June 17, Week 3

Today: Chapter 4, Forces

Homework #3 is now available.

Quadrants

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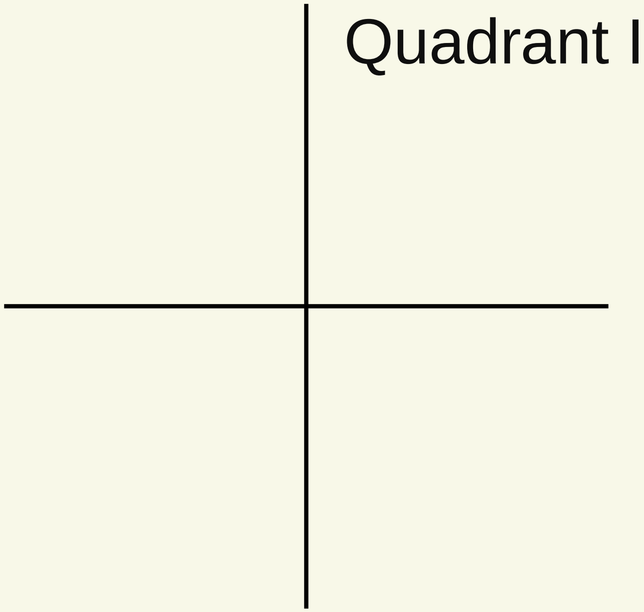

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$A_x =$ positive

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Quadrant II

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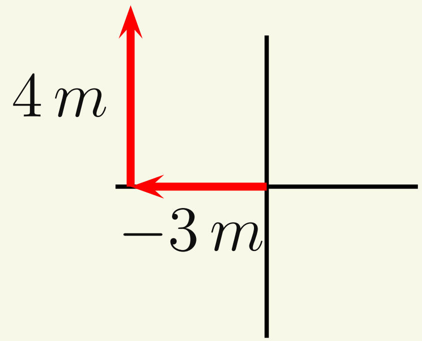

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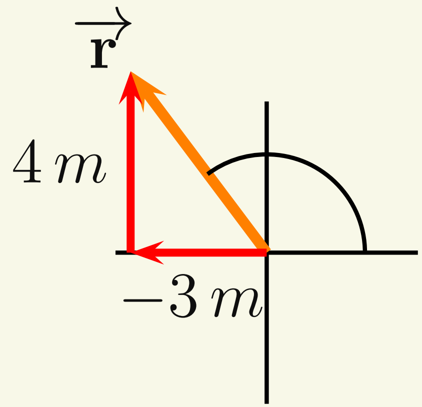

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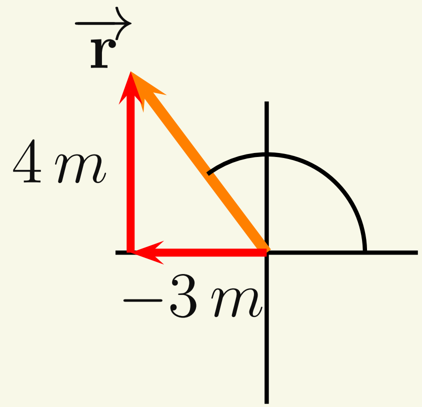

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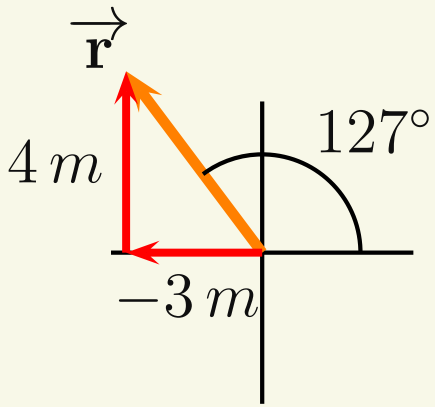

