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18/ENG 06 1066  
Mechanical Engineering  
ENR 281 (Mechanics)

### Assignment

1  $S = 0.5t^3$

$0 < t < 6$  secs

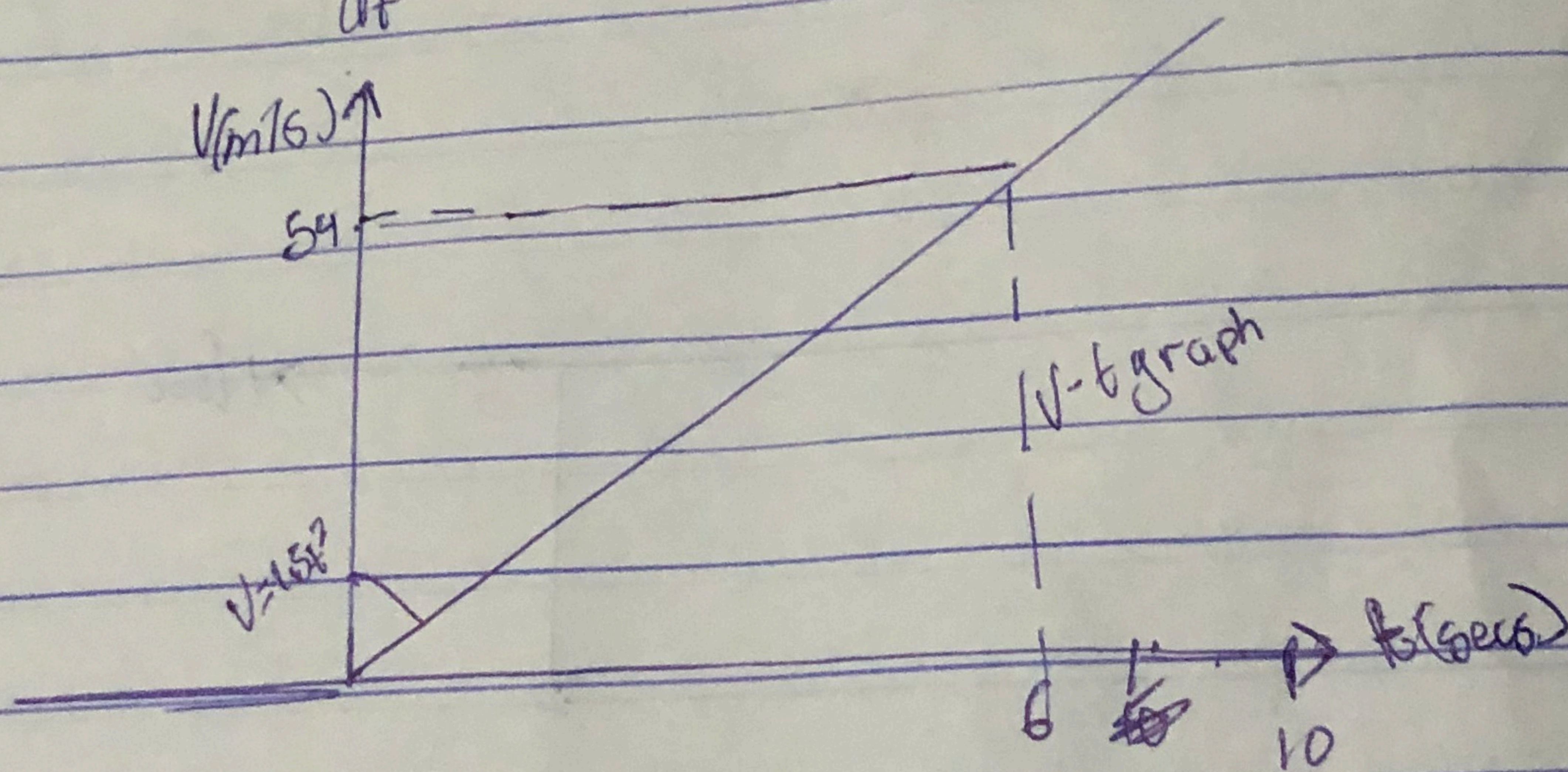
$V = \frac{ds}{dt} = 1.5t^2 \text{ m/s}$

