Date of Lab 9/26/2018 Date of Submission 10/3/2018

Laboratory Report Cover for #1 Lab

Title Analyzing the Motion of Dynamics Cart with a Spark Timer.

Homeroom	Section	Name	
11K			Tsukiyo Shingai

Lab Partners Moe Oshima

Summary

We recorded how the acceleration of a Dynamic Cart descending on a slope changes by changing mass (OK) of a Dynamic cart and the angle of slope using a spark timer and a thermal recording tape in this lab. Through this lab, we found that only the angle of slope affects the acceleration not the mass of Dynamic Cart. And we also found that it was Constant accelerated motion from the straight line of v-t graph. Good summary!

· Meet a deadline · Write logically · Write clearly · Write with your own words

Teacher's Comments Beautiful tables, graphs analysis and reasonable discussion and summary. In your No. 4 experiment, there must have had some trouble in car; this results in some "singular points" in v-t graph. See my notes inside.

1 Due	2 Summary	3 Data copy	4 Results Tables	5 Fig. Graphs	6 Results Summary Table	7 Discussion & Opinions	8 Clearness	9 General

* Use this form as a cover sheet.
* Submit your reports by the seventh day after your lab.

Results

Table 1 (steep slope, without weights)

Condition: Mass=500g, $\theta = 12.1^\circ$

Time t [s]	0	0.100	0.200	0.300	0.400	0.500	0.600	0.700	0.800	0.900
Displacement x [x 10^{-2}m]	0	1.20	4.00	8.10	13.65	20.64	29.04	38.89	50.13	62.98
Displacement per 0.100s [x 10^{-2}m] △x	1.20	2.80	4.1	5.55	6.99	8.40	9.85	11.24	12.85	
Average velocity [x 10^{-2}m/s] v	12.0	28.0	41.0	55.5	69.9	84.0	98.5	112.4	128.5	
Time at central point[s] t	0.05	0.15	0.25	0.35	0,45	0,55	0,65	0.75	0.85	

From graph 1, the acceleration is 1.166-0.400/0.80-0.25=1.392727⋯→ 1.39m/s^2

Table 2 (steep slope, with weights)

Is this correct? Using just one weight? 1250g?

Condition: Mass=750g, $\theta = 12.1^\circ$

Time t [s]	0	0.100	0.200	0.300	0.400	0.500	0.600	0.700	0.800	0.900
Displacement x [x 10^{-2}m]	0	1.25	4.00	8.35	14.25	21.70	30.68	41.18	53.28	63.83
Displacement per 0.100s [x 10^{-2}m] △x	1.25	2.75	4.35	5.90	7.45	8.98	10.50	12.10	13.55	
Average velocity [x 10^{-2}m/s] v	12.5	27.5	43.5	59.0	74.5	89.8	105.0	121.0	135.5	
Time at central	0.05	0.15	0.25	0.35	0,45	0,55	0,65	0.75	0.85	

point [s] t										

From graph 2, the acceleration is 1.210-0.435/0.75-0.25=1.550→1.55m/s^2

Table 3 (gentle slope, without weights)

Condition: Mass=500g, θ =6.2°

Time t 〔s〕	0	0.100	0.200	0.300	0.400	0.500	0.600	0.700	0.800	0.900
Displacement x 〔x 10^{-2}m〕	0	0.7	2.10	4.25	7.15	10.75	15.0	19.9	25.58	31.93

Displacement per 0.100s 〔x 10^{-2}m〕 △x	0.7	1.40	2.15	2.90	3.60	4.25	4.90	5.68	6.35	
Average velocity 〔 x 10^{-2}m/s 〕 v	7.0	14.0	21.5	29.0	36.0	42.5	49.0	56.8	63.5	
Time at central point〔s〕 t	0.05	0.15	0.25	0.35	0,45	0,55	0,65	0.75	0.85	

From graph 3, the acceleration is 0.568-0.07/0.75-0.05=0.7114… → 0.71m/s^2

Table 4 (gentle slope, with weights)

