Science KS3 **Energy**

Glossary:

- **Chemical energy store**
  Energy stored because of the chemical composition of an object.
- **Conduction**
  Method of transferring heat in solids.
- **Convection**
  Method of transferring heat in liquids and gases.
- **Dissipation**
  Energy stored in a less useful way.
- **Elastic potential energy store**
  Stored in a compressed or twisted elastic material.
- **Energy transfer**
  Energy moved from one store to another.
- **Gravitational energy store**
  Stored because of the position of the object above ground.
- **Internal energy**
  Energy stored in the system by particles.
- **Joule** Unit of energy
- **Kinetic energy store**
  Stored in a moving object.
- **Non-renewable**
  Energy resources that will run out.
- **Radiation**
  Method of transferring heat which does not need particles.
- **Renewable**
  Energy resources which can be replaced.
- **Temperature**
  A measure of how hot something is.
- **Thermal conductivity**
  A measure of how well an object transfers heat.
- **Thermal energy store**
  Stored because of the object's temperature.
- **Work**
  causes energy to be transferred from one store to another.

Activities

- These books have been lifted off the ground.

  a) What energy store do these books have?
  b) If these books were to fall what would happen to this stored energy?

- When a torch is switched on, not all of the energy stored in a battery is transferred to useful light in the bulb. What has happened to the remaining energy?

- Look at the following diagram of a rollercoaster.

  a) Describe the energy transfers which take place as the rollercoaster car travels from the top of a hill down to the bottom.
  b) Explain why the second hill on a roller coaster has to be lower than the first.

- If an ice cube were placed on a table it would melt. Explain why in terms of energy transfer.

- Describe how heat is transferred by:
  a) Conduction
  b) Convection
  c) Radiation

- Which of the following would store the most energy and why?
  a) Cup of water at 70°C
  b) Swimming pool at 30°C
  c) Bucket of water at 100°C.

QUICK QUESTIONS:

1. Name 3 methods of transferring thermal energy from one substance or place to another.
2. State five reasons why objects might have stored energy.
3. Explain the difference between renewable and non-renewable energy resources.
4. Explain the difference between heat and temperature.
5. Sate the unit for energy.

KS3 Spine

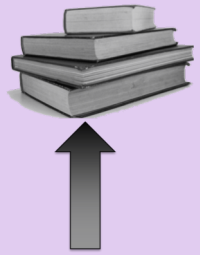
Energy

1. Energy stores

- Objects can have **stored energy** either because of:
  - Their chemical composition – **chemical**
  - Their movement – **kinetic**
  - Their temperature – **thermal**
  - Their position in a field – **gravitational potential, magnetic, electric**
  - Compression or distortion of an elastic material – **elastic potential**

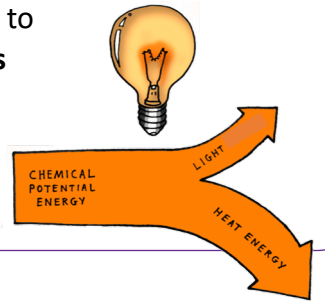
2. Work

- When **work** is done by a **force**, it results in an **energy transfer** and leads to energy being **stored** by an object.
- These books have been lifted into the air; work has therefore been done. Energy has been transferred to the books and is now stored in them.



3. Energy transfers and dissipation

- The unit for energy is the **joule.**
- Energy **cannot** be created or destroyed.
- Energy can be **transferred** to other useful **energy stores** or **dissipated**.
- We can use diagrams to show these transfers.

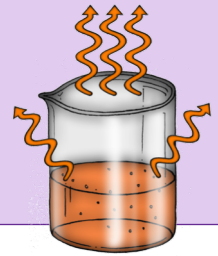


4. Lifting objects above the ground

- Energy can be stored by lifting it higher above ground – **gravitational potential**.
- When it is released and falls, this energy is stored in its motion – **kinetic**.
- During this transfer some energy will be **dissipated**.

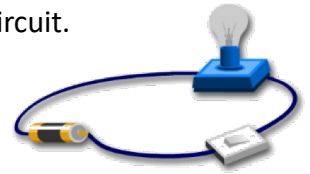
5. Heat and temperature

- **Heat** is an **energy store** whereas **temperature** is a measure of how hot something is.
- An object at higher temperature transfers **thermal energy** to the surroundings until they are at the same temperature.
- How quickly this happens depends on the **thermal conductivity** of the materials.



6. Batteries and electrical current

- The chemicals in the cells of a battery store energy.
- This energy is **transferred** to charged particles when the battery is connected to a complete circuit.
- This causes the **current** to flow, **transferring** energy to other parts of the circuit.



7. Methods of thermal energy transfer

- **Thermal energy** can be transferred by particles, using **conduction** and **convection**. It can also be transferred by **radiation**.
- **Internal energy** is the energy stored in a system by the particles. When heat is added the internal energy of the particles increases.

8. Energy resources

- Fuels such as oil, gas, coal and wood are **energy resources**.
- Some energy resources are **renewable**, such as those produced by wind, waves, sunlight and tides.
- Others are **non-renewable** such as those formed by burning fossil fuels with oxygen.