Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Class #: \_\_\_\_\_

**7th Grade Science 3rd week homework (due is 4/18/19 Thursday)**

***Topics***

1. Newton’s Laws
2. Newton’s 2nd Law
3. Gravity and Free Fall
4. Net Force

***By the end of the week you will demonstrate an understanding of…***

… Newton’s Laws of Motion by classifying real-world examples.

… Newton’s Second Law by solving algebraic equations.

… gravity and free fall by solving algebraic equations.

… net force by drawing force diagrams.

***Directions:***

- Answer all questions on **loose leaf paper**.

- Write your **name, date, and class #** on every sheet of paper.

- Write each question number, and write your answers very clearly.

- **SHOW ALL OF YOUR WORK** to get all of the points.

- **Staple** the loose leaf paper to the back of this homework packet.

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| **Grade** | **Teacher Comments** |
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**Topic 1: Newton’s Laws (35 pts)**

1. What are Newton’s three laws of motion?
2. What is a force?
3. Give three examples of a force acting on an object in the cafeteria.
4. Action and reaction forces always have \_\_\_\_\_\_\_ *(greater, same, smaller, or opposite)* strength and act in the \_\_\_\_\_\_\_ *(greater, smaller, same, or opposite)* direction.
5. ***(1st law)*** You fill a cup to the top with water and put it in a cup holder in a race car. When you drive the race car around a track, when will the water spill?
   1. *Car is at rest*
   2. *Car is slowing down*
   3. *Car has constant speed and direction*
   4. *Car is speeding up*
   5. *Car is turning*
6. ***(2nd law)*** If a 5N force acts on a ping pong ball and on a bowling ball, which will have a greater acceleration? **WHY?**
7. ***(3rd law)*** When you jump, in what direction is your action force on the ground? What is the reaction force? In what direction do you accelerate?

**Topic 2: Newton’s 2nd Law (25 pts)**

1. What equation describes Newton’s second law?
2. When the force on an object increases, what happens to the acceleration of that object?
3. Is the relationship between **force** and **acceleration** an inverse or direct relationship?
4. A 2kg ball is hit with a bat with a force of 80N. What is the acceleration of the ball?
5. You are sitting in a rolling chair and kick the wall with a force of 180N. The wall pushes back. You and the rolling chair accelerate away from the wall at 3 m/ss. What is your and the rolling chair’s mass?

**Topic 3: Gravity and Free Fall (25 pts)**

1. What is gravity?
2. If you drop a bowling ball and a golf ball off of Mergenthaler’s roof, which should hit the ground first? Explain your answer! (Ignore the effects of air resistance)
3. Mr. Rivers likes to go bungee jumping. What is his acceleration as he falls toward the earth (ignoring air resistance)?
4. Mr. Rivers has a mass of 90kg. What is the force of gravity acting on Mr. Ward when he is falling from the bridge?
5. What is Mr. Rivers’s velocity 10s after he begins his free fall from the bridge?

**Topic 4: Net Force (15 pts)**

1. The net force acting on a ball is 0N. What do we know about the acceleration of the ball?
2. For each of the scenarios below, the car is driving toward the left and two forces act on the car at the same time. For each car: What is the net force? Does the car speed up, slow down, or have constant velocity?

