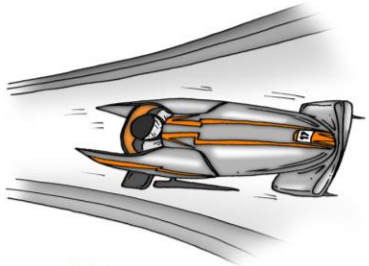
AQA ENERGY THINK IT!

ENERGY STORE CHANGES



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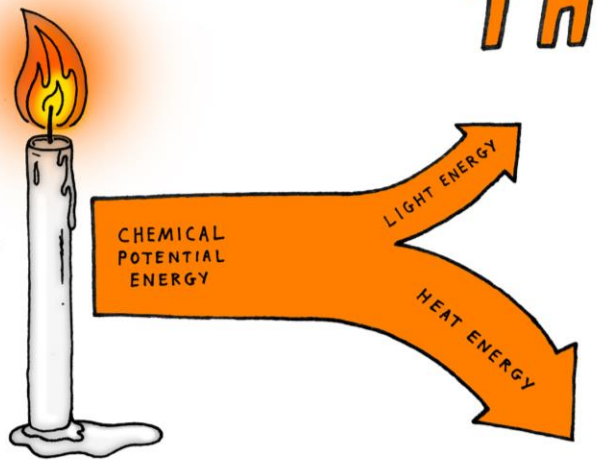
OR



Energy stores and systems:

- Both a rocket rising in the air and a train travelling down a track have kinetic energy. Explain the differences between the energy changes involved with these two processes
- Design an energy store change diagram, including pathways, for a coal fired power station.
- Describe to a peer how to construct a Sankey diagram to show the energy store changes for arrange of household appliances.

Changes in energy:

- Compare the change in kinetic energy change of a 60 kg surfer if her velocity doubles from 3 m/s to 6 m/s. Can you derive a relationship for velocity doubling?
- Explain how to re-arrange the formula for kinetic energy so the velocity of a moving object can be found.
- Show how work done lifting an object and its gain in gravitational potential energy equate to each other.
- Explain the term "limit of proportionality" for a spring.

Energy changes in systems:

- On a sunny day, the sea and sand both receive the same energy from the sun. Explain why the sand feels hotter.
- Devise a new unit for measuring specific heat capacity with different units to the common unit of J/kg ºC.
- Which will keep you the warmest? A hot water bottle with 0.8 kg water cooling from 80 ºC to 30 ºC (c for water = 4200 J/kg ºC) **OR** an electric blanket giving off 120 kJ of energy over the same time period.

Power:

- Explain why a London bus is more powerful than a Ferrari supercar.
- A person is running up a long flight of stairs. What physical measurements would you have to take to be able to calculate the power exerted by their legs?
- A student says "A more powerful machine does more work". Explain why this statement is incorrect.

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Energy transfers in a system:

- Thermal conductivity measures the rate at which energy passes through a thickness of material when there is a temperature difference. This is given by:

$$\frac{\text{power}}{\text{distance} \times \text{temperature}}$$

- Try to derive the unit of thermal conductivity.
- When a rock falls off a cliff the final energy store is thermal. Explain why this store is often described as being "wasted".
- Explain why a closed energy system cannot exist.

Efficiency:

- Discuss the statement: "LED lights are much more efficient energy transferrers than normal lightbulbs.
- Even in a "closed energy system" explain why you cannot achieve 100% efficiency of an energy store transfer.
- Describe one way to increase the efficiency of an energy transfer of your choice.
- One wind turbine has an efficiency of 0.83 and another an efficiency of 72%. Explain which is the most efficient.

Calculations

Formulate a question to ask a peer which demonstrates an understanding of how to calculate the following:

- Power
- Efficiency
- Kinetic energy
- Gravitational potential energy
- Elastic energy
- Specific heat capacity

National and global energy resources:

- Compare the environmental issues that could result from using coal or nuclear energy to provide electricity.
- Discuss why politicians sometimes block environmental concerns regarding electricity production which scientists have identified.
- By 2050 the UK is unlikely to be producing any electricity using fossil fuels. Give an argument to support the use of nuclear fuel over renewable energies to replace fossil fuels.