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1.)  $S = 0.5t^3 \text{ m}$

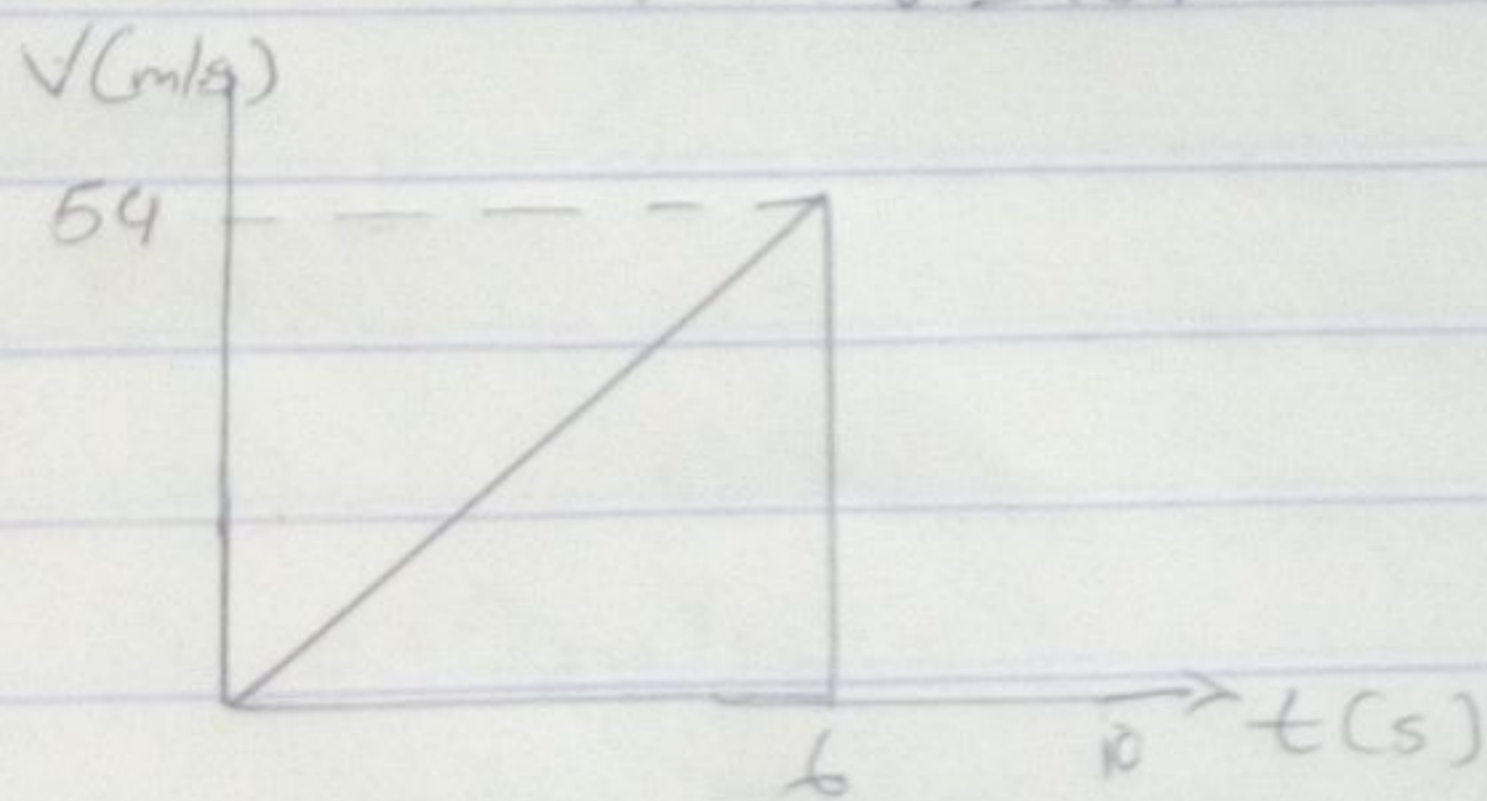
$$v = \frac{ds}{dt} = 1.5t^2 \text{ m/s}$$

