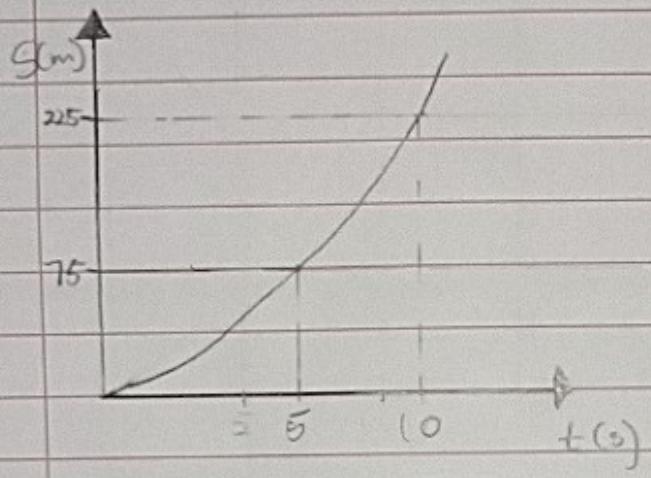
Q1 (F12-12)

Construct the v-t and a-t graph



Solutions:

V-T

$V = ds/dt$

at $0 \leq t \leq 5$

$S = 3t^2$

$V = 6t$

at $t = 5$, $V = 30$ m/s

at $5 \leq t \leq 10$

$S = 30t - 75$

$V = 30$

at $t = 10$, $V = 30$ m/s

a-t

