Answer on Question#38537 – Physics - Other

Is average speed the magnitude of average velocity? Justify the answer with example.

Solution:

There are two types of quantities, vector and scalar quantities. Scalar quantities deal only with amounts, also called magnitudes. Vector quantities such as velocity add in the direction. Average speed does not include direction because is is scalar (it uses only magnitude).

Velocity and speed are directly related, speed being the magnitude of velocity, which is a vector quantity.

However, we are talking about average speed and velocity. If the direction of velocity changes, the average velocity changes. However, the amount of velocity may not change, and therefore the speed may not change. If the velocity changes and speed remains constant, their averages will be different. A previous answer gives a good example of this.

Example: Lets say that you move in a cirlce and you end where you started.

Your displacement is therefore zero. So your average velocity will also be zero but your average speed will not be zero.

Answer: no, average speed is not the magnitude of average velocity.