**Conceptual Force Questions (Answer 8)**

1. What does it meant to say that something is in mechanical equilibrium?
2. If you push on a crate with a force of 100 N and it slides at constant velocity, how much is the friction acting on the crate? (i.e. how much of a force is friction providing)
3. If you’re in a car at rest that gets hit from behind, you can suffer a serious neck injury called whiplash. What does whiplash have to do with Newton’s first law?
4. When a ball is tossed straight up, it momentarily comes to a stop at the top of its path. Is it in equilibrium during this brief moment? Why or why not?
5. Can you say that no force acts on a body at rest? Or is it correct to say that no net force acts on it? Defend your answer.
6. Two people stand on a painter’s staging, which weighs 300 N and is supported by two cables. One person weighs 250 N and the other weighs 300 N. The tension in the left cable is 400 N. What is the tension in the right cable?
7. When you walk along the Earth, you don’t change the Earth’s rotation very much. Why is it that people participating in log-rolling competitions change the rotation of the log by an awful lot?
8. A farmer urges his horse to pull a wagon. The horse refuses, saying that to try would be futile for it would violate Newton’s Third Law for if the horse were to pull on the wagon, the wagon would pull back with an opposite and equal force, making the net force between them be zero and thus leading to a zero acceleration. After deciding that he should really cash in on his talking horse on the talk shows, what does the farmer say to refute the horse’s argument and convince it to pull the wagon? (Ignore the friction of the cart wheels on the road).
9. Within a book on a table, there are billions of forces pushing and pulling on all the molecules. (A)Why is it that these forces never, by chance, add up to a net force in one direction, causing the book to accelerate ”spontaneously” across the table? (B) How does your answer refute Aristotle’s idea of Natural Motion?
10. Consider an airplane that flies due east on a trip, then returns flying due west. Flying in one direction, the plane flies with the rotation of the Earth, and in the opposite direction, against the Earth’s rotation. But, in the absence of winds, the times of flight are equal either way. Why is this so?