

3.6 Speed Ain't Acceleration

Zip and Zap are in Zip's car cruising downtown on a Friday night, sitting side by side in the front seat, hitting the occasional bump and turning the occasional corner.

Zip: Check this out Zap; I'm going to show you a magic trick.

Zap: How about you just keep your eyes on the road. I'm not in the mood to see an ambulance magically appear.

Zip: No, check this out. I can magically make the car accelerate backwards but make it's velocity continue forwards.

Zap: I don't get it. How can you make something accelerate backwards, but move forward? You'd have to cut the car in two!

Zip: Are you ready?

(waving hand magically, and simultaneously applying the brake)

Subsisto Plaustrum!

Zip and Zap's heads go forward to simulate braking

Zap: All you did was hit the brake; I thought you were going to accelerate backwards?

Zip: We did! Watch I can now accelerate forward!

(waving hand magically again and this time stomping on the gas)

Accelero Plaustrum!

Zip and Zap's heads now go backwards from accelerating

Zap: I get it, so in both cases we were still moving forward; when we braked and when we accelerated. But in the first case we accelerated backwards, when we applied the brake, and in the second case we accelerated forward, when we hit the gas.

Zip: You got it. It's a common physics mistake to think that acceleration's direction is linked to velocity's direction. Usually in physics we assign a direction to be positive and negative. In this case we could say that forward is positive and backward is the negative direction.

Zap: So it would be pretty simple to show another situation of having your velocity be 'negative' and your acceleration also be 'negative'. That would mean we would go backwards and get faster!

Zip: Exactamundo amigo! We could even show our velocity being negative and our acceleration to be positive.

Zap: That would mean we would be traveling backward and slowing down. Hey, speaking of positives and negatives, is it possible to have a velocity or acceleration of zero?



Zip: Sure. A velocity of zero means something is standing still. An acceleration of zero means that it isn't getting faster or slower. It could be stopped, or it could be moving at a constant speed.

Zap: So is it possible to have a velocity of zero but have a negative acceleration?

Zip: Sure it is! Ready for another magic trick!

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