

Dhigeno Ramat Ernanto

18/Eng05/041

Mechanics

$$1. s = 0.5t^2$$

$$\text{at } (0.5 \leq t \leq 6)$$

To get velocity $\frac{ds}{dt}$

$$v = \frac{ds}{dt} = 1.5t^2$$

$$\text{at } t = 6 \text{ sec}$$

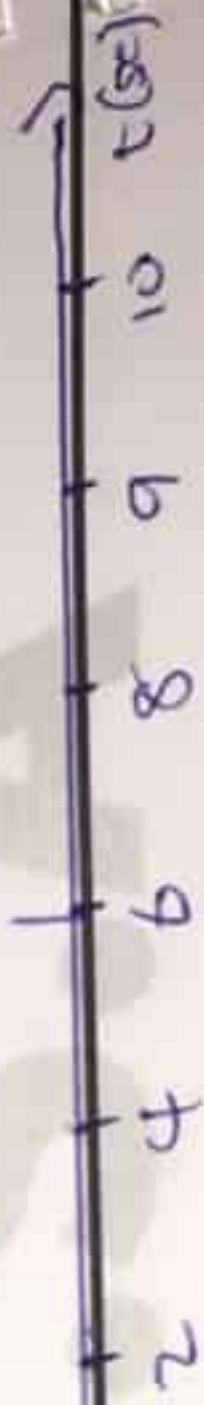
$$v = 1.5(6)^2$$

$$v = 54 \text{ ms}^{-1}$$

$$s = 108$$

$$(6 \leq t \leq 40)$$

$$v = \frac{ds}{dt} = 0 \text{ ms}^{-1}$$



$$2. v = 4t + 80 \quad v = \frac{ds}{dt}$$

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

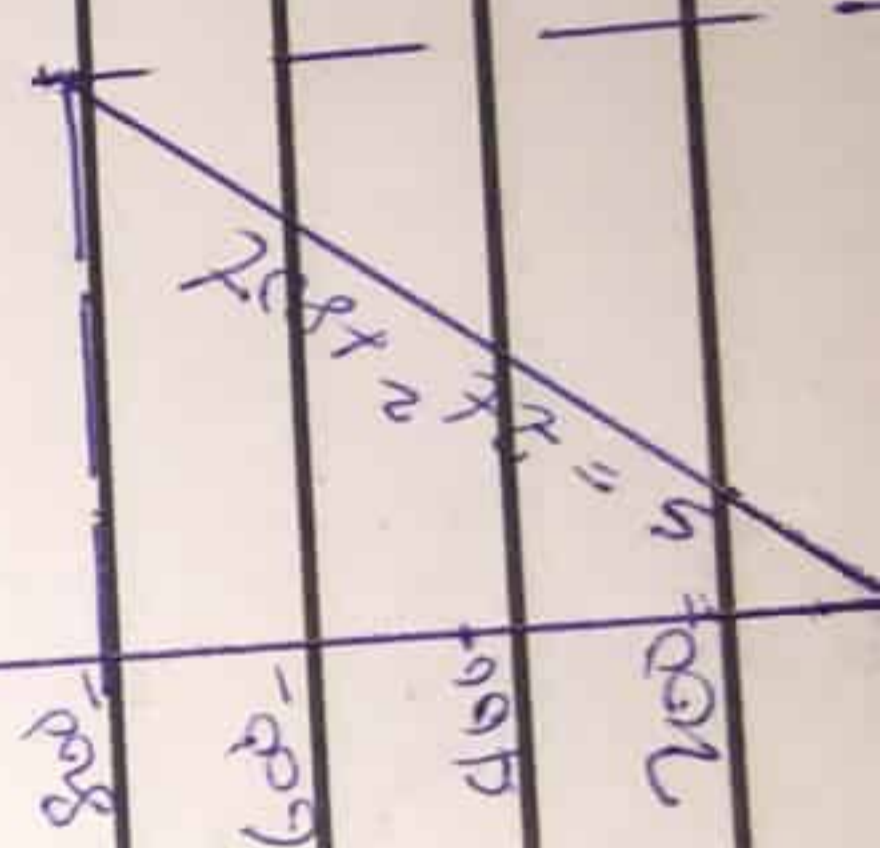
$$s \Big|_0^s = (-2t^2 + 80t) \Big|_0^t$$

