

Chidi Milestone Miralle  
18/ENG 01/005

Chemical Engineering  
Mechanics Assignment

2)  $v = -4t + 80$

$s = \int -4t + 80$

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

When  $t = 0$  ;  $s = 0$

$0 = -2(0)^2 + 80(0) + C$

$0 = 0 + 0 + C$

$C = 0$

∴ When  $t = 0$

$s = -2(0)^2 + 80(0) + 0$

$s = 0$  ----- (1)

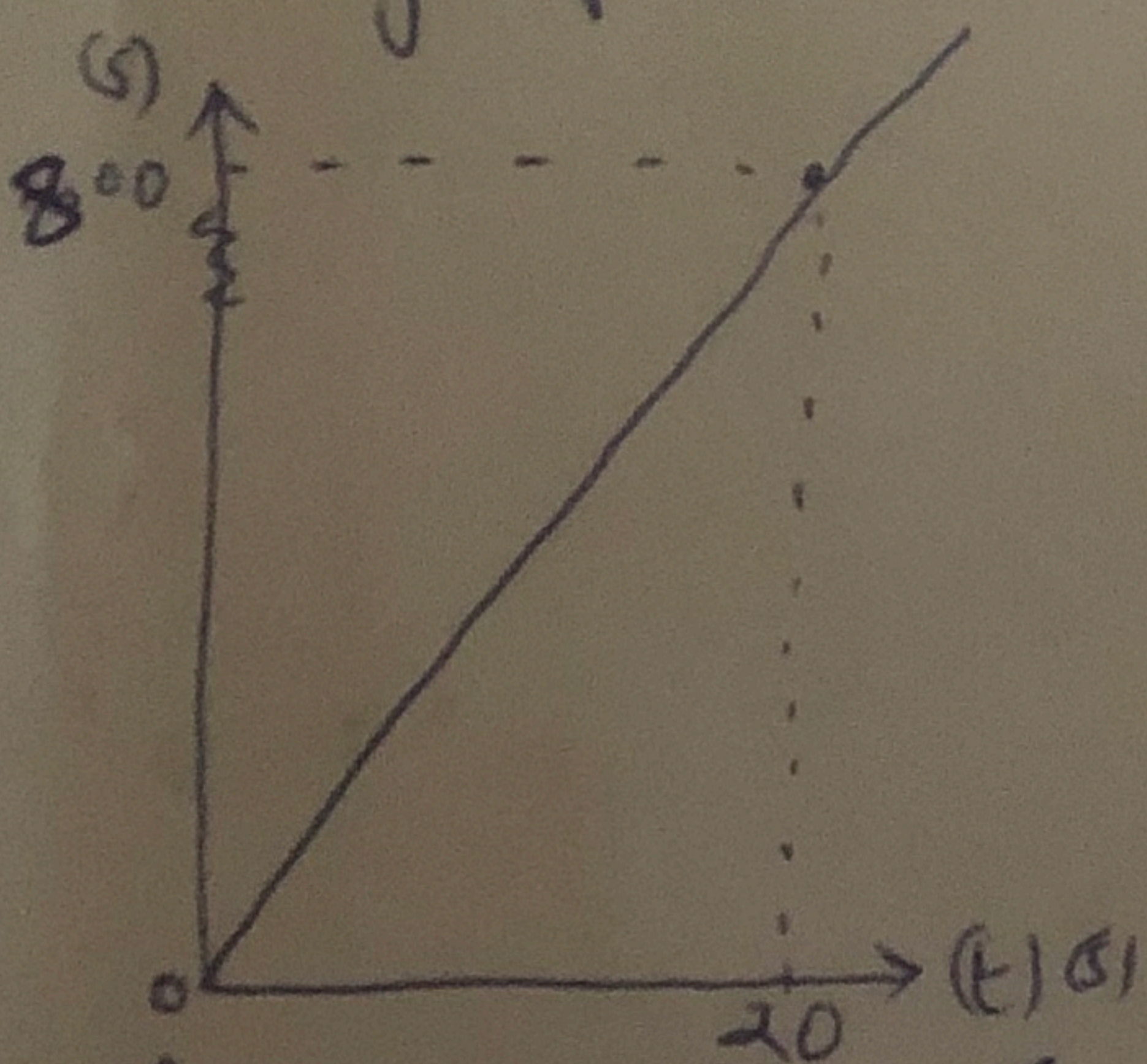
When  $t = 20$

$s = -2(20)^2 + 80(20) + 0$

$s = -800 + 1600 + 0$

$s = 800m$  ----- (2)

