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**Directions:**

1. Go to [phet.colorado.edu/simulations](http://phet.colorado.edu/simulations)
2. Select PHYSICS on the sidebar, then scroll down until you find GRAVITY FORCE LAB. Click on the lab.
3. Select "Run Now."

**Part 1: Changing the Mass**Color of  $M_1$ =Color of  $M_2$ =**Task 1**

1. Record the current masses of the objects.  
Mass of Blue Object=  
Mass of Red Object=
2. What is the size of the force of the red object on the blue object?  
\_\_\_\_\_
3. What is the size of the force of the blue object on the red object?  
\_\_\_\_\_

**Task 2**

1. Increase the size of the red object until it equals the blue object.  
Mass of Blue Object=  
Mass of Red Object=
2. What is the size of the force of the red object on the blue object?  
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3. What is the size of the force of the blue object on the red object?  
\_\_\_\_\_

**Task 3**

1. Decrease the size of the red object until it is  $\frac{1}{2}$  the mass of the blue object.  
Mass of Blue Object=  
Mass of Red Object=
2. What is the size of the force of the red object on the blue object?  
\_\_\_\_\_

3. What is the size of the force of the blue object on the red object?

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### Analysis Questions

1. What happened to the force when the mass of the red object increased?

2. What happened to the force when the mass of the red object decreased?

3. Create a statement that states how the gravitational force of an object relates to the mass of an object.

4. If the moon were twice as massive as it is (it is currently about 1/6 the mass of Earth), how would that change the gravitational pull on the earth?

### Part 2: Changing the Distance

1. Increase the blue object's mass to 50 kg and the red object's mass to 30 kg.

Mass of Blue Object =

Mass of Red Object =

2. What is the size of the force of the red object on the blue object?

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3. What is the size of the force of the blue object on the red object?

\_\_\_\_\_

4. Leaving their masses the same, move the humanoid holding the red object closer to the blue object.

5. What is the new size of the force of the red object on the blue object?  
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6. What is the new size of the force of the blue object on the red object?  
\_\_\_\_\_
7. How did the size of the force change when the objects were moved closer together?
8. Make a prediction as to what were to happen to the size of the force if the objects were moved further apart and then test your prediction.
9. Create a statement that states how the gravitational force of an object relates to the ~~mass of an object.~~ *distance between objects.*

**Conclusion:**

Write a general rule for the gravitational force between objects that explains the effect of increasing the mass of the objects and creating a greater distance between objects.