Year 9 Subject Name Medium Term Plan
Autumn Term 1

Learning Overview (Contents)	Biology – 9A Genetics and Evolution Chemistry – 9E Making Materials Physics – 9I Forces and Motion
Assessment Opportunities	Assessments will occur at the end of each topic using exam style questions.
Textbooks Published Lesson Resources	Exploring Science Int Y9 SB - 9781292294131 Pearson Science

Home Learning Resources	https://www.thenational.academy/teachers/programmes/science-secondary-ks3/units/variation-differences-within-species/lessons?sid-cb730d=jDm-gm6d3b&sm=0&src=3 https://www.thenational.academy/teachers/programmes/science-secondary-ks3/units/adaptations-competition-natural-selection-and-evolution/lessons?sid-1abfe3=bp8HRVvhaN&sm=0&src=3 https://www.thenational.academy/teachers/programmes/science-secondary-ks3/units/heredity-and-dna/lessons?sid-dbb614=i9fGAjZLpU&sm=0&src=3 https://www.thenational.academy/teachers/programmes/science-secondary-ks3/units/materials/lessons?sid-422894=q_p-QueGQM&sm=0&src=3 https://www.thenational.academy/teachers/programmes/science-secondary-ks3/units/climate-change-and-living-sustainably/lessons/waste-and-recycling?sid-2c74d6=_l9ETiEJXp&sm=0&src=4 https://www.thenational.academy/teachers/programmes/science-secondary-ks3/units/moving-by-force/lessons?sid-62d450=WOHKqw0_BU&sm=0&src=3
Knowledge organisers	Link to knowledge Organisers (look on the TES!)

Week Number	**Learning Overview / objective (outlined above)**	**What should pupils know, understand and be able to do by the end of the week?** **(Use clear Success criteria)**

1	Environmental Variation	• Identify different types of environmental variation and explain their causes • Explain how environmental variation can cause problems with classification
	Inherited Variation	• Identify different types of inherited variation • Explain how sexual reproduction causes inherited variation • Identify a normal distribution
	DNA	• Outline how the structure of DNA was discovered • Explain the importance of DNA • Describe the relationship between chromosomes, DNA, genes, genetic information and nuclei
2	Genes and Extinction	• Explain how organisms become endangered or extinct • Explain how adaptations affect the survival of organisms • Explain some ways of preserving biodiversity
	Natural Selection	• Recall that individuals in a population vary genetically • Explain how natural selection works on these variations
	Investigation/science skills lesson	Carry out a practical/science skills lesson on the topic
	Consolidation Lesson	Completing content
3	End of Unit Assessment (Genetics and Evolution)	Apply knowledge of Genetics and Evolution to exam style questions
	About Ceramics	• Name some examples of ceramics and their uses • Explain why certain ceramics have particular uses • Explain how the properties of ceramics can depend on their structure
	Polymers	• Name some examples and uses of polymers • Explain some of the main properties of polymers • Describe how polymers are made
4	Composite Materials	• Explain composite materials, giving examples • Describe and justify the uses of some composite materials • Explain what happens in thermal decomposition, and exothermic and endothermic reactions
	Problems with materials	• Explain how making and using materials can cause problems • Suggest ways of reducing these problems
	Recycling Materials	• Explain the advantages of recycling

		• Describe the recycling of some materials
	Investigation/science skills lesson	Carry out a practical/science skills lesson on the topic
5	Consolidation Lesson	Completing content
	End of Unit Assessment (Making Materials)	Apply knowledge of Making Materials to exam style questions
	Forces and Movement	• Recall the names of different types of forces • Explain the effects of balanced and unbalanced forces • Explain why moving objects have a top speed
6	Energy for Movement	• Recall ways in which energy can be stored and transferred • Recall the law of conservation of energy • State the meaning of efficiency
	Speed	• Describe the meanings of speed and mean (average) speed • Use the formula relating speed, distance and time • Represent simple journeys on a distance-time graph
	Turning Forces	• Describe how a simple lever can multiply forces or distances • Identify the load, effort ad pivot on a diagram of a lever • Describe the factors that affect the size of a moment • Explain why something will balance if the moments are equal and opposite
	More Machines	• Describe how simple machines can magnify forces • Describe the factors that affect the total work done
7	Investigation/science skills lesson	Carry out a practical/science skills lesson on the topic
	Consolidation Lesson	Completing content
	End of Unit Assessment (Forces and motion)	Apply knowledge of Forces and Motion to exam style questions
8	Exam Skills	
	Exam Skills	
	Exam Skills	
	Exam Skills	

