

Future Academies Curriculum

Year 7

Overview

Autumn	Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	w/c	04-Sep	11-Sep	18-Sep	25-Sep	02-Oct	09-Oct	16-Oct	06-Nov	13-Nov	20-Nov	27-Nov	04-Dec	11-Dec	18-Dec
	Unit	Sequences		Algebraic notation		Equality and equivalence		Place value			FDP equivalence			Assessment	Addition Subtraction
Spring	Week	1	2	3	4	5	6	7	8	9	10	11			
	w/c	08-Jan	15-Jan	22-Jan	29-Jan	05-Feb	12-Feb	26-Feb	04-Mar	11-Mar	18-Mar	25-Mar			
	Unit	Addition and subtraction		Multiplication and division			Percent of an amount	Directed number			Addition and subtraction of fractions				
Summer	Week	1	2	3	4	5	6	7	8	9	10	11	12	13	
	w/c	15-Apr	22-Apr	29-Apr	06-May	13-May	20-May	03-Jun	10-Jun	17-Jun	24-Jun	01-Jul	08-Jul	15-Jul	
	Unit	Construction and geometric notation			Geometric reasoning	Assessment	Geometric Reasoning		Number Sense	Averages	Sets and probability		Primes and proof		

Units and objectives

Sequences (1.5 weeks)

- Describe and continue sequences
- Predict and check next term(s)
- Represent sequences in a table and graphically
- Linear and non-linear sequences
- Continue linear sequences
- Continue non-linear sequences
- Explain the term-to-term rule
- Find missing terms

Algebraic notation (2.5 weeks)

- Given a numerical input, find the output of a single function machine
- Use inverse operations to find the input given the output
- Use diagrams and letters to generalise number operations

- Use diagrams and letters with single function machines
- Find the function machine given a simple expression
- Substitute values into single operation expressions
- Find numerical inputs and outputs for a series of two function machines
- Use diagrams and letters with a series of two function machines
- Find the function machines given a two-step expression
- Substitute values into two-step expressions
- Generate sequences given an algebraic rule
- Represent one- and two-step functions graphically

Equality and equivalence (2 weeks)

- Understand the meaning of equality
- Solve one-step linear equations involving $+/ -$ using inverse operations
- Solve one-step linear equations involving $\times / \div$ using inverse operations
- Understand the meaning of like and unlike terms
- Understand the meaning of equivalence
- Simplify algebraic expressions by collecting like terms, using the $\equiv$ symbol

Place value (3 weeks)

- Recognise the place value of any number in an integer up to one billion
- Understand and write integers up to one billion in words and figures
- Work out intervals on a number line
- Position integers on a number line
- Round integers to the nearest power of ten
- Compare two numbers using $=, \neq, <, >, \leq, \geq$
- Order a list of integers
- Understand place value for decimals
- Position decimals on a number line
- Compare and order any number up to one billion
- Round a number to 1 significant figure

Fraction, decimal and percentage equivalence (3 weeks)

- Represent tenths and hundredths as diagrams
- Interchange between fractional and decimal number lines

- Convert between fractions and decimals - tenths and hundredths
- Convert between fractions and decimals - fifths and quarters
- Convert between fractions and decimals - eighths and thousandths (H)
- Understand the meaning of percentage using a hundred square
- Convert fluently between simple fractions, decimals and percentages
- Represent any fraction as a diagram
- Represent fractions on number lines
- Identify and use simple equivalent fractions
- Understand fractions as division
- Convert fluently between fractions, decimals and percentages
- Explore fractions above one, decimals and percentages (H)

Problems with addition and subtraction (2.5 weeks)

- Properties of addition and subtraction
- Mental strategies for addition and subtraction
- Use formal methods for addition of integers
- Use formal methods for addition of decimals
- Use formal methods for subtraction of integers
- Use formal methods for subtraction of decimals
- Choose the most appropriate method: mental strategies, formal written or calculator
- Solve problems in the context of perimeter
- Solve financial maths problems
- Solve problems involving tables and timetables
- Solve problems with frequency trees
- Solve problems with bar charts and line charts

