April 20, Week 13

Today: Chapter 10, Angular Momentum

Homework #10 - Due April 23 at 11:59pm
Mastering Physics: 7 questions from chapter 10.
Written Question: 10.86

Exam #5, Friday, April 27
On Chapters 9 and 10

Review Session: Thursday, April 26, 7:30PM, Room 114 of Regener Hall.

Review

Angular Momentum:

Review

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Point Particle:

Review

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Point Particle: $\overrightarrow{\mathbf{L}} = \overrightarrow{\mathbf{r}} \times \overrightarrow{\mathbf{p}}$

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For either: $\overrightarrow{\boldsymbol{\tau}} = \dfrac{\overrightarrow{d\mathbf{L}}}{dt}$

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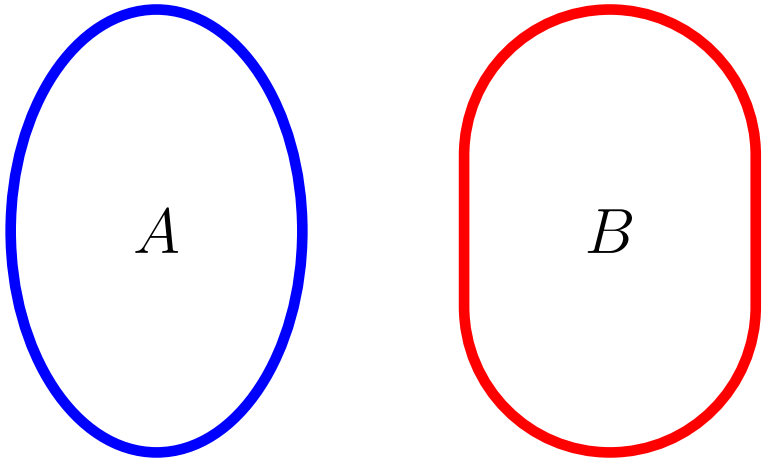

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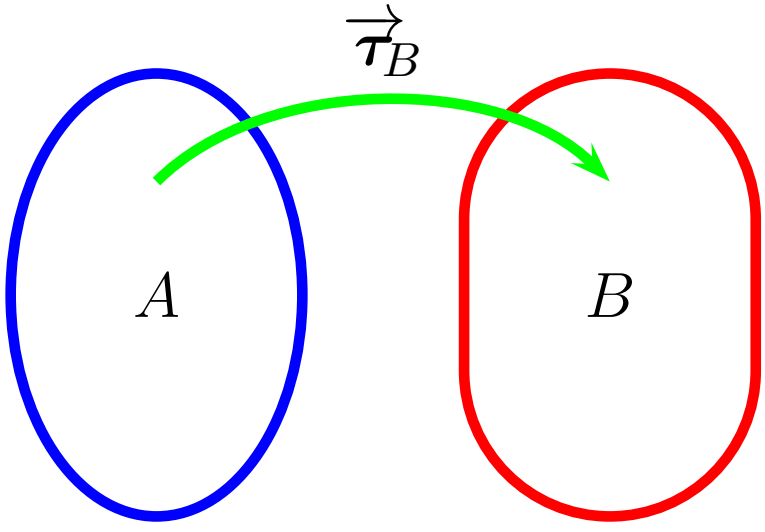