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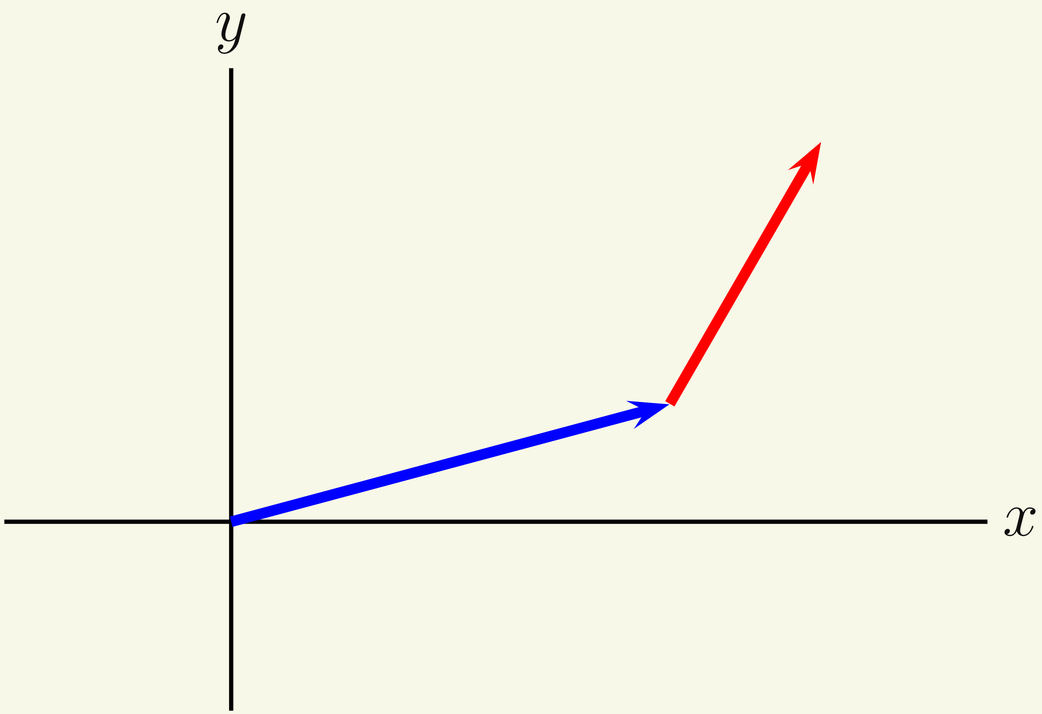

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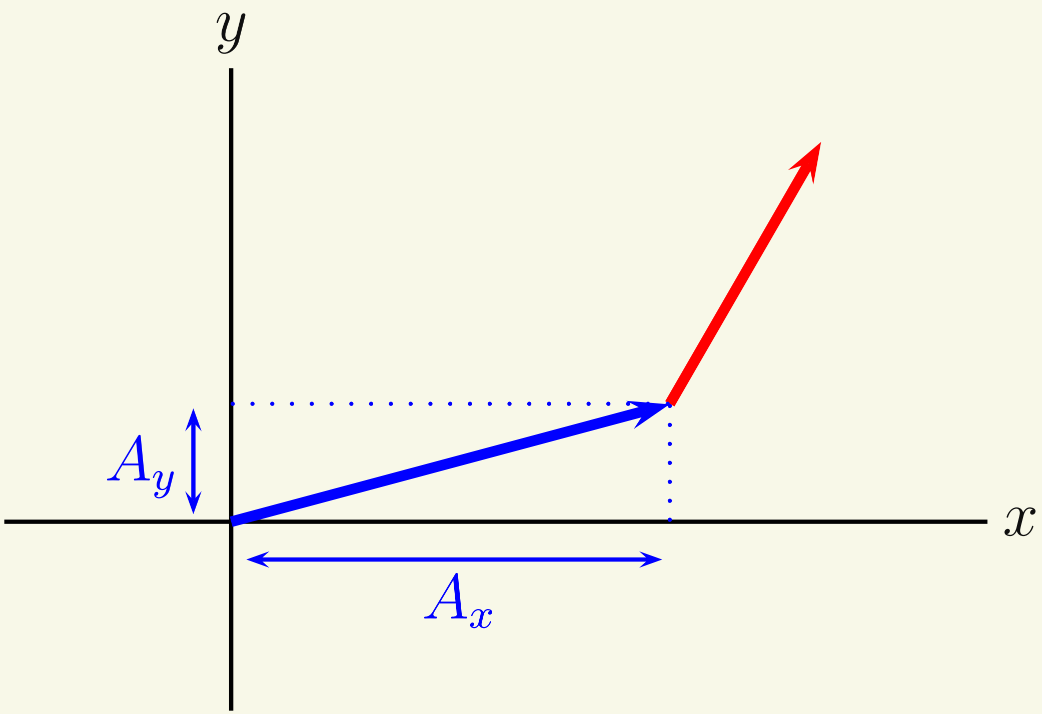