$a = dv/dt$

at $0 \leq t \leq 5$

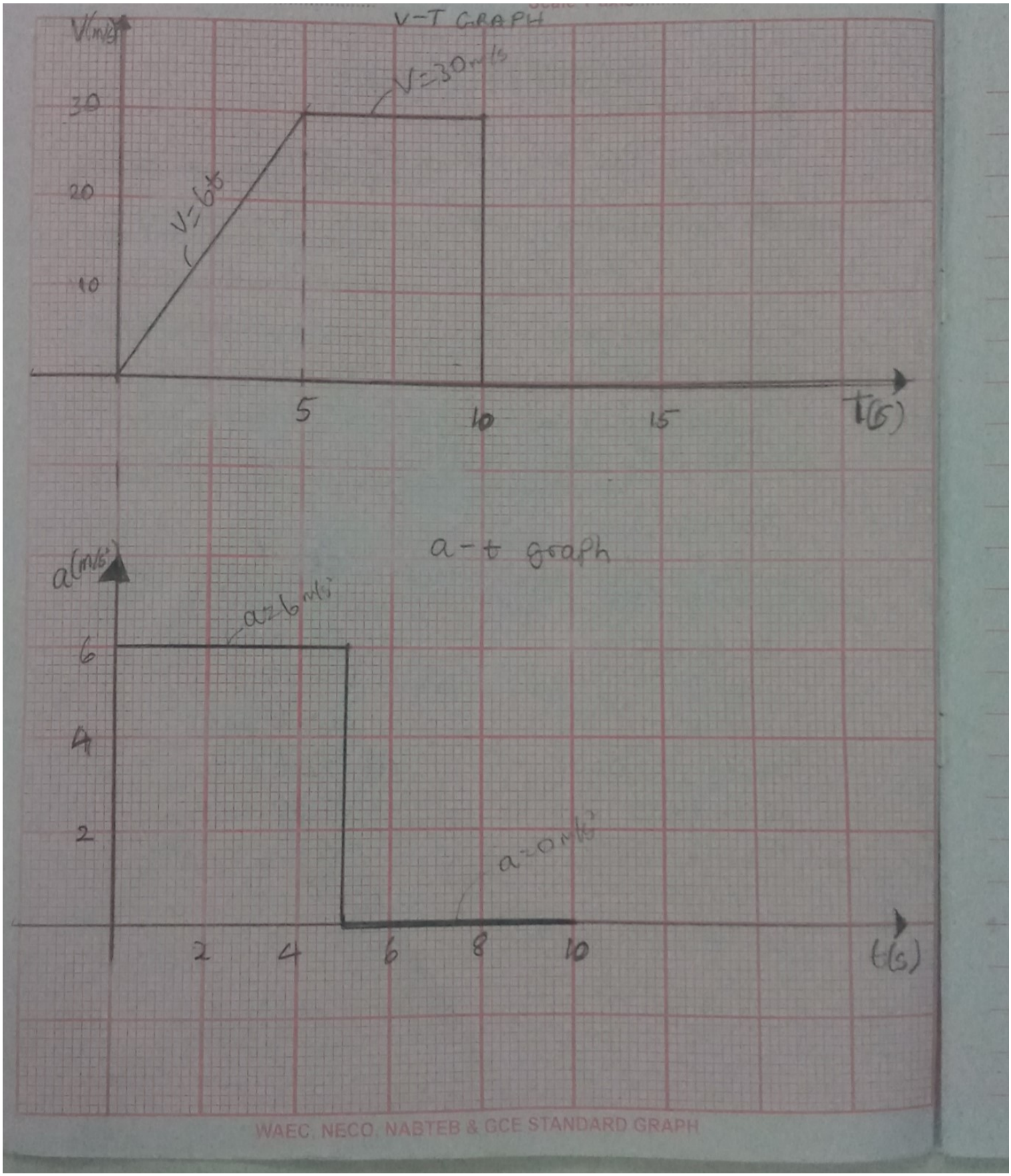
$V = 6t$

$a = 6$ m/s^2

at $5 \leq t \leq 10$

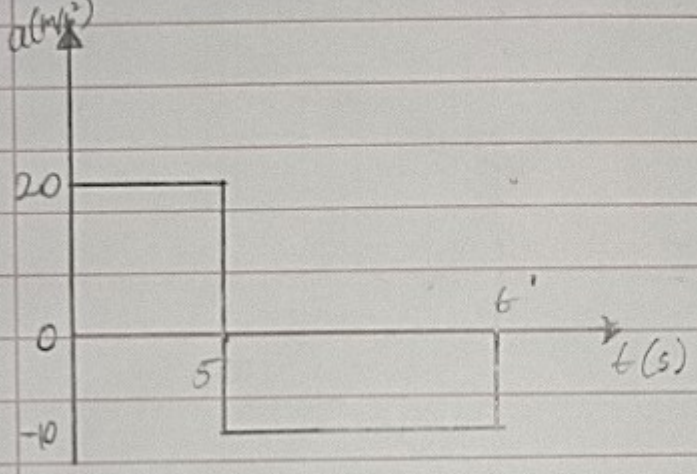
$V = 30$ m/s

$a = 0$ m/s^2



Q2 (F12-13)

Construct the V-t graph for $0 \leq t \leq t'$



Solution:

