

Episode 213: Preparation for work, energy and power topic

For some students, this will be a revision topic on fairly well understood themes. For this reason you may want to state the basic physics with clarity and brevity at the beginning of the topic to allow the students as much time as possible performing the experiment.

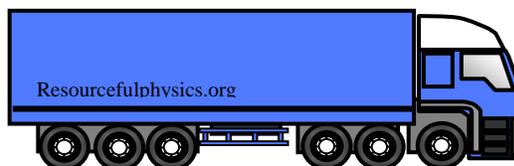
Episode 214: Work done by a force

Episode 215: Forces on vehicles

Episode 216: Energy changes

Episode 217: Conservation of energy

Episode 218: Mechanical power



Advance warning

In these episodes, students can perform some useful experiments with **trolleys**, weights, pulleys etc. It will help if you familiarise yourself with this equipment in advance, and ensure that the wheels of trolleys and pulleys are as frictionless as possible.

Be prepared to cope with experiments where the results don't quite show that energy is conserved; this will be because of energy losses due to friction. Your students should appreciate that no practical system can be perfect; turn the situation to your advantage by opening up a discussion on the idea of energy efficiency.

Also in these episodes, you will find that there are opportunities for **datalogging**. It is impossible to provide experimental recipes which match each commercial variety of datalogger, so you will have to be prepared to adapt to the equipment available to you. Check the manufacturer's supporting documentation for suggested experiments.

Main aims

Students will:

Use the following equations:

- work done = force \times distance moved in direction of force.
- potential energy = mgh
- power = work done/ time taken = rate of energy transfer
- power = force \times velocity
- efficiency = (useful energy transferred / total work done) \times 100%
- Understand energy transfers from potential energy to kinetic energy.
- Equate work done in decelerating to rest with initial kinetic energy.
- Apply these ideas to situations in which vehicles and passengers are accelerated or decelerated.
- Understand and use the principle of conservation of energy (as applied to mechanical energy).

Prior knowledge

Students are likely to have a simple understanding of energy, and how it is transferred by a force. They will have met the idea of conservation of energy. In these episodes, you can extend these ideas to make them more quantitative.

Where this leads

A good grounding in ideas about mechanical energy is needed before going on to a consideration of momentum.

General ideas about energy and its conservation permeate the whole of Physics (and, indeed, the whole of science). Many specific results in other areas of science turn out to be examples of energy conservation, e.g. Lenz's law in electromagnetism, Bernoulli's equation of fluid flow.