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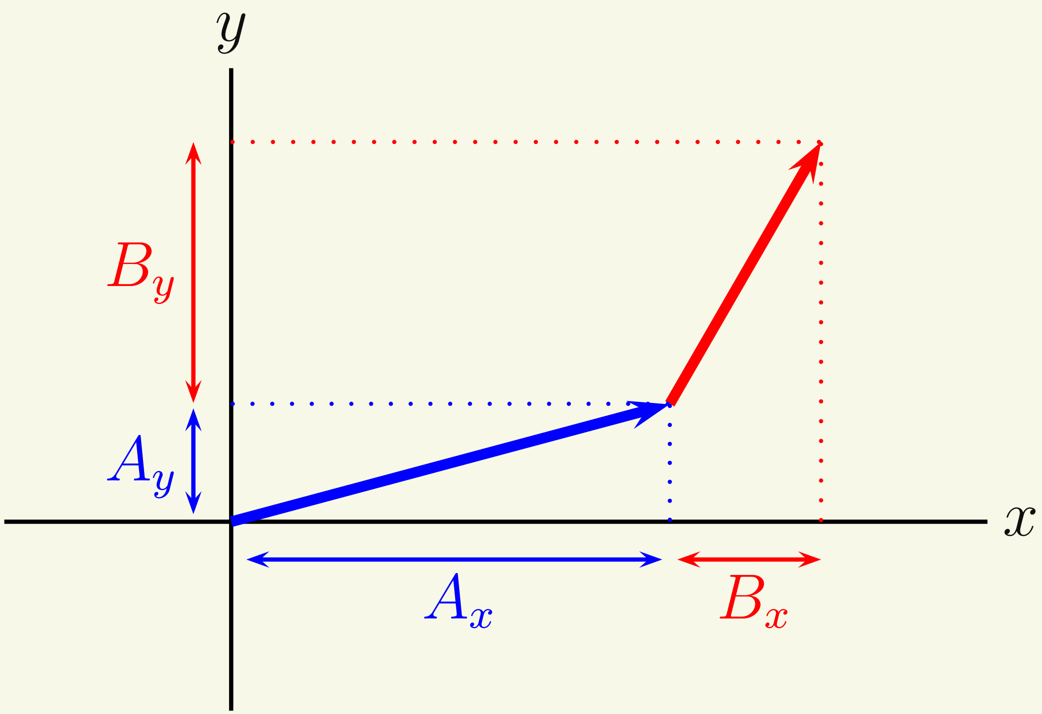

