



This chapter gives you an overview of all the basics of kinematics that are important in biomechanics. The aim is to give you an introduction to the physics of biomechanics and maybe to awaken your fascination for thereof. The topics movement (location, velocity, acceleration) are covered. In order to illustrate the physical laws in a practical way, there is one example from physics and one from biomechanics for each topic area. Do not be surprised if you see a Δ (a so-called delta) in front of some variables. This indicates that there is a change in some way, such as a change in speed or time. We hope it does not confuse too much, but it is important to us that all of our formulas are mathematically correct. Have fun!

1. [Movement](#)
2. [Location](#)
3. [Velocity](#)
4. [Acceleration](#)

1. Movement

The analysis of movement plays a central role in biomechanics. The physical quantities, the location, the speed and the acceleration are used to describe the movement.

2. Location

In physics, the location $s(t)$ indicates the position of a body in space at a certain point time t . Its unit is meter [m].

[Example Physics I](#)

[Example Physics II](#)

[Example Biomechanics](#)



3. Velocity

In physics, the velocity v indicates how fast a body moves and thus changes its location. The unit is meter per second $[\frac{m}{s}]$. The velocity v is the mathematical derivation of the location function according to time t and is therefore described by the general formula $v = \frac{\Delta s}{\Delta t}$, where Δs is the change of position in the a certain period of time Δt .

[Example Physics](#)

[Example Biomechanics](#)

4. Acceleration

In physics, the acceleration a indicates how the velocity of a body changes. Its unit is meter per second squared $[\frac{m}{s^2}]$. The acceleration a is the mathematical derivative of the velocity function with respect to time and thus the second derivative of the location function. This is described by the general formula $a = \frac{\Delta v}{\Delta t}$, where Δv is the change of velocity in the a certain period of time Δt .

[Excample Physics](#)

[Example Biomechanics](#)