Maps and Distances

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1 Goals

The goals of this activity are:

1. To give students practice with working with magnitude and distance.

2. To help students understand the role the origin plays in defining vectors, and how this is related to subtraction.

2 Materials

For this activity you will need:

1. Maps of California, the US, and the world

3 Instructions

This activity will take approximately 40 minutes.

1. Group students into pairs, ask each pair to pick up depending on where they're from, and explain the goals of the activity.

2. Ask students to draw vectors to each of their homes, and find their distance from Stanford, using the magnitude of the vector. Ask them to also notice that they don't need the 'whole' vector to specify the compass-direction from Stanford to a home, only a scaled version of the vector.

3. Then, ask students to use the difference of the two vectors to represent the direction from one home to another, and to find the magnitude of this vector–this is the distance from one home to the other.

4. Finally, ask students to make one of their homes the origin, and find the vector to the other home. How is this vector related to ones obtained in the previous step? Is the magnitude the same as the distance computed in the previous step?

5. Ask students to discuss any observations they have about the activity.

4 Tips

1. Some students might be from Hawaii or Alaska, and then a map of the continental US will not work.

2. You can ask students to check their answers with Google Maps. Why might their answer be different from the answer Maps gives?

3. Students might have to look up the spacing between latitudes and longitudes online. It is a feature of the activity that longitude spacing is latitude dependent.