Year 9 Subject Name Medium Term Plan
Autumn Term 2

Learning Overview (Contents)	Biology – 9B Plant Growth Chemistry – 9F Reactivity Physics – 9J Force Fields and Electromagnets
Assessment Opportunities	Assessments will occur at the end of each topic using exam style questions.
Textbooks Published Lesson Resources	Exploring Science Int Y9 SB - 9781292294131 Pearson Science

Home Learning Resources	https://www.thenational.academy/teachers/programmes/science-secondary-ks3/units/plant-nutrition-and-photosynthesis/lessons?sid-d859af=mXJxwYAD8l&sm=0&src=3 https://www.thenational.academy/teachers/programmes/science-secondary-ks3/units/understanding-chemical-reactions/lessons?sid-93ea09=vrWDE2XEJA&sm=0&src=3 https://www.thenational.academy/teachers/programmes/science-secondary-ks3/units/series-circuits/lessons?sid-62c84a=DiWLHfEBbs&sm=0&src=3 https://www.thenational.academy/teachers/programmes/science-secondary-ks3/units/magnets-and-electromagnets/lessons?sid-b12abd=QP4h77gJJu&sm=0&src=3
Knowledge organisers	Link to knowledge Organisers (look on the TES!)

Week Number	**Learning Overview / objective (outlined above)**	**What should pupils know, understand and be able to do by the end of the week?** **(Use clear Success criteria)**
1	Reactions in Plants	• Explain what happens when plants photosynthesise and respire • Explain how the rate of photosynthesis can be affected
	Plant Adaptations	• Describe how leaves, roots and stems are adapted for their functions • Explain how substances enter and leave plants

	Plant Products	• Explain how and why plants make different substances • Explain the importance of nitrates
2	Growing Crops	• Describe how pests and human populations alter the food supply • Explain ways in which farmers boost food production • Explain some ways in which plant varieties are created
	Farming Problems	• Use models, for examples food webs and the carbon cycle, to explain changes in an ecosystem • Recognise the advantages and disadvantages of different farming methods
	Investigation/science skills lesson	Carry out a practical/science skills lesson on the topic
	Consolidation Lesson	Completing content
3	End of Unit Assessment (9B Plant Growth)	Apply knowledge of Plant Growth to exam style questions
	Types of Explosion	• Identify and explain the differences between physical changes and chemical reactions • Model reactions using words and formulae • Use particle theory to explain gas pressure and how it can be changed
	Reactivity	• Describe the reactions of metals with water, dilute acids and air • Explain how metals are placed in the reactivity series • Describe the structure of an atom
4	Energy and Reactions	• Describe the test for oxygen • Explain how combustion reactions can be speeded up • Classify changes as exothermic or endothermic • Explain why some reactions need a supply of energy
	Displacement	• Explain what happens in a displacement reaction • Predict whether a displacement reaction will occur
	Extracting Metals	• Explain why the method used to extract a metal is related to cost and the metal's reactivity • Describe how metals are extracted from their ores by heating with carbon or by electrolysis • Explain what happens in redox reactions
	Investigation/science skills lesson	Carry out a practical/science skills lesson on the topic
5	Consolidation Lesson	Completing content
	End of Unit Assessment (9F Reactivity)	Apply knowledge of Reactivity to exam style questions
	Force Fields	• State what is meant by a force field • Describe the shape of a magnetic field

		• Recall the factors that affect the strength of gravity • Calculate the weight of a mass
6	Static Electricity	• Explain why an insulating material can be given a charge by rubbing • Describe how electrically charged objects affect each other • Describe an electric field
	Current Electricity	• Explain how switches can be used to control different parts of a circuit • Recall how current behaves in series and parallel circuits • Describe how voltage behaves in series and parallel circuits
	Resistance	• Describe some factors that affect resistance • Use the formula relating voltage, current and resistance
	Electromagnets	• Describe an electromagnet and its magnetic field • Describe how the strength of an electromagnet can be changed • Describe some applications of electromagnets
7	Investigation/science skills lesson	Carry out a practical/science skills lesson on the topic
	Consolidation Lesson	Completing content
	End of Unit Assessment (9J Force Fields and Electromagnets)	Apply knowledge of Reactivity to exam style questions

Year 9 Science Medium Term Plan
Science Term 1

Learning Overview (Contents)	Overview of main learning objectives: Characteristic of living organisms Variety of living organisms States of matter Elements, compounds, mixtures
Assessment Opportunities	Assessments will occur at the end of each topic using exam style questions.
Textbooks Published Lesson Resources	

Home Learning Resources	
Knowledge organisers	Link to knowledge Organisers (look on the TES!)

