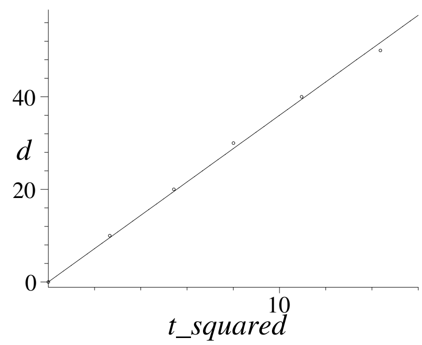
71. (a) It is the intent of this problem to treat the $v_0 = 0$ condition rigidly. In other words, we are not fitting the distance to just any second-degree polynomial in t; rather, we requiring $d = At^2$ (which meets the condition that d and its derivative is zero when $t = 0$). If we perform a leastsquares fit with this expression, we obtain $A = 3.587$ (SI units understood). We return to this discussion in part (c). Our expectation based on Eq. 2-15, assuming no error in starting the clock at the moment the acceleration begins, is $d = \frac{1}{2}at^2$ (since he started at the coordinate origin, the location of which presumably is something we can be fairly certain about).

(b) The graph (d on the vertical axis, SI units understood) is shown.

The horizontal axis is t^2 (as indicated by the problem statement) so that we have a straight line instead of a parabola.



(c) Comparing our two expressions for d, we see the parameter A in our fit should correspond to $\frac{1}{2}a$, so $a = 2(3.587) \approx 7.2\,\mathrm{m/s^2}$. Now, other approaches might be considered (trying to fit the data with $d = Ct^2 + B$ for instance, which leads to $a = 2C = 7.0\,\mathrm{m/s^2}$ and $B \neq 0$), and it might be useful to have the class discuss the assumptions made in each approach.