

Name ITUA EHIAGHE

### Assignment

ITUA EHIAGHE

ENGI 234 (MECHANICS)

18/ENGO1/012

CHEMICAL ENGINEERING.

Answers.

1. Given that;

$$s_1 = 0.5t^3$$

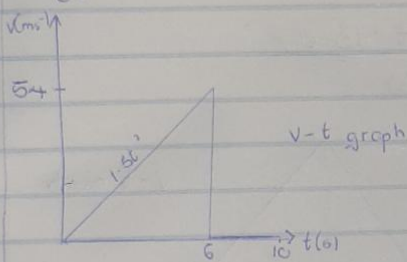
$$v = \frac{ds_1}{dt} = 1.5t^2$$

so at  $t = 6$

$$v = 1.5(6)^2 = 54 \text{ms}^{-1}$$

$$s_2 = 100\text{m}$$

$$v = \frac{ds_2}{dt} = 0; v = 0 \text{ms}^{-1}$$



2. Given that

$$v = -4t + 80$$

$$s = \int v dt$$

$$s = \int_0^{20} -4t + 80 dt$$

$$s = \left[ -2t^2 + 80t \right]_0^{20}$$

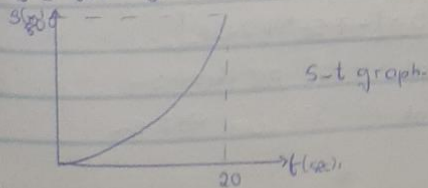
at  $t = 20\text{sec}$

$$s = (-2 \times 20^2) + (80 \times 20) = 800\text{m}$$

at  $t = 0\text{sec}$

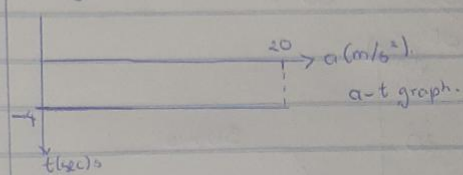
$$s = 0\text{m}$$

$$s = 800 - 0 = 800\text{m}$$



2. continue d.

$$a = \frac{dv}{dt} = -4 \text{m/s}^2$$



3) Given that,

$$v = 0.25s$$

$$a ds = v dv$$

$$a = \frac{v dv}{ds}$$

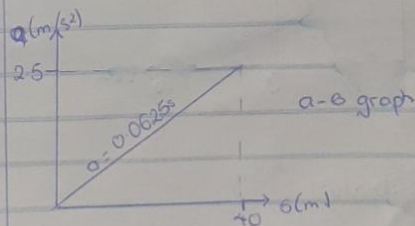
$$\frac{dv}{ds} = 0.25$$

$$a = (0.25s) \cdot 0.25$$

$$a = 0.0625s \quad \text{at } s = 40\text{m}$$

$$a = 0.0625 \times 40$$

$$a = 2.5 \text{m/s}^2$$



$$s_1 = 3t^2$$

$$\frac{ds_1}{dt} = v = 6t \text{ ms}^{-1}$$

$$\text{at } t = 5 \text{ secs}$$

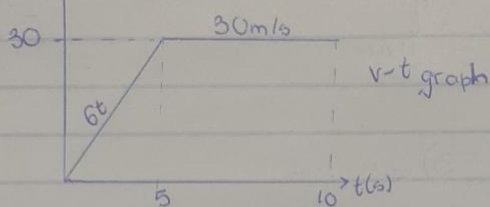
$$v_1 = 6 \times 5 = 30 \text{ ms}^{-1}$$

Then

$$s_2 = 30t - 7.5$$

$$\frac{ds_2}{dt} = v_2 = 30 \text{ ms}^{-1}$$

$v \text{ (ms}^{-1}\text{)}$



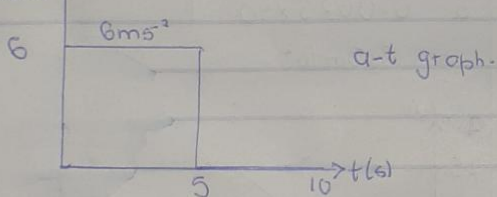
Then

$$a = \frac{dv}{dt} = 6 \text{ ms}^{-2}$$

Then

$$a_2 = \frac{dv}{dt} = 0 \text{ ms}^{-2}$$

$a \text{ (ms}^{-2}\text{)}$



$$5) a = 20 \text{ m/s}^2$$

$$\frac{dv}{dt} = a$$

$$\therefore v = \int a \, dt$$

$$v = \int_0^5 20 \, dt$$

$$v = [20t]_0^5$$

$$v = 100 \text{ m/s}$$

Then

moving on

$$v = \int a \, dt$$

$$v = \int_5^t -10 \, dt$$

but

$$v - 100 = [-10t]_5^t$$

$$v - 100 = -10t - (-50)$$

$$v - 100 = -10t + 50$$

$$v = (-10t + 150) \text{ m/s}$$

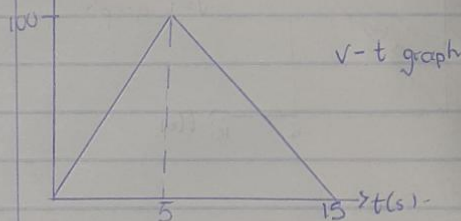
$$v = 0$$

$$0 = -10t + 150$$

$$\frac{+10t}{10} = \frac{150}{10}$$

$$t = 15 \text{ secs}$$

$v \text{ (m/s)}$



$$6) v = 30t$$

$$s = \int v \, dt$$

$$s = \int_0^5 30t \, dt$$

$$s = [15t^2]_0^5 \therefore s = 375 \text{ m (at } t = 5)$$

Then

$$v = -16t + 22.5$$

$$s = \int_5^{15} -16t + 22.5 \, dt$$

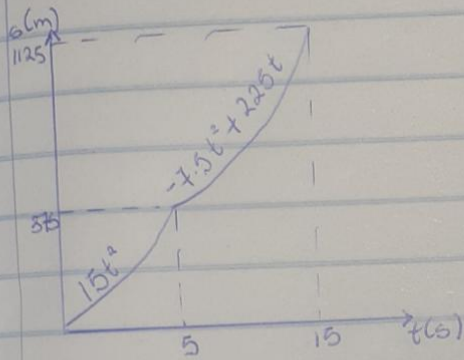
$$s = [-8t^2 + 22.5t]_5^{15}$$

$$\text{at } t = 15 \quad s = 1687.5 \text{ m}$$

$$\text{at } t = 5 \quad s = 937.5 \text{ m}$$

$$s_2 = (1687.5) - (937.5)$$

$$s_2 = 750\text{m}$$



Total distance covered.

$$s = s_1 + s_2$$

$$= 375 + 750$$

$$= 1125\text{m.}$$