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Matric no: 18/ENG09/1005

1 From the first part of the graph (from t = 0 to t = 6s)

$S = 0.5t^3 m$

But velocity, $v = \frac{ds}{dt} = \frac{d(0.5t^3)}{dt} = 1.5t^2$

$\therefore V_{t=0} = 0 m/s$

$V_{t=6} = 54 m/s$

From the Second part of the graph (from t = 6 to t = 10s)

$S = 108 m$

$V = \frac{ds}{dt} = \frac{d(108)}{dt} = 0 m/s$

the body is at rest

~~Uniform displacement~~

2a From the graph,

$V = -4t + 80$

$S = \int v\,dt$

$= \int -4t + 80\,dt$

$S = \frac{-4t^2}{2} + 80t$

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

$\therefore S_{t=0} = 0$

$S_{t=20} = 800 m$

2b $a = \frac{dv}{dt} = \frac{d(-4t + 80)}{dt}$

$= \frac{-4 m/s}{-4t}$

3 From the graph

$v = 0.25s$

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

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

$= 10 \times 0.25$

$= 2.5 m/s^2$

when $s = 0$, $a \neq 0$

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

but $v = 0.25s$

$\therefore a = 0.25s \times 0.25$

$a = 0.0625s$

4 From the first part of the graph (from $t = 0$ to $t = 5$)

$s = 3t^2$

$v = \frac{ds}{dt} = \frac{d(3t^2)}{dt} = 6t$

$v_{t=0} = 0 m/s$

$v_{t=5} = 30 m/s$

From the second part of the graph

$s = 30t - 75$

$v = \frac{ds}{dt} = \frac{d(30t - 75)}{dt} = 30 m/s$

5 From the first part of the graph (from $t = 0$ to $t = 5$)

the acceleration $= 20 m/s^2$

$\therefore a = 20 m/s^2$

$v = \int a\,dt = \int 20\,dt = 20t$

$\therefore v = 20t$

when $t = 5$, $v = 100 m/s$

From the second part of the graph (from $t = 5s$ to $t = 6'$)

acceleration $= -10 m/s^2$

$\therefore \quad a = -10 m/s^2$

$V = \int a\,dt = \int -10\,dt = -10t$

when $t = 5$, $V = -50 m/s$

$t = 6$, $V = -60 m/s$

$t = 7$, $V = -70 m/s$

6 From the first part of the graph (from $t = 0$ to $t = 6$)

$V = 30t\ m/s$

$S = \int V\,dt = \int 30t\,dt = \frac{30t^2}{2} = 15t^2$

$\therefore \quad S = 15t^2$

when $t = 0$, $S = 0$

when $t = 5$, $S = 375m$

From the second part of the graph (from $t = 5$ to $t = 15 sec$)

