Name: _____ Period: _____ Date: _____

5.1 Practice Problems
Astronomy

Momentum
momentum = mass (velocity)

1. If the velocity of a truck is 55 m/s and its mass is 2,000 kg, what is its momentum?

2. If the car has a mass of 1,500 kilograms, what is its momentum? (v = 50 m/s)

3. A marble rolling in a straight line toward you at a speed of 6 m/sec. Its momentum is 32.5 kg·m/sec. What is the mass of the marble?

4. A 0.5-kilogram softball is thrown in a straight line at a velocity of 20 m/sec. What is the momentum of the baseball?

Acceleration
final velocity – starting velocity / time

1. A ball is released at the top of the 60 meter hill. It took 16 seconds for it to make it to the bottom. Calculate the final velocity and the acceleration.

2. A car rolled down the street for 150 meters. It took the car 23 seconds to come to a complete stop. Calculate the final velocity and the acceleration.

Net Force
force = mass (acceleration)

1. What net force is required to accelerate a car at a rate of 3 m/s^2 if the car has a mass of 3,000 kg?

2. A car accelerates at 6 m/s^2. If the car has a mass of 1300 kg, how much force does the car produce?

3. What is the mass of a truck of it produces a force of 14,000 N while accelerating at a rate of 10 m/s^2?

4. Your car has a mass of 2000 kg. If your car produces a force of 7000 N, how fast will it accelerate?

5. Given a force of 200 N and an acceleration of 10 m/s^2, what is the mass?

Mutual Gravitation

$$\frac{Gm_1m_2}{d^2}$$

1. Determine the force of gravitational attraction between the earth (m = 5.98×10^{24} kg) and a 90 kg pilot if the pilot is in an airplane at 30000 feet above earth's surface. This would place the pilot a distance of 6.389×10^6 m from earth's center.

2. Communications satellites orbit the Earth at a height of 36,000 km above Earth's surface. The distance from Earth's surface to its center is 6.38×10^6 m and the satellites are about 250 kg each. What is the force of attraction?

3. What is the Earth's attraction to you at the surface? Earth's mass is 5.98×10^{24}kg and has a distance of 6.38×10^6 m from surface to center. Figure out what your mass is in kg and then calculate the gravitational force.

4. What is the Sun's attraction to you? Sun's mass 2.0×10^{30}kg and has a distance of 1.5×10^{11}m from Earth.