$V = 15(6)^2 = 54 \text{ m/s}$

$6 < t < 10$  secs

$S = 108$

$V = \frac{ds}{dt} = 0 \text{ m/s}$



2.  $V = -4t + 80$

$S = \int_0^5 ds = \int_0^1 dt$

$S = \int_0^{20} (-4t + 80) dt$  ,  $S = \int_0^{20} [-2t^2 + 80t] dt$

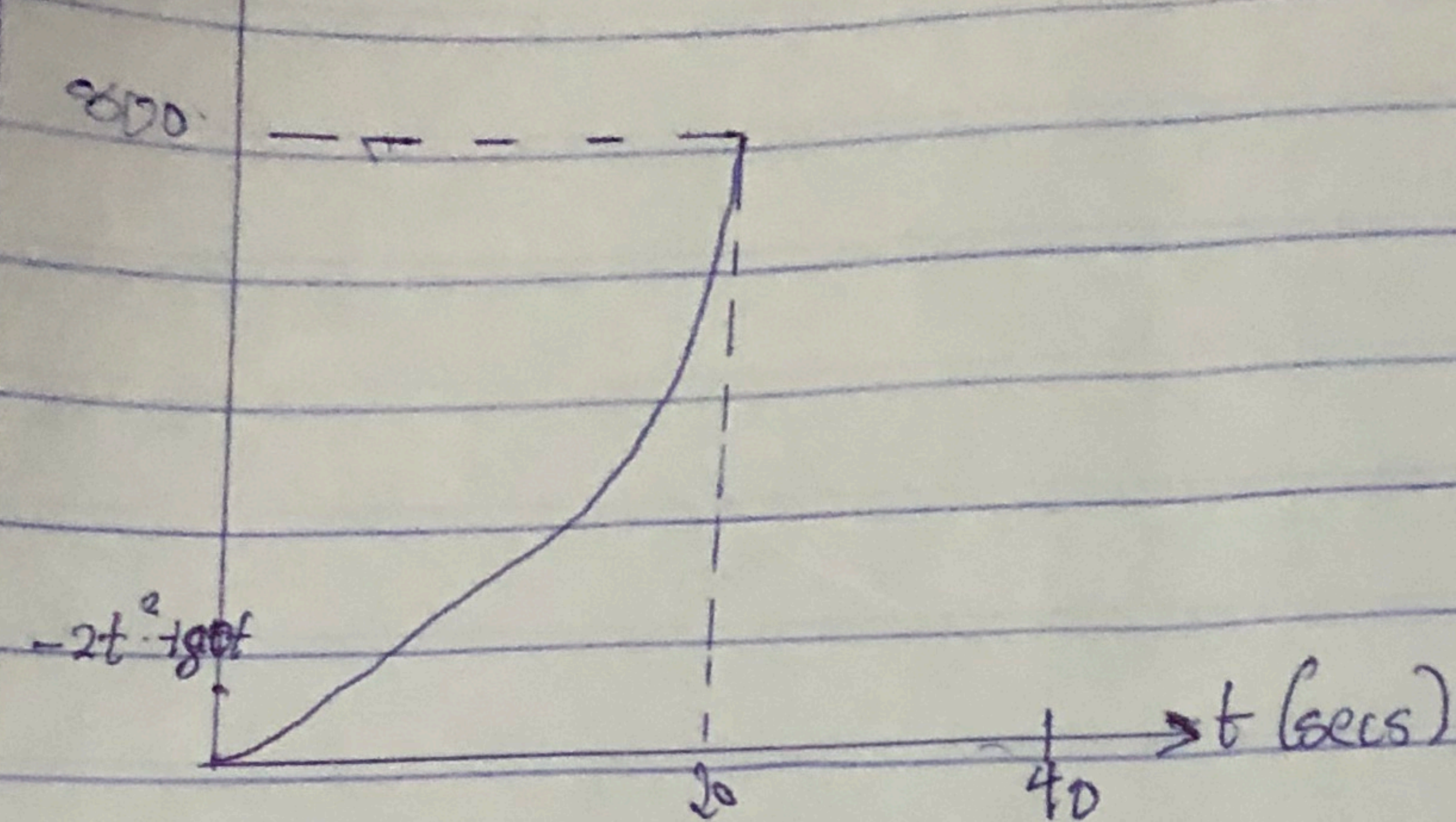
$0 < t < 20$  secs

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

$S = -800 + 1600 = 800 \text{ ft}$

~~S~~ = t graph

S-T graph

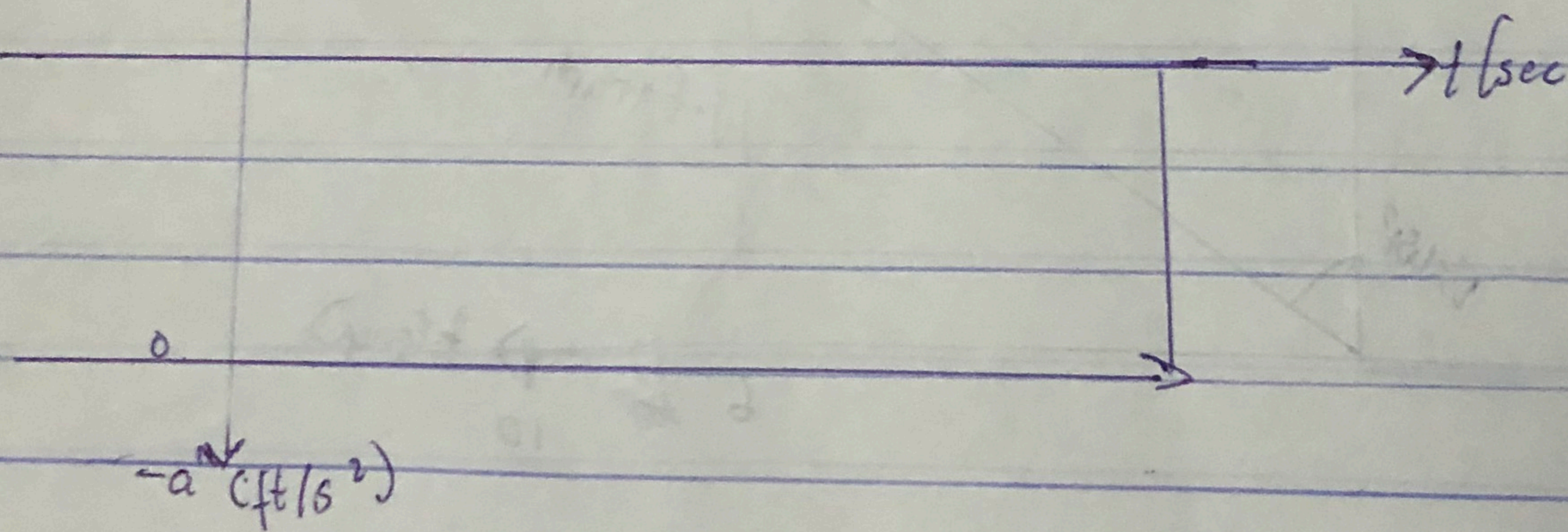


