NKS Physics Curriculum Map 2021

The purpose of studying Physics at NKS is…

The Science Curriculum at NKS ensures that:

- Students develop their scientific knowledge and conceptual understanding in Biology, Chemistry and Physics
- Students build up, and confidently use specialist vocabulary
- Students are able to answer scientific questions through enquiry
- Students can competently demonstrate their practical skills

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Year 7

Our curriculum builds on and extends this by:

- Throughout Year 7 students will study two Biology (Biology A and B), two Chemistry (Chemistry A and B) and two Physics topics (Physics A and B).
- Each group will rotate through the subjects by studying one unit each. Consequently, the actual teaching order may differ from the one below.
- The programme of study allows students to develop a secure understanding of each block, before moving onto the next. All units include planning investigations, recording and analysing data, writing conclusions and evaluations.
- Students have five lessons a fortnight

Our curriculum builds on and extends this by sequencing units to encourage/allow a deeper appreciation of interrelated concepts.

The GCSE Physics AQA SoW begins by building on topics covered at KS3: Circuits and Energy, Forces and Waves. Physics principles are embedded throughout using modelling, mathematics and practical investigative work. Required Practical's engage students, embed skills, and enable the linking of application of knowledge to practice and data analysis, whilst respecting safe and ethical working practices.

Good Science includes investigating, observing, experimenting and testing out ideas. These scientific ideas flow through the Schemes of Work and more details of each of the skills can be found on the below links **(right click to Open Hyperlink)**:

Physics GCSE Developing Scientific Skills

A Level Physics Practical Skills

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Content – Knowledge and Understanding **Skills and concepts**	Introduction to Science/Primary transition. Organisms and Movement (Biology A) Working Scientifically Skills: Scientific attitudes, experimental skills, analysis and evaluation.	The Particle Model and Separating Mixtures (Chemistry A) Working Scientifically Skills : Scientific attitudes, experimental skills, analysis and evaluation.	Circuits and Energy (Physics A) Working Scientifically Skills Scientific attitudes, experimental skills, analysis and evaluation.	Interdependence, Plant reproduction and Variation (Biology B) Working Scientifically Skills: Scientific attitudes, experimental skills, analysis and evaluation.	Acids and Alkalis and Metals and non-metals (Chemistry B) Working Scientifically Skills: Scientific attitudes, experimental skills, analysis and evaluation.	Forces; Speed, Gravity and Waves (Physics B) Working Scientifically Skills: Scientific attitudes, experimental skills, analysis and evaluation.
Assessment	Baseline testing Regular Afl embedded into lessons End of Topic test	Regular Afl embedded into lessons End of Topic test	Regular Afl embedded into lessons End of Topic test	Regular Afl embedded into lessons End of Topic test	Regular Afl embedded into lessons End of Topic test	Regular Afl embedded into lessons End of Topic test End of Year exams
Enrichment and extension	○ **Y7 Science Club (Terms 4-6)** ○ **Science week activities (March)** ○ **World Space Week Activities (October)**					

NKS Physics Curriculum Map 2021

Year 8

Our Y8 curriculum builds on and extends the work done in Y7 by:

- Throughout Year 8 students will study two Biology (Biology C and D), two Chemistry (Chemistry A and B) and two Physics topics (Physics A and B).
- Each group will rotate through the subjects by studying one unit each. Consequently, the actual teaching order may differ from the one below.
- Units are sequenced to allow students to develop a secure understanding of each block, before moving onto the next. All units include planning investigations, recording and analysing data, writing conclusions and evaluations.

Students have three lessons a fortnight

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Content – Knowledge and Understanding	Breathing and Nutrients (Biology C)	An introduction to the Periodic Table and Representing Chemical reactions (Chemistry C)	Contact Forces, Pressure and Work (Physics C)	Photosynthesis and Evolution (Biology D)	Types of Chemical reaction and an introduction to Chemical Energy and The Earth (Chemistry D)	Electromagnets, Waves and Space (Physics D)
Skills and concepts	Working Scientifically Skills: Scientific attitudes, experimental skills, analysis and evaluation.	Working Scientifically Skills: Scientific attitudes, experimental skills, analysis and evaluation.	Working Scientifically Skills: Scientific attitudes, experimental skills, analysis and evaluation.	Working Scientifically Skills: Scientific attitudes, experimental skills, analysis and evaluation.	Working Scientifically Skills: Scientific attitudes, experimental skills, analysis and evaluation.	Working Scientifically Skills Scientific attitudes, experimental skills, analysis and evaluation.
Assessment	Regular Afl embedded into lessons End of Topic test	Regular Afl embedded into lessons End of Topic test	Regular Afl embedded into lessons End of Topic test	Regular Afl embedded into lessons End of Topic test	Regular Afl embedded into lessons End of Topic test	Regular Afl embedded into lessons End of Topic test
Enrichment and extension	○ Science and Technology Challenge ○ Salters Challenge ○ World Space Week (October)					

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Year 9

In year 9, electricity is described as a transfer of energy around a circuit and then this is used to explore how this is used in their homes and radiation topics are used to look at Physics' impact on the wider environment and discuss how Physics can impact the wider world.

