

OBE CORNELIUS MBA

18/ENG06/049

MECHANICAL ENGINEERING

ENG 234

1.) For V-t graph

Since $V = ds/dt$, The V-t graph can be determined by differentiating the equation defining the s-t graph. Equation: $S = 0.5t^3$
 $s = 108$

$$V = \frac{ds}{dt} = 3 \times 0.5t^2 = 1.5t^2$$

To find t

$$108 = 0.5t^3$$

$$216 = t^3, t = 6s$$

Into Velocity equation $= 1.5 \times 6^2$
 $= 1.5 \times 36 = 54 \text{ m/s}$

For A-t graph

Since $a = \frac{dv}{dt}$, The a-t graph can be determined by differentiating the defining the V-t graph. Equation: $V = 1.5t^2$

$$V = 54 \text{ m/s}$$

$$a = 3t$$

$$a = 3 \times 6 = 18 \text{ m/s}^2$$

F12-10.)

For s-t graph

S-t graph can be determined by integrating the ~~V-t~~ graph equation defining the V-t graph. Equation: $V = -4t + 80$

$$s = \int -4t + 80$$

$$= \frac{-4t^2}{2} + 80t$$

$$= -2t^2 + 80t$$

Substituting the values of $t = 20s$

$$s = -2(20)^2 + 80(20)$$

$$s = -800 + 1600$$

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

For A-t graph

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

$$= -4 \text{ m/s}^2$$

F12-11.)

a-s graph can be determined by differentiating the equation defining the V-s graph

$$a = \frac{dv}{ds} \quad \text{Equation: } V = 0.25s$$

$$a = 0.25 \text{ m/s}^2$$

F12-12.

$$0 \leq t \leq 10s \quad \text{From } 75 \text{ m}$$

$$\text{Equation: } s = 30t - 75$$

F12-12.) $V = \frac{ds}{dt} = 30 \text{ m/s}$

~~For a-t~~ For a-t

$$a = \frac{dv}{dt} = 0$$

From 0-75m

$$\text{Equation: } s = 3t^2$$

$$V = \frac{ds}{dt} = 6t$$

$$t = 5, V = 30 \text{ m/s}$$

$$a = \frac{dv}{dt} = 6 \text{ m/s}^2$$

Fig-13

The v-t graph can be determined by Integrating the

q. Since $a = 20$

$$\therefore v = 20t, \text{ where } t = 5$$

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

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

$$\therefore v = -10t$$

where $t = t^2 - 5$

$$t^2 - t + 5$$

Fig-14

$s = \int v$. The s-t graph can be determined by Integrating the equation for the v-t graph