s-t graph



finding a-t graph

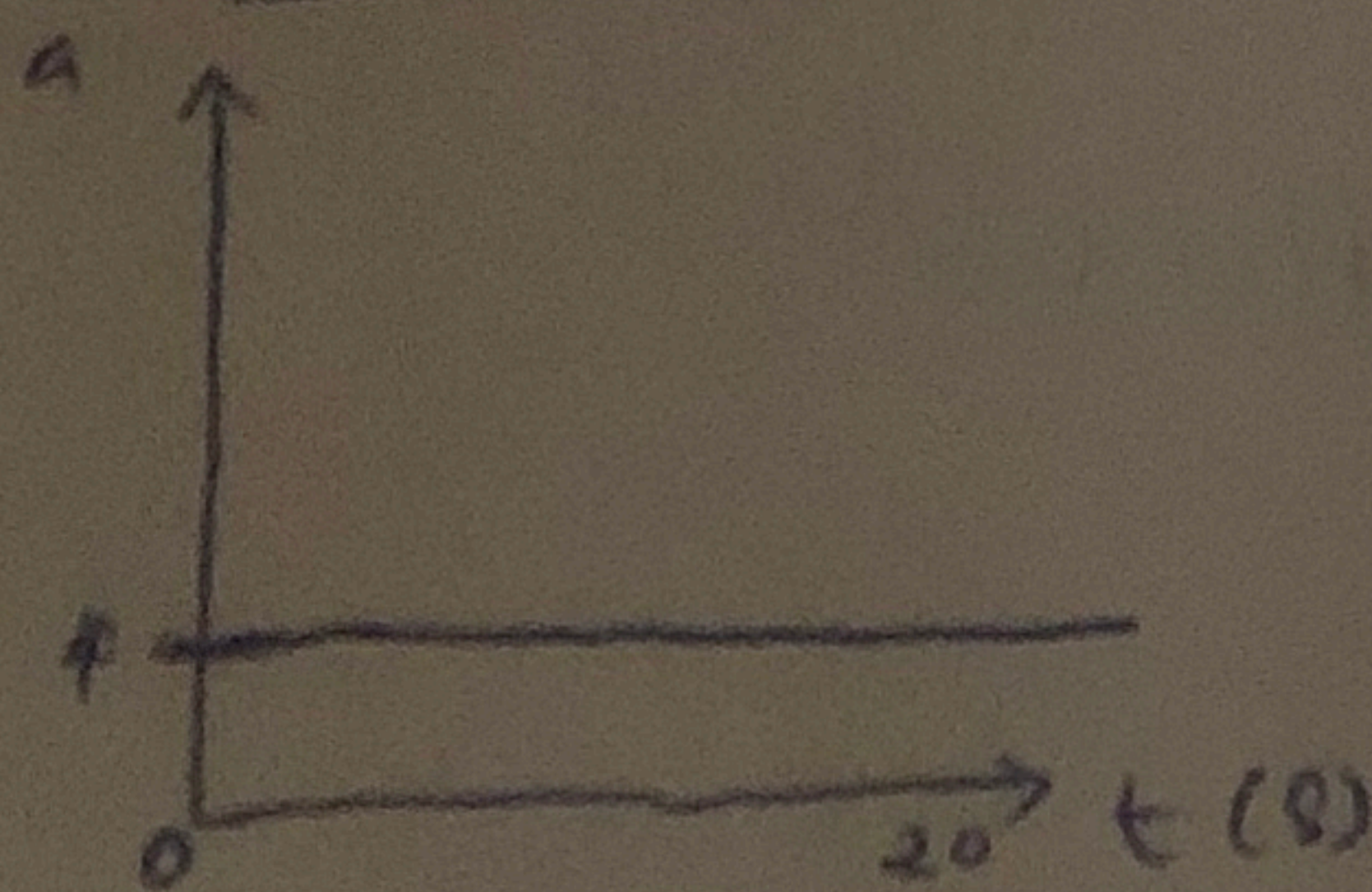
$v = -4t + 80$

$a = \frac{dv}{dt} = -4$

acceleration is  $4m/s^2$

∴ The acceleration is uniform

a-t graph



Number 3

3)  $v = 0.25s$

$a = v \frac{dv}{ds} = (0.25s) \cdot 0.25$

$a = 0.0625s$

When  $s = 0$

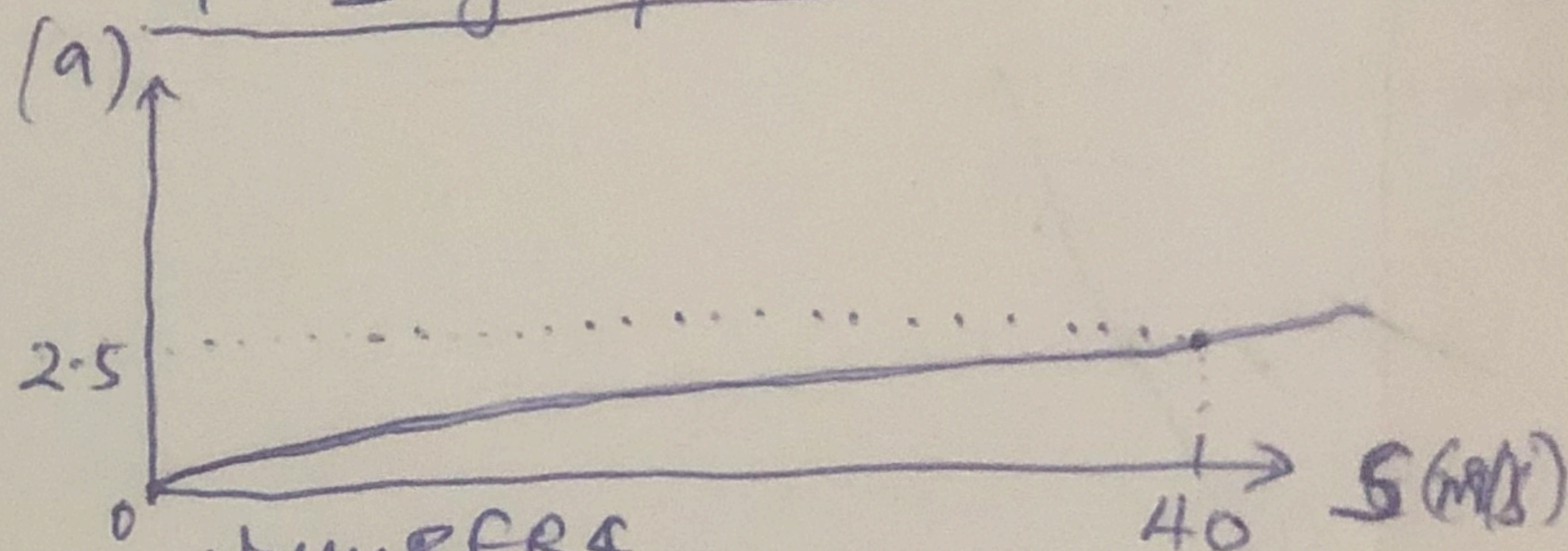
$a = 0$  ----- (1)

∴  $s = 40$

$a = 0.0625(40)$

$a = 2.5m/s^2$  ----- (2)

a-s graph



4) for (time = 5)

$s = 3t^2$  ∴  $v = 6t$  ∴  $a = 6$

∴ When  $t = 5$

$v = 6(5) = 30$  ;  $a = 6$  ----- (1)