Problems with multiplication and division (3 weeks)

- Properties of multiplication & division
- Understand and use factors
- Find common factors of a set of numbers including the HCF
- Understand and use multiples
- Find common multiples of a set of numbers including the LCM
- Multiply and divide integers and decimals by powers of 10
- Convert metric units

- Use formal methods to multiply integers
- Use formal methods to multiply decimals
- Use formal methods to divide integers
- Use formal methods to divide decimals
- Understand and use order of operations
- Solve problems using the area of rectangles and parallelograms
- Solve problems using the area of triangles
- Explore multiplication and division in algebraic expressions (H)

Fractions and percentages of amounts (1 week)

- Find a fraction of a given amount
- Use a given fraction to find the whole and/or other fractions
- Find a percentage of a given amount using mental methods
- Find a percentage of a given amount using a calculator
- Solve problems with fractions greater than 1 and percentages greater than 100% (H)

Directed number (3 weeks)

- Understand and use representations of directed numbers
- Order directed numbers using lines and appropriate symbols
- Perform calculations that cross zero
- Add directed numbers
- Subtract directed numbers
- Multiplication of directed numbers
- Multiplication and division of directed numbers
- Use a calculator for directed number calculations
- Evaluate algebraic expressions with directed number
- Introduction to two-step equations
- Solve two-step equations
- Use order of operations with directed numbers

Addition and subtraction of fractions (2 weeks)

- Convert between mixed numbers and fractions
- Add and subtract unit fractions with the same denominator
- Add and subtract fractions with the same denominator

- Add and subtract fractions from integers expressing the answer as a single fraction
- Add and subtract fractions where denominators share a simple common multiple
- Add and subtract fractions with any denominator
- Add and subtract improper fractions and mixed numbers
- Use equivalence to add and subtract decimals and fractions
- Use fractions in algebraic contexts (H)
- Add and subtract simple algebraic fractions (H)

Construction and geometric notation (3 weeks)

- Understand and use letter and labelling conventions including those for geometric figures
- Draw and measure line segments including geometric figures
- Understand angles as a measure of turn
- Classify angles
- Measure angles up to 180°
- Draw angles up to 180°
- Draw and measure angles between 180° and 360°
- Identify perpendicular and parallel lines
- Recognise types of triangle and quadrilateral
- Identify polygons up to a decagon
- Construct triangles using SSS, SAS, and ASA
- Construct more complex polygons
- Interpret simple pie charts using proportion
- Interpret pie charts using a protractor
- Draw pie charts

Geometric reasoning (2 weeks)

- Understand and use the sum of angles at a point
- Understand and use the sum of angles on a straight line
- Understand and use the equality of vertically opposite angles
- Know and apply the sum of angles in a triangle
- Know and apply the sum of angles in a quadrilateral
- Solve angle problems using properties of triangles and quadrilaterals
- Solve complex angle problems
- Find and use the angle sum of any polygon (H)

Developing number sense (1 week)

- Know and use mental addition and subtraction strategies for integers
- Known and use mental multiplication and division strategies for integers
- Use factors to simplify calculations
- Use estimation as a method for checking mental calculations
- Use known number facts to derive other facts

Averages and range (1 week)

- Find the range of a set of numbers
- Find the median of a set of numbers
- Find the mode of a set of numbers
- Solve problems using the mean
- Choose an appropriate average for a set of data

Sets and probability (2 weeks)

- Understand and use the sum of angles at a point
- Interpret and create Venn diagrams
- Understand and use the intersection of sets
- Understand and use the union of sets
- Understand and use the complement of a set (H)
- Know and use the vocabulary of probability
- Generate sample spaces for single events
- Calculate the probability of a single event
- Understand and use the probability scale
- Know that the sum of probabilities for all possible outcomes is 1

Primes and proof (1.5 weeks)