at $0 \leq t \leq 5$,

$dv = a\,dt$

$\int_0^v dv = \int 20\,dt$

$V = 20t$

at $t = 5s$,

$V = 20(5) = 100 m/s$

at $5 \leq t \leq t'$

$a = -10$

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

$V|_{100}^{v} = -10t|_5^t$

$V - 100 = -10t + 50$

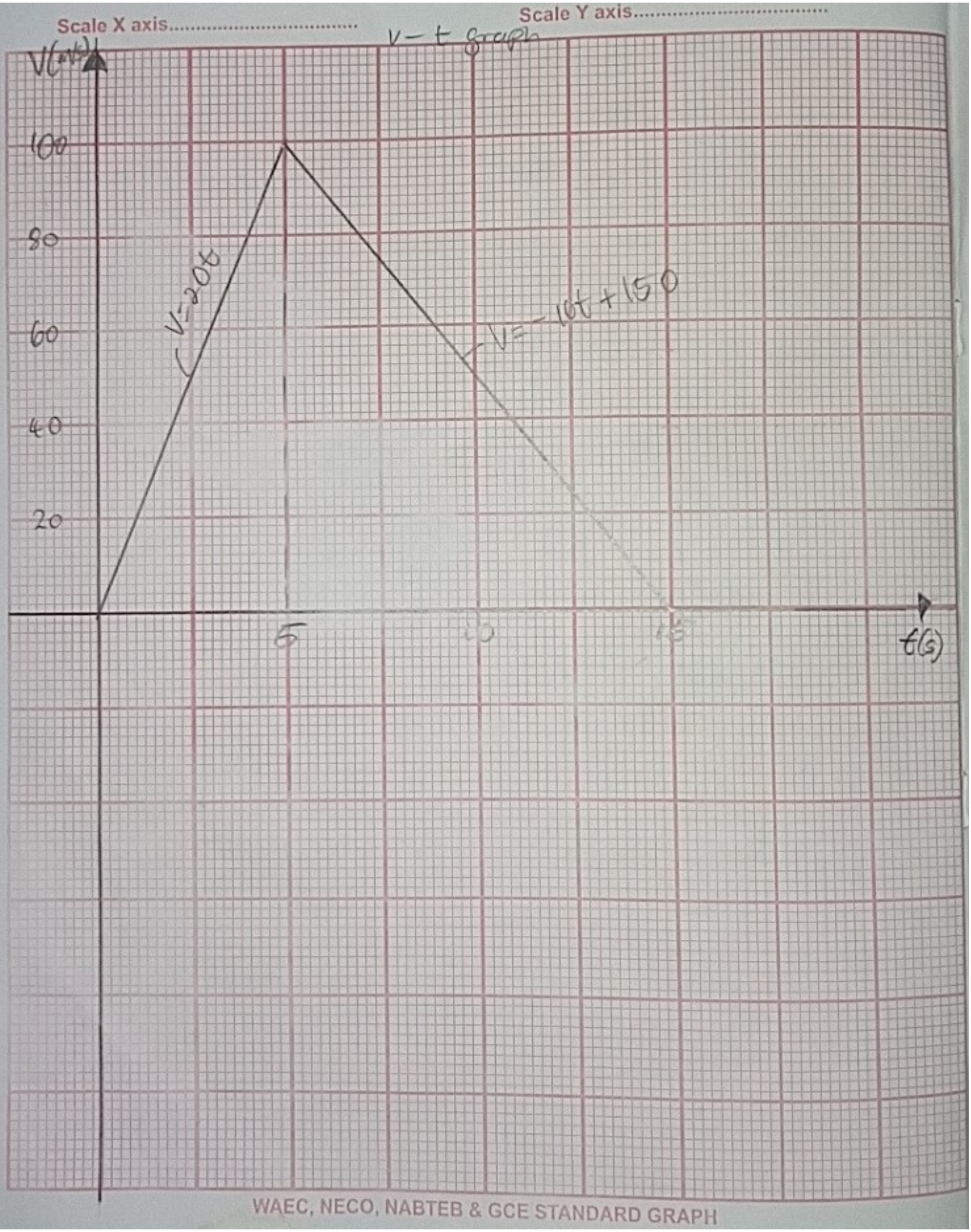
$V = -10t + 150$

at $t = t'$, $V = 0$,

$\therefore t = \frac{0 - 150}{-10} = 15$

Scale X axis.....

Scale Y axis.....

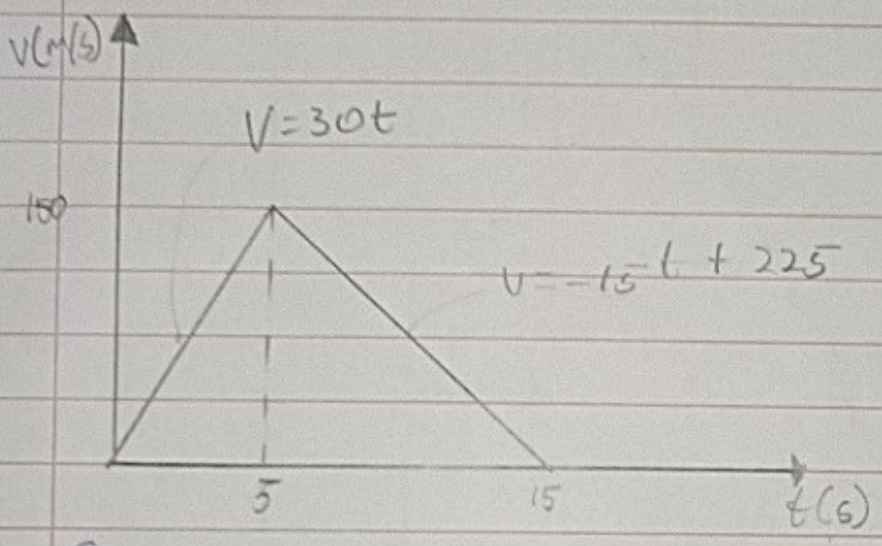


WAEC, NECO, NABTEB & GCE STANDARD GRAPH

Q3 (F12-14)

Construct the s-t graph

$0 \leq t \leq 15s$, find the total distance



Solution:

$\int_0^s ds = \int_0^t v\,dt$

$0 \leq t \leq 5$

$V = 30t$

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

$S = 15t^2$

at $t = 5s$, $S = 15(5)^2 = 375m$

at $5 \leq t \leq 15$

$V = -15t + 225$

$\int_{375}^{s} ds = \int_5^t (-15t + 225)\,dt$

$S - 375 = -15/2\,t^2 + 225t \Big|_5^t$

$S - 375 = \frac{-15}{2}t^2 + 225t - \left(\frac{-15}{2}(5^2) + 225(5)\right)$

$S - 375 = -15/2\,t^2 + 225t + 15/2\,(5^2) - 225(5)$

$S - 375 = -15/2\,t^2 + 225t - 937.5$

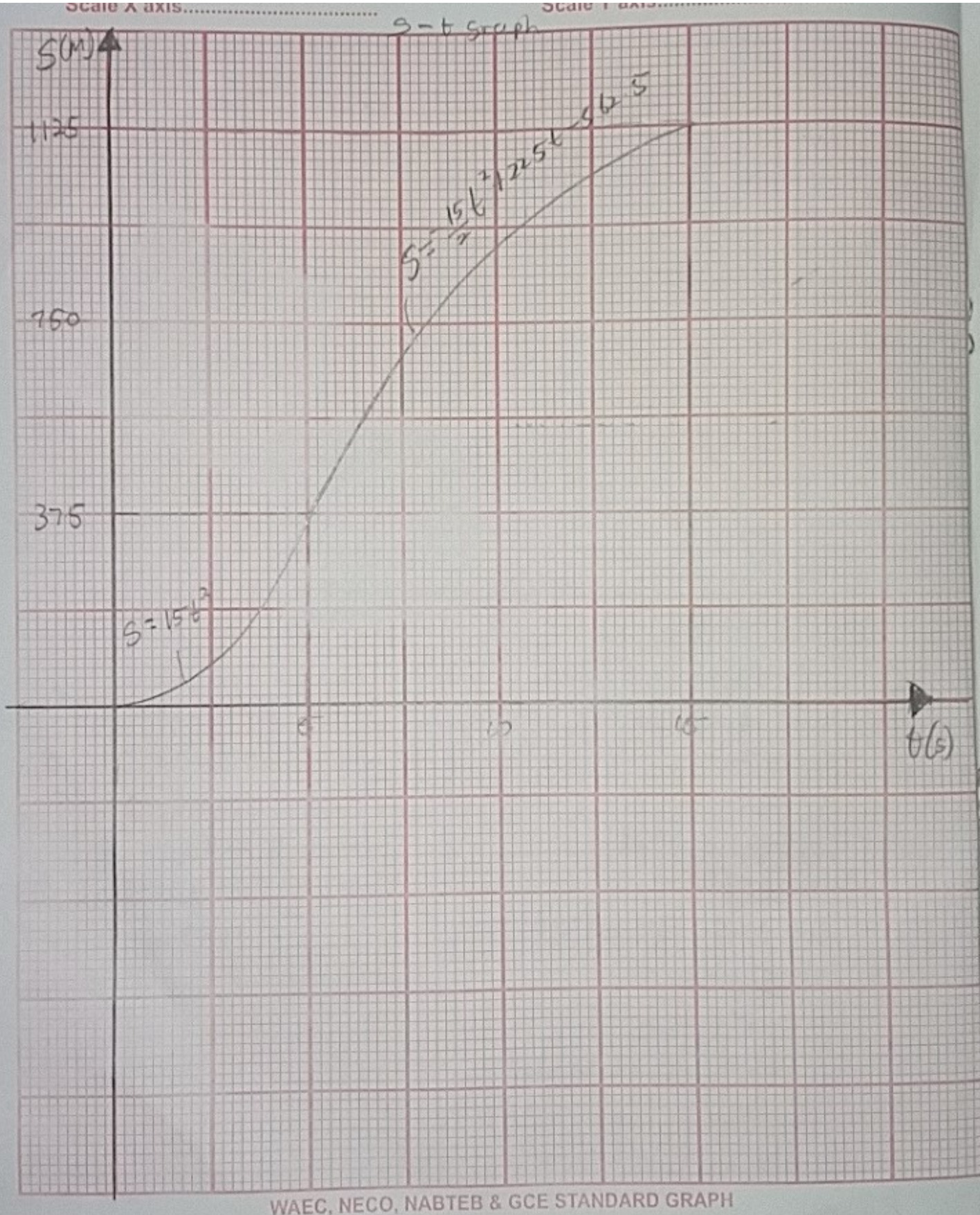
$S = \frac{-15}{2}t^2 + 225t - 562.5$

When $t = 15s$,

$S = \frac{-15}{2}(15)^2 + 225(15) - 562.5$

$S = 1125m$

Scale X axis..... Scale Y axis.....

