing something
3. Pulling something
4. Magnetism
5. Blowing on something
6. All of the above
7. None of the above

Inertia is the tendency of an object to change.

1. True
2. False

According to Newton's 2nd law, as acceleration increases...

1. Mass increases with a constant force
2. Force increases with a constant mass
3. Force decreases with a constant mass
4. All of the above
5. None of the above

Joe pushes east with 50 N and Paul pushes east with 40 N, what is the net force?

1. 90 N
2. 10 N
3. 100 N
4. 0 N
5. All of the above
6. None of the above

Assignment

- Q: 1-5 (3 and 4 make sure to have angle)
- 4.2 Pack
- SP - B
