Mechanics I - Question Bank – 7

2018-2019 Fall Semester – 20/12/2018

KEY

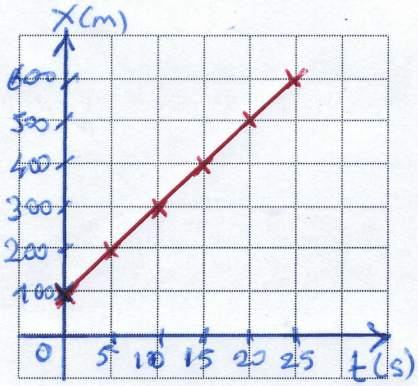
Full name: .....

Part A- Plot the displacement – time and velocity - time graph for the data given in the tables below.

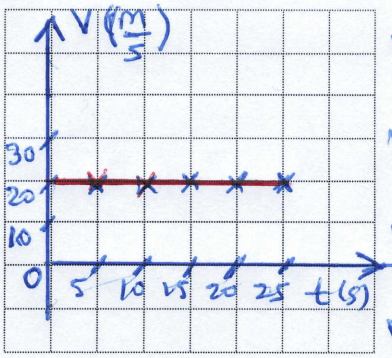
Example 1

Time (s)	Distance(m)
0	100
5	200
10	300
15	400
20	500
25	600

displacement – time graph



velocity – time graph



$V = \frac{\Delta x}{\Delta t}$

$V = \frac{x_f - x_i}{t_f - t_i}$

$V = \frac{600-100}{25-0}$

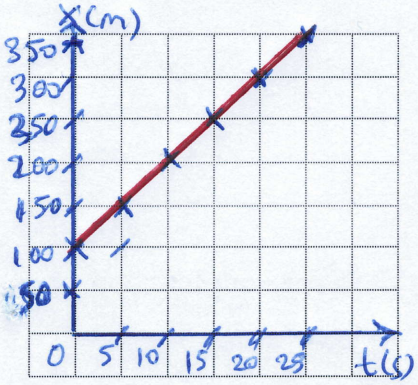
$V = \frac{500}{25}$

$V = 20 \frac{m}{s}$

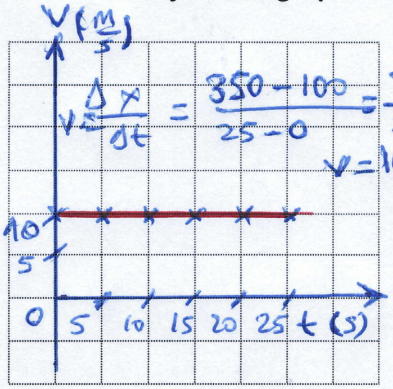
Example 2

Time (s)	Distance(m)
0	100
5	150
10	200
15	250
20	300
25	350

displacement – time graph



velocity – time graph



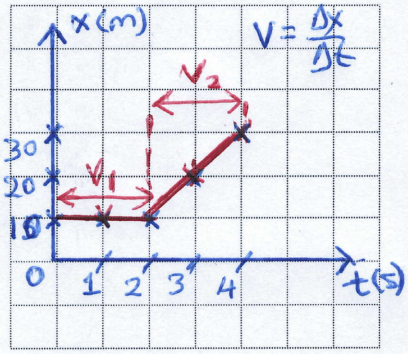
$V = \frac{\Delta x}{\Delta t} = \frac{350-100}{25-0} = \frac{250}{25}$