Week Number	Learning Overview / objective (outlined above)	What should pupils know, understand and be able to do by the end of the week? (Use clear Success criteria)
1	• Characteristics of living organisms • Plants • Animals	1.1 understand how living organisms share the following characteristics: • they require nutrition • they respire • they excrete their waste • they respond to their surroundings • they move • they control their internal conditions • they reproduce • they grow and develop.

		describe the common features shown by eukaryotic organisms: plants, animals, fungi and protoctists Plants: these are multicellular organisms; their cells contain chloroplasts and are able to carry out photosynthesis; their cells have cellulose cell walls; they store carbohydrates as starch or sucrose. Examples include flowering plants, such as a cereal (for example maize) and a herbaceous legume (for example peas or beans). Animals: these are multicellular organisms; their cells do not contain chloroplasts and are not able to carry out photosynthesis; they have no cell walls; they usually have nervous co-ordination and are able to move from one place to another; they often store carbohydrate as glycogen. Examples include mammals (for example humans) and insects (for example housefly and mosquito).
2	• Fungi • Protoctists • Bacteria • Viruses	Fungi: these are organisms that are not able to carry out photosynthesis; their body is usually organised into a mycelium made from thread-like structures called hyphae, which contain many nuclei; some examples are single-celled; their cells have walls made of chitin; they feed by extracellular secretion of digestive enzymes onto food material and absorption of the organic products; this is known as saprotrophic nutrition; they may store carbohydrate as glycogen. Examples include *Mucor*, which has the typical fungal hyphal structure, and yeast, which is single-celled. Protoctists: these are microscopic single-celled organisms. Some, like *Amoeba*, that live in pond water, have features like an animal cell, while others, like *Chlorella*, have chloroplasts and are more like plants. A pathogenic example is *Plasmodium*, responsible for causing malaria. 1.3 describe the common features shown by prokaryotic organisms such as bacteria Bacteria: these are microscopic single-celled organisms; they have a cell wall, cell membrane, cytoplasm and plasmids; they lack a nucleus but contain a circular chromosome of DNA; some bacteria can carry out photosynthesis but most feed off other living or dead organisms. Examples include *Lactobacillus bulgaricus*, a rod-shaped bacterium used in the production of yoghurt from milk, and *Pneumococcus*, a spherical bacterium that acts as the pathogen causing pneumonia. 1.4 understand the term 'pathogen' and know that pathogens may include fungi, bacteria, protoctists and viruses Viruses: these are not living organisms. They are small particles, smaller than bacteria; they are parasitic and can reproduce only inside living cells; they infect every type of living organism. They have a wide variety of shapes and sizes; they have no cellular structure but have a protein coat and contain one type of nucleic acid, either DNA or RNA. Examples include the tobacco mosaic virus that causes discolouring of the leaves of tobacco plants by preventing the formation of chloroplasts, the influenza virus that causes flu and the HIV virus that causes AIDS.

3	• Levels of organisation • Cell structure and organelles • Plant and animal cells	2.1 describe the levels of organisation in organisms: organelles, cells, tissues, organs and systems 2.2 describe cell structures, including the nucleus, cytoplasm, cell membrane, cell wall, mitochondria, chloroplasts, ribosomes and vacuole 2.3 describe the functions of the nucleus, cytoplasm, cell membrane, cell wall, mitochondria, chloroplasts, ribosomes and vacuole 2.4 know the similarities and differences in the structure of plant and animal cells
4	• Consolidation • Biology assessment • States of matter and interconversion • Elements, compounds, mixtures and pure substances	1.8 understand how to classify a substance as an element, compound or mixture 1.9 understand that a pure substance has a fixed melting and boiling point, but that a mixture may melt or boil over a range of temperatures 1.1 understand the three states of matter in terms of the arrangement, movement and energy of the particles 1.2 understand the interconversions between the three states of matter in terms of: • the names of the interconversions • how they are achieved • the changes in arrangement, movement and energy of the particles

5	• Separation techniques – definitions • Practical • Practical • Chromatography	1.10 describe these experimental techniques for the separation of mixtures: • simple distillation • fractional distillation • filtration • crystallisation • paper chromatography 1.11 understand how a chromatogram provides information about the composition of a mixture 1.12 understand how to use the calculation of R_f values to identify the components of a mixture 1.13 *practical: investigate paper chromatography using inks/food colourings*
6	• Chromatography practical • Consolidation • Chemistry assessment	