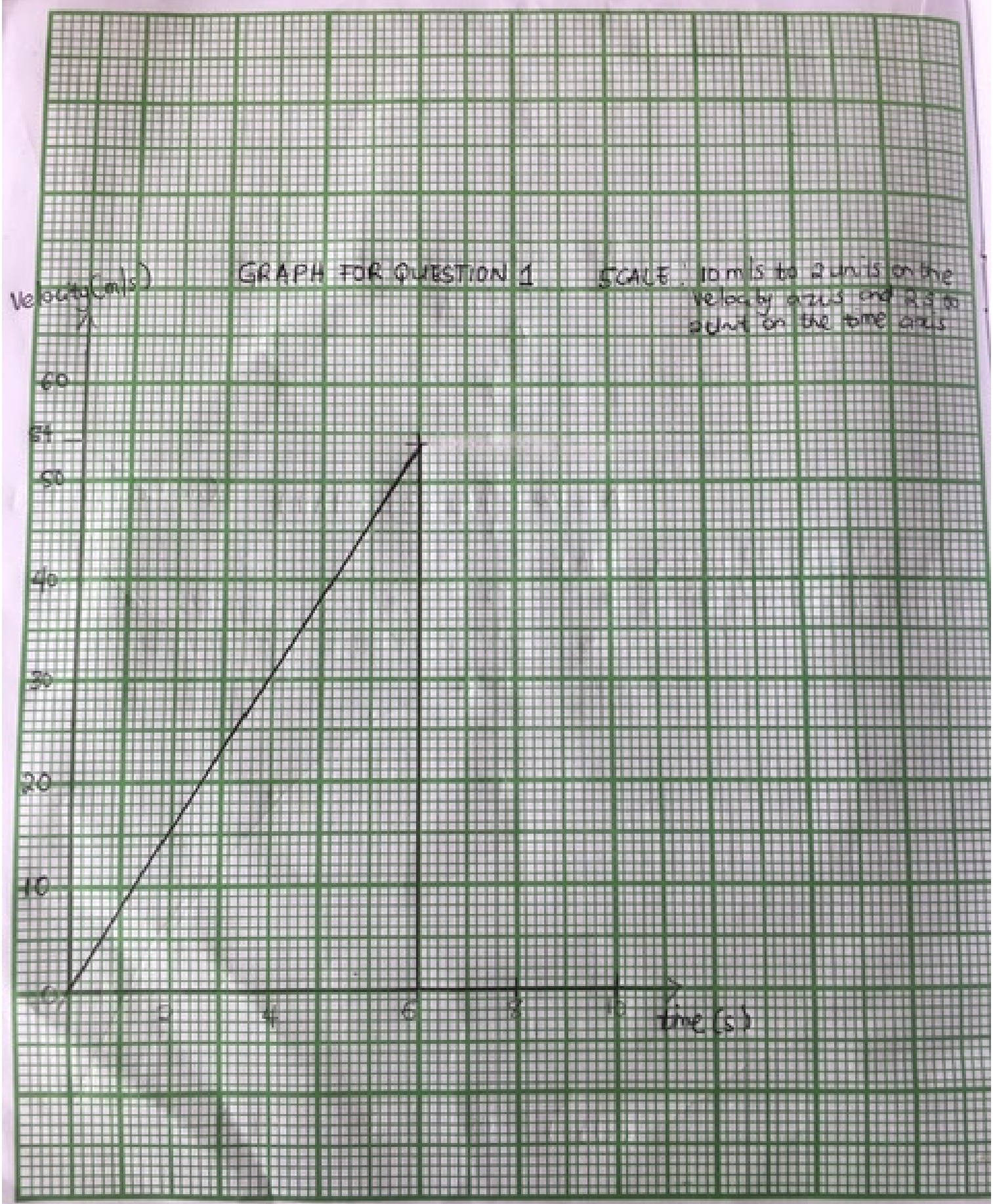
$V = 15t + 225 m/s$