Condition: Mass=750g, θ =6.2°

Time t 〔s〕	0	0.100	0.200	0.300	0.400	0.500	0.600	0.700	0.800	0.900
Displacement x 〔x 10^{-2}m〕	0	0.50	1.10	1.80	3.25	5.30	7.95	11.65	16.10	21.40

Displacement per 0.100s 〔x 10^{-2}m〕 △x	0.5	0.6	0.7	1.45	2.05	2.65	3.70	4.45	5.30	
Average velocity 〔 x 10^{-2}m/s 〕	5.0	6.0	7.0	14.5	20.5	26.5	37.0	44.5	53.0	

v										
Time at central point[s] t	0.05	0.15	0.25	0.35	0,45	0,55	0,65	0.75	0.85	

From graph 4, the acceleration is 0.40-0.033/0.75-0.05=0.52428⋯→ 0.52m/s^2

Table 5 (Relationship of Mass, Angle and Acceleration)

	Mass(g)	Angle(°)	Acceleration(m/s^2)
①	500	12.1	1.39
②	750	12.1	1.55
③	500	12.1	0.71
④	750	12.1	0.52

Discussion

As you can see from the graph and the tables in Result, the pair of experiment① and experiment② and the pair of experiment③ and experiment ④ are little similar about acceleration. But the difference is that when I did experiment with steep slope, the acceleration and the acceleration rate of the experiment without weights was higher but, it was opposite in the experiment with gentle slope. The acceleration and acceleration rate of the experiment with weights was higher. So, we couldn't find how they change depends on the mass of the object. But both pair's difference was small, we can find that the acceleration doesn't affected by the mass of the object, slips.

On the other hand, when I change the angle of slope, there were big change of both of acceleration and acceleration rate. The

acceleration got smaller when the acceleration became smaller. We can see that by comparing the experiment ① and ③. The mass of them are same but the only angle of slope was lesson from 12.1° to 6.21° and when the angle is greater, the acceleration was also greater. We can also say that when we compare experiment ② and ④.

Conclusions

The acceleration is only be affected by the angle of the track not by the mass ~~weight~~ of an object. We can say that this is the constant acceleration movements.

Opinions

This lab was really understandable even for me who is not good at English. At the first of the lab, I couldn't imagine well what the result will be like. But through the operation of drawing graph and expressing the result in graph, I think I did understand that gradually.

