



Physics Scheme of Learning

P1: Conservation and Dissipation of Energy

Intent – Rationale

This is the first topic in the “Energy and energy resources” topic, covering how energy is transferred and stored, types of energy store, how to quantify energy changes, and efficiency of different energy transfers.

Sequencing – what prior learning does this topic build upon?	Sequencing – what subsequent learning does this topic feed into?
KS3 Topic 1 Energy transfers KS3 Topic 2 Forces and effects KS3 Topic 3 Energy Resources	<ul style="list-style-type: none"> • P2 Energy transfer by heating • P3 Energy resources • P4 Electric circuits • P5 Electricity in the home • P7 Radioactivity • P15 Electromagnetism
What are the links with other subjects in the curriculum?	What are the links to SMSC, British Values and Careers?
<ul style="list-style-type: none"> • Base the content here on what you already know but there will be time in future to liaise further as part of our collaborative work 	<ul style="list-style-type: none"> • Careers – communication (a), problem solving (e)
What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading?	What are the opportunities for developing mathematical skills?
FROM THE LIBRARY <i>Energy</i> ; Louise Spilsbury-530 <i>Energy</i> ; Chris oxlade-531 <i>Energy and Chemical Change</i> ; Brian Knapp-531 <i>Energy and Cells</i> ; C Gayford-571.6 <i>Energy Alternatives</i> ; Robert Sneddon-620	<ul style="list-style-type: none"> • Calculations using energy conservation, work done, power, kinetic energy, efficiency • Percentages • Unit prefixes • Rearranging equations



Physics Scheme of Learning

P1: Conservation and Dissipation of Energy

Intent – Concepts

What knowledge will students gain and what skills will they develop as a consequence of this topic?

Know

- State the ways in which energy can be stored and transferred.
- State the meaning of the conservation of energy.
- State the definition of a ‘closed system’.
- State what happens to gravitational potential energy stores of an object as it moves up or down.
- State the quantities on which an object’s kinetic energy depends.
- State what is meant by an elastic potential energy store.
- State what is meant by useful and wasted energy, and state what happens to the wasted energy.
- State what is meant by efficiency, and maximum efficiency of any energy transfer.
- State what is meant by power.

Apply

- Described energy changes within a closed system.
- Describe how energy and work are related.
- Calculate the work done by a force on an object.
- Explain why an object moving up gains gravitational potential energy.
- Calculate the change in gravitational potential energy of an object.
- Calculate the kinetic energy of an object.
- Describe how machines waste energy.
- Calculate the power of an appliance.
- Calculate efficiency of an appliance in terms of power.

Extend

- Describe the changes in energy stores and the energy transfers that happen when an object falls and/or hits the ground.
- Explain why conservation of energy is an important concept.
- Describe what happens to work done in order to overcome friction.
- Explain why it is easier to lift an object on Earth than on the Moon.
- Calculate the amount of energy in an elastic potential energy store.
- Describe whether energy is still useful after it has been used.
- Describe some ways in which energy transfers can be made more efficient.
- Calculate the wasted power of an appliance.



What subject specific language will be used and developed in this topic?	What opportunities are available for assessing the progress of students?
<p>Chemical energy store Energy contained in fuels, food or chemicals. Energy is released during chemical reactions.</p> <p>Closed system An object or a group of objects for which the total energy is constant.</p> <p>Conservation of energy Energy cannot be created or destroyed.</p> <p>Dissipated Describes energy that is not usefully transferred and is stored in less useful ways.</p> <p>Efficiency Useful energy transferred by a device divided by total energy supplied to the device.</p> <p>Elastic A material is elastic if it is able to regain its shape after it has been squashed or stretched.</p> <p>Elastic potential energy Energy stored in an elastic material when it is stretched or squashed.</p> <p>Energy transfers Energy is transferred by heating, by waves, by applying an electric current, or by a force that moves an object.</p> <p>Geothermal energy Energy that comes from energy released by radioactive substances deep within the Earth.</p> <p>Gravitational potential energy stores in an object due to its position – usually height above the ground.</p> <p>Hooke's law The extension of a spring is directly proportional to the force applied, as long as its limit of proportionality is not exceeded.</p> <p>Kinetic energy store Energy an object possesses when it is moving.</p> <p>Spring constant Force per unit extension of a spring.</p> <p>Thermal energy Energy an object has due to its temperature.</p>	<ul style="list-style-type: none"> • Assessed homework (Light bulb efficiency) 6 mark, long answer question • End of unit summative test



Useful energy Energy transferred to where it is wanted in the way that is wanted.

Wasted energy Energy that is not usefully transferred.

Work The energy transferred by a force.

Work done (joules, J) = force (newtons, N) x distance moved in the direction of the force (metres, m).

KESTEVEN AND SLEAFORD HIGH SCHOOL



Intent – Concepts

Lesson title	Learning challenge	Higher level challenge	Suggested activities and resources
P1.1 Conservation of energy	Can I state the ways in which energy can be stored and transferred? Can I state the meaning of the conservation of energy?	Can I explain why conservation of energy is an important concept?	
P1.2 Work	Can I state the definition of a 'closed system'?	Can I describe what happens to work done in order to overcome friction?	
P1.3 Gravitational potential energy (GPE)	Can I state what happens to gravitational potential energy stores of an object as it moves up or down?	Can I describe the changes in energy stores and the energy transfers that happen when an object falls or hits the ground?	
P1.4 Kinetic energy (KE) and elastic potential energy (EPE)	Can I state the quantities on which kinetic energy depends? Can I state what is meant by an elastic potential energy store?	Can I calculate the amount of energy in an elastic potential energy store?	
P1.5 Efficiency and dissipation	Can I state what is meant by useful and wasted energy and state what happens to wasted energy?	Can I describe some ways in which energy transfers can be made more efficient?	
P1.6 Power	Can I state the meaning of 'power'?	Can I calculate the wasted power of an appliance?	
Revision			
P1 End of Unit Summative Test			