Free fall- acceleration due to gravity worksheet

Free Fall Formula Free fall means that an object falls freely with no forces acting on it except gravity, a defined constant, g = -9.8 m/s2. The distance the object falls, or height, h, is 1/2 gravity x the square of time falls. Speed is defined as gravity x time. h = 1/2gt2, m v = gt, m/s Free Fall Formulas FAQ: 1) You stand at the edge of a cliff and drop a ball. It takes 10 secs to hit the ground running. How high are you? Answer: You know that gravity, g = 9.8 m/s2, and time, t = 10 secs. h = 1/2 gt2 h = 1/2 (9.8 m/s2) X (10 sec)2 h = 490 m 2) What was the velocity of the ball? Answer: you know that gravity, g = 9.8 m/s2 and time, t = 10 sec v = v = 9.8 m/s2 x10 sec v = 98 m/s Free Fall Formula The purpose of this lab was to evaluate the increase in velocity with time during a free fall. Also to determine the position of the beginning of autumn. Can we help with your assignment? Let's do your homework! Professional authors in all subject areas are available and will comply with your assignment deadline. Free proofreading and copying support included. Hypothesis It is hypothesized that the object that is dropped will endure gradual change acceleration in acceleration. The acceleration for the object in the speed time graph will be gravity (9.81 m/s^2). And the velocity time chart will be a straight line. Material – C Clamp – Meter Rod – Mass (50g) – Cushion - Recording timer tape – Chart paper - Recording timer – Power supply - Long retort booth - Masking tape Procedure I use the table on the given lab sheet to design a table for my results. My lab partners and I clamped down a recording timer in a vertical position above the floor as shown in figure 1. We used masking tape to attach a 50g mass at the end of the 121cm recording tape. We took the recording tape through the timer and held the top end vertically to reduce the friction between the timer and the tape. We started the timer and then released the 50g mass. After that, we individually analyzed the tape marked in 6 dot intervals. Every 6th dot is 0.1s. I measured and recorded the displacements that matched the 6 dot intervals in Table 1. I calculated and recorded average velocity for every 6 dot interval. I plotted a chart of velocity at time using the halftime intervals. I calculated the slope of the velocity time graph, which gave me acceleration in cm/s^ 2. I measured and recorded the position from the beginning of the tape that matched each halftime interval and then plotted a velocity-position chart using the speeds I recorded. I then answered all given questions. Observations Time t(s) 0.1s 0.2s 0.3s 0.4s 0.5s 0.6s Displacement (cm[down]) 2.5cm 9.2cm 0.6s Displacement (cm[down]) 2.5cm 9.2cm9.2cm 2cm 15.6cm 26.5cm 31.3cm 36.2cm Average velocity (cm/s[down]) 25cm/s 92cm/s 156cm/s 265cm/s 313cm/s 362cm/s Time t (s) 0.15s 0.25s 0.35s 0.45s 0.55s Position of the start (cm[down of the beginning]) 1.25cm 5.85cm 13.65cm 26.9cm 42.55cm 60.65cm Calculations Average velocity was by dividing change in time through displacement. The comparison was as follows. Vave = Δd /Δt READ: One example calculation will be at 0.2 seconds, when displacement is 9.2cm. To find average speed, I did the following: Vave = Δd/Δt = 9.2cm/0.1s = 92cm/s So at 0.2s, the average velocity was 92cm/s. Acceleration was found by finding the slope of the speed time chart. m = (y2-y1)/(x2-x1), In this case a = (v2-v1)/(t2-t1) = (362cm-25cm)/ (0.55s-0.05s) = 337cm / 0.50s = 674 cm/s ^ 2 (note: To dial in meters, I split (674 cm/s^ 2) by 100) = 6.74 m/s^ 2 [off] Therefore the acceleration throughout 6.74 m /s^2 [off] was this can be caused by experimental errors and computational errors. Analysis 1. The speed time chart is in a straight line, meaning it goes at a constant acceleration. It was headed in a positive direction (refer to graph 1). 2. The relationship between the change in velocity and elapsed time was that speed increased continuously after however the time increased therefore they were proportionate. 3. The slope of the speed time graph accelerated 6,74 m/s^2 [down]. 4. The speed position chart (refer to graph 2) is curved because changing speeds mean change in slope. 5. The change in speed of an object in free fall was directly proportional to the displacement. It's directly proportional to time. This was because as time increases, velocity changes at a constant rate. Due to change in velocity, there has been a change in displacement. Given the formula vf = vi +at and d = (vf +vi/2) . We know that speed changes with t = time and displacement changes with v = speed. Errors After conducting the experiment were noted several errors. One error can be in the calculations in Table 1. The expected mistake was that the numbers would have been rounded up and not entirely accurate. Another systematic error is that the ruler is not 100% accurate when measuring; it may be down by .5mm. A random error that occurred was that one group member released the object that is not in synchronization with the ticker-timer that hindered the process of dots recorded on the tape. Conclusion I concluded that the velocity time chart had gone in a straight line. My hypothesis was only partially correct. Instead of the acceleration being 9.81 m/s^2 [down] as I hypothesized, it was actually 6.73 m/s^2 [down] when calculated due to computational and experimental errors. Acceleration fall key - Displays top 8 worksheets found for this concept. Some of the worksheets for this concept are Acceleration and fall jobs, Physics acceleration speed and time, Name sec date constant acceleration problem works, Fall jobs, Fall jobs, Acceleration jobs, Acceleration due to gravity reviewed. Did you find worksheet you're looking for? To download/print, click on pop-out icon press icon to worksheet to print or download. Worksheet will open in a new window. You can and download or print using the browser document browser options. 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