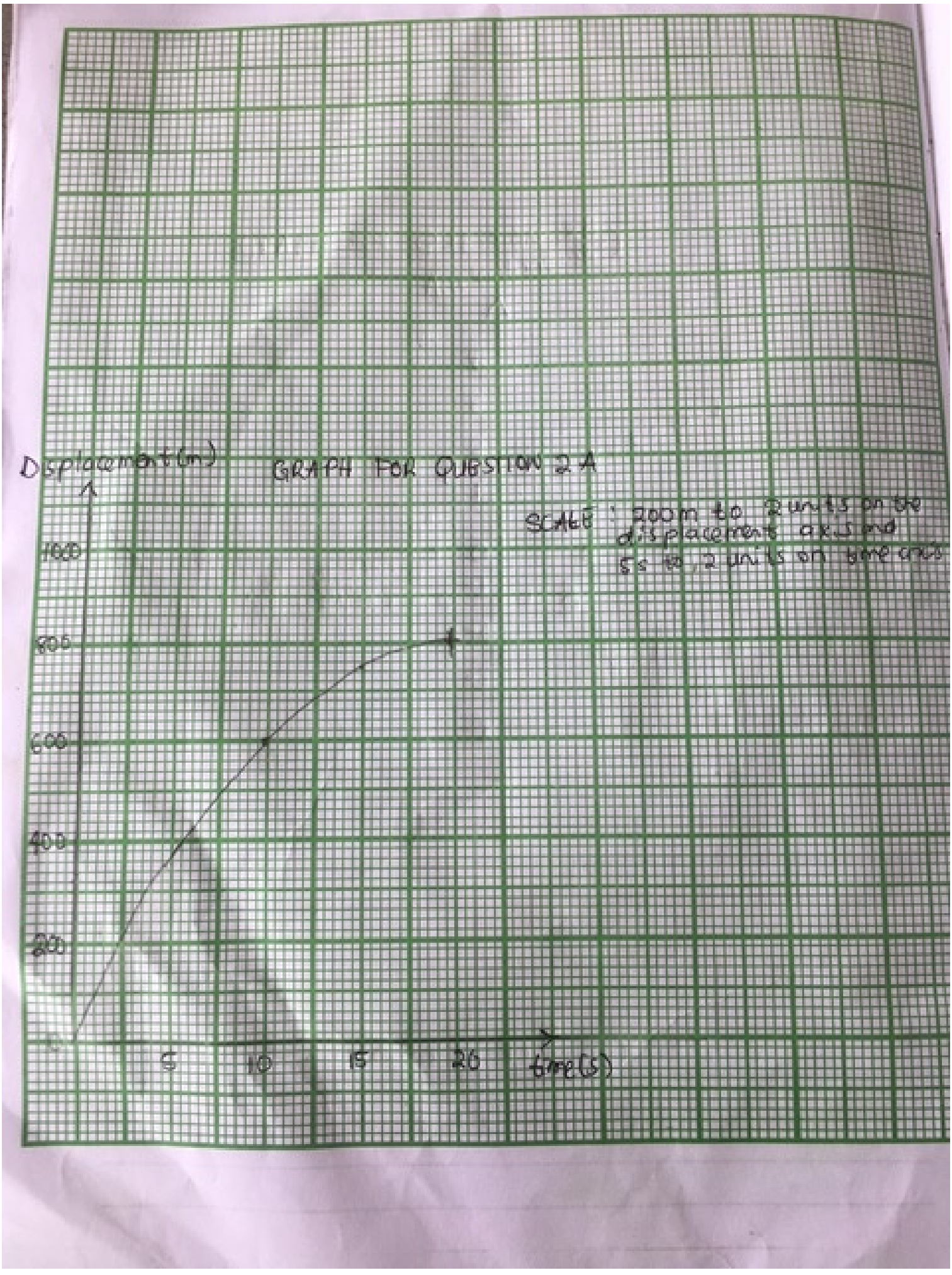
$S = \int V\,dt = \int 15t + 225\,dt = -7.5t^2 + 225t$