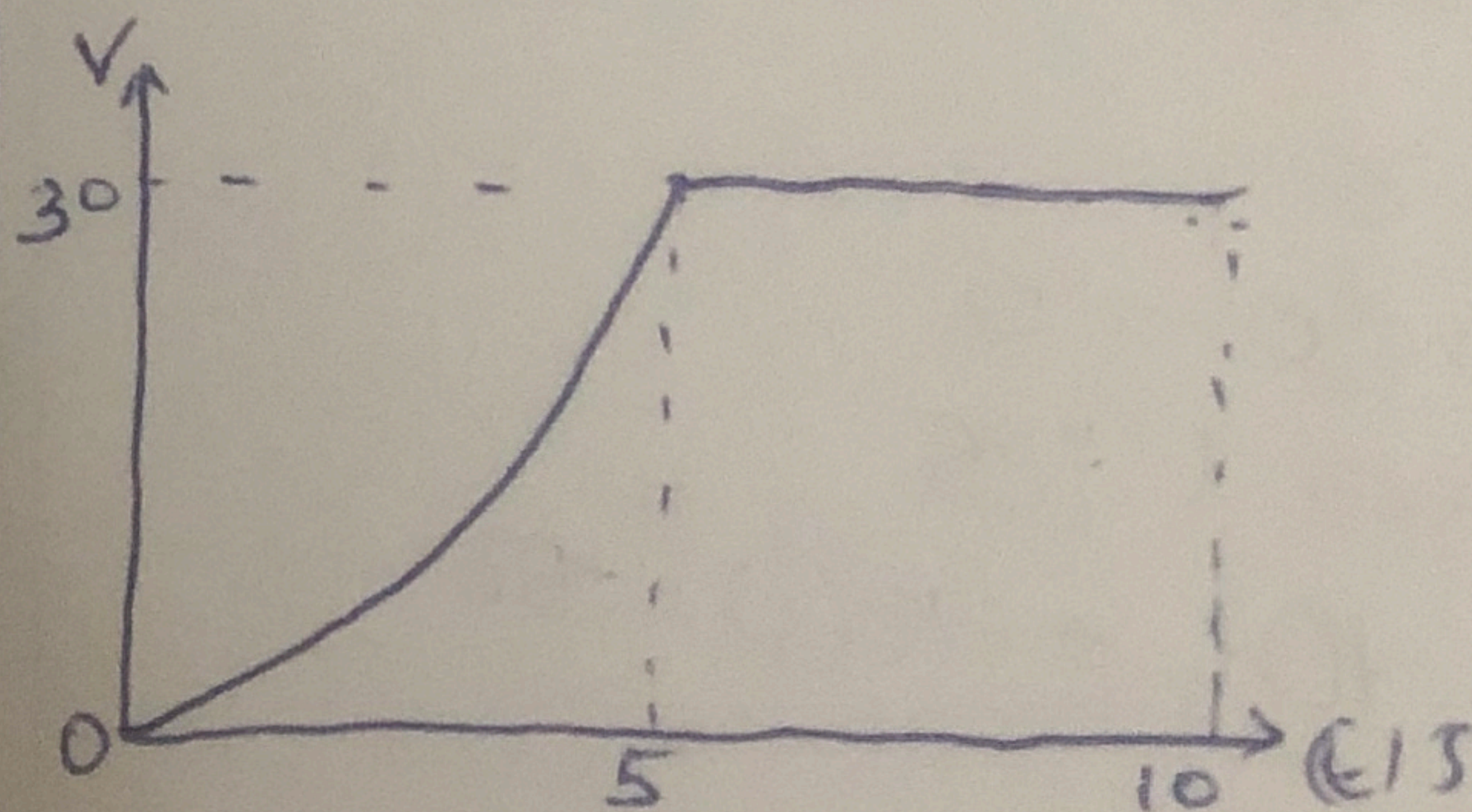
When  $t = 10$  ;  $a = 6$  ----- (2)

$v = 6(10) = 60$  ;  $a = 6$

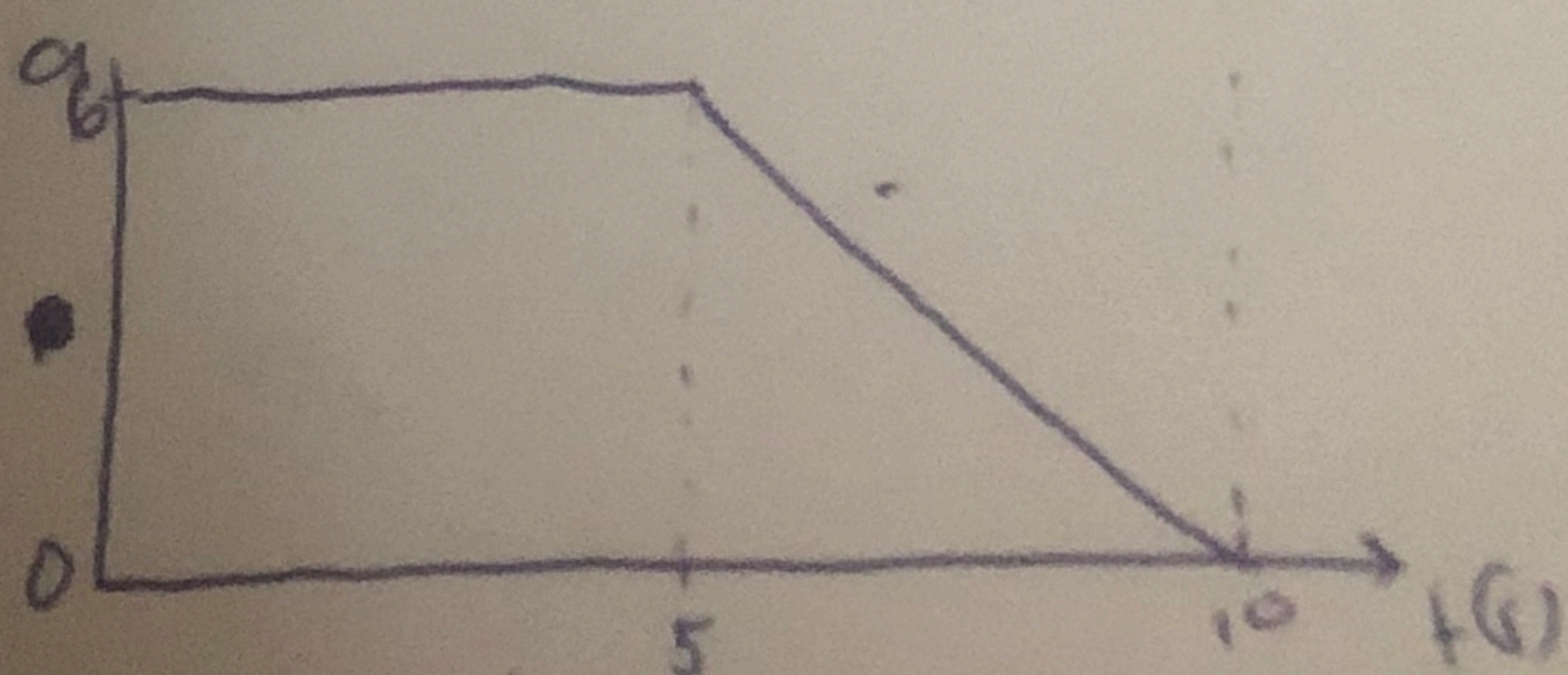
When  $t = 10$

$s = 225$  ;  $v = 30$  ;  $a = 0$  ----- (3)

