Acceleration + Displacement

Displacement => area under v-t graph

Constant Velocity: $v = \frac{\Delta d}{\Delta t}$

Constant Acceleration: $v_{ave} = \frac{\Delta d}{\Delta t}$ and $a = \frac{\Delta v}{\Delta t}$

$v_{ave} = \frac{v_1 + v_2}{2}$

$v_2 - v_1$

maybe useful

$$\Delta d = v_1 t + \frac{1}{2} a t^2$$

$$\Delta d = v_2 t - \frac{1}{2} a t^2$$

$$v_2^2 = v_1^2 + 2a\Delta d$$

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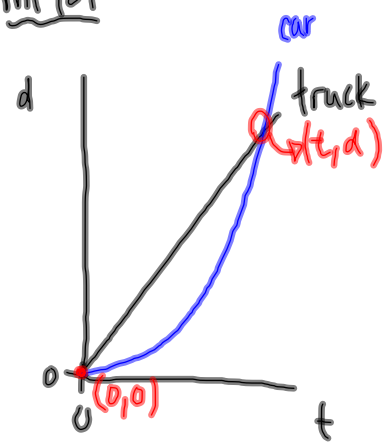

Truck - constant velocity

$v = \frac{\Delta d}{\Delta t}$

$v = \frac{d-0}{t-0}$

$v = \frac{d}{t}$

$22\text{m/s} = \frac{d}{t}$

$d = (22\text{m/s})t$

Car - constant acc.

$v_i = 0$

$a = 4.8\text{m/s}^2$

$\Delta d = ?$

$\Delta t = ?$

$\Delta d = v_i t + \frac{1}{2}a(\Delta t)^2$

$d = 0(t) + \frac{1}{2}(4.8\text{m/s}^2)t^2$

$d = (2.4\text{m/s}^2)t^2$

$(22\text{m/s})t = (2.4\text{m/s}^2)t^2$

$0 = 2.4t^2 - 22t$

$0 = t(2.4t - 22)$

$t = 0$ and $2.4t - 22 = 0$

$2.4t = 22$

$t = \frac{22\text{m/s}}{2.4\text{m/s}^2}$

$\frac{\text{m/s}}{\text{m/s}^2} = \frac{\text{m}}{\text{s}} \div \frac{\text{m}}{\text{s}^2}$

$= \frac{\text{m}}{\text{s}} \times \frac{\text{s}^2}{\text{m}}$

$= \text{s}$

$t = 9.2\text{s}$

It will take 9.2s for the car to catchup with the truc

Oct 13-12:04 PM

Example

$V_1 = 0$ V_2

An airplane must reach a velocity of 71 m/s for takeoff.

If the runway is 1.0 km long, what must the acceleration be?

Δd a

$V_1 = 0$

$V_2 = 71\ m/s$

$\Delta d = 1.0\ km = 1.0 \times 10^3\ m$

$a = ??$

$$V_2^2 = V_1^2 + 2a\Delta d$$

$$V_2^2 - V_1^2 = 2a\Delta d$$

$$a = \frac{(V_2^2 - V_1^2)}{(2\Delta d)}$$

$$a = \frac{(71\ m/s)^2 - 0^2}{2(1.0 \times 10^3\ m)}$$

$$a = 2.5\ m/s^2$$

To Do:

1. pp 89
2. Calculator Pad | kinematics
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