Over (to) The Moon: Crash Course Kids #13.2

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

===== Introduction =====

(intro plays)

You know how many people have actually been on the moon? Twelve. That's all. But one day, we may go back there. We have a lot more to learn about the moon and space in general. So some day, maybe in your lifetime, we'll send astronauts out there to study and explore. Do *you* want to be one of them?

If you do, let me give you some helpful tips about a little thing called gravity, because you're going to need to know all about what gravity is and how it works if you're going to escape the pull of Earth and fly to the moon.

Now, you already know that astronauts can leave the Earth, but it takes a lot of effort to boldly go where few have gone before. But once astronauts reach the speed called escape velocity, they're able to overcome the force of Earth's gravity and get into orbit around our planet *or* head on over to the moon. So, this brings up an interesting question: what happens when an object gets away from Earth's gravity, but close to the moon's gravity?

===== Big Question =====

(big question music)

You already know that gravity is the force that keeps us from flying off the surface of the Earth. And you know that gravity pulls things, not down, but towards the Earth's center. You also know that gravity exists between any objects that have mass, and the greater an object's mass is, the greater the effect of its gravity, or pull on other objects, is.

But there's something more. Remember Isaac Newton, the apple tree guy? He determined that the amount of gravitational force, or pull, between two objects also depends on how far apart they are. So the farther away something is from the Earth, the less it will feel the pull of Earth's gravity. And the closer it gets to the moon, the more it will feel the moon's gravity pulling on it.

Let's do a little pretending to see what happens to something when it moves closer to an object that has a really large mass, and therefore, a really strong pull of gravity.

===== Investigation =====

(investigation music)

If you've ever made a wish on a shooting star, you've seen the effect of Earth's gravity pulling on an object. Shooting stars, which are actually meteors, occur when pieces of rock break off from a passing comet or asteroid and get too close to the Earth.

For example, say this globe represents the Earth, and the marble represents a piece of space rock that's flying by. You can see that there's a huge difference in size between the two objects. And, if we were to put them on a scale, we'd see that there's a big difference in their mass too. Our model Earth has a larger mass.

If the space rock is far away from the Earth, then it can go on its merry way, since it won't be affected by the Earth's gravity. *But* if it gets too close, then it and the Earth engage in a bit of tug-of-war, since both have gravity that pull on one another.

It's not much of a fight though. The more massive Earth has a much larger gravitational pull, so the rock gets caught in Earth's gravity, and most of the time, it gives us a brilliant streak of light we call a meteor.

But what does this mean for our space travelers? Well when an astronaut ship takes off for the moon and moves away from the Earth, the farther away it goes, the less it feels the pull of Earth's gravity. And, as it gets closer to the moon, the spaceship begins to feel the tug of the *moon's* gravity more.

So even though the moon has a smaller mass than the Earth, and has less of a pull on the ship than the Earth does... once the ship gets closer to the moon than the Earth, the moon's gravity pulls the ship toward it. And then the astronauts can make a safe landing!

===== Conclusion =====

(conclusion music)

So we can make the argument that two things affect the pull of gravity: First, the size of the object. Objects with a bigger mass have a stronger pull of gravity. And second, the distance between objects. The farther apart objects are, the weaker the pull of gravity between them, and the closer together they are, the stronger the pull of gravity.

All of this means that when the day comes that you're flying a spaceship to the moon, you just have to escape *Earth's* gravity, and then get close enough to the moon to enter its gravity. Remember that when you're grown up, and you're welcome.

If you wanna thank me, you could just name a crater or something after me when you get there.

===== Credits =====

(credits music)