



Impulse: Teacher Play Guide

Before starting the study in your class, please play *Impulse* yourself up to level 45 (or as far as you can). It is very important that you are comfortable with the way physics is represented in the game, and how it is integral to the predictions students might make or the strategies they might develop while playing.

The first 45 levels of *Impulse* deal with gravitational forces between objects. At higher levels, the electric force is introduced so there are both attractive and repulsive forces at play.

Particle Guide

Although this information is not explicit in the game, it might be useful to you as a teacher to know the relative masses and sizes of the particles to help you lead class discussions about the particles' behaviors and the physics behind those behaviors.

<u>color</u>	<u>mass</u>	<u>size</u>	<u>charge</u>
green (player particle)	80	25	0
red	80	25	0
blue	40	23	0
white	160	35	0
gray	180	20	0
cyan	80	25	+1
orange	80	25	-1

While playing, consider the following questions:

1. What are the forces acting on each particle?
2. Are the collisions between particles elastic or inelastic?
3. How does the momentum of each particle change with each impulse or collision?
4. What strategies do you use to avoid collisions?
5. What assumptions about forces and motion are you making with those strategies?
6. Are those assumptions consistent with Newton's first and second laws of motion?
7. What different strategies or actions do you use for different colored particles? Why? How do these relate to your understanding of Newton's first and second laws?
8. How do you think your students might think differently about these questions?