

# Science Year 8



A student's attainment in Year 8 science is determined by tests completed during science lessons throughout the year. These tests will include all content taught up to that point. Prior to each test, a detailed list of topics will be given to students in class. Results will be shared with students in class along with information on how to improve.

Below is the list of topics covered in all subject areas:

<b>Biology</b>
<a href="#">Organisms (Breathing and Digestion)</a> <a href="#">Genes (Inheritance and Evolution)</a> <a href="#">Ecosystems (Respiration and Photosynthesis)</a>
<b>Chemistry</b>
<a href="#">Matter (Periodic Table and Types of Reactions)</a> <a href="#">Chemical Reactions (Metals &amp; Non-Metals and Chemical Energy)</a> <a href="#">Earth (Earth's Climate and Resources)</a>
<b>Physics</b>
<a href="#">Energy (Energy Resources and Heating &amp; Cooling)</a> <a href="#">Forces (Gravity and Pressure)</a> <a href="#">Electromagnets (Magnets and Electromagnets)</a> <a href="#">Waves (Wave Properties and Effects)</a>

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<p><b>BIOLOGY</b></p> <p><b><u>Organisms</u></b></p> <p><b>(Breathing and Digestion)</b></p>	<p><b>Emerging</b> – a student whose understanding of the Y8 science skills is still emerging will be able to:</p>	<p><b>Developing</b> – a student who is developing their Y8 science skills will be able to:</p>	<p><b>Secure</b> – a student who is secure in the skills in the Y8 science curriculum will be able to:</p>	<p><b>Mastered</b> – a student who has mastered the skills in the Y8 science curriculum will be able to:</p>
	<p>Identify some of the organs in the digestive system.</p>	<p>Name some of the organs of the digestive system.</p> <p>Describe what is meant by physical digestion and chemical digestion.</p>	<p>Locate the organs of the digestive system on a diagram.</p> <p>Recall where physical digestion takes place and where chemical digestion takes place.</p> <p>Explain how teeth and saliva are adapted to digest food.</p>	<p>Name the organs of the digestive system in the order that food passes through them.</p> <p>Explain the link between digestion and circulation.</p>
	<p>Describe the role of the stomach and small intestine in digestion.</p>	<p>Describe the role of the stomach, small intestine, oesophagus, pancreas and large intestine in digestion.</p>	<p>Describe some adaptations of the organs of the digestive system.</p>	<p>Explain how the structure of each of the organs of the digestive system supports its function.</p>
		<p>Recall the names of some digestive enzymes.</p>	<p>Explain the role of three digestive enzymes.</p>	<p>Explain how visking tubing can be used to model the digestive system.</p>
	<p>Describe the components of a healthy diet (food groups).</p>	<p>Describe the components of a healthy diet (food groups).</p>	<p>Explain the role of some of the components of a healthy diet.</p>	<p>Explain the role of all of the components of a healthy diet.</p>
		<p>Recall the tests for starch and sugar.</p> <p>Suggest some foods that contain starch and sugar.</p>	<p>Recall the tests for protein and fats.</p> <p>Suggest several foods that contain proteins and fats.</p>	<p>Predict the observations of food tests for several foods for starch, sugar, protein and fats.</p>
	<p>Describe the movements of the ribs during breathing in and out.</p>	<p>Describe the movements of the ribs and diaphragm during breathing in and out.</p>	<p>Explain how changes in pressure in the chest bring about breathing in and out.</p>	<p>Compare the pressure in the chest before breathing in</p>

