CHIEZE CHINONSO FAITH

Aerospace Engineering

18/ENG01/006

Mechanics Assignment

1) Given that

$S = 0.5t^3 m$

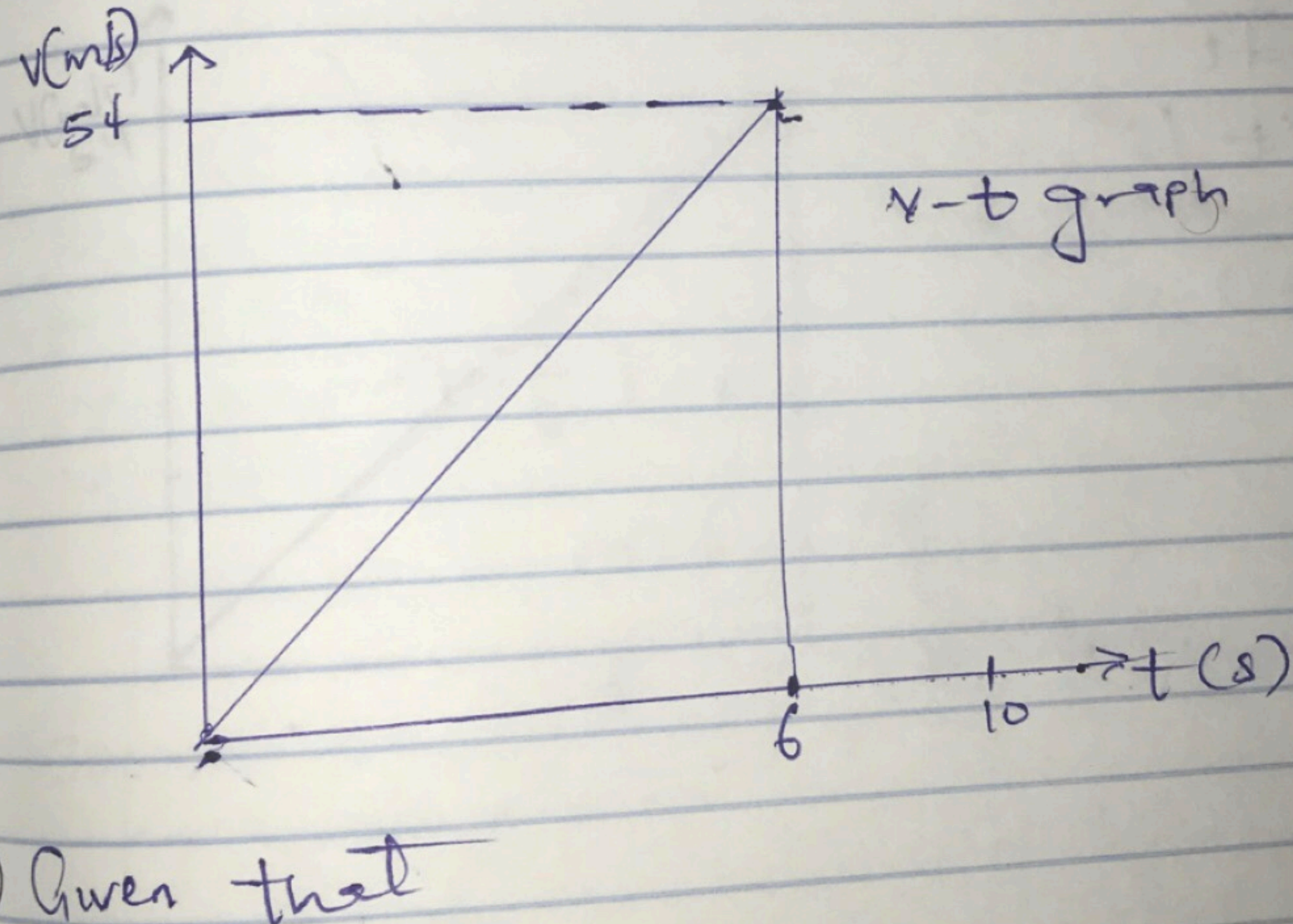
$\frac{VdS}{ft}$, $V_1 = 1.5t^2$

when $t = 6$