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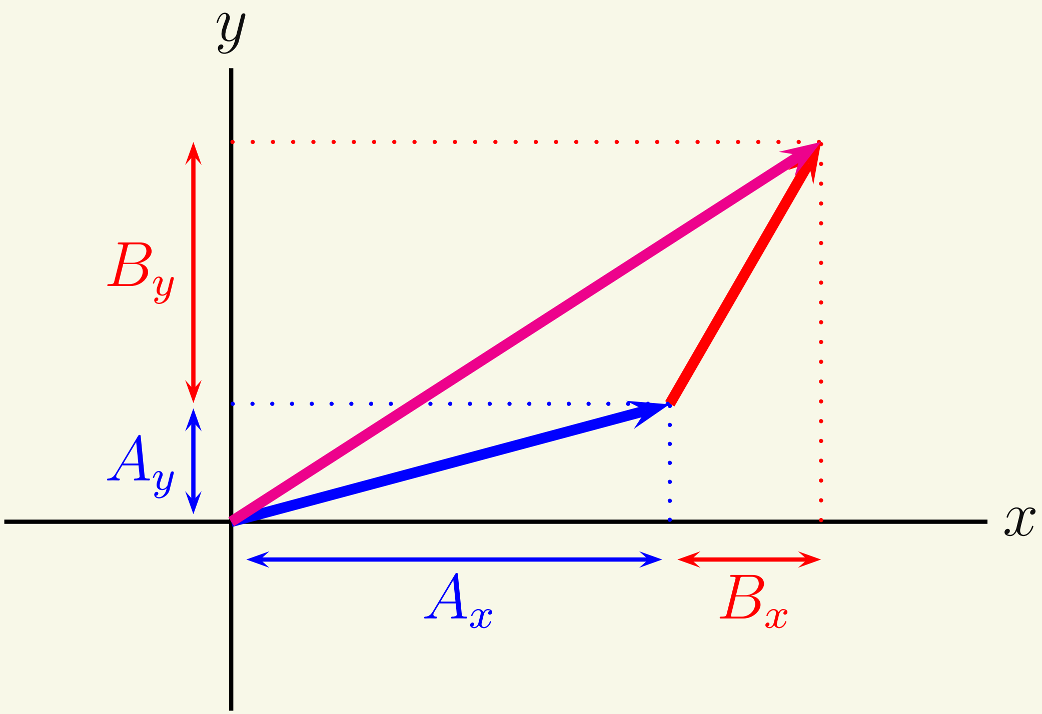

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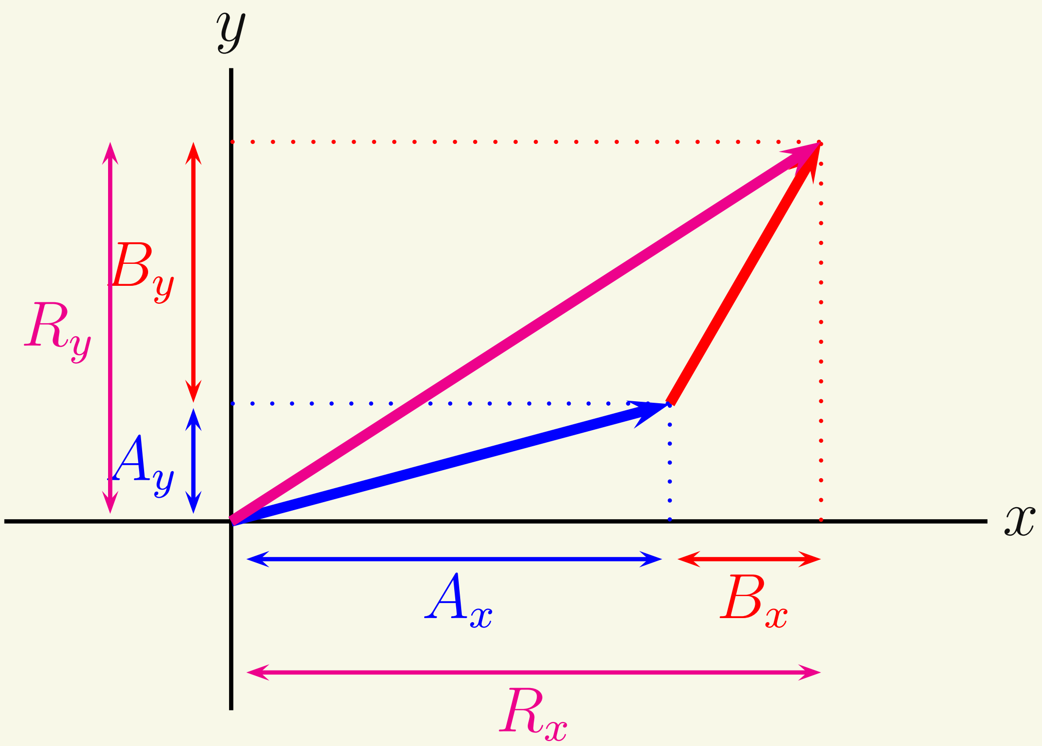