				and breathing out with atmospheric pressure.
		Describe what is meant by lung volume.	Describe two ways of measuring lung volume.	Compare two ways of measuring lung volume.
	Identify which gas in the air is used in the body.	Describe which gas from the air is used in the body.	Describe four features of the alveoli that help gas exchange.	Apply the structure of alveoli to their function in gas exchange.
		Describe where gases are exchanged between the lungs and the blood.	Explain how each feature of the alveoli supports gas exchange.	Explain the effects of exercise, asthma and smoking on the breathing system.
		Describe examples of disease and lifestyle choices that affect the breathing system.	Explain the effects of exercise, asthma and smoking on the breathing system.	Explain the difference between breathing and respiration.
<p><b><u>Genes</u></b> (Inheritance and Evolution)</p>	<p><b>Emerging</b> – a student whose understanding of the Y8 science skills is still emerging will be able to:</p>	<p><b>Developing</b> – a student who is developing their Y8 science skills will be able to:</p>	<p><b>Secure</b> – a student who is secure in the skills in the Y8 science curriculum will be able to:</p>	<p><b>Mastered</b> – a student who has mastered the skills in the Y8 science curriculum will be able to:</p>
	Identify a feature that is inherited.	Identify some features of different organisms that are inherited and some that are determined by the environment in which the organism lives.	Explain the difference between continuous and discontinuous variation; explain why offspring from the same parents can be very different.	Use ideas and evidence to evaluate the importance of genetic and environmental variation.
	Understand that humans breed cows to get lots of meat and milk.	Describe what selective breeding is and explain that it has produced new breeds of an organism.	Explain the process of selective breeding and why new breeds have been produced.	Explore and evaluate the advantages and disadvantages of selective breeding.
<p><b><u>Genes</u></b></p>				

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	Identify what organisms compete for.	Identify examples of how variation causes competition for resources and causes natural selection.	Explore the theories of Lamarck, Wallace and Darwin, and explain their theories about why some organisms are better able to survive than others.	Evaluate the impact of Darwin's theories on contemporary science.
	Know that genetic information is found in the nucleus of a cell.	Describe chromosomes and their role in transferring heredity information to offspring.	Explain the relationship between chromosomes, genes and DNA; explain why offspring of the same parents may look very different.	Explore the role of scientists in the discovery of DNA and evaluate the relative importance of their contributions.
	Know that offspring get half their genetic information from their Mum and half from their Dad.	Describe how fertilised egg cells contain half of the chromosomes from each parent with a random mix of genetic information from each parent.	Explain how every new individual produced by sexual reproduction is genetically unique.	Explain the impact of slight 'changes' to DNA passed on from parents to offspring.
	Understand that clones are genetically identical to their parent.	Describe cloning as one parent producing new individuals and identify examples of cloning that occur naturally; describe natural cloning as asexual reproduction.	Explain how artificial cloning is performed – for example in the creation of Dolly the sheep.	Explore and evaluate the advantages and disadvantages of artificial cloning; compare and contrast asexual and sexual reproduction.
	Understand that species can become extinct.	Identify natural and human-caused environmental changes that have caused some species to become extinct.	Explain how the use of gene banks to preserve heredity material may prevent some endangered species from becoming extinct.	Analyse and evaluate the available evidence to explain why the dinosaurs suffered mass extinction.

