

KS3 Physics – Energy Transfer – Learning Objectives

	Beginning	Developing	Secure	Embedding	Extending	Excelling
Transferring Energy	Describe what energy is, and give the unit. Explain where most of the Earth's energy comes from.	Name some different types of energy, and how where they are typically found. Explain the law of conservation of energy.	Describe the main methods of energy transfer. Use simple energy transfer diagrams to show useful and wasted forms of energy.	Complete simple energy transfer calculations. Show an understanding of the term 'energy efficiency'.	Interpret and construct Sankey diagrams drawn to scale. Calculate energy efficiency, suggesting realistic values.	
Releasing Energy	-	Recall that thermal energy is released when a fuel is burned. State the useful/wasted energy types released during burning.	Describe an experiment to compare the amount of energy stored in different fuels/foods. Show an understanding of the term 'energy density', and calculate the energy density of a fuel.		-	
Thermal Conduction	Define the terms 'thermal conductor' and 'thermal insulators', and name some examples.	Explain the difference between 'heat' and 'temperature', and give the units for both.	Understand the term 'thermal equilibrium', and use examples to describe how this can be achieved. Explain, in terms of particles, the main method of energy transfer in solids.		Explain why metals are the best type of thermal conductor.	
Convection	-	In simple terms, explain that hot air rises, giving an example.	Explain, in terms of particles, how particles with more energy rise upwards, and how a convection current forms. Explain examples of the uses of convection currents (eg. kettle/water heater, oven, refrigerator).		-	
Infrared Radiation	Recall that thermal energy may only be transferred across a vacuum by infrared radiation.	State that all objects emit infrared radiation, and explain the information shown in a thermal image.	Recall the types of surface that act as good / bad emitters, absorbers and reflectors.	Discuss situations where infrared radiant heat is present, and how absorbing, reflecting and emitting surfaces can aid or prevent energy transfer.		-
Keeping Warm	-	Name some methods of preventing heat loss from a home. Describe why some types of clothing (including fabrics and colours) keep us warm / cool.	Explain how methods of insulation may be used to prevent heat loss, and how they work. <i>Specific examples may include home insulation, winter clothing, vacuum flask.</i>		Calculate payback time, and discuss the cost-effectiveness of different home insulation methods. Define and interpret U-values.	

* Objectives covering more than one grade are assessed based on the level of scientific detail and language used by the learner.