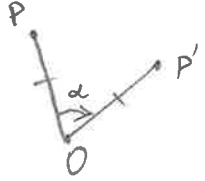


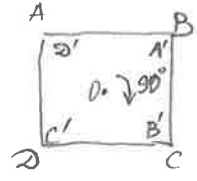
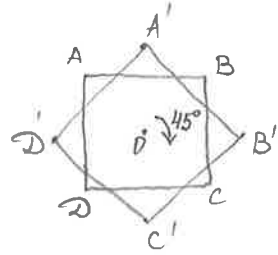
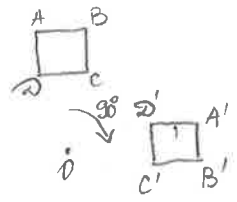
• 2nd type of rigid motions in 2d: "Rotations"

A rotation in the plane is a rigid motion that pivots/swings an object around a fixed point O . It is defined by 2 pieces of information.

- (1) point O - the rotocenter, (2) angle of rotation.

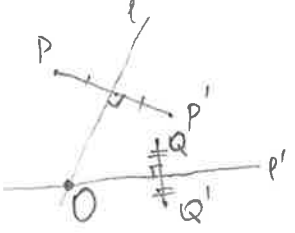


Example:



Key properties of rotations

- The rotocenter is the only fixed point of any rotation, which is not an identity map
- The rotation is completely determined by O and α
- The rotation is completely determined by any two points P, Q and their images P', Q' (as far as $P \neq P', Q \neq Q'$)



The rotocenter O is obtained as intersection of two lines l and l' which pass through middle points of PP', QQ' and are perpendicular to them.

The angle of rotation $\alpha = \angle POP'$.

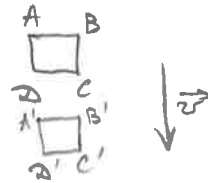
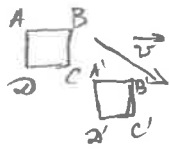
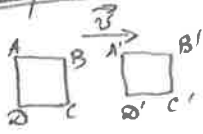
- A 360° rotation is the identity motion \rightarrow rotation by $\alpha = n \cdot 360^\circ + \beta$ (n -integer) is equivalent to a rotation by β with the same rotocenter
- A rotation is a proper rigid motion, i.e. preserves orientation

3^d type of rigid motions: "Translations"

A translation consists of essentially dragging an object in a specified direction and by a specified amount. These two pieces of information are combined in the form of a vector of translation.

A vector is represented by an arrow pointing in the direction of translation, while its length is the length of translation.

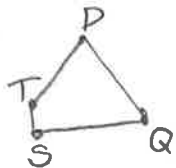
Example



Key properties of translations

- A translation is completely determined by any point P and its image P'
 $\vec{v} = \overrightarrow{PP'}$
- A translation (which is not an identity map) has no fixed points.
- A translation is a proper rigid motion, i.e. it preserves an orientation.
- A translation by \vec{v} followed by a translation in the opposite direction by $-\vec{v}$ is the identity map.

Ex: Find an image of the shape F under a translation given P and P' :



! Discuss several more examples!