$V = 1.5(6)^2 = 54 m/s.$

$S_2 = 108m$

$V = \frac{ds}{ft} = 0$, $v = 0 m/s$



2) Given that

$V = -4t + 80$

$S - \int V dt.$

$S = \int_0^{20} -4t + 80 \, dt.$

$S = [-2t^2 + 80t]\Big|_0^{20}$

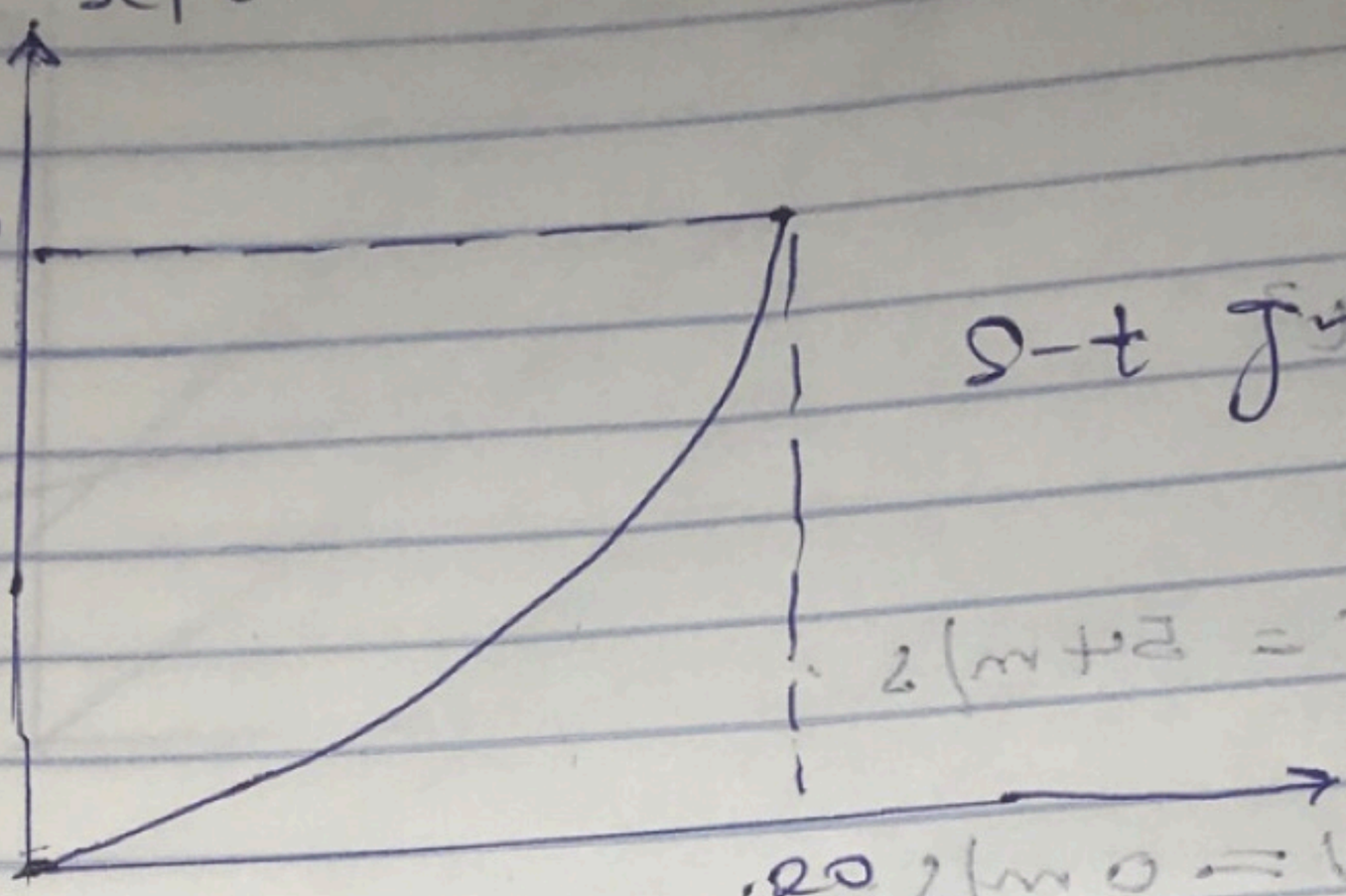
