Student 4: High Achieved

Aim: *To find a relationship between the distance travelled by a marble down a ramp and the time taken.*

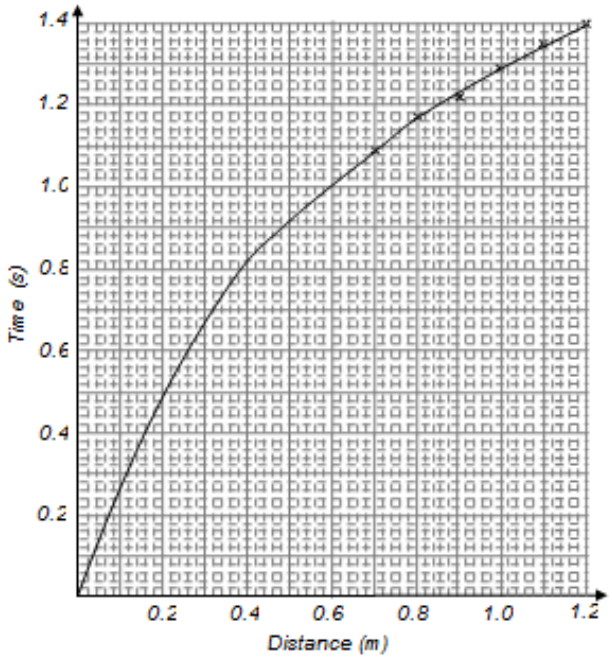
Method

Lean the ramp at an appropriate angle against the clamp stand. *(1)*
Put a stopper on the channel at a length that looks good.
Roll the marble from the top and time how long it takes to hit the stopper.
Record all data and collate together at the end.

Results *(2)*

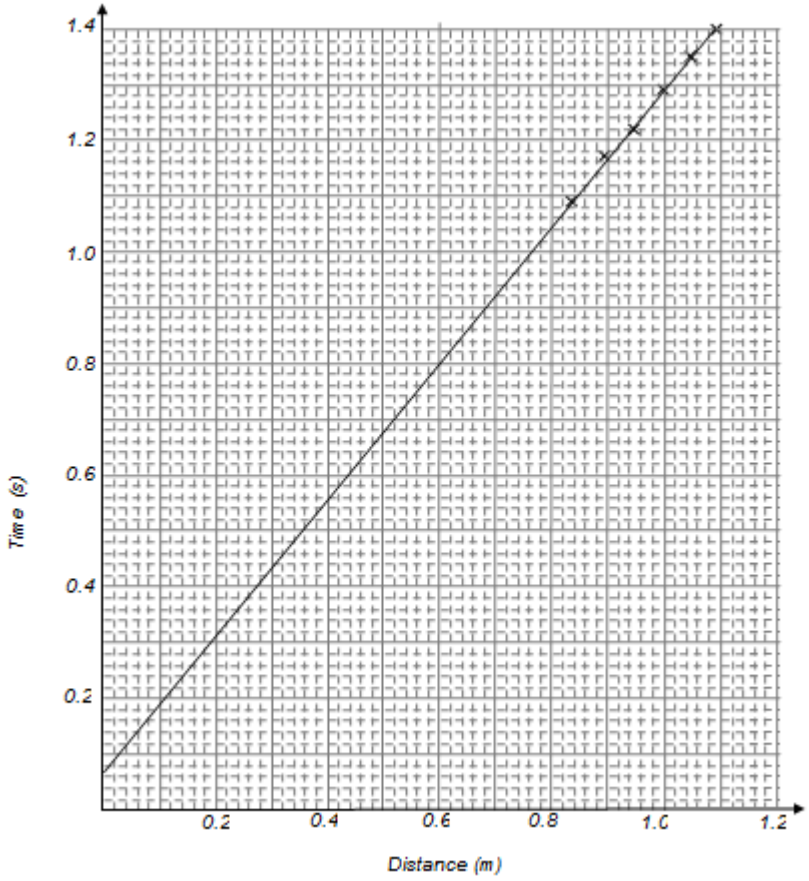
Distance (m)	*t1 (s)*	*t2 (s)*	*t3 (s)*	*Average t (s)*	$\sqrt{D}$
1.200	*1.41*	*1.38*	*1.41*	*1.40*	*1.095*
1.100	*1.37*	*1.35*	*1.32*	*1.35*	*1.049*
1.000	*1.28*	*1.31*	*1.28*	*1.29*	*1.000*
0.900	*1.22*	*1.22*	*1.22*	*1.22*	*0.949*
0.800	*1.19*	*1.15*	*1.18*	*1.17*	*0.894*
0.700	*1.07*	*1.09*	*1.10*	*1.09*	*0.837*

Initial Graph (3)



$t = \sqrt{D}$

Linear Graph



Conclusion

Intercept (c) = 0.7

$$gradient = \frac{rise}{run} = \frac{0.49}{0.400} = 1.2$$

y = mx + c

t = 1.2 D + 0.7

From my non-linear graph, the relationship I concluded was time is proportional to the square root of distance (4). The correct mathematical relationship from my linear graph was t = 1.2 D + 0.7 (5).

Parallax error was an issue when it came to placing the stopper and also placing the marble in the same place each time. To stop this from occurring I stood up and stood in line with the marks so they would be the same. For the stopper I placed my ruler on the line also to line it up. (6)