

KS3 Physics – Energy
Summer 1 2022

Students will learn about different types of energy, how we experience and how we use energy. Students will learn that energy can be found in a range of objects and that most objects display more than one type of energy. They will start to identify when energy has changed from one form to another and whether the energy is useful or wasted. Students will also identify how energy can be saved through investigations into heat loss and insulation. Students will learn that electrical energy is generated from natural resources and will develop an understanding of the effects of burning fossil fuels. Students will recognise that plants get their energy from the sun and animals get energy from the food that they eat. Students will learn about the energy content of different foods and will begin to identify the effects of eating too much or too little.

Students will ‘work scientifically’ to achieve these goals, learning the key features of scientific enquiry; observing over time, pattern seeking, identifying, classifying, investigating (fair tests) and researching.

RRS Articles:

This unit of work is linked to Articles of the UN Convention on the Rights of the Child.

Article 13 (freedom of expression)

Article 29 (goals of education)

	<u>OU Progression Steps 5-6</u>	<u>OU Progression Steps 7-8</u>	<u>OU NC Step 1</u>	<u>OU NC Step 2</u>
<u>Subject specific knowledge</u>	<p><u>Students know</u> 4 forms of energy with visual prompts: heat, sound, light and kinetic.</p> <p><u>Students know</u> the names of 4 given forms of energy after exploring concrete resources.</p> <p><u>Students know</u> which energy is the useful energy in an example.</p> <p><u>Students know</u> when something is cold or hot.</p>	<p><u>Students know</u> the 6 forms of energy with visual prompts: heat, sound, light, magnetic, kinetic and gravitational potential.</p> <p><u>Students know</u> the names of 6 given forms of energy after exploring concrete resources.</p> <p><u>Students know</u> which energy is the useful energy in an example and suggests why using a choice of 2.</p>	<p><u>Students know</u> the 8 forms of energy with visual prompts: heat, electrical, sound, light, magnetic, elastic potential, kinetic and gravitational potential.</p> <p><u>Students know</u> the names of 8 forms of energy after exploring concrete resources.</p> <p><u>Students know</u> that some energy is useful and some energy is not by referencing specific examples.</p>	<p><u>Students know</u> the 8 forms of energy: heat, electrical, sound, light, magnetic, elastic potential, kinetic and gravitational potential.</p> <p><u>Students know</u> an example of each form of energy after exploring concrete resources.</p> <p><u>Students know</u> the names a device/object that can store energy e.g. batteries.</p>

	<p><u>Students know</u> materials keep us warm.</p> <p><u>Students know</u> the concepts of fair testing.</p> <p><u>Students know</u> when an investigation has been successful.</p> <p><u>Students know</u> that electrical energy is generated from natural resources and can identify examples using images.</p> <p><u>Students know</u> that burning fossil fuels is bad for the planet.</p> <p><u>Students know</u> that plants get energy from the sun and animals get energy from food.</p> <p><u>Students know</u> that the energy from food can be stored as fat if it is not used by the body.</p>	<p><u>Students know</u> that some materials keep you warmer than others and names them.</p> <p><u>Students know</u> materials that are good for insulation after conducting an experiment.</p> <p><u>Students know</u> that objects need to be completely covered with insulation to stop heat escaping with verbal prompts after an investigation.</p> <p><u>Students know</u> the concepts of fair testing and how to collect results.</p> <p><u>Students know</u> investigations that are successful and unsuccessful.</p> <p><u>Students know</u> that electrical energy is generated from renewable and non-renewable resources and can identify examples of each using images.</p> <p><u>Students know</u> why burning fossil fuels is bad for the planet using images.</p> <p><u>Students know</u> where plants and animals get their energy from.</p>	<p><u>Students know</u> that during energy transfers energy is never lost.</p> <p><u>Students know</u> objects need to be completely covered with insulation to stop heat escaping with verbal prompts after an investigation.</p> <p><u>Students know</u> materials that are good or bad for insulation after conducting an experiment.</p> <p><u>Students know</u> low temperatures mean that something is cold and high temperatures mean something is hot and give approximate temperatures.</p> <p><u>Students know</u> the concepts of method, investigation, fair testing and results.</p> <p><u>Students know</u> that electrical energy is generated from non-renewable sources which are bad for the environment or renewable sources which are good for the environment.</p> <p><u>Students know</u> and describes why burning fossil fuels is</p>	<p><u>Students know</u> that during energy transfers energy is never lost.</p> <p><u>Students know</u> that objects need to be completely covered with insulation to stop heat escaping.</p> <p><u>Students know</u> how unwanted energy transfers can be reduced e.g. insulation. Names appropriate insulation materials from a selection.</p> <p><u>Students know</u> that low temperatures mean that something is cold and high temperatures mean something is hot and give approximate temperatures.</p> <p><u>Students know</u> the concepts of method, investigation, fair test, results and evaluation.</p> <p><u>Students know</u> that energy can change from one form to another e.g. light energy from the sun changing to electrical energy using solar panels.</p> <p><u>Students know</u> 8 energy sources, states which are renewable and gives reasons why we should use renewable energy.</p>
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<p><u>Subject specific skills</u></p>	<p><u>Students are able to</u> sort concrete resources into those that use energy and those that do not.</p> <p><u>Students are able to</u> select the correct object for a given type of energy e.g.:</p> <ul style="list-style-type: none"> - Light - torch, fairy lights. - Sound - radio, instruments - Heat - hot water bottle - Kinetic - windup toy <p><u>Students are able to</u> identify when an example is losing heat by touch.</p> <p><u>Students are able to</u> measure temperature using a data logger and identifies if temperature is warm or cold by touch.</p> <p><u>Students are able to</u> respond to questioning regarding</p>	<p><u>Students are able to</u> sort images into those that use energy and those that do not.</p> <p><u>Students are able to</u> select the correct object for a given type of energy e.g.:</p> <ul style="list-style-type: none"> - Light - torch, fairy lights. - Sound - radio, instruments - Heat - hot water bottle - Kinetic - windup toy - Magnetic - magnet - Gravitational - ball <p><u>Students are able to</u> name the energy before a transfer and the name of the energy after the transfer from a choice of 2.</p> <p><u>Students are able to</u> measure the temperature at the start and end of an activity using a data logger and identifies if</p>	<p><u>Students are able to</u> sort words or symbols into those that use energy and those that do not.</p> <p><u>Students are able to</u> select the correct object for a given type of energy e.g.:</p> <ul style="list-style-type: none"> - Light - torch - Sound - radio - Heat - hot water bottle - Kinetic - windup toy - Magnetic - magnet - Gravitational - ball - Electric - plasma ball - Elastic - elastic bands <p><u>Students are able to</u> name the energy before a transfer and the name of the energy after the transfer from a choice of images.</p> <p><u>Students are able to</u> measure the temperature at</p>	<p><u>Students are able to</u> identify objects that use energy and those that do not.</p> <p><u>Students are able to</u> select more than one type of energy emitted by a given object e.g. TV: light & sound. Ball: kinetic & gravitational Spring: elastic, kinaesthetic & sound Plasma ball: light & electric</p> <p><u>Students are able to</u> name the energy before a transfer and the energy after the transfer from a key word list.</p> <p><u>Students are able to</u> measure the temperature at the start and end of an activity using a thermometer to the nearest degree.</p>