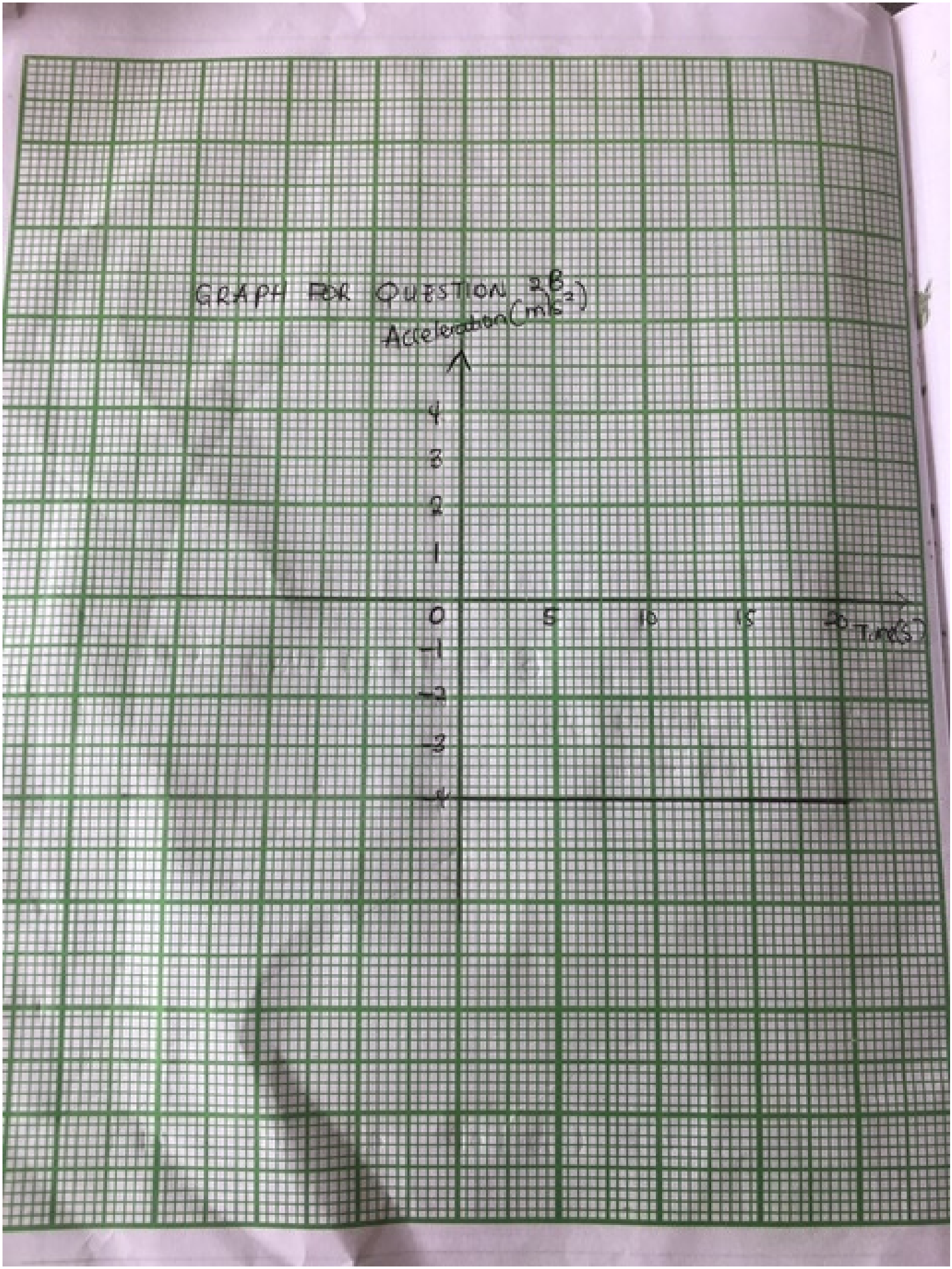
when $t = 5$, $S = 937.5m$

when $t = 15$ $S = 1687.5\ m$

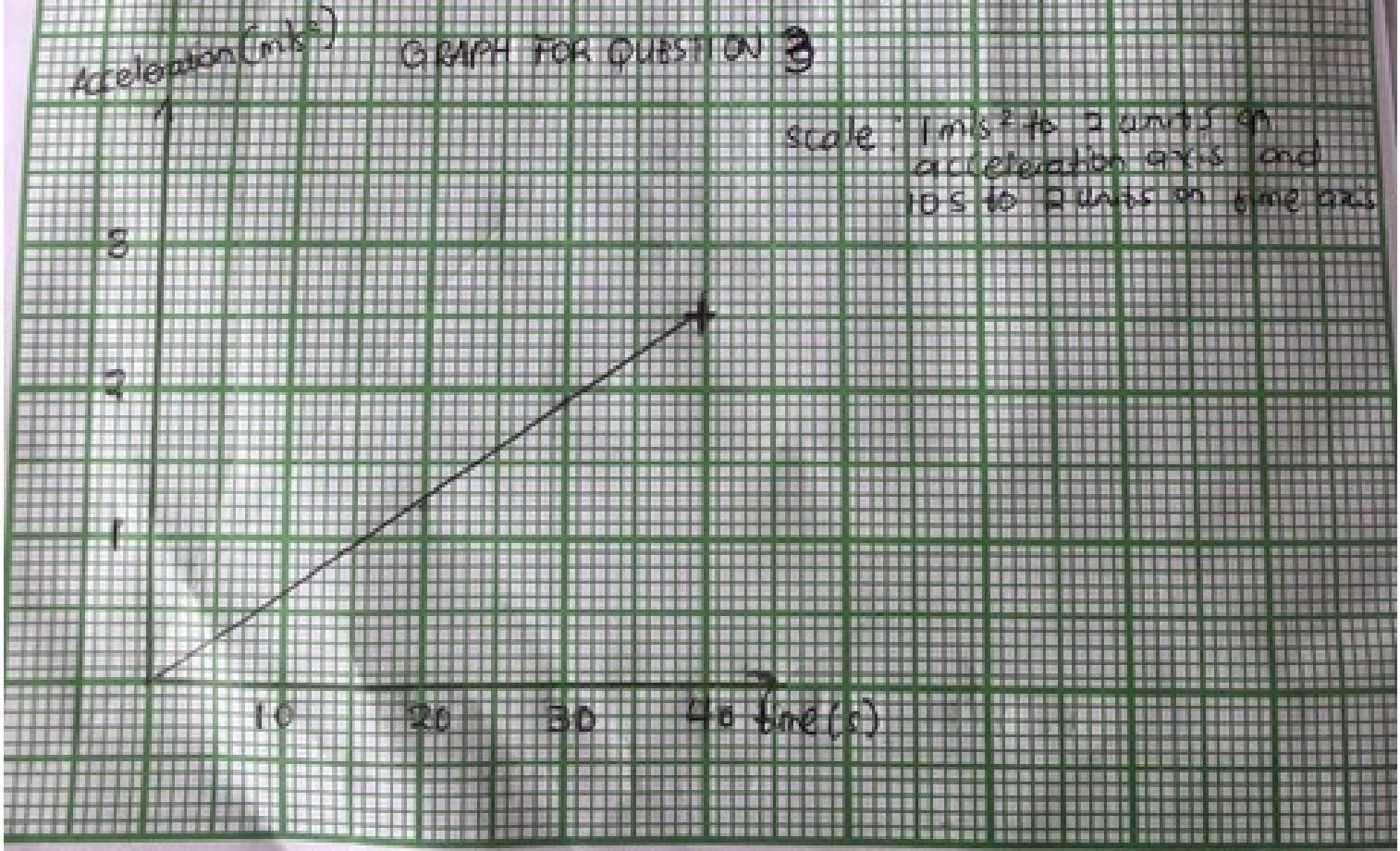
GRAPH FOR QUESTION 1 SCALE : 10 m/s to 2 units on the velocity axis and 1 s to 2 unit on the time axis




Displacement(m)
GRAPH FOR QUESTION 2.A
SCALE : 200m to 2 units on the displacements axis and
5s to 2 units on time axis
1000
800
600
400
200
5
10
15
20
time(s)

