Honors Physics – Formula Sheet

Kinematics 1-D

$$v_f = v_i + a\,\Delta t$$

$$\Delta x = \frac{1}{2}\left(v_f + v_{fi}\right)\Delta t$$

$$\Delta x = v_i\,\Delta t + \frac{1}{2}\,a\,\Delta t^2$$

$$v_f^2 = v_i^2 + 2\,a\,\Delta x$$

Kinematics in 2-D

$$\Delta x = \frac{v_i^2 \sin 2\Theta}{-a_y}$$

$$v_{xi} = v_i \cos\Theta$$

$$v_{yi} = v_i \sin\Theta$$

$$\Delta x = v_{xi}\,\Delta t$$

$$\Delta y = v_{yi}\,\Delta t + \frac{1}{2}\,a\,\Delta t^2$$

$$v_{yf} = v_{yi} + a\,\Delta t$$

$$v_{yf}^2 = v_{yi}^2 + 2\,a\,\Delta y$$

Dynamics

$$\Sigma F = ma$$

$$F_f = \mu_k\,F_N$$

$$W = mg$$

Work, Power, and Energy

$$KE = \frac{1}{2}\,m\,v^2$$

$$PE = mgh$$

$$PE = \frac{1}{2}\,k\,x^2$$

$$PE_1 + KE_1 + W_{net} = PE_2 + KE_2$$

$$ME = KE + PE$$

$$P = \frac{W}{t}$$

$$W = F\,d$$

$$\tau = F\,r_\perp$$

Momentum

$$p = m\,\Delta v$$

$$Impulse = F\,\Delta t = m\,\Delta v = \Delta p$$

$$\Delta p_1 = -\Delta p_2$$

$$v_{1i} + v_{1f} = v_{2i} + v_{2f}$$

Rotational/Orbital Motion

$$v = \frac{2\pi r}{T}$$

$$a = \frac{v^2}{r}$$

$$F_c = m\,a_c$$

$$v = \sqrt{\frac{GM}{r}}$$

$$T^2 = \frac{4\pi^2 r^3}{GM}$$

$$\frac{T_1^2}{r_1^3} = \frac{T_2^2}{r_2^3}$$

Gravity

$$F = \frac{GM_1M_2}{r^2}$$

$$g = \frac{GM}{r^2}$$

$$G = 6.67\ x\ 10^{-11}\ \frac{Nm^2}{kg^2}$$

Honors Physics – Formula Sheet - continued

Heat

$$\Delta U + \Delta KE + \Delta PE = 0$$

$$Q = m\, c_p\, \Delta T$$

$$Q = m\, \Delta H_{fusion}$$

$$Q = m\, \Delta H_{vap}$$

$$K = T(\text{°C}) + 273$$

$$T(\text{°F}) = 1.8\, T(\text{°C}) + 32$$

Thermodynamics

$$\Delta U = Q + W$$

$$W = -P\, \Delta V$$

Vibrations and Waves

$$F = -kx$$

$$PE = \frac{1}{2}kx^2$$

$$KE = \frac{1}{2}mv^2$$

$$v = \lambda f$$

$$v = \frac{\lambda}{T}$$

$$T = 2\pi\sqrt{\frac{m}{k}}$$

Electric Forces and Fields

$$F = \frac{kq_1q_2}{r^2}$$

$$k = 9\ x\ 10^9\ \frac{Nm^2}{C^2}$$

$$E = \frac{kQ}{r^2}$$

Electricity

$$\Delta V = I\, R$$

$$I = \frac{Q}{t}$$

$$I_{Tot} = I_1 = I_2 = \ldots$$

$$I_{Tot} = I_1 + I_2 + \ldots$$

$$R_{eq} = R_1 + R_2 + \ldots$$

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots$$