$\therefore$ at $t = 20$

$S = [-2(20)^2 + 80(20)]$

$S = -800 + 1600$

$S = 80t$

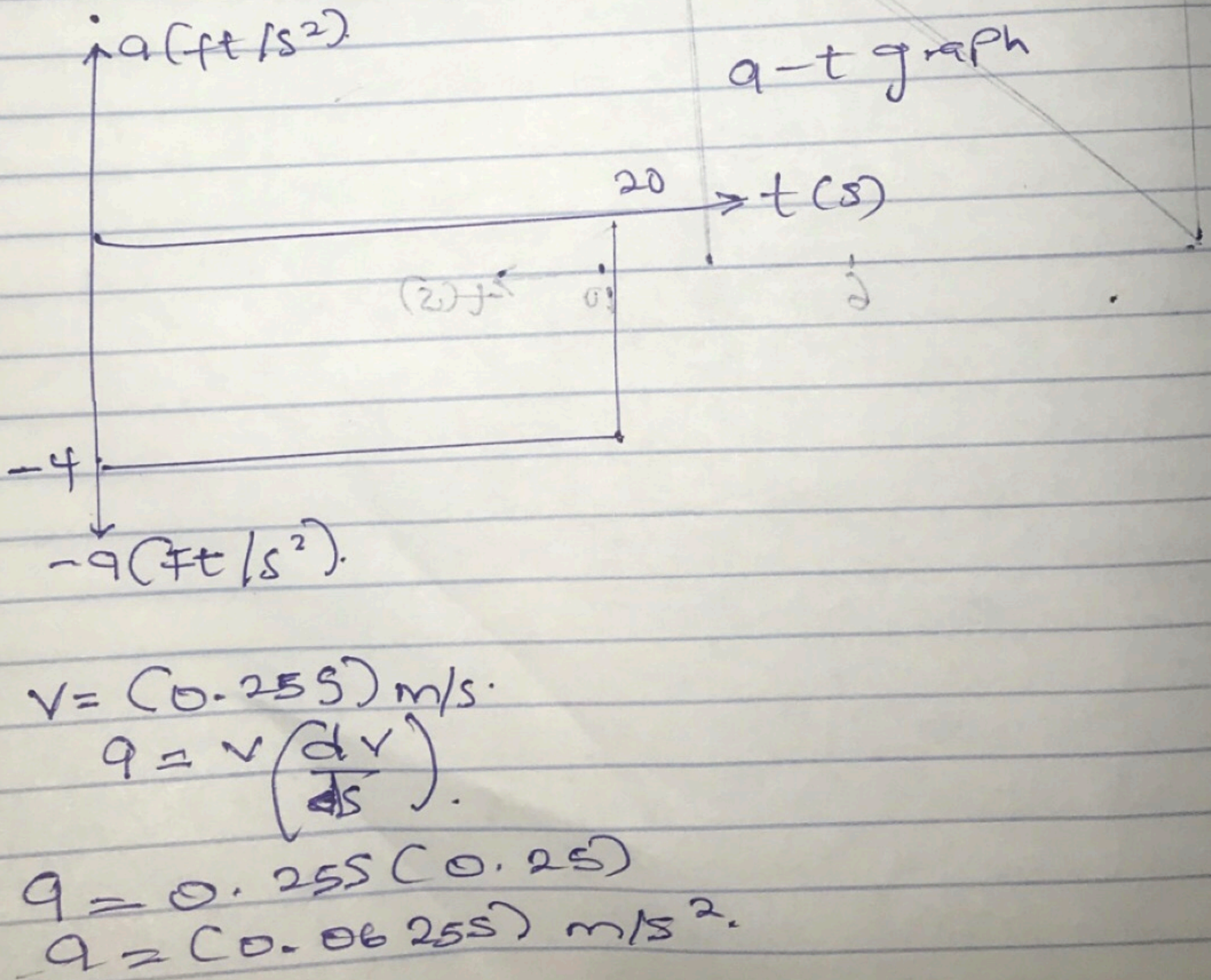
$S = f(t)$



$v = (-4t + 80)\ ft/s$

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