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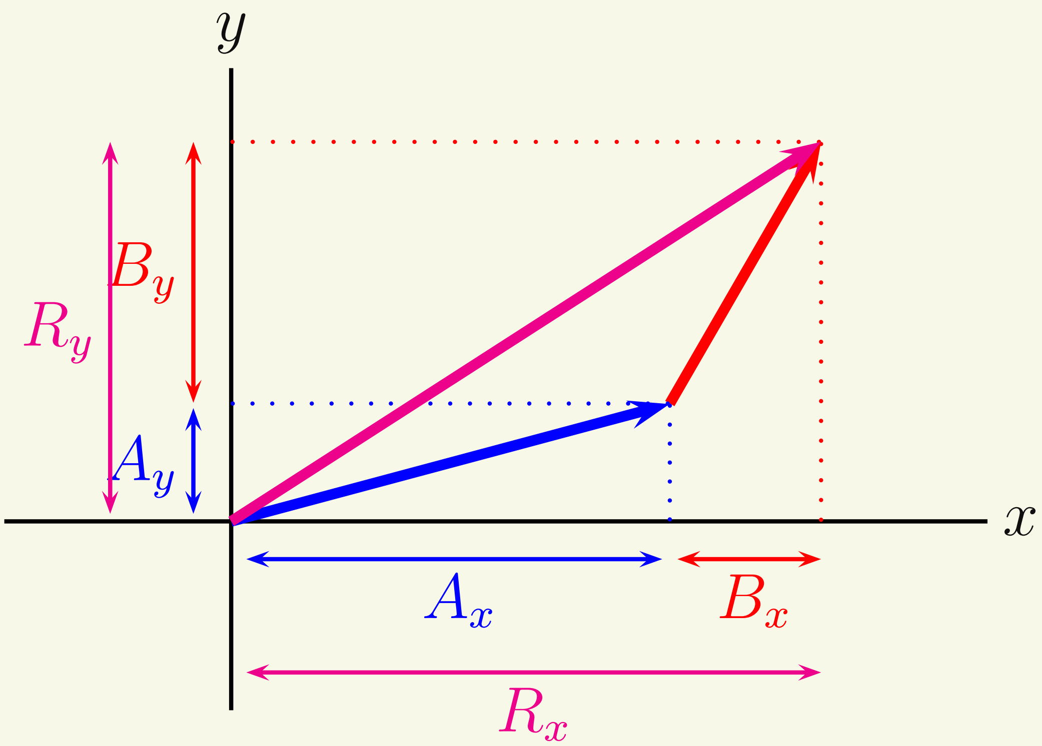

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The components of $\overrightarrow{\mathbf{R}}$:

$\boxed{R_x = A_x + B_x}$ $\boxed{R_y = A_y + B_y}$

Projectile Motion

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Gravity pulls straight down, so it causes acceleration in the y-direction only.

$$a_x = 0, a_y = -g \quad (\text{Down is negative })$$

Launch Angle

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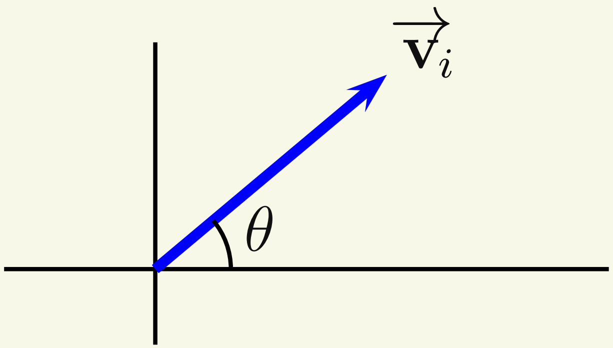

