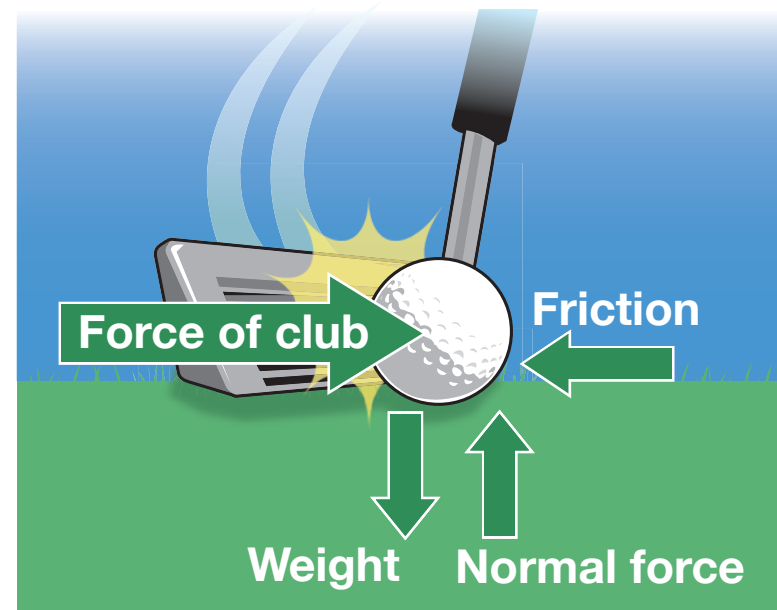
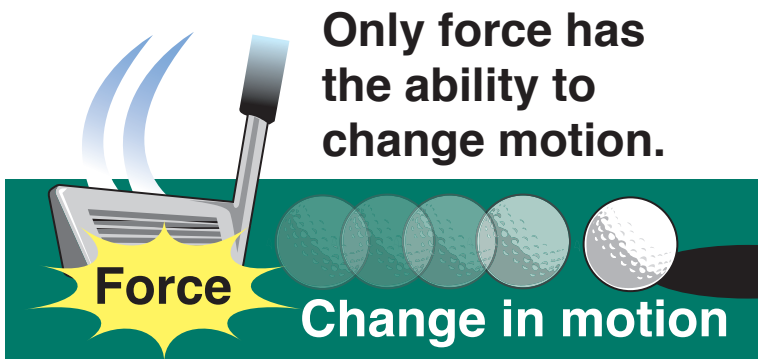











Force Changes Motion

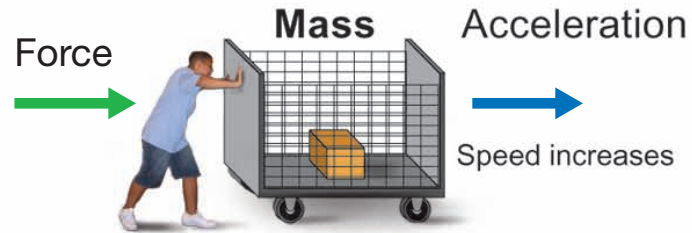


Acceleration and Force

What it means to say
“Acceleration is proportional to force.”

Force	Mass	Acceleration
 1 newton		 1 m/s ²
 2 newtons		 2 m/s ²
 0.5 newton		 0.5 m/s ²