at  $t = 6$

$$v = 1.5(6)^2 = 54 \text{ m/s}$$

from  $t = 6 \text{ s} - 10 \text{ s}$ ,  $s = 108$

$$\therefore v = 108$$



v-t graph

2.)  $v = -4t + 80$

$$a = \frac{dv}{dt} = -4 \text{ m/s}^2; \text{ at } t = 20 \quad a = 4 \text{ m/s}^2$$

$$s = \int v dt$$

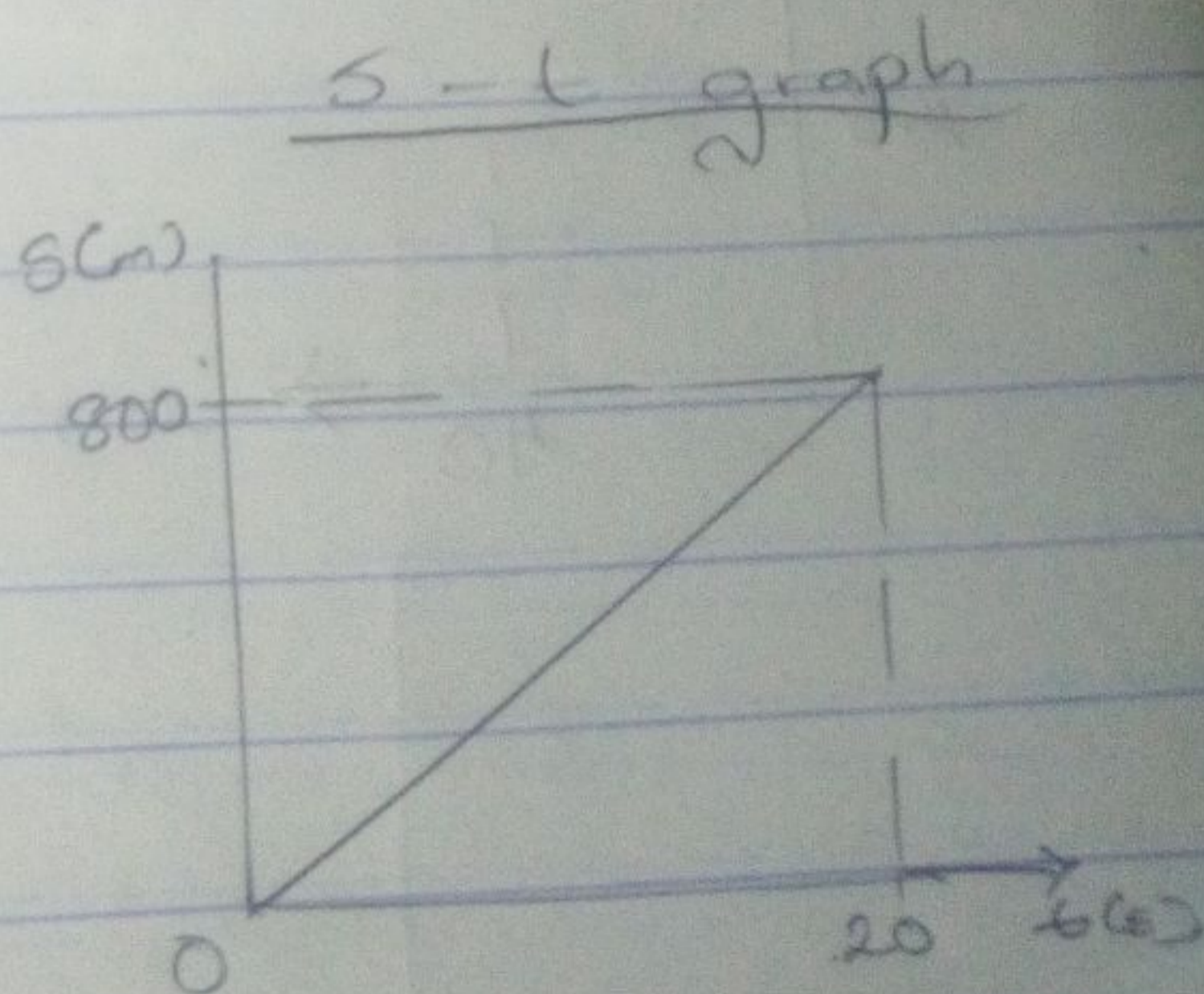
$$s = \int (-4t + 80)$$

