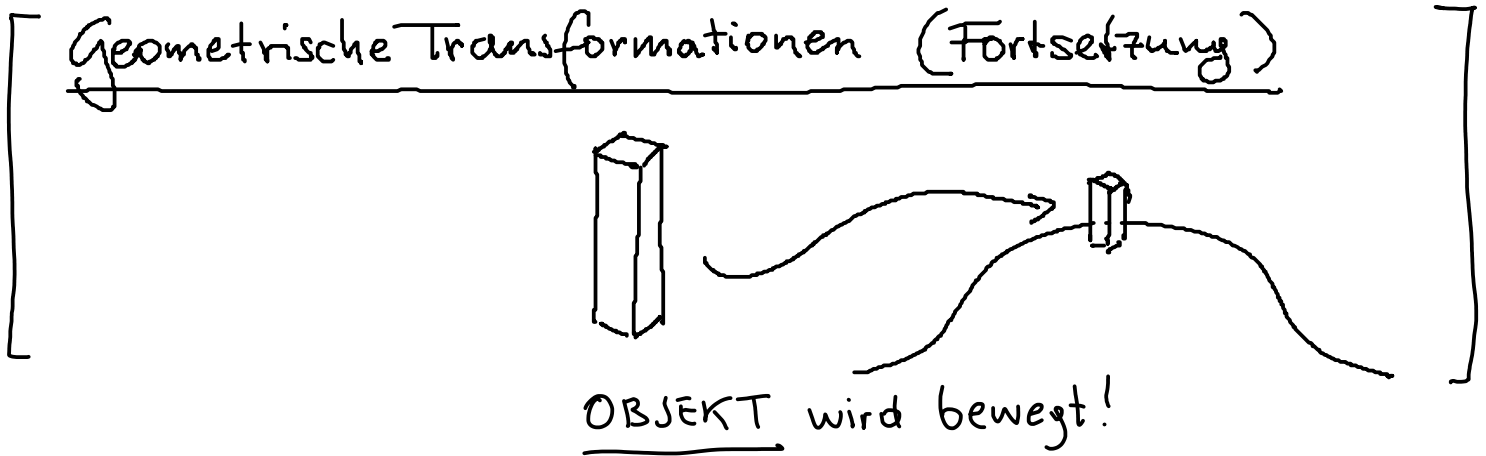


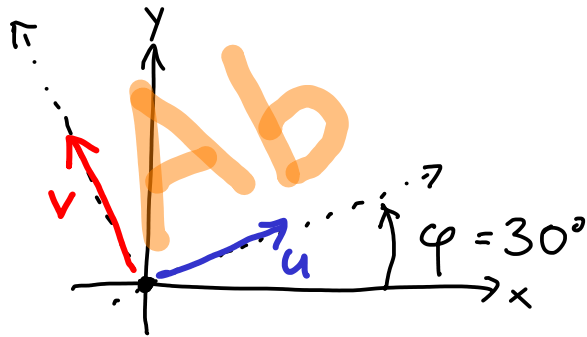
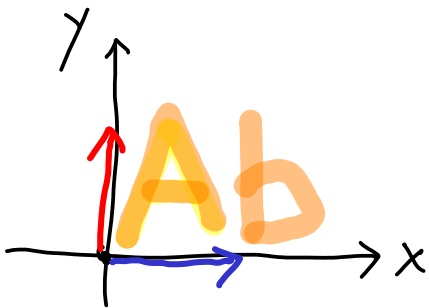
## Koordinatentransformationen

Wiederholung:



Beispiel:

### Rotation (Drehung)

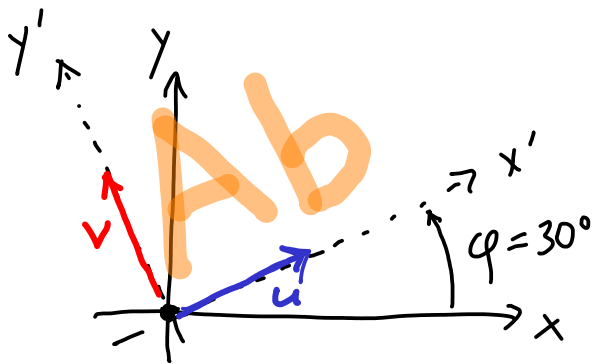


$$\begin{pmatrix} x \\ y \end{pmatrix} \mapsto \begin{pmatrix} \cos \varphi & -\sin \varphi \\ \sin \varphi & \cos \varphi \end{pmatrix} \cdot \begin{pmatrix} x \\ y \end{pmatrix}$$

Rotationsmatrix  $R = (u \ v)$

Gegensatz:

Das KOORDINATENSYSTEM wird bewegt.



$u = \begin{pmatrix} a \\ b \end{pmatrix}, v = \begin{pmatrix} c \\ d \end{pmatrix}$  im  $x, y$ -Koordinatensystem

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \end{pmatrix} \hat{=} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} a \\ b \end{pmatrix} = u$$

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} 0 \\ 1 \end{pmatrix} \hat{=} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} c \\ d \end{pmatrix} = v$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \underbrace{\begin{pmatrix} u & v \end{pmatrix}}_{\substack{\text{Transformationsmatrix} \\ R}} \cdot \begin{pmatrix} x' \\ y' \end{pmatrix}$$

alte Koordinaten  neue Koordinaten

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} u & v \end{pmatrix}^{-1} \begin{pmatrix} x \\ y \end{pmatrix} = R^{-1} \begin{pmatrix} x \\ y \end{pmatrix}$$

neu  alt