STUDY GUIDE FIRST QUARTER TEST *(Test Date = 11-02-06)*

***aka* FUNDAMENTAL /CRITICAL RELATIONSHIPS / CONCEPTS OF INTRODUCTORY PHYSICS (*to date*)**

This document is a recommended (*First Quarter Test*) Study Guide. Prior to utilizing this document the student should be fluent in all POD's & WOD's assigned to date. This recommendation notwithstanding, there may be problems on the quiz/test, which cover salient points of PSII, not directly highlighted herein.

1. Scalar Quantities – Those requiring only magnitude for sufficient description.

2. Vector Quantities – Those requiring magnitude and direction for sufficient description.

3. Basic SI (*System International*) Units are Meters, Kilograms, Seconds and fluency with the Factor Label Method of units conversion and solution arrangement. See reference links page for further information.

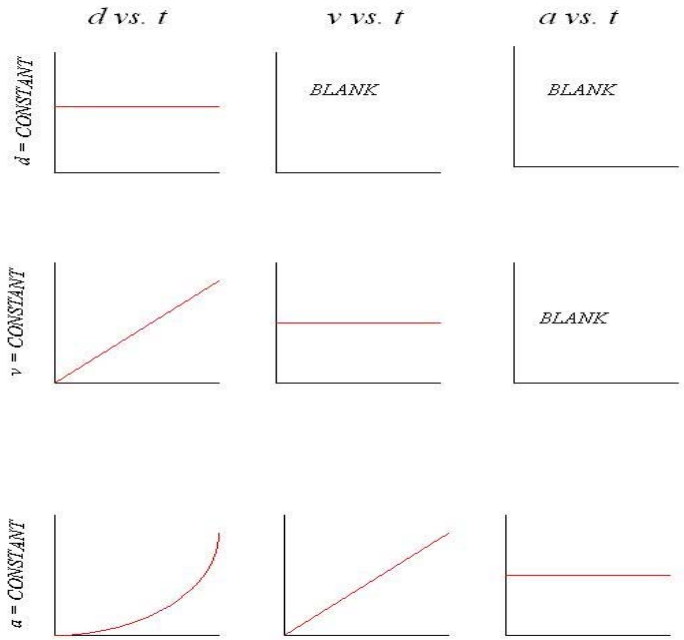
4. Average Speed (*or Velocity if direction is constant and distance equals displacement*) = V_{AVG} = [Total Distance] / [Total Time] = [Δd / Δt] {*Not generally the average of the speeds or velocities.*}

5. Velocity = Speed with a specific direction = Rate of change of displacement = V = [Δd / Δt]. **Note also that the slope of a displacement versus time graph is equivalent to the associated velocity for the involved object.**

6. Acceleration = a = Rate of change of Velocity = $\Delta V/\Delta t = (V_f - V_i) / \Delta t$ (*From this one can rearrange to get* $V_f = V_i + a(\Delta t)$ *or when* $V_i = 0$ *then* $V_f = a(\Delta t)$ *assuming* a *is constant*.) **Note also that the slope of a velocity versus time graph is equivalent to the associated acceleration for the involved object.**

7. When acceleration is constant, average Velocity = $V_{AVG} = [V_f + V_i] / 2$

8. Position/Displacement, Velocity & Acceleration Graphs as follows:



9. The area under a velocity versus time graph is equivalent to the displacement of the object.

10. Newton's Three Laws of Motion are:

(1) All bodies will stay in motion (*at constant velocity*) or at rest, unless acted upon by an outside force - *aka* the Law of Inertia.
(2) The acceleration of an object is directly proportional to the Force applied and inversely proportional to its Mass - *aka* F = ma.
(3) For every action force there is an equal and opposite reaction force – *aka* a force pair. Each of these forces, of the force pair, acts on a different object.

11. **F**orce = (mass) x (acceleration), especially $\Sigma F = (m)(a)$ => *aka* Newton's Second Law of Motion. It says that the sum of the forces on any object (*i.e. the net force*) is equal to the mass times the acceleration of the object (in Newtons) – where *one* Newton = an acceleration of *one* [Meter / s^2] times a mass of *one* [Kilogram].

12. **W**eight Force = (mass) x (acceleration of gravity) = (m) (g) = (m) $\left|(-9.81 \text{ meters}/s^2)\right|$ in Newtons.