Unit 4 – Forces and Newton's Laws Review Guide

1. Earth's gravity pulls a skydiver toward Earth. If this is the action force, what is the reaction force?

2. Two logs roll down a hill. One has a mass of 20 kg and the other 50 kg. Both roll at the same speed. Which would be harder for you to stop? Explain using Newton's Laws.

3. A 2500 kg car accelerates at a rate of 10 m/s^2. How much force was required?

4. Two sumo wrestlers push their opponents each with the same force. If wrestler A accelerates twice as much as wrestler B, what does this tell us about the masses of A and B?

5. A tow truck pulls on a 2500 kg car with a horizontal force of 15,000 N. The car rolls on a frictionless road. Draw a free body diagram representing **ALL** the forces acting on the car. Does the car accelerate?

6. A 4 kg birdfeeder hangs from a rope. Draw a free body diagram showing numerically all the forces acting on the birdfeeder.

7. A bulldozer pushes a 5000 kg concrete slab with a force of 12,000 N. How much does the slab accelerate?

8. A 5 kg bowling ball starts at rest, then is pushed by a 500 N force for 10 seconds.

a. What is its speed after 10 s?

b. How far does it travel in 10 s?

9. A 50 N weight is pulled across a rough surface at a constant speed with a pulling force of 8 N. What is the coefficient of kinetic friction?

10. The coefficient of kinetic friction between wood and steel is 0.47. A 30 kg block of steel is pushed and then released on a wood floor and slides to a stop due to friction. What is the acceleration of the block?

11. A basketball player jumps straight into the air, dunks the ball and hangs on the rim, falls back to the ground, then lands on the ground and stands in place celebrating. Draw free body diagrams of the player for each part of his motion:

Jump: Hang: Falling: Celebrating:

12. Your friend is not a great driver and accidentally runs over his mailbox. If his car hits the mailbox with a force of 1300 N, how hard does the mailbox hit the car?

13. Your physics textbook has a mass of 1250 g.

a. What is its weight in Newtons?

b. If your math textbook has a mass of 1000 g, which book will have a greater force of gravity acting on it? Why?

14. What are Newton's Three Laws of motion?

15. A 40 kg wagon is pulled down the sidewalk so that it accelerates at 3 m/s^2. The coefficient of friction is 0.23. How much force is pulling on the wagon? Draw a free body diagram to help you answer.