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

at  $t = 20 \text{ s}$

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

$$s = 1600 - 800 = 800 \text{ m}$$



s-t graph

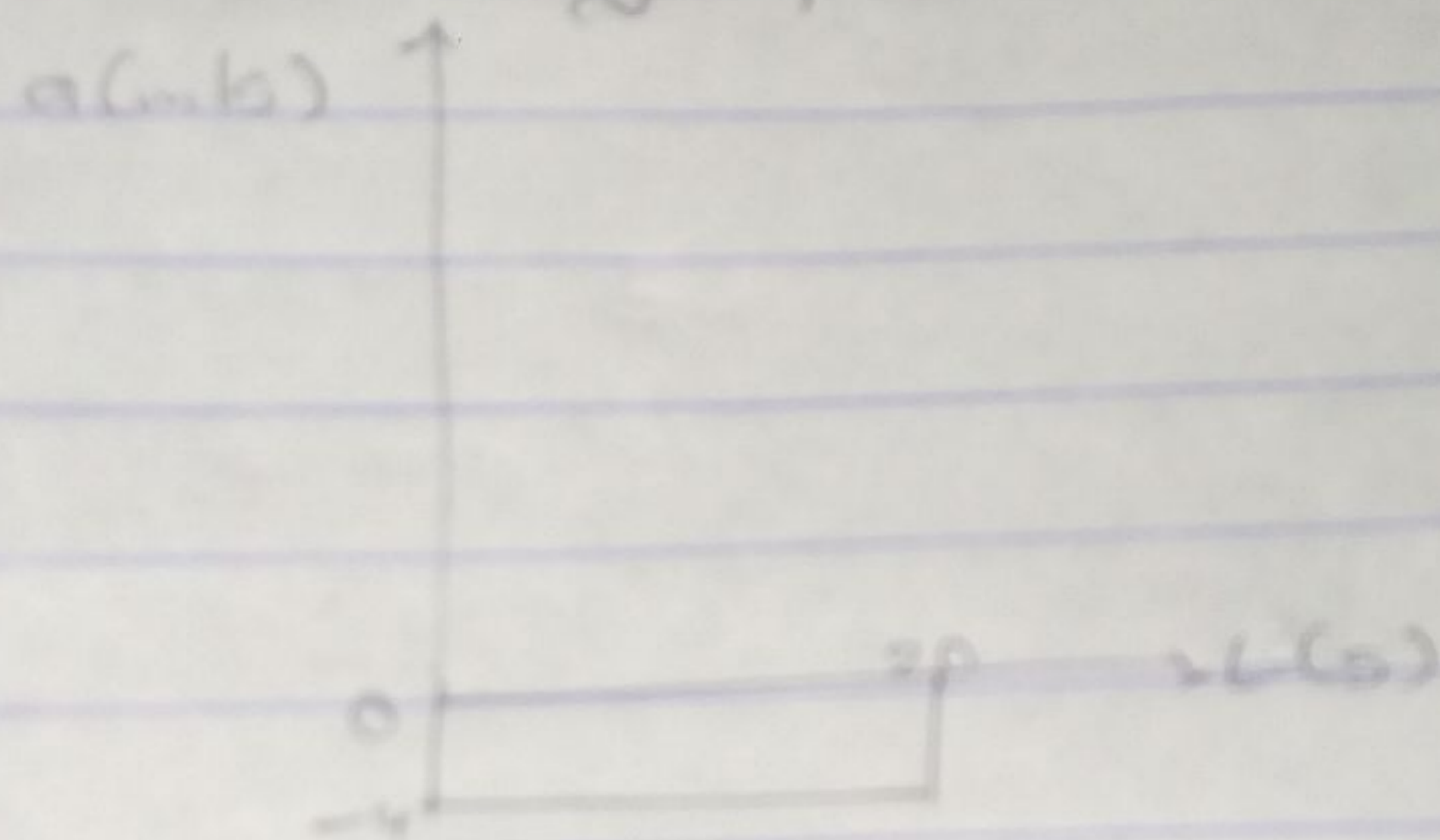
2) acceleration

$$a = dv/dt$$

$$a = -4 \text{ m/s}^2$$

$$\text{at } t = 20, a = -4 \text{ m/s}^2$$

