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18/ENG02/1041
Computer Engineering
ENG 234 Assignment

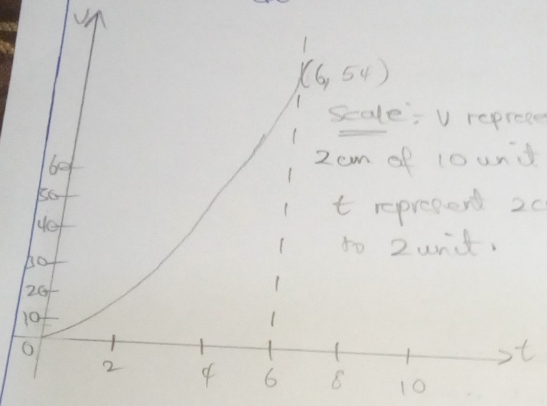
E12.9

when $s = 0.5t^2$

$$v = \frac{ds}{dt} = 1.5t^2 \, m/s^2$$

when $s = 108$

$$v = \frac{ds}{dt} = 0$$



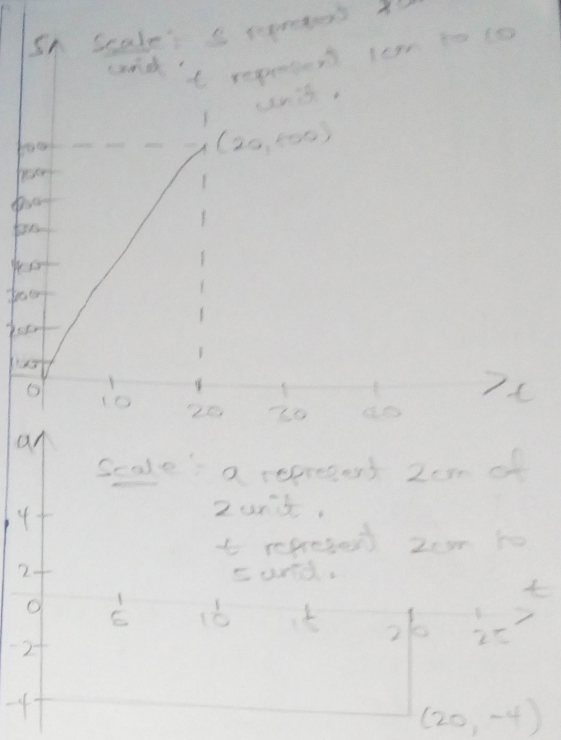
E12.10

$$v = -4t + 80$$

$$s = \int (-4t + 80)\, dt$$

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

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



E12.11

$$v = 0.25s$$

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

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

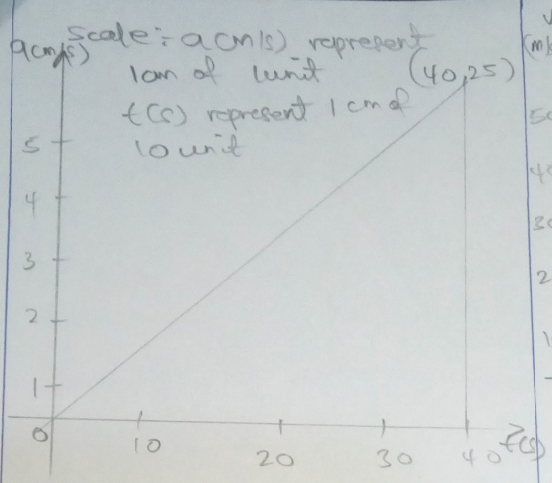
$$= v \cdot \frac{dv}{s}$$

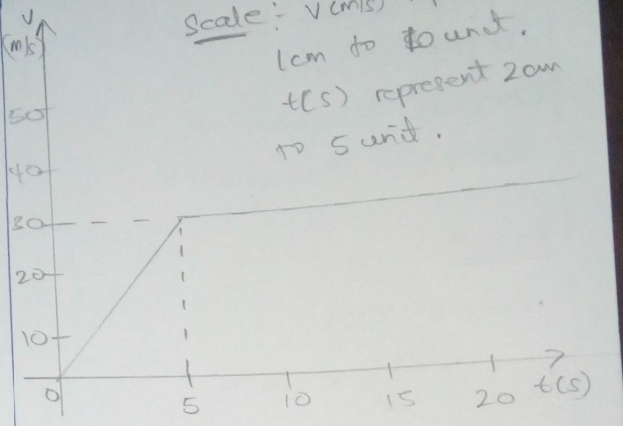
$$= 0.25v = 0025(0.25s)$$

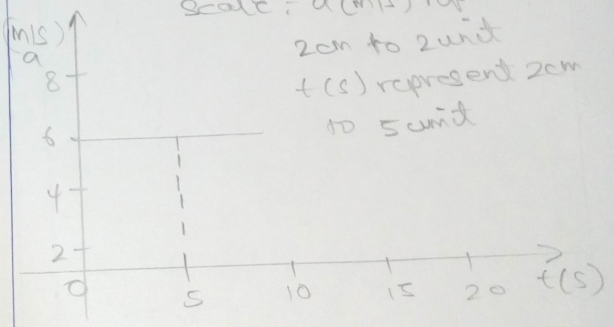
$$= 0.0625s$$

$$\Rightarrow a = 0.0625 = 0.6625(4)$$

$$= 2.5 m/s$$







F12.12

$S = 3t^2, \quad 0 \le t < 5$

$S = 30t - 75; \quad 5 \le t \le 10$

$v = \frac{ds}{dt}$

$v = 6t, \quad 0 \le t \le 5$

$v = 30, \quad 5 \le t \le 10$

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

$a = 6, \quad 0 \le t < 5$

$a = 0, \quad 5 \le t \le 10$

F12.13

v-t graph

