Answer on Question #70115-Physics-Mechanics | Relativity
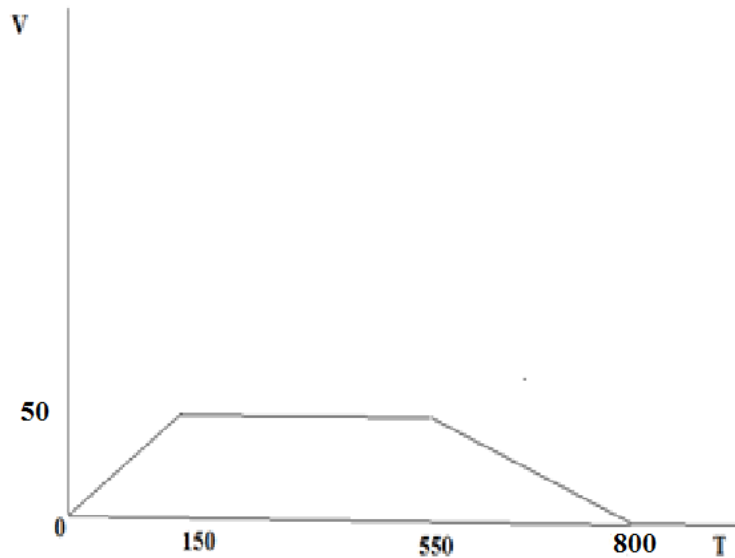
A train starts from, a station, accelerates uniformly from rest and reaches 50m/s in 150s. It travels at this speed for another 400s and then slowly steadily to rest in another 250s. Use the graph to find out, the acceleration, the retardation, the total distance travelled, the average speed over the whole journey

Solution

The acceleration is

$$a = \frac{50 - 0}{150 - 0} = \frac{1}{3} \approx 0.33 \frac{m}{s^2}.$$

The retardation is

$$a' = \frac{50 - 0}{800 - 550} = \frac{1}{5} = 0.2 \frac{m}{s^2}.$$

The total distance travelled is equal to the area enclosed:

$$D = \frac{1}{2}(50)(800 + 400) = 30000\ m.$$

The average speed over the whole journey is

$$V = \frac{D}{T} = \frac{30000}{800} = 37.5 \frac{m}{s}.$$