PROFESSOR: Imagine holding a party and then sending out the invitations after the party. Wait a minute. That doesn't make any sense. Are my friends going to be able to time travel back just to attend my party?

In 2009, Stephen Hawking actually conducted such an experiment to disprove time travel. What exactly is time travel? And how does it work? It actually has a lot to do with-- speed.

A lot of what we know about time traveling actually comes from Einstein's theories of special and general relativity. We are actually time traveling right now, but not in the manner that sci-fi films have depicted them. We are, in fact, time traveling at a pace of one hour per hour. In other words, every hour I experience, the world around me experiences a singular hour, too. Now, it may sound simple and trivial, but stay with me. This is where it gets interesting.

Now, the last part of Einstein's theory of special relativity is actually a phenomenon known as time dilation. Effectively this means that the faster you travel, the slower time passes around you. It potentially means that I could travel at, maybe, more than one hour per hour. This phenomenon, however, is only noticeable at really, really high speeds, speeds near the speed of light. This rocket here? Not even close.

Say I do have a spaceship now that travels at 90% of the speed of light, and I have a pair of newborn twins. I bring one of them with me on this journey for 10 years. When I return, one of them will have turned 23 years old while the one with me will have only turned 10 years old. While we have experience 10 years on a spaceship, 23 years have actually passed on earth. This amount of time actually increases exponentially as we get closer to the speed of light.

So we could potentially travel forward in time. But what about backwards in time? That's a whole other issue. Now, remember our previous graph. The time that it took [INAUDIBLE] to the speed of light. [INAUDIBLE] may be the secret to time travel lies on the other side of the line. In other words, we may have to travel faster than the speed of light just to be able to travel back in time.

Now, when you do travel at speeds near the speed of light, something called relativistic mass comes into play. In other words, as your speed goes up, your mass increases. As your mass increases, you require more energy to move the same object. This might mean that you need an infinite amount of energy just to move an object beyond the speed of light. However, the

more energy you put into an object, the more likely you are to increase its mass rather than to increase its speed. Therefore, to get an object past the speed of light is quite impossible at this point in time.

So why are we still so obsessed with time travel? Time travel does come with its own set of problems. Take, for example, my party before. If I were to send out my invitations after the party, my friends would have come back in time to attend it, and if they did come back in time to attend it, I wouldn't have time to send out my invitations. And if I didn't send out my invitations, they wouldn't be at my party.

It doesn't make any sense at all that they are both at my party and not at my party. This is what we call the grandfather paradox. It's one of three time travel theories that we currently have. So it seems that we may not be able to time travel yet, based on what physics tells us, at least.

For now, if you are planning a party, be sure to send out the invites first. Your friends can't time travel, yet.