

1. In the small town of Coriander, the library can be found by starting at the center of the town square, walking 25 meters north (\vec{a}), turning 90° to the right, and walking a further 60 meters (\vec{b}).
 - Draw a figure showing the displacement vectors \vec{a} and \vec{b} , as well as their sum, the displacement vector $\vec{v} = \vec{a} + \vec{b}$.
 - How far is the library from the center of the town square?
 - Let \hat{x} be the unit vector pointing east, and \hat{y} be the unit vector pointing north. Express \vec{a} , \vec{b} , and \vec{v} in terms of \hat{x} and \hat{y} .
2. It turns out that magnetic north in Coriander is approximately 14° degrees east of true north. If you use a compass to find the library (!), the above directions will fail. Instead, you must walk 39 meters in the direction of magnetic north (\vec{A}), turn 90° to the right, and walk a further 52 meters (\vec{B}).
 - Draw a figure showing the displacement vectors \vec{A} and \vec{B} , as well as their sum, the displacement vector $\vec{v} = \vec{A} + \vec{B}$.
 - How far is the library from the center of the town square?
 - Let \hat{X} be the unit vector pointing towards “magnetic east”, and \hat{Y} be the unit vector pointing towards magnetic north. Express \vec{A} , \vec{B} , and \vec{v} in terms of \hat{X} and \hat{Y} .
3. Can any vector displacement within the town limits be expressed as the sum of two vectors, one of which points north and the other east?
4. **FOOD FOR THOUGHT:** Where on Earth is Coriander?!