$$V = (-4 + 80) \text{ ft/s}$$

$$0 < t < 20 \text{ s}$$

$$a = \frac{dv}{dt} = -4 \text{ ft/s}^2$$

$a \text{ (ft/s}^2\text{)}$



$$3 \quad V = (0.25 S) \text{ m/s}$$

$$a ds = V dv$$

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

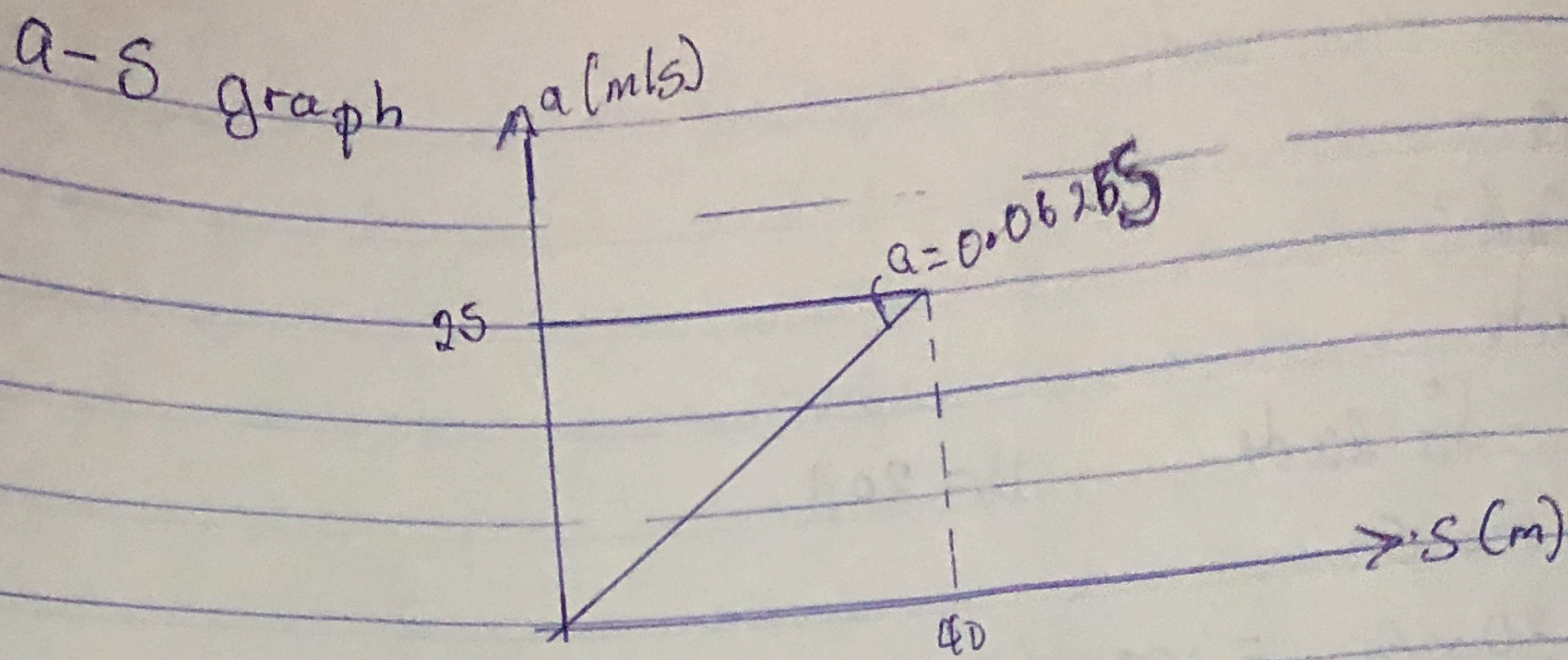
$$\frac{dv}{ds} = 0.25$$

$$a = (0.25 S) (0.25)$$

$$a = 0.0625 S \text{ m/s}^2$$

$$At = 5 = 40 \text{ m}$$

$$a = 0.0625 \times 40 = 2.5 \text{ m/s}^2$$