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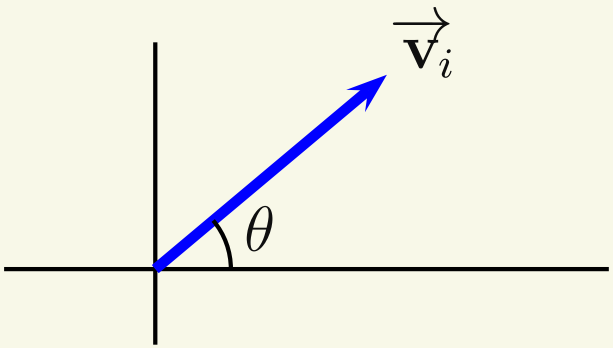

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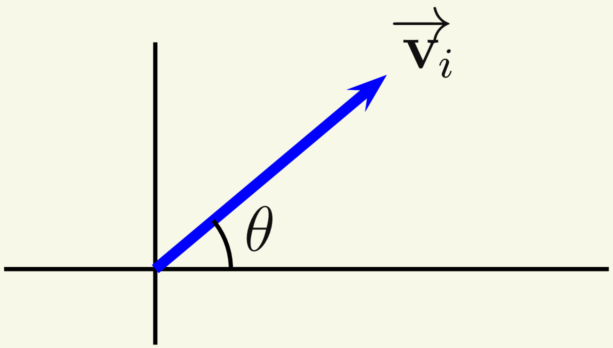

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Summary

Projectile Equations

$a_x = 0$	$a_y = -g$
$(v_x)_f = (v_x)_i$	$(v_y)_f = (v_y)_i - g\Delta t$
$x_f = x_i + (v_x)_i\Delta t$	$y_f = y_i + (v_y)_i\Delta t - \frac{1}{2}g\Delta t^2$
$(v_x)_i = v_i \cos\theta$	$(v_y)_i = v_i \sin\theta$

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For each ball: Their vertical motion is the same $\Rightarrow$ the same Δt!

Dynamics

Dynamics - Why objects move.

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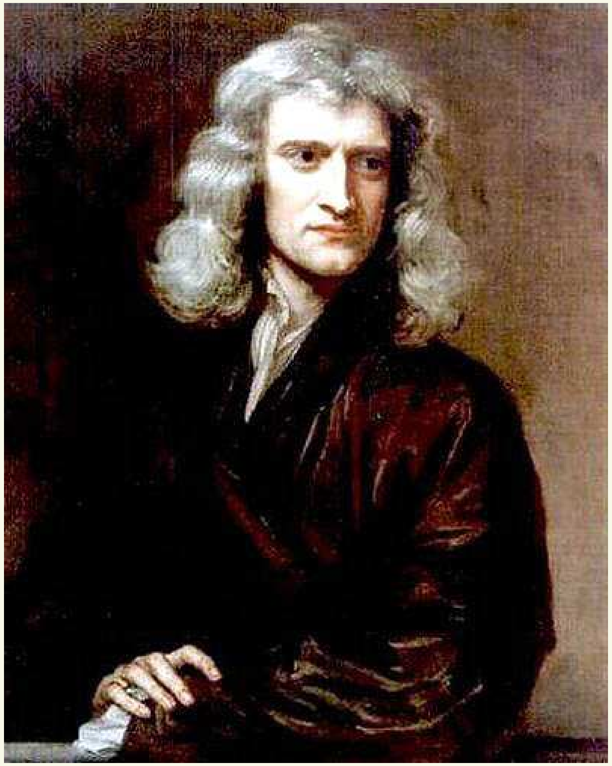

Sir Isaac Newton (1642-1727) British Physicist, In 1687 he published the *Philosophiæ Naturalis Principia Mathematica*. The *Principia* details how all motion can be explained by one of three simple statements = Newton's Three Laws of Motion.

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Motion of atomic-sized objects - Quantum Mechanics (Also started by Einstein).

