Second Law Motion Problems

Here are 10 problems based on the Second Law of Motion (Newton's Second Law):

1. A car of mass 1500 kg accelerates from rest to 20 m/s in 10 seconds. Calculate the net force acting on the car.
2. A force of 500 N is applied to a 50 kg mass. What is the acceleration produced?
3. A bullet of mass 0.05 kg is fired from a gun with a velocity of 300 m/s. If the bullet takes 0.002 seconds to leave the gun, calculate the force exerted on the bullet by the gun.
4. A hockey puck of mass 0.2 kg slides on the ice with a constant force of 1 N applied to it. What will be its acceleration?
5. A 1000 kg car is acted on by a force that increases its velocity by 5 m/s². What is the force applied to the car?
6. An object of mass 10 kg is accelerated from 0 to 15 m/s in 3 seconds. What is the force acting on the object?
7. A 50 kg person stands in an elevator that is accelerating upwards at 2 m/s². Calculate the net force acting on the person.
8. A rocket of mass 500 kg accelerates upward at 4 m/s². What is the thrust force provided by the engine, assuming no air resistance?
9. A cyclist of mass 70 kg accelerates at 1.5 m/s². What is the net force acting on the cyclist?
10. A boat of mass 200 kg is acted on by a net force of 600 N. What is the boat's acceleration?

These questions test the application of Newton's Second Law, $F = ma$, and require calculations based on mass, acceleration, and force.

Here are the keys for the 10 problems based on the Second Law of Motion:

1. **3000 N**
2. **10 m/s²**
3. **7500 N**
4. **5 m/s²**
5. **5000 N**
6. **50 N**
7. **600 N**
8. **6200 N**
9. **105 N**
10. **3 m/s²**