How does gravity work?

by Julia Layton

Every time you jump, you experience gravity. It pulls you back down to the ground. Without gravity, you'd float off into the atmosphere -- along with all of the other matter on Earth.

You see gravity at work any time you drop a book, step on a scale or toss a ball up into the air. It's such a constant presence in our lives, we seldom marvel at the mystery of it -- but even with several well-received theories out there attempting to explain why a book falls to the ground (and at the same rate as a pebble or a couch, at that), they're still just theories. The mystery of gravity's pull is pretty much intact.

So what do we know about gravity? We know that it causes any two objects in the universe to be drawn to one another. We know that gravity assisted in forming the universe, that it keeps the moon in orbit around the Earth, and that it can be harnessed for more mundane applications like gravity-powered motors or gravity-powered lamps.

As for the science behind the action, we know that Isaac Newton defined gravity as a force -- one that attracts all objects to all other objects. We know that Albert Einstein said gravity is a result of the curvature of space-time. These two theories are the most common and widely held (if somewhat incomplete) explanations of gravity.

In this article, we'll look at Newton's theory of gravity, Einstein's theory of gravity and we'll touch on a more recent view of the phenomenon as well.

Although many people had already noted that gravity exists, Newton was the first to develop a cohesive explanation for gravity, so we'll start there.

Newton's Gravity

In the 1600s, an English physicist and mathematician named Isaac Newton was sitting under an apple tree -- or so the legend tells us. Apparently, an apple fell on his head, and he started wondering why the apple was attracted to the ground in the first place.

Newton publicized his Theory of Universal Gravitation in the 1680s. It basically set forth the idea that gravity was a predictable force that acts on all matter in the universe, and is a function of both mass and distance. The theory states that each particle of matter attracts every other particle (for instance, the particles of "Earth" and the particles of "you") with a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between them.

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