

# Energy and work



## Two stones - the same size, the same weight, but...

It requires energy to lift a 20 kg stone 3 m up. Every time we pull the so-called potential energy of the stone increases. If you let go of the chain potential energy turns into kinetic energy.

The deeper the stone falls the more the kinetic energy grows.

So potential energy is biggest at the highest point.

The name 'potential energy' means that this force has the intrinsic possibility to be turned into kinetic energy.



*Inventing the pulley resulted in new possibilities. Without the pulley and crane the Colosseum in Rome could have never been built. (Replica of a Roman crane in Xanten)*

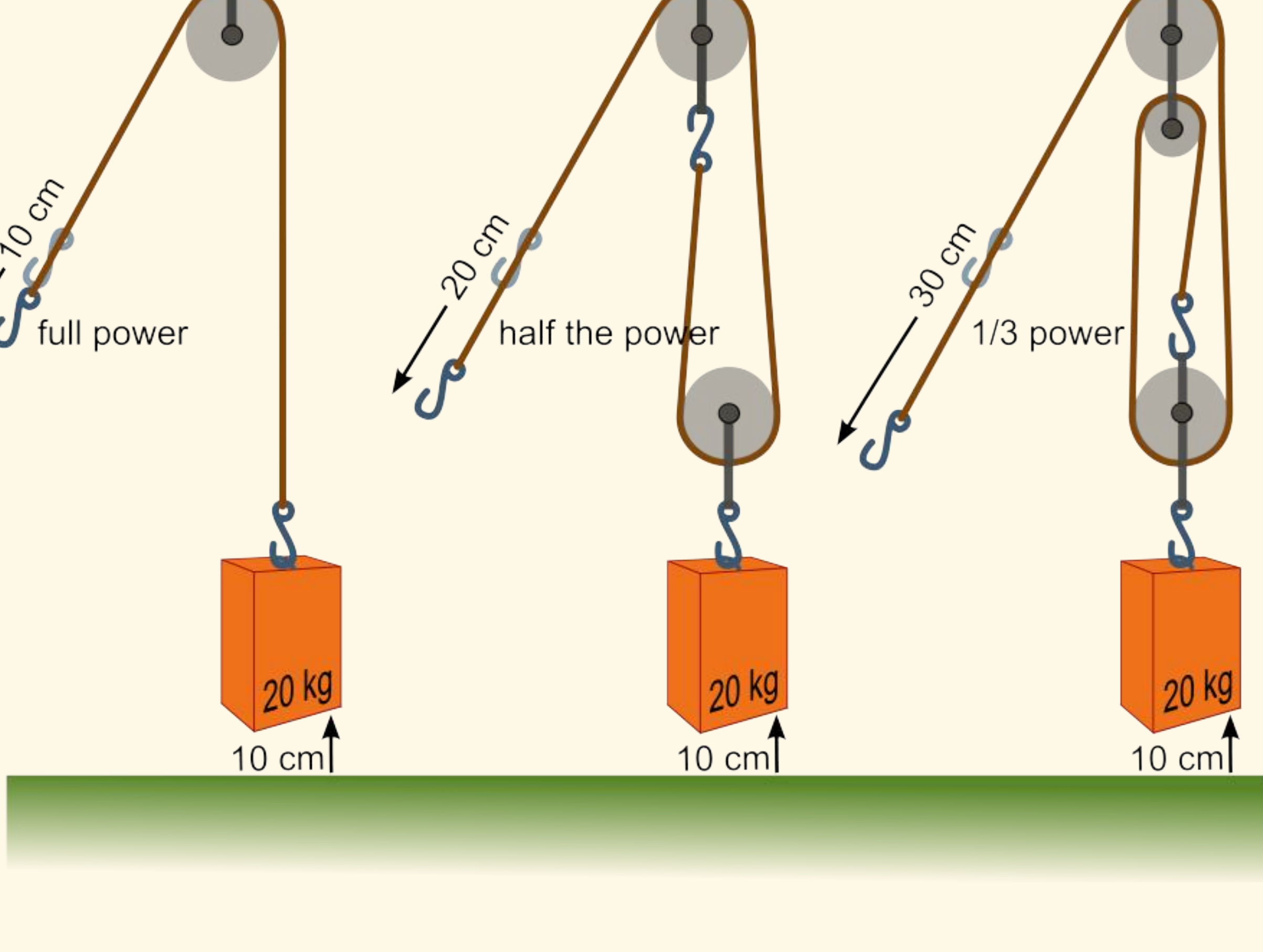
## It's a trick

How come: you only need half as much force to pull the right-hand stone although it weighs exactly the same?

The trick is a hand pulley system with a deflection roller at the weight. It's easier, but you need to pull more often.

This is because now you have to pull the chain 6 m to lift the stone 3 m. To get the

right-hand stone requires exactly the same amount of work as for the left stone, because in physics work equals force times distance. So half the force times double distance equals the same work. At the top both stones hold the same amount of potential energy. Energy is stored work!



## What makes us strong

If we don't eat enough, we do not have any strength. Our strength comes from our muscles, and they need energy to work. Energy-rich biochemicals, especially sugars and other carbohydrates, which our body produces, for instance from spaghetti supply this energy. Sugar is broken down in our cells into CO<sub>2</sub> and water, thus releasing energy. Our muscles convert this biochemical energy into mechanical work and eventually into potential energy, when we pull up the stone.

Surely, you jumped from the poolside into the water before. Even if the dive goes wrong it barely hurts. However, a belly flop from a 5 metre or even 10 metre diving board can be dangerous. The higher the board the faster you come down slapping the water's surface.

When you fill a balloon with water, knot the end and drop it about a hand's width from a stone floor, not a lot will happen. But if you drop it off the second floor of a house onto a stone floor, the balloon will gain a lot of speed and hit the ground with a lot of energy - it will pop and splash everything in its vicinity...

I can be rather stubborn, but I don't stand a chance against such a pulley.

