

Work Depends on Frame of Reference.

With change of frame of reference (inertial) force does not change while displacement may change. So the work done by a force will be different in different frames.

Examples : (1) If a porter with a suitcase on his head moves up a staircase, work done by the upward lifting force relative to him will be zero (as displacement relative to him is zero) while relative to a person on the ground will be mgh .

(2) If a person is pushing a box inside a moving train, the work done in the frame of train will $\vec{F} \cdot \vec{s}$ while in the frame of earth will be $\vec{F} \cdot (\vec{s} + \vec{s}_0)$ where \vec{s}_0 is the displacement of the train relative to the ground.

