



Energy

# Energy transfers: Learning pathway

Activate

Acquire

Apply

Assess

Analyse



Energy model

- Model energy as a quantitative property that allows jobs to be done
- Use energy in and out model compare amounts of food and activity

- Represent the change in a system using a visual model of energy
- Do simple calculations using energy values of food and activities

- Acquire
- Apply

- Justify a claim about the energy transfer of a device, using data

Heat & temperature

States

- Collect evidence for a claim about how the temperatures of objects change

- Describe or estimate how much the temperature of an object will change

- Acquire
- Apply

- Make deductions about heat and temperature changes from graphs

Wasted energy

- Test claims about devices using the percentage of energy usefully transferred

- Determine the amount of useful and wasted energy during a transfer

- Acquire
- Apply

- Draw conclusions using data about energy efficiency



Act

Decide

Devise a food or drink label to show how much exercise is needed to use the energy



# Energy transfer: Big ideas

## Energy

What expert understanding do we want after 5 years?

### Energy is conserved

Big idea

Energy is a property that objects must have to do work. It exists in different stores and can move between them. These stores can be kinetic or potential (based on the position in a field), or radiation. During an energy transfer, the total quantity is always constant but useful energy is wasted. This allows us to predict what can or cannot happen, using formulae.

How does the unit develop this?

#### Energy model

Key Concept

When there is a change, energy is transferred from one store at the start to another at the end

#### Sub-concepts

Energy stores, kinetic energy, gravitational energy

#### Facts

- Other energy stores: thermal (hot), elastic (stretched), electrical (current), chemical (fuel, food or battery)
- Total energy is same before and after
- Energy is measured in Joules (J)

#### Heat & temperature

Key Concept

Energy moves from warmer objects to cooler objects, until both reach the same temperature

#### Sub-concepts

Temperature, thermal equilibrium, temperature-time graph

#### Facts

- Heat is a movement of energy between objects
- Temperature measured in °C

#### Wasted energy

Key Concept

When energy is transferred, some energy is wasted, reducing the useful energy

#### Sub-concepts

Input & output, efficiency

#### Facts

- Energy can be useful or wasted
- Efficiency = output/input energy x 100



Energy

# Energy transfer: Scientific thinking, maths & literacy

How are investigation skills integrated with the concepts?

## Heat & temperature

### Collect evidence

Plan the data collection for the independent and dependent variables

How are maths skills integrated with the concepts?

## Energy model

### Numbers

Use ratios, fractions and percentages

## Heat & temperature

### Graphs

Reading values off graphs and interpolating and extrapolating

## Wasted energy

### Algebra

Substitute values into equations, with units and symbols



# Energy transfers: Curriculum links

## Energy

Which parts of KS3 are covered?

AQA KS3 syllabus: 3.3.2 Energy transfer

Which parts of GCSE are covered?

(AQA Trilogy combined science)

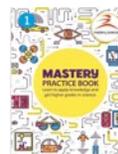
|                         |   |   |
|-------------------------|---|---|
| <b>Energy transfers</b> | ✓ 6.1.2.1 Energy transfers in a system  |   |
| <b>Wasted energy</b>    |   |   |
| <b>Collect data</b>     | ✓ WS 2.2 Plan experiments or devise procedures  |   |
| <b>Maths</b>            | ✓ 3a Substitute numerical values into algebraic equations using appropriate units for physical quantities | ✓ 1c Use ratios, fractions and percentages<br>✓ 4a Translate information between graphical and numeric form |

What resources are there to teach this unit?

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[CPD](#)



[Teaching](#)



[Assessment](#)



**Act** One weight loss idea is to make the quantity of energy in food more meaningful. It can be expressed as how long you would need to exercise for to use the energy. Students can be given energy data per g of food and /minute of exercise, choose activities that are relevant to the target audience.