- Recognise and identify prime numbers
- Recognise square and triangular numbers
- Write a number as a product of its prime factors
- Use a Venn diagram to calculate the HCF and LCM (H)
- Make and test conjectures

Future Academies Maths Curriculum

Year 8 Overview

Scheme of Work

	Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	w/c	04-Sep	11-Sep	18-Sep	25-Sep	02-Oct	09-Oct	16-Oct	06-Nov	13-Nov	20-Nov	27-Nov	04-Dec	11-Dec	18-Dec
Autumn	Unit	Ratio and Scale			Multiplicative Change		Multiplying and dividing fractions		Working in the cartesian plane			Indices	Brackets, equations, inequalities		
	Week	1	2	3	4	5	6	7	8	9	10	11			
	w/c	08-Jan	15-Jan	22-Jan	29-Jan	05-Feb	12-Feb	26-Feb	04-Mar	11-Mar	18-Mar	25-Mar			
Spring	Unit	Sequences	Assessment	Tables and probability	Fractions and percentages			Standard Form		Angles in parallel lines and polygons					
	Week	1	2	3	4	5	6	7	8	9	10	11	12	13	
	w/c	15-Apr	22-Apr	29-Apr	06-May	13-May	20-May	03-Jun	10-Jun	17-Jun	24-Jun	01-Jul	08-Jul	15-Jul	
Summer	Unit	Number sense	Area			Reflection	Data handling cycle			Assessment	Data handling cycle	Measures of location			

Adaptations from WRM

- Circumference of a circle is taught during the area unit, rather than as part of ratio
- The Representing Data unit is moved into the Data Handling Cycle and Measures of Location units
- Indices is brought forward to support the study of expansion and factorisation
- Some changes of unit length to allow time to teach key topics

Objectives by unit

Ratio and scale

- Understand the meaning and representation of ratio
- Understand and use ratio notation
- Express ratios in their simplest integer form
- Divide in a given ratio
- Solve problems involving ratio
- Express ratios in the form 1 : n (H)
- Compare ratios and fractions

Multiplicative change

- Solve problems involving direct proportion
- Explore conversion graphs
- Convert between currencies
- Explore direct proportion graphs (H)
- Explore relationships between similar shapes
- Understand scale factors as multiplicative representations
- Draw and interpret scale diagrams
- Interpret maps using scale factors and ratios

Multiplying and dividing fractions

- Multiply a fraction by an integer
- Find the product of a pair of fractions
- Divide an integer by a fraction
- Divide a fraction by a unit fraction
- Understand and use the reciprocal
- Divide any pair of fractions
- Multiply and divide improper and mixed fractions
- Multiply and divide algebraic fractions

Indices

- Adding and subtracting expressions with indices
- Simplifying algebraic expressions by multiplying indices
- Simplifying algebraic expressions by dividing indices
- Using the addition law for indices
- Using the addition and subtraction law for indices
- Exploring powers of powers (H)

Brackets, equations, inequalities

- Form algebraic expressions
- Use directed number with algebra
- Multiply out a single bracket
- Expand multiple single brackets and simplify
- Factorise into a single bracket
- Expand a pair of binomials (H)
- Solve equations, including with brackets
- Form and solve equations with brackets
- Understand and solve simple inequalities
- Form and solve inequalities
- Solve equations and inequalities with unknowns on both sides (H)
- Form and solve equations and inequalities with unknowns on both sides (H)
- Identify and use formulae, expressions, identities and equations

Sequences

- Generate sequences given a rule in words
- Generate sequences given a simple algebraic rule
- Generate sequences given a complex algebraic rule
- Find the rule for the n th term of a linear sequence (H)

Tables and probability

- Construct sample spaces for one or more events
- Find probabilities from a sample space
- Construct and interpret two-way tables
- Find probabilities from two-way tables
- Find probabilities from Venn diagrams
- Use the product rule for finding the total number of possible outcomes

