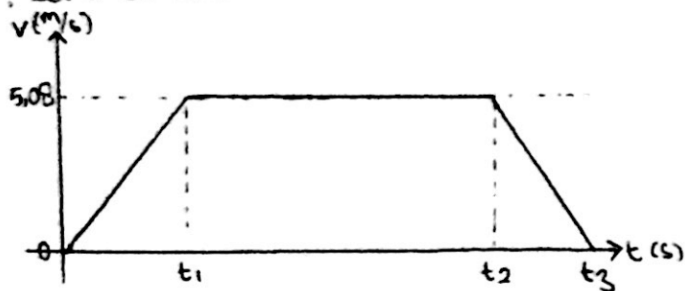


Yohandi - Assignment 1

29. Let's simulate the case with v-t graph



$$v_t = v_0 + at$$

$$\rightarrow v_1 = v_0 + a(t_1 - t_0)$$

$$5.08 = 0 + 1.22 \cdot t_1$$

$$\boxed{t_1 = 4.16 \text{ s}}$$

$$\rightarrow v_2 = v_2 - a(t_3 - t_2)$$

$$0 = 5.08 - 1.22(t_3 - t_2)$$

$$\boxed{t_3 - t_2 = 4.16 \text{ s}}$$

$$a. x_1 = x_0 + v_0 t_1 + \frac{1}{2} a t_1^2$$

$$x_1 = 0 + 0 \cdot 4.16 + \frac{1}{2} \cdot 1.22 \cdot (4.16)^2 \text{ m}$$

$$\boxed{x_1 = 10.6 \text{ m}}$$

$$b. x_3 = 190 \text{ m} = (x_3 - x_2) + (x_2 - x_1) + x_1,$$

since $x_3 - x_2 = x_1$

$$190 \text{ m} = 10.6 \text{ m} + (x_2 - x_1) + 10.6 \text{ m}$$

$$x_2 - x_1 = 168.8 \text{ m}$$

$$\boxed{t_2 - t_1 = \frac{x_2 - x_1}{v} = \frac{168.8 \text{ m}}{5.08 \text{ m/s}} = 33.2 \text{ s}}$$

$$t_3 = (t_3 - t_2) + (t_2 - t_1) + (t_1)$$

$$t_3 = (4.16 + 33.2 + 4.16) \text{ s}$$

$$\boxed{t_3 = 41.5 \text{ s} = t_{\text{total}}}$$

$$34. x_{r0} = 0 \text{ m}$$

$$x_{g0} = 220 \text{ m}$$

$$\text{when } v_r = 20 \text{ km/h} = \frac{20 \cdot 1000 \text{ m}}{3600 \text{ s}} = \frac{50}{9} \text{ m/s},$$

$$x_{\text{meet}} = 44.5 \text{ m}$$

$$t_{\text{meet}} = \frac{x_{\text{meet}}}{v_r} = \frac{44.5 \text{ m}}{\frac{50}{9} \text{ m/s}} = 8.01 \text{ s}$$

$$x_{\text{meet}} = x_{g0} + v_{g0} \cdot t_{\text{meet}} + \frac{1}{2} a_g \cdot t_{\text{meet}}^2$$

$$44.5 \text{ m} = (220 + v_{g0} \cdot 8.01 + \frac{1}{2} a_g \cdot 8.01^2) \text{ m}$$

$$(32.08 a_g + 8.01 v_{g0}) \text{ m} = -175.5 \text{ m} \dots (1)$$

$$\text{when } v_r = 40 \text{ km/h} = \frac{40 \cdot 1000 \text{ m}}{3600 \text{ s}} = \frac{100}{9} \text{ m/s},$$

$$x_{\text{meet}} = 77.9 \text{ m}$$

$$t_{\text{meet}} = \frac{x_{\text{meet}}}{v_r} = \frac{77.9 \text{ m}}{\frac{100}{9} \text{ m/s}} = 7.01 \text{ s}$$

$$x_{\text{meet}} = x_{g0} + v_{g0} \cdot t_{\text{meet}} + \frac{1}{2} a_g \cdot t_{\text{meet}}^2$$

$$77.9 \text{ m} = (220 + v_{g0} \cdot 7.01 + \frac{1}{2} a_g \cdot 7.01^2) \text{ m}$$

$$(24.57 a_g + 7.01 v_{g0}) \text{ m} = -142.1 \text{ m} \dots (2)$$

$$7.01(1) - 8.01(2)$$

$$\rightarrow 7.01 \cdot 32.08 a_g = -1230.255$$

$$8.01 \cdot 24.57 a_g = -1138.221$$

$$\boxed{a_g = -3.28 \text{ m/s}^2}$$

substitute a_g to (1)

$$\rightarrow (32.08 \cdot (-3.28) + 8.01 v_{g0}) = -175.5$$

$$\boxed{v_{g0} = -8.77 \text{ m/s}}$$

$$a. v = v_{g0} = -8.77 \text{ m/s}$$

$$b. a = a_g = -3.28 \text{ m/s}^2$$

$$47a. v_t^2 = v_0^2 + 2ax$$

$$v_t^2 = 14^2 + 2(-9.8)(-98)$$

$$\boxed{v_t = \pm 46.0 \text{ m/s} = -46.0 \text{ m/s} (\downarrow)}$$

$$b. v_t = v_0 + at$$

$$-46.0 = 14 - 9.8 \cdot t$$

$$\boxed{t = 6.1 \text{ s}}$$

$$64. x = x_0 + v_0 \cdot t + \frac{1}{2} a t^2$$

$$x_0 - x = -(v_0 \cdot t + \frac{1}{2} a t^2)$$

$$x_0 - x = -(-10 \cdot 3 - \frac{1}{2} \cdot 9.8 \cdot 3^2) \text{ m}$$

$$\boxed{x_0 - x = 74.1 \text{ m} = h}$$