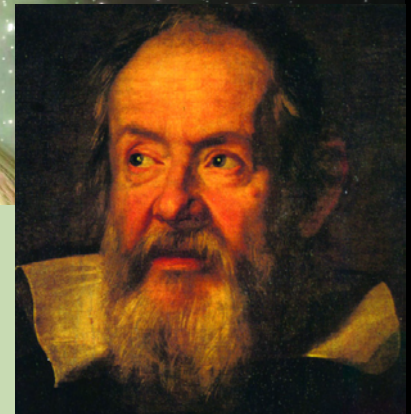


## SEEING THE WORLD

# THROUGH GALILEO'S EYES

Galileo Galilei was born to a noble Florentine family in 1564. At his father's urging, he began studying medicine at the University of Pisa until a lecture on geometry changed his life, prompting him to begin a rigorous study of mathematics. He soon became the head of mathematics at Padua's University, and later earned lifetime tenure at the University of Florence. Galileo conducted many experiments at these universities that revolutionized the world of science.



A portrait of Galileo Galilei by Justus Sustermans (1597-1681)

Galileo is considered to be one of the fathers of modern science for his groundbreaking discoveries in the fields of physics and astronomy and for his struggle to overthrow the false, yet prevalent, scientific notions of his time. His improvements to the design of the telescope allowed for the most detailed examination of the heavens to date and changed the way we understand nature. But how, over 400 years ago, did Galileo make such groundbreaking discoveries? Take a look at some of his landmark experiments, a few of which you'll even see on stage in *Two Men of Florence*.

### Falling Objects

**What he did:** Although little evidence exists that Galileo actually performed this experiment, it is considered to be one of his most famous. Accounts say in 1604, Galileo climbed to the top of the Leaning Tower of Pisa with a 10-pound cannonball and a one-pound cannonball and dropped them to see which would hit the ground first.



**So what?** Even if the famous Pisa experiment never took place, Galileo's other experiments were enough to prove both objects would hit the ground at roughly the same time. This showed that gravity acts upon all objects with the same force, regardless of an object's mass. A century later, this principal fueled Sir Isaac Newton to develop the laws of motion.

### Projectiles

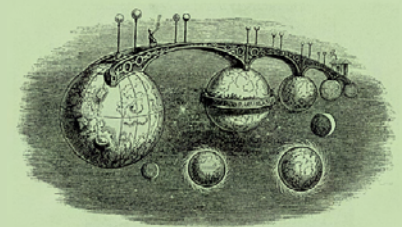
**What he did:** In a similar experiment, Galileo dropped two balls of equal weight from a tower. One ball was just released, the other thrown from the tower, parallel to the ground.

**So what?** Contrary to what people expected, both balls hit the ground at the same time. But how could that be, since one ball was clearly moving with greater speed and force? The answer is: in addition to the force of gravity, acceleration (velocity over time) is constant. Therefore the thrown ball fell faster, but traveled farther, ending its fall simultaneously to the other ball.

### Thought Experiment with a Horse

**What he did:** A rider on a stationary horse drops an object to the ground. Then, a rider on a galloping horse drops the same object. In both cases, the object falls directly beside the horse. So convinced of this experiment's result, Galileo never actually performed it.

**So what?** This indicates that the object moves in the same direction and at the same speed as the moving horse. In actuality, the ball is falling from the moving horse in an arc, not straight down, much like the ball thrown in the projectile experiment. The constant acceleration rate ensures that the object falls beside the horse, despite its forward motion. Galileo likened the horse to the moving Earth and the object to everything on it, thus validating the possibility of orbital motion.



— Chris Carcione