$$H = \frac{p^2}{2m} \qquad p = \frac{\partial S}{\partial q}$$

1. Ham. Jacobi: $H\left(\frac{\partial S}{\partial q}, q, t\right) + \frac{\partial S}{\partial t} = 0$ allgem.

$$\frac{1}{2m}\left(\frac{\partial S}{\partial q}\right)^2 = -\frac{\partial S}{\partial t}$$ speziell

Ansatz: $S(q,t) = \alpha q - Et$ $\qquad$ $\boxed{W(q) - Et}$ allg.

2. Lösung: $\frac{\partial S}{\partial q} = \alpha$

$\frac{1}{2m}\alpha^2 = E$ $\qquad$ $\alpha = \pm\sqrt{2mE}$

3. $\alpha = f$ $\quad \frac{1}{2m} f^2 t$

4. Transf. Gleichungen:

$p = \frac{\partial S}{\partial q}(q, f, t) = f$ (a)

$Q = \frac{\partial S}{\partial f} = q - \frac{f}{m} t$ (b)

5. Anfangsbed. bei $t = 0$: $p(0)$, $q(0)$
fixieren f, Q. $\quad p(0) = f$ (a)'
$Q = q(0)$ (b)'

6. Löse Transf. Gl. nach $p(t)$ $q(t)$ auf:

$p(t) = p(0)$ aus (a)

$q(t) = q(0) + \frac{p(0)}{m} t$ aus b

$$\frac{1}{2m}\left(\frac{\partial S}{\partial q}\right)^2 = \frac{\partial S}{\partial t}$$

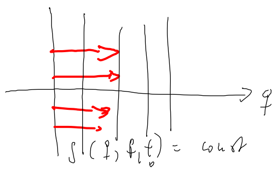
Ansatz $\boxed{S = W(q) - Et}$

$$\frac{1}{2m}\left(\frac{\partial W}{\partial q}\right)^2 = E$$

$$\frac{\partial W}{\partial q} = \pm\sqrt{2mE}$$ const

$$W(q) = \pm q \cdot \sqrt{2mE} + k'$$

$$S(q, f, t) = q \cdot f - \frac{f^2}{2m} t$$



$p = \frac{\partial S}{\partial q}$