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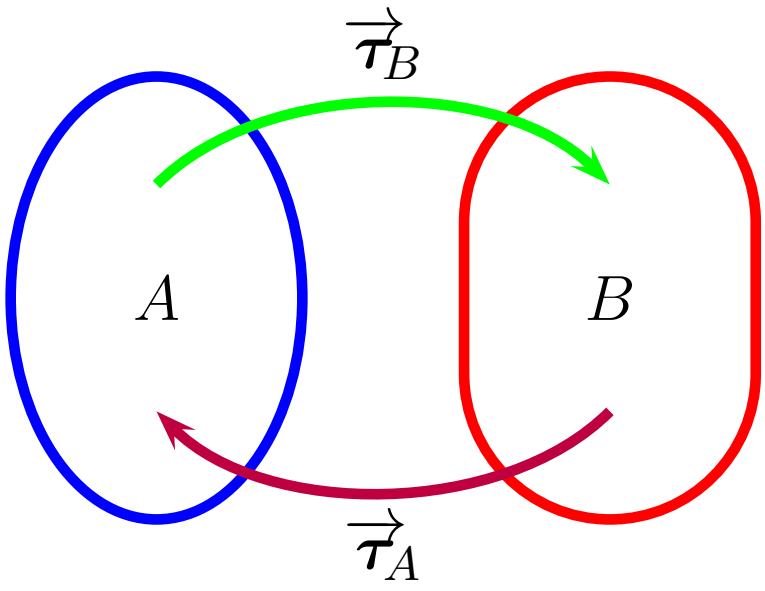

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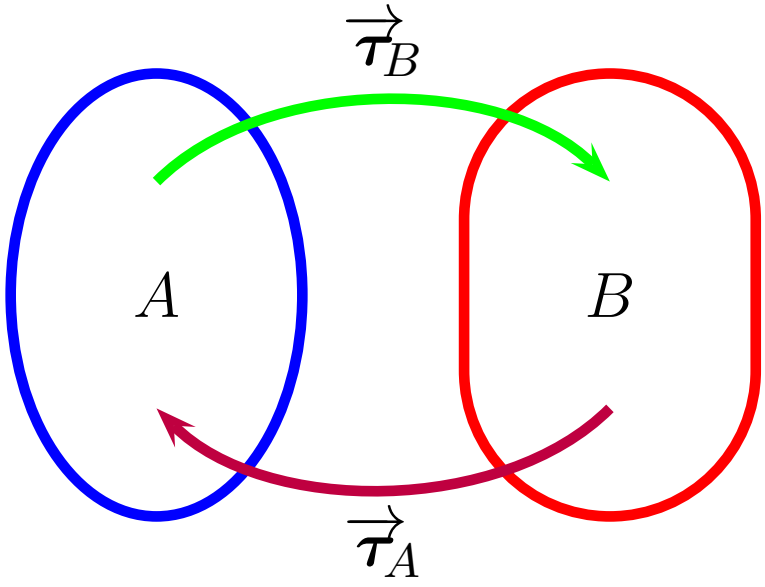

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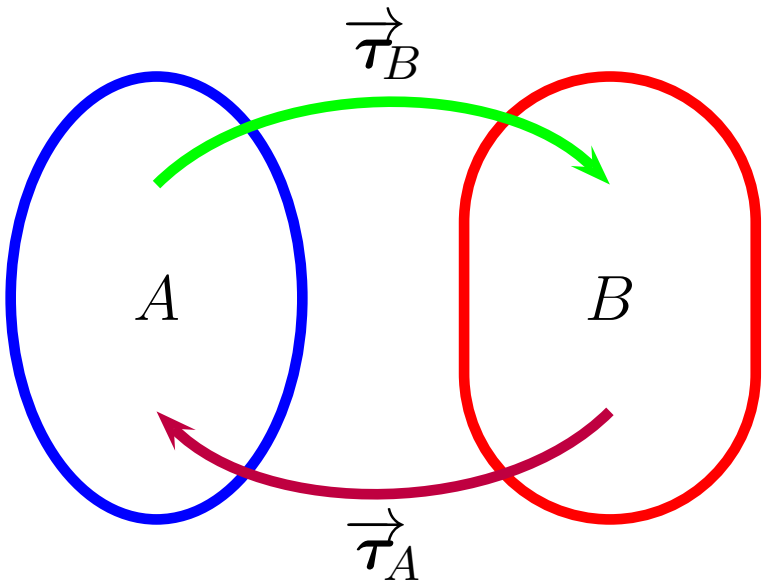