a-t graph



3)  $a = (dv/ds) v$

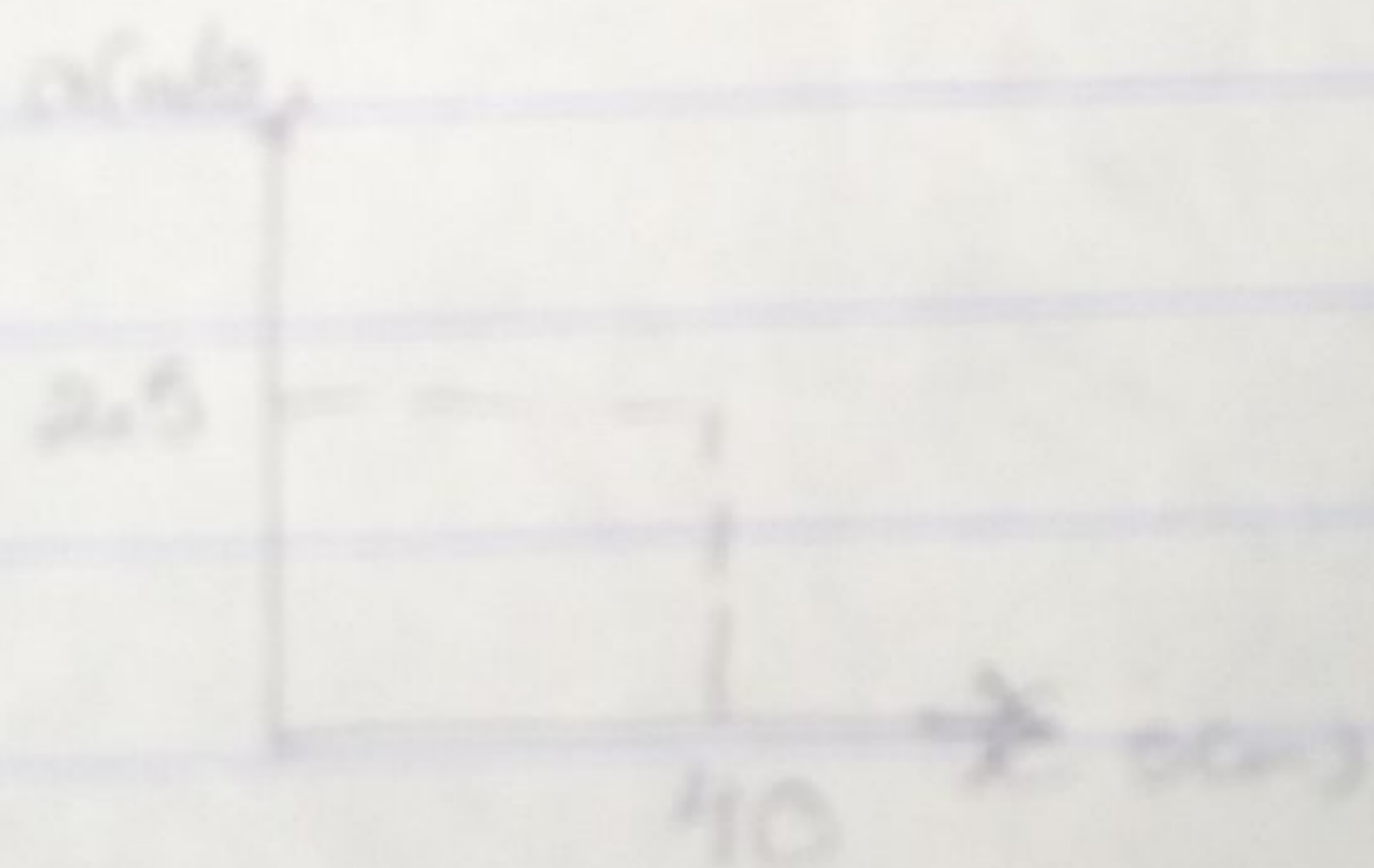
$$v = 0.25s$$

$$a = 10 \times d(0.25s)/ds$$

$$a = 10 \times 0.25$$

$$a = 2.5 \text{ m/s}^2$$

a-s graph



4i.  $v = \frac{ds}{dt}$

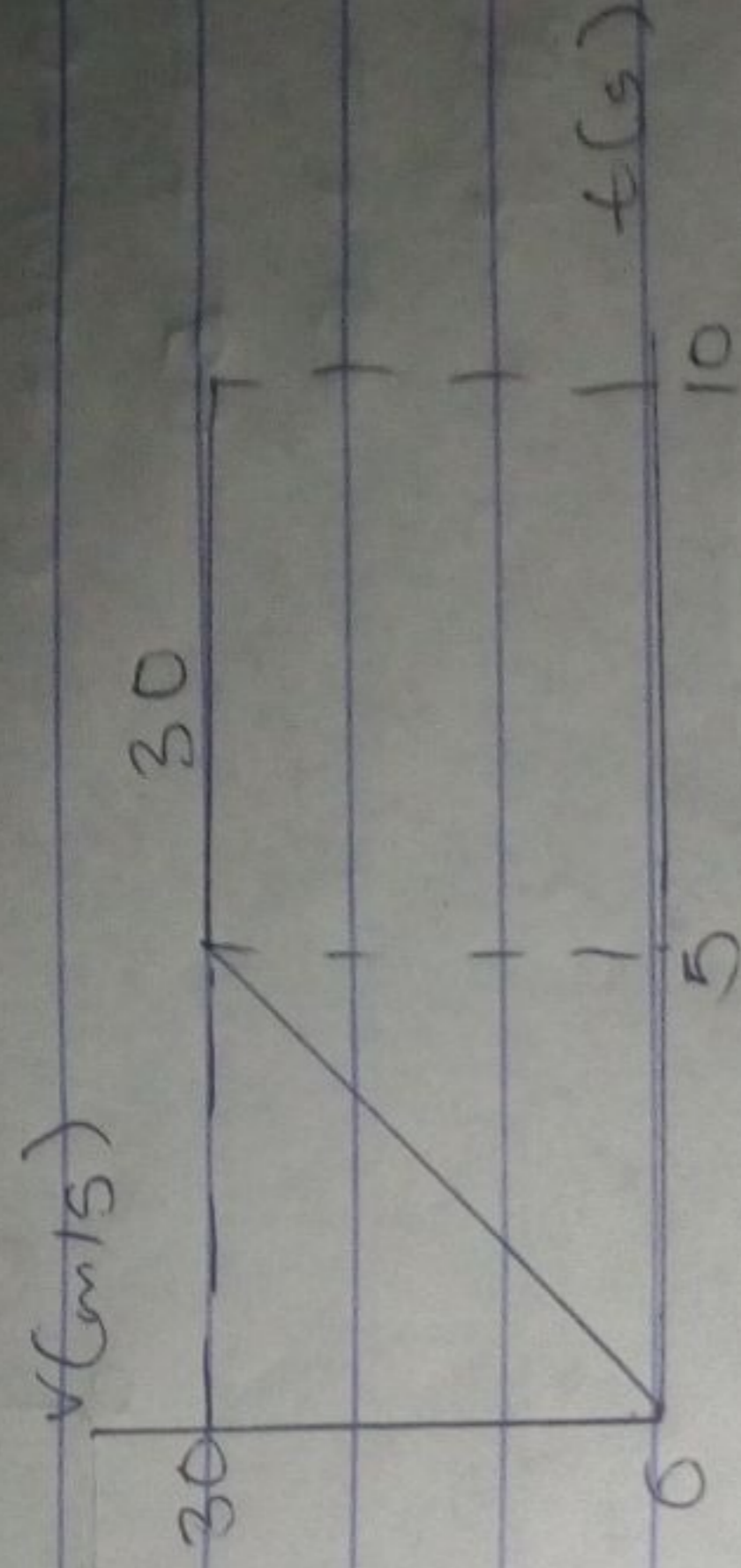
at  $t = 5s$

$v = bt = 6 \times 5$

$= 30 \text{ m/s}$

