

WORKSHEETS FOR PUPILS

Name of activity	Estimated time needed	Difficulty of activity	Age of children for whom the activity is suitable	Tools and used materials	Objective of activity
Comet	20 – 30 minutes	medium	14 – 15	encyclopaedia, atlas or internet, calculator, spreadsheet	concept of comet, tail, movement around the sun
Minor Planet Velocity	30 – 40 minutes	very hard	14 – 15	encyclopaedia, atlas or internet, calculator, spreadsheet	3. Kepler's law, unit conversions
Energy	20 – 30 minutes	medium	14 – 15	paper, computer, calculator	law of conservation of mechanical energy, kinetic and positional energy
Impact Craters	20 – 30 minutes	medium	14 – 15	metre ruler, calculator, spreadsheet, graph paper	work with map, kinetic energy, volume, weight, density
Gravitational Force	20 – 30 minutes	medium	14 – 15	calculator, spreadsheet, graph paper	gravitational force, sphere volume, unit conversions

Worksheet 3: ENERGY

Practical Exercise: The ten-kilogram weight is at rest at a height of 10 km above the Earth's surface. Calculate the positional energy according to the equation $E_p = mhg$, where $g = 10 \text{ N} \cdot \text{kg}^{-1}$, $h = 5 \text{ km}$. How much energy is converted from positional energy to kinetic energy if the body is moved from 10 km to 5 km? Estimate what maximum speed the weight can reach if we do not take air resistance into account.

Practical Exercise: Let's look at the energy that is released when a moving object suddenly stops – e.g. a comet or minor planet hits the Earth. The usual velocities of minor planets hitting the Earth range from $20 \text{ km}\cdot\text{s}^{-1}$ to $70 \text{ km}\cdot\text{s}^{-1}$.
Imagine a kilogram object that hits the Earth at speed $20 \text{ km}\cdot\text{s}^{-1}$. Calculate how much energy is released during this collision.

Practical Exercise: Now, imagine the same object, only hitting the Earth at a speed of $70 \text{ km}\cdot\text{s}^{-1}$. Calculate how much energy is released during this collision. Compare with the previous value.

Practical Exercise: We will look at the effect of the size of the incident object on the released energy. Calculate the released energy of a two-kilogram object that collides with the Earth at speed $20 \text{ km}\cdot\text{s}^{-1}$. Compare with the answer in the first case.