

**Purpose:**

- 3.C.1.1 Use Newton’s law of gravitation to calculate the gravitational force that two objects exert on each other and use that force in contexts other than orbital motion. [SP 2.2]
- 3.C.1.2 Use Newton’s law of gravitation to calculate the gravitational force between two objects and use that force in contexts involving orbital motion (for circular orbital motion only in Physics 1). [SP 2.2]
- 3.C.2.2 Connect the concepts of gravitational force and electric force to compare similarities and differences between the forces. [SP 7.2]

Select the preset “Sun and planet.” Use the applet to create circular orbits of varying radii around the central star and record radius, period, and planet mass for various trials. Describe how the velocity changes in each trial and how the radii change for each planet.

Trial	Mass of Planet #1	Mass of Planet #2	Radius between planets	Period	Sketch the orbit pattern. Describe any differences from the previous sketch.
1	200	10			
2	200	20			
3	200	50			
4	200	100			
5	200	200			
6	200	300			

Using the formula sheet and the definitions of velocity and force, derive two equations:

1. To find the velocity of Planet 2
2. To find the force of planet 2

For each trial, calculate the velocity and the force.

<b>Trial</b>	<b>Velocity</b>	<b>Force</b>	<b>Trial</b>	<b>Velocity</b>	<b>Force</b>
<b>1</b>			<b>4</b>		
<b>2</b>			<b>5</b>		
<b>3</b>			<b>6</b>		

How is gravitational force related to mass? How is gravitational force related to radius? Justify your answer using the equation and using a graph. Graph both relationships together and include a legend.

