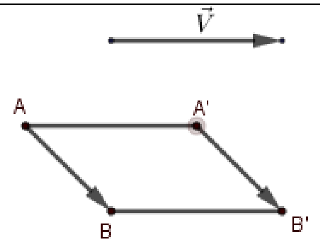
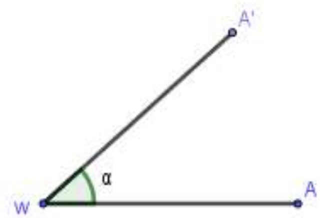
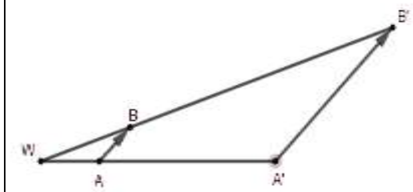
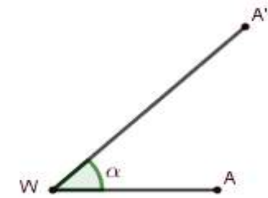
Transformation	**Translation** $t_{\vec{v}}$	**Rotation R(w ; α)**	**Dilation h(w ; k)**	**Similitude S(w ; k ; α)**
Definition	$t(M)=M'\Leftrightarrow\overrightarrow{MM'}=\vec{V}$	$R(M)=M'\Leftrightarrow\begin{cases}wM'=wM\\(\overrightarrow{wM};\overrightarrow{wM'})=\alpha[2\pi]\end{cases}$	$h(M)=M'\Leftrightarrow\overrightarrow{wM'}=k.\overrightarrow{wM}$	$S(M)=M'\Leftrightarrow\begin{cases}wM'=k.wM\\(\overrightarrow{wM};\overrightarrow{wM'})=\alpha[2\pi]\end{cases}$
Figure				
Characteristic Property	$\left.\begin{matrix}A\xrightarrow{t}A'\\B\xrightarrow{t}B'\end{matrix}\right\}\Leftrightarrow\overrightarrow{A'B'}=\overrightarrow{AB}$	$\left.\begin{matrix}A\xrightarrow{R}A'\\B\xrightarrow{R}B'\end{matrix}\right\}\Leftrightarrow\begin{cases}A'B'=AB\\(\overrightarrow{AB};\overrightarrow{A'B'})=\alpha[2\pi]\end{cases}$	$\left.\begin{matrix}A\xrightarrow{h}A'\\B\xrightarrow{h}B'\end{matrix}\right\}\Leftrightarrow\overrightarrow{A'B'}=k.\overrightarrow{AB}$	$\left.\begin{matrix}A\xrightarrow{S}A'\\B\xrightarrow{S}B'\end{matrix}\right\}\Leftrightarrow\begin{cases}A'B'=k.AB\\(\overrightarrow{AB};\overrightarrow{A'B'})=\alpha[2\pi]\end{cases}$
Complex form	$z'=az+b$ $a=1$ and $b=z_{\vec{v}}$	$z'=az+b$ $a=e^{i\alpha}$ and $b=z_w(1-a)$	$z'=az+b$ $a=k$ and $b=z_w(1-a)$	$z'=az+b$ $a=ke^{i\alpha}$ and $b=z_w(1-a)$
Image of a line (D)	A line (D') parallel or confounded to (D)	A line (D') such that $(D;D')=\alpha$	A line (D') parallel or confounded to (D)	A line (D') such that $(D;D')=\alpha$
Image of a circle (C) of center I and radius R	A circle (C') $I'=t_{\vec{v}}(I)$ and $R'=R$	A circle (C') $I'=R(I)$ and $R'=R$	A circle (C') $I'=h(I)$ and $R'=\|k\|R$	A circle (C') $I'=S(I)$ and $R'=k.R$
Conservation				
Distance	Yes	Yes	No $(\times\|k\|)$	No $(\times k)$
Midpoint	Yes	Yes	Yes	Yes
Collinearity of points	Yes	Yes	Yes	Yes
Oriented Angles	Yes	Yes	Yes	Yes
Area	Yes	Yes	No $(\times\ k^2)$	No $(\times\ k^2)$

Composite of two transformations:

($k > 0$ and $k' > 0$)

	$t_{\vec{u}}$	$r(I;\alpha)$	$h(I;\alpha)$	$S(I;k;\alpha)$
$t_{\vec{v}}$	$t_{\vec{u}+\vec{v}}$	$r(w;\alpha)$	$h(w;k)$	$S(w;k;\alpha)$
$r(J;\beta)$	$r(w;\beta)$	$r(w;\alpha+\beta)$	$S(w;k;\beta)$	$S(w;k;\alpha+\beta)$
$h(J;k')$	$h(w;k')$	$S(w;k';\alpha)$	$h(w;k.k')$	$S(w;k.k';\alpha)$
$S(J;k';\beta)$	$S(w;k';\beta)$	$s(w;k';\alpha+\beta)$	$S(w;k.k';\beta)$	$S(w;k.k';\alpha+\beta)$

Remark:

- If $k > 0$, then $r(I;\alpha)\circ h(J;k)=S(w;k;\alpha)$.
- If $k < 0$, then $r(I;\alpha)\circ h(J;k)=S(w;|k|;\alpha+\pi)$.