v-t graph



a-t graph



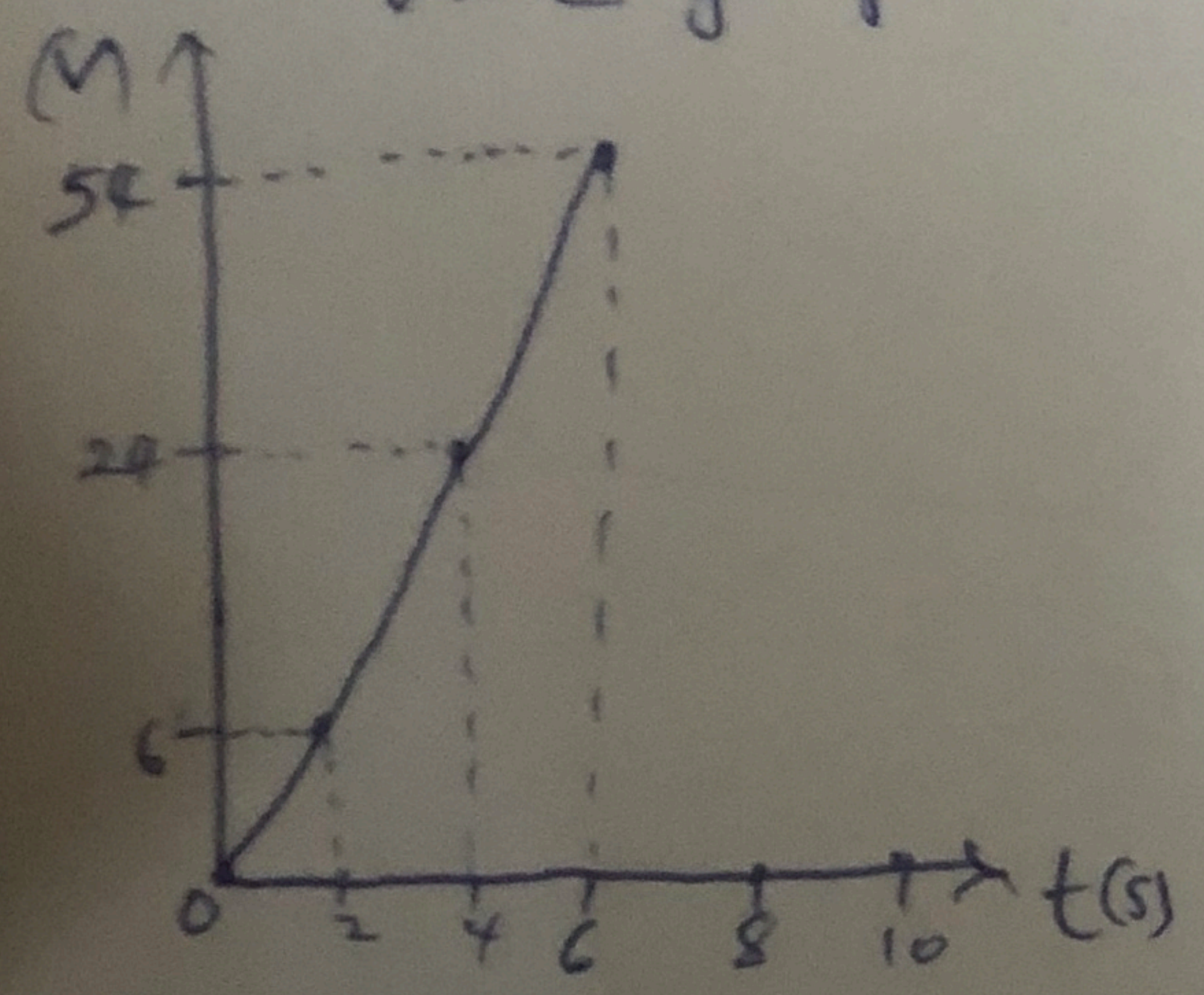
∴ At 5-10 time there is a deceleration of the car.



NUMBER 1

1)  $s = 0.5t^3$   
 $v = \frac{ds}{dt} = 1.5t^2$   
 when  $t = 6$  when  $t = 0$   
 $s = 108$  ;  $s = 0$

$\therefore$  when  $t = 0$   
 $v = 1.5(0)^2 = 0$  --- (1)  
 when  $t = 6$   
 $v = 1.5(6)^2 = 54 \text{ m/s}$  --- (2)  
 when  $t = 8$  and  $10$   
 $s = 108$  ;  $v = 0$  --- (3)  
 v-t graph



when  $t = 2$   
 $v = 1.5(2)^2 = 6 \text{ m/s}$   
 when  $t = 4 \text{ m/s}$   
 $v = 1.5(4)^2 = 24 \text{ m/s}$

NUMBER 5

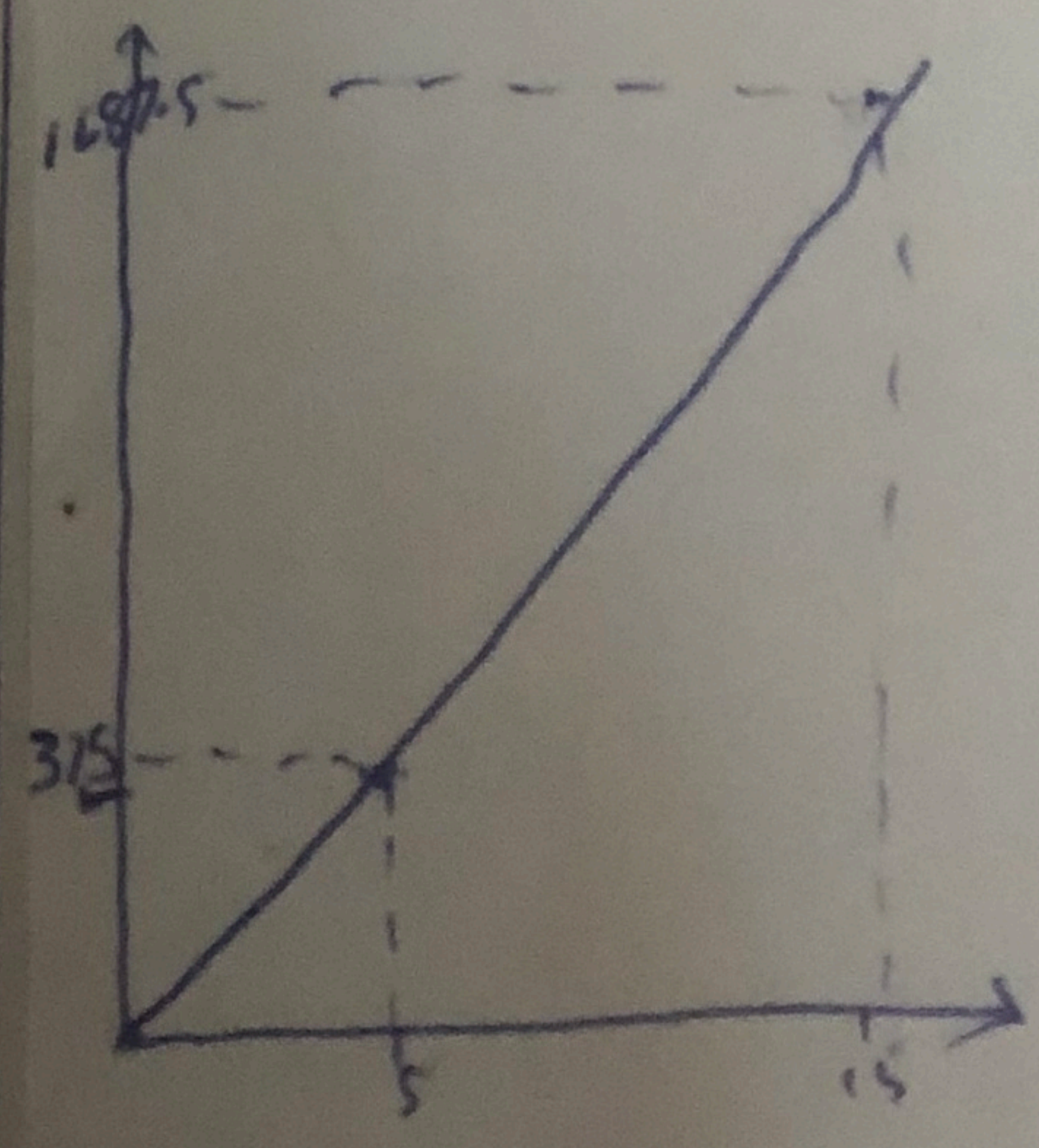
5) acceleration = 20 when  $t = 0$   
 $\therefore$  velocity:  $\int a = 20t + c$   
 $\therefore$  when  $v = 0$ ;  $t = 0$   
 $c = 0 = 20(0) + c$   
 $\therefore c = 0$   
 when  $t = 0$   
 $v = 20(0) + 0 = 0$   
 $a = 10$  when  $t = 5$   
 $v = \int a dt = 10t = 10(5) = 50$   
 when  $t = t'$   
 $a = 0 \therefore v = 0$

