Physics 1: Energy

Section 1: Energy stores and methods of transfer

1 Chemical store	Energy stored as chemicals waiting to **react.**
2 Kinetic store	Energy stored in objects that **move.**
3 Gravitational Potential store	Energy stored in objects raised up against the force of **gravity.**
4 Elastic Potential store	Energy stored in an object that have been **stretched.**
5 Internal store	Energy stored in the movement of particles. It is a combination of the **kinetic** energy of the particles and the **potential** energy of particles that are apart from each other. Can be modified by **heating** or **cooling**.
6 Nuclear store	Energy stored in the **nuclei** of atoms that can fuse (nuclear fusion) or split (nuclear fission).
7 Magnetic store	Energy stored in **magnets** that are **attracting** or **repelling.**
8 Electrostatic store	Energy stored in **electric charges** that are **attracting** or **repelling**.
9 Mechanical transfer	Energy transferred when a **force moves through a distance**.
10 Electrical transfer	Energy transferred when a **charge moves**.
11 Radiation transfer	Energy transferred by **electromagnetic radiation**.
12 Heat transfer	Energy transferred when an object is **heated.**

Section 2: Equations to learn

Calculation	Equation	Symbol equation	Units
13 Kinetic energy store	Kinetic energy = 0.5 x mass x velocity^2	$E_k = 0.5\ m\ v^2$	Energy – Joules (J) Mass – kilograms (kg) Velocity – metres per second (m/s)
14 Gravitational potential energy store	Gravitational potential energy = mass x gravitational field strength x height	$E_p = m\ g\ h$	Energy – Joules (J) Mass – kilograms (kg) Gravitational field strength – Newtons per kilogram (N/kg) Height – metres (m)
15 Power	Power =energy transferred ÷ time	$P = \frac{E}{t}$	Power – Watts (W) Energy transferred – Joules (J) Time – seconds (s)
16 Power	Power = work done ÷ time	$P = \frac{W}{t}$	Power – Watts (W) Work done – Joules (J) Time – seconds (s)
17 Efficiency	Efficiency = $\frac{\text{useful energy output}}{\text{total energy input}}$		Energy – Joules (J)
18 Efficiency	Efficiency = $\frac{\text{useful power output}}{\text{total power input}}$		Power – Watts (W)

Section 3: Energy Resources

Resource	Renewable?	Uses	Advantages	Disadvantages
19 Fossil Fuels	Non-Renewable	Electricity, transport, heating	**Reliable** – electricity can be generated all of the time. Relatively **cheap** way of generating electricity.	Produces **carbon dioxide**, a greenhouse gas that causes **global warming.** Can produce **sulphur dioxide**, a gas that causes **acid rain**.
20 Nuclear Fuel	Non-Renewable	Electricity	Produces **no carbon dioxide** when generating electricity. **Reliable** – electricity can be generated all of the time.	Produces **nuclear waste** that remains **radioactive** for thousands of years. **Expensive** to build and **decommission** power stations.
21 Bio Fuel	Renewable	Heating, electricity	**Carbon neutral**. **Reliable** – electricity can be generated all of the time.	Production of fuel may damage ecosystems and create a **monoculture**.
22 Wind	Renewable	Electricity	**No CO_2** produced while generating electricity.	**Unreliable** – may not produce electricity during **low wind**. **Expensive** to construct.
23 Hydroelectricity	Renewable	Electricity	**No CO_2** produced while generating electricity.	Blocks rivers stopping **fish migration**. **Unreliable** – may not produce electricity during **droughts**.
24 Geothermal	Renewable	Electricity, heating	Does not damage **ecosystems**. **Reliable** source of electricity generation.	Fluids drawn from ground may contain **greenhouse gases** such as **CO_2** and **methane**. These contribute to **global warming**.
25 Tidal	Renewable	Electricity	**No CO_2** produced while generating electricity.	**Unreliable** – **tides vary**. May damage **tidal ecosystem** e.g. mudflats.
26 Waves	Renewable	Electricity	**No CO_2** produced while generating electricity.	**Unreliable** – may not produce electricity during **calm** seas.
27 Solar	Renewable	Electricity, heating	**No CO_2** produced while generating electricity.	**Unreliable** – does not produce electricity at **night**. Limited production on **cloudy** days. **Expensive** to construct.

Section 4: Key terms

28 Dissipation	Energy becoming **spread out** instead of in a concentrated store. "Wasted" energy.
29 Lubrication	A method of reducing unwanted energy transfers by application of a **lubricant** (e.g. **oil**) to **reduce friction**. Occurs in machines.
30 Insulation	A method of reducing energy transfers by the use of **insulators** (non-conductive material). Occurs in buildings.
31 Conservation of energy	The law that states that **energy cannot be created or destroyed**.
32 Specific heat capacity	The energy needed to raise **1kg** of a material by **1°C**.

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