Answer on Question#40676 – Physics - Mechanics

A body starts from rest with an acceleration a1. After 2 s another body B starts from rest with an acceleration a2. If they travel equal distances in 5 s after the start of body A, the ratio of a1:a2 = ?

Solution:

$t = 2s -$ time after body B starts moving;

$T = 5s -$ time of travel for each body;

Equation of motion for the first body:

$$S = \frac{a_1 T^2}{2}$$

$$a_1 = \frac{2S}{T^2} \qquad (1)$$

Equation of motion for the second body:

$$S = \frac{a_2 (T - t)^2}{2}$$

$$a_2 = \frac{2S}{(T - t)^2} \qquad (2)$$

$(1) \div (2)$:

$$\frac{a_1}{a_2} = \frac{\frac{2S}{T^2}}{\frac{2S}{(T - t)^2}} = \frac{2S}{T^2} \cdot \frac{(T - t)^2}{2S} = \frac{(T - t)^2}{T^2} = \frac{(5s - 2s)^2}{(5s)^2} = 0.36$$

Answer: ratio of a1:a2 is equal to 0.36.