NUMBER 6

6)  $v = 30t$  (from  $0 \leq t \leq 5$ )  
 $s = \int dv = \int 30t = 15t^2 + c$   
 finding  $c$   
 when  $s = 10$   $t = 0$   
 $0 = 15(0)^2 + c$   
 $c = 0$

$\therefore$  when  $t = 5$   
 $s = 15(5)^2 + 0$   
 $s = 375 \text{ m}$   
 $v = -15t + 225$   
 $s = \int v = -7.5t^2 + 225t + c$   
 when  $s = 0$   $t = 0$   $c = ?$

$0 = -7.5(0)^2 + 225(0) + c$   
 $c = 0$   
 when  $t = 15$   
 $s = -7.5(15)^2 + 225(15) + 0$   
 $s = 1687.5 \text{ m}$   
 Total distance = 1687.5 m  
 s-t graph

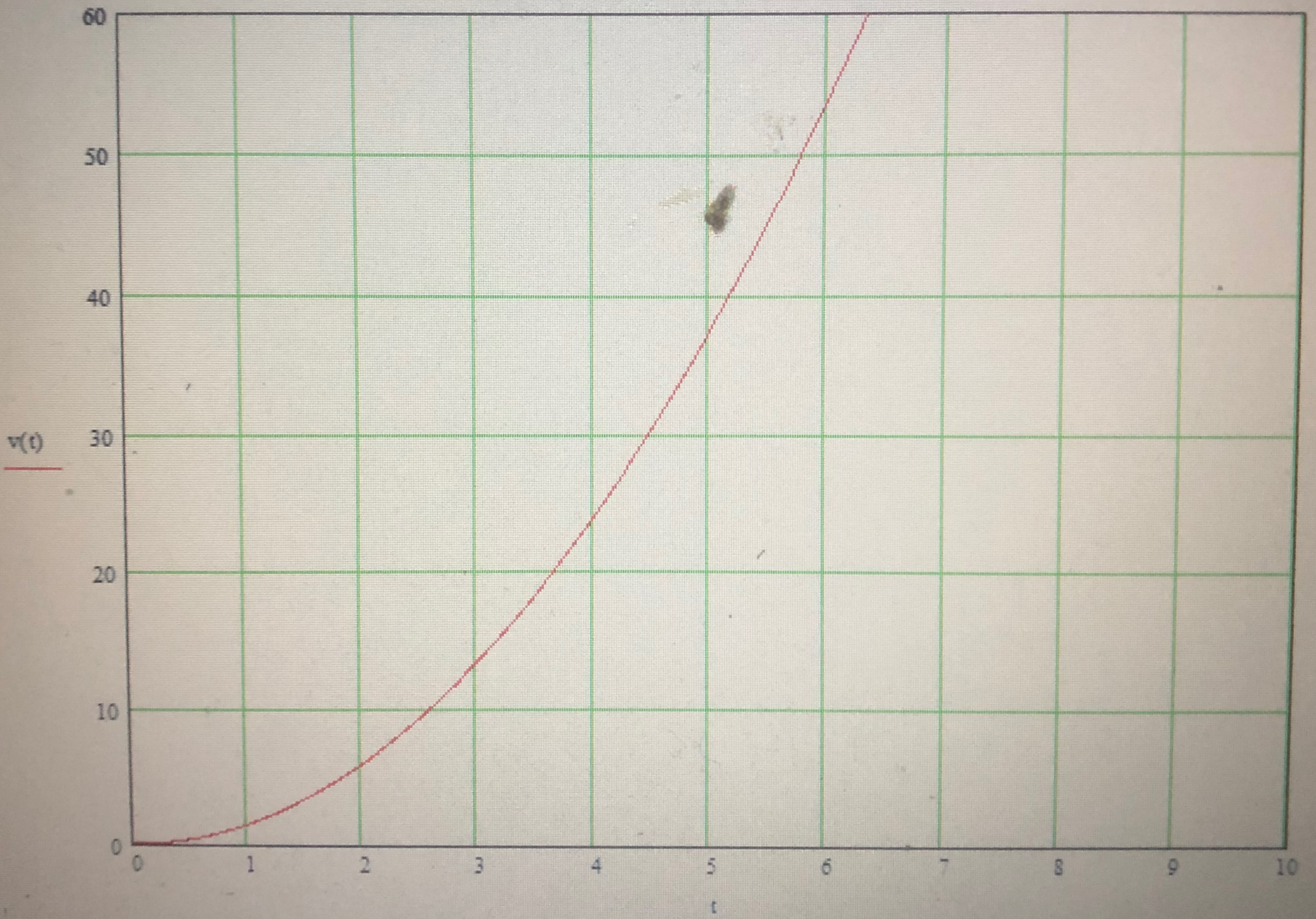




# NUMBER 1

V - Tgraph

$$v(t) = 1.5 \cdot t^2$$