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Content – Knowledge and Understanding **Triple Only Content** **Skills and concepts**	Energy - Using the stores and Pathways Model **Required Practical** **Specific Heat Capacity** Working Scientifically: 4.5, 1.2, 1.4, 1.3, 3.5, 4.4, 4.5, 4.6 Maths Skills: 1a,c 2c & 3b,c **Maths Skills** – see Appendix 1 for code definitions: AT 1, 5	Earth's Energy Resources **Required Practical** **The Effect of Thermal Insulation** Working Scientifically 4.5, 1.2, 1.4, 1.3, 3.5, 4.4, 4.5, 4.6 Maths Skills: 1a,c 2c 3b,c AT 1, 5	Electric Circuits – *In terms of defining current as the result of potential difference and resistance. Rather than current as the foundation of electricity.* **Required Practical** **Calculating Resistance of a Wire** **I-V Characteristics** **Static Electricity** Working Scientifically 1.2, 1.4 Maths Skills: 1c 3b,c,d 4c,d,e AT 6	Energy in the Home Working Scientifically 1.2 1.4, 1.5, 4.5 Maths Skills: 1a,b,c 3b,c	The Particle Model **Measuring and Increasing Pressure in Gasses** Working Scientifically 1.2, 3.5 Maths Skills: 1a, b,c 3b,c, d 4a AT 5	Atomic Structure and Radiation Working Scientifically 1.1, 1.5, 4.1, 4.4 Maths Skills: 1b,c 3c,d 4a
Assessment	Regular Afl embedded into lessons Interim marked test	Regular Afl embedded into lessons GCSE Style Test covering all of term 1 and term 2 content	Regular Afl embedded into lessons Interim marked test	Regular Afl embedded into lessons GCSE Style Test covering all of term 3 and 4 content	Regular Afl embedded into lessons Interim Marked Test	End of Year exams covering all year 9 content
Enrichment and extension	○ Space Club ○ THiNKS Lectures					

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Year 10

In year 10, the relationship between force and energy is explored on the macro through Newton's three laws, Hooke's law and the idea of conservation of momentum.

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Content – Knowledge and Understanding **Triple Only Content** **Skills and concepts**	Forces in Balance **Required Practical** **Calculating the Density of an irregular object** **Moments, levers and gears** Working Scientifically 1.2, 3.5, 4.5, 4.6 Maths Skills: 1c, 3a,b,c 4a 5a,c	Motion **Required Practical** **Calculating Acceleration** Working Scientifically 1.2, 3.5, 4.5, 4.6 Maths Skills: 1c, 3a,b,c 4a 5a,c	Forces and Motion **Required Practical** **Hooke's Law** **Calculating changes in momentum during a collision** Working Scientifically 1.2, 1.5, 3.5, 4.5, 4.6, 4.2 Maths Skills: 1c,d 3a,b,c 4a 5a,c AT 1 ,2	PPE Preparation	Wave Properties **Forces and Fluid Pressure (Triple Only)** Working Scientifically 1.2, 1.5, 3.5, 4.5, 4.6, 4.2 Maths Skills: 1c,d 3a,b,c 4a 5a,c	Wave Properties **Required Practical** **IR** **Waves in a Ripple Tank** **Reflection of Waves, Sound Waves (including ultrasound) and Seismic Waves** Working Scientifically 1.2, 1.5, 3.5, 4.5, 4.6, 4.2 Maths Skills: 1c,d 3a,b,c 4a 5a,c
Assessment	Regular Afl embedded into lessons Interim Marked Test	Regular Afl embedded into lessons Interim Marked Test	Regular Afl embedded into lessons Multiple Choice Test focussing on using Equations	PPE – Paper 1	Regular Afl embedded into lessons GCSE Style Test covering all of Forces	Regular Afl embedded into lessons Interim Marked Test
Enrichment and extension	○ Space Club ○ Physics Olympiad					

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Year 11

Finally, in year 11 the interaction between energy and force is explored beyond visible physics by exploring the effects of magnetism and the EM spectrum.

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Content – Knowledge and Understanding **Triple only Content** **Skills and concepts**	Electromagnetic Radiation Working Scientifically 1.2, 3.5, 4.5, 4.6 Maths Skills: 1c, 3a,b,c 4a 5a,c	Properties of Light PPE Paper 1 Preparation **Required Practical Reflection and Refraction (Physics Only)** **Lenses** **Visible Light** **Black Body Radiation** Working Scientifically 1.2, 3.5, 4.5, 4.6 Maths Skills: 1c, 3a,b,c 4a 5a,c	Electromagnetic Effects **Induction, Transformers and the National Grid** Working Scientifically 1.2, 3.5, 4.5, 4.6 Maths Skills: 1c, 3a,b,c 4a 5a,c	Electromagnetic Effects PPE Paper 2 Preparation **Space** Working Scientifically 1.2, 3.5, 4.5, 4.6 Maths Skills: 1c, 3a,b,c 4a 5a,c	Exam Period	Exam Period
Assessment	Regular AfI embedded into lessons Interim Marked Test	**PPE paper 1**	Regular AfI embedded into lessons Interim Marked Test	**PPE paper 2**	Regular AfI embedded into lessons	Regular AfI embedded into lessons
Enrichment and extension	○ Science Live! Conference					

Appendix 1

Mathematical requirements

Students will be required to demonstrate the following mathematics skills in GCSE Biology assessments.