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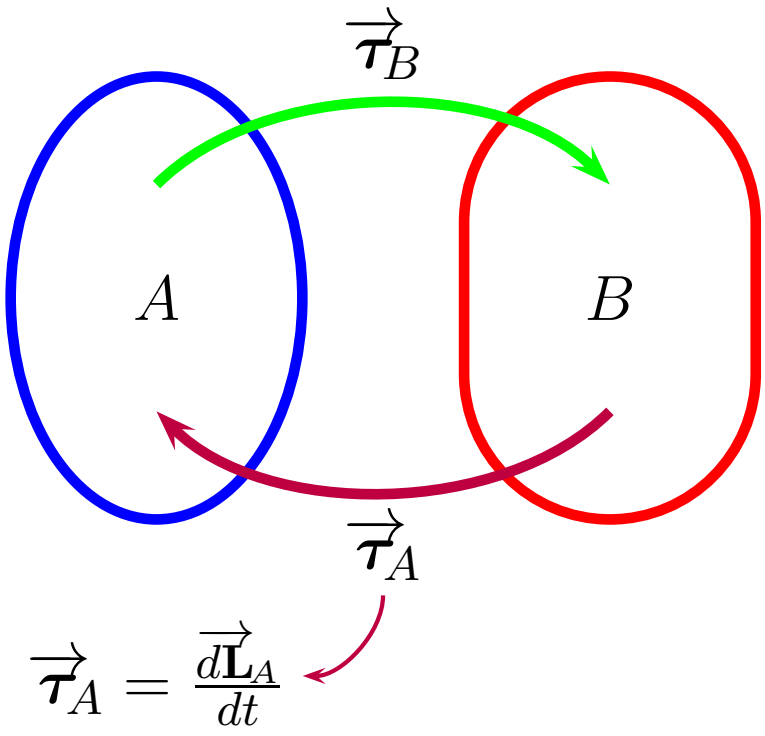

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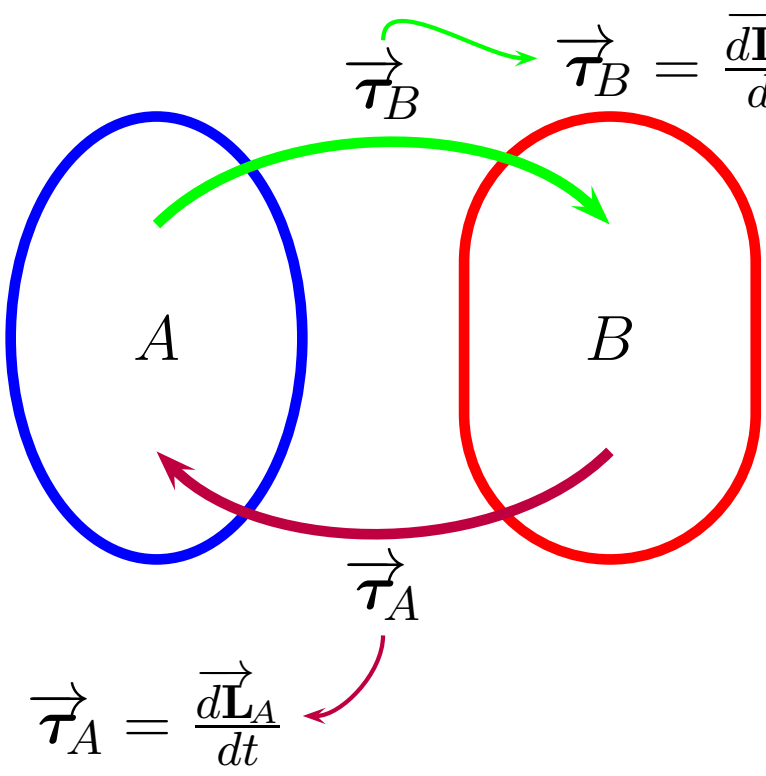

