

Summary: Work-Energy Equation 1

FUNDAMENTAL equation: the work-energy equation

$$T_1 + V_1 + U_{1 \rightarrow 2}^{(nc)} = T_2 + V_2$$

where:

$$T = \frac{1}{2}mv^2 (\geq 0) = \text{kinetic energy}$$

$$U_{1 \rightarrow 2}^{(nc)} = \int_1^2 (\sum \vec{F}) \cdot \hat{e}_t ds = \text{work done by non-conservative forces}$$

$$= \int_1^2 [(\sum \vec{F})_x dx + (\sum \vec{F})_y dy]$$

$$V = V_{gr} + V_{sp} = \text{potential energy}$$

$$V_{gr} = mgh \quad (\text{sign depends on } h)$$

$$V_{sp} = \frac{1}{2}k\Delta^2 \geq 0 \quad (\text{ALWAYS})$$

SIGN of work term: The direction of a force relative to the \hat{e}_t dictates the sign of the work, U .

