Hooking Up

Imagine Galileo standing at the top of the Leaning Tower of Pisa in Italy. He is holding two different-sized spheres. He releases them at the same time. As expected, they strike the ground at the same time. One is large. The other is small. Yet they fall to Earth at the same rate. It makes sense, or does it?

Materials
3 identical rubber balls
String
Adhesive tape
A pair of scissors

To Do
Extend your arms while holding out two separate rubber balls. Release the balls at the same time. Both balls should fall to the floor at almost the same instant. This should make sense because they both contain the same amount of atomic material (also known as matter).

Now let's make a falling body of twice the mass. To build this object, cut a section of string about 6 inches (15 cm) long. Tape one end of the string to each ball. This string connector makes this object a "double" ball. Some scientists refer to this complex mass as a system.

If you drop the system, will it fall at a faster rate than a single ball? Will one ball of the system fall faster than the other ball? Test your ideas.

Hold this system in one hand and a single rubber ball in the other hand. When you let go of both loads at the same time, should the system fall faster? If so, how would each ball of the system know to increase its speed? Is a message sent along the connecting string?

The Science
Whether it is a single ball or a system of two, the loads will fall to the floor at the same rate. Think about it. There is no "telepathy" that tells the individual balls of the system that they should fall faster as a result of being attached by a string to another ball. Drop the system and neither component ball falls faster than the other.

Let's expand this idea. Imagine a five-ball system. Although the five balls are attached by strings, this system will still fall at the rate of a single ball.