

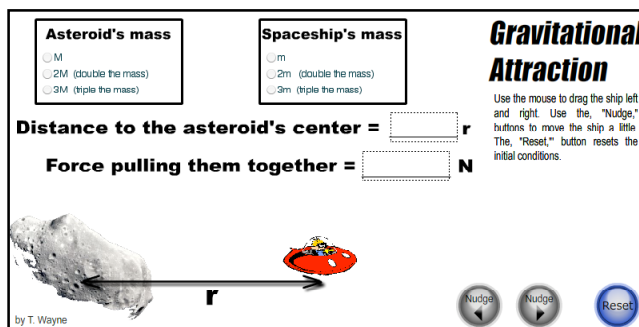
Universal Gravity Presentation Example Problems

Go to <http://www.mrwaynesclass.com/gravity>

A page with a simulation looking the one below should open up.

The spaceship can be dragged left and right with the mouse. The, "Nudge," buttons can be used to easily move the spaceship small distances.

Your task is to work with a partner to figure out what affects the pull of gravity. You are to create an experiment to PREDICT how the pull of gravity will be affected by multiplying the distance by some number, "X," and how the pull of gravity will be affected by changing the mass by multiplying it by a number, "N." From these rules that you create you should be able to correctly answer the following questions.



DATA	
R -factor	F-factor
2	
1	
$\frac{1}{2}$	
$\frac{1}{3}$	
$\frac{1}{4}$	
$\frac{1}{5}$	

The factor "r" changes by is given. However, the factor the force changes by will need to be calculated. Let's say the original force is 200 N and the new force is 800 N. What number must 200 N be multiplied by to equal 800 N. This number is the factor the force changes by. In this case, $200 \times 4 = 800$. Therefore the force factor of change is "4."

1. If the initial force at some distance, r , is 1.00×10^2 N, then what is the force of attraction at a distance of exactly $3r$? _____
2. If the initial force at some distance, r , is 1.00×10^2 N, then what is the force of attraction at a distance of exactly $4r$? _____
3. If the initial force at some distance, r , is 1.00×10^2 N, then what is the force of attraction at a distance of exactly $\frac{1}{10} r$? _____
4. How does the force of attraction change as the space ship is moved closer to asteroid, "Ida?"
5. If the initial force at some distance, r , is 1.00×10^2 N, then what is the force of attraction when the mass of asteroid, "Ida," is halved? _____
6. If the initial force at some distance, r , is 1.00×10^2 N, then what is the force of attraction when the mass of asteroid, "Ida," is tripled and the mass of the spaceship is doubled?

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7. If the initial force at some distance, r , is 1.00×10^2 N, then what is the force of attraction if the mass of asteroid, "Ida," changes by a factor of 6, the spaceship's mass is tripled and the spaceship is moved away from asteroid, "Ida," to a distance of the spaceship is increased to $3r$? _____
8. By what factor has the spaceship's distance, " r ," changed by if the masses are unchanged from the initial condition and the force of attraction has changed from 3.60×10^2 N to 4.00×10^2 N _____