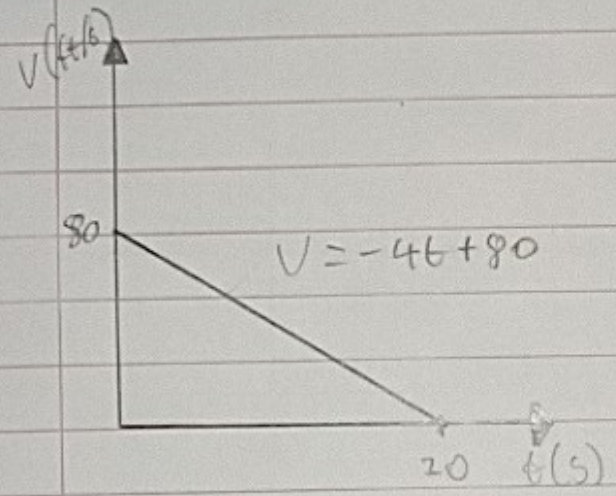


WAEC, NECO, NABTEB & GCE STANDARD GRAPH

Q4 (F12-10)

Construct the s-t and the a-t graphs

take s=0, when t=0



a-t

$a = dv/dt$

$V = -4t + 80, \quad t = 20$

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

s-t

$V = ds/dt$

$\int_{s_0}^{s} ds = \int_{t_0}^{t} V\,dt$

