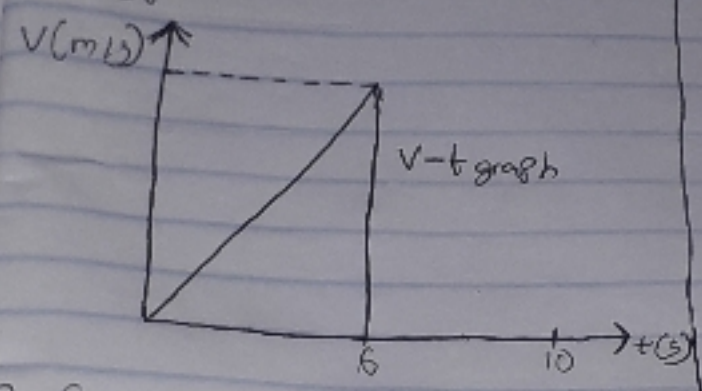
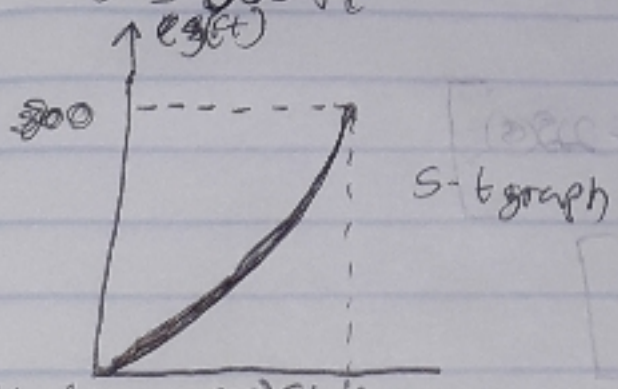
Toby Andrew. K.
15/ENG07/013.
Petroleum Eng.
200 Level.
ENG 234: ENGINEERING MECHANICS
Ans

① Given that
$s = 0.5t^3$
$\frac{ds}{dt}$ $V_i = 1.5t^2$

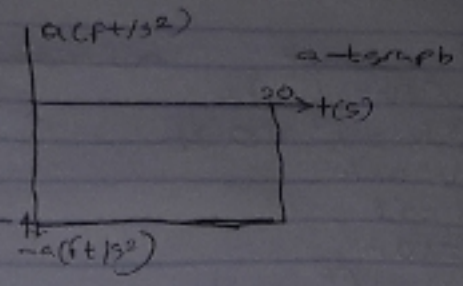
So at $t = 6$
$V = 1.5(6)^2 = 54\ m/s$
$s_2 = 108m$.
$V = \frac{ds}{dt} = 0$, $V = 0m/s$



2 Given that
$V = -4t + 80$
$s = \int V dt$.
$s = \int_0^{20} -4t + 80\ dt$
$s = [-2t^2 + 80t]_0^{20}$
∴ at $t = 20$
$s = [-2(20)^2 + 80(20)]$
$s = -800 + 1600$
$s = 800ft$

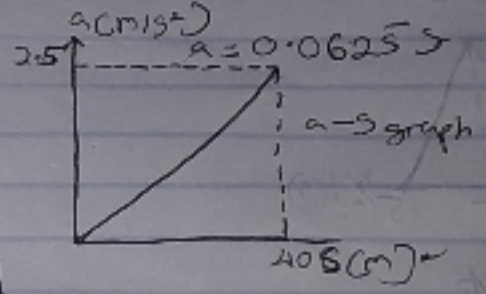


$V = (-4t + 80)ft/s$
$a = \frac{dv}{dt}$ $a = -4ft/s^2$

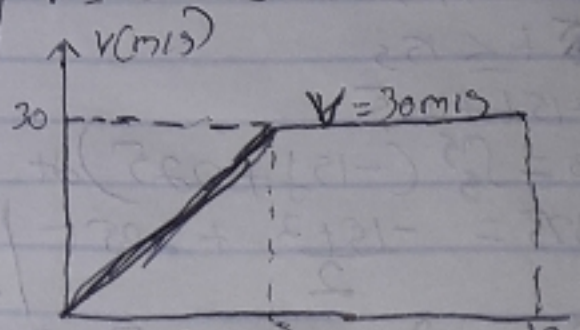


3.) $V = (0.25s)\ m/s$
$a = V(\frac{dV}{ds})$

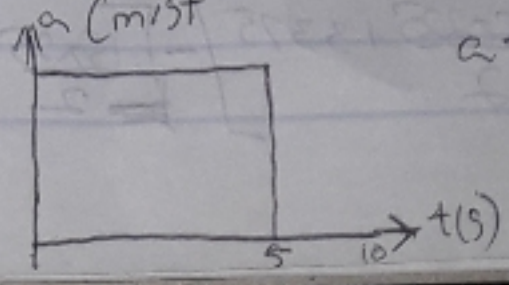
$a = 0.25s(0.25)$
$a = (0.0625s)\ m/s^2$
At $s = 40m$
$a = (0.0625 \times 40)$
$a = 2.5\ m/s^2$



4 $s = 3t^2$ $s = 30t - 75$
$V = 6t$ $V = 30m/s$
$t = 5$
$V = 6 \times 5$
$V = 30m/s$



$V = (6t)m/s$ $V = 30m/s$
$a = 6m/s$ $a = 0m/s$



5.) $a = 20 m/s^2$ $a = -10 m/s^2$

$\int dv = \int_2^t dt$

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

$v = 20t$

$t = 5s$

$v = 100 m/s$

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

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

$v - 100 = -10t + 50$

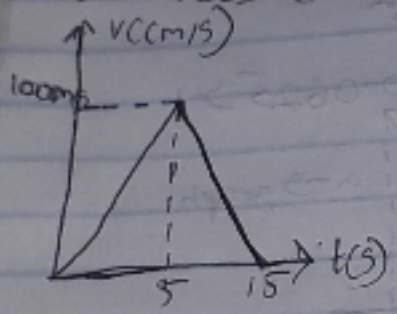
$v = (-10t + 150) m/s$

At $v = 0$

$0 = -10t + 150$

$-150 = -10t$

$t = 15 sec$



6.) $v = 30t$

$\int ds = \int v dt$

$\int_0^s ds = \int_0^t (30t) dt$

$s = 15t^2$, $t = \sqrt{\frac{s}{15}}$

$s = 15(5)^2$

$s = 375 m$

$5 \leq t \leq 15 s$

$v = -15t + 225$

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

$s - 375 = \frac{-15t^2}{2} + 225t \Big|_5^{15}$

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

$s - 375 = \left[\frac{-15 \times 225}{2} + 3375\right] - \left[\frac{15 \times 25}{2} + 1125\right]$

$S - 375 = (-1687.5 + 3375) - (-187.5 + 1125)$

$S - 375 = +1687.5 - 737.5$

$S - 375 = 750$

$S = ~~750~~ 1125 m$