



Science (Physics)

Year 8

Week Learning Objectives

1 3. Heating and cooling

3.1 Introduction/distinction between heat and temperature

- to be able to explain why using their senses is not a reliable way to measure temperature
- to understand the need for a scale of temperature and use the Celsius scale of temperature
- to interpret line graphs and sketch temperature-time graphs to help with explanations
- to be able to select an appropriate thermometer for a set of measurements
- to describe the flow of heat (energy) in everyday situations of temperature change
- to relate a flow of heat energy to change in temperature
- to relate a difference in temperature to a flow of heat energy

3.2 Conductors and insulators

- to be able to explain that whether things feel warm or cold to the touch will depend on their conductivity as well as their temperature
- to be able to classify materials as conductors or insulators of heat
- to describe evidence that gases and liquids are poor conductors of heat
- to simulate the conduction of thermal energy through a solid, liquid or gas
- to apply the particle model to explain why metals are good conductors and how fluids are poor conductors of heat

2 3.3 Expansion

- to describe the expansion of all three states of matter on heating (in terms of particles moving more and taking up more space) and contraction on cooling (in terms of particles slowing down and taking up less space)
- to relate different states to the different motion and arrangement of particles
- to recognise the large forces involved when a material is prevented from expanding or contracting
- to use data to plot two graphs on the same axes and explain how to interpret the graphs
- to recognise that expansion of fluids causes a change in density

3.4 Convection

- to produce coherent text explaining how a convection current transfers heat
- to describe how air or water moves when part is heated or cooled

3 3.5 Radiation

- to distinguish between transfer of thermal energy via conduction and convection and transfer by radiation, with reference to requirement for a medium
- to write coherent text to explain how to perform an experiment to investigate whether the colour of the surface of an object affects the amount of energy emitted
- to understand that black surfaces are both good absorbers and good emitters of radiation

3.6 Evaporation

- to identify the process that takes place when a liquid changes to a gas as evaporation
- to identify a range of contexts in which liquids evaporate

- c. to identify the factors that affect the rate of evaporation of a liquid
- d. to explain the process of evaporation in terms of the movement of particles

3.7 Energy conservation

- a. to describe where energy losses arise in a typical house and explain how to reduce these
- b. to extract information from a diagram and present the data as a pie chart

3.8 Sc1 investigation

- a. to devise a safe plan in which they make fair comparisons
- b. to make predictions
- c. to collect and present data
- d. to draw conclusions
- e. to discuss the validity of results

3.9 Change of state/assessing pupil's learning

- a. to collect data and draw appropriate graph curves to show what happens to the temperature as a material changes state
- b. to use the terms 'melting point' and 'boiling point' and give some important examples
- c. to describe in words what happens to the temperature of the substance as it goes through a change of state
- d. to describe, with reasons, what would happen if the liquid/solid were cooled/heated again
- e. to use the particle model to associate heating and cooling with changes of state

4 4. Sound

4.1 What do you know about sound?

- a. to describe different sounds using appropriate terms, for example high, low and soft
- b. to explain that sounds are made as a result of vibrations and identify the source of vibration in a range of cases
- c. to describe how sounds travel through solids, liquids and gases
- d. to explain in terms of the particle model why sound needs a medium

4.2 How sound travels

- a. to state that sound cannot travel through a vacuum but can travel through solids, liquids and gases
- b. to suggest ways to change the pitch and loudness of sounds from musical instruments
- c. to make generalisations about changing sounds in musical instruments, for example, 'the thinner the string, the higher the sound'
- d. to make generalisations about changing sounds related to vibrations, for example, 'the greater the movement, the louder the sound' or 'the faster the movement, the higher the sound'
- e. to use the terms 'frequency' and 'amplitude' in describing sound waves
- f. to know that frequency is measured in hertz
- g. to relate high pitch to high frequency, and high amplitude to loudness
- h. to compare and interpret waveforms in terms of pitch and loudness

5 4.3 Reflection of sound and speed of sound

- a. to explain how sound travels at different speeds in different types of material
- b. to explain everyday phenomena in terms of the different speeds at which sound travels in air and solids

4.4 The ear and hearing

- a. to describe how hearing ability changes with age and how hearing can be damaged by, for example, loud sounds

- b. to identify the main parts of the ear on a diagram or model and explain how they work
- c. to describe how vibrations in the air are transmitted and translated into electrical signals, which pass to the brain

6 4.5. Ultrasonics

- a. to describe examples of animals detecting sounds that are inaudible to human ears
- b. to describe various uses of ultrasound

4.6 Sound levels and noise

- a. to use a sound level meter or other method of comparing sounds
- b. to understand that the relative loudness of sounds depends on their sound levels, measured in decibels

8. Light

8.1 What do you know about light?

- a. to recognise that light is all around us
- b. to explain that light travels from a source
- c. to understand that objects are visible because they reflect or emit light which travels into our eyes
- d. to explain how shadows are formed
- e. to understand that light is reflected from surfaces
- f. to state that light travels much faster than sound

