

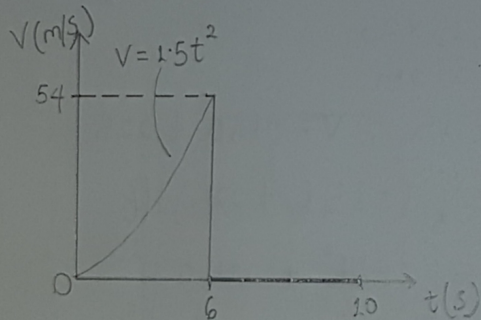
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18/ENG02/066
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1) $v = \frac{ds}{dt}$

$0 \leq t < 6$; $s = (0.5t^3)m$
 $v = (1.5t^2)m/s$

$6 < t \leq 10$; $s = (108)m$
 $v = 0m/s$

V-t Graph:



2) $\int ds = \int v dt$

$v = -4t + 80$

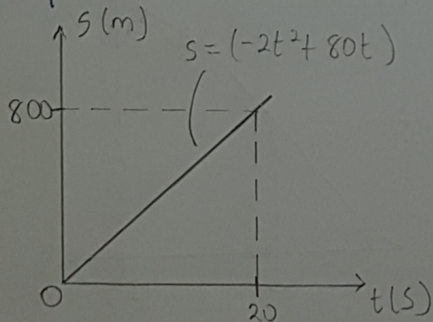
$\int_0^s ds = \int_0^t (-4t + 80) dt$

$s = (-2t^2 + 80t)m$

at $t = 20$

$s = -2(20)^2 + 80(20)$
 $= 800m$

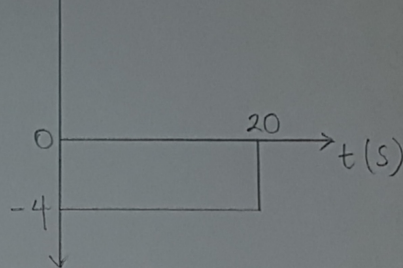
s-t Graph:



(ii) $a = \frac{dv}{dt}$

$a = (-4)m/s^2$

A-t Graph



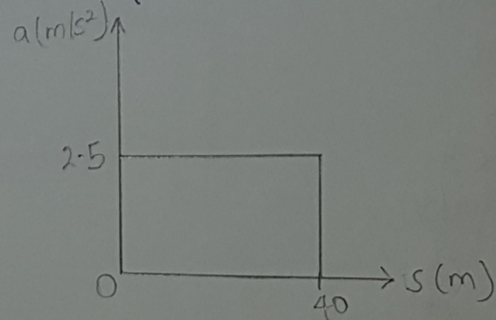
3) $a = \left(\frac{dv}{ds}\right) \cdot v$

$v = 0.25s$

$a = \frac{d(0.25s)}{ds} \times 10$

$a = 10 \times 0.25$
 $= 2.5m/s^2$

A-s Graph



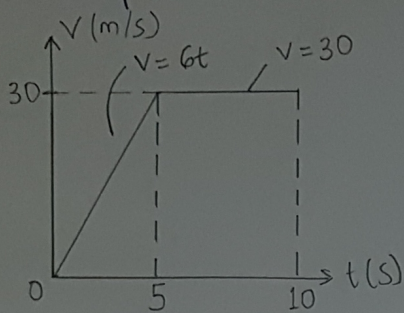
4) $v = \frac{ds}{dt}$

at $t = 5s$

$v = 6t$
 $= 6 \times 5$
 $= 30m/s$

at $t = 10s$
 $v = 30m/s$

V-t Graph



$$(n) a = \frac{dv}{dt}$$

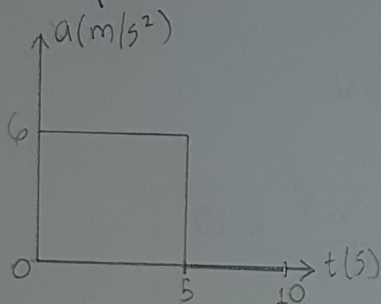
$$\text{at } t = 5$$

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

$$\text{at } t = 10 \text{ s}$$

$$a = 0 \text{ m/s}^2$$

A-t Graph



$$5) v = \int a dt$$

$$v = \int 20 dt$$

$$v = 20t$$

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

$$v = 20 \times 5$$

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

$$5 < t \leq t^1$$

$$\int_{100}^v dv = \int_5^{t^1} -10 dt$$

$$v - 100 = [-10t]_5^{t^1}$$

$$v - 100 = -10t^1 - (-10(5))$$

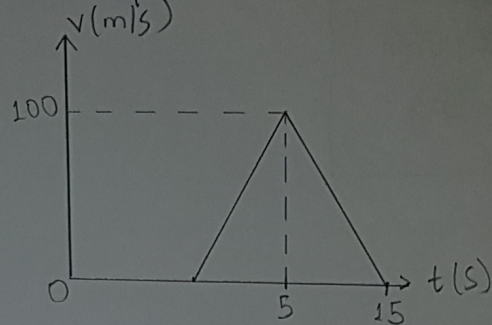
$$v - 100 = -10t^1 + 50$$

$$\text{at } t^1, v = 0$$

$$0 - 100 = -10t^1 + 50$$

$$t^1 = \frac{100 + 50}{10} = \frac{150}{10} = 15 \text{ s}$$

V-t Graph



$$(b) 0 \leq t \leq 5 ; v = 30t$$

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

$$s = [15t^2]_0^5$$

$$s = [15(5)^2] - 0$$

$$= 15 \times 25$$

$$= 375 \text{ m}$$

$$5 \leq t \leq 15 ; v = -15t + 225$$

$$\int_{375}^s ds = \int_5^{15} (-15t + 225) dt$$

$$s - 375 = \left[\frac{-15t^2}{2} + 225t \right]_5^{15}$$

$$s - 375 = \left[\frac{-15(15)^2}{2} + 225(15) \right] - \left[\frac{-15(5)^2}{2} + 225(5) \right]$$

$$s - 375 = 1687.5 - 937.5$$

$$s = 750 + 375$$

$$= 1125 \text{ m}$$

s-t Graph

