

Key Stage 4

Programme of Study: Science

NB: Also view Triple Science Co-Teaching documents for those on Triple Science route.

Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
Topic: B3 Infection &	Topic: C4 Chemical		Topic: B6 Inheritance,	Topic: C7 Organic	Topic: P4 Atomic
Response & B5	Changes & C5 Energy	Topic: P5 Forces	Variation & Evolution	Chemistry & C3	Structure & P7
Homeostasis & Response	Changes			Quantitative Chemistry	Magnetism &
		Key Knowledge P5:	Key Knowledge B6:		Electromagnetism
Key Knowledge B3:	Key Knowledge C4:	Engineers analyse	In this section we will	Key Knowledge C7:	
Pathogens are	Understanding of	forces when designing	discover how the number	The chemistry of	Key Knowledge P4:
microorganisms such as	chemical changes	a great variety of	of chromosomes are	carbon compounds is	Ionising radiation is
viruses and bacteria that	began when people	machines and	halved during meiosis	so important that it	hazardous but can be
cause infectious diseases	began experimenting	instruments, from	and then combined with	forms a separate	very useful. Although
in animals and plants.	with chemical reactions	road bridges and	new genes from the	branch of chemistry.	radioactivity was
They depend on their	in a systematic way and	fairground rides to	sexual partner to	A great variety of	discovered over a
host to provide the	organizing their results	atomic force	produce unique	carbon compounds is	century ago, it took
conditions and nutrients	logically. Knowing	microscopes. Anything	offspring. Gene	possible because	many nuclear
that they need to grow	about these different	mechanical can be	mutations occur	carbon atoms can	physicists several
and reproduce. They	chemical changes	analysed in this way.	continuously and on rare	form chains and rings	decades to
frequently produce	meant that scientists	Recent developments	occasions can affect the	linked by C-C bonds.	understand the
toxins that damage	could begin to predict	in artificial limbs use	functioning of the animal	This branch of	structure of atoms,
tissues and make us feel	exactly what new	the analysis of forces	or plant. These mutations	chemistry gets its	nuclear forces and
ill. This section will	substances would be	to make movement	may be damaging and	name from the fact	stability. Early
explore how we can	formed and use this	possible.	lead to a number of	that the main sources	researchers suffered
avoid diseases by	knowledge to develop	-Scalar and vector	genetic disorders or	of organic	from their exposure
reducing contact with	a wide range of	quantities	death. Very rarely a new	compounds are	to ionising radiation.
them, as well as how the	different materials and	-Contact and non-	mutation can be	living, or once-living	Rules for radiological
body uses barriers	processes. It also	contact forces	beneficial and	materials from plants	protection were first
against pathogens. Once	helped biochemists to	-Gravity	consequently, lead to	and animals. These	introduced in the
inside the body our	understand the	-Resultant forces	increased fitness in the	sources include fossil	1930s and
immune system is	complex reactions that	-Work done and	individual. Variation	fuels which are a	subsequently
triggered which is usually	take place in living	energy transfer	generated by mutations	major source of	improved. Today
strong enough to destroy	organisms. The	-Forces and elasticity	and sexual reproduction	feedstock for the	radioactive materials
the pathogen and	extraction of important	-Forces and motion	is the basis for natural	petrochemical	are widely used in
prevent disease. When at	resources from the		selection; this is how	industry. Chemists	medicine, industry,
	Half Term 1 Topic: B3 Infection & Response & B5 Homeostasis & Response Key Knowledge B3: Pathogens are microorganisms such as viruses and bacteria that cause infectious diseases in animals and plants. They depend on their host to provide the conditions and nutrients that they need to grow and reproduce. They frequently produce toxins that damage tissues and make us feel ill. This section will explore how we can avoid diseases by reducing contact with them, as well as how the body uses barriers against pathogens. Once inside the body our immune system is triggered which is usually strong enough to destroy the pathogen and prevent disease. When at	Half Term 1Half Term 2Topic: B3 Infection & Response & B5 Homeostasis & ResponseTopic: C4 Chemical Changes & C5 Energy ChangesKey Knowledge B3: Pathogens are wiruses and bacteria that cause infectious diseases in animals and plants.Key Knowledge C4: began when people began experimenting with chemical reactionsThey depend on their host to provide the conditions and nutrients that they need to grow and reproduce. They frequently produce tissues and make us feel ill. This section will explore how we can avoid diseases by reducing contact with them, as well as how the body uses barriers against pathogens. Once inside the