

## Dynamics Review Questions

1. What average net force is required to stop an 8500 kg truck in 10.0 s if it's initially traveling at 20.0 m/s?
2. What average net force is required to accelerate a 9.5 g bullet from rest to 650 m/s over a distance of 0.85 m along the barrel of a rifle?
3. A physics student pushed a 50 kg load across the floor, accelerating it at a rate of  $1.5 \text{ m/s}^2$ . How much force did she apply?
4. A 10,000 N net force is accelerating a car at a rate of  $5.5 \text{ m/s}^2$ . What is the car's mass?
5. A boy pedals his bicycle with a net horizontal force of 235 N. If the total mass of the boy and the bike is 40 kg, how much are they accelerating?
6. A 45 kg swimmer starting from rest can develop a maximum speed of 12 m/s over a distance of 20 m. How much net force must be applied to do this?
7. A net force of 3000 N is accelerating a 1200 kg elevator upward. If the elevator starts from rest, how long will it take to travel up 15 m?
8. A 20.0 kg box is being pulled across a floor by a horizontal rope. The tension in the rope is 99 N. The coefficient of friction is 0.25. What is the force of friction on the box? What is the acceleration of the box?
9. John is pushing (horizontally) on a 100.0 kg bench with a force of 380 N. What is the size of the friction force acting on the bench if the coefficient of static friction is 0.40?
10. A 38 kg crate rests on a floor. A horizontal pulling force of 170 N is needed to start the crate moving. What is the coefficient of static friction between the crate and the floor?
11. The same crate as in the previous question only requires a 120 N force to keep it moving at constant speed. What is the coefficient of sliding (kinetic) friction?
12. An 8.0 kg sled is being pulled across snow the snow, at constant speed, by a horizontal force of 15 N. Find the coefficient of friction between the snow and sled.
13. A 56 kilogram cart is pulled along a horizontal road at constant speed of 2.0 m/s by a horizontal rope. The coefficient of friction between card and road is 0.69. Find the tension in the rope (the force the rope is applying).
14. A 2.0 kg book is held against a vertical wall. The coefficient of friction is 0.45. What is the minimum force that must be applied on the book, perpendicular to the wall, to prevent the book from slipping down the wall?
15. A 1200 kg car is travelling at 18 m/s when the brakes are applied and the wheels lock. The coefficient of friction between tires and road is 0.62. Find the distance travelled, from when the brakes are first applied, for the car to come to a full stop.

1. -17,000 N
2. 2361 N
3. 75 N
4. 1818 kg
5.  $4.857 \text{ m/s}^2$
6. 162 N
7. 3.46 s
8. 49 N,  $2.5 \text{ m/s}^2$
9. 390 N
10.  $\mu = 0.46$
11.  $\mu = 0.3222$
12.  $\mu = 0.19$
13. 380 N
14. 44 N
15. 27 m