POSTULATES OF SPECIAL RELATIVITY

1. Principle of Relativity – All the laws of physics are the same in all inertial reference frames.
2. The speed of light in a vacuum is the same (3.0×10^8 m/s) in all inertial reference frames regardless of the motion of the observer or source.

Consequences of Special Relativity

a) There is no such thing as absolute length or absolute time in relativity.
b) A time interval (or length) measurement depends on the reference frame in which it is made.

Consider the following thought experiment devised by Einstein:

A trainbox moves is moving with constant velocity when two lightning bolts strike the end of the trainbox leaving marks on the boxcar and ground. Two observers are located midway between the ends of trainbox. One at O' and another fixed on the ground at O.

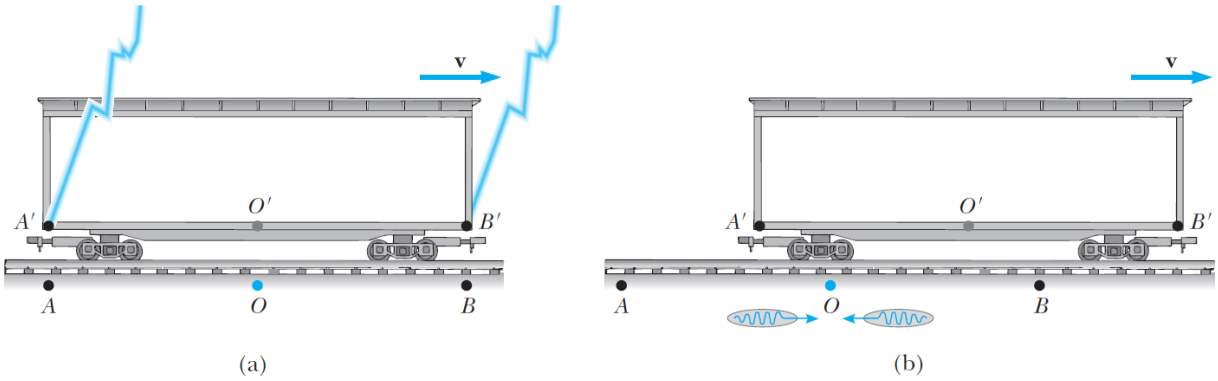

Figure 1.9 Two lightning bolts strike the ends of a moving boxcar. (a) The events appear to be simultaneous to the stationary observer at *O*, who is midway between *A* and *B*. (b) The events do not appear to be simultaneous to the observer at *O′*, who claims that the front of the train is struck *before* the rear.

a) Relative to observer at O the two light signals reach him at the same time. Since the light signals traveled at the same speed over equal distances, he concludes that the two events at A and B occurred simultaneous.

b) Relative to observer at O' the light signals reach him at different times. Since he is at the midpoint he observes that the light signals must take the same time to reach him because both light signals travel at the same speed over equal distances. Since the light signals do not reach him at the same time, he concludes that they were **NOT** simultaneous.

IN GERERAL, TWO EVENTS THAT ARE SIMULTANEOUNS IN ONE INERTIAL REFERENCE FRAME ARE NOT SIMULTANEOUS IN A SECOND INERTIAL RF MOVING AT CONSTANT VELOCITY RELATIVE TO THE FIRST!!!