body our triggered which is usually strong enough to destroy the pathogen and provent disease. When atHalf Term 2 Topic: C4 Chemical Changes Key Knowledge C4: Understanding of chemical changes meant that scientists could begin to predict exactly what new substances would be formed and use this a wide range of different materials and processes. It also helped biochemists to understand the complex reactions that take place in living organisms. The extraction of important prevent disease. When at	Half Term 1Half Term 2Half Term 3Topic: B3 Infection & Response & B5Topic: C4 Chemical Changes & C5 EnergyTopic: P5 ForcesHomeostasis & ResponseChangesKey Knowledge P5: Engineers analyseKey Knowledge B3:Key Knowledge C4: began when peopleEngineers analyse forces when designing a great variety of machines and instruments, from road bridges and host to provide the organizing their resultsinstruments, from road bridges and fairground rides to atomic forceThey depend on their host to provide the conditions and nutrientslogically. Knowing mechanical changesmicroscopes. Anything microscopes. Anything microscopes. Anything that they need to grow about these different toxins that damagecould begin to predict in a vistematic way and about these different toxins that damagecould begin to predict in artificial limbs use tissues and make us feel exactly what new tissues and make us feel explore how we can avoid diseases by knowledge to develop-Scalar and vector quantitiesthem, as well as how the different materials and body uses barriersprocesses. It also ormat and use this processes. It also contact forces-Contact and non- cortact forcesthem, as well as how the different materials and triggered which is usually take place in living-Gravity -Resultant forcesthe pathogen and pervent disease. When atresources from the-Forces and elasticity	Half Term 1Half Term 2Half Term 3Half Term 4Topic: B3 Infection & Response & B5Topic: C4 Chemical Changes & C5 Energy ChangesTopic: P5 ForcesTopic: B6 Inheritance, Variation & EvolutionHomeostasis & ResponseChangesKey Knowledge P5: Engineers analyseKey Knowledge B6: In this section we will discover how the number of chromosomes are machines and in animals and plants.Key Knowledge C4: began when people began when people in a systematic way and host to provide the conditions and nutrients frequently produceNew York Continue organizing their results about these different about these different and reproduce. They chemical changesHalf Term 4Topic: 200Topic: 200Key Knowledge C4: began when people began experimenting in a systematic way and about these different atomic forceTopic: 95 ForcesVariation & EvolutionThey depend on their in a systematic way and requently produce texts tat damageIn systematic way and about these different substances would be substances would be substances would be towing adout these different avoid diseases by knowledge to develop reducing contact with a wide range of different materials and body use barriers processes. It also complex reactions that different materials and body use barriersHalf Term 3Half Term 4Topic: 20 Consequently, lead to inside the body our inside the body our inside the body ourTopic: 20 Consequently, lead to understant the complex reactions that different materials and processes. It also complex reactions that complex reaction theHalf Term 4Topic: 86 Inheritance	Haif Term 1Haif Term 2Haif Term 3Haif Term 4Haif Term 4Haif Term 4Topic: B3 Infection & Response & B5Topic: C4 Chemical Changes & C5 Energy ChangesTopic: D5 ForcesTopic: D6 Inheritance, Variation & EvolutionTopic: C7 Organic Chemistry & C3 Quantitative ChemistryKey Knowledge B3: Pathogens are uircoorganism such as viruses and bacteria that to animals and plants.Key Knowledge C4: to chemical changesEngineers analyse a great variety of nachines and in ariswat and plants.Key Knowledge C7: to chemical changesThey depend on their to any to provide the organizing their results conditions and nutrients.with chemical reactions about these different about these different and reproduce.Name that scientists toxins that damage exactly what new toxins that damageKey Knowlege C3: to provide the organizing their results about these different toxins that damageName that scientists to and the combined with to provide the organizing their results avoid diseases by knowledge to develop avoid diseases by knowledge to developName that scientists to make movement the analysis of forces to make movement them, as well as how the different materials and processes. It also hody use barriersHeif Term 4 to make movement the analysed this section will substances would be to make movement them, as well as how the helped biochemists to understand the uspresent in the processes. It alsoTopic: 20 Organic to make movement the apalogen and ergoured which is usually take place in living organism. The the pathogen and ergoured which is usually take place in living organism. T

