Engineering Physics I – Fall 2015
Quiz 4 – October 8, 2015
Name: SOLUTIONS

1. (40 points) Match each item on the left with the best answer from the right.

a) **F** = m**a** **Newton's Second Law**

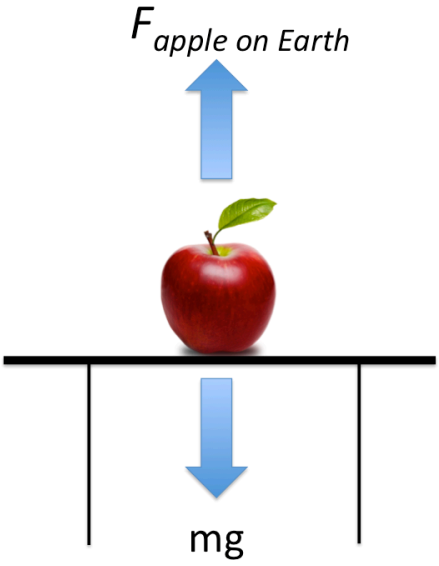
b) May the force be with you **Star Wars**

c) An object in motion will stay in motion unless acted upon by a force
Newton's First Law

d) For every action there is an equal and opposite reaction
Newton's Third Law

1. Newton's First Law
2. Newton's Second Law
3. Newton's Third Law
4. Star Wars

2. (20 points) An apple of mass *m* sits on a table as shown in the diagram on the right.



a) Does the diagram show a free body diagram for the apple?
Yes **No**

b) Does the diagram contain an action/reaction pair?
Yes No

The diagram contains an action/reaction pair (the force of the Earth on the apple and the force of the apple on the Earth). It does not include all of the forces on the apple because it is missing the normal force or the force of the table on the apple.

3. (40 points) I apply the same force (80 N) to two blocks on a frictionless surface for 10 seconds. The blocks are initially at rest. Block 1 has a mass of 10 kg and block 2 has a mass of 5 kg. Which one goes farther?

Block 1 (10 kg) **Block 2 (5 kg)** They travel the same distance

From Newton's second law we know that F=ma, so the larger the mass the less acceleration you get from the same applied force. We also know from kinematics that $x(t) = 0.5*a*t^2$ if the initial position and velocity are zero. So Block 2 has a larger acceleration than Block 1 and that means that it will travel farther in 10 seconds than Block 1.