Fig 1 v-t Graph

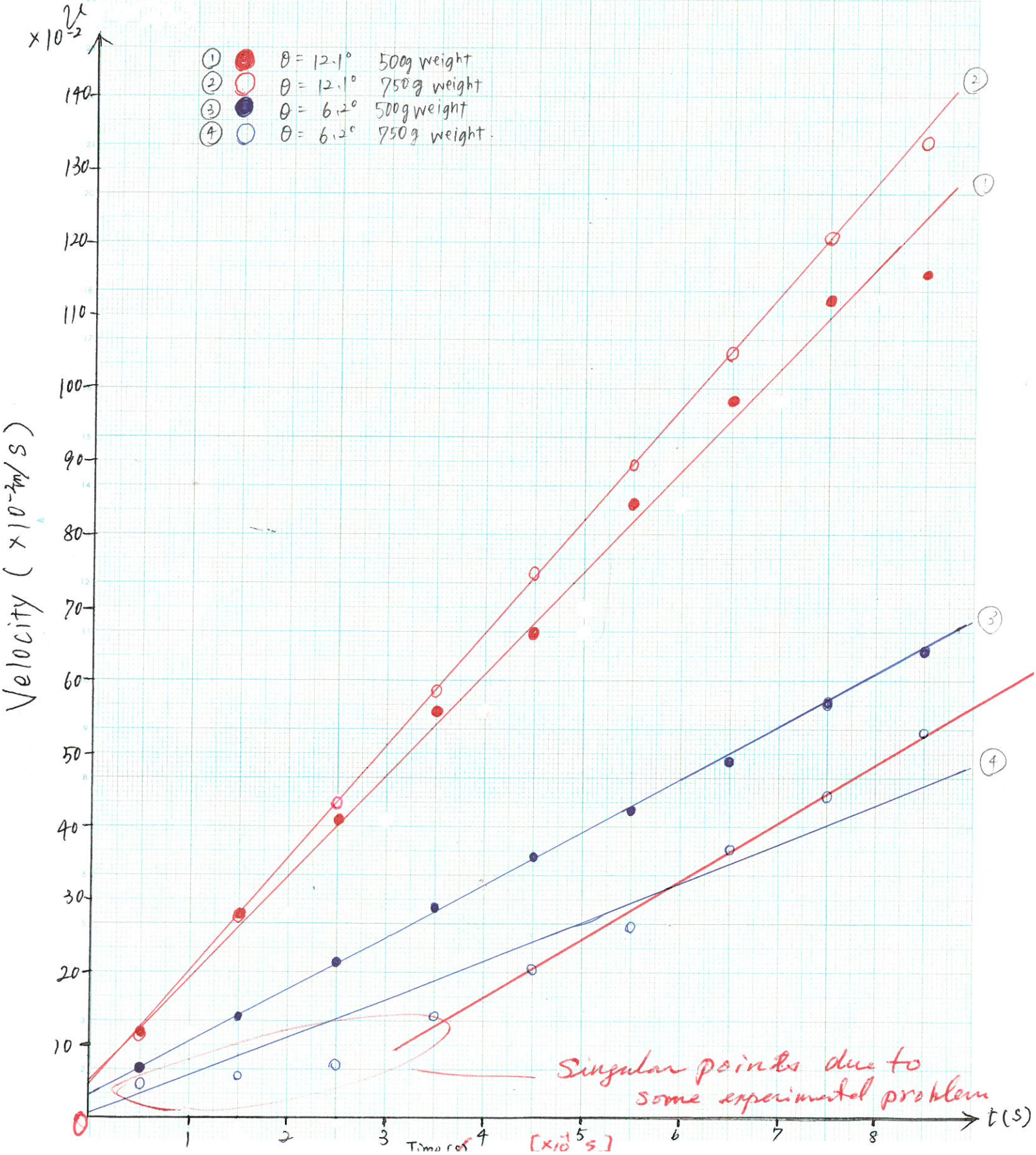
