Beckfoot

Subject: Science (Physics)	Topic: Energy	Year Group: 8

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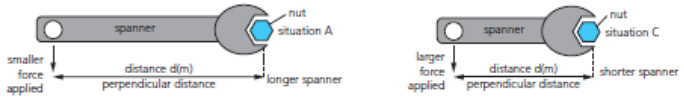
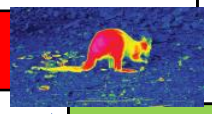
Work, energy and machines

1	"Work done" definition	The energy transferred when a force is used to move an object a certain distance. It is measured in Joules (J).
2	Equation	Work done (J) = Force (N) x distance (m)
3	Levers	Simple machines that make it easier to lift things, they reduce the force needed. A force multiplier uses a smaller input force to give a greater output force.



Energy transfer – radiation and insulation



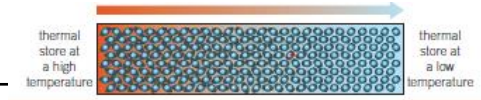
1	Radiation	A method of transferring energy without the need for particles.
2	Infrared radiation	E.g. thermal energy being transferred from the Sun to us through space. The hotter an object is the more infrared radiation it will emit (give out)
3	Surfaces and radiation	Darker matte surfaces absorb and emit more infrared radiation. Shiny and smooth surfaces absorb and emit less infrared radiation, instead reflecting. Thermal imaging shows infrared radiation from an object.
4	Insulation	Methods to reduce heat loss from an object. Examples for a house include; carpets and curtains, reflective foil on the inside walls and double glazing.

Energy and temperature

1	Heat vs Temperature	The **temperature** of a substance is a measure of how hot or cold it is. It is measured with a **thermometer** in degrees Celsius (°C) "Heat" or **thermal energy** of a substance depends on the individual energy of all of the particles, it is measured in Joules (J).
2	Speed and thermal energy	The faster particles are moving, the more thermal energy they have.
3	Factors affecting temperature and heat	Substances with more particles need more thermal energy to increase their temperature (e.g. a bath of water compared to a cup of water). Other factors include the type of substance (e.g. water needs more thermal energy than air to increase temp).

Energy transfer – particles

1	Transfer of energy	If there is a difference in temperature between two objects, energy is transferred from the hotter object to the cooler one. This will continue until both objects are at the same temperature.
2	Convection	How thermal energy is transferred in liquids or gases. Relies on density of particles and convection currents.
3	Conduction	How thermal (heat) energy is transferred in solids by particles colliding.
4	Conductors and insulators	Metals are good **thermal conductors** as they contain electrons which are free to move and particles close together to collide. Gases and liquids are poor conductors as their particles are spread out and so do not collide often, we call these **insulators.**



Key Vocabulary

1	Conservation of energy	Energy can never be created or destroyed just transferred from one store to another.
2	Work	The amount of energy transferred to carry out an action. e.g. lifting a book, work is done against gravity.
3	Input and output force	Input force is the energy used to start an action, output force is the energy outcome.
4	Random errors	Occur due to human error and mistakes made when carrying out a method.
5	Systematic errors	Occur due to faulty equipment in an experiment.
6	Convection currents	As the particles near a heat source are heated they spread out and become less dense, this means that they will rise. More dense particles will take their place at the bottom nearest the heat source creating a constant flow of particles.
7	Equilibrium	If there is no transfer of thermal energy and 2 materials are at the same temperature.