

**Task:**

Two trains 210 m and 240 m long run on parallel tracks in the same direction. Speed of the first train is 90 miles/h and the second train crosses the first train in 36 s. Find the time taken by them to cross in the opposite direction.

**Solution:****Find:**

$$t_2$$

**Given:**

$$s_1 - s_2 = 30 \text{ m} = 0.019 \text{ miles}$$

$$v_1 = \text{const} = 90 \frac{\text{miles}}{\text{hour}}$$

$$v_2 = \text{const}$$

$$t = 36 \text{ s} = 0.01 \text{ hour}$$

$$s_1 = v_1 \cdot t = 0.9 \text{ miles}$$

$$s_2 = v_2 \cdot t$$

$$s_2 = s_1 - 0.019 \text{ miles}$$

$$v_2 = \frac{s_2}{t} = \frac{s_1 - 0.019 \text{ miles}}{t} = 88.136 \frac{\text{miles}}{\text{hour}}$$

Since we don't know the initial distance between the trains when they move in the opposite direction (suppose that the initial distance between them in the opposite direction equals

$$s_1 - s_2 = 30 \text{ m} = 0.019 \text{ miles});$$

$$v_1 \cdot t_2 + v_2 \cdot t_2 = 0.019 \text{ miles}$$

$$t_2 = \frac{0.019 \text{ miles}}{v_1 + v_2} = 0.384 \text{ s}$$

**Answer:**

$$t_2 = 0.384 \text{ s}$$