Year 9 Science Medium Term Plan
Spring Term 2

Learning Overview (Contents)	Atomic structure Periodic table Forces – movements and position Forces – movement and momentum
Assessment Opportunities	Assessments will occur at the end of each topic using exam style questions.
Textbooks Published Lesson Resources	IG Biology SB — 9780435185084 — Pearson IG Chemistry SB — 9780435185169 — Pearson IG Physics SB — 9780435185275 — Pearson

Home Learning Resources	https://www.thenational.academy/teachers/programmes/chemistry-secondary-ks4-higher-edexcel/units/atomic-structure-and-the-periodic-table/lessons https://www.thenational.academy/teachers/programmes/physics-secondary-ks4-higher-edexcel/units/measuring-and-calculating-motion/lessons https://www.thenational.academy/teachers/programmes/physics-secondary-ks4-higher-edexcel/units/forces-make-things-change/lessons
Knowledge organisers	Link to knowledge Organisers (look on the TES!)

Week Number	**Learning Overview / objective (outlined above)**	**What should pupils know, understand and be able to do by the end of the week?** **(Use clear Success criteria)**
1	Atomic Structure	1.14 know what is meant by the terms 'atom' and 'molecule' 1.15 know the structure of an atom in terms of the positions, relative masses and relative charges of sub-atomic particles 1.16 know what is meant by the terms: atomic number, mass number, isotopes and relative atomic mass (A_r) 1.17 be able to calculate the relative atomic mass of an element (A_r) from isotopic abundances

	Periodic Table	1.18 understand how elements are arranged in the Periodic Table: • in order of atomic number • in groups and periods 1.19 understand how to deduce the electronic configurations of the first 20 elements from their positions in the Periodic Table 1.20 understand how to use electrical conductivity and the acid-base character of oxides to classify elements as metals or non-metals 1.21 identify an element as a metal or a non-metal according to its position in the Periodic Table 1.22 understand how the electronic configuration of a main group element is related to its position in the Periodic Table 1.23 understand why elements in the same group of the Periodic Table have similar chemical properties 1.24 understand why the noble gases (Group 0) do not readily react
2	• Consolidation • Chemistry assessment • Distance time graphs • Practical investigation collect data	1.3 plot and explain distance-time graphs 1.4 know and use the relationship between average speed, distance moved and time taken: $\text{average speed} = \frac{\text{distance moved}}{\text{time taken}}$ 1.5 *practical: investigate the motion of everyday objects such as toy cars or tennis balls*
		1.6 know and use the relationship between acceleration, change in velocity and time taken: $\text{acceleration} = \frac{\text{change in velocity}}{\text{time taken}}$ $a = \frac{(v-u)}{t}$ 1.7 plot and explain velocity-time graphs 1.8 determine acceleration from the gradient of a velocity-time graph 1.9 determine the distance travelled from the area between a velocity-time graph and the time axis 1.10 use the relationship between final speed, initial speed, acceleration and distance moved: $(\text{final speed})^2 = (\text{initial speed})^2 + (2 \times \text{acceleration} \times \text{distance moved})$ $v^2 = u^2 + (2 \times a \times s)$

3	• Write up of practical –distance time graphs • Velocity time graphs • Introduction to forces • Forces, mass and acceleration -	1.11 describe the effects of forces between bodies such as changes in speed, shape or direction 1.12 identify different types of force such as gravitational or electrostatic 1.13 understand how vector quantities differ from scalar quantities 1.14 understand that force is a vector quantity 1.15 calculate the resultant force of forces that act along a line 1.16 know that friction is a force that opposes motion 1.17 know and use the relationship between unbalanced force, mass and acceleration: force = mass × acceleration $F = m \times a$ 1.18 know and use the relationship between weight, mass and gravitational field strength: weight = mass × gravitational field strength $W = m \times g$ 1.21 describe the forces acting on falling objects (and explain why falling objects reach a termin velocity)
4	• Weight, mass and terminal velocity • Stopping and breaking distances • Hooke's law	1.22 *practical: investigate how extension varies with applied force for helical springs, metal wires and rubber bands* 1.23 know that the initial linear region of a force-extension graph is associated with Hooke's law 1.24 describe elastic behaviour as the ability of a material to recover its original shape after the forces causing deformation have been removed
5	• Hooke's Law practical • Hookes law write up • Consolidation lesson	
6	• Revision • Physics assessment	

Year 9 Science Medium Term Plan
Summer Term 1

Learning Overview (Contents)	Overview of main learning objectives: Nutrition – flowering plants and humans Chemical formula, equations and calculations. Mains electricity
Assessment Opportunities	Assessments will occur at the end of each topic using exam style questions.
Textbooks Published Lesson Resources	IG Biology SB — 9780435185084 — Pearson IG Chemistry SB — 9780435185169 — Pearson IG Physics SB — 9780435185275 — Pearson

