

## AP Physics – Vectors is Phun

1. Two vectors have unequal magnitudes. Can their sum equal zero? Explain your response.
2. What is wrong with this sentence: “A car turned the corner maintaining constant velocity.”
3. A hunter walks west 2.5 km and then walks south 1.8 km. Find the hunter’s resultant displacement.
4. A man lost in a maze makes three consecutive displacements so that at the end of the walk he is right back where he started. The first displacement is 8.00 m westward, and the second is 13.0 m northward. Find the magnitude and direction of the third displacement.
5. A rock is thrown with a velocity of 23.5 m/s at an angle of  $22.5^\circ$  to the horizontal. Find the horizontal and vertical velocity components.
6. A boat is rowed east across the river with a constant speed of 5.0 mi/h. If the current is 1.5 mi/h to the south, what direction must the boat row to get straight across? What is the speed that it makes good?
7. A car drives straight off a cliff that is 52.5 m tall. The car travels a horizontal distance of 122 m. Find:  
(a) how much time it will take for the car to hit the lake below and (b) the horizontal speed of the car.
8. A girl is told to “take a hike” by a sarcastic person, so she decides to do just that. Off she goes. She walks north for a while and then walks east for 1 hour and 15 minutes. During the whole time she walked at a constant speed of 2.50 m/s. Anyway. She ends up a distance of 25.2 km from her starting point (as the proverbial crow flies). (a) So how far north did she walk? (b) what is her direction from where she started?
9. A hawk sees a mouse in a field. The second the hawk sees the mouse, the mouse runs for its hole at a speed of 10 m/s which is 130m away. At the same time the Hawk dives using the acceleration of gravity. The hawk is 100m high when this all begins. Does the mouse make it to it’s hole? Or does it get caught by the hawk?
10. A rock is dropped from a 100.0 m tower. (a) How long does it take the rock to fall the first 50.0 m? (b) The second 50.0 m?
11. A girl walks north for 50m, then turns west and walks 32 meters, then walks  $40^\circ$  North of East for 10m. Finally, she ran 100m at  $70^\circ$  North of West. What is the displacement of the girl from her original location?