at  $t = 10, v = 30 \text{ m/s}$

v-t graph



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

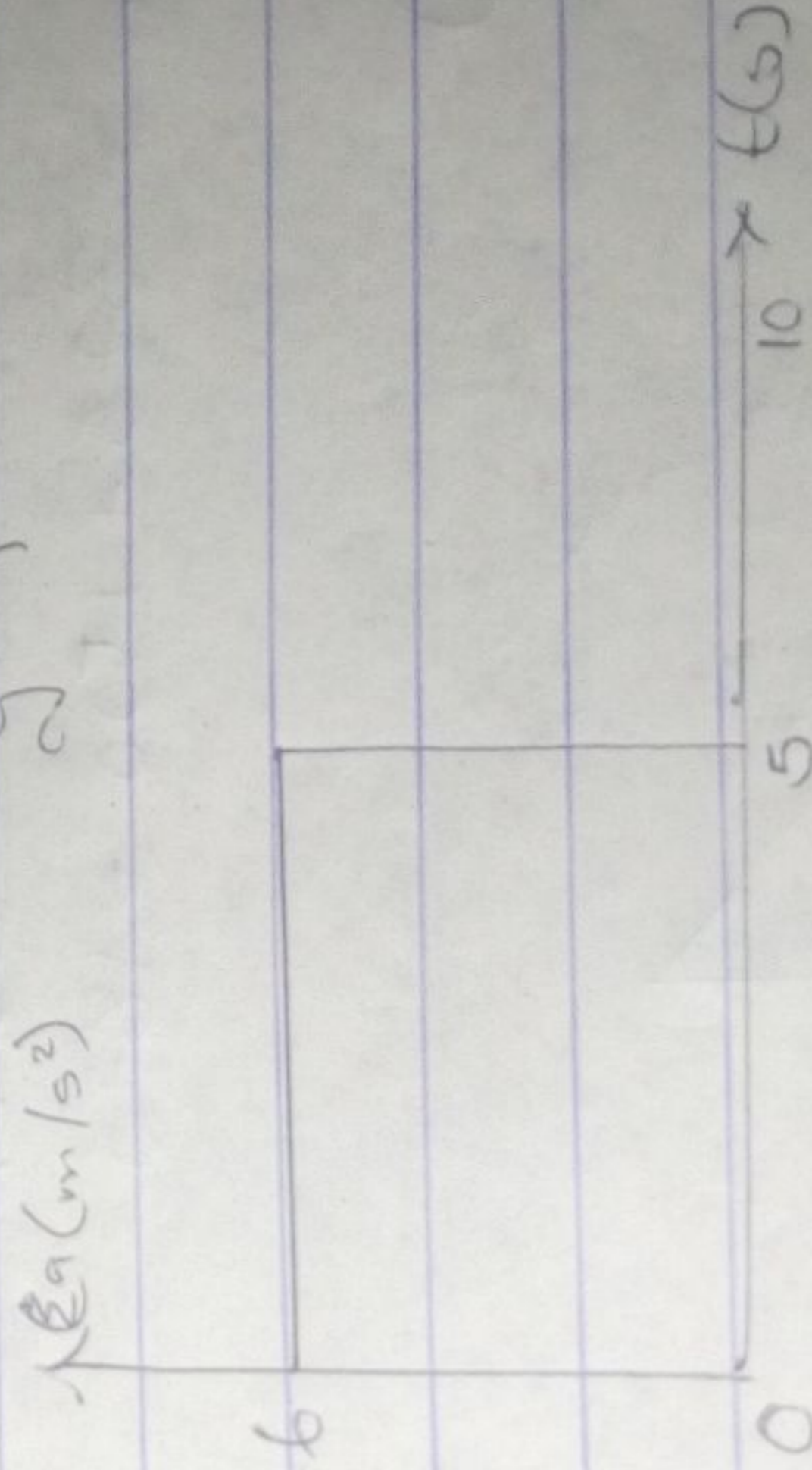
at  $t = 5,$

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

at  $t = 10s$

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

a-t graph



5)  $v = \int a dt$

$v = \int 20 dt$