8.2 Light travels in straight lines/pinhole camera

- a. to describe evidence to support the idea that light travels in a straight line
- b. to represent simply the path of light as rays

8.3 Transmission of light

- a. to use words precisely when describing the effects of materials, for example transparents, translucent, opaque, reflect, absorb
- b. to describe the use of a light sensor
- c. to plot a non-linear graph from results presented in tabular form

8.4 Reflection of light

- a. to explain how non-luminous objects are seen, using words like 'because light is reflected from them and enters our eyes', and by drawing ray diagrams
- b. to make predictions about the way that light is reflected from plane surfaces
- c. to make and record accurate measurements of angles of incidence and reflection with respect to the normal
- d. to represent data as a line graph and draw a line of best fit
- e. to make a generalisation eg that the light is reflected from a plane surface at the same angle at which it hits it
- f. to describe the nature of the image formed in a plane mirror, eg inverted
- g. to suggest how such an image is formed
- h. to make and test predictions about the number of images formed in mirrors
- i. to record findings and describe patterns in them
- j. to explain everyday reflections using words and/or ray diagrams

7 Holiday

8 8.5 Refraction of light

- a. to make generalisations from their observations of refraction, eg that light bends towards the normal (inwards) when travelling from a more dense to a less dense medium, and vice versa
- b. to draw selected angles of incidence and refraction and use it to establish generalisations

c. to draw a ray diagram to explain a phenomenon of refraction

8.6 Dispersion of light

a. to describe how white light is dispersed by a prism

b. to identify the colours of the spectrum

c. to describe how a spectrum can be recombined to form white light

8.7 Colours and colour mixing

a. to investigate how coloured filters change white light

b. to suggest how filters affect white light

c. to investigate how coloured light can be combined to produce new colours

d. to investigate how coloured objects appear in white light and in different colours of light

8.8 Optical illusions/the eye/assessing pupil's learning

a. to explain the main features in the structure of the eye

9 11. Magnets and electromagnetism

11.1 Introduction/properties of magnets

a. to name materials that magnets attract

b. to make a record of uses of magnets

c. to describe how to magnetise a magnetic material

d. to design and use a method for measuring magnetic strength

11.2 Magnets and forces

a. to state that magnets can both attract and repel each other

b. to explain why attraction is not proof of magnetism

c. to describe their technique for deciding which bar was a magnet

11.3 Magnets, fields and the Earth's magnetic field

a. to recognize that the Earth has a magnetic field, which attracts a freely pivoted magnet

b. to recall the shape of the magnetic field line pattern

c. to extend the model of magnetic field lines to represent the direction of the field

10 11.4 Magnetic fields and electric currents

a. to describe the magnetic field pattern around a straight wire carrying an electric current

b. to understand the importance of Oersted's experiment in showing the connection between electric currents and magnets

c. to draw the field pattern for a coil and a solenoid

11.5 Electromagnets

a. to make an electromagnet and identify strengths and weaknesses in their own methods

b. to recall that electromagnets are used in a wide range of applications

c. to draw the field pattern of an electromagnet and explain the effect of an iron core

11.6 Making electromagnets

a. to identify the factors that affect the strength of an electromagnet

b. to make appropriate measurements and present data in a suitable form

c. to use scientific knowledge and understanding to explain observations

11 2. Rocks and weathering

2.1 Soil analysis

a. to recognise the features of a good soil and the properties of the main types of soil

2.2 Describing rocks

- a. to explain that rocks are usually made up of a mixture of mineral grains
- b. to explain that rocks vary in composition, texture, porosity, colour

2.3 Classifying rocks

- a. to classify rocks into three groups: igneous, sedimentary, metamorphic

12 2.4 Physical weathering

- a. to explain that rocks exposed to the weather disintegrate through physical changes
- b. to explain that rocks are broken down by forces resulting from stresses

2.5 Chemical weathering

- a. to explain that rocks will weather by exposure to chemicals in the atmosphere

2.6 What happens to weathered rock?

- a. to explain that rock fragments can be transported by water

13 10. The rock cycle

10.1 How is sedimentary rock formed?

- a. to know that sedimentary rock can be formed by pressure from layers of sediment
- b. to recognise some characteristics of sedimentary rocks

10.2 Limestone enquiry

- a. to learn that rocks like limestone are of varying composition
- b. to learn about the composition of limestone

10.3 Metamorphic rocks

- a. to learn that increasing temperature and pressure can cause rocks to change in the solid state
- b. to know that metamorphic rocks are formed from existing rocks, due to pressure or temperature

14 10.4 Igneous rocks

- a. to know that igneous rocks crystallise from magma
- b. to know that the rate of cooling and crystallisation determines the crystal size in the rock
- c. to explain the differences in crystal size according to the particle model

10.5 Investigating volcanoes

- a. to investigate the relationship between viscosity and the rate of lava flow

10.6 The rock cycle

- a. to explain that the rock cycle links together the processes of rock formation
- b. to explain how the rock cycle provides a continuous supply and transformation of Earth materials

10.7 Rocky history

- a. to consider different theories put forward to explain the history of the Earth
- b. to consider the theory of plate tectonics

15 Revision