$V = 10 \frac{m}{s}$

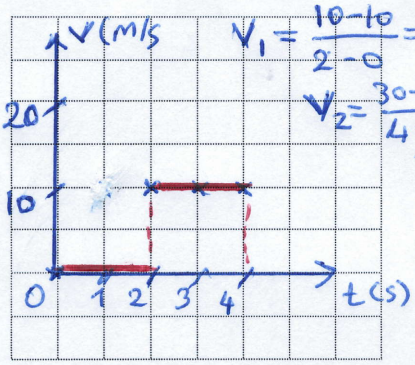
Example 3

Time (s)	Distance(m)
0	10
1	10
2	10
3	20
4	30

displacement – time graph



velocity – time graph



$V_1 = \frac{10-10}{2-0} = \frac{0}{2} = 0$

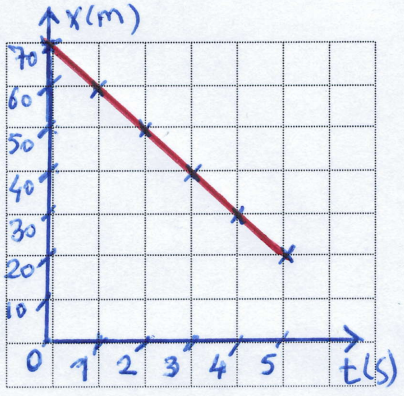
$V_2 = \frac{30-10}{4-2} = \frac{20}{2}$

$= 10 \frac{m}{s}$

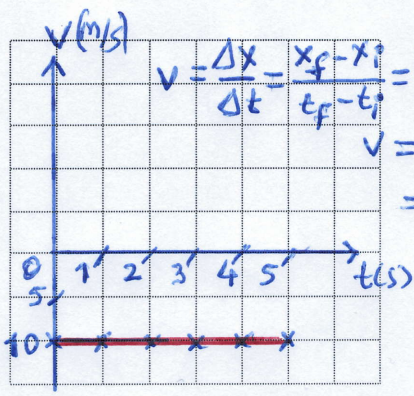
Example 4

Time (s)	Distance(m)
0	70
1	60
2	50
3	40
4	30
5	20

displacement – time graph



velocity – time graph



$V = \frac{\Delta x}{\Delta t} = \frac{x_f - x_i}{t_f - t_i} = \frac{20-70}{5-0}$

$V = \frac{-50}{5}$

$= -10 \frac{m}{s}$

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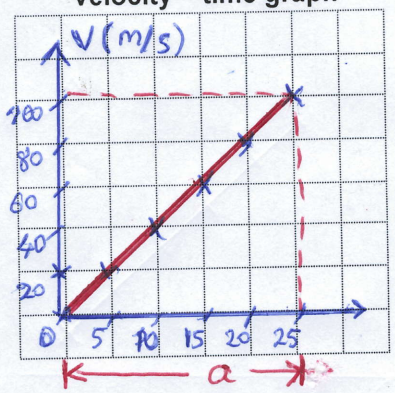
Part B - Plot the velocity – time and acceleration - time graph for the data given in the tables below.

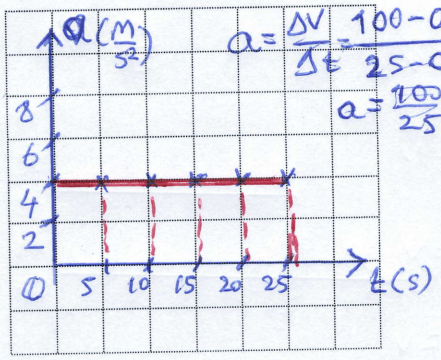
Example 1

Time (s)	velocity(m/s)
0	0
5	20
10	40
15	60
20	80
25	100

velocity – time graph



acceleration – time graph



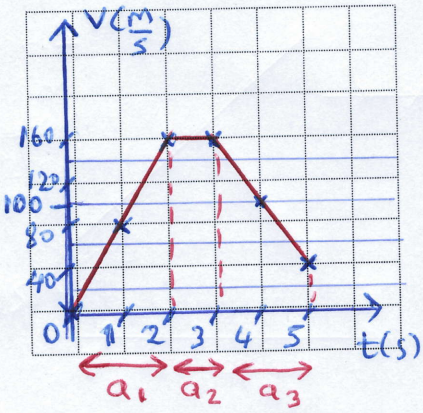
$a = \frac{\Delta V}{\Delta t} = \frac{100-0}{25-0}$