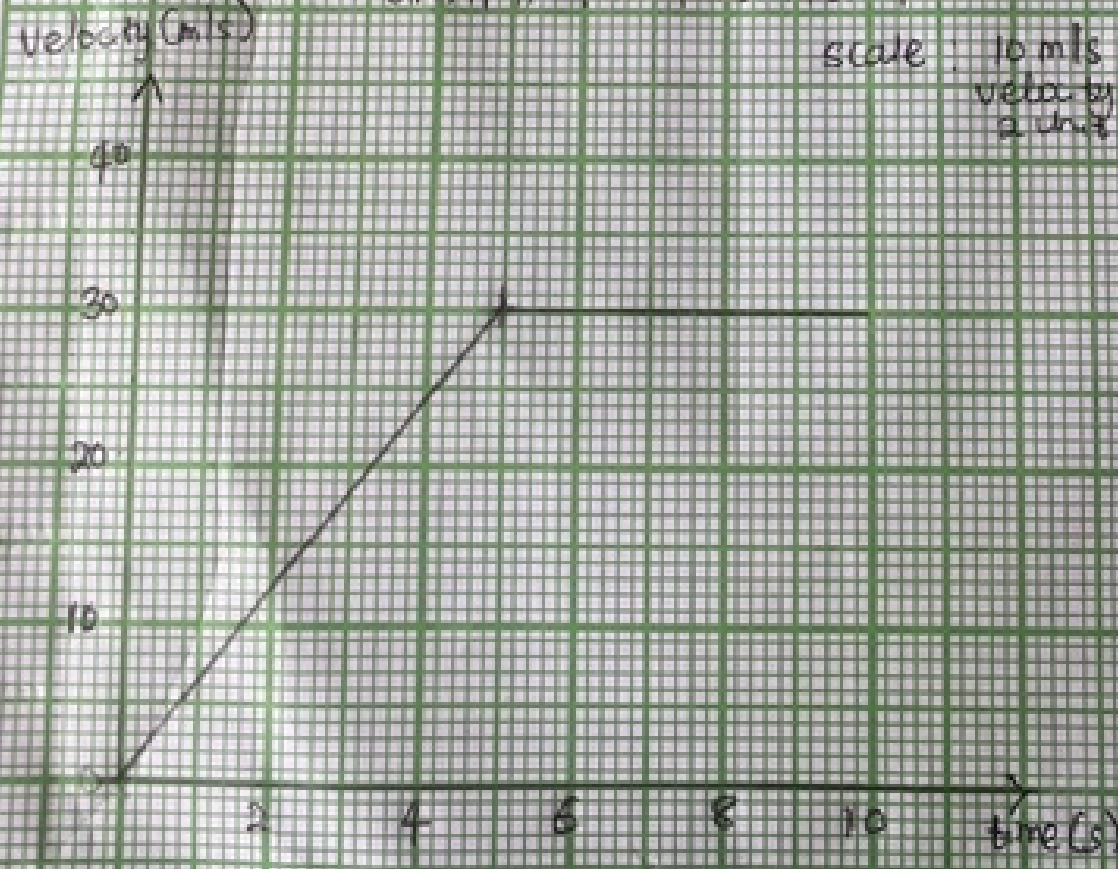

GRAPH FOR QUESTION 2(B)
Acceleration(ms^{-2})
4
3
2
1
0
-1
-2
-3
-4
5
10
15
20
Time(s)

