# Vectors in a Garden

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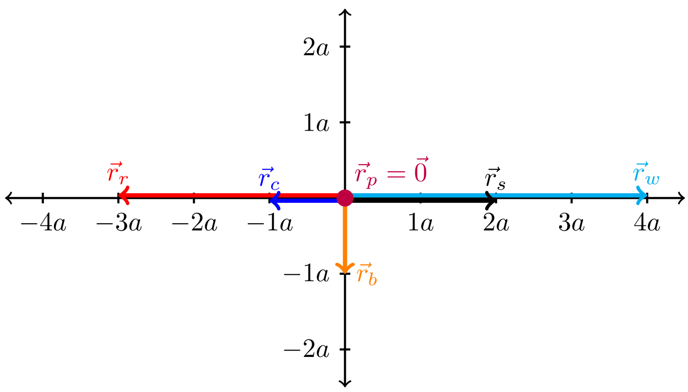
Summer 2024

## XX-1: Vectors in a Garden

You visit a garden with a trail that includes the following landmarks.

- Red roses at $\vec{r}_r = -3a\hat{x}$
- White roses at $\vec{r}_w = +4a\hat{x}$
- A pond at $\vec{r}_p = 0\hat{x}$
- A bench at $\vec{r}_b = -a\hat{y}$
- A bridge over a creek at $\vec{r}_c = -a\hat{x}$
- A statue at $\vec{r}_s = +2a\hat{x}$

(1) Sketch and label the garden and its landmarks.




(2) Find the following displacement vectors using both symbols and diagrams.

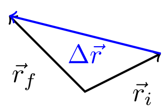
A displacement vector, $\Delta\vec{r}$, can be thought of as the difference of the final position vector, $\vec{r}_f$, and the initial position vector, $\vec{r}_i$:

$$\Delta\vec{r} = \vec{r}_f - \vec{r}_i.$$

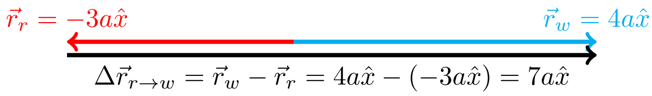
It can also be thought of as the vector that, when added to $\vec{r}_i$, gives you $\vec{r}_f$:

$$\Delta\vec{r} = \vec{r}_f - \vec{r}_i.$$

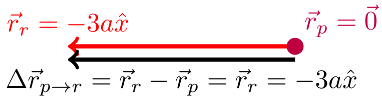
As such, $\Delta\vec{r}$ points from the tip of $\vec{r}_i$ to the tip of $\vec{r}_f$:



## (a) From the red roses to the white roses




## (b) From the pond to the red roses




## (c) From the bench to the statue