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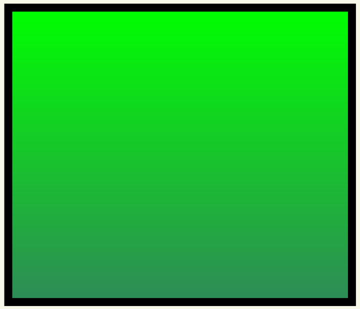

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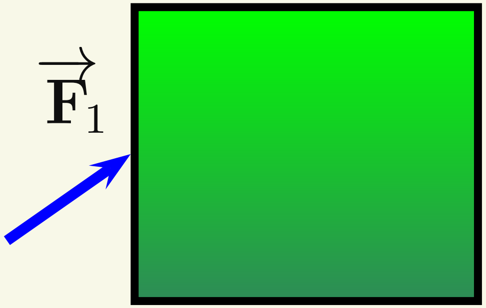

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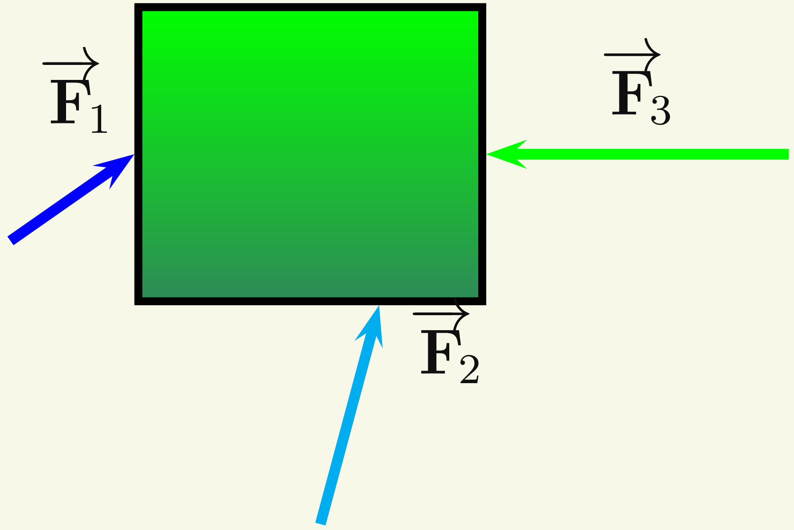

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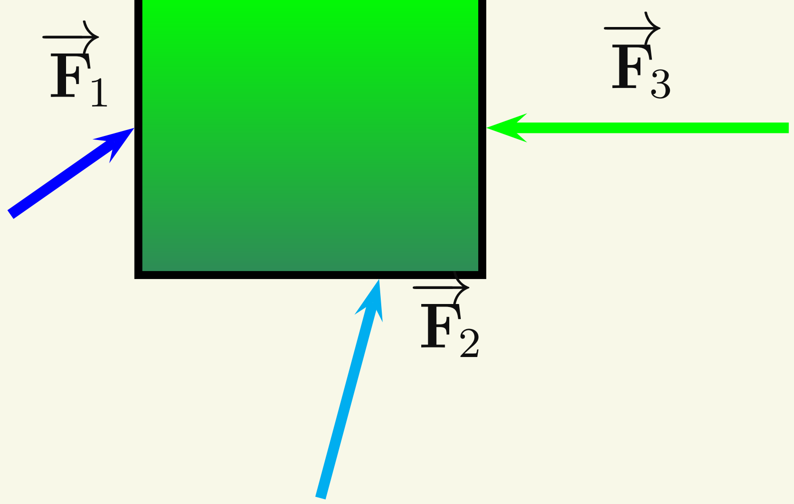