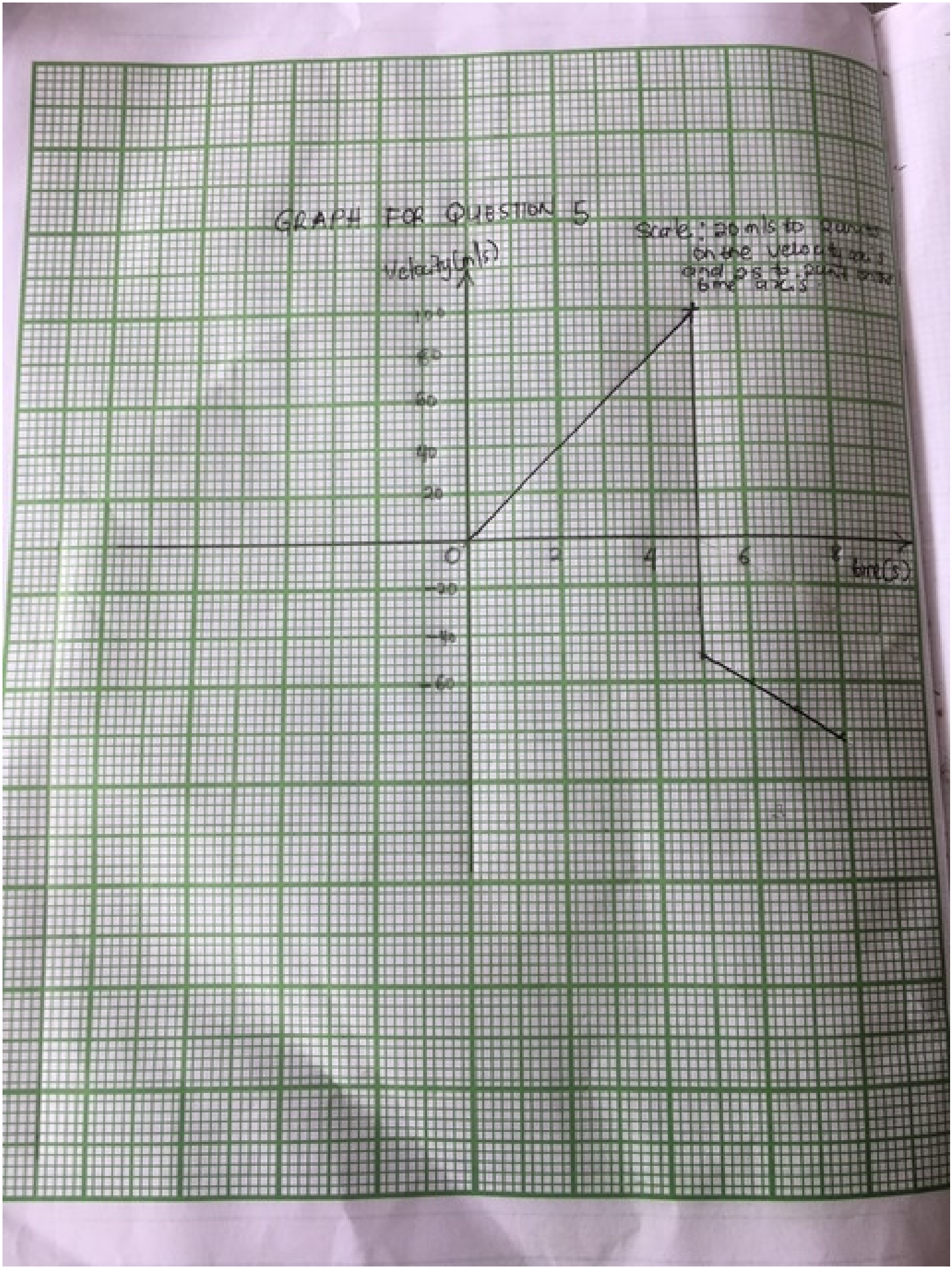
GRAPH FOR QUESTION 3

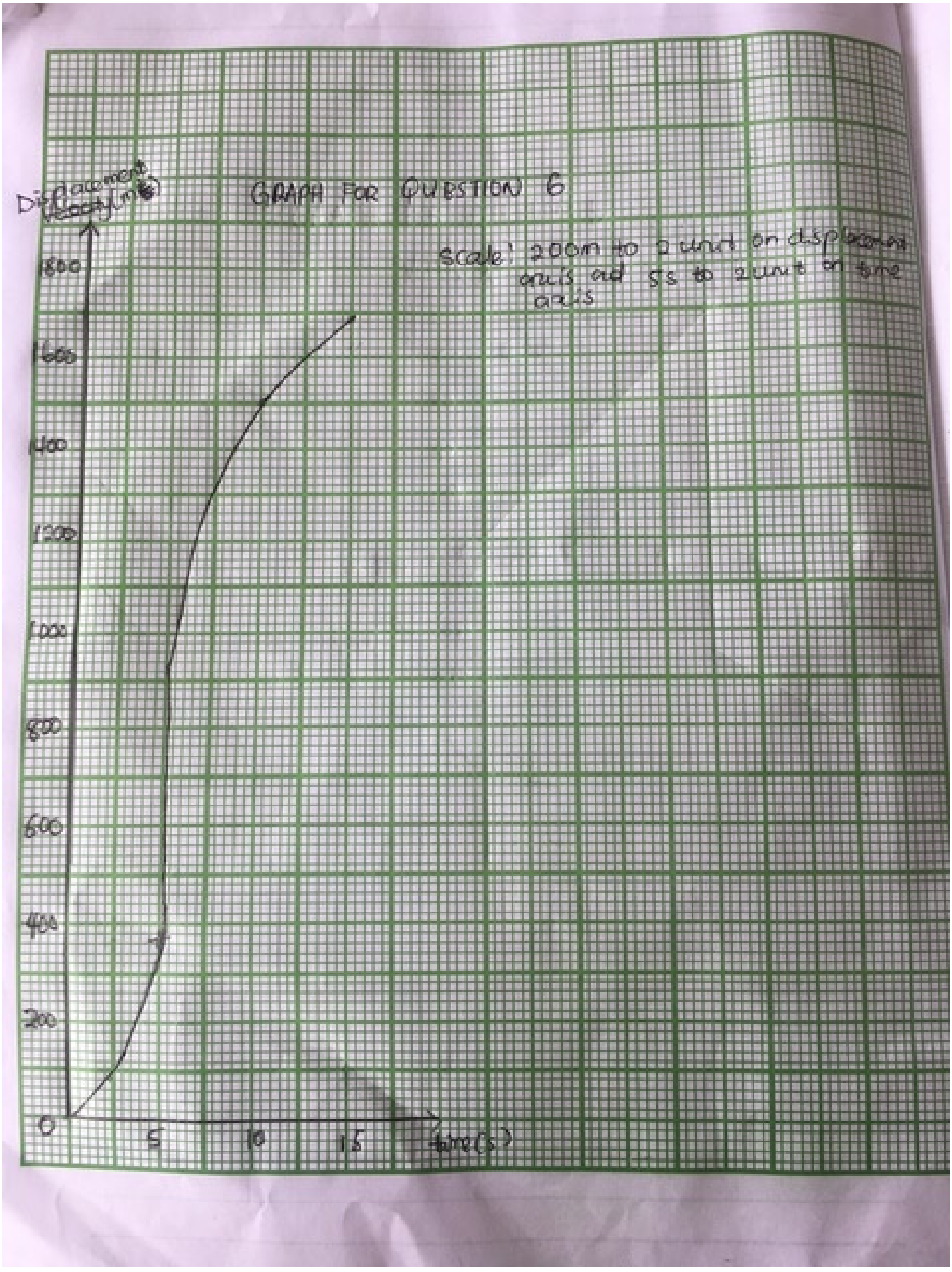


GRAPH FOR QUESTION 4

scale : 10 m/s to 2 units on the velocity axis and 2 s to 2 units on the time axis




GRAPH FOR QUESTION 5
Scale: 20 m/s to 2 units on the velocity axis and 2 s to 1 unit on the time axis
Velocity (m/s)
100
80
60
40
20
O
2
4
6
8
time (s)
-20
-40
-60


GRAPH FOR QUESTION 6
Scale: 200m to 2 unit on displacement axis and 5s to 2unit on time axis
Displacement/velocity(m)
1800
1600
1400
1200
1000
800
600
400
200
0
5
10
15
time(s)