4.  $s = 3t^2$

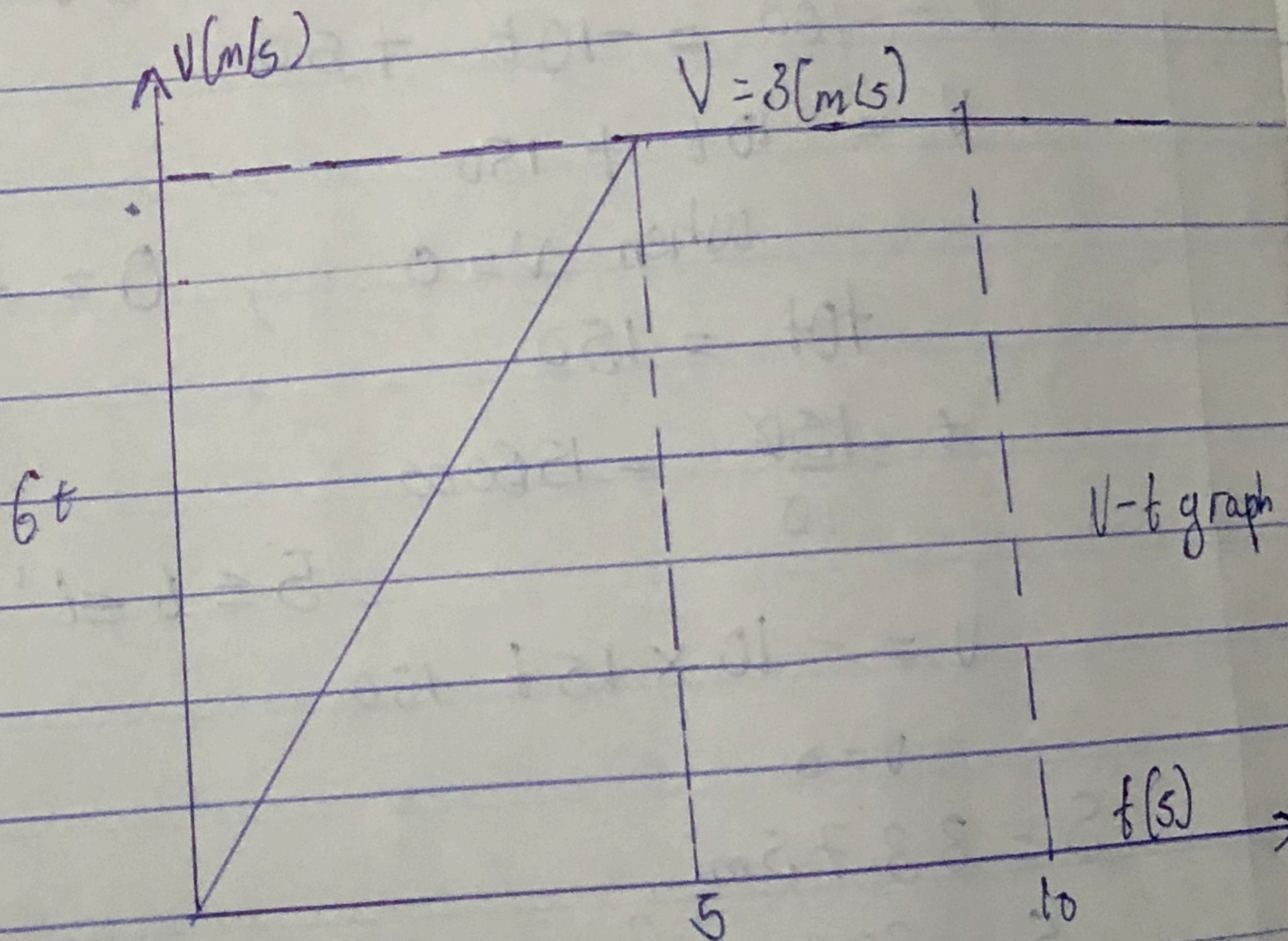
$0 < t < 5 \text{ secs}$

$v = \frac{ds}{dt} = 6t$        $v = 6 \times 5 = 30 \text{ m/s}$

$5 \leq t \leq 10 \text{ secs}$

$s = 30t = 75$

$v = 30 \text{ m/s}$

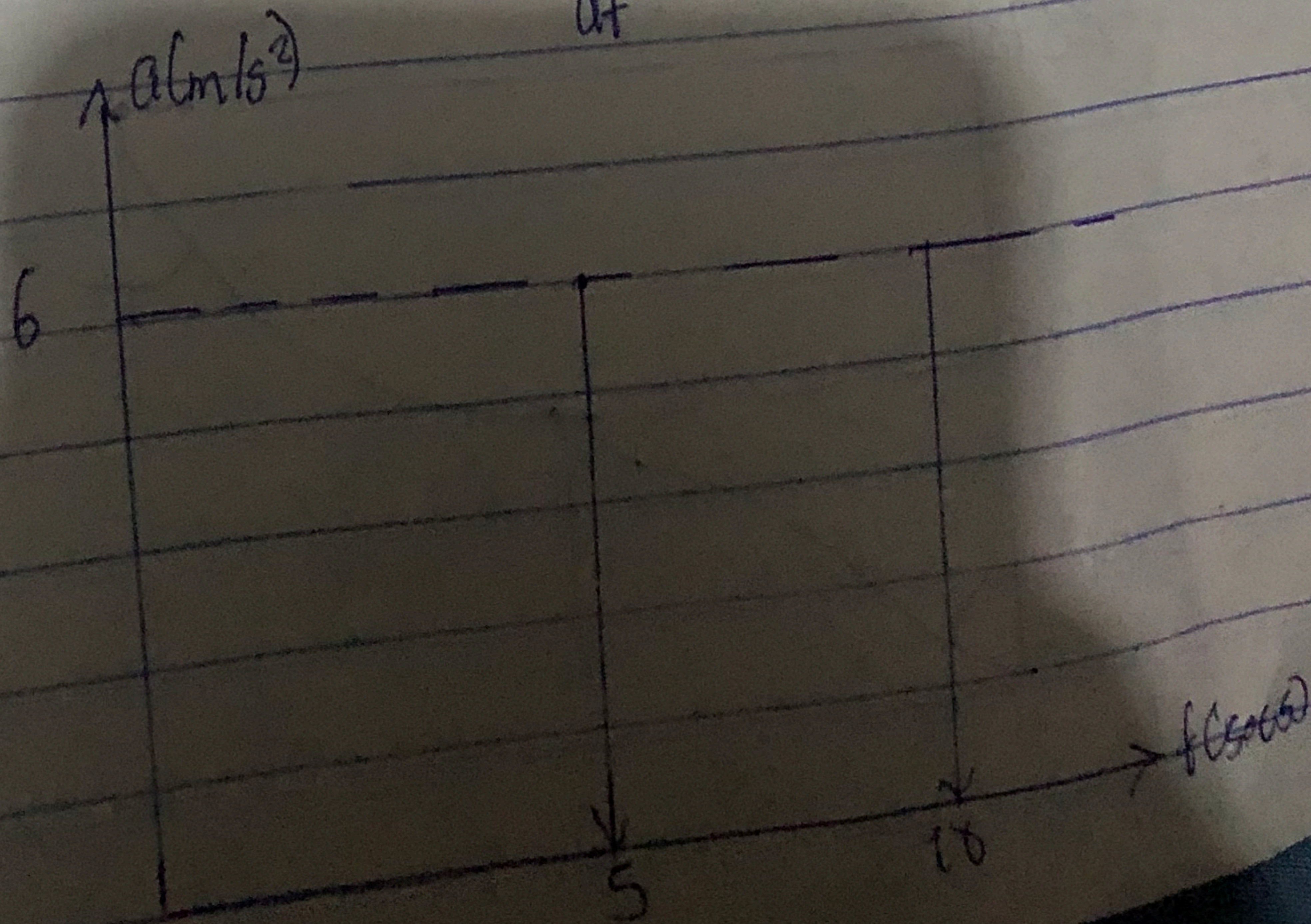


$v = 6t \text{ m/s}$

$0 \leq t \leq 5 \text{ secs}$

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

a-t graph.



$v = 30 \text{ m/s}$

$5 \leq t \leq 10 \text{ secs}$

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

$$5 \quad 0 \leq t \leq 5 \text{secs}$$

$$a = 20 \text{m/s}^2$$

$$dv = a dt$$

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

When  $t = 5$

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

$$5 \leq t \leq 10 \text{secs}$$

$$a = -10 \text{m/s}^2 \quad \int_{100}^v dv = \int_5^{t'} -10 dt$$

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

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

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

$$v = -10t + 150$$

$$\text{When } v = 0, \quad 0 = -10t + 150$$

$$10t = 150$$

$$t = \frac{150}{10} = 15 \text{secs}$$

$$5 \leq t \leq t' \quad t' = 15 \text{secs}$$

$$v = -10 \times 15 + 150$$

$$v = 0$$

$$s = 3375 \text{m}$$

$$s = 3375 \text{m (Total distance covered)}$$

$\uparrow$   $s(\text{m})$

