

2. The solution to this problem is similar to the solution to the previous problem with the difference that the ball's motion with respect to the train is in the opposite direction of the train's motion with respect to the Earth. Thus these two velocities will have opposite signs.

$$\mathbf{v}_{be} = \mathbf{v}_{bt} + \mathbf{v}_{te}$$

$$v_{be} = -5 \text{ m/s} + 30 \text{ m/s} = 25 \text{ m/s}$$

We chose the direction in which the train was moving as the positive direction, so we used a negative sign for the velocity of the ball with respect to the train. The positive sign on the final answer indicates that the ball moves in the same direction as the train with respect to the Earth at a speed of 25 m / s.