

# Equation Sheet – Physics 105 -- exam #1

Physics 105 -- Fall 2009 Exam #1 (10/2/09)

**DO NOT USE THIS SHEET DURING COMMON EXAM.**

**Use the copy that will be provided during the exam.**

Use  $g=9.8 \text{ m/s}^2$  unless otherwise stated in problem.

**Some useful conversion factors:**

1 m = 100 cm      1 km = 1000 m      1 mi = 1609 m      1 inch = 2.54 cm      1 hour = 60 min = 3600 s  
1 kg = 1000 g  
1 yd = 3 ft      1ft = 12 inch  
1 U.S. gallon = 0.134 cubic feet

**Vectors:** for  $\theta$  measured from the +x axis:  $A_x = A\cos\theta$ ;  $A_y = A\sin\theta$ ;  $A = \sqrt{A_x^2 + A_y^2}$  ;

$$\theta = \tan^{-1} \frac{A_y}{A_x}; \quad \mathbf{A} + \mathbf{B} = \mathbf{C} \Rightarrow C_x = A_x + B_x, C_y = A_y + B_y$$

**One-dimensional motion:**  $\Delta x = x - x_0 = v_0 t + \frac{1}{2} a t^2$ ,  $v^2 - v_0^2 = 2a\Delta x$ ;  $v = v_0 + at$ ;

**Free fall:**  $\Delta y = y - y_0 = v_0 t - \frac{1}{2} g t^2$ ,  $v = v_0 - gt$ ,  $v^2 = v_0^2 - 2g\Delta y$

**Projectile motion:**  $v_{ox} = v_0 \cos\theta$ ;  $v_{oy} = v_0 \sin\theta$ ;  $x = v_{ox} t$ ;  $v_x = v_{ox}$   
 $\Delta y = y - y_0 = v_{oy} t - \frac{1}{2} g t^2$ ;  $v_y = v_{oy} - gt$ ;  $v_y^2 = v_{oy}^2 - 2g\Delta y$