

Ast 25 week 1b: Useful readings/Homework #01

Wikipedia readings

Skip over the math on these; stick to the text.

[Absolute time and space](http://en.wikipedia.org/wiki/Absolute_time_and_space)

(http://en.wikipedia.org/wiki/Absolute_time_and_space)

[Newton's laws of motion](http://en.wikipedia.org/wiki/Newton's_laws_of_motion)

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Videos

Velocity addition:

<http://www.youtube.com/watch?v=yPHoUbCNPX8>

A truck driving at 100 km/h shoots a ball behind it, with a relative velocity of 100 km/h. Observe the result from the track. (Note much of the resultant ball speed with respect to the ground comes from the ball's spin.)

Homework #01 (5 pts):

Suppose you let go of a ball and let it fall. The situation can be analyzed using Newton's first, second, and third laws the following way:

The ball is initially not moving, as the force of gravity is balanced by the force of your holding it up (Newton's first law). Once you let go, it falls under the influence of gravity. The force of gravity accelerates it downwards, in compliance with Newton's law of acceleration.

Now it is your turn. Consider the following scenario...

It is winter, and a boulder-sized chunk of ice is sitting still on a slippery, ice-covered lake. You push on the boulder, making it slide away from you. While you do this, much to your surprise, you end up sliding in the opposite direction. The boulder slides a long way before coming to a halt.

The situation is broken into four phases (see below). Use Newton's laws to analyze the situation. No math is required, although you may cite the relevant equations.

Phase 1: You and the ice boulder are not moving.

Phase 2: You push on the ice boulder, accelerating it and in turn recoil in response.

Phase 3: The ice boulder is past your reach—in time both you and the boulder come to a halt.

Phase 4: You and the ice boulder are not moving.