Chapter 12 - Forces and Motion Discussion Questions Name:

Ch 12.1 - Forces:

1. Can an object be in motion when forces are balanced? Explain why or why not.

2. Does the acceleration of an object always have to be in the same direction the object is moving?

3. Do you like friction? How does friction help us? When does it cause us problems or challenges?

4. Suppose you were to drop a bowling ball and a marble from bridge at the same time. Which would hit the water below first?

5. If you shoot a gun and drop a bullet at the same time, which would hit the ground first?

6. Where would you aim when shooting a bow and arrow at a target? When hunting? What about the stuphed with stuff monkey?

7. How does a parachute keep a skydiver from plummeting to their death?

Ch 12.2 - Newton’s 1st & 2nd Laws of Motion:

8. How is a seatbelt related to Newton’s 1st Law of Motion? Can you think of any other real-life examples?

9. Which has more inertia: an elephant taking a nap or a baseball going 95 mph? Explain.

10. Use F=ma to solve.  
a. What is the rate of acceleration of a 2,000-kilogram truck if a force of 4,200 N is used to make it start moving forward?

b. How much force is needed to accelerate a 68 kg skier at a rate of 1.2 m/s2?

c. What is the mass of an object that needs a force of 4,500 N to accelerate it at a rate of 5 m/s2?

11. What does the unit Newton actually mean? Hint: use the equation from his 2nd law.

12. What is the difference between mass and weight? How do you calculate weight? If you went to the moon, which would change: your mass or your weight?

Ch 12.3 - Newton’s 3rd Law of Motion and Momentum:

13. Give an example of force pairs.

14. 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?

15. 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…  
 a. greater than the acceleration of the bullet.

b. smaller than the acceleration of the bullet.

c. the same size as the acceleration of the bullet.

16. Compare and contrast inertia and momentum.

17. Using the equation, describe how is force related to changing momentum. *F = (mvf – mvi)/t*

(Hint: Think about dropping an egg from a balcony. How can you save the egg?!)

Ch 12.4 – Universal Forces:

18. Describe the Universal Law of Gravitation.