$a = \frac{100}{25} = 4 \frac{m}{s^2}$

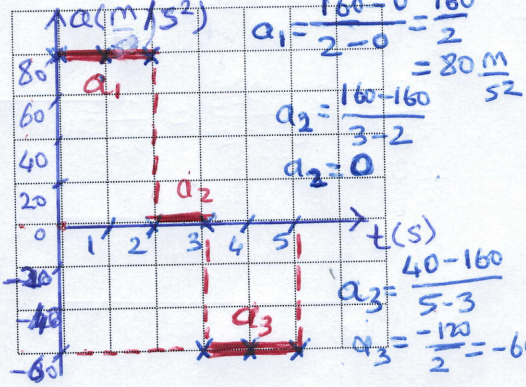
Example 2

Time (h)	velocity(km/h)
0	0
1	80
2	160
3	160
4	100
5	40

velocity – time graph



acceleration – time graph



$a_1 = \frac{160-0}{2-0} = \frac{160}{2} = 80 \frac{m}{s^2}$

$a_2 = \frac{160-160}{3-2}$

$a_2 = 0$

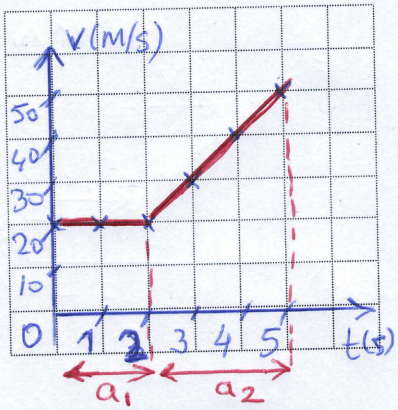
$a_3 = \frac{40-160}{5-3}$

$a_3 = \frac{-120}{2} = -60 \frac{m}{s^2}$

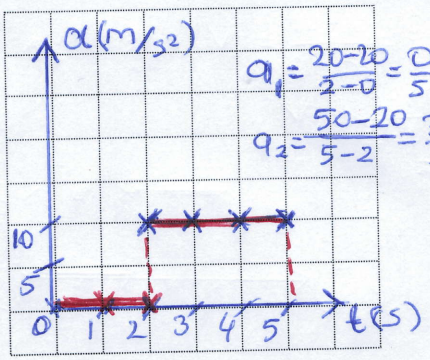
Example 3

Time (s)	velocity(m/s)
0	20
1	20
2	20
3	30
4	40
5	50

velocity – time graph



acceleration – time graph



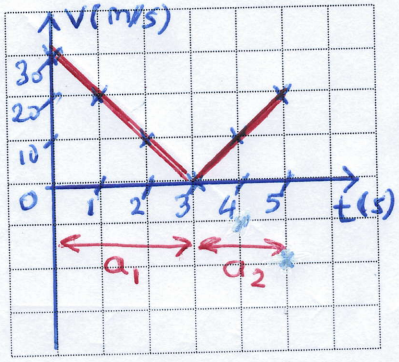
$a_1 = \frac{20-20}{2-0} = \frac{0}{5} = 0 \frac{m}{s^2}$

$a_2 = \frac{50-20}{5-2} = \frac{30}{3} = 10 \frac{m}{s^2}$

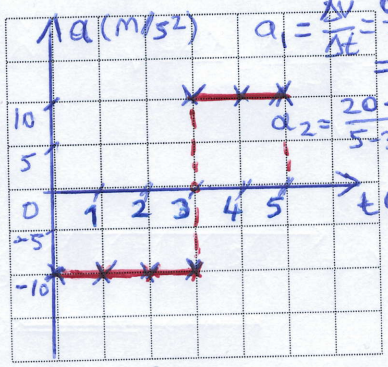
Example 4

Time (s)	velocity(m/s)
0	30
1	20
2	10
3	0
4	+10
5	+20

velocity – time graph



acceleration – time graph



$a_1 = \frac{\Delta V}{\Delta t} = \frac{0-30}{3-0}$

$= -10 \frac{m}{s^2}$

$a_2 = \frac{20-0}{5-3}$

$a_2 = \frac{20}{2}$

$= 10 \frac{m}{s^2}$