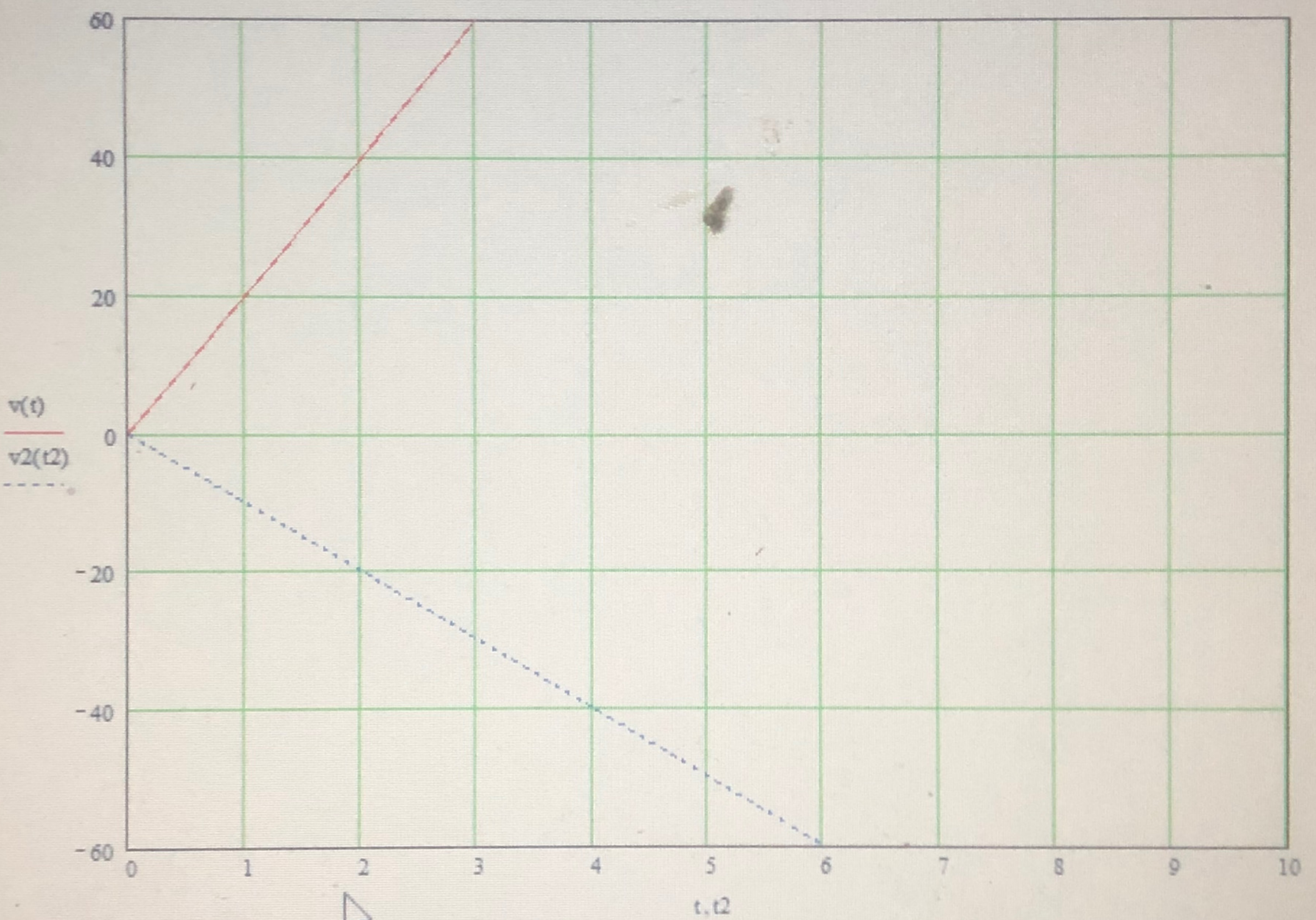


# NUMBER 5

V - Tgraph

$$v(t) = 20 \cdot t$$

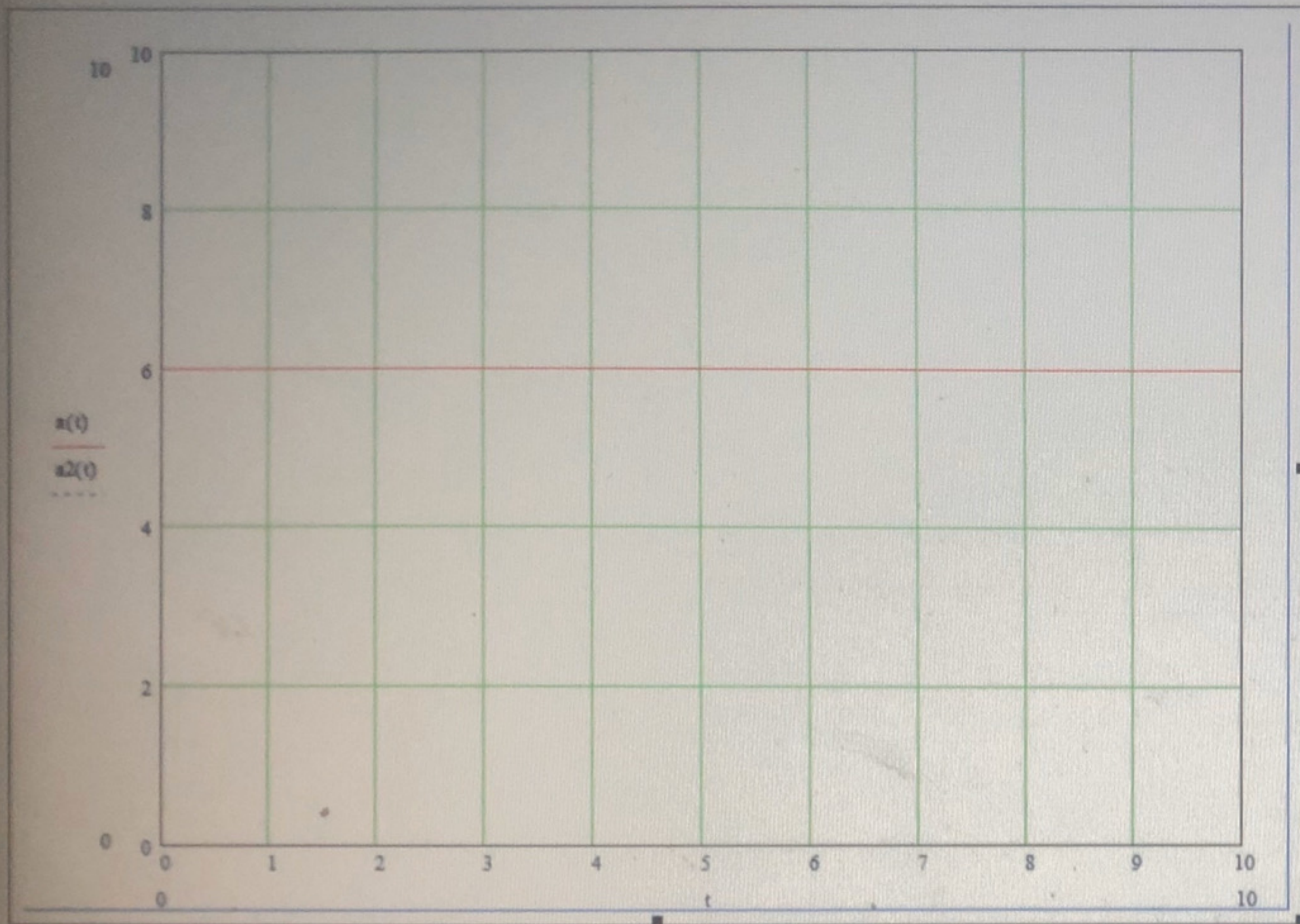
$$v_2(t_2) = -10 \cdot t_2$$





A - Tgraph

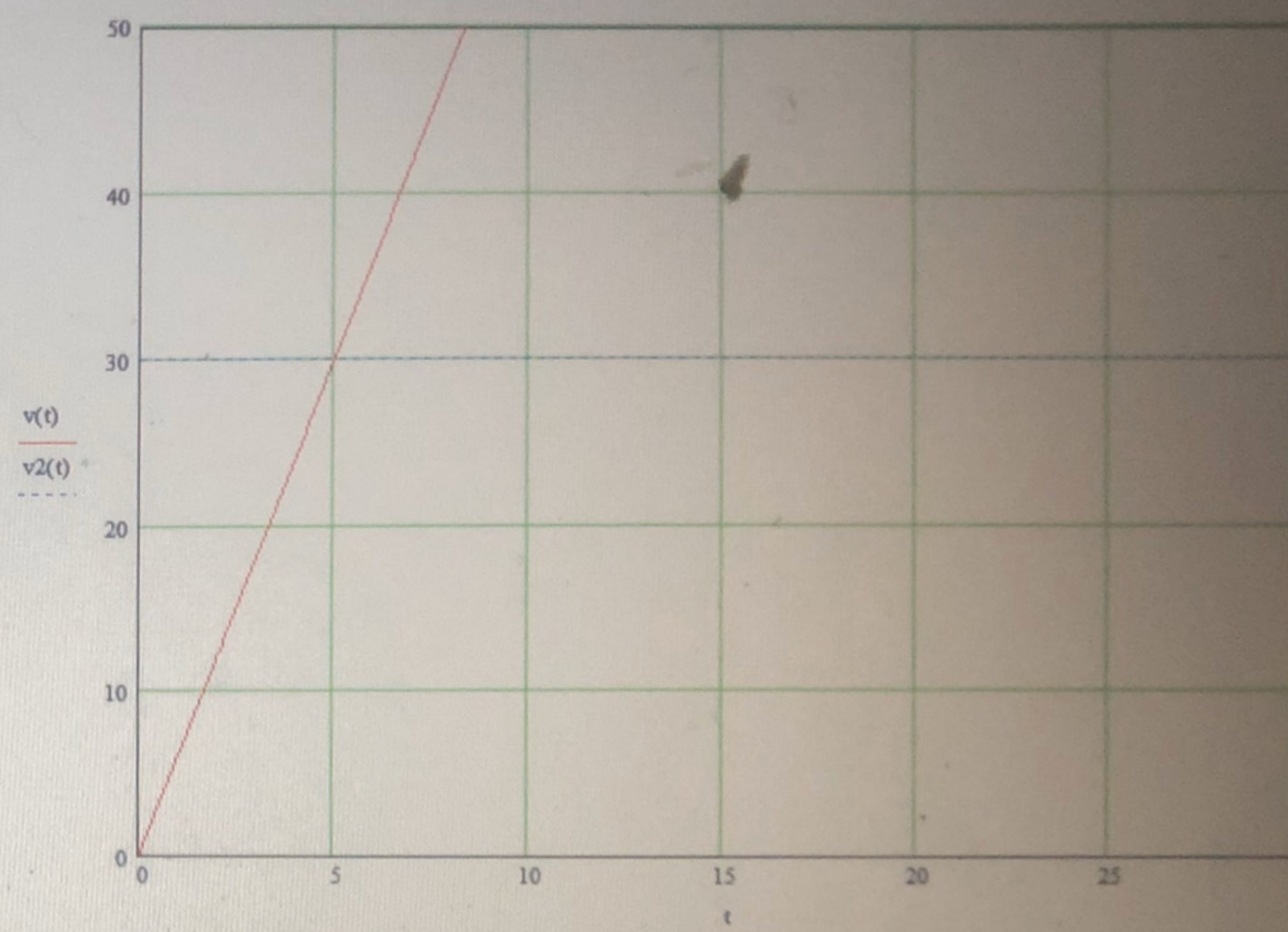
$$a_1(t) = 6 \quad a_2(t) = 0$$



NUMBER 4

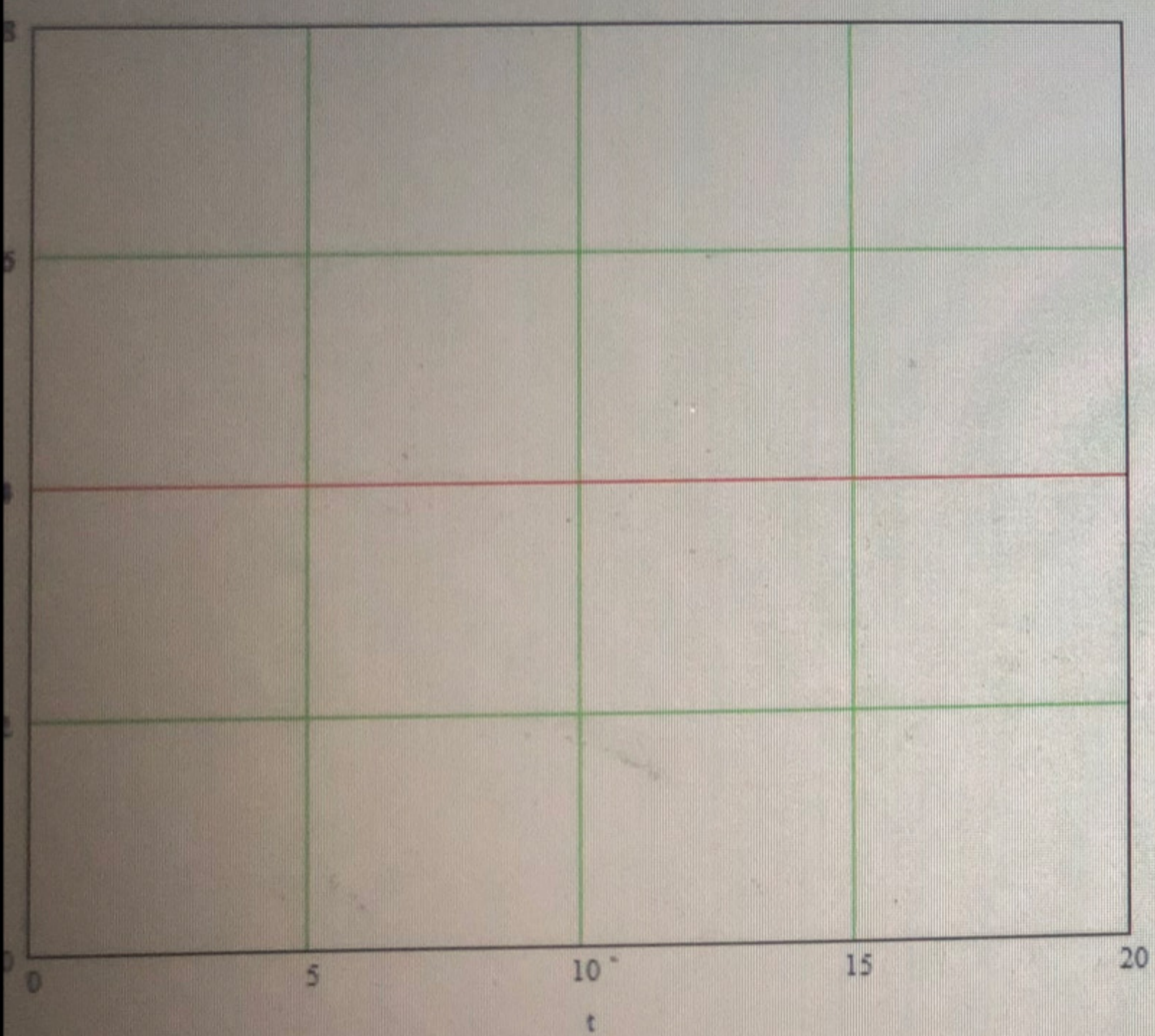