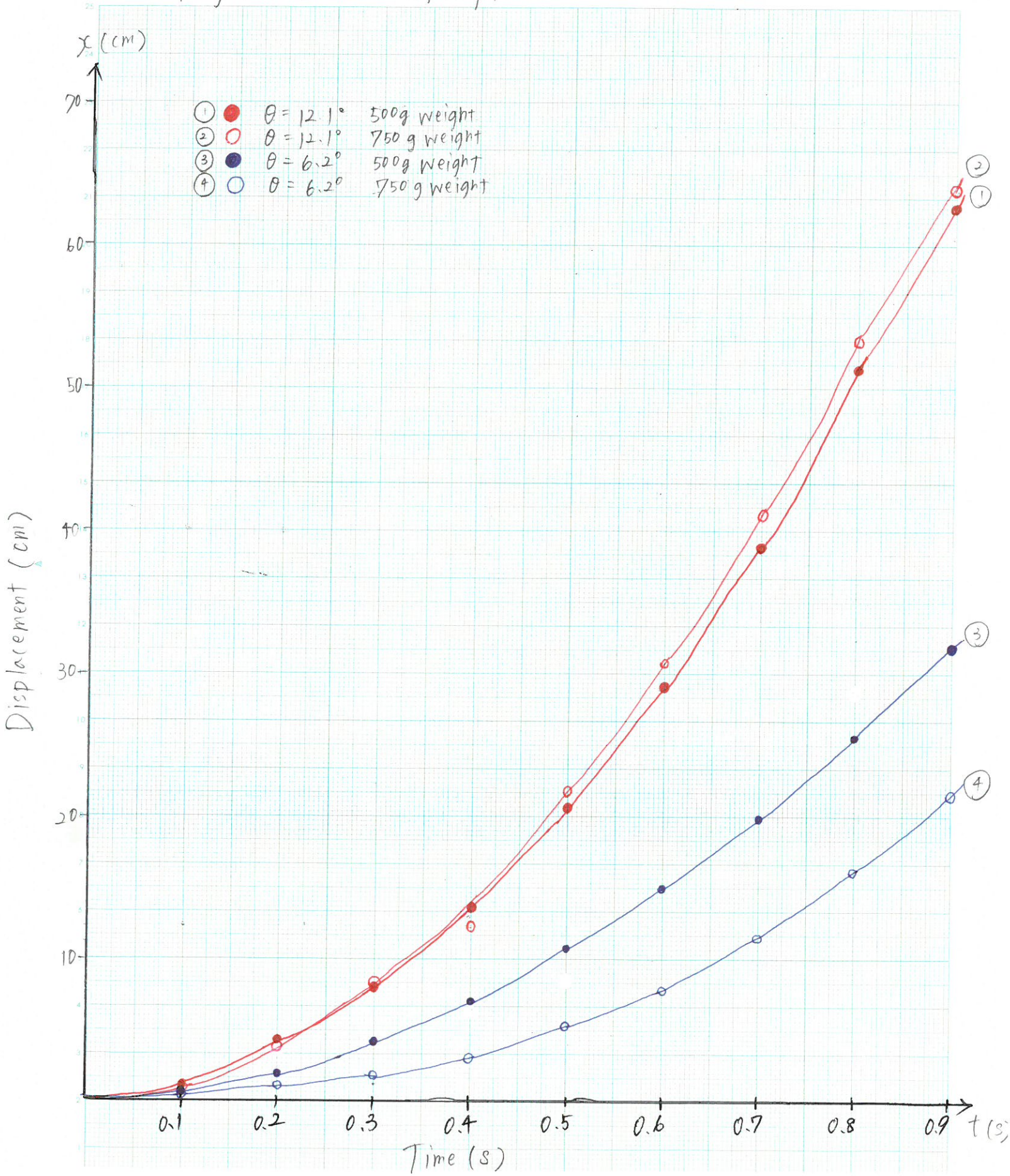
