Height: 866.14 ft | 264 meters

Mass: 0.68 kg

We already have the mass of our rocket from the simulation, 0.68 kg. But we need acceleration, and the acceleration is the slowing down of the rocket in the fraction of a second that it hits the ground. The acceleration will represent the G-forces the minifigs experience, while the force will be how hard they are slamming into the ground.

In order to find acceleration, I will use this equation: , which comes from the three kinematics equations. This is the first step in finding acceleration. The initial velocity, , is 0, because we start at apogee, and when the rocket changes direction from up to down, its speed is 0. Acceleration is easy, as it’s the acceleration due to Earth’s gravity, 9.8 meters per second squared. The final missing piece is , which is the change in height. Again, super easy, 264 meters, which we got from our on-board computer. Now we can solve for acceleration:

This means that the instant before the rocket hits the ground, it was traveling at 71.93 meters per second, or over 160 mph! Now that we have final velocity, we can calculate acceleration, which we can find just by using the properties of acceleration, it’s the change in velocity over time. So, the final piece to the puzzle is the time it takes for the rocket to go from 160 mph to a dead stop. Now, finding the precise value would be immensely difficult and time consuming, so I am going to assume a common value, 0.05 seconds. This brings the equation to , where is 71.93 meters per second. This brings the grand total of acceleration to:

2973.96

This means that the minifigures experienced a grand total of a whopping 146.8 Gs (303.47)! With this kind of force, your bones would shatter and the rest of you would be mush! While technically with appropriate protective gear it is *possible* to survive this, it is so small a chance as to be negligible. Additionally, the minifigures were wearing no protective gear, not even a seatbelt! They are more than dead; they are definitively *destroyed*!

30.023 0.613125 148.698 -2034.45