**Motion Exam Study Guide**

1. Relative Motion
   1. Distance vs. Displacement
      1. Displacement has direction
   2. Speed vs. Velocity
      1. Velocity has direction
   3. Vector Addition
   4. Speed = distance ÷ time
   5. Change in velocity = final velocity – initial velocity
   6. SI Units
2. Forces
   1. Force of Earth’s Gravity = 9.8 m/s2
   2. Air resistance (Fluid friction) motion against gravity
   3. Newton = kg \* m/s2
   4. Net force = unbalanced forces
3. Newton’s 1st Law
   1. Object at rest stays at rest, an object in motion stays in motion
   2. Inertia – dependent on an object’ mass
   3. Inertia is a resistance to change
4. Newton’s 2nd Law
   1. Force = (mass)(acceleration)
   2. Mass = Force ÷ acceleration
   3. Acceleration = Force ÷ mass
   4. An object accelerates when a unbalance force acts upon the object
5. Newton’s 3rd Law
   1. An action and a reaction (opposite but equal forces)
   2. Momentum – an unbalance force causes the speeding up or slowing down of an object in reference to its mass and change in velocity
   3. Momentum equation: p = mass (velocity)
   4. Impulse – the time an unbalance force is applied to an object
   5. Equation for impulse – J = Force (time)
   6. Force (time) = mass (final velocity – initial velocity)
   7. Change in momentum = Impulse