Danger! Falling Objects: Crash Course Kids #32.1

Physical Science
https://youtube.com/watch?v=dxcx35x5L9Y
https://nerdfighteria.info/v/dxcx35x5L9Y

Sabrina: I don't care who you are. If you live anywhere near this planet, then you're no stranger to gravity, the force that affects every object on earth and beyond.

Because of gravity, whether you're an astronauts on the International Space Station or an ordinary clumsily earthbound human who happens to drop her books a lot, all things caught in our planet's gravity will, in some way, have the potential to fall to Earth.

But objects fall differently, right? Like when I knock a piece of paper off my desk, it takes a lot longer to fall to the ground than if I knock a book of my desk. So what's up with that? Why do things seem to fall at different speed on Earth?

Well, we already know that all objects have mass. They have a certain amount of matter in them and when gravity pulls on an object, it gives the object weight.

Now a long time ago, people used to think that heavier things fell faster than lighter things because that's what our senses told us. Now it certainly looks like the book falls faster than the piece of paper and why would we expect anything else? That would be like dropping a hammer and a feather and expecting them to hit the ground at the same time, except the thing I just said about the hammer and the feather, someone did actually try that and they did hit the ground at the same time. It just didn't happen on Earth.

True story: when astronaut Dave Scott was on the moon in 1971, he did an experiment where he dropped a falcon feather and a hammer from the same height and they hit the ground at the same time.

Now how can that be if you drop a hammer and a feather on earth, the feather would take a lot longer to reach the ground. So what does the earth have that the moon doesn't?

For one thing an atmosphere. The gases that make up Earth's atmosphere push against objects as they fall and the push of the air against a falling object causes friction. We call that friction air resistance.

So on Earth, the feather's flat fluffy shape makes it run into more air resistance than the hammer does. This makes it fall more slowly than the hammer but since the moon has almost no atmosphere, there is almost no air resistance so the two objects fell at the same rate.

So it seem to me it's the resistance of air pushing against objects that really affects how fast objects fall.

And that means it's experiment time. But you don't have to go to the moon to do this so don't pack your bags or anything.

All you need are two pieces of paper that are the same size. Crumple one of the pieces into a tight ball and leave the other one smooth and flat. Now drop each piece of paper from the same height, let's say a meter, and then write down in a table how long it takes each piece to reach the ground.

We'll see it takes the flat paper longer than the crumpled paper to hit the floor. This is evidence that an object's shape affects how fast it seems to fall to Earth because the two pieces of paper are exactly the same. They have the same mass but air resistance makes the flat paper seem to fall more slowly than the crumpled paper.

So, based on the result of our experiment, we can say, at least here on Earth, objects appear to fall at different rates, not because they have different masses or weights but because of air resistance. The force that the Earth's atmosphere has on objects as they fall and, hey, if you don't believe me, tell you what. Next time you go to the moon take a feather and a hammer with you and try it for yourself.