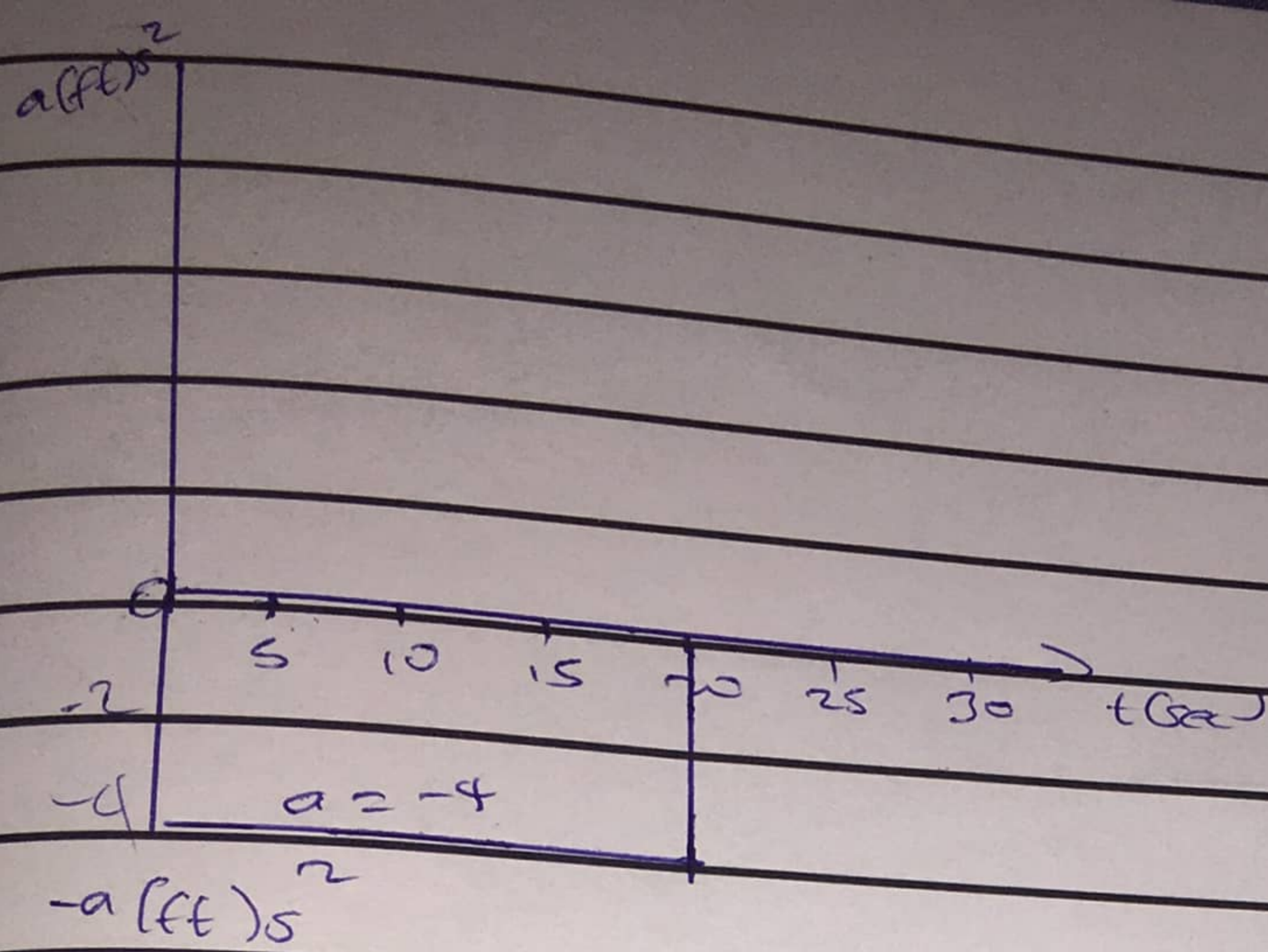
$$s = -20(20)^2 + 80(20)$$

$$s = 800 \text{ (ft)}$$

To get acceleration

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





$$3 = v = 0.25s$$

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

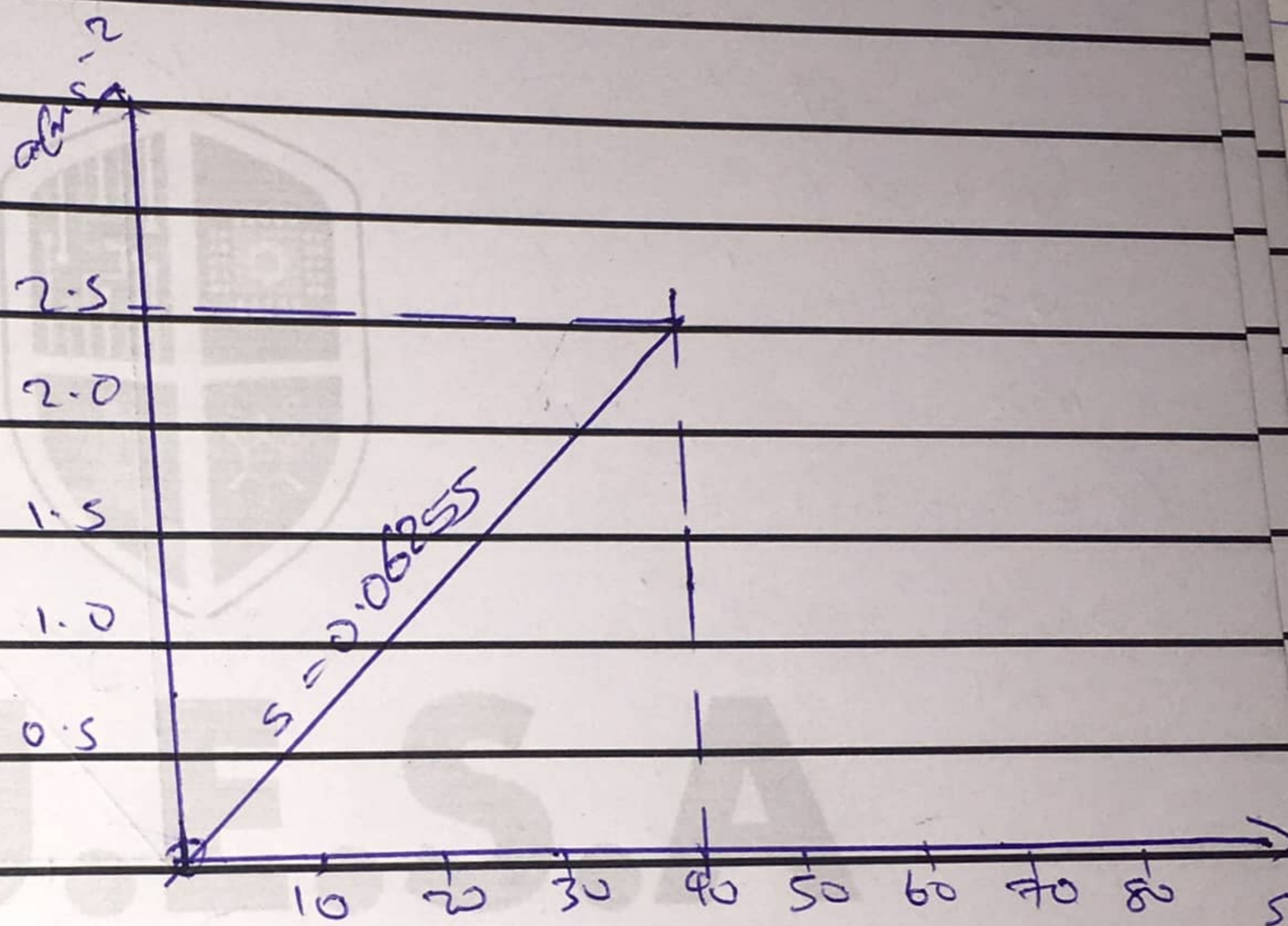