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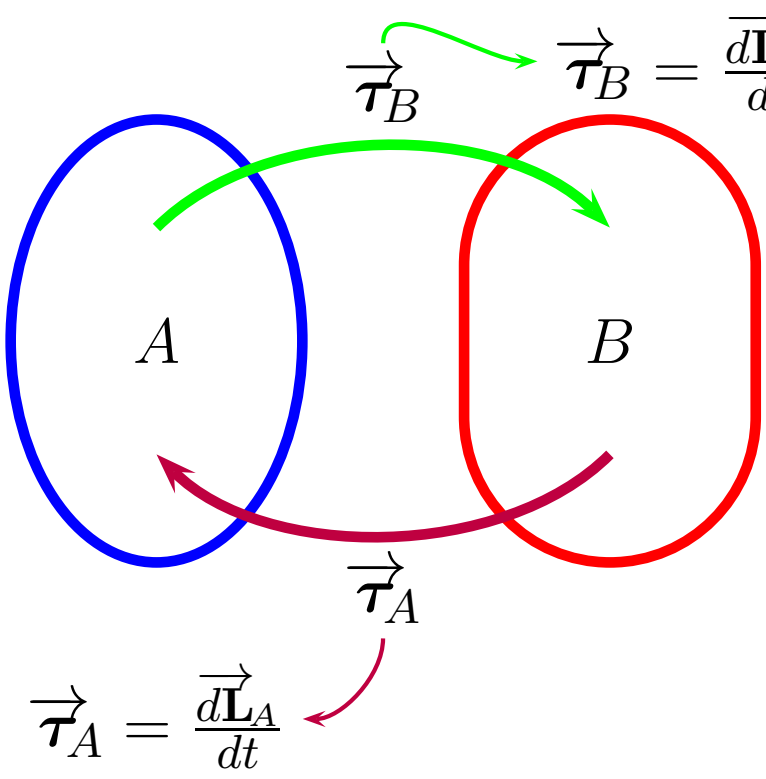

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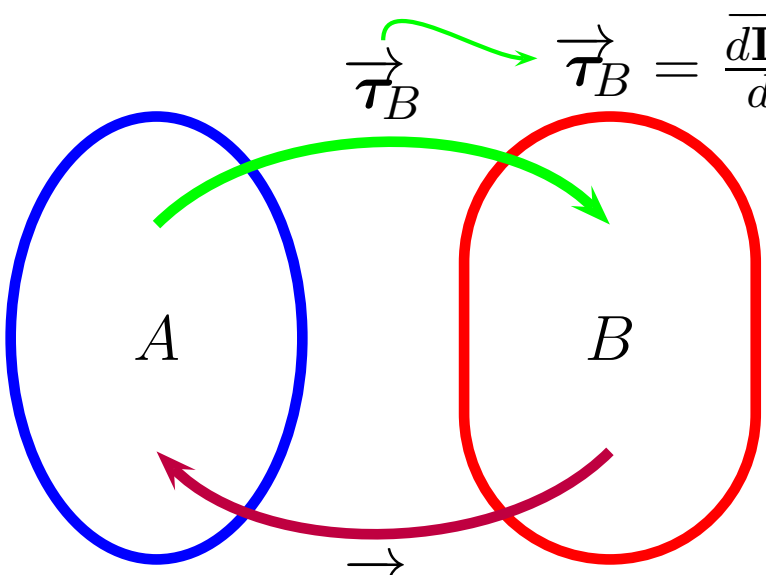

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$$\boxed{\vec{\mathbf{L}}_A + \vec{\mathbf{L}}_B = \text{constant}}$$

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Conservation of Angular Momentum:

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Example: A 60-kg man runs at $3.4\,m/s$ alongside a 155-kg, 2.6-m radius merry-go-round that is rotating at $4\,rad/s$. If the both the man and the merry-go-round are circling counter-clockwise (as viewed from above), how fast will the merry-go-round be going after the man jumps onto its edge?

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An olympic diver launches himself from the 20-m platform with angular speed $2\,rad/s$. By tucking himself into a ball, he increases his angular speed to $6\,rad/s$. By what factor did the diver change his moment of inertia by tucking himself into a ball?