From Initial to 150 m/s

$$a = 30 \text{ m/s}^2 \Rightarrow v = 30t$$

$$s_1 = \int 30t = \frac{30t^2}{2} = 15t^2$$

From 150 m/s to Initial

$$v = -15t + 225$$

$$s_2 = \int -15t + \int 225$$

$$s_2 = -7.5t^2 + 225t$$

For Total distance

$$s_1 + s_2$$

$$15 \times 5^2 = s_1 = 375 \text{ m}$$

$$-7.5 \times 10^2 + 2250$$

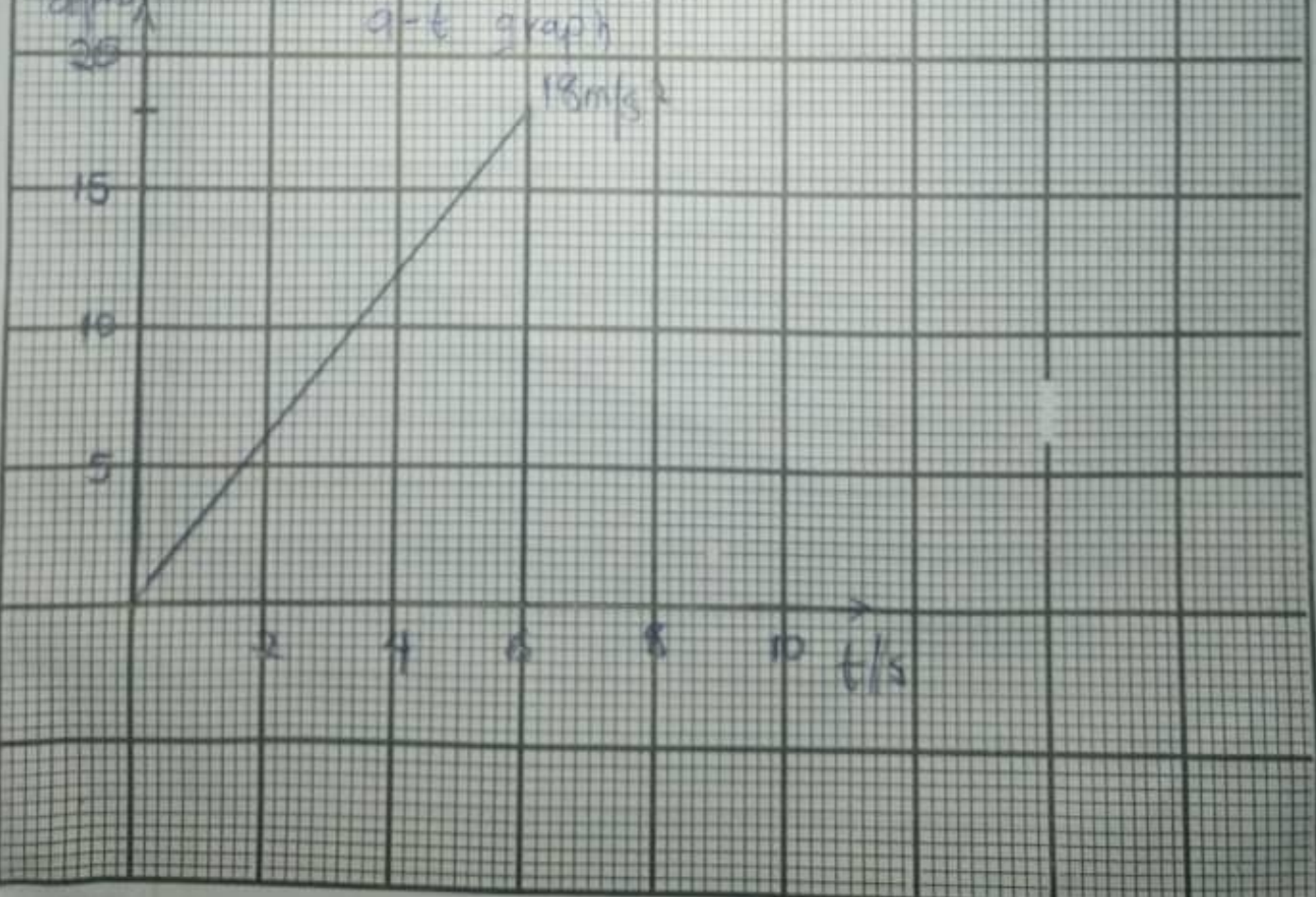
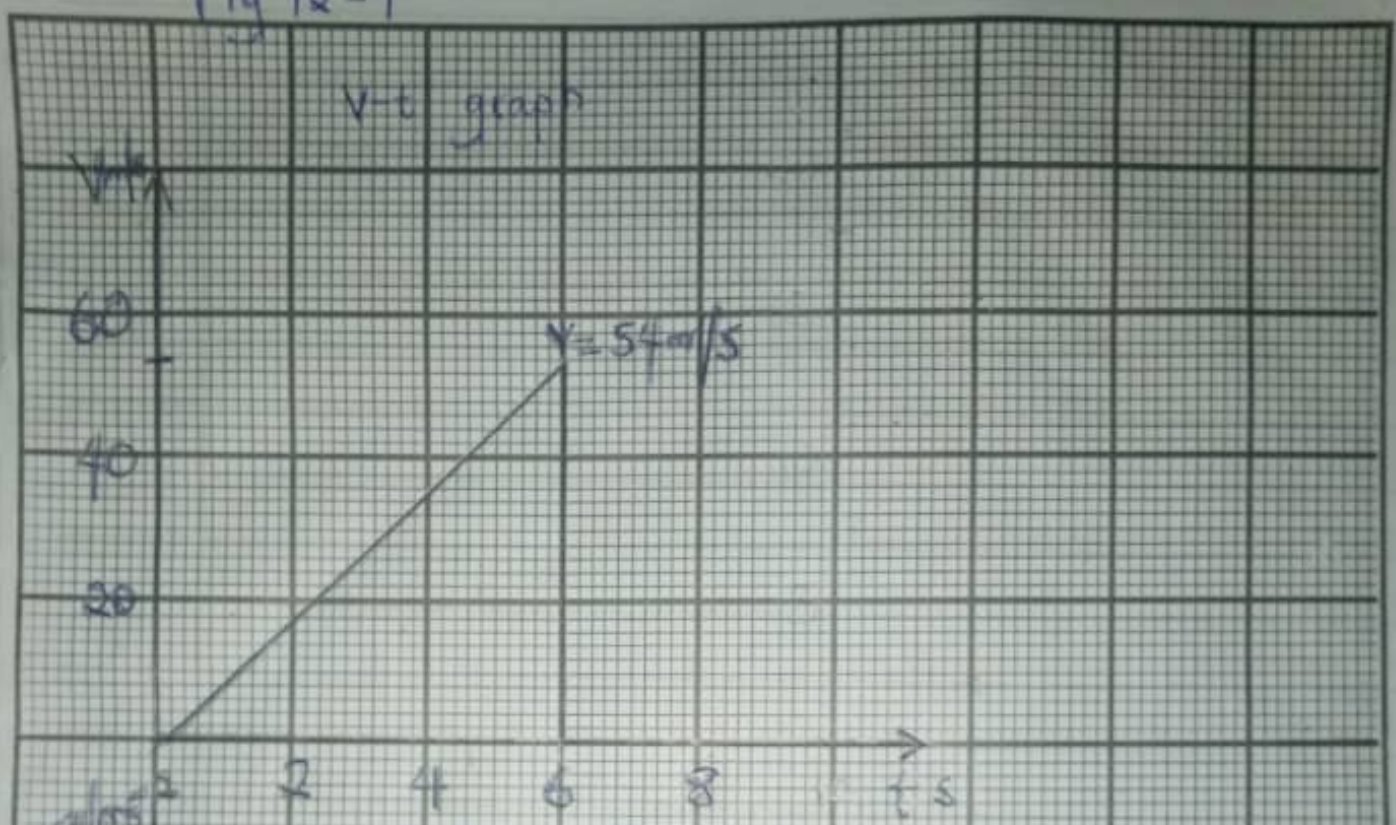
$$-750 + 2250$$