Questions will target maths skills at a level of demand appropriate to each subject. In Foundation Tier papers questions assessing maths requirements will not be lower than that expected at Key Stage 3 (as outlined in Mathematics Programmes of Study: Key Stage 3, by the DfE, document reference DFE00179-2013). In Higher Tier papers questions assessing maths requirements will not be lower than that of questions and tasks in assessments for the Foundation Tier in a GCSE qualification in mathematics.

1 Arithmetic and numerical computation

a Recognise and use expressions in decimal form

b Recognise and use expressions in standard form

c Use ratios, fractions and percentages

d Make estimates of the results of simple calculations

2 Handling data

a Use an appropriate number of significant figures

b Find arithmetic means

c Construct and interpret frequency tables and diagrams, bar charts and histograms

d Understand the principles of sampling as applied to scientific data

e Understand simple probability

f Understand the terms mean, mode and median

g Use a scatter diagram to identify a correlation between two variables

h Make order of magnitude calculations

3 Algebra

a Understand and use the symbols: =, <, <<, >>, >, ∝ , ~

d Solve simple algebraic equations

4 Graphs

a Translate information between graphical and numeric form

b Understand that y = mx + c represents a linear relationship

c Plot two variables from experimental or other data

d Determine the slope and intercept of a linear graph

5 Geometry and trigonometry

c Calculate areas of triangles and rectangles, surface areas and volumes of cubes

Mathematical skills references are taken from the DfE subject criteria.

NKS Physics Curriculum Map 2021

Year 12

At A level, students follow the OCR A course; this offers the students a challenging scheme but remains accessible to the majority. The structure of the course is linear and therefore we don't deviate from the prescribed route. This allows the move of students from A Level to AS only entry if necessary. The Year 12 course starts with GCSE transition tasks and the teaching of Module 2: Foundations of Chemistry. This unit is split equally and taught by both teachers and continually revisited throughout the two year course. In a similar way to GCSE we use the required practical activities to back up theoretical concepts. This allows students to have a more inquiry led experience.

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Content – Knowledge and Understanding	Foundations in Physics • Quantities and Units • Scalar and Vector • Resolving Vectors Modelling Physics • Speed • Acceleration • V-T Graphs • Equations of Motion Exploring Physics • Moving Charge • Kirchhoff's First Law • Drift Velocity	Modelling Physics • Representing Forces • Density Exploring Physics • Energy Power and Resistance • Electrical Circuits	Modelling Physics • Representing Forces • Density Exploring Physics • Wave Theory	Modelling Physics • Materials Physics • Laws of Motion and Momentum Exploring Physics • Wave Theory	Modelling Physics • Laws of Motion and Momentum Exploring Physics • Quantum Physics	Physics Research Project
Skills and concepts	PAG 1 PAG 3	PAG 2 PAG 4		PAG 5	PAG 6	PAG 9 PAG 12
Assessment	Regular AfI embedded into lessons Interim Marked Test	Regular AfI embedded into lessons Interim Marked Test	Regular AfI embedded into lessons Interim Marked Test	Regular AfI embedded into lessons Interim Marked Test	Regular AfI embedded into lessons Interim Marked Test	
Enrichment and extension	○ Physics Olympiad ○ Dungeness Visit					

NKS Physics Curriculum Map 2021

Year 13

At A level, students follow the OCR A course; this offers the students a challenging scheme but remains accessible to the majority. The structure of the course is linear and therefore we don't deviate from the prescribed route. This allows the move of students from A Level to AS only entry if necessary. The Year 12 course starts with GCSE transition tasks and the teaching of Module 2: Foundations of Chemistry. This unit is split equally and taught by both teachers and continually revisited throughout the two year course. In a similar way to GCSE we use the required practical activities to back up theoretical concepts. This allows students to have a more inquiry led experience.

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Content – Knowledge and Understanding **Skills and concepts**	Modelling Physics • Circular motion • Gravitation Fields Exploring Physics • Capacitance • Electric Fields PAG 8	Modelling Physics • Stars • Cosmology Exploring Physics • Magnetic Fields • Particle Physics PAG 10	Modelling Physics • Oscillations Exploring Physics • Radioactivity PAG 7 PAG 11	Modelling Physics • Thermal Physics • The Ideal Gas Exploring Physics • Nuclear Physics	Modelling Physics • Ideal Gas Exploring Physics • Medical Physics	Exam Period
Assessment	Regular AfL embedded into lessons Interim Marked Test	Regular AfL embedded into lessons Interim Marked Test	Regular AfL embedded into lessons Interim Marked Test	Regular AfL embedded into lessons Interim Marked Test	Regular AfL embedded into lessons Interim Marked Test	Regular AfL embedded into lessons Interim Marked Test
Enrichment and extension	○ Physics Olympiad ○ Dungeness Visit					