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<b><u>Ecosystems</u></b> <b>(Respiration and Photosynthesis)</b>	<b>Emerging</b> – a student whose understanding of the Y8 science skills is still emerging will be able to:	<b>Developing</b> – a student who is developing their Y8 science skills will be able to:	<b>Secure</b> – a student who is secure in the skills in the Y8 science curriculum will be able to:	<b>Mastered</b> – a student who has mastered the skills in the Y8 science curriculum will be able to:
	Understand that chemical reactions in the body release energy.	Describe the purpose of respiration.	Describe and explain aerobic respiration using a word equation.	Explain the role of respiration in building up complex molecules.
	Identify what chemicals are needed for respiration.	Describe aerobic respiration in plants.	Identify evidence for aerobic respiration in plants and animals.	Evaluate the quality of evidence for aerobic respiration in plants and animals.
		Define anaerobic respiration and give examples of sports that use anaerobic respiration.	Explain why some sports rely mainly on aerobic respiration while others require anaerobic respiration.	Describe and explain the effects on the body of anaerobic respiration and explain 'oxygen debt'.
	Understand that if you exercise with not enough oxygen your muscles will ache.	Identify some living things that carry out anaerobic respiration and identify some applications.	Describe and explain some evidence to show the products of anaerobic respiration and plan an investigation into fermentation.	Plan an investigation to test a hypothesis about anaerobic respiration, analyse the data and evaluate the investigation.
<b><u>Ecosystems</u></b>	Recognise that green plants need sunlight.  Identify the part of a leaf cell that is responsible for absorbing the sun's light energy.	State that green plants need sunlight to grow and to make food.  Describe how gases enter and leave a leaf and how light energy for photosynthesis is captured.	Identify water and carbon dioxide as the raw materials for photosynthesis, and glucose and oxygen as the products.  Describe how cells in the leaf and root are adapted for their functions.	Explain the chemical changes involved in photosynthesis and the roles of light and chlorophyll.  Relate and explain how the structure of palisade, mesophyll and guard cells allows them to perform their function.

<p><b>CHEMISTRY</b> <b><u>Matter</u></b> <b>(Periodic Table and Types of Reactions)</b></p> <p><b><u>Matter</u></b></p>	Understand that the amount of light affects photosynthesis.	Describe how levels of light, temperature and carbon dioxide affect the rate of photosynthesis.	Explain how levels of light, temperature and carbon dioxide affect the rate of photosynthesis.	Apply learning about the factors affecting photosynthesis to solve problems.
	<p><b>Emerging</b> – a student whose understanding of the Y8 science skills is still emerging will be able to:</p>	<p><b>Developing</b> – a student who is developing their Y8 science skills will be able to:</p>	<p><b>Secure</b> – a student who is secure in the skills in the Y8 science curriculum will be able to:</p>	<p><b>Mastered</b> – a student who has mastered the skills in the Y8 science curriculum will be able to:</p>
	Give some examples of elements.	Give some examples of elements, locate them in the Periodic Table and use the table to identify metals and non-metals.	Give examples of elements and explain how they are organised in the Periodic Table.	Define elements, use symbols, link the organisation of the Periodic Table to element features and explain how scientists organised the Periodic Table.
	State that the horizontal rows of the Periodic Table are called periods, and the vertical columns are called groups.	State that as you go down a group and across a period the elements show patterns in physical properties.	Use data to describe a trend in physical properties.  Use data showing a pattern in physical properties to predict the missing value for an element.	Use data about the properties of elements to identify similarities, patterns, and anomalies.  Explain how to predict missing data values using trends in properties.
State that the elements in Group 1 all react in a similar way and show a pattern in reactivity.  State that as you go down Group 1 the elements show patterns in physical properties.	Identify hazards of working with Group 1 elements.  Use data to describe a trend in physical properties of Group 1 elements.	Use data showing a pattern in physical properties to predict the missing value for an element in Group 1.  Use observations of a pattern in chemical reactions to predict the	Use data about the properties of elements to identify similarities, patterns, and anomalies.	