$a = -4\ ft/s^2$



3.) $v = (0.255)\ m/s$

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

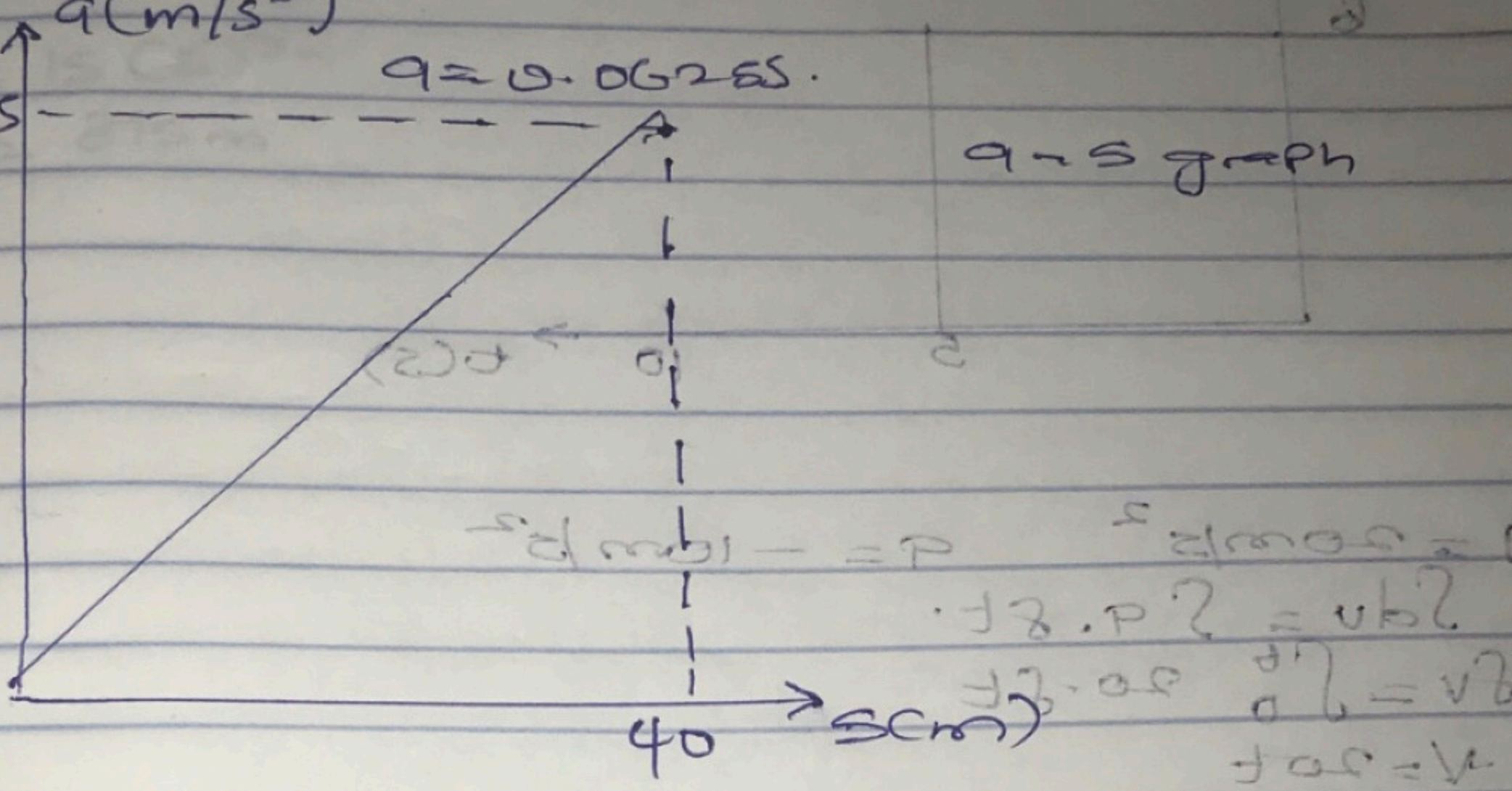
$a = 0.255(0.25)$

$a = (0.06255)\ m/s^2$.