$$= (0.25s)(0.25)$$

$$a = (0.0625s) \text{ m s}^{-1}$$

$$\text{at } s = 40 \text{ m}$$

$$a = 0.0625 \times 40$$

$$= 2.5 \text{ m s}^{-2}$$



$$4. s = 3t^2$$

$$0 \leq t \leq 5 \quad \text{To get } v$$

$$v = ds/dt = 6t$$

Maximum velocity at 5 sec

$$v = 6(5), \quad v = 30 \text{ m s}^{-1}$$

$$\text{Distance at 10 sec, } s = 30t - 7s$$

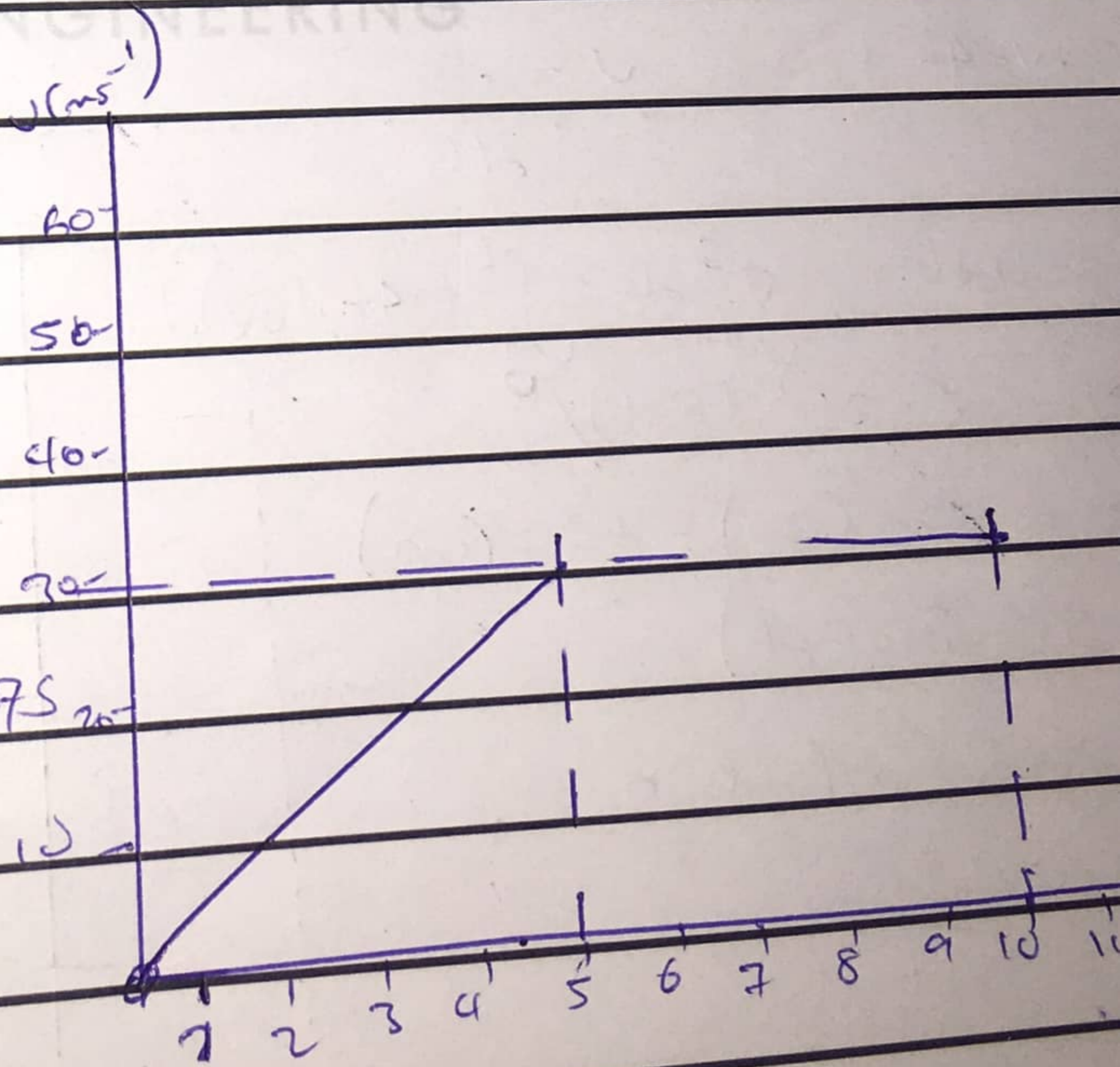
$$v = 30 \text{ m s}^{-1}$$

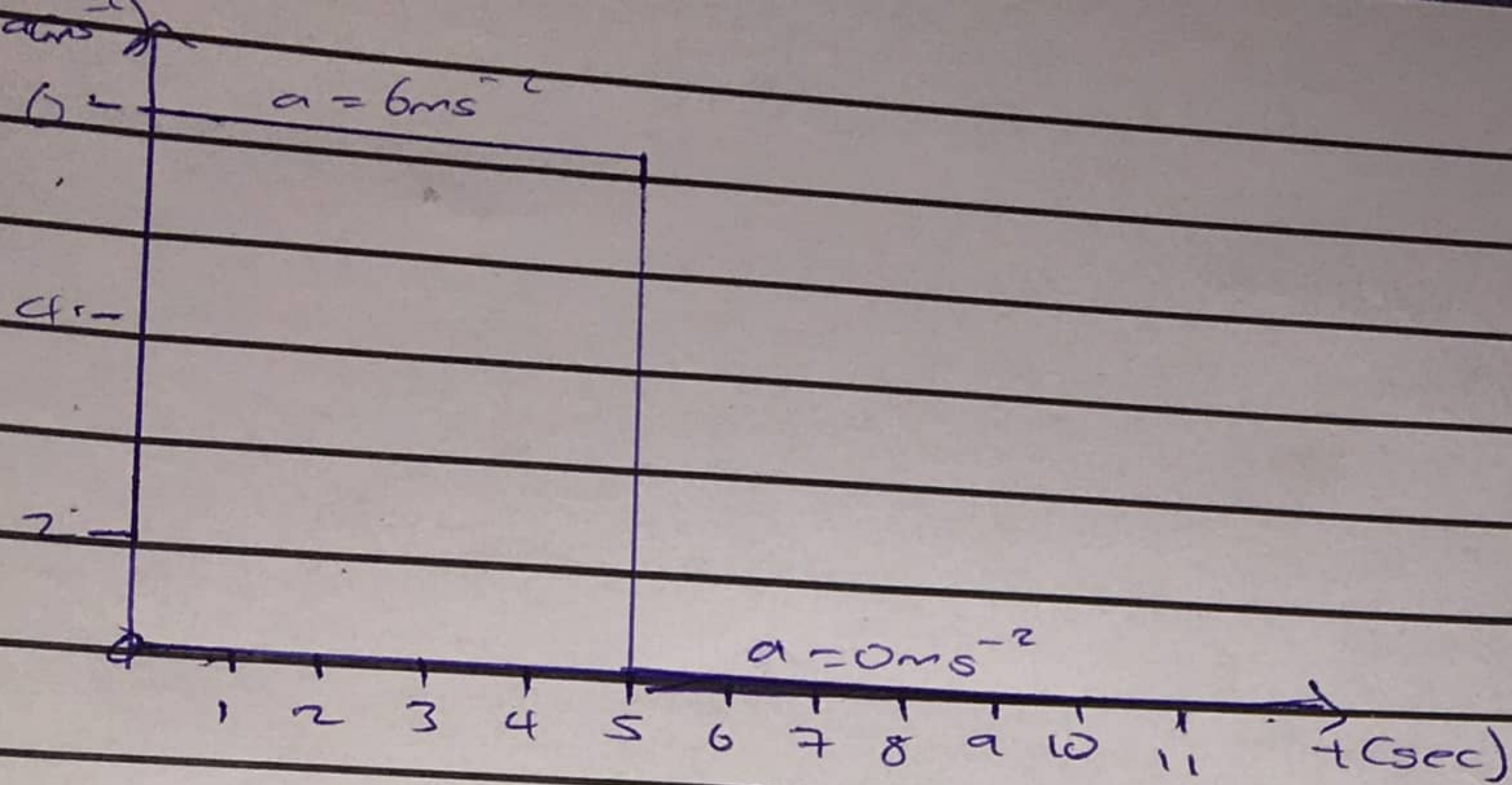
To get acceleration

$$v = 6t$$

$$a = dv/dt = 6 \text{ m s}^{-2} \text{ at } 5 \text{ sec}$$

$$\text{at } 10 \text{ sec, } v = 30, \quad \frac{dv}{dt} = 0 \text{ m s}^{-2}$$





5. $a = 20 \text{ ms}^{-2}$; $a = 10 \text{ ms}^{-2}$

To get velocity $v = \int a dt$
 $= \int_0^t 20 dt \quad \therefore v = 20t \text{ (ms}^{-1}\text{)}$

