

Question#20344

A boy starts from rest and accelerates at 3 m/s^2 , for four seconds. Its velocity remains constant at the maximum value so reached for seven seconds. and it finally comes to rest with uniform retardation after another five seconds. What is the distance moved during each stage of the motion?

Solution:

Let:

$$a = 3 \text{ m/s}^2$$

$$t_1 = 4 \text{ s}$$

$$t_2 = 7 \text{ s}$$

$$t_3 = 5 \text{ s}$$

$$S_1-?, S_2-?, S_3-?$$

$$S_1 = \frac{1}{2} a t_1^2$$

$$S_2 = v t_2$$

Where v is the velocity after first four seconds

$$v = a t_1$$

$$S_2 = a t_1 t_2$$

$$S_3 = v t_3 - \frac{1}{2} a_1 t_3^2, \text{ where } a_1 \text{ - is the acceleration of retardation.}$$

$$a_1 = \frac{v}{t_3}$$

$$S_3 = v t_3 - \frac{1}{2} \frac{v}{t_3} t_3^2$$

$$S_3 = \frac{1}{2} a t_1 t_3$$

$$S_1 = \frac{1}{2} 3 * 4^2 = 24 \text{ m}$$

$$S_2 = 3 * 4 * 7 = 84 \text{ m}$$

$$S_3 = \frac{1}{2} 3 * 4 * 5 = 30 \text{ m}$$

Answer: 24 m, 84 m, 30 m.