$$= 1500 \text{ m}$$

$$s_1 + s_2 = 375 + 1500$$

$$\text{Total distance} = 1875 \text{ m}$$

Fig 12-9



2.) For
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 $s = 10$
 $V = \frac{ds}{dt}$
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 Fig-10
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Fig-10

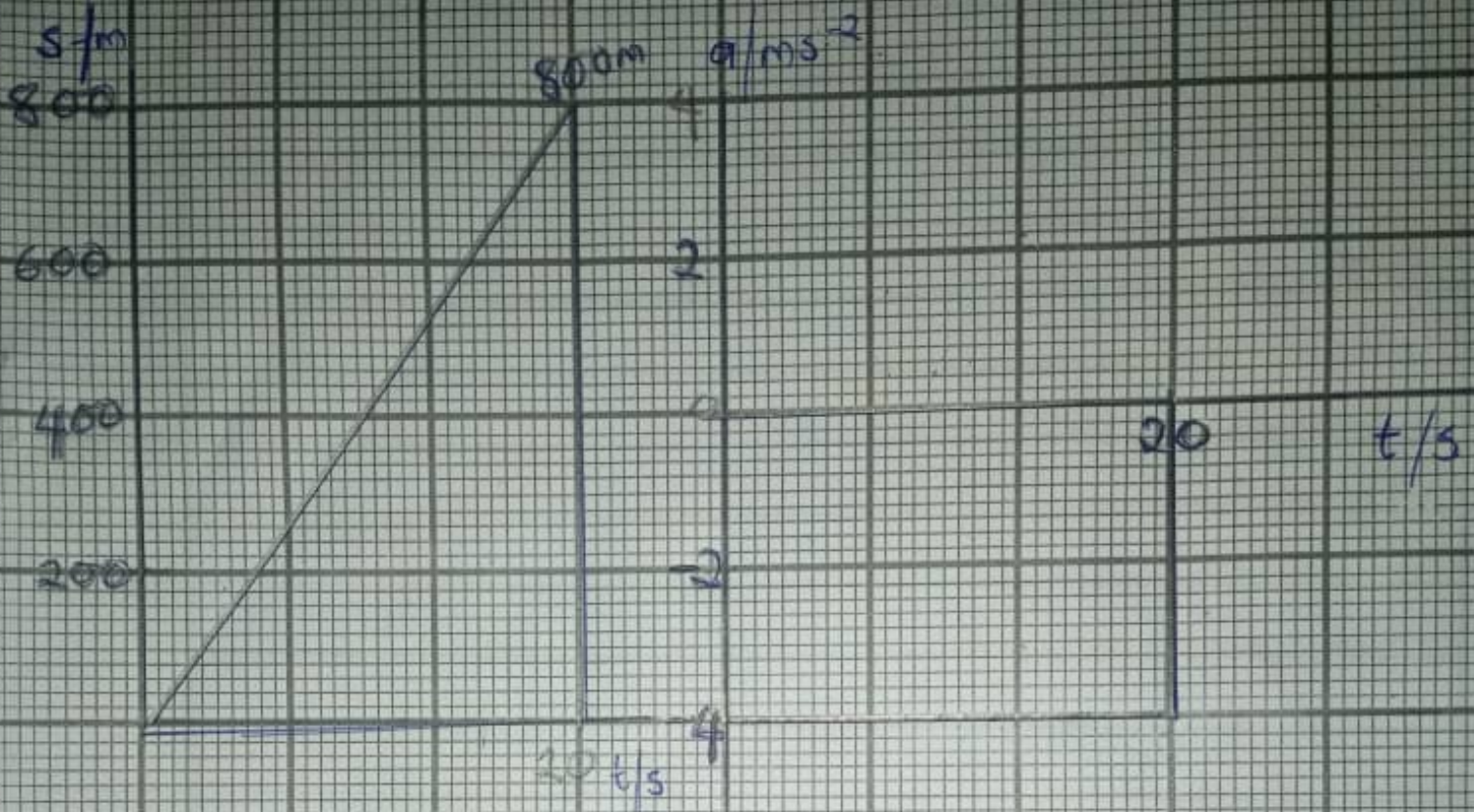


