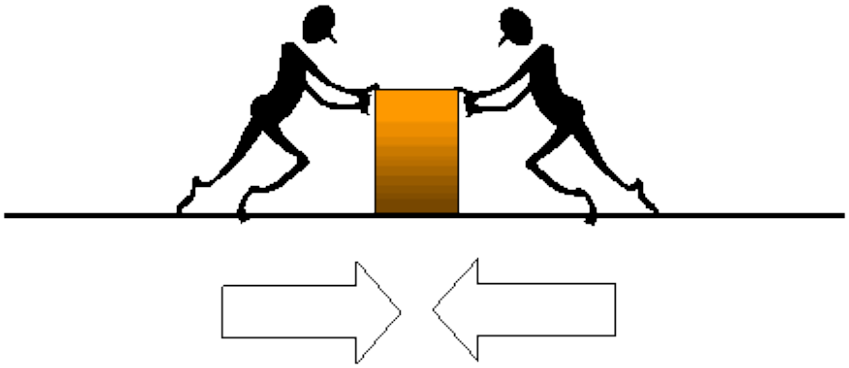
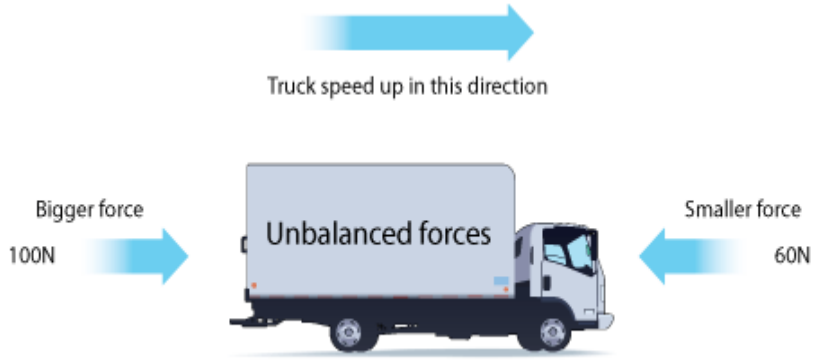
Newton's 2nd Law

Unbalanced Force

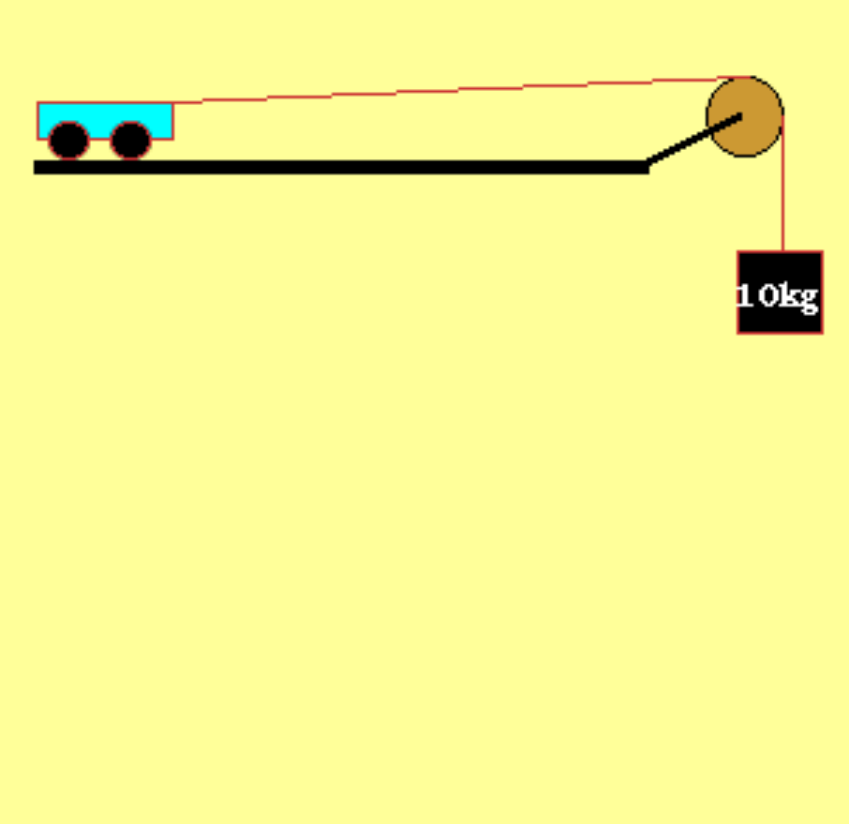
- Often forces acting on an object are balanced. In this case, the object will not move, or it moves with a constant velocity.
- When the total force acting on an object is stronger in one direction, it accelerates.





