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| **The Physics of Baumgartner Skydiving** |
| **Formulas and Constant** |
| **Definitions** |
| : The mass of Baumgartner and his equipment.  : The projected area of the Baumgartner.   |  |  | | --- | --- | |  | kg | |  | m2 | |  | m/s2 | |  | s |   : The drag coefficient of Baumgartner.  **𝑔**: The acceleration due to gravity.  Figure 1: Baumgartner and his equipment  : the density of the atmosphere around Baumgartner.  : The velocity of Baumgartner.  : The time pass after Baumgartner began falling.  : The distance between ground and Baumgartner.  : The temperature of atmosphere around Baumgartner.  : The pressure of atmosphere around Baumgartner.  : A very short time. |
| **Calculation of Constant** |
| About seconds after Baumgartner began falling, he reached the terminal velocity(km/hrm/s) at a height of about meters.  We hypothesized that is constant. We found out is about kilogram and set m/s2. Reaching the terminal velocity signified that the resistance equals gravity, so we got .  We substituted meters into the function of density and got . Then find by  .  After Baumgartner opened his parachute, his velocity fluctuated between and m/s. We thought it is probably because the instability from stratosphere. So we take the average(m/s) as the velocity after he opened. |
| **Simulation by Computer Program** |
| **Flow Path** |
| * **“”** here is the **program usage.** It means **to change the value of LHS into the value of RHS.**   **Yes**  **Yes**  **No**  **Yes**  **No**  **No**  Original State  Result                        **Yes**  **No** |
| **Program (made by phthon)** |
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| **Result and Discussion** |
| The simulation by computer program tlod us Baumgartner spent 531 seconds on falling. It is close to the practical situation. We thought the error brobably from ~~~. |
| **References** |
| Natalie Wolchover. (2012). The Physics of the First-Ever Supersonic Skydive. Retrieved from <https://www.livescience.com/23710-physics-supersonic-skydive.html> (November 3, 2019)  Drag coefficient. (November 14, 2019). <https://en.wikipedia.org/wiki/Drag_coefficient> (November 3, 2019)  <https://www.zhihu.com/question/59208808>  <https://www.youtube.com/watch?v=raiFrxbHxV0>  <https://www.youtube.com/watch?v=vvbN-cWe0A0> |