	<p>whether an object is losing heat and correcting the issues.</p> <p><u>Students are able to follow a set of demonstrations to carry out a simple investigation.</u></p>	<p>temperature has gone up or down.</p> <p><u>Students are able to follow a picture method to carry out a simple investigation.</u></p> <p><u>Students are able to identify the correct result in a table.</u></p>	<p>the start and end of an activity using a thermometer to the nearest 5 degrees.</p> <p><u>Students are able to follow a word and picture method to carry out a simple investigation.</u></p> <p>Records results in a given table.</p> <p><u>Students are able to analyse results in the form of simple bar graphs and a brief descriptions using key words or sentence blanks.</u></p> <p><u>Students are able to find and compare the energy content in different foods.</u></p>	<p><u>Students are able to follow a written set of instructions to carry out a simple investigation.</u></p> <p><u>Students are able to record results in a suitable table.</u></p> <p><u>Students are able to analyse results in the form on simple bar graphs and a brief description.</u></p> <p><u>Students are able to find, compare and analyse the energy content in different foods.</u></p>
<p><u>Personal development</u></p>	<p><u>Problem solving</u> Investigations and matching exercises</p> <p><u>Communication skills</u> Working as pairs in investigations, asking and answering questions</p> <p><u>Self-belief</u> Learning new skills, practising them and demonstrating them.</p> <p><u>Self-management</u> Working with new equipment</p> <p><u>Teamwork</u> Working as groups to solve problems or find out new information</p>			
<p><u>Suggested activities</u></p>	<p>Types of energy:</p> <ul style="list-style-type: none"> • Carousel different types of energy and how we experience each. • Explore objects and label using symbols e.g. does a torch emit light or sound energy? • Kahoot quiz to identify energy types in images. • Identify examples of wasted energy. Which type of energy is useful and which is wasted? E.g. lightbulb (light = useful, heat = wasted) or drill (movement = useful, sound = wasted). 			

- Research given types of energy on laptops and present back to the class.

Insulation:

- Explore, identify and describe clothing and then materials. Sort into good and bad for insulation. Does wool keep you warm?
- Practical 1 wrap a cup of hot water in different materials and identify which stays warm for the longest amount of time.
- Practical 2 wrap a box in insulation to investigate how much is needed to keep something warm.
- Test the whether flasks / water bottles keep drinks warm or cold.
- Measure temperature using thermometers or data loggers.
- Represent results in a graph.

Energy sources:

- Sort renewable and non-renewable energy.
- Create a fact file / poster / presentation of the effects of burning fossil fuels and possible solutions.
- Sort images of plants and animals into where their energy comes from (the sun or food), possible link to food chains.
- Identify the energy content of food by reading the label.

Online resources

Twinkl

CLEAPPS for risk assessments

BBC bitesize for video resources.

Evidencing Work

All work / evidence sheets need to be printed off, annotated by staff, self-assessed by pupils and stored in student folders.