risk from unusual or	earth makes use of the	-Forces, accelerations	species evolve. An	are able to take	agriculture and
dangerous diseases our	way that some	and Newton's Laws of	understanding of these	organic molecules	electrical power
body's natural system	elements and	motion	processes has allowed	and modify them in	generation.
can be enhanced by the	compounds react with	-Momentum (HT only)	scientists to intervene	many ways to make	Key Knowledge P7:
use of vaccination. Since	each other and how		through selective	new and useful	Electromagnetic
the 1940s a range of	easily they can be	Assessment:	breeding to produce	materials such as	effects are used in a
antibiotics have been	'pulled apart'.	Forces Topic Test	livestock with favoured	polymers,	wide variety of
developed which have	Key Knowledge C5:		characteristics. Once new	pharmaceuticals,	devices. Engineers
proved successful against	Energy changes are an		varieties of plants or	perfumes and	make use of the fact
a number of lethal	important part of		animals have been	flavourings, dyes and	that a magnet moving
diseases caused by	chemical reactions. The		produced it is possible to	detergents.	in a coil can produce
bacteria. Unfortunately	interaction of particles		clone individuals to	Key Knowledge C3:	electric current and
many groups of bacteria	often involves transfers		produce larger numbers	Chemists use	also that when
have now become	of energy due to the		of identical individuals all	quantitative analysis	current flows around
resistant to these	breaking and formation		carrying the favourable	to determine the	a magnet it can
antibiotics. The race is	of bonds. Reactions in		characteristic. Scientists	formulae of	produce movement. It
now on to develop a new	which energy is		have now discovered	compounds and the	means that systems
set of antibiotics.	released to the		how to take genes from	equations for	that involve control or
Key Knowledge B5:	surroundings are		one species and	reactions. Given this	communications can
Cells in the body can only	exothermic reactions,		introduce them in to the	information, analysts	take full advantage of
survive within narrow	while those that take in		genome of another by a	can then use	this.
physical and chemical	thermal energy are		process called genetic	quantitative methods	- Permanent and
limits. They require a	endothermic. These		engineering. In spite of	to determine the	induced magnetism,
constant temperature	interactions between		the huge potential	purity of chemical	magnetic forces and
and pH as well as a	particles can produce		benefits that this	samples and to	fields
constant supply of	heating or cooling		technology can offer,	monitor the yield	- The motor effect
dissolved food and	effects that are used in		genetic modification still	from chemical	
water. In order to do this	a range of everyday		remains highly	reactions. Chemical	
the body requires control	applications. Some		controversial.	reactions can be	Assessment:
systems that constantly	interactions between		Assessment:	classified in various	Atomic Structure,
monitor and adjust the	ions in an electrolyte		Inheritance, Variation &	ways. Identifying	Flectromagnetism Tonic
composition of the blood	result in the production		Evolution Topic Test	different types of	Test
and tissues. These	of electricity. Cells and			chemical reaction	
control systems include	batteries use these			allows chemists to	
receptors which sense	chemical reactions to			make sense of how	
changes and effectors	provide electricity.			different chemicals	
that bring about changes.	Electricity can also be			react together, to	
In this section we will	used to decompose			establish patterns	