At $s = 40m$

$a = (0.0625 \times 40)$

$a = 2.5 m/s^2$



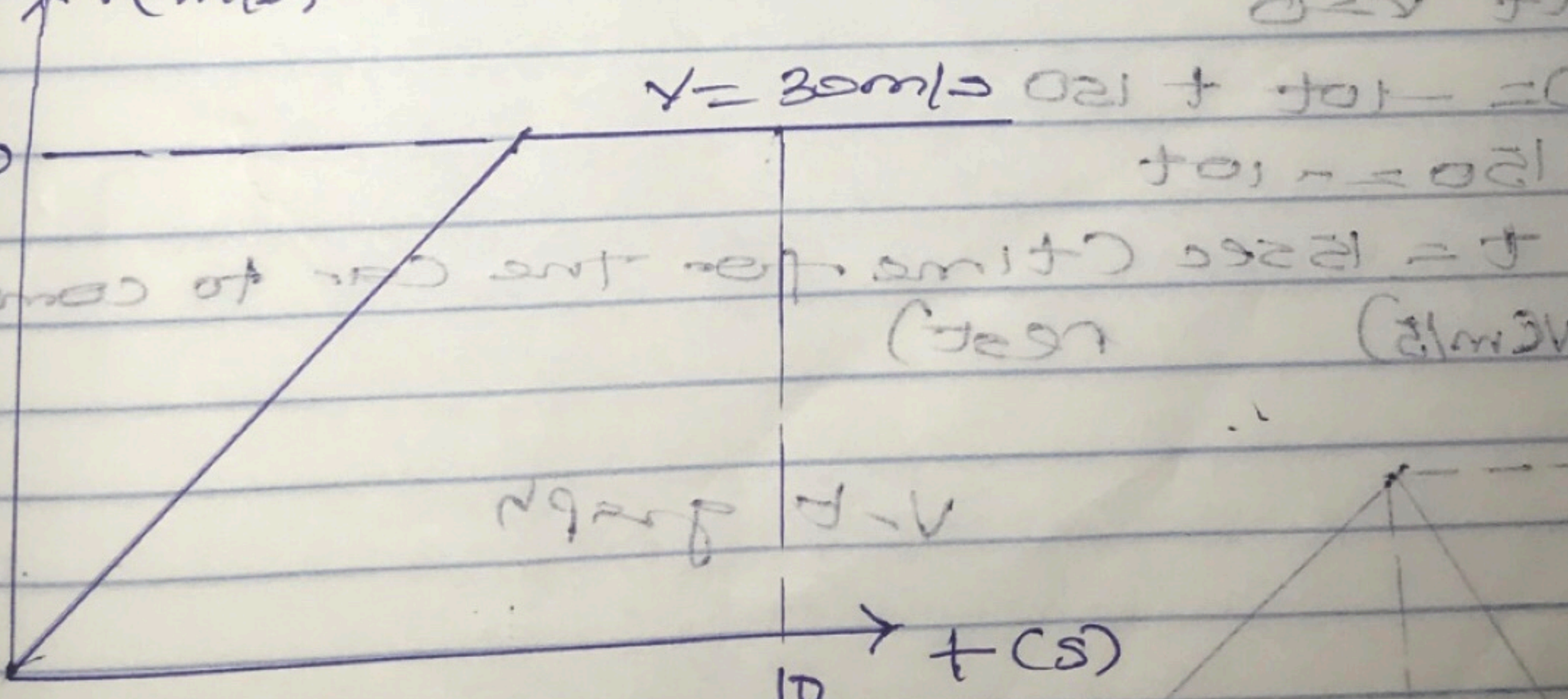
q) $s = 3t^2$

$v = 6t$

At $t = 5$

$v = 6 \times 5$

$v = 30 m/s.$



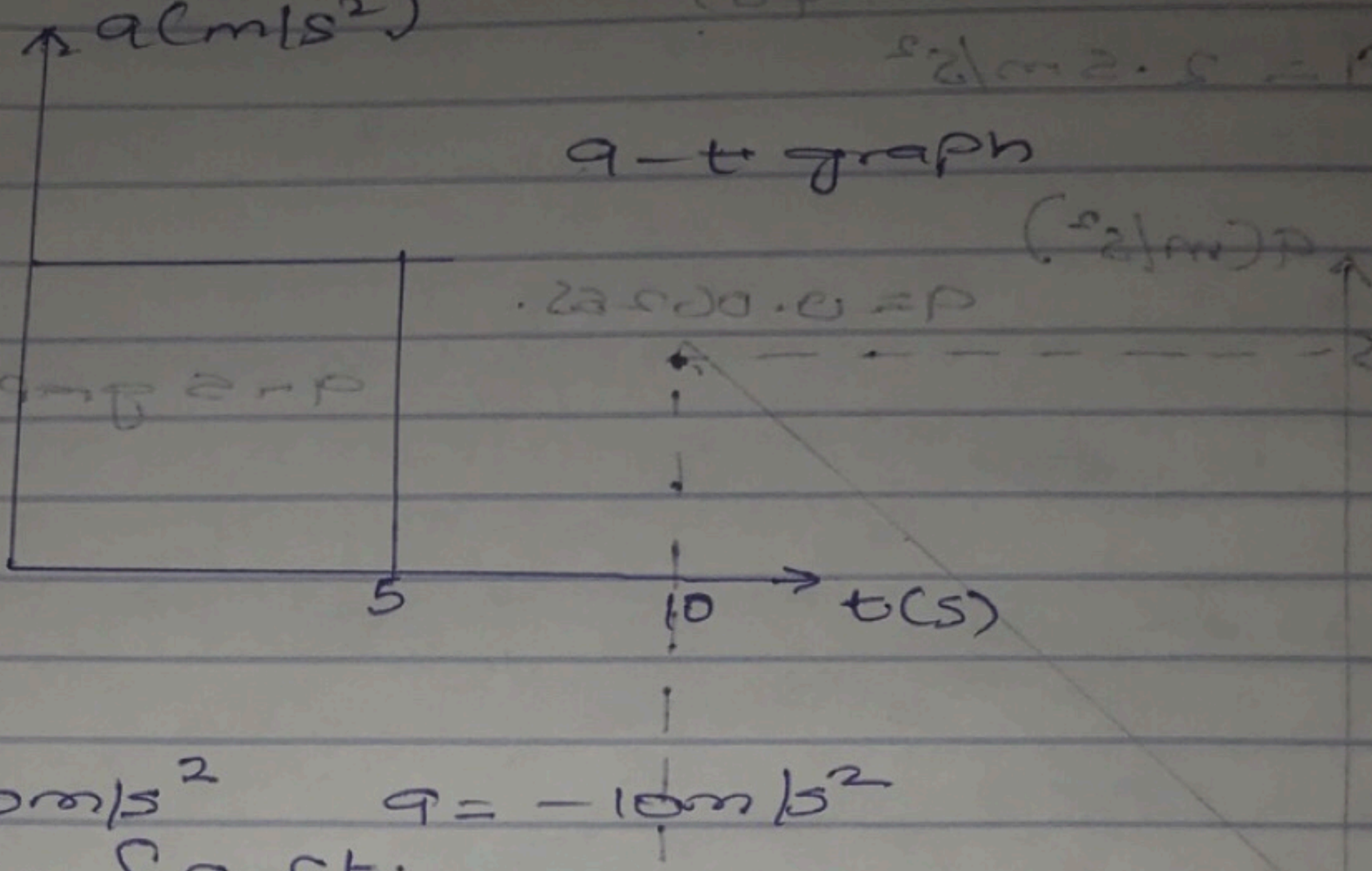
$v = (6t) m/s.$

$a = 6 m/s^2$

$s = 30t - 75$

$v = 30 m/s$

$a = 0 m/s^2$



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

$$\int dv = \int a \cdot dt$$

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

$$v = 20t$$

At $t = 5s$.

