Problem 3

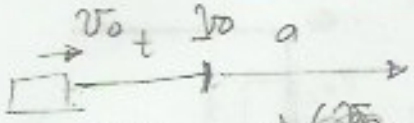
The data below shows the total stopping distance (including the distance traveled before the driver reacts and the distance traveled while slowing down) and the corresponding initial speed for two different cars, car A and car B, driven by two different drivers, driver A and driver B. Calculate the reaction time for both drivers and the braking acceleration for both cars. Assume that once the car starts braking it has a constant acceleration. ***Hint: think about both parts of the motion, and make a system of equations for each car and driver. Think about which variables will remain the same as long as you have the same car and the same driver.***

Table 1: Data for *car A* and *driver A*

Speed (m/s)	Stopping Distance (m)
4.44	5.18
8.89	14.32

Table 2: Data for car B and driver B

Speed (m/s)	Stopping Distance (m)
4.44	8.23
8.89	19.20



$v_0 t \quad \frac{1}{2}(\quad) - \frac{v_0^2}{2a}$

$4.44 \cdot t - \frac{(4.44)^2}{2a} = 5.18$

$8.89t - \frac{(8.89)^2}{2a} = 14.32$

$4.44(0.72) - \frac{(4.44)^2}{2a} = 5.18$

$-\frac{(4.44)^2}{2a} = 1.98$

$\frac{-(4.44)^2 - 1.99}{2} = a$

$a = -10.85$

$(4.44t - 5.18) = \frac{(4.44)^2}{2a}$

$(8.89t - 14.32) = \frac{(8.89)^2}{2a}$

$\frac{4.44t - 5.18}{8.89t - 14.32} = 0.25$

$4.44t - 5.18 = 2.22t - 3.58$

$2.22t = 5.18 - 3.58$

$t = \frac{1.6}{2.22} = 0.72\,s$

reaction time
A: 0.72s
Brake accel$_A$: -10.85