Since $dv = a\,dt$, the v-t graph can be obtained by the integration of a-t graph when $v = 0$ and $t = 0$

$0 \le t < 5s \quad a = 20 m/s^2$

$\int_0^v dv = \int_0^t 20\,dt$

$v = 20t \; m/s$

when $t = 5s$, $v = 20(5) m/s = 100 m/s$

$5s \le t \le t, \quad a = 10 m/s$

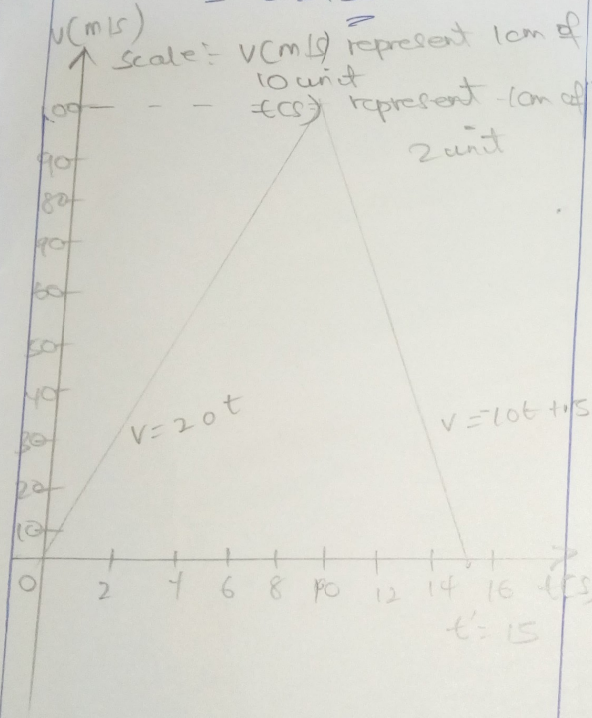
$$\int_{100 m/s}^{v} dv = \int_{5s}^{t} -10\,dt$$

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

② Time (t) requires the car to stop can be consequently determined by setting $v = 0$

$$\Rightarrow 0 = -10t + 150$$

$$t = 15s$$



F12.14

S-t graph

Since the equation for segment of the v-t graph are given the s-t graph can be determined using $ds = v\,dt$

when $s = 0$ when $t = 0$

$$0 \le t < 5s, \quad v = 30t\ (m/s)$$

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

$$s = 15t^2 m$$

when $t = 5s$,

$$s = 15(15^2)m = 375m$$

using this, as initial condition

$$5 < t \le 15s$$

$$v = (-15t + 225)\ m/s$$

$$\int_{375m}^{s} ds = \int_{5s}^{t} (-15t + 225)\,dt$$

$$s = (-7.5t^2 + 225t - 562.5)\ m$$

Distance travelled

The total distance (d) travelled during the time interval when $t = 15s$.

$$s = (-7.5(15) + 225(15) - 562.5$$

$$d = 1125m$$

Scale : S (m) represent 1cm of 200 unit

t (s) represent 2cm of 5 unit