Home Learning Resources	https://www.thenational.academy/teachers/programmes/biology-secondary-ks4-higher-edexcel/units/biological-molecules-and-enzymes/lessons https://www.thenational.academy/teachers/programmes/biology-secondary-ks4-higher-edexcel/units/photosynthesis-requirements-and-products/lessons https://www.thenational.academy/teachers/programmes/physics-secondary-ks4-higher-edexcel/units/mains-electricity/lessons https://www.thenational.academy/teachers/programmes/physics-secondary-ks4-higher-edexcel/units/electric-fields-and-circuit-calculations/lessons
Knowledge organisers	Link to knowledge Organisers (look on the TES!)

Week Number	**Learning Overview / objective (outlined above)**	**What should pupils know, understand and be able to do by the end of the week?** **(Use clear Success criteria)**

1	• Photosynthesis • Investigating photosynthesis • Leaf structure	2.18 understand the process of photosynthesis and its importance in the conversion of light energy to chemical energy 2.19 know the word equation and the balanced chemical symbol equation for photosynthesis 2.20 understand how varying carbon dioxide concentration, light intensity and temperature affect the rate of photosynthesis 2.21 describe the structure of the leaf and explain how it is adapted for photosynthesis 2.22 understand that plants require mineral ions for growth, and that magnesium ions are needed for chlorophyll and nitrate ions are needed for amino acids 2.23 *practical: investigate photosynthesis, showing the evolution of oxygen from a water plant, the production of starch and the requirements of light, carbon dioxide and chlorophyll*
2	• Balanced diet • Digestive system • Enzymes • Bile and the small intestine	2.24 understand that a balanced diet should include appropriate proportions of carbohydrate, protein, lipid, vitamins, minerals, water and dietary fibre 2.25 identify the sources and describe the functions of carbohydrate, protein, lipid (fats and oils), vitamins A, C and D, the mineral ions calcium and iron, water and dietary fibre as components of the diet 2.26 understand how energy requirements vary with activity levels, age and pregnancy 2.27 describe the structure and function of the human alimentary canal, including the mouth, oesophagus, stomach, small intestine (duodenum and ileum), large intestine (colon and rectum) and pancreas 2.28 understand how food is moved through the gut by peristalsis 2.29 understand the role of digestive enzymes, including the digestion of starch to glucose by amylase and maltase, the digestion of proteins to amino acids by proteases and the digestion of lipids to fatty acids and glycerol by lipases 2.30 understand that bile is produced by the liver and stored in the gall bladder 2.31 understand the role of bile in neutralising stomach acid and emulsifying lipids 2.32 understand how the small intestine is adapted for absorption, including the structure of a villus
3	• Biology assessment • Word and symbol equations • Relative formula mass	1.25 write word equations and balanced chemical equations (including state symbols): • for reactions studied in this specification • for unfamiliar reactions where suitable information is provided 1.26 calculate relative formula masses (including relative molecular masses) (M_r) from relative atomic masses (A_r)
4	• The mole • Calculating reacting mass • Calculating percentage yield • Empirical formulae	1.27 know that the mole (mol) is the unit for the amount of a substance 1.28 understand how to carry out calculations involving amount of substance, relative atomic mass (A_r) and relative formula mass (M_r) 1.29 calculate reacting masses using experimental data and chemical equations 1.30 calculate percentage yield 1.32 know what is meant by the terms 'empirical formula' and 'molecular formula' 1.33 calculate empirical and molecular formulae from experimental data

5	• Practical – determining formulae • Consolidation • Chemistry assessment	1.31 understand how the formulae of simple compounds can be obtained experimentally, including metal oxides, water and salts containing water of crystallisation 1.36 *practical: know how to determine the formula of a metal oxide by combustion (e.g. magnesium oxide) or by reduction (e.g. copper(II) oxide)*
6	• Electricity in the home • Power = current x voltage • Energy transferred, current, voltage and time. • AC/DC	2.2 understand how the use of insulation, double insulation, earthing, fuses and circuit breakers protects the device or user in a range of domestic appliances 2.3 understand why a current in a resistor results in the electrical transfer of energy and an increase in temperature, and how this can be used in a variety of domestic contexts 2.4 know and use the relationship between power, current and voltage: power = current × voltage $P = I \times V$ and apply the relationship to the selection of appropriate fuses 2.5 use the relationship between energy transferred, current, voltage and time: energy transferred = current × voltage × time $E = I \times V \times t$ 2.6 know the difference between mains electricity being alternating current (a.c.) and direct current (d.c.) being supplied by a cell or battery