$$\vec{r}_{AP} \neq \vec{r}_{BP}$$

$$\vec{r}_{AP} = \vec{r}_{AB} + \vec{r}_{BP}$$

$$\vec{r}_{AP} - \vec{r}_{BP} = \vec{r}_{AB}$$

$$\vec{v}_{AP} - \vec{v}_{AB} = \vec{v}_{BP}$$

$$\vec{v}_{AP} - \vec{v}_{BP} = \vec{v}_{AB}$$