



Flipping Physics Lecture Notes:

Dropping a Bucket of Water Demonstration

Water flows out of a bucket with two holes in it which is filled with water because the force of gravity pulls the water down, but you are holding the bucket up. The bucket pushes up on the water to hold the water up, but where the two holes are, the bucket does not hold the water. So the force of gravity pulls the water out of the bucket.

Water stops flowing out of the bucket after you drop it because when you drop the bucket, the force of gravity is still acting on the bucket and the water; however, you are no longer holding the bucket up. So the only force acting on the bucket and water is the force of gravity. The whole thing enters free fall and accelerates downward at 9.81 meters per second squared. In other words, the bucket no longer gets in the way of the water and the water and bucket both fall straight down.

Another way of looking at it is to think about the bottom of the bucket relative to the water. The bottom of the bucket is always accelerating downward at the same rate as the water, so the bottom of the bucket is basically always getting out of the way of the water because they are both in free fall. Therefore the water is never able to catch up to the holes and the water falls straight down.

A reason the water does not immediately stop flowing out of the holes when the bucket is dropped is that before Mr. P. drops the bucket, some of the water inside the bucket is flowing toward the holes. When he drops the bucket, the water stops being pushed out of the holes by the force of gravity, however, the inertia of the water which was already flowing towards the holes keeps the water flowing towards and out of the holes. So the inertia of the water, or the tendency of the water to try to maintain a constant velocity, causes it to take about half a second for water to stop flowing out of the holes of the bucket.

