Time dilation

Time dilation is an example of a relativistic effect that follows from Einstein's special theory of relativity. It says that when an object is in motion, for example a train, time passes more slowly inside the train than outside. More specifically, if you compare two clocks, put one clock on a train going around the world, the clock on the train will have run less than the clock outside. This effect is very small for normal situations, but for satellites used for GPS localization it is an important factor in predicting the correct time. To understand time dilation, it is important to know that the speed of light is constant regardless of which reference system you measure it in. If you send a flash of light between the ground and the ceiling of the train back and forth during the train journey, it will appear to the train that the light has gone up and down X number of times. Whereas for the person standing outside the train, the flash of light will also have moved diagonally and thus "travelled further". Since the speed of light must be the same for both observers, but the distance the light has traveled is different, the only explanation is that the time that has passed for the observers is different.