Fractions and percentages

- Convert fluently between key fractions decimals and percentages
- Calculate key fractions, decimals and percentages of an amount without a calculator
- Calculate fractions, decimals and percentages of an amount using calculator methods
- Convert between decimals and percentages greater than 100%
- Percentage decrease with a multiplier
- Calculate percentage increase and decrease using a multiplier
- Express one number as a fraction or a percentage of another without a calculator
- Express one number as a fraction or a percentage of another using calculator methods
- Work with percentage change
- Choose appropriate methods to solve percentage problems
- Find the original amount given the percentage less than 100% (H)
- Find the original amount given the percentage greater than 100% (H)

- Choose appropriate methods to solve complex percentage problems (H)

Standard form

- Work with numbers greater than 1 in standard form
- Work with numbers between 0 and 1 in standard form
- Compare and order numbers in standard form
- Mentally calculate with numbers in standard form
- Add and subtract numbers in standard form
- Multiply and divide numbers in standard form
- Use a calculator to work with numbers in standard form
- Understand and use negative indices (H)
- Understand and use fractional indices (H)

Angles in parallel lines and polygons

- Understand and use basic angle rules and notation
- Investigate angles between parallel lines and the transversal
- Identify and calculate with co-interior, alternate and corresponding angles
- Solve complex problems with parallel line angles
- Identify and calculate with sides and angles in special quadrilaterals
- Understand and use the properties of diagonals of quadrilaterals
- Understand and use the sum of exterior angles of any polygon
- Understand and use the sum of the interior angles in any polygon
- Calculate missing interior angles in regular polygons

Number sense

- Round numbers to powers of 10 and 1 significant figure
- Round numbers to a given number of decimal places
- Estimate the answer to a calculation
- Understand and use error interval notation (H)
- Calculate using the order of operations

Area

- Calculate the area of triangles, rectangles and parallelograms
- Calculate the area of a trapezium
- Calculate the perimeter and area of compound shapes (1)
- Calculate the area of a circle and parts of a circle without a calculator
- Calculate the area of a circle and parts of a circle with a calculator
- Calculate the perimeter and area of compound shapes (2)
- Understand pi as a ratio

Reflection and symmetry

- Recognise line symmetry
- Reflect a shape in a horizontal or vertical line
- Reflect a shape in a diagonal line

Data handling cycle

- Identify different types of data
- Set up a statistical enquiry
- Design and criticise questionnaires
- Draw and interpret pictograms, bar charts and vertical line charts
- Draw and interpret multiple bar charts

- Draw and interpret pie charts
- Draw and interpret line graphs
- Choose the most appropriate diagram for given set of data
- Represent and interpret grouped quantitative data
- Compare distributions using charts
- Identify misleading graphs
- Draw and interpret scatter graphs
- Understand and describe linear correlation
- Draw and use a line of best fit
- Identify outliers

Measures of location

- Understand and use the mean, median and mode
- Choose the most appropriate average
- Read and interpret ungrouped frequency tables
- Read and interpret grouped frequency tables
- Find the mean from an ungrouped frequency table (H)
- Find the mean from a grouped frequency table (H)
- Compare distributions using averages and the range

Future Academies Maths Curriculum

Year 9 Overview

Scheme of Work

	Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	w/c	04-Sep	11-Sep	18-Sep	25-Sep	02-Oct	09-Oct	16-Oct	06-Nov	13-Nov	20-Nov	27-Nov	04-Dec	11-Dec	18-Dec
Autumn	Unit	Linear graphs			Forming and solving equations		Testing conjectures		3D Shape			Construction		Assessment	Congruence
	Week	1	2	3	4	5	6	7	8	9	10	11			
	w/c	08-Jan	15-Jan	22-Jan	29-Jan	05-Feb	12-Feb	26-Feb	04-Mar	11-Mar	18-Mar	25-Mar			
Spring	Unit	Number		Using percentages		Maths and money		Deduction		Rotation Translation	Pythagoras Theorem				
	Week	1	2	3	4	5	6	7	8	9	10	11	12	13	
	w/c	15-Apr	22-Apr	29-Apr	06-May	13-May	20-May	03-Jun	10-Jun	17-Jun	24-Jun	01-Jul	08-Jul	15-Jul	
Summer	Unit	Enlargement and similarity		Ratio and proportion		Assessment	Rates		Probability		Trigonometry		Types of graph		

Small steps by unit

Linear graphs

- Lines parallel to the axis, $y=x$ and $y=-x$ (R)
- Using tables of values (R)
- Compare gradients
- Compare intercepts
- Understand and use $y=mx+c$
- Write an equation in the form $y=mx+c$ (H)
- Find the equation of a line from a graph
- Interpret gradients and intercepts of real-life graphs
- Model real-life graphs involving inverse proportion (H)

Forming and solving equations

- One and two-step equations and inequalities (R)
- Equations and inequalities with brackets (R)
- Inequalities with negative numbers
- Solve equations with unknowns on both sides
- Solve inequalities with unknowns on both sides
- Equations and inequalities in other mathematical contexts
- Rearrange formulae
- Rearrange complex formulae (H)

Testing conjectures

- Factors, multiples and primes (R)
- True or false
- Always, sometimes, never true
- Show that
- Conjectures about number
- Expand a pair of binomials
- Conjectures with algebra
- Expand three binomials (H)

3D shape

- Know names of 2D and 3D shapes
- Recognise prisms (including language of edges and vertices)
- Accurate nets of cuboids and other 3D shapes

- Sketch and recognise nets of cuboids and other 3D shapes
- Plans and elevations
- Find area of 2D shapes (R)
- Surface area of cubes and cuboids
- Surface area of triangular prisms
- Surface area of a cylinder
- Volume of cubes and cuboids
- Volume of other 3D shapes - prisms and cylinders
- Explore volumes of cones, pyramids and spheres (H)

Construction and congruence

- Draw and measure angles (R)
- Construct and interpret scale drawings (R)
- Locus of distance from a point
- Locus of distance from a straight line
- Locus equidistant from two points
- Construct a perpendicular bisector
- Construct a perpendicular from a point
- Construct a perpendicular to a point
- Locus of distance from two lines
- Construct an angle bisector
- Construct triangles from given information (R)
- Identify congruent figures
- Identify congruent triangles

Number

- Integers, real and rational numbers
- Understand and use surds (H)
- Work with directed number (R)
- Solve problems with integers
- Solve problems with decimals
- Solve problems with fractions

Using percentages

- Use the equivalence of fractions, decimals and percentages (R)
- Calculate percentage increase and decrease (R)
- Express a change as a percentage (R)
- Solve reverse percentage problems
- Recognise and solve percentage problems
- Solve problems with repeated percentage change (H)

Maths and money

- Solve problems with bills and bank statements
- Calculate simple interest
- Calculate compound interest
- Solve problems with Value Added Tax
- Calculate wages and taxes
- Solve problems with exchange rates
- Solve unit pricing problems

Deduction

- Angles in parallel lines (R)
- Solve angle problems using chains of reasoning
- Angle problems with algebra
- Conjectures with angles
- Conjectures with shapes

Rotation and translation

- Identify the order of rotational symmetry of a shape
- Compare and contrast rotational symmetry with line symmetry
- Rotate a shape about a point
- Translate points and shapes by a given vector
- Find the result of a series of transformations (H)

Pythagoras' theorem

- Identify the hypotenuse of a right-angled triangle
- Determine whether a triangle is right-angled
- Calculate the hypotenuse of a right-angled triangle
- Calculate missing sides in right-angled triangles
- Use Pythagoras' theorem on coordinate axes
- Use Pythagoras' theorem in 3D shapes (H)

Enlargement and similarity

- Recognise enlargement and similarity
- Enlarge a shape by a positive integer scale factor
- Enlarge a shape by a positive integer scale factor from a point
- Enlarge a shape by a positive fractional scale factor
- Enlarge a shape by a negative scale factor (H)
- Work out missing sides and angles in a pair of given similar shapes
- Solve problems with similar triangles (H)
- Explore ratios in right-angled triangles (H)

