Lyzinski
Accel Physics

An **extensive** review for the upcoming test ☺

Newton's Laws with Friction Review Worksheet

1. Answer each of the questions below.
   a) What is the net force required to give an automobile of mass 1600 kg an acceleration of 4.5 m/s^2?
   b) What is the acceleration of a wagon of mass 20 kg if a horizontal force of 64 N is applied to it (ignore friction)?
   c) What is the mass of a block of iron if a net force of 240 N causes it to accelerate across a smooth horizontal surface at 2.5 m/s^2?

2. Why must an object at rest have either no force or a minimum of two forces acting on it?

3. A 50 kg wood block is being dragged at an angle of 20° above horizontal across a wood floor, where the coefficient of friction is 0.5. The dragging force is 75N. Find the acceleration of the block.

4. A 20 kg object is at rest. A force of 200 N is required to set the block in motion. Once the object is in motion, it will maintain a constant velocity as long as a 150 N acts upon it. Find the coefficients of static and kinetic friction between the object and the floor.

5. A 3.0 kg toy is pulled by a force of 24 N. If the toy starts from rest, how far will it travel in the first 5.0 s?

6. A 40 kg sprinter starts from rest and 2.0 s later is running at a speed of 8.0 m/s. What is the average net horizontal force acting on her? What exerts this force?

7. A 70 kg hockey player coasts along the ice on steel skates. If the coefficient of kinetic friction is 0.010, what is the force of friction? How long will it take him to coast to a stop, if he is traveling at 1.0 m/s?

8. A boy pulls a 50 kg crate across a level floor with a force of 200 N. If the force acts at an angle of 30° up from the horizontal, and the coefficient of kinetic friction is 0.30, determine

   a. the normal force exerted on the crate by the floor
   b. the horizontal frictional force exerted on the crate by the floor
   c. the acceleration of the crate

9. An 8.0 g bullet traveling at 400 m/s passes through a heavy block of wood in 4.0×10^{-4} s, emerging with a velocity of 100 m/s. Ignore any motion of the wood.

   a) with what average force did the wood oppose the motion of the bullet?
   b) how thick is the block of wood?

10. A 0.22 caliber rifle shoots a bullet of mass 1.8 g with a muzzle velocity (exit velocity) of 500 m/s. If the barrel is 25 cm long, what is the average force exerted on the bullet while it is in the barrel?

11. SKIP
12. SKIP
13. SKIP

14. A child's wagon experiences a frictional force of 73 N whenever it is in motion, regardless of the load it is carrying. An applied horizontal force of 128 N causes the wagon to accelerate at 5.0 m/s^2. The same applied force, with a child on the wagon, causes it to accelerate at 1.0 m/s^2. What is the mass of the child?

15. A 10 kg box is pushed with a 50 N horizontal force. The coefficient of friction between the box and the ground is 0.4. Determine the acceleration of the box.
16. A 45 N force is applied to a 10 kg toy causing it to accelerate at 0.58 m/s^2. Determine the coefficient of friction.

17. A 15 kg box falls off the back of a truck traveling at 20 m/s. It comes to rest in 12 meters. Determine the coefficient of friction between the box and the road.