<p style="text-align: center;"><b><u>Chemical Reactions</u></b> <b>(Metals &amp; Non-Metals and Chemical Energy)</b></p>			behaviour of an element in Group 1.	
	State that the elements in Group 7 all react in a similar way and show a pattern in reactivity.  State that as you go down Group 7 the elements show patterns in physical properties.	Identify hazards of working with Group 7 elements.  Use data to describe a trend in physical properties of Group 7 elements.	Use observations of a pattern in chemical reactions to predict the behaviour of an element in Group 7.  Identify control measures when working with Group 7 elements.	Predict the position of an element in the Periodic Table based on information about its chemical properties.
	Define the words reactive and unreactive.	Define the words reactive and unreactive with respect to the elements in Group 1, Group 7, and Group 0	Use data about the properties of elements to identify similarities, patterns, and anomalies.	Choose elements for different uses based on their positions in the Periodic Table.
	<b>Emerging</b> – a student whose understanding of the Y8 science skills is still emerging will be able to:	<b>Developing</b> – a student who is developing their Y8 science skills will be able to:	<b>Secure</b> – a student who is secure in the skills in the Y8 science curriculum will be able to:	<b>Mastered</b> – a student who has mastered the skills in the Y8 science curriculum will be able to:
	Identify metals and non-metals.	Identify metals and non-metals using data and suggest a reason for particular applications.	Explain the properties of elements using data and why they are used for different applications.	Select and justify the use of elements for different purposes, based on their properties.
	Understand what a compound is.	Describe an example of a compound and represent a chemical reaction using a simple model.	Explain how compounds can be formed and explain a chemical reaction using simple models.	Make links between simple models of compounds and chemical symbols.
	Make observations of a chemical reaction.	Make observations and identify reactants and products.	Make accurate observations, identify differences, and with support, describe reactions	Suggest reasons for different observations, describe reactions using word equations and start to use





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<b><u>Earth</u></b>			<p>gases in the Earth’s atmosphere.</p> <p>Outline a design for a model to explain the greenhouse effect .</p>	<p>Interpret graphs that show trends over time.</p>
	List the processes that recycle carbon naturally.	<p>State the changes in levels of carbon dioxide over time.</p> <p>Name one carbon sink.</p>	<p>Explain why the concentration of carbon dioxide in the atmosphere did not change for many years.</p> <p>Use the carbon cycle to identify carbon sinks.</p> <p>Use the carbon cycle to show how carbon is recycled</p>	<p>Explain changes in the levels of carbon dioxide using stages of the carbon cycle.</p> <p>Use equations to explain processes that exchange carbon dioxide into and out of the atmosphere.</p>
	Give examples of impacts of climate change.	Describe how human activities affect the carbon cycle.	<p>Describe how global warming can impact on climate and local weather patterns.</p> <p>Give arguments for and against the claim that human activity is causing global warming and climate change.</p>	<p>Compare the relative effects of human-produced and natural global warming.</p> <p>Evaluate the implications of a proposal to reduce carbon emissions.</p> <p>Evaluate claims that human activity is causing global warming or climate change.</p>
	Understand that metal ores are found in the earth’s crust.	Describe different ways to extract metal ores from the earth and describe the associated environmental issues.	Explain how metals are recycled and how this affects the environment.	Evaluate the positive and negative aspects of metal mining and extraction.

<p style="text-align: center;"><b>PHYSICS</b></p> <p style="text-align: center;"><b><u>Energy</u></b></p> <p style="text-align: center;"><b>(Energy Resources and Heating &amp; Cooling)</b></p>	Understand that carbon can be used to extract some metals.	Describe the use of carbon in extracting iron from its ore.	Describe the process of extracting iron from its ore in a blast furnace.	Use balanced symbol equations to make predictions about the mass of iron produced when extracted from ore, showing that mass is conserved, and explain the advantages of using carbon.
		Write word equations for the reactions between carbon and metal ores.	Describe the extraction processes for lead, copper and zinc.	Work out the yield of an extraction process.
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	Understand that different devices will transfer different amounts of energy.	Explain the data given on an energy bill, including the units used for energy ‘consumed’ (transferred to appliances in the home) and the meaning of ‘standing charge’.	Use the power rating of an appliance to calculate the amount of energy transferred.	Calculate the cost of energy used in different scenarios.
	State that hot objects give out heat.	Describe the transfer of energy by heating and cooling.	Explain the relationship between energy transfer and temperature difference.	Compare the transfer of energy by conduction and by radiation.
	State how energy and temperature are measured.	Describe how energy is transferred through solids, liquids, and in air.	Describe what happens when you heat up solids, liquids, and gases. Explain what is meant by equilibrium.	Explain, in terms of particles, how energy is transferred. Give examples of equilibrium.

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<p><b>Forces</b> (Gravity and Pressure)</p>	Describe simply what happens in conduction and convection.	Describe how energy is transferred by particles in conduction and convection.	Describe how a thermal insulator can reduce energy transfer.  Describe the pattern in conduction shown by results, using numerical data to inform a conclusion.	Explain in detail the processes involved during heat transfers.  Explain why certain materials are good thermal insulators
	State some sources of infrared radiation.	Describe some sources of infrared radiation, and how energy is transferred.	Describe different ways to insulate in terms of conduction, convection and radiation.	Explain how thermal equilibrium can be established.  Compare the different ways that energy is transferred.
	<b>Emerging</b> – a student whose understanding of the Y8 science skills is still emerging will be able to:	<b>Developing</b> – a student who is developing their Y8 science skills will be able to:	<b>Secure</b> – a student who is secure in the skills in the Y8 science curriculum will be able to:	<b>Mastered</b> – a student who has mastered the skills in the Y8 science curriculum will be able to:
	Know that gravity is the force that stops us floating into space.	Describe the variation and effects of gravity on Earth and in space.	Apply the concept of gravitational fields to explain the variation and effects of gravity on Earth and in space.	Apply the concept of gravitational fields in explaining gravitational effects on Earth and in space, including acceleration.
	Understand why polar bears have big feet.	Describe the causes and effects of varying pressure on and by solids.	Explain the effects of varying pressure on and by solids; calculate the pressure applied by a solid from the force applied and the contact surface area.	Explain how force and area can be varied to alter the pressure applied.
		Describe the variation of pressure in liquids with	Explain the variation of pressure with depth in liquids.	Identify the causes and implications of variation of pressure with depth.

<p><b>Electromagnets</b> (Magnets and Electromagnets)</p>		depth and the effects of this.		
	State the cause of atmospheric pressure.	Explain why fluids exert a pressure.	Explain a range of observations in terms of fluid pressure.	Predict the changes to the effects of atmospheric pressure at different altitudes or temperatures.
	<p><b>Emerging</b> – a student whose understanding of the Y8 science skills is still emerging will be able to:</p>			
	Be able to use a permanent magnet.	Describe differences between permanent and temporary magnets.	Describe and compare different methods to make permanent magnets.	Use the domain theory to explain how materials become magnetised and demagnetised.
	Understand that a stronger magnet can pick up more paper clips.	Describe how to test the strength of a magnet and an electromagnet.	Design investigations to compare different methods of making magnets and testing the strength of electromagnets.	Use models and analogies to explain the factors affecting the strengths of magnets and electromagnets.
	State a use for a magnet.	Describe different applications of magnets and electromagnets.	Explain the advantages of using electromagnets.	Compare and contrast the use of magnets and electromagnets in different applications, such as a circuit breaker.
<p><b>Waves</b> (Wave Properties and Effects)</p>	<p><b>Emerging</b> – a student whose understanding of the Y8 science skills is still emerging will be able to:</p>			
<p><b>Developing</b> – a student who is developing their Y8 science skills will be able to:</p>				
<p><b>Secure</b> – a student who is secure in the skills in the Y8 science curriculum will be able to:</p>				
<p><b>Mastered</b> – a student who has mastered the skills in the Y8 science curriculum will be able to:</p>				

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	<p>Name some waves of the electromagnetic spectrum.</p>	<p>Name the electromagnetic wave with the biggest &amp; smallest wavelength.</p> <p>Name an electromagnetic wave that can be harmful to living cells.</p>	<p>Describe the electromagnetic spectrum.</p> <p>Describe the effect of radiation on living cells.</p>	<p>Describe all the waves of the electromagnetic spectrum in terms of increasing wavelength or increasing frequency.</p> <p>Explain why only some electromagnetic waves cause ionisation.</p> <p>Explain why ionisation can be harmful to living cells.</p>
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