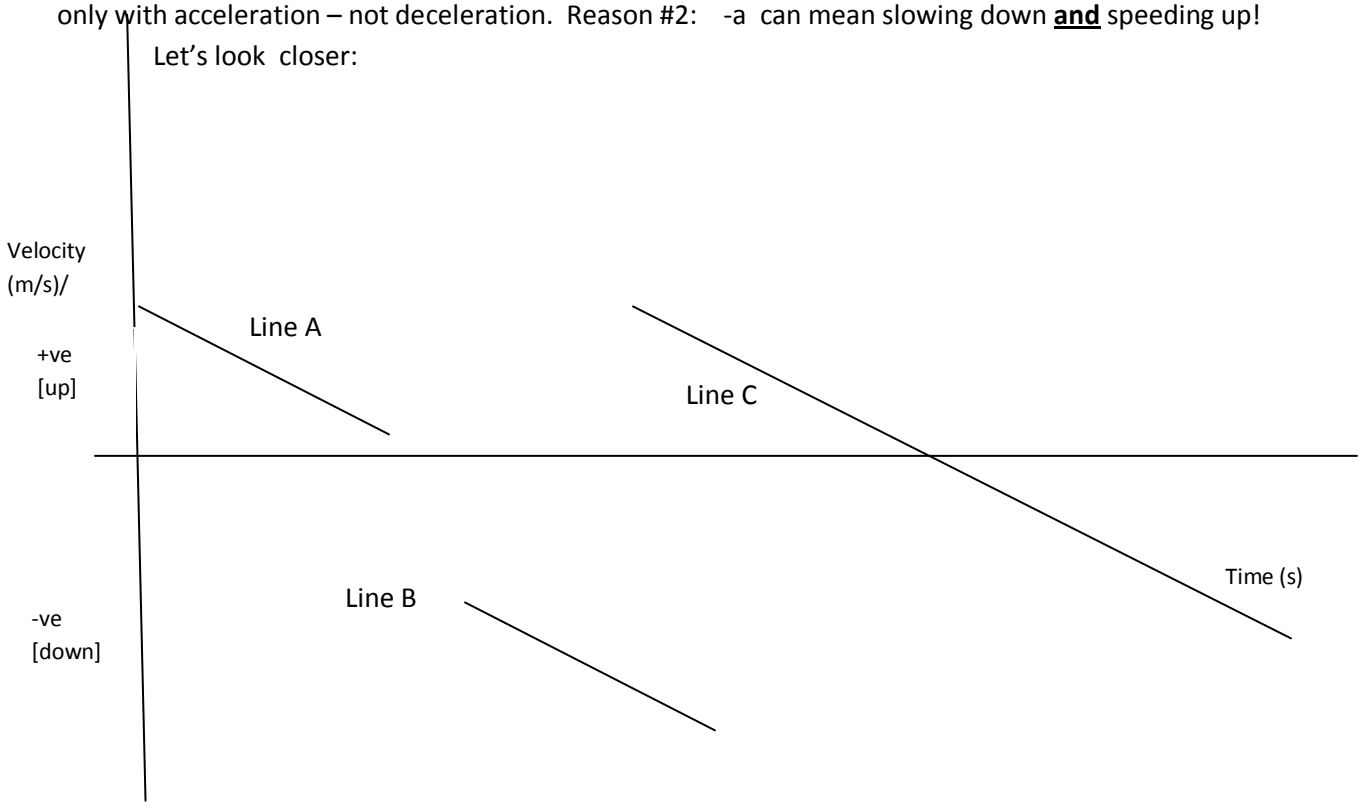
Positive (+ve) and Negative (-ve) Acceleration…..or why I don't like 'deceleration'!

When we're driving around town in our car, we tend to think acceleration (usually thought of as + a) is speeding up and deceleration (usually thought of as -a)means slowing down. That relationship is ok for everyday folk, but not ok for the budding young physicist! Reason #1: mathematical formulas deal only with acceleration – not deceleration. Reason #2: -a can mean slowing down **and** speeding up!