	explore the structure and	ionic substances and is			and to make	
	function of the nervous	a useful means of			predictions about the	
	system and how it can	producing elements			behaviour of other	
	bring about fast	that are too expensive			chemicals. Chemical	
	responses. We will also	to extract any other			equations provide a	
	explore the hormonal	way.			means of	
	system which usually				representing	
	brings about much	Assessment:			chemical reactions	
	slower changes.	Chemical Changes &			and are a key way for	
	Hormonal coordination is	Energy Changes Topic			chemists to	
	particularly important in	Test			communicate	
	reproduction since it				chemical ideas.	
	controls the menstrual					
	cycle. An understanding				Assessment:	
	of the role of hormones				Organic Chemistry &	
	in reproduction has				Quantitative Chemistry	
	allowed scientists to				Topic Test	
	develop not only					
	contraceptive drugs but					
	also drugs which can					
	increase fertility.					
	Assessment:					
	Infection & Response and					
	Homeostasis & Response					
	Topic Test					
	Topic: B7 Ecology	Topic: C6 The rate &	Topic: P6 Waves (Triple		Topic: Revision	
	Key Knowledge B7:	extent of chemical	P8)	Topic: Revision		
	The Sun is a source of	change & CIU Using	Key Knowledge P6.		Key Knowledge:	
	energy that passes	Resources	Wave behaviour is	Key Knowledge:	Review of KS4 course	
	through ecosystems	Key Knowledge C6:	common in both	Review of KS4 course and	and use of Question	
11	Materials including	Chemical reactions can	natural and man-made	use of Question Level	Level Analysis tools to	EXAMS
	carbon and water are	occur at vastly different	systems. Waves carry	nersonalised learning	learning sequences	
	continually recycled by	rates. Whilst the	energy from one place	sequences	icarining sequences	
	the living world heing	reactivity of chemicals	to another and can	Assessment:	Assessment:	
	released through	is a significant factor in	also carry information	Mock Exam – Past Papers	Mock Exam – Past	
	respiration of animals	how fast chemical	Designing comfortable		Papers	
	copilation of animalo,					

plants and decomposing	reactions proceed,	and safe structures		
microorganisms and	there are many	such as bridges,		
taken up by plants in	variables that can be	houses and music		
photosynthesis. All	manipulated in order	performance halls		
species live in	to speed them up or	requires an		
ecosystems composed of	slow them down.	understanding of		
complex communities of	Chemical reactions may	mechanical waves.		
animals and plants	also be reversible and	Modern technologies		
dependent on each other	therefore the effect of	such as imaging and		
and that are adapted to	different variables	communication		
particular conditions,	needs to be established	systems show how we		
both abiotic and biotic.	in order to identify how	can make the most of		
These ecosystems	to maximise the yield	electromagnetic		
provide essential services	of desired product.	waves.		
that support human life	Understanding energy	Key Knowledge P8		
and continued	changes that	(Triple Only):		
development. In order to	accompany chemical	Questions about		
continue to benefit from	reactions is important	where we are, and		
these services humans	for this process. In	where we came from,		
need to engage with the	industry, chemists and	have been asked for		
environment in a	chemical engineers	thousands of years. In		
sustainable way. In this	determine the effect of	the past century,		
section we will explore	different variables on	astronomers and		
how humans are	reaction rate and yield	astrophysicists have		
threatening biodiversity	of product. Whilst	made remarkable		
as well as the natural	there may be	progress in		
systems that support it.	compromises to be	understanding the		
We will also consider	made, they carry out	scale and structure of		
some actions we need to	optimisation processes	the universe, its		
take to ensure our future	to ensure that enough	evolution and ours.		
health, prosperity and	product is produced	New questions have		
well-being.	within a sufficient time,	emerged recently.		
Assessment:	and in an energy-	'Dark matter', which		
Ecology Topic Test	efficient way.	bends light and holds		
	Key Knowledge C10:	galaxies together but		
	Industries use the	does not emit		
	Earth's natural	electromagnetic		
	resources to	radiation, is		
		everywhere – what is		

m	apufacture useful	it? And what is causing		
	roducts. In order to	the universe to evened		
pro	ouucis. III oluel lu	over factor?		
Op	Jerale Sustainably,	ever laster?		
	iemists seek to	Accorcmont:		
mi	inimise the use of	Assessment: Wayos Topic Tost		
lin	nited resources, use	Vertes Topic Test (For Trinle - Snace		
of	energy, waste and	(1 of 11)pic - Space Physics P8)		
en	nvironmental impact	1 11 1 3 1 5 1 5 1		
in i	the manufacture of			
the	ese products.			
Ch	nemists also aim to			
de	evelop ways of			
dis	sposing of products			
at	the end of their			
us	seful life in ways that			
en	nsure that materials			
an	nd stored energy are			
uti	ilised. Pollution,			
dis	sposal of waste			
pro	oducts and changing			
lar	nd use has a			
sig	gnificant effect on the			
l en	nvironment, and			
en	nvironmental			
ch	nemists study how			
hu	uman activity has			
aff	fected the Earth's			
	atural cycles, and how			
da	amaging effects can			
	- minimised			
be	. mmmjca.			
As	ssessment:			
	ne Rate & Extent of			
Ch	nemical Change and			
Usi	sing Resources Topic			
Tes	est			