VECTOR ADDITION

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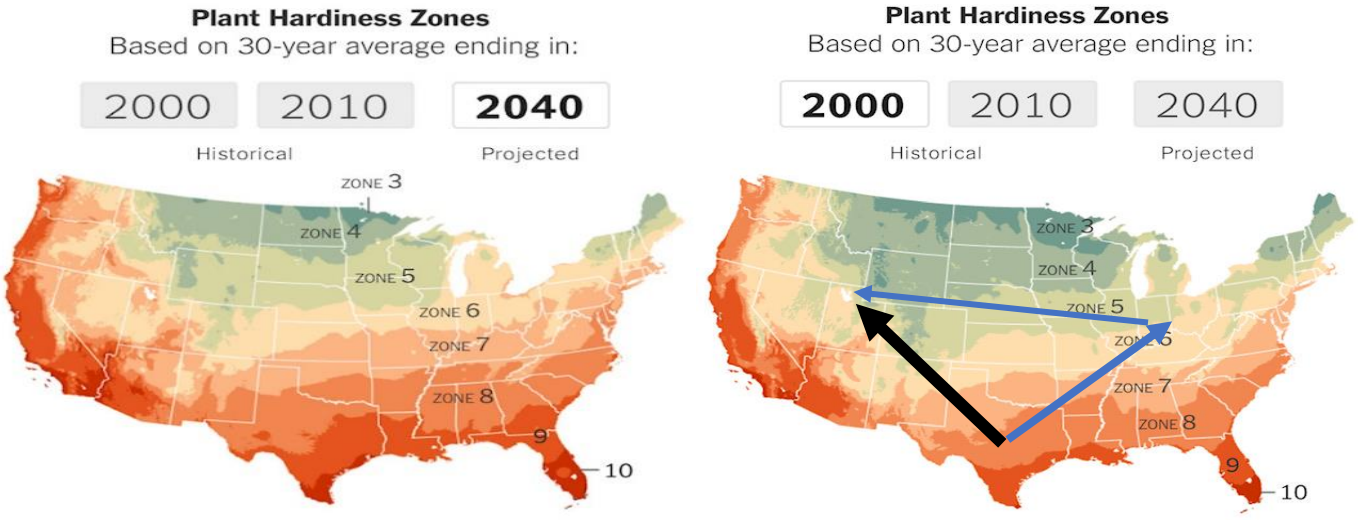
How Climate Change May Affect the Plants in Your Yard

As temperatures warm across America, growing zones for flowers, shrubs, and trees are shifting northward.



Plant Hardiness Zones
Based on 30-year average ending in:

The maps above show how so-called plant hardiness zones have moved over the past four decades and how they could change in the future, according to an analysis by the National Oceanic and Atmospheric Administration. These zones — based on the coldest temperature of the year at each location, averaged over a 30-year period — help gardeners and growers determine which plants are likely to thrive, and which are likely to die from winter cold. Hardiness zones "are creeping north systemically" to higher latitudes and elevations, said Russell Vose, who leads the Analysis and Synthesis Branch in NOAA's National Centers for Environmental Information. That means "you can probably grow some things farther north than you used to be able to," he said. (But, he added, you still can't "plant a banana tree outside in Central Park.") How cold it gets in winter is an important factor determining what plants are able to survive year to year. Lemon trees, for example, are very sensitive to frost and best suited for hardiness zones 9 to 11, which tend not to dip below 20 degrees Fahrenheit. Sweet cherry trees, by contrast, can withstand colder winters, thriving even in zone 5, where temperatures can reach -20°F. Other factors, like light, precipitation and soil type, also affect how well plants can survive in any specific location.

Average Winter Lows in Each Hardiness Zone
Zone 3-40°F to -30°F
4-30 to -20
5-20 to -10
6-10 to 0
70 to 10
810 to 20
920 to 30
1030 to 40

INTRODUCTION: **Austin to Cincinnati(vector A) is 1127 miles at 45° north of east. Cincinnati to Provo Utah(vector B) is 1667 miles at 10° North of west.**

QUESTIONS: **(a) Find x & y components of vector A?, (b) Find x & y components of vector B?, (c) Find resultant vector R(magnitude & direction) from Austin to Provo Utah?**

ANSWERS: **(a) A_x = 797 mi., A_y = 797 mi., (b) B_x = - 1641.7 mi., B_y = 289.5 mi., (c) R(Austin to Provo, Utah) = 1376 mi. at 52.14^0 North of west.**