

Linear momentum and impulse

Principle of impulse and momentum

$$\mathbf{R} = \Sigma \mathbf{F} = m \mathbf{a}$$

$$\mathbf{R} = m \, d\mathbf{v}/dt$$

$$\mathbf{R} \, dt = m \, d\mathbf{v}$$

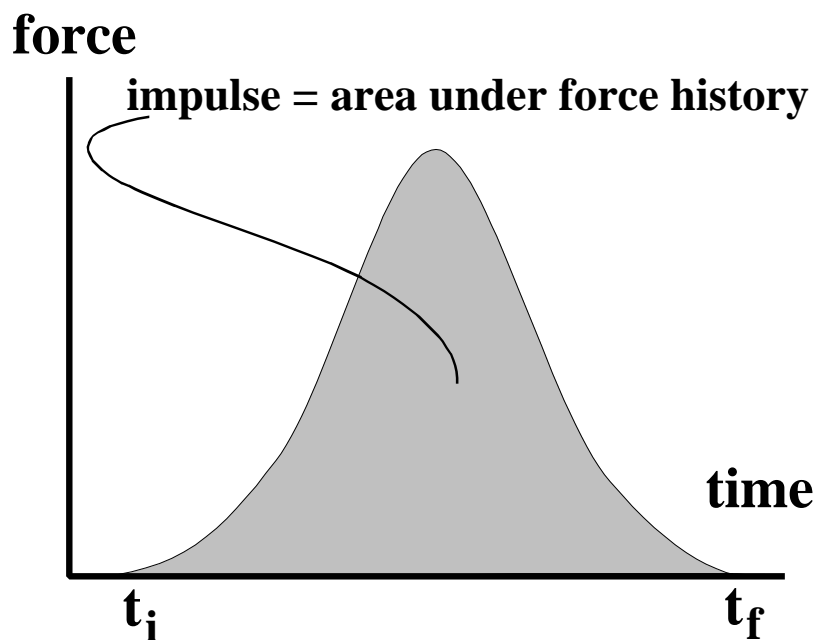
$$\int \mathbf{R} \, dt = \int m \, d\mathbf{v} = m \mathbf{v}_f - m \mathbf{v}_i$$

Impulse = change in momentum

$$\text{Impulse of force} = \int \mathbf{R} \, dt$$

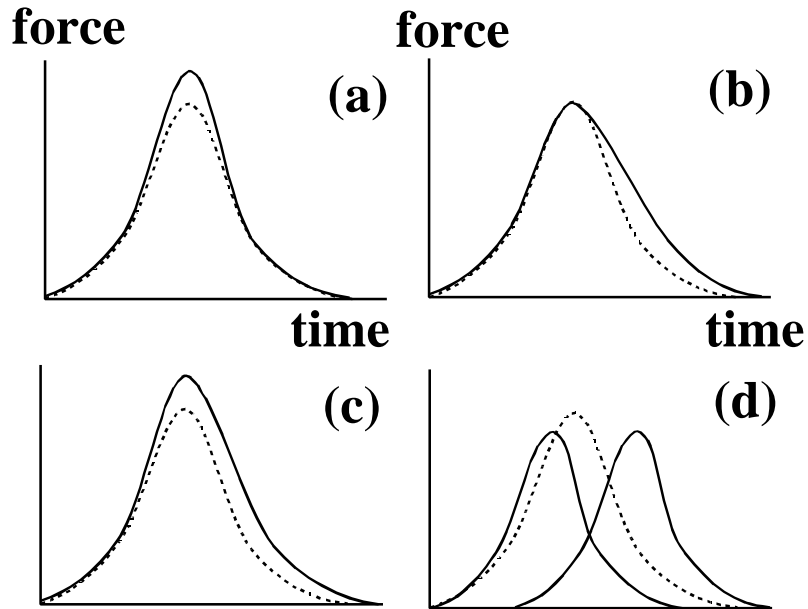
Momentum (quantity of motion) = $m \mathbf{v}$

Graphically, impulse is the area under a force history.



There are several ways of increasing impulse:

- (a) increase magnitude of force,
- (b) increase duration of force,
- (c) increase both magnitude and force and
- (d) increase number of impulses



Ground reaction forces during running:

