Y7 Cycle 3 Science

Scholar's Guide

Oxford Spires Academy

Full Name: _____

Tutor Group : _____

Science Class : _____

Science Teacher(s): _____

Science Y7

Cycle 2

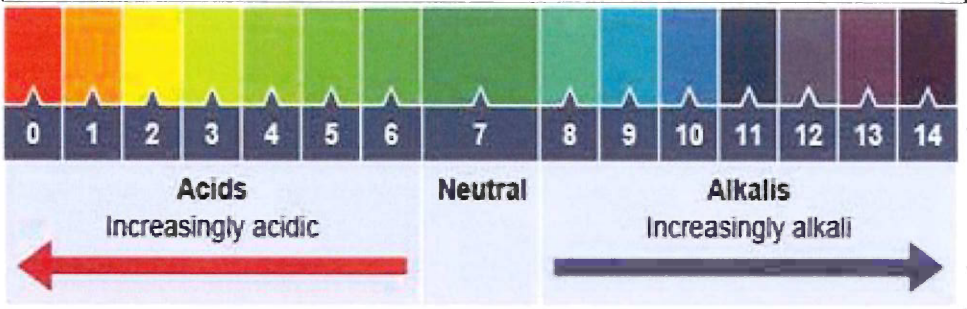
The Knowledge Organisers contain all the knowledge you need to learn. Below is what you need to be able to do.

Lesson number	7.5 Acids, Alkalis and Chemical Reactions	7.6 Space and Energy
1-3	Use data and observations to determine the pH of a solution and explain what this shows. Identify the best indicator to distinguish between solutions of different pH, using data provided.	Explain why places on the Earth experience different daylight hours and amounts of sunlight during the year. Describe the appearance of planets or moons from diagrams showing their position in relation to the Earth and Sun
4-6	Explain how neutralisation reactions are used in a range of situations. Describe a method for how to make a neutral solution from an acid and alkali.	Describe how space exploration and observations of stars are affected by the scale of the universe. Explain the choice of particular units for measuring distance.
7-9	Carry out a method carefully and consistently during a practical investigation. Collect results, make a conclusion and explain it.	Show how energy is transferred between energy stores in a range of real-life examples. Describe how the energy of an object depends on its speed, temperature, height or whether it is stretched or compressed. Calculate the useful energy and the amount dissipated
10-13	Describe a metal -acid reaction with word equations. Explain why a reaction is an example of combustion. Predict the products of the combustion of a given reactant and show the reaction as a word equation.	Compare the amounts of energy transferred by different foods and activities. Explain the advantages and disadvantages of different energy resources.
	Assessment & Reteach	Assessment & Reteach

7.5 Acids, Alkalis and Chemical Reactions KO 1

Know

The pH of a solution depends on the strength of the acid: strong acids have lower pH values than weak acids. Mixing an acid and alkali produces a chemical reaction, neutralisation, forming a chemical called a salt and water.



← Increasingly red Green Increasingly purple →

Fact

Acids have a pH below 7, neutral solutions have a pH of 7, alkalis have a pH above 7. Acids and alkalis can be corrosive or irritant and require safe handling. Hydrochloric, sulfuric and nitric acid are strong acids. Acetic and citric acid are weak acids.

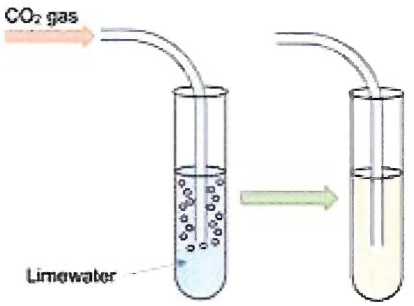
Key Word	Meaning
pH	Scale of acidity and alkalinity from 0 to 14
Indicators	Substances used to identify whether unknown solutions are acidic or alkaline.
Base	A substance that neutralises an acid – those that dissolve in water are called alkalis.
Concentration	A measure of the number of particles in a given volume.
Acidic	Having a pH lower than 7.
Alkaline	Having a pH greater than 7.
Neutralisation	The reaction between an acid and a base to form a salt plus water.
Corrosive	Able to damage metal, stonework, clothes and skin. Strong acids and alkalis are corrosive.

7.5 Acids, Alkalis and Chemical Reactions KO 2

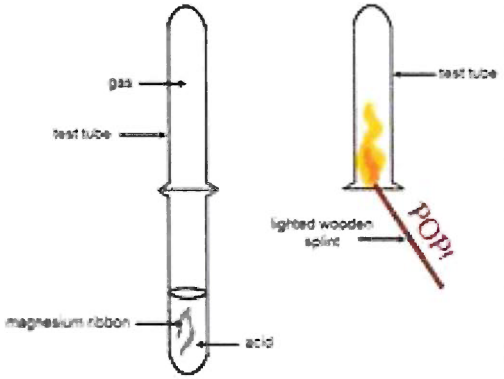
Know

Combustion is a reaction with oxygen in which energy is transferred to the surroundings as heat and light.

Metals and non-metals react with oxygen to form oxides which are either bases or acids. Some metals react with acids to produce salts and hydrogen.



Test for Carbon Dioxide



Test for Hydrogen

Fact

Acids have a pH below 7, neutral solutions have a pH of 7, alkalis have a pH above 7. Acids and alkalis can be corrosive or irritant and require safe handling. Hydrochloric, sulfuric and nitric acid are strong acids. Acetic and citric acid are weak acids.

Key Word	Meaning
Fuel	Stores energy in a chemical store which it can release as heat.
Chemical reaction	A change in which a new substance is formed.
Physical change	One that changes the physical properties of a substance, but no new substance is formed.
Reactants	Substances that react together, shown before the arrow in an equation.
Products	Substances formed in a chemical reaction, shown after the reaction arrow in an equation.

Acid + alkali → salt + water

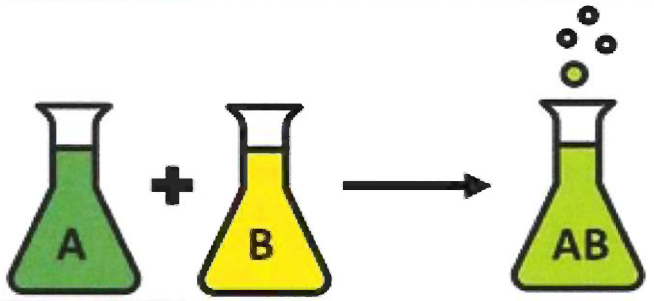
Acid + metal → salt + hydrogen

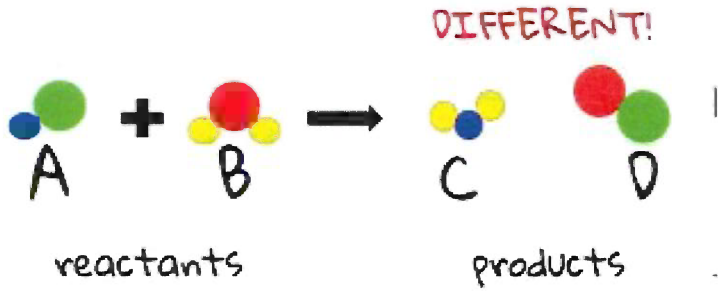
Acid + metal oxide → salt + water

Acid + metal carbonate → salt + water + carbon dioxide

7.5 Acids, Alkalis and Chemical Reactions KO 3

Key Word	Meaning
Fuel	Stores energy in a chemical store which it can release as heat.
Chemical reaction	A change in which a new substance is formed.
Physical change	One that changes the physical properties of a substance, but no new substance is formed.
Reactants	Substances that react together, shown before the arrow in an equation.
Products	Substances formed in a chemical reaction, shown after the reaction arrow in an equation.



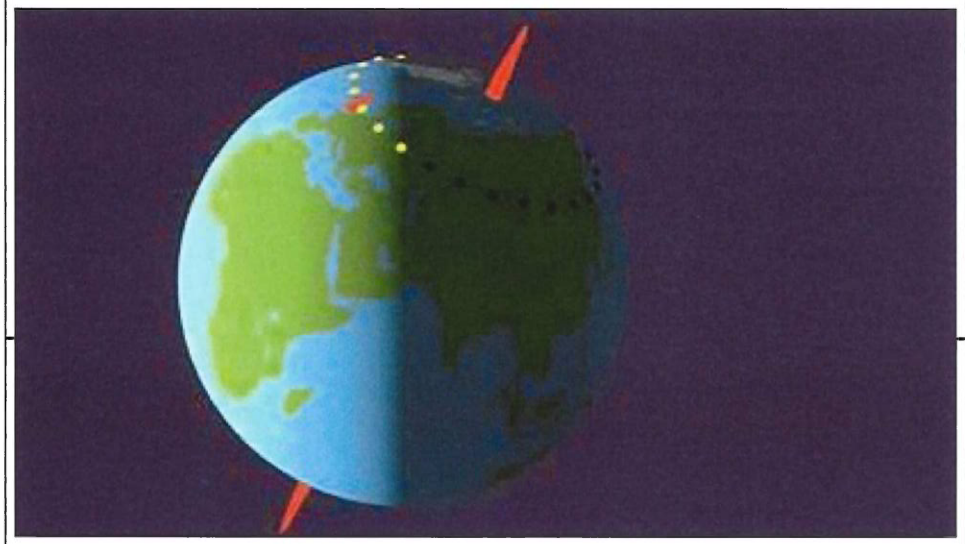


Space and Energy 7.6 KO 1

Know

The solar system can be modelled as planets rotating on tilted axes while orbiting the Sun, moons orbiting planets and sunlight spreading out and being reflected. This explains day and year length, seasons and the visibility of objects from Earth.

Our solar system is a tiny part of a galaxy, one of many billions in the Universe. Light takes minutes to reach Earth from the Sun, four years from our nearest star and billions of years from other galaxies.

