Gravity Force Lab

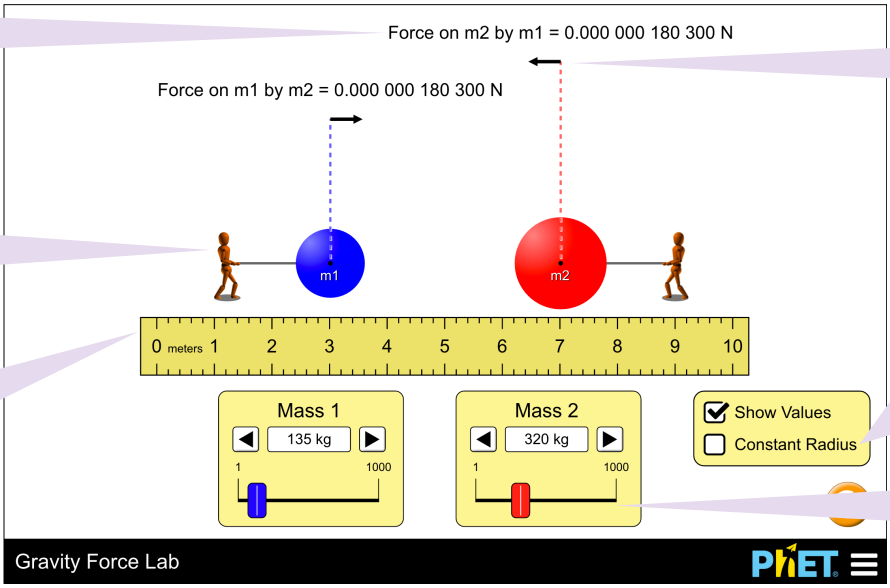
Tips for Teachers

In ***Gravity Force Lab*** students visualize the gravitational force that two objects exert on each other, and adjust the properties of the masses to see how it affects the gravitational attraction.

VIEW the forces in the system

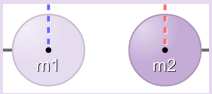
DRAG the masses apart or together

MEASURE the distance between the objects



SEE the vector representation of the forces

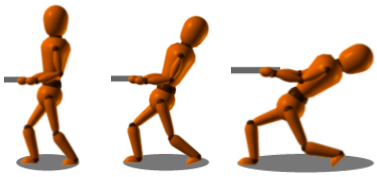
COMPARE masses with the same radius



ADJUST the masses

Model Simplifications

- By default, the masses will maintain a constant density. If the mass is increased, the radius will increase proportionally to maintain the density. If the simulation is in Constant Radius mode, the radii of the masses will instead remain constant. If the mass is increased, the color of the mass will darken to indicate its increasing density.
- The figures attached to the masses are displayed to help students understand why the objects stay apart, despite their attraction. The figure will lean further back to indicate that the force exerted by the mass it is holding has increased. However, the figure is massless and does not contribute to the forces in the system.



Insights into Student Use

- Students need to measure distances from the center of mass, but we want them to discover this on their own. If they use something else, like distance between outer edges, they should find that their data doesn't make sense.
- We encourage students to construct their own ideas through exploration, and have found that referring directly to the "Universal Law of Gravity" may encourage some students to simply look up the relevant information.

Rouinfar, March 2016

Suggestions for Use

Sample Challenge Prompts

- Identify two ways you can change the amount of gravitational force that the objects experience. How could you increase gravitational force using each factor? How could you decrease gravitational force using each factor?
- If gravity is a force of attraction between objects, why aren't objects like your pencil, being pulled towards you? Explain your reasoning.
- Select two different values for mass 1 and mass 2. How does the force that the smaller mass exerts on the larger mass compare to the force that the larger mass exerts on the smaller mass?
- Predict what happens to the gravitational force as the distance between the masses is doubled.
- Pick an independent variable to manipulate and design an experiment to determine what happens to the gravitational force as this variable is changed. What do you observe?
- Design an experiment to determine the equation that describes the relationship between the gravitational force and the masses of the objects and the distance between the objects. Plot your data in Excel and explain how you chose an appropriate trendline.

See all published activities for Gravity Force Lab here.
For more tips on using PhET sims with your students, see Tips for Using PhET.