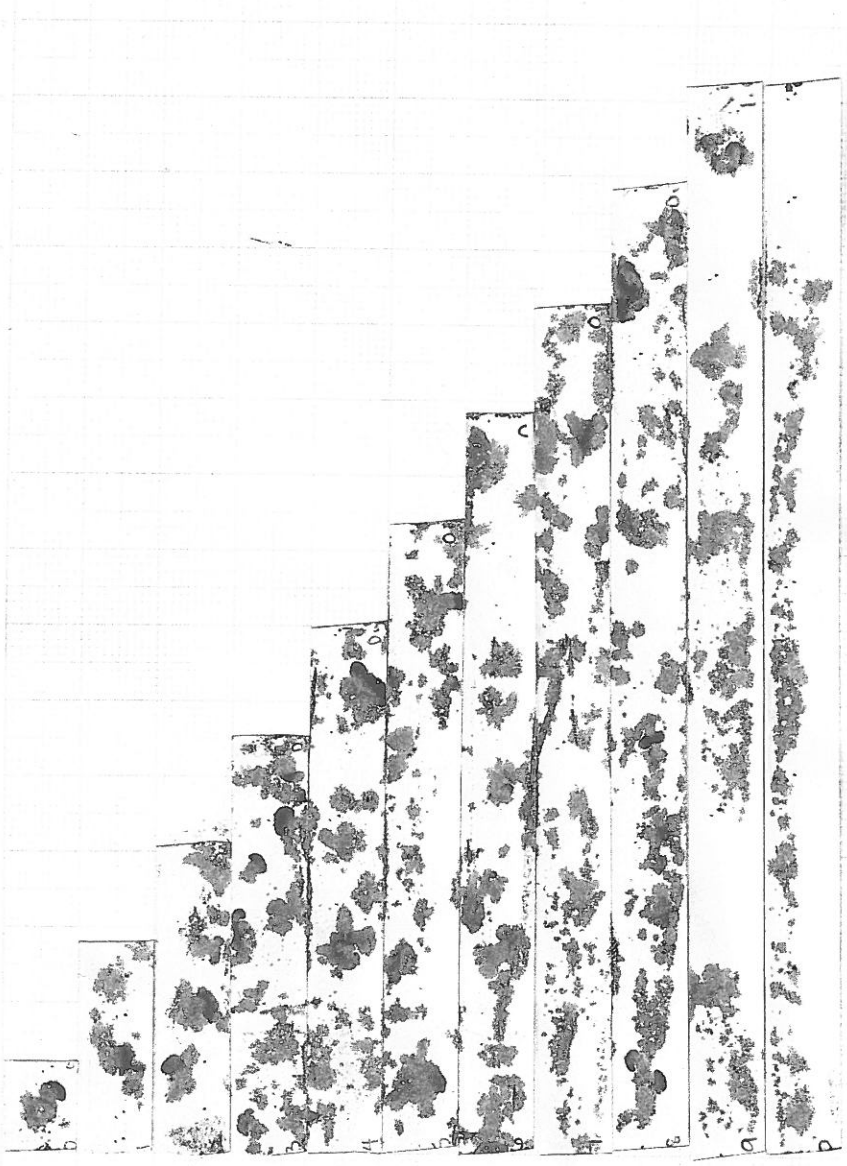