$v = 20t$

at  $t = 5$

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

$5s < t \leq 10s$

$$\int_{100}^v dv = \int_0^{t'} -10 dt$$

$$v - 100 = -10t'$$

$$v - 100 = -10t' + 10 \times 5$$

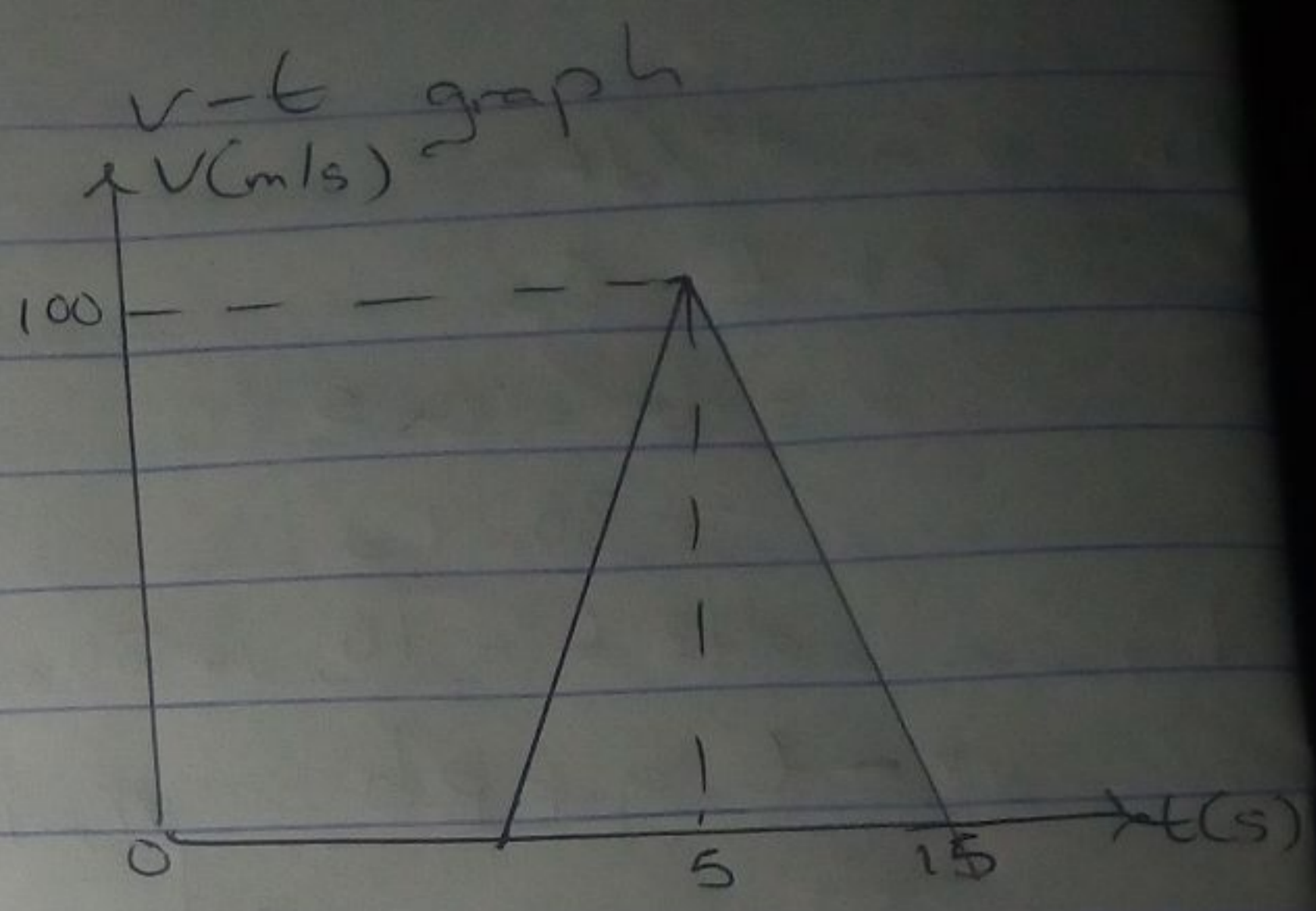
$$v - 100 = -10t' + 50$$

at  $t', v = 0$

$$0 - 100 = -10t' + 50$$

$$10t' = 150$$

$$t' = 15s$$



~~s-t graph~~

6)  $v = 30t$

$$s = \int v dt$$

$$s = 15t^2$$

$$t = 5$$

$$15(5)^2$$

$$= 375m$$

$$v = -15t + 225$$

$$s = \int v dt = -7.5t^2 + 225t$$

at  $t = t_2 - t_1 = 15 - 5 = 10$

$\therefore$  at  $t = 10$

$$-7.5(10)^2 + 225(10)$$

$$= 1500m$$

Total distance =  $375 + 1500 = 1875$

s-t graph

