



ROCKET ENERGY

A huge amount of fuel is needed to get space craft into orbit. The fuel provides energy that gets converted into kinetic energy and energy that gets converted into gravitational potential energy.

In the video, mathematician Matt Parker and astronaut Chris Hadfield did not consider the energy required for gravitational potential energy in their calculations. Let's work out how much difference this makes!

Using the formulae and facts below about Chris Hadfield's space shuttle in orbit, work out how many times bigger the kinetic energy is than the gravitational potential energy.

$$\text{Kinetic Energy} = \frac{1}{2}mv^2$$

$$\text{Gravitational Potential Energy} = mgh$$

m is the mass of the shuttle in kg
 v (speed of the shuttle) = $8000ms^{-1}$
 h (height of orbit) = $408,000m$

g is the acceleration due to gravity - we can assume is $g = 9.81ms^{-2}$ for low Earth orbit.

Hopefully this explains why Matt didn't take gravitational potential energy into account. Of course, space scientists and astronauts do need to be a lot more accurate in their calculations so they get into orbit safely.