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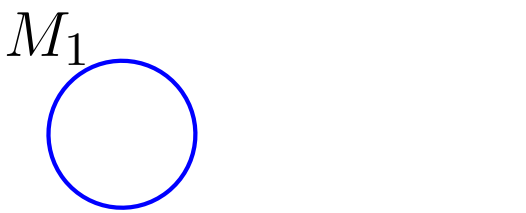

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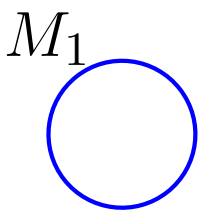

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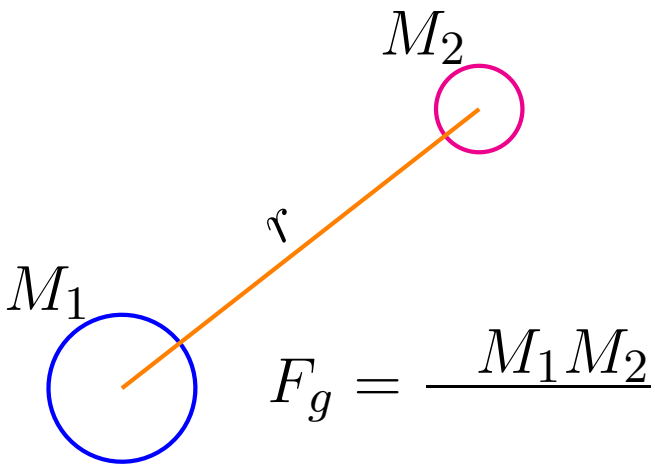

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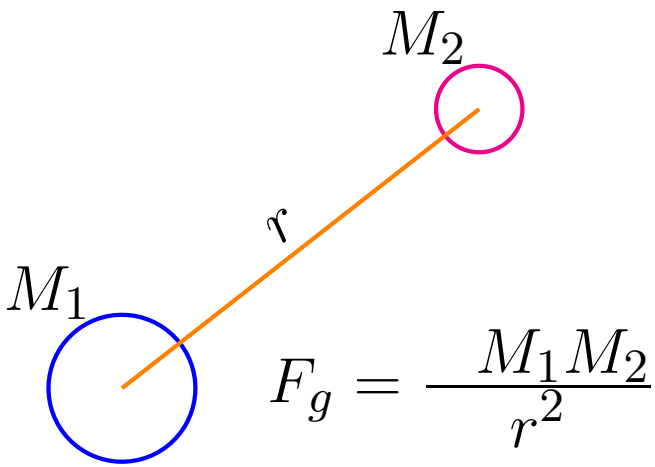

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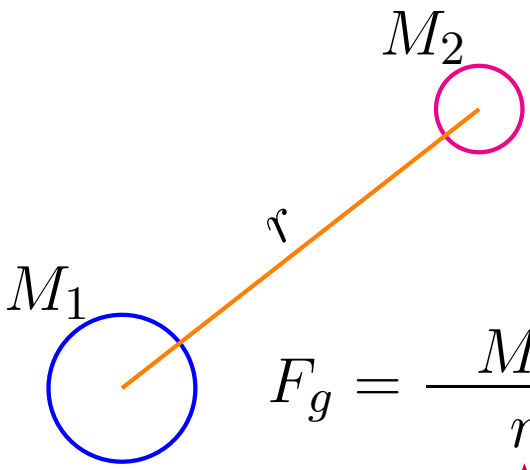

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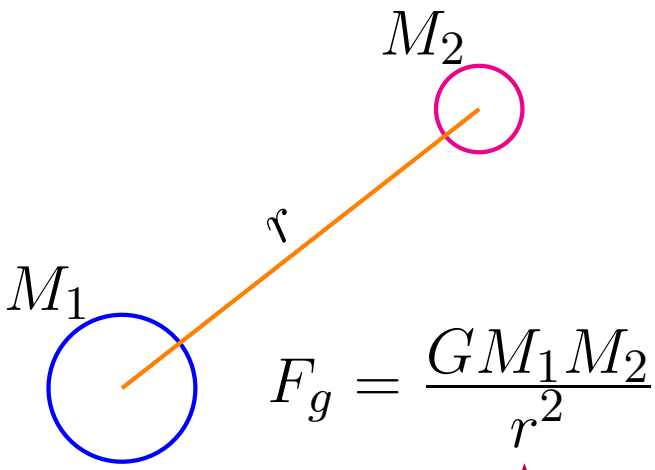

