This is the opening credits for a 1941 episode of Superman. Superman's history is presented, from his birth on Krypton, his orphanhood, and his rise to superhero status. In his early days, Superman only had superhuman strength; it wasn't until much later that he was capable to almost supernatural abilities (flying, x-ray vision, etc.). What is the source of Superman's great strength?

The acceleration due to gravity on Earth is:

$$g = \frac{GM_E}{R_E^2} = 9.8 \frac{m}{s^2}$$

If the mass of the Earth was to increase or its radius to decrease, the acceleration due to gravity would increase proportionally. Then, the force due to gravity would also increase. For example, if the mass of the earth doubled, the acceleration due to gravity would also double. Then, a person who previously had a weight of 600 newtons would have a weight of 1200 newtons.

Similarly, Superman came from a planet that was either much more massive, much smaller, or both. Let's assume Superman's weight on Krypton was 1000 times his weight on Earth. Then, something that would seem fairly heavy to us would seem much lighter to Superman. It would also allow Superman to jump to great heights, just like the men on the moon were able to jump higher than they would on Earth because of the reduced g.

If Krypton has a radius that is ½ that of the Earth, what must its mass be (in terms of the Earth's mass) for its acceleration due to gravity to be 1000 times that found on the Earth?

Answer: The decrease in radius causes an increase in g by a factor of 4, so an additional increase by a factor of 250 is needed. Therefore, the mass of Krypton must be 250 times the mass of Earth.