***GPS – Calculating Forces Introduction – Newton’s Second Law***

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



**Warmup – Use the box and triangle provided.**

1. Force is measured in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and mass is measured in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  and acceleration is measured in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. If we know the force exerted on an object (in Newtons) and we know the mass of the object (in kilograms) we can easily find the acceleration the object experiences by dividing the \_\_\_\_\_\_\_\_\_\_ by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. If we know the force exerted on an object (in Newtons) and we know how fast the object accelerates (in m/s2) then we can easily find the mass of the object experiences by dividing the \_\_\_\_\_\_\_\_\_\_ by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. If we know the mass of an object in kilograms, and we know the acceleration that an object experiences then we can calculate the force exerted on that object by multiplying the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ x \_\_\_\_\_\_\_\_\_\_\_\_\_.

**Practice problems – Use the triangle and include units. SHOW ALL WORK.**

 1. An unbalanced force of 25 N in an Easterly direction is applied to a 12 kg mass. What will be the **acceleration**?

2. An unbalanced 16 N force is applied to a 2.0 kg mass. What is the **acceleration**?

3. A shot-putter exerts an unbalanced force of 140 N on a shot giving it an acceleration of 19 m/s2. What is the **mass** of the shot?



4. An object moving with a constant velocity has an unbalanced force applied to it. If the unbalanced force is -20.0 N and the mass of the object is 3.75 kg, what is the **acceleration** of the object while this force is acting?



5. A racing car undergoes a uniform acceleration of 8.00 m/s2. If the unbalanced force causing the acceleration is 6,000 N, what is the **mass** of the racing car?

6. How much **force** is needed to keep a 20 N stone from falling?



7. An economy car has a mass of 800 kg. What is its **weight (force)** if the acceleration of gravity is 9.8 m/s2?



8. A small yacht weighs (force) 14,700 N. If the acceleration of gravity is 9.8 m/s2, what is its **mass**?



9. A 7.5 kg object is placed on a spring scale on the surface of the planet Nerdo. If the spring scale reads 78.4 N, what is the **acceleration** of gravity on Nerdo?



10. A car has a mass of 1200 kg. How much would the car **weigh (force)** on the moon where the gravitational acceleration is 1.6 m/s2?

