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P6 Energy transformations & transfers

P6.02 Forms of energy

Example 1: running

Chemical energy stored in muscle → kinetic energy + thermal(heat) energy

Fitness training - help people to reduce **waste**(thermal energy)

Example 2: switching on a light

Electrical energy → light energy + thermal(heat) energy

1. Naming form of energy

Kinetic energy(k.e.)

- Faster an object moves, greater its kinetic energy

Gravitational potential energy(g.p.e)

- Higher an object is above the ground, the greater its g.p.e
- Water behind a hydroelectric dam has g.p.e

Chemical energy

- Fuels like coal, petrol, gasoline
- Fuel burns - energy released as heat and light

Electrical energy

- Electric current

Nuclear energy

- Uranium stores nuclear energy
- Nuclear power station is made to release nuclear energy stored in uranium

Strain energy(elastic energy)

- Energy stored by an object that has been stretched or squashed in an elastic way
- Band

thermal (heat) energy

- Travel from hot to cold

Light energy

- Hot objects glow brightly

Sound energy

- Electric current - bring electrical energy to a loudspeaker

2. Energy stores, energy transfers

How to transfer energy

1. By a **force**

- Lift something with force, give it gravitational potential energy
- Give force to move something - give it kinetic energy
- Energy is transferred from one object to another by a force - **doing work**

2. By **heating**

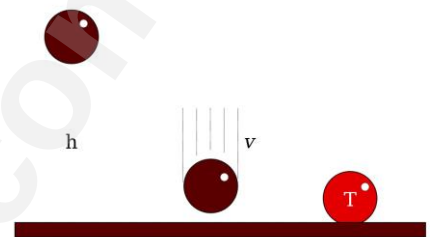
- thermal(heat) energy spreads out from hot objects
- Energy is always transferred from hot object to cooler surroundings

3. By **waves**

- Light waves from the sun - electromagnetic waves

4. By **electricity**

- Electric current - transfer energy from place to place



P6.04 Conservation of energy

Energy is **converted** or **transformed** - energy changes from one form to another

Principle of conservation of energy - in any energy conversion, total energy before = total energy after

- Energy cannot be created and destroyed
- Total amount of energy is always constant

1. Energy efficiency

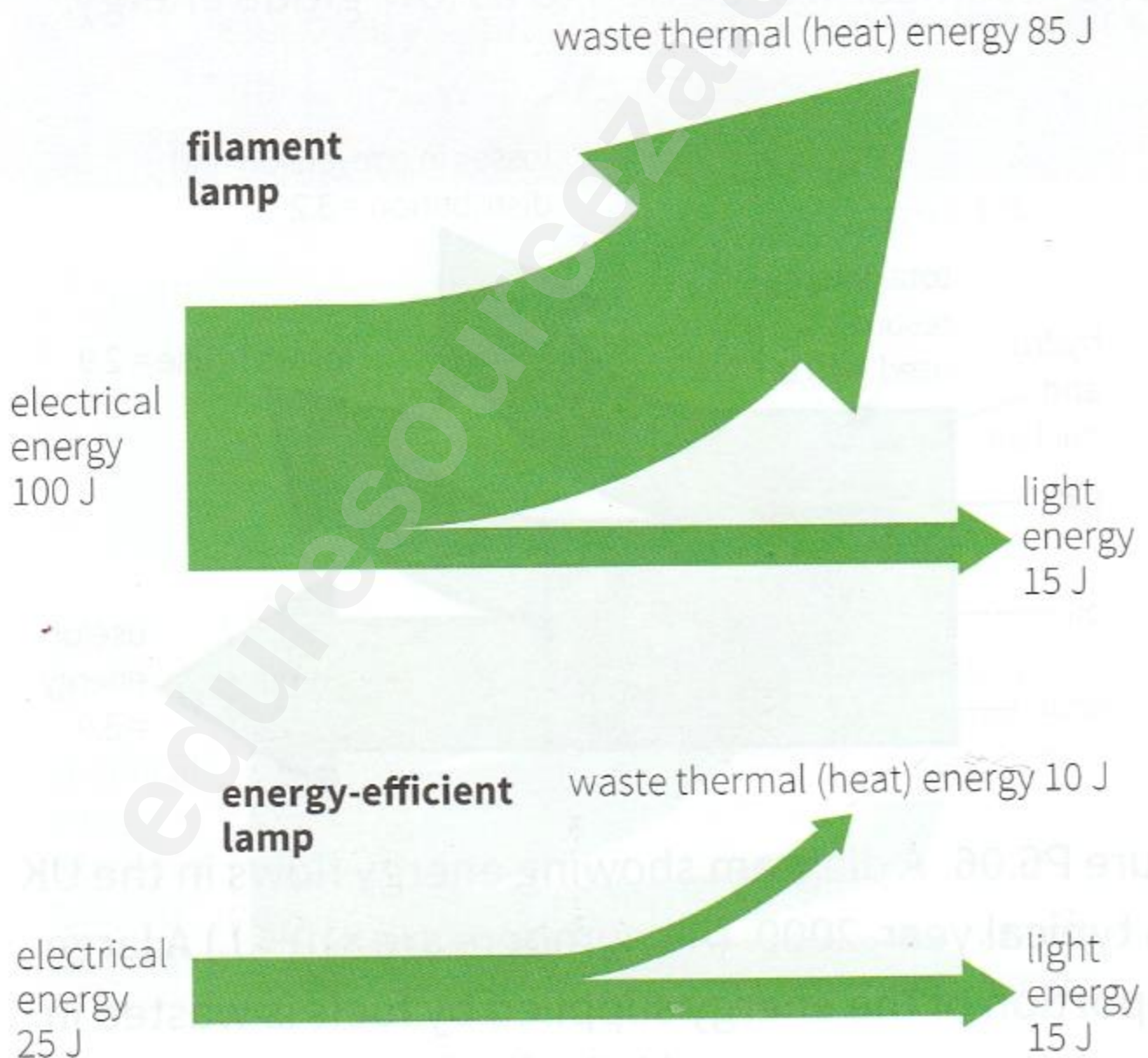
Reasons of waste

- When fuels are burnt, heat is produced, heat energy is lost to surroundings
- Friction of cars - generates heat
- Sound - not considerable

2. Making better use of energy

Efficiency of an energy conversion: fraction of the energy that ends up in the desired form

Energy diagram



$$\text{Efficiency} = \frac{\text{Useful energy output}}{\text{Energy input}} \times 100\%$$

P6.05 Energy calculations

1. Gravitational potential energy(g.p.e)

Distance = always should be vertical

Gravitational potential energy = weight x height = mass x 10N/kg x height

G.p.e = mgh

- Energy unit = J
- Mass = kg
- Gravitational force = m/s²
- Height = mass

2. Kinetic energy(k.e)

Kinetic energy = 0.5 x mass x speed²

K.e = 0.5mv²

- Energy unit = J
- Mass = kg
- Speed = m/s