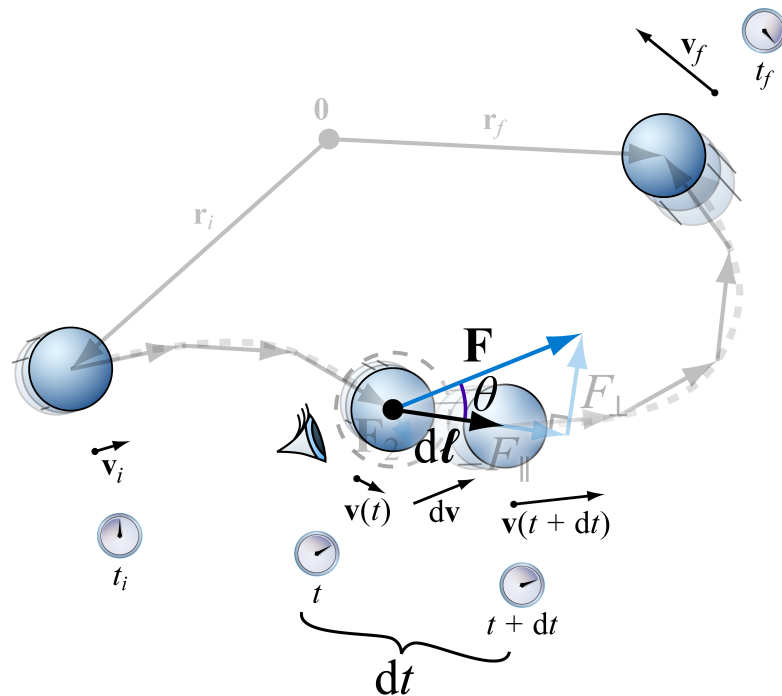


Work performed along a path

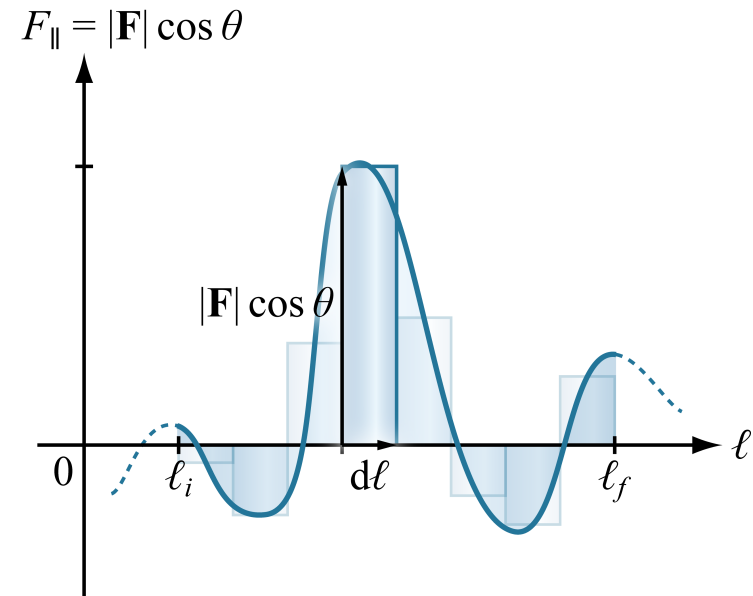


$$dW_F = \vec{F} \cdot d\vec{\ell}$$

$$dW_F = (|\vec{F}| \cos \theta) d\ell$$

Steps for calculating work done along paths

1. Draw a large figure of the path.
2. Draw and label a representative differential displacement $d\vec{\ell}$.
3. Draw and label a force vector \vec{F} applied at the tail of $d\vec{\ell}$.
4. Draw angle θ between \vec{F} and $d\vec{\ell}$.
5. Obtain an expression for \vec{F} .
6. Obtain an expression for $d\vec{\ell}$.
7. Calculate $\vec{F} \cdot d\vec{\ell}$.
8. Integrate the resulting expression.



$$\Delta W_F = \int_{\vec{r}=\vec{r}_i}^{\vec{r}=\vec{r}_f} (|\vec{F}| \cos \theta) d\ell$$

$$\Delta W_F = \int_{\vec{r}=\vec{r}_i}^{\vec{r}=\vec{r}_f} \vec{F} \cdot d\vec{\ell}$$