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

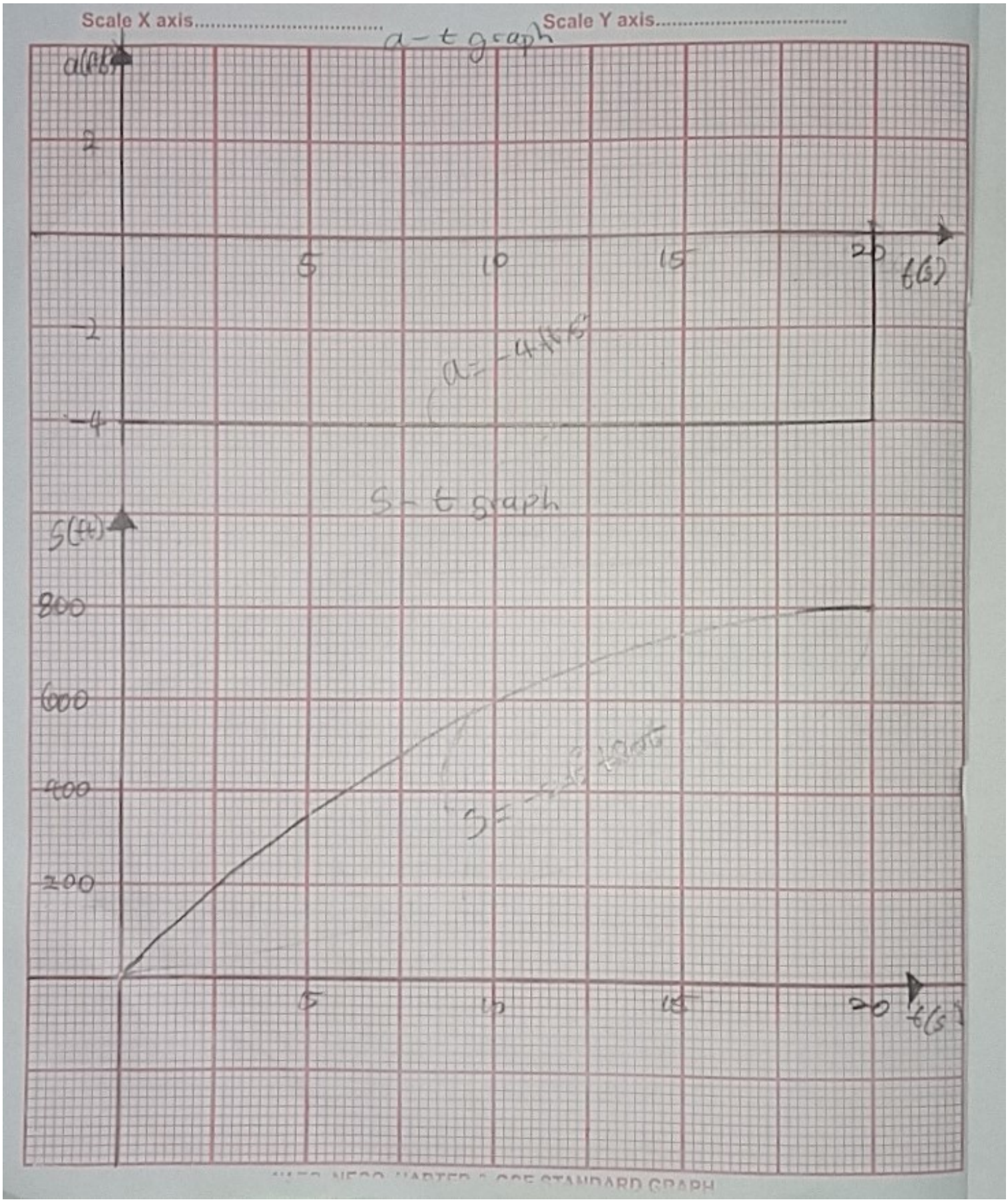
$s = -2t^2 + 80t - (-2(0)^2 + 80(t))$

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

when $t = 20s$,

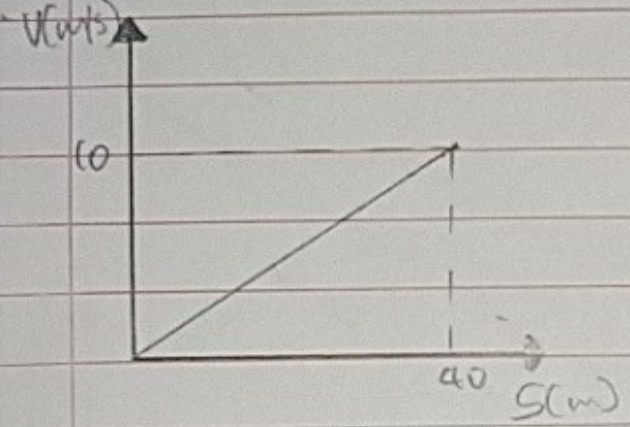
$s = -2(20)^2 + 80(20) = 800$ ft

Scale X axis..... Scale Y axis.....



Q5 (F12-11)