Force, Mass, and Acceleration



$$a = \frac{F}{m}$$



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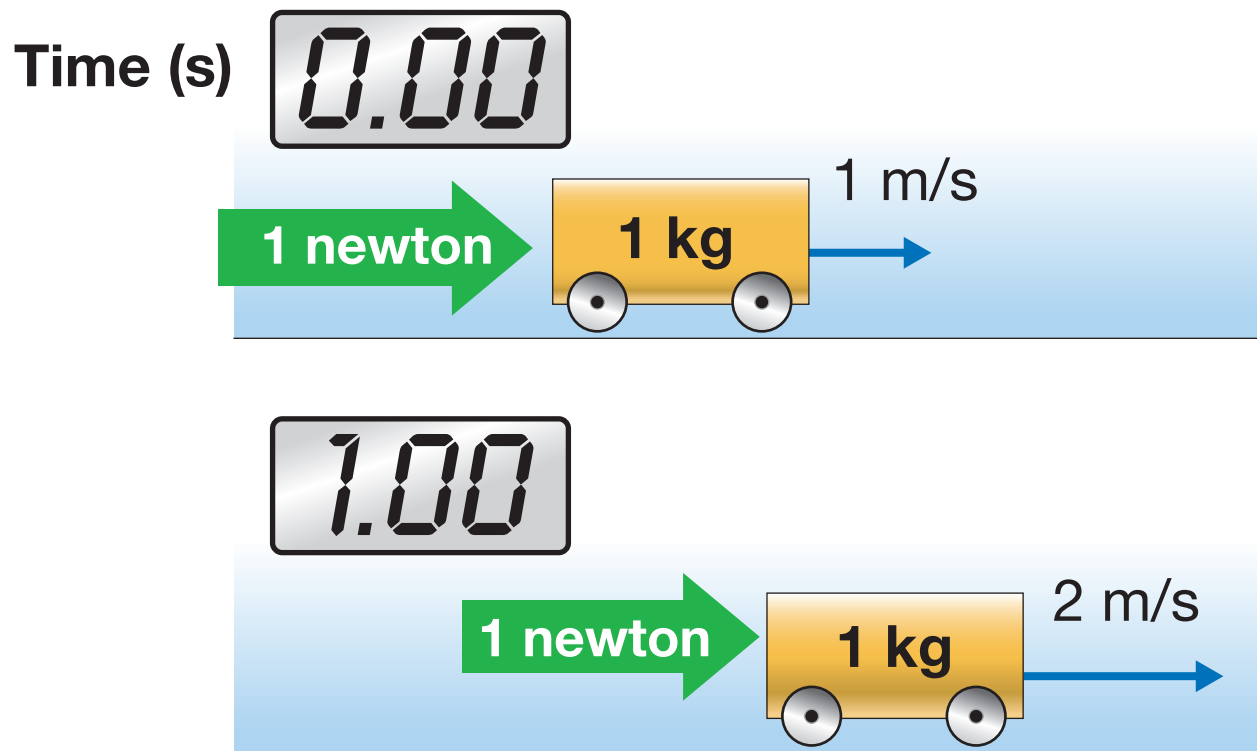


$$a = \frac{F}{m}$$

Newton's Second Law

Newton

One newton (N) is the force it takes to change the speed of a 1 kg mass by 1 m/s in 1 second.





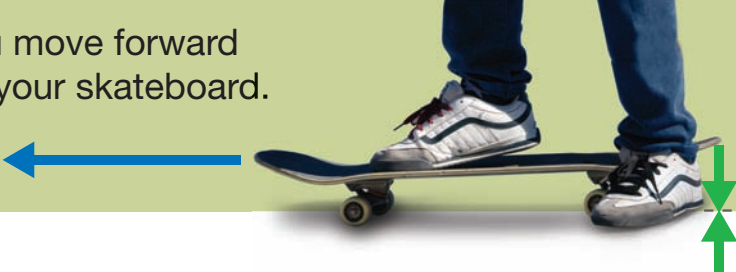


Solving Problems: Newton's Second Law

NEWTON'S SECOND LAW

$$\text{Acceleration (m/s}^2\text{)} \quad \mathbf{a} = \frac{\mathbf{F} \text{ Force (N)}}{\mathbf{m} \text{ Mass (kg)}}$$

Action Reaction Guidelines

Guidelines for Action-Reaction Forces	Examples
Both are always there whenever any force appears.	Your foot pushes (action) and the ground pushes back (reaction). 
They always have the exact same strength.	The force arrows are the same length. 
They always act in opposite directions.	The force arrows point in opposite directions. 
They always act on different objects.	Your foot and the ground. 
Both are real forces and can cause changes in motion.	You move forward on your skateboard. 

Solving Problems: Conservation of Momentum

MOMENTUM

$$\begin{array}{c} \text{Momentum} \\ \text{(kg-m/sec)} \end{array} \mathbf{P} = \begin{array}{c} \text{Mass (kg)} \\ \text{---} \\ \mathbf{m} \end{array} \mathbf{v} \begin{array}{c} \text{---} \\ \text{Velocity (m/sec)} \end{array}$$

Newton's Third Law and Momentum