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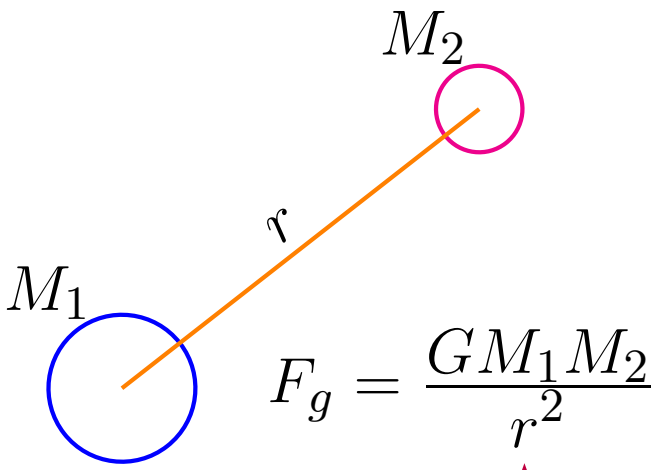

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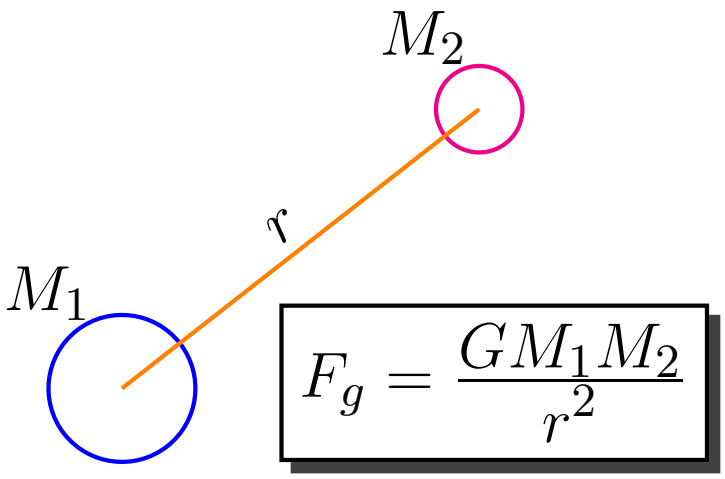
Example



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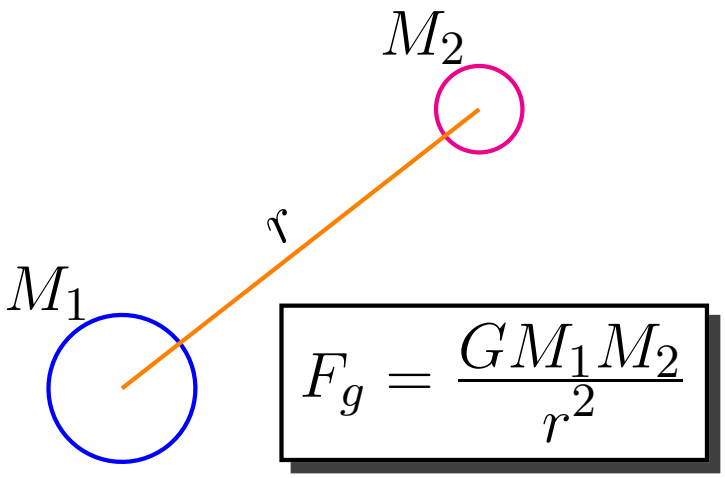

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Example: Find the gravitational force that the earth exerts on the moon.