Answer on Question #59700- Physics – Mechanics | Relativity

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.