Answer on Question #58094-Physics – Mechanics | Relativity

1 A stationary observer at a railway station sees a passenger in a railway coach that is in motion at constant speed in a straight and horizontal track. Which of the following best describes the frames of reference from which both the observer and the passenger describe each other's motion?

inertial

uniform

constant

relativistic

Solution

Both the observer and the passenger move with constant velocity relative each other. Thus, the frames of reference from which both the observer and the passenger describe each other's motion are **inertial** frames.

Answer: inertial.

2 Consider the two observers O and O′ at the origins of the frames of reference S and S′ respectively, which are in relative motion at constant velocity v along the x-axis as illustrated in figure TMA 1_Fig1. Suppose the origins O and O′ as well as the axes of the coordinates of these frames are coincident at an initial time t=t′=0. The two observers are equipped with measuring instruments to determine the coordinates of the event at P. Measurements made in the S frame are related to those made in the S′ by the following EXCEPT

x′=x−vt

y′=y

t′=t

z′=z+vt

Solution

Measurements made in the S frame are related to those made in the S′ by the following EXCEPT z′=z+vt. It is because the relative motion at constant velocity v along only the x-axis. Thus,

$$z' = z$$

Answer: z′=z+vt.

3 The joule (J) is the same as

kgm−1s−2

kgm−2s−1

kgm2s−2

kgms−1

Solution

The joule (J) is the unit of work:

$$J = [W] = [F][l] = [ma][l] = [m][a][l] = kg \cdot \frac{m}{s^2} \cdot m = kgm^2s^{-2}$$

Answer: kgm2s−2.