HPS Gravity, Mass, Weight 2020                        Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Per \_\_\_\_\_

OBJECTIVES: Use Newton’s Universal Law of Gravitation to mathematically describe the force relationship between two masses. (Obj 5)

1. What is the difference between mass and weight?
2. What is Newton’s Universal Law of Gravitation?  
     
     
   1. Is gravity the same everywhere? <https://www.newscientist.com/article/dn24068-gravity-map-reveals-earths-extremes/>   
        
      <http://www.glencoe.com/sites/common_assets/science/virtual_labs/E25/E25.html>
3. Consider falling objects…
   1. How does a parachute keep a skydiver from plummeting to their death?
   2. Suppose you were to drop a bowling ball and a marble from bridge at the same time. Which would hit the water below first?
   3. If you shoot a gun and drop a bullet at the same time, which would hit the ground first?
4. Application of Newton’s Laws
   1. While driving down the road, an unfortunate bug strikes the windshield of a bus. The bug hit the windshield, and the windshield hit the bug. Which of the two forces is greater: the force on the bug or the force on the bus?
   2. A gun recoils when it is fired. The recoil is the result of action-reaction force pairs. As the gases from the gunpowder explosion expand, the gun pushes the bullet forward and the bullet pushes the gun backward. The acceleration of the recoiling gun is…
      1. greater than the acceleration of the bullet.
      2. smaller than the acceleration of the bullet.
      3. the same size as the acceleration of the bullet.

Can You Accelerate? Remember: **F = ma** and **W = mg**

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| --- | --- | --- | --- | --- | --- |
| Participant | Standing Force (N) | Max Force (N) | Change in Force (N) | Mass (kg) = Force/gravity | Accel (m/s2) = change in F/m |
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Scratch Paper for calculations: