

7.1 Newton's law of gravitation

Objects with mass are attracted to each other. This is the force due to gravity.

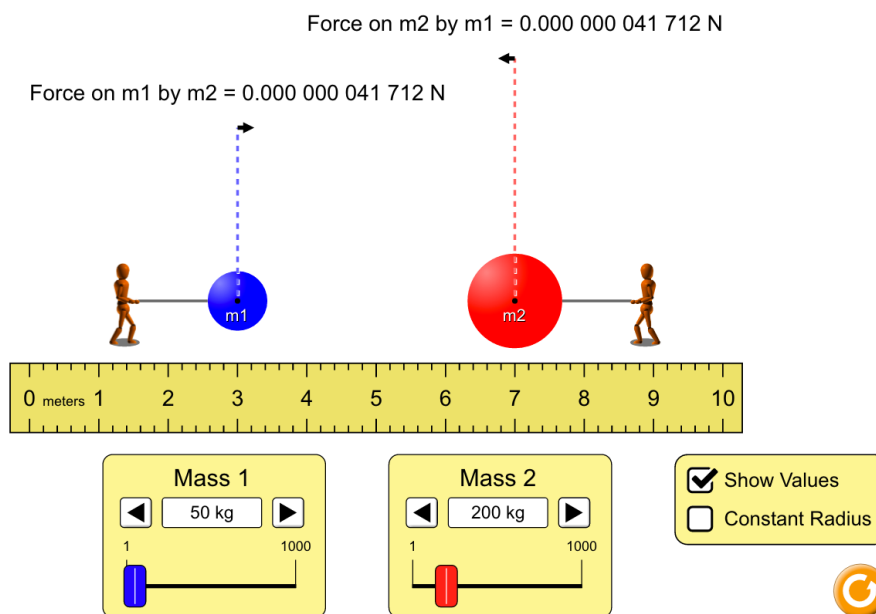
(1) *What two factors affect the size of this force?*



videos

Open the following simulation: <https://tinyurl.com/ma8rw9x>

Try changing the size of the two forces and their separation.



(2) *How does the force on the two masses compare?*

(3) *Circle the correct statement:*

The force of attraction between two objects is **proportional/inversely proportional** to the product of the masses and **proportional/inversely proportional** to the distance between the masses (squared).

(4) *Now write a mathematical expression for the force of attraction between two masses.*

Newtons's Law of Gravitation states that the force of attraction between two bodies with mass m_1 and m_2 is given by:

$$F = G \frac{m_1 m_2}{r^2}$$

where G =gravitational constant= $6.67 \times 10^{-11} \text{m}^3 \text{kg}^{-1} \text{s}^{-2}$, and r =the distance between the centre of mass of the two masses

(5)  The mass of the Earth is $6 \times 10^{24} \text{kg}$ and has a mean radius of 6400km. What is the force of gravitational attraction between you and the Earth, on the Earth's surface? (Note: if you don't know your mass, take it to be 70kg)

(6)  What is the force of gravitational attraction between you and someone of the same mass standing 1m away from you?

(7)  From the previous answer, what can you conclude about the magnitude of gravitational attraction?