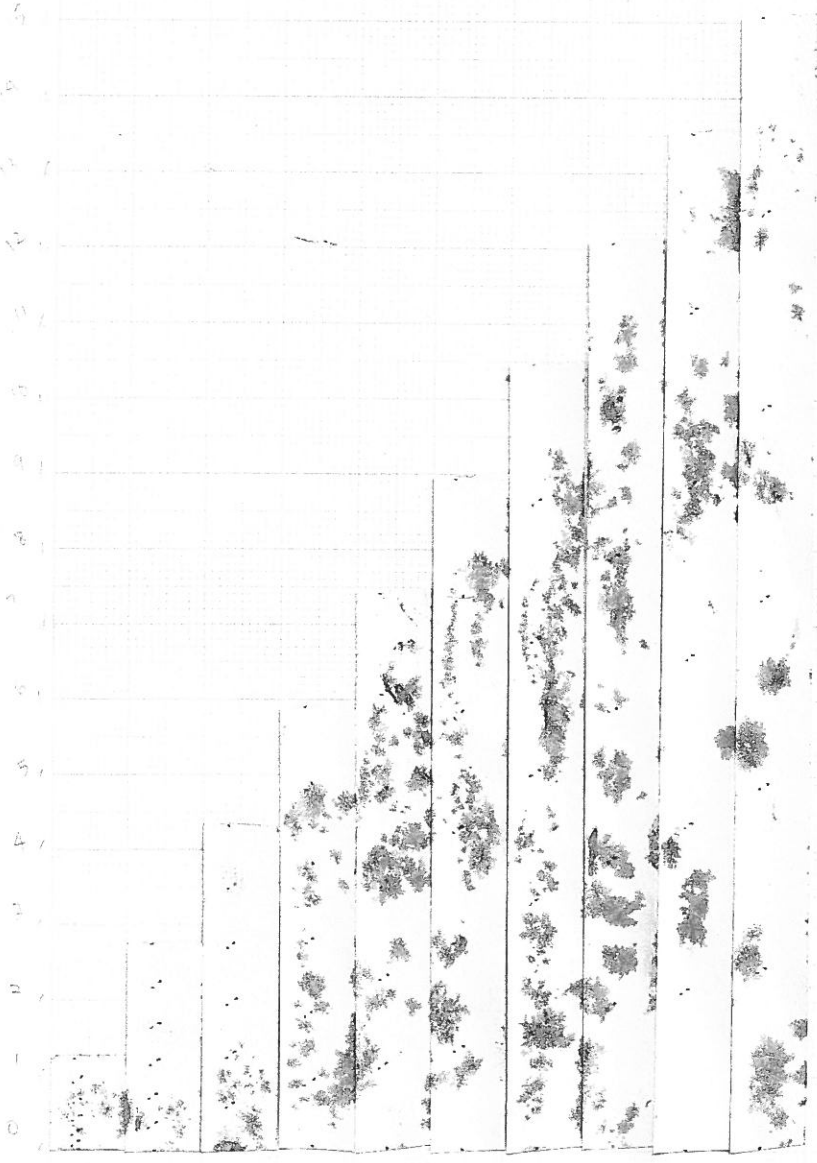
Fig 2 x-t Graph



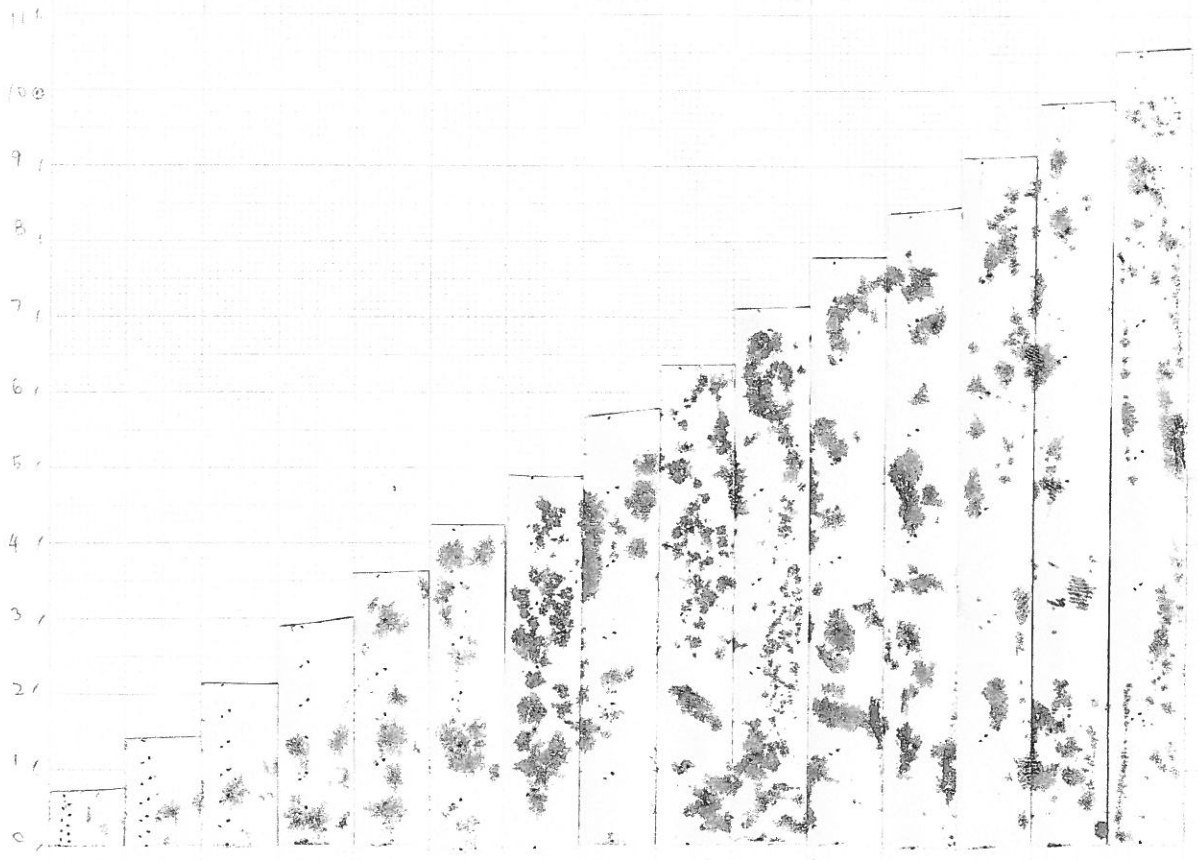
① 12.02976°, without weights



(2) 12.0=976°, 5 weeks



(3) 6.2853° with out weights



④ 6.2353°, with 3 weights