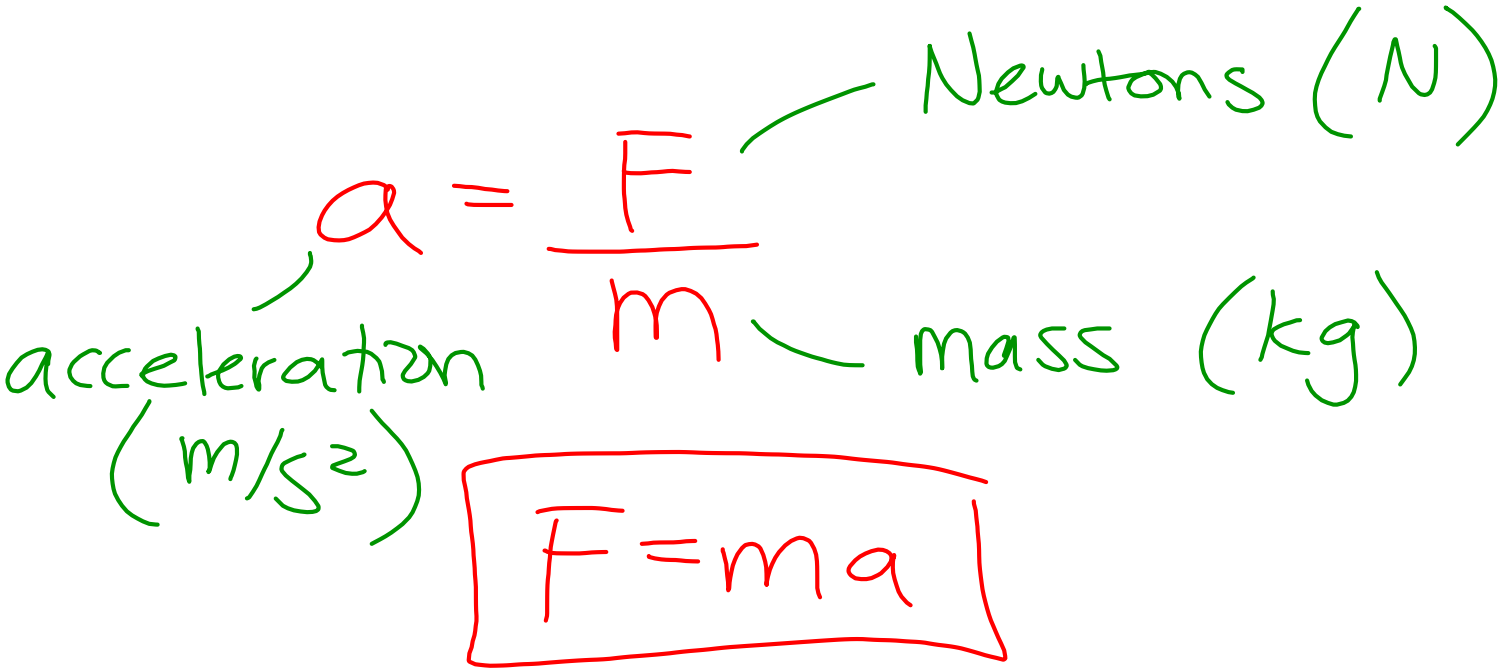
Demo

- Mass on a cart



Here's the connection…

- Newton's second Law:



Newton's 2nd Law

- An object of greater mass has more inertia, so it is harder to accelerate and decelerate.
- A bigger force will accelerate an object faster, a smaller force will accelerate an object slower.

Example

- How fast will a 700 kg car accelerate if a force of 400N west is applied by stepping on the gas?

$m = 700\,kg$

$F = 400\,N$

$a = ?$

$F = ma$

$\frac{400}{700} = \frac{700a}{700}$

$0.57 = a$

$a = 0.57\ m/s^2$ west

Example

- How much force is required to accelerate a 15 kg mass at 2 m/s² east?

$F = ?$
$a = 2\ m/s^2$
$m = 15\ kg$

$F = ma$
$F = (15)(2)$
$F = 30\ N$ east