when $t = 5 \text{ sec}$

$v = 20(5) = 100 \text{ m/s}$

velocity at 5 sec is 100 ms^{-1}

$a_2 = -10 \text{ ms}^{-2}$

$v = \int -10 dt$

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

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

$v = (150 - 10t) \text{ ms}^{-1}$

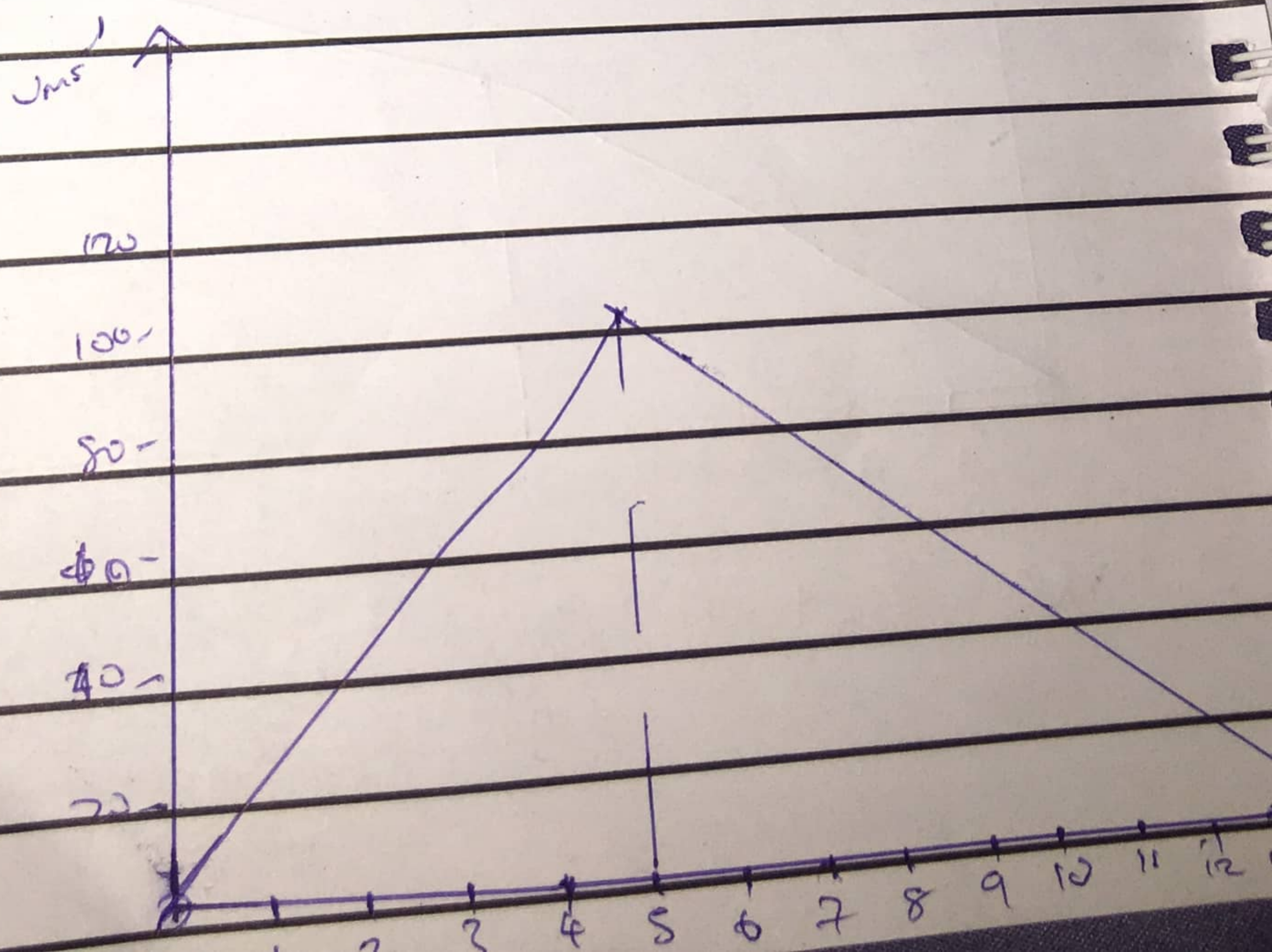
when $v = 0$

$0 = 150 - 10t$

$-10t = -150$

$= \frac{-150}{-10}$

$t = 15 \text{ sec}$



6. $V=30t$

to get distance at $\cos t = s$