$$v = 100 m/s$$

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

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

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

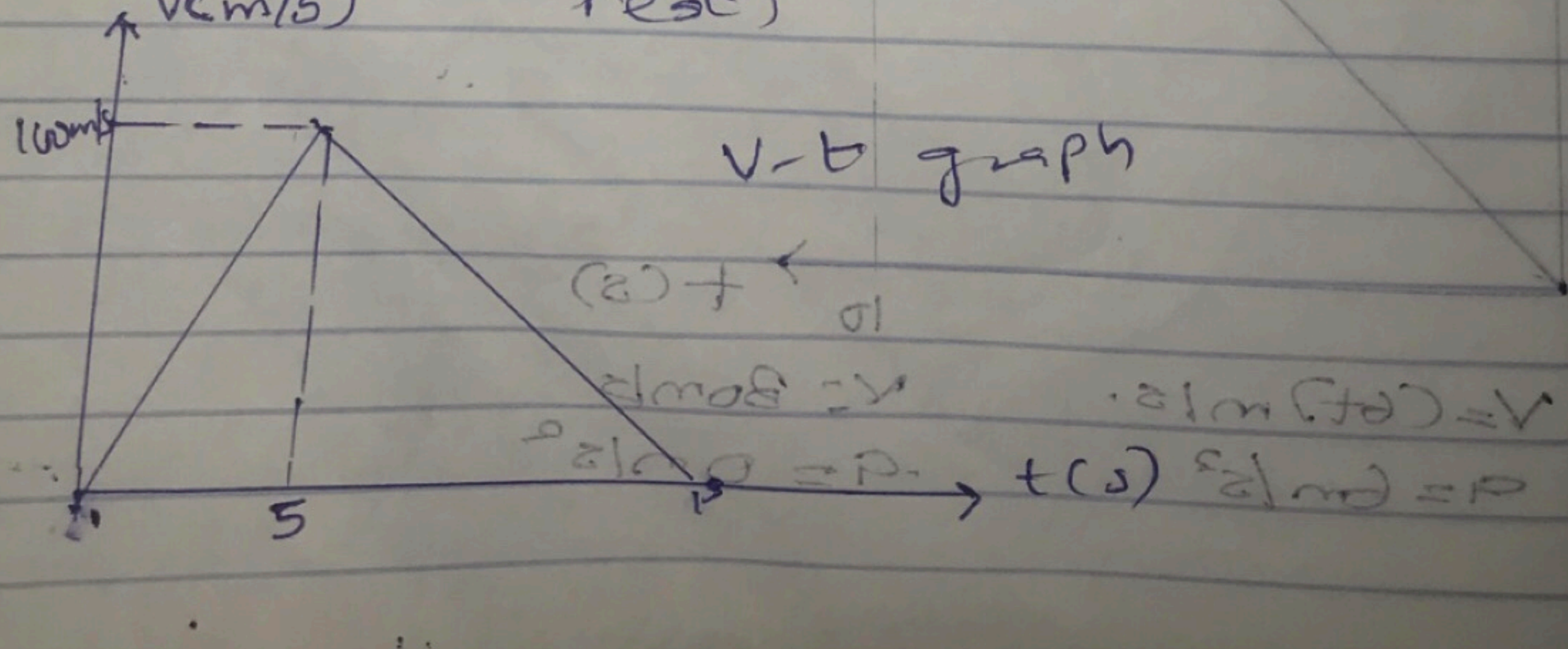
$$x = (-10t + 150)\ m.$$

At $v = 0$

$$0 = -10t + 150$$

$$-150 = -10t$$

$t = 15 sec$ (time for the car to come to



6) $v = 30t$

$$\int ds = \int v\,dt$$

$$\int_0^5 ds = \int_0^t (30t)\,dt$$

$$5 = 15t^2$$

$$t = 5s$$

$$S = 15(5)^2$$

$$S = 375m.$$