Effects of varying torques can be accrued

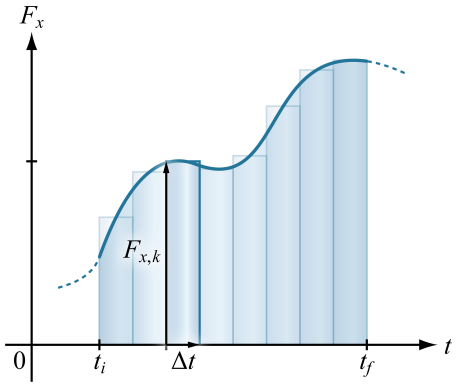
Linear impulse

$$\Delta J_{\mathrm{F},x} \approx \sum_k F_{x,k}\Delta t$$

is the signed area "under" the plot of F_x vs. t.

For AP Physics C,

$$\Delta J_{\mathrm{F},x} = \int_{t=t_i}^{t=t_f} F_x \, \mathrm{d}t$$



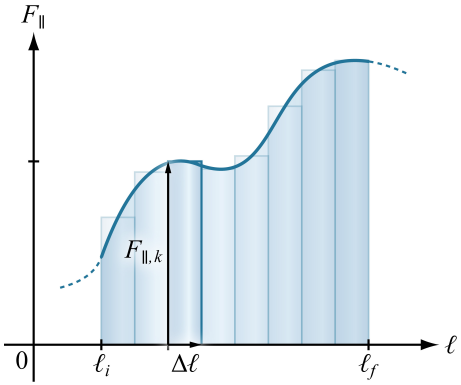
Work done by a force

$$\Delta W_{\mathrm{F}} \approx \sum_k F_{\parallel,k}\Delta \ell$$

is the signed area "under" the plot of $F_\parallel$ vs. ℓ.

For AP Physics C,

$$\Delta W_{\mathrm{F}} = \int_{\ell=\ell_i}^{\ell=\ell_f} F_\parallel \, \mathrm{d}\ell$$



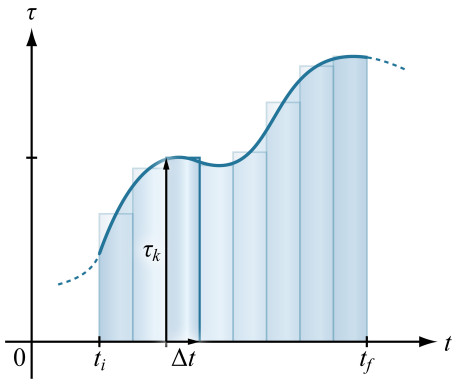
Angular impulse

$$\tau_{\mathrm{AVG}} \sum_k \Delta t \approx \sum_k \tau_k \Delta t$$

is the signed area "under" the plot of τ vs. t.

For AP Physics C,

$$\tau_{\mathrm{AVG}}(t_f - t_i) = \int_{t=t_i}^{t=t_f} \tau \, \mathrm{d}t$$



Work done by a torque

$$\Delta W_\tau \approx \sum_k \tau_k \Delta \theta$$

is the signed area "under" the plot of τ vs. θ.

For AP Physics C,

$$\Delta W_\tau = \int_{\theta=\theta_i}^{\theta=\theta_f} \tau \, \mathrm{d}\theta$$