Student 2: High Merit

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

Note: This snippet contains the discussion only. All other aspects of the method, results, graphs and conclusion meet the requirements for Merit. The gradient of the student's graph is 0.83 ms^{-2} and there is an intercept at -0.03 m. The ramp angle is set at 13.6°.

Discussion

I used repeats and averaging to improve the accuracy of my investigation. This technique allows me to discard any random errors. By repeating the experiment 3 times and averaging the results I am making my data more accurate and reaction time error less apparent. (1) As well as this, I double checked the measurements on my ramp to make sure they were correctly marked. This reduced the chances of glitches in my data as my distance was always as accurate as possible.

I also made sure I always used the same angle of elevation so all the trials are fair and non-biased. (2) I secured the ramp on to the table and the clamp stand so as to avoid any movement and change in the angle so that all the trials were held in a constant set up. The same stopwatch was used which meant that if the stopwatch was running fast or slow the difference would be apparent in all data as the times would increase by the same amount thus making no difference to the gradient of the curve. The same mass marble was also used so that the speed did not increase or decrease depending on mass of the marble.

As we can see in my non-linear graph the y intercept is not zero but -0.03. This could be because of my reaction time error.

The angle of my slope was 13.6^0 so the acceleration should have been a = 10 × sin 13.6 = 2.4. So the gradient should have been ½ this   gradient = ½ a = 1.2. (3) The gradient is greater than my gradient which suggests my curve should have been steeper. An explanation for this could be as the number of trials increased my reaction time slowed down. Thus at first my reaction time error was at its minimum. But as the number of trials increased my reaction nerves slowed down. Because the gradient is incorrect this rules out the possibility of my stopwatch being slower or the measurements on my ruler being wrong as that would have caused a constant increase in all the data and values collected. Another explanation could be that as the distance covered on the ramp increased so did friction. (4) It could be possible that the topmost length of my ramp had the least friction because the bottom part may have been dirty.