Let's look closer:



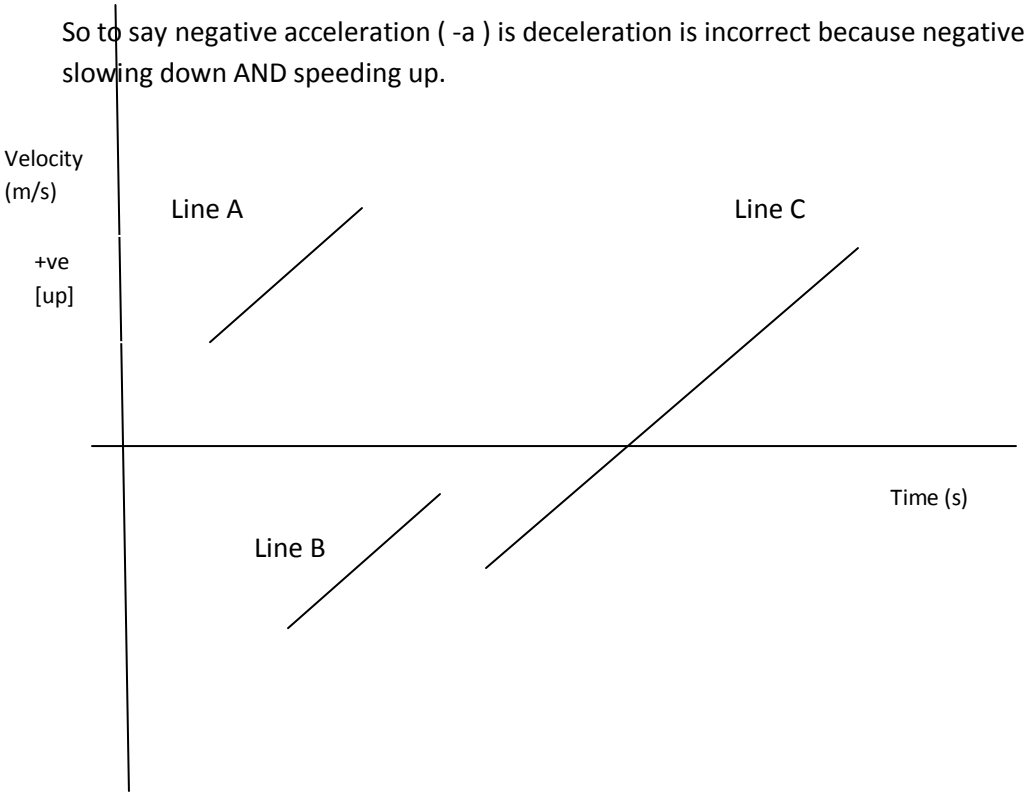
Notice that we have a velocity / time graph. Which line do you think shows -a ? Most people say Line A because as time goes on, the velocity [up] decreases. But, we know that slope of a v/t graph gives us acceleration and Line B has the same slope. Therefore, Line B shows -a. And, so does Line C! They all have the same -a. But let's look at what they are doing more closely:

Line A – Graph shows a negative slope and therefore negative acceleration (-a).
Maybe it's going 4 m/s [up] → 3 m/s → 2 m/s It's slowing down.

Line B – Graph shows a negative slope and therefore negative acceleration (-a).
Maybe it's going -2 m/s [up] → -3 m/s → -4 m/s. It's speeding up. (look at the numbers)

Line C – Graph shows a negative slope and therefore negative acceleration (-a).
Maybe it's going 4 m/s [up] → 2 m/s → 0 m/s → -2 m/s → -4 m/s etc.
It's slowing down, actually stopping momentarily and then speeding up. (look at the numbers)

So to say negative acceleration (-a) is deceleration is incorrect because negative acceleration can mean slowing down AND speeding up.



All 3 lines have the same positive slope, that same +a. But it's the same logic as above. Look closely. Line A shows an object speeding up, Line B shows an object slowing down and Line C shows an object first slowing down, stopping still for the briefest instant and then speeding up. It's the direction that changes! Line C could be following a skateboarder going up the half-pipe, stopping for a moment and then coming back down. Think about it.

So positive acceleration can mean speeding up AND slowing down!