Construct the a-s graph



Solution

$V\,dv = a\,ds$

$V = 0.25s$

$dv/ds = 0.25$

$dv = 0.25\,ds$

$a\,ds = v\,dv$

$a\,ds = (0.25s)\cdot(0.25\,ds)$

$a = 0.25s \cdot 0.25$

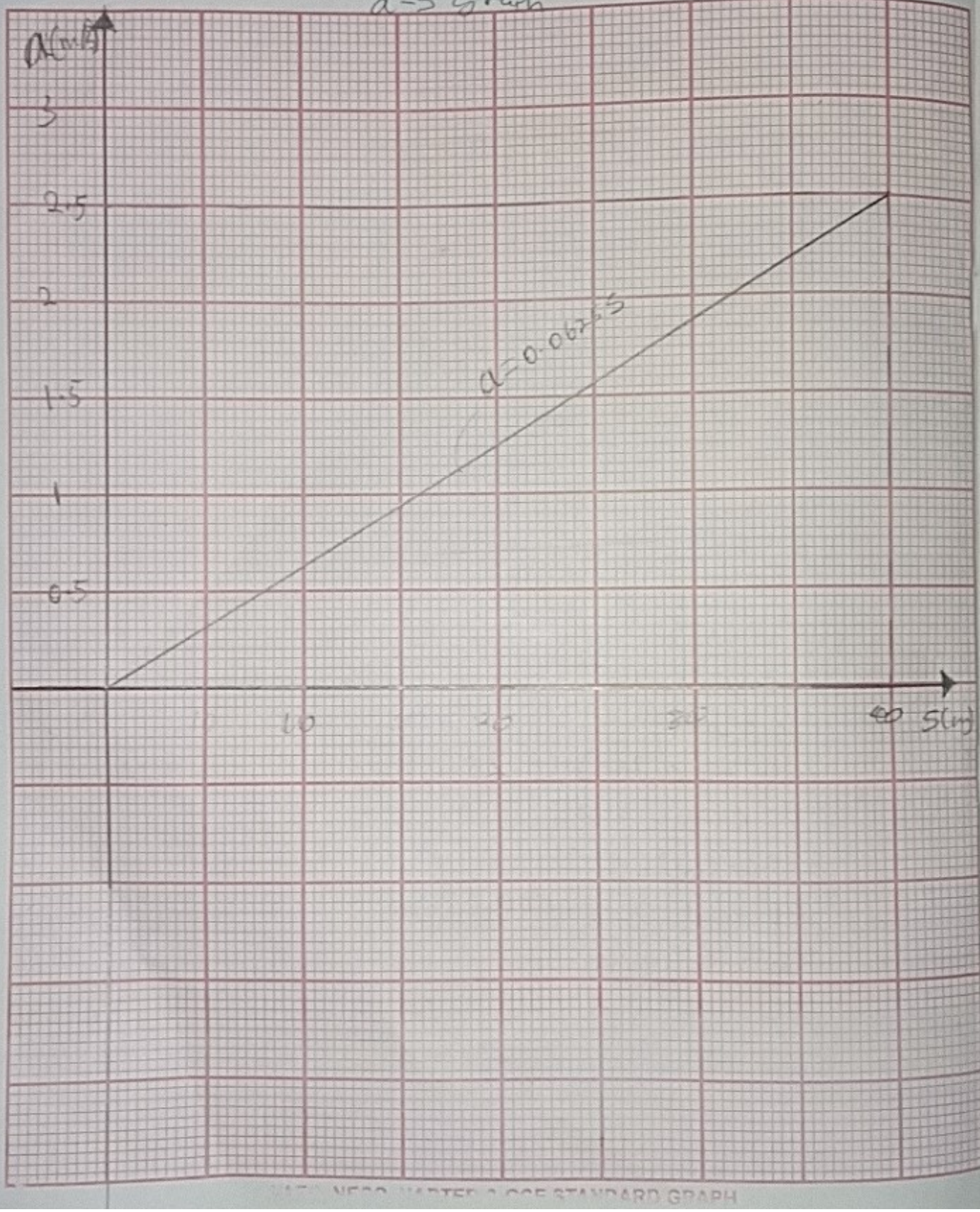
$a = 0.0625s$

at $s = 40$, $a = 0.0625(40)$

$a = 2.5 m/s$

Scale X axis.....

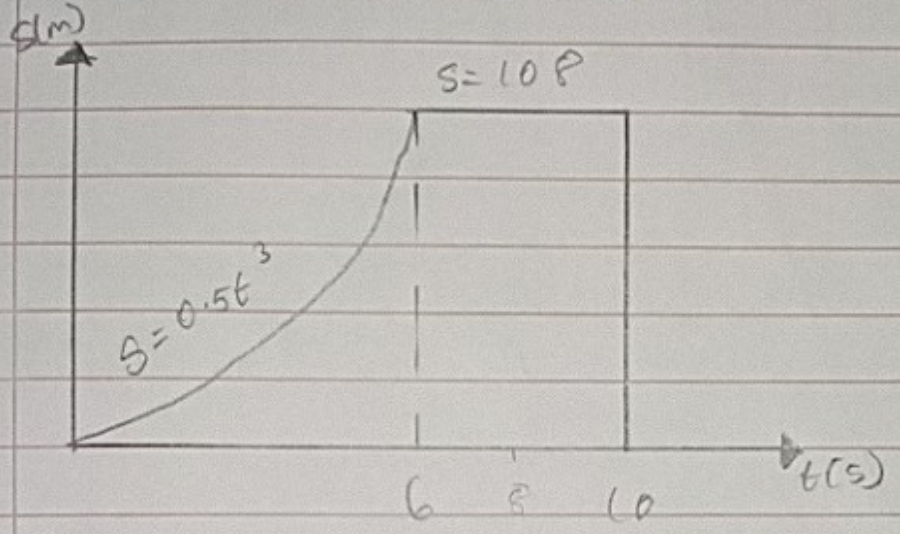
a-s Graph



NEED HELP? SEE STANDARD GRAPH

Q6 (F12-9)

