Question #53222, Physics / Mechanics | Kinematics | Dynamics |

This question relates to finding a constant acceleration using average velocity. In the acceleration questions posted at the beginning of the Khan Academy's MCAT Prep Acceleration section, there is one that asks for the constant acceleration to be solved for when a dragster travels 400 m in 4 seconds. The correct answer is displayed as 50 m/s/s, and the hints suggest solving with the d = 1/2at^2 formula.

Here is what I don't get: when I use the d = 1/2at^2 formula to solve for acceleration, I get the correct answer (50m/s/s). However, when I try to use the average velocity formula, a = 1/2(vi+vf) / t ---- I don't get the correct answer (12.5 m/s/s).

Could someone explain this for me, please? I would love to understand why I can't use acceleration = average velocity/time to solve this problem correctly, or what I have done wrong in trying to do so.

Thanks!!

Answer:

You can use this formula for acceleration: $a = v_{av}/t$, where v_{av} – average speed. However, it should be noted that t – is the period of time, when you rich the average speed, because the acceleration is the difference of speeds divided into the time for the speed being changed.

For this task, you use an average speed which is calculated as 400 m / 4 sec = 100 m/s. Although the time when an object riches this value of speed is not of 4 sec, and it equals 2 sec. This is like 'average time'. Thus, acceleration can be calculated as follows: a = 100 m/s / 2 sec = 50 m/s^2.