Ratio and proportion

- Solve problems with direct proportion (R)
- Direct proportion and conversion graphs (R)
- Solve problems with inverse proportion
- Graphs of inverse relationships (H)
- Solve ratio problems given the whole or a part (R)
- Solve best buy problems
- Solve problems involving ratio and algebra (H)

Rates

- Solve speed, distance and time problems without a calculator
- Solve speed, distance and time problems with a calculator
- Use distance-time graphs
- Solve problems with density, mass and volume
- Solve flow problems and their graphs
- Rates of change and their units
- Convert compound units

Probability

- Single event probability (R)

- Relative frequency - including convergence
- Expected outcomes
- Independent events
- Use tree diagrams (H)
- Use tree diagrams to solve without replacement problems (H)
- Use diagrams to work out probabilities

Trigonometry

- Work fluently with the hypotenuse, opposite and adjacent sides
- Use the tangent ratio to find missing side lengths
- Use the sine and cosine ratio to find missing side lengths
- Use the sine, cosine and tangent to find missing side lengths
- Use the sine, cosine and tangent to find missing angles
- Select the appropriate method to solve right-angled triangle problems

Types of graph

- Draw and interpret quadratic graphs
- Interpret graphs, including reciprocal and piece-wise
- Investigate graphs of simultaneous equations (H)
- Represent inequalities

Future Academies Mathematics Curriculum

Year 10 Overview

Scheme of Work

	Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	w/c	04-Sep	11-Sep	18-Sep	25-Sep	02-Oct	09-Oct	16-Oct	06-Nov	13-Nov	20-Nov	27-Nov	04-Dec	11-Dec	18-Dec
Autumn	Unit	Indices and roots		Non-calculator methods			Types of sequence	Congruence, Similarity and Enlargement			Trigonometry			Solutions of equations and inequalities	
	Week	1	2	3	4	5	6	7	8	9	10	11			
	w/c	08-Jan	15-Jan	22-Jan	29-Jan	05-Feb	12-Feb	26-Feb	04-Mar	11-Mar	18-Mar	25-Mar			
Spring	Unit	Solutions of equations	Assessment	Simultaneous Equations			Bearings		Working with Circles						
	Week	1	2	3	4	5	6	7	8	9	10	11	12	13	
	w/c	15-Apr	22-Apr	29-Apr	06-May	13-May	20-May	03-Jun	10-Jun	17-Jun	24-Jun	01-Jul	08-Jul	15-Jul	
Summer	Unit	Collecting and representing data				Probability		Percentages and interest		Mocks		Ratio and Fractions		Manipulating expressions	

Small steps by unit

Indices and roots

- Square and cube numbers (R)
- Calculate higher powers and roots
- Powers of ten and standard form (R)
- The addition and subtraction rules for indices (R)
- Understand and use the power zero and negative indices
- Work with powers of powers
- Understand and use fractional indices (H)
- Calculate with numbers in standard form (R)

Non-calculator methods

- Mental/written methods of integer/decimal addition and subtraction (R)
- Mental/written methods of integer/decimal multiplication and division (R)
- The four rules of fraction arithmetic (R)
- Rational and irrational numbers (H)
- Understand and use surds (H)
- Calculate with surds (H)
- Rounding to decimal places and significant figures (R)
- Estimating answers to calculations (R)
- Understand and use limits of accuracy
- Upper and lower bounds (H)
- Solve financial maths problems
- Break down and solve multi-step problems

Types of number and sequence

- Understand the difference between factors and multiples (R)
- Understand primes and express a number as a product of its prime factors (R)
- Find the HCF and LCM of a set of numbers (R)
- Describe and continue arithmetic and geometric sequences
- Explore other sequences
- Describe and continue sequences involving surds (H)
- Find the rule for the nth term of a linear sequence (R)
- Find the rule for the nth term of a quadratic sequence (H)

Congruence, similarity and enlargement

- Enlarge a shape by a positive integer scale factor