V - Tgraph

$$v_1(t) = 6 \cdot t \quad v_2(t) = 30$$



A - Tgraph

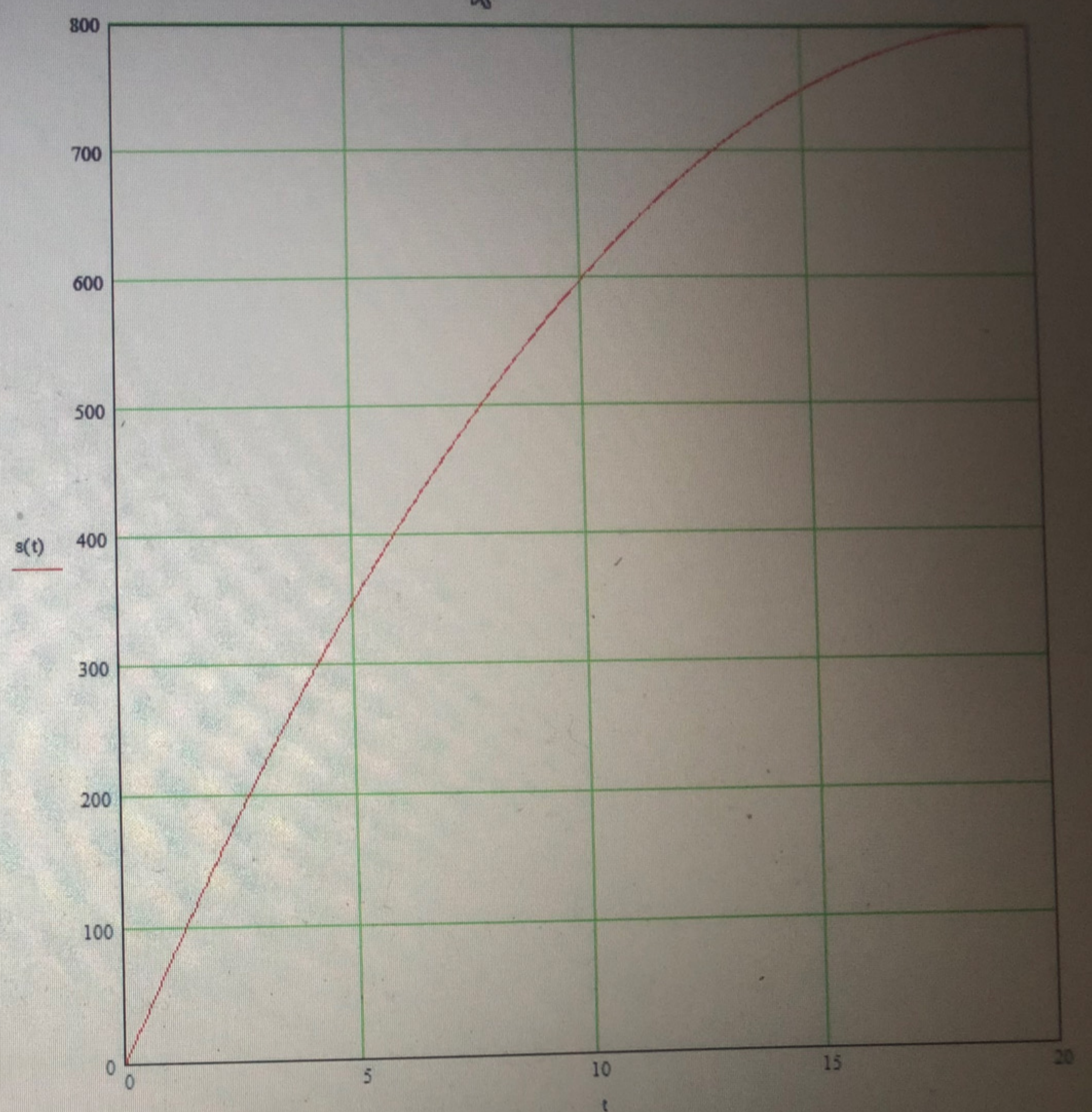
$$a(t) = -4$$



NUMBER 2

$$s(t) = -2 \cdot t^2 + 80 \cdot t + 0$$

S - Tgraph





# NUMBER 6

S - T graph

$$s(t) = 15 \cdot t^2 \quad s_2(t) = -7.5 \cdot t^2 + 225 \cdot t$$