Construct the V-t graph



Solution

V-t

$0 \leq t \leq 6$

$V = ds/dt$, $s = 0.5t^3$

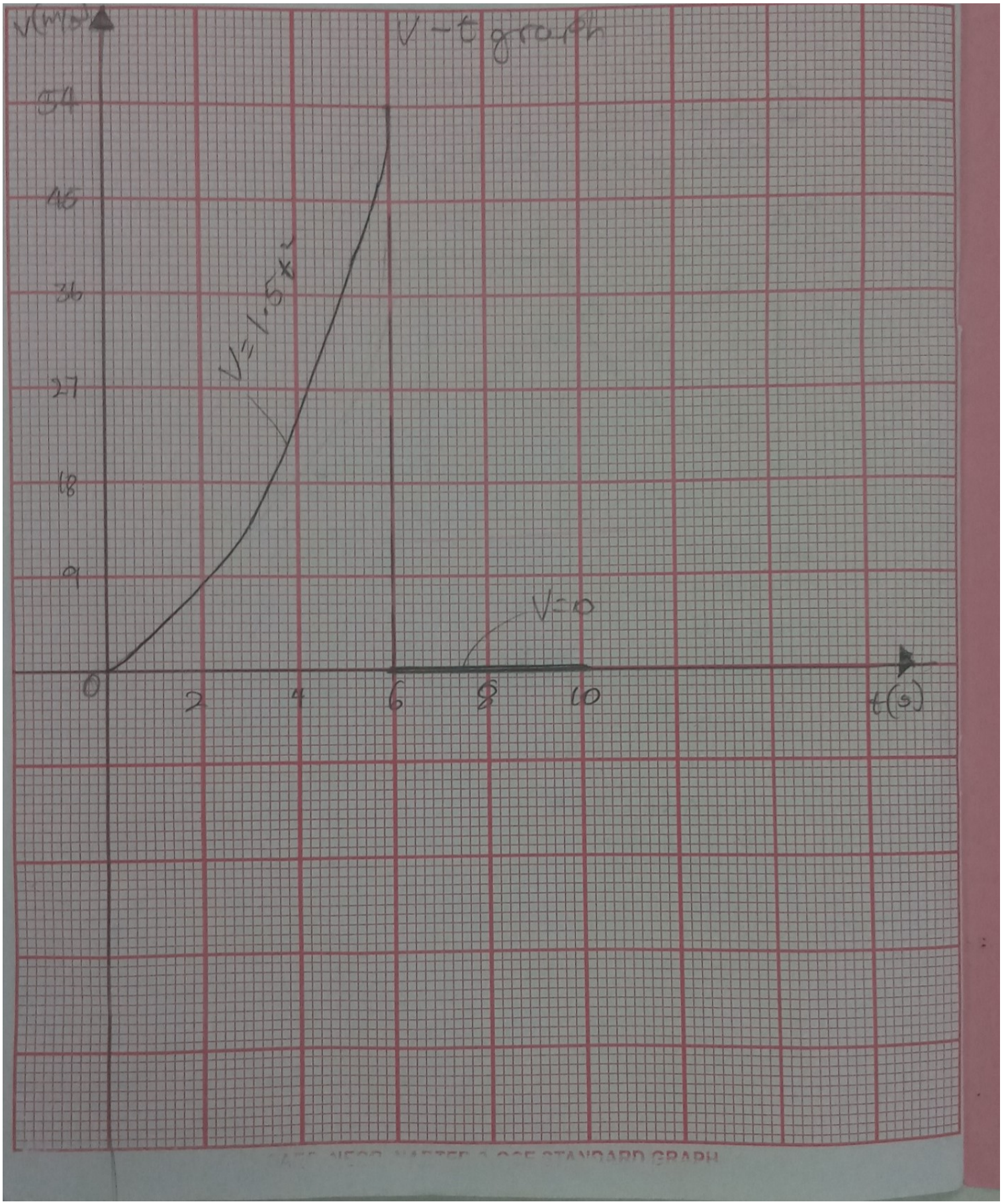
$V = 1.5t^2$

at $t = 6s$

$V = 1.5(6)^2 = 54$

$6 \leq t \leq 10$,

$V = 0$


v(m/s)
V-t graph
54
45
36
27
18
9
0
2
4
6
8
10
t(s)
V=1.5t²
V=0