A particle starts from rest at xi=0 and moves for 10 seconds with an acceleration of 2 cm/s^2 for the next 20 seconds the acceleration of the particle is -1 cm/s^2 what is the position of the particle at the end of the motion

Solution

At the first part of the way position of the particle is giving by formula

$$x_1(t) = x_{10} + v_{10}t + \frac{a_1 t^2}{2} = 0 + 0 * t + \frac{a_1 t^2}{2} = \frac{a_1 t^2}{2}.$$

A position of the particle after 10 seconds:

$$x_1(10) = \frac{2\frac{\text{cm}}{\text{s}^2} * (10s)^2}{2} = 100\ cm.$$

At the first part of the way position of the particle is giving by formula

$$x_2(t) = x_{20} + v_{20}t + \frac{a_2 t^2}{2}.$$

$$x_{20} = x_1(10) = 100\ cm, v_{20} = 2\frac{\text{cm}}{\text{s}^2} * 10s = 20\frac{cm}{s}.$$

The position of the particle at the end of the motion

$$x_2(20) = 100 + 20 * 20 + \frac{(-1) * 20^2}{2} = 300\ cm.$$

Answer: 300 *cm*.