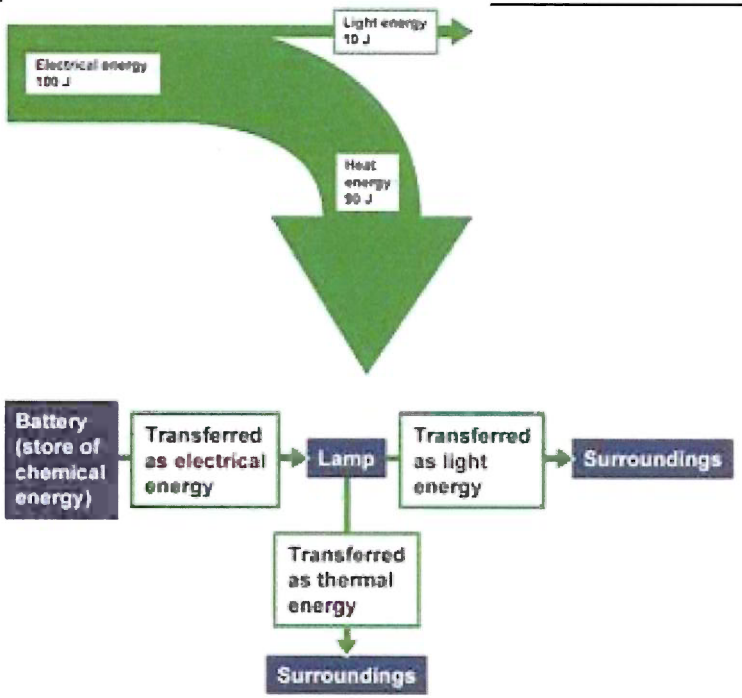


Key Word	Meaning
Orbit	Path taken by a satellite, planet or star moving around a larger body. Earth completes one orbit of the Sun every year.
Day	A day is how long it takes for the Earth to spin once on its **axis**; a year is **365 ¼ days**.
Season	Each season is a period during the year linked to temperature and daylight.
Axis	As the earth spins, the half facing the Sun is in daylight, and the half facing away becomes night-time.
Tides	Tides are the rise and fall of sea levels around the world. The gravitational pull of the Moon and Sun causes the tides.
Galaxy	A collection of stars held together by gravity. Our galaxy is called the Milky Way.
Light year	The distance light travels in a year (over 9 million, million kilometres).
Stars	Bodies which give out light, and which may have a solar system of planets.

Space and Energy 7.6 KO 2

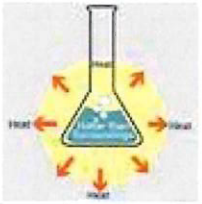
Know

We can describe how jobs get done using an energy model where energy is transferred from one store at the start to another at the end. When energy is transferred, the total is conserved, but some energy is dissipated, reducing the useful energy.



Fact

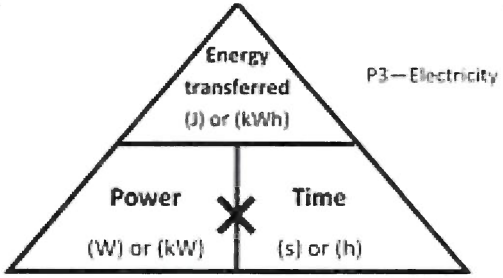
Food labels list the energy content of food in kilojoules (kJ).

Key Word	Meaning
Thermal energy store	Filled when an object is warmed up. 
Chemical energy store	Emptied during chemical reactions when energy is transferred to the surroundings. 
Kinetic energy store	Filled when an object speeds up. 
Gravitational potential energy store	Filled when an object is raised. 
Elastic energy store	Filled when a material is stretched or compressed. 
Dissipated	Become spread out wastefully.
Work	The transfer of energy when a force moves an object, in joules.

Space Energy 7.6 KO 3

Know

We pay for our domestic electricity usage based on the amount of energy transferred. Electricity is generated by a combination of resources which each have advantages and disadvantages.
Calculate the cost of home energy usage, using the formula: cost = power (kW) x time (hours) x price (per kWh).



P3—Electricity

Energy Transferred (J) = Power (W) X Time (s)

Cost of electricity = Power (kW) x time (h) x cost per kWh (p)

$$\text{Efficiency} = \frac{\text{Useful Energy Output}}{\text{Energy Input}} \times 100\%$$

$$\text{Efficiency} = \frac{\text{Useful Power Output}}{\text{Power Input}} \times 100\%$$

Fact

Cost of electricity = Power x Time x Cost per KWh

Key Word	Meaning
Power	How quickly energy is transferred by a device (watts)
Energy resource	Something with stored energy that can be released in a useful way.
Non-renewable	An energy resource that cannot be replaced and will be used up.
Renewable	An energy resource that can be replaced and will not run out. Examples are solar, wind, waves, geothermal and biomass.
Fossil fuels	Non-renewable energy resources formed from the remains of ancient plants or animals. Examples are coal, crude oil and natural gas.