Fig-11

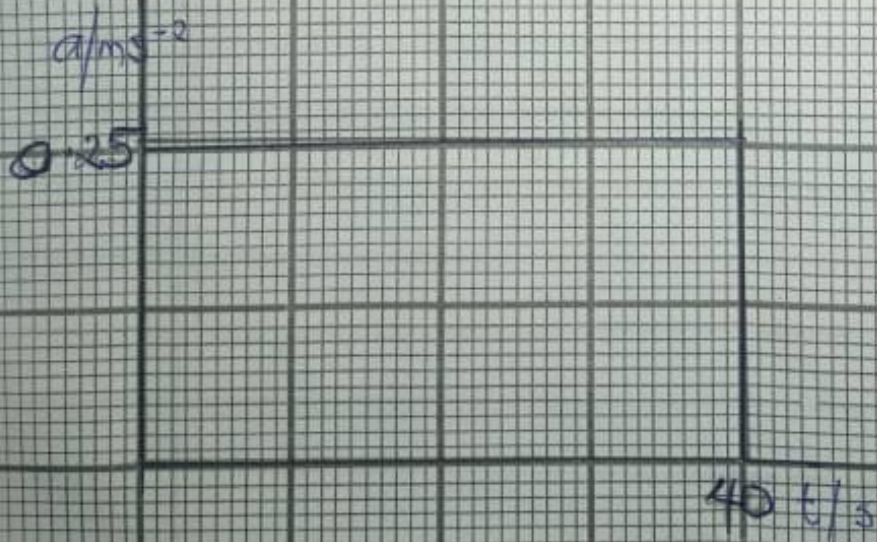


FIG 12-12

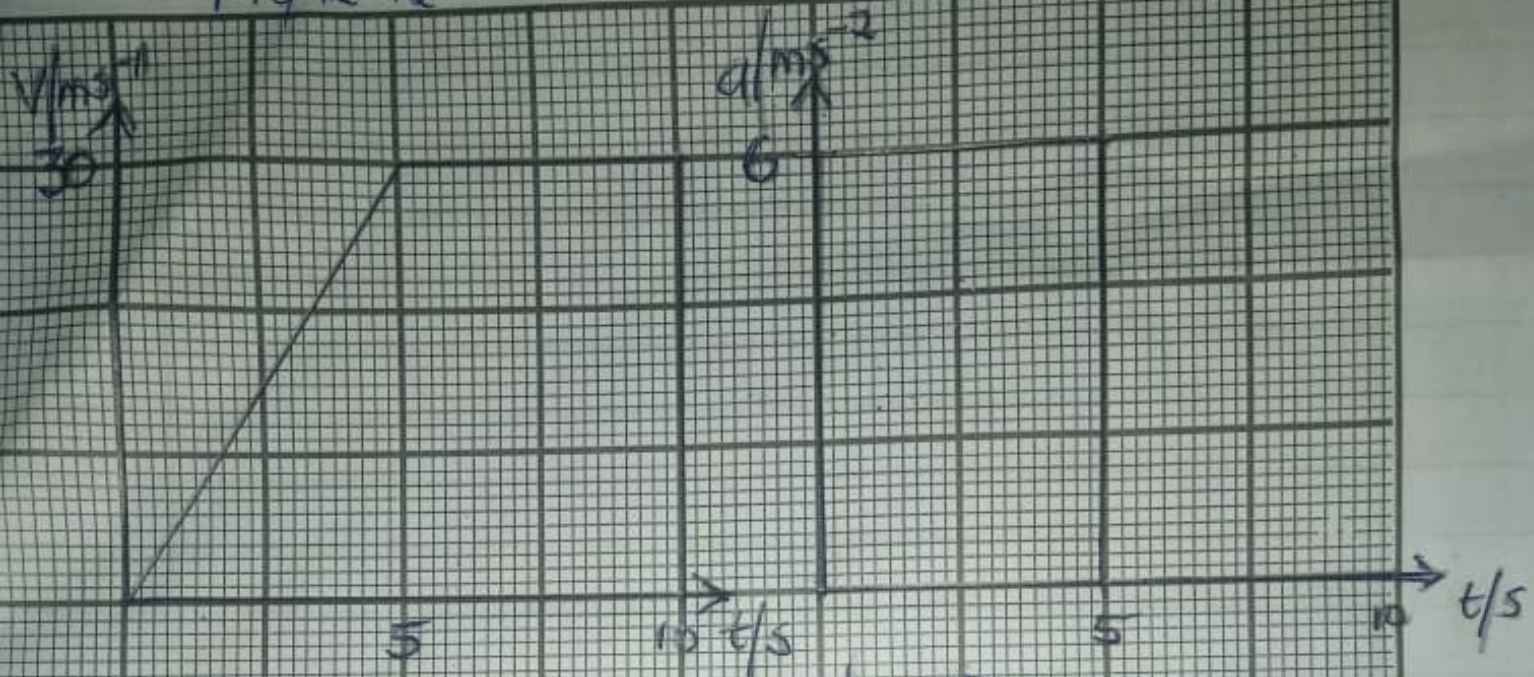


FIG 12-13

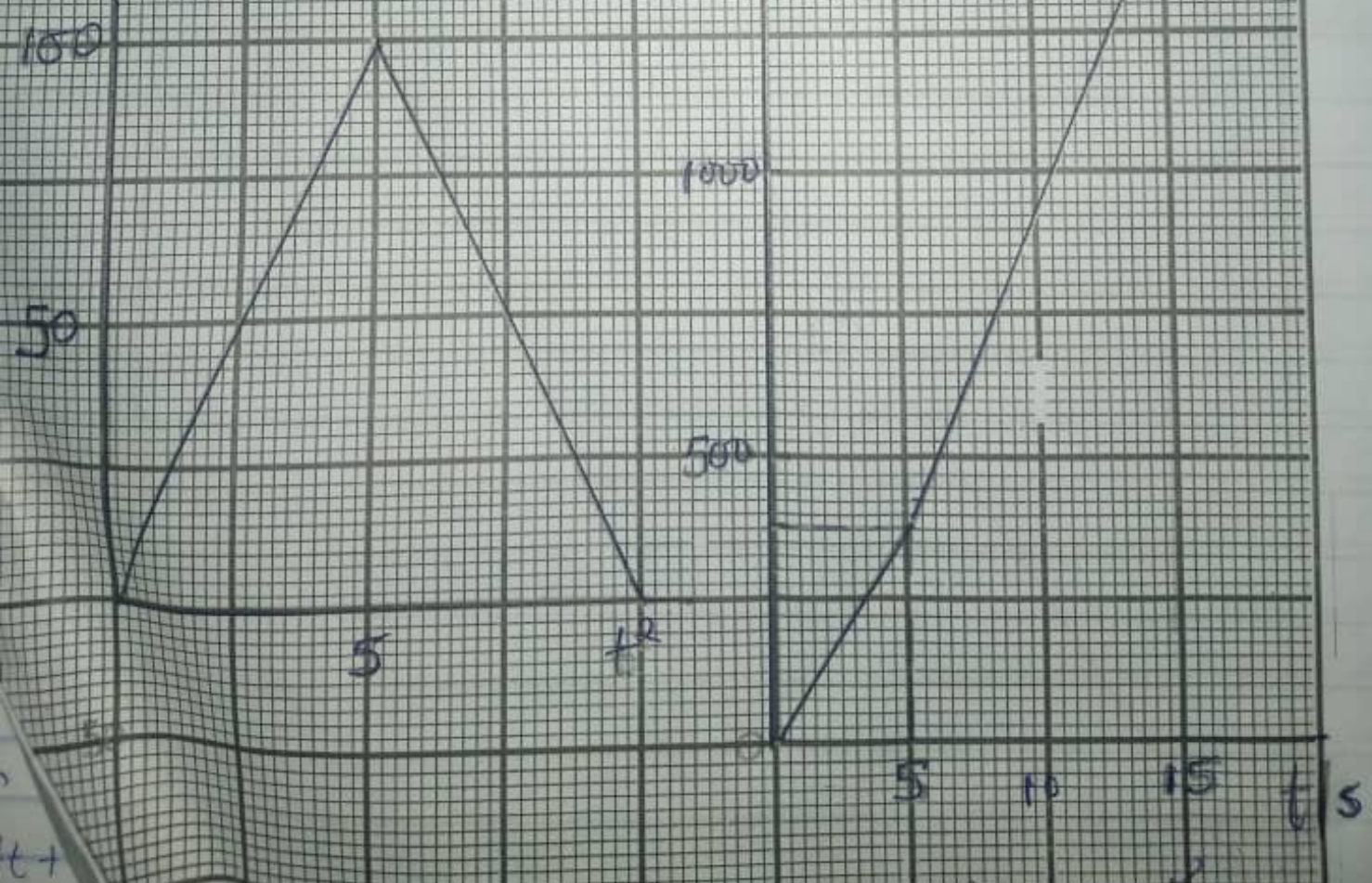


FIG 12-14