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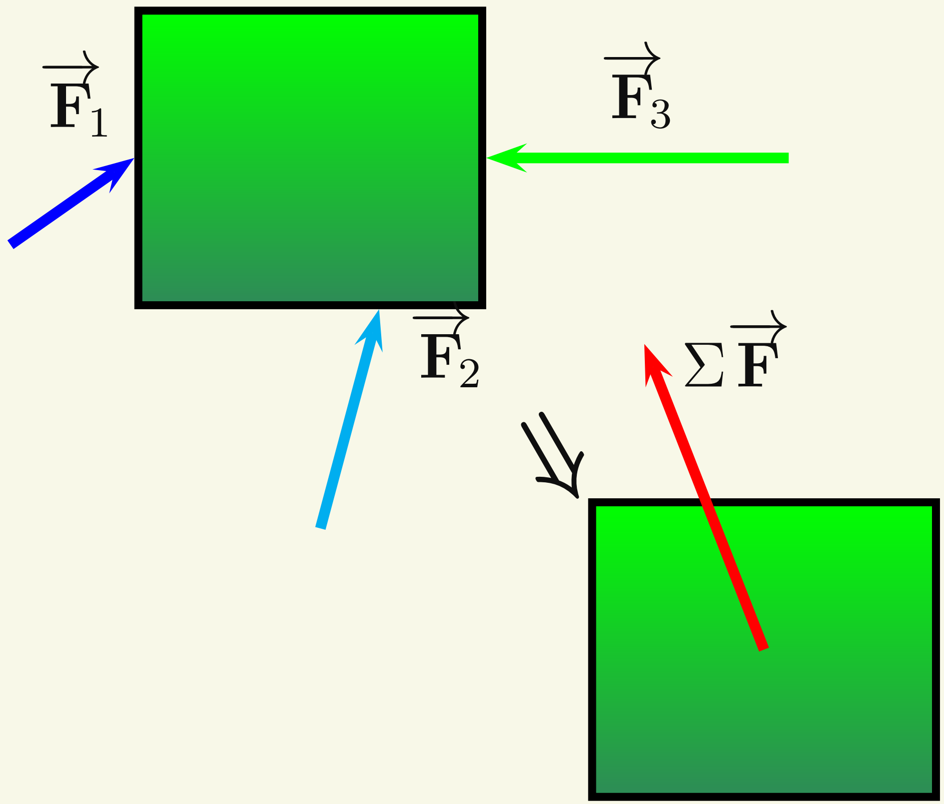

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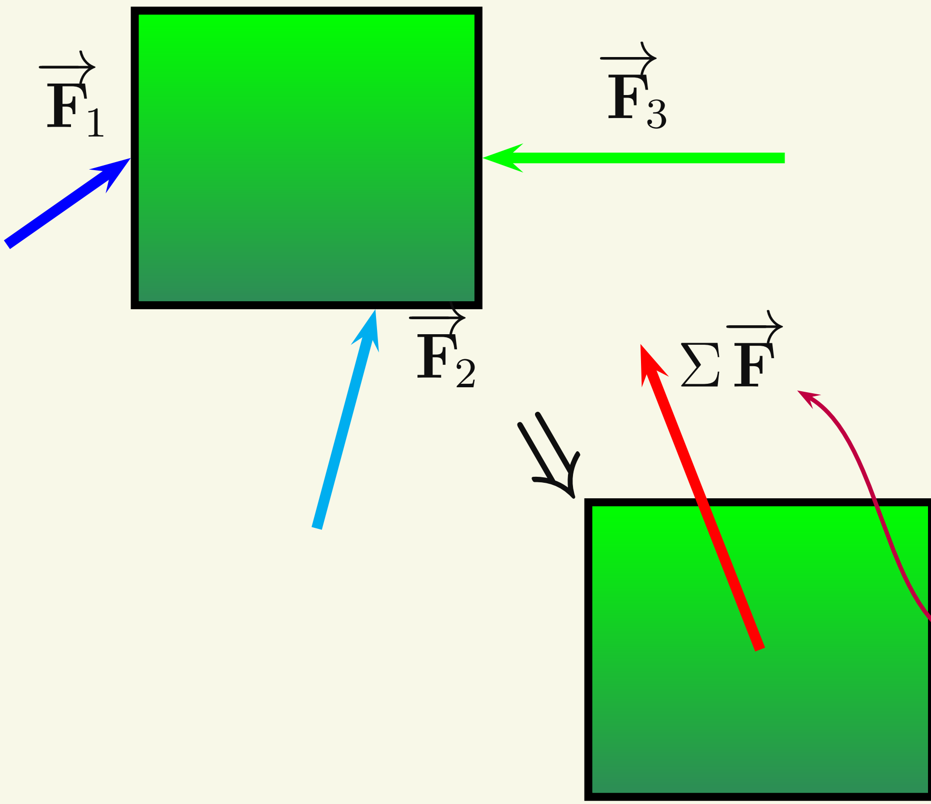

One single force. Applied at the center to avoid rotation.

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