

Recap: Lecture #2

Constant Acceleration

(Don't write this down! This is mostly review from the last lecture.)

$$(1) \quad \mathbf{v} = \mathbf{v}_0 + \mathbf{a} \mathbf{t}$$

$$(2) \quad \mathbf{x} = \mathbf{x}_0 + \mathbf{v}_0 \mathbf{t} + \frac{1}{2} \mathbf{a} \mathbf{t}^2$$

$$(3) \quad \mathbf{v}^2 = \mathbf{v}_0^2 + 2\mathbf{a} (\mathbf{x} - \mathbf{x}_0)$$

$$\mathbf{v}_2 = \mathbf{v}_1 + \mathbf{a} (\mathbf{t}_2 - \mathbf{t}_1)$$

$$\mathbf{v}_2 = \mathbf{v}_1 + \mathbf{a} \Delta \mathbf{t}$$

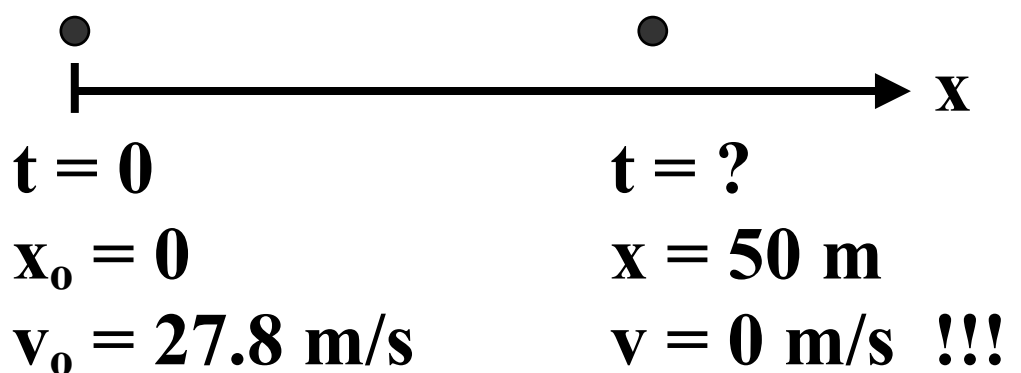
$$(1) \quad \mathbf{v}_2 = \mathbf{v}_1 + \mathbf{a} (\mathbf{t}_2 - \mathbf{t}_1)$$

$$(2) \quad \mathbf{x}_2 = \mathbf{x}_1 + \mathbf{v}_1 (\mathbf{t}_2 - \mathbf{t}_1) + \frac{1}{2} \mathbf{a} (\mathbf{t}_2 - \mathbf{t}_1)^2$$

$$(3) \quad \mathbf{v}_2^2 = \mathbf{v}_1^2 + 2\mathbf{a} (\mathbf{x}_2 - \mathbf{x}_1)$$

Example

A car, going 27.8 m/s brakes, coming to a halt in after traveling 50 m. What was its acceleration?



$$\mathbf{v}^2 - \mathbf{v}_0^2 = 2\mathbf{a} (\mathbf{x} - \mathbf{x}_0)$$

$$\mathbf{a} = \frac{1}{2} (\mathbf{v}^2 - \mathbf{v}_0^2) / (\mathbf{x} - \mathbf{x}_0) = -7.7 \text{ m/s}^2$$

Recap: Lecture #3

Lessons from Rocket problem.

One of the kinematic, constant acceleration equations we used was:


$$\mathbf{x}_2 = \mathbf{x}_1 + \mathbf{v}_1 (t_2 - t_1) + \frac{1}{2} \mathbf{a} (t_2 - t_1)^2$$

This relates quantities at time t_1 to quantities at time t_2 . It also assume an x-axis.

We used a y-axis, however.

Also, we needed to relate time t_3 to time t_2 .

So, we changed notation:

$$\mathbf{y}_3 = \mathbf{y}_2 + \mathbf{v}_2 (t_3 - t_2) + \frac{1}{2} \mathbf{a} (t_3 - t_2)^2$$


Message

All of our equations in this class are written in “generic” notation that might not be appropriate for your problem.

Pick a notation that helps you do your job. Then rewrite the equations using it. It doesn't take long and (believe it or not) helps avoid mistakes.