**Grade 11 Physics ~ Review**

**Unit # 2: Forces and Vectors (Chapters 3-5)**

1. Anything from Unit # 1 is fair game. We are building from Unit # 1.

$$The Constant Velocity Equation v= \frac{d}{t}$$

$$The 5 Equations for Constant Acceleration $$

$$a= \frac{v\_{2}-v\_{1}}{t}, d=v\_{1}t+\frac{1}{2}at^{2}, d=v\_{2}t-\frac{1}{2}at^{2}$$

$ d=\frac{(v\_{2}+v\_{1})}{2}t, v\_{2}^{2}-v\_{1}^{2}=2ad$

1. **Vector Problems:**
2. Adding, subtracting and multiplying by a scalar.
3. Scale diagrams
4. Solving by trigonometry
5. Free body diagrams
6. Types of problems i. River crossing ii. Airplane iii. Mailman question etc.
7. **Relative Motion** ~ using components or trigonometric methods
8. **Newton’s Laws:**

N1 “The law of Inertia” All objects will remain moving at a constant velocity unless they are acted upon by an external, unbalanced force.

N2 $\vec{Fnet}=m\vec{a}$ The acceleration of an object depends inversely on its mass and directly on the unbalanced force applied to it. The object will accelerate in the same direction as the net force.

N3 $\vec{F\_{action}}=-\vec{F\_{reaction}}$ For every action force, there is an equal but opposite reaction force.

1. Give examples from everyday life that demonstrates these laws.
2. Solve problems using Newton’s Laws.
3. **Weight v.s Mass** $\vec{F}=m\vec{g}, \vec{g}=9.8 m/s^{2}$ Weight is a force and thus a vector quantity.

 Mass is a scalar quantity and is constant.

1. **Newton’s Law of Universal Gravitation.**

$$\vec{Fg}=\frac{Gm\_{1}m\_{2}}{\vec{d}^{2}} where G=6.67×10^{-11}\frac{N∙m^{2}}{kg^{2}}$$

Explain Henry Cavendish’s famous experiment to solve for G.

1. **Force of Friction**

$$F\_{f}=μF\_{N}$$

Where µ is the coefficient of friction.

1. **Projectile Motion** (find maximum height, maximum range and time of flight) (v = vertical, h=horizontal)

$$d\_{y}=\frac{v^{2}sin^{2}θ}{2g}, d\_{x}=\left|v\right|cosθt, d\_{x}=\frac{v^{2}sin2θ}{g}, t=\frac{2|v|sinθ}{g}$$

Where v = the initial speed of the projectile and θ is the angle at which it was projected at. “dy” is the maximum height, dx is the maximum range and t is the time of flight.

1. **Motion on an incline.** Find force pulling up and down the incline and possibly the acceleration.

Remember $F\_{N}=F\_{gy}=mgcosθ and F\_{gx}=mgsinθ$ going down the slope. Ff=µmgcosθ