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

$$s = \left(\frac{30t^2}{2} \right) / 0$$

$$s = (15t^2) / 0$$

$$s = (s) s + 15(0)^2$$

$$s = 375m$$

at $s = 15$

$$v = -15t + 225$$

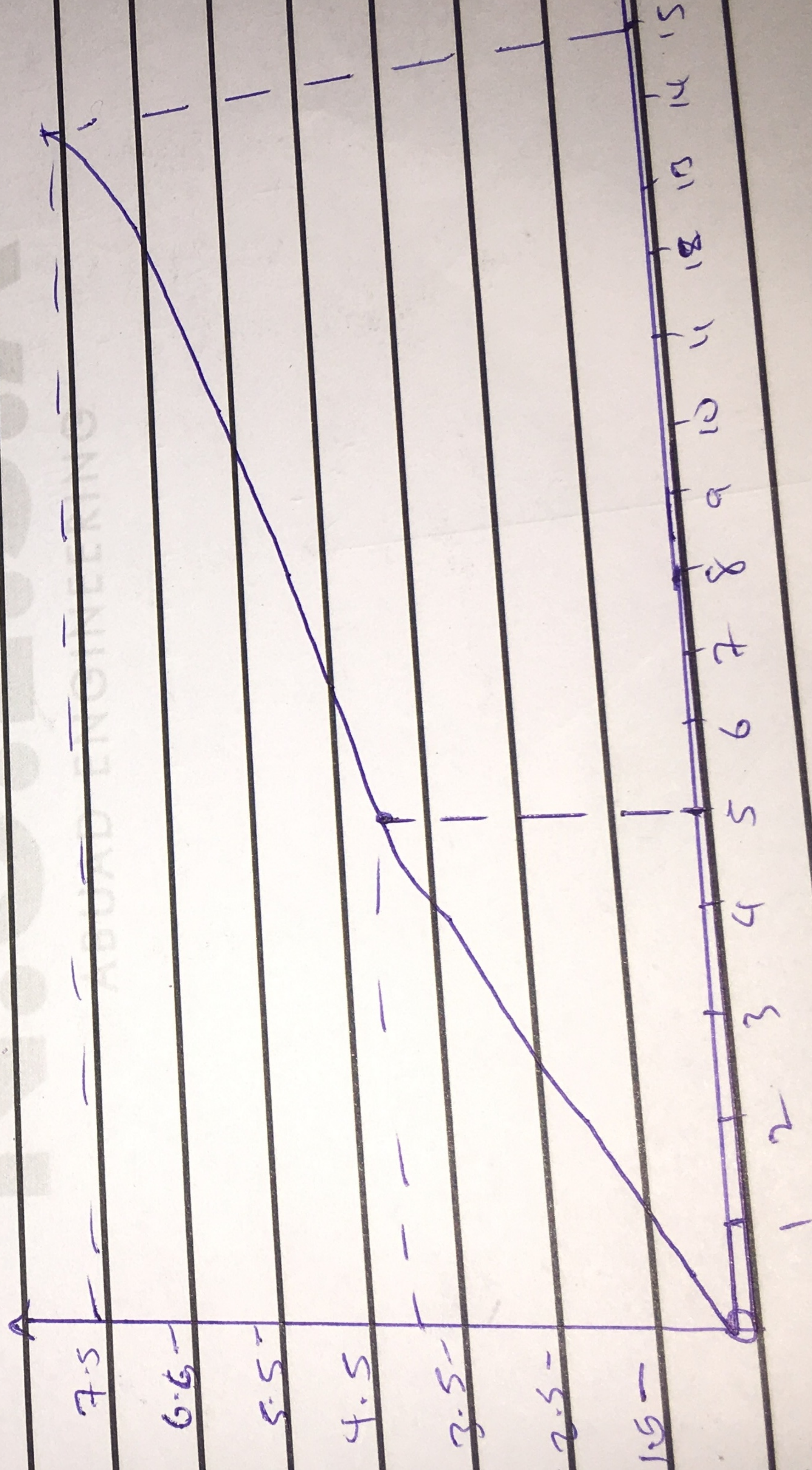
$$\int_0^s ds = \int_0^{15} (-15t + 225) dt$$

$$s = (-7.5t^2 + 225t) / 0$$

$$s = (-7.5(15)^2 + 225(15) - (-7.5)(0)^2 + 225(0))$$

$$s = 1687.5 - 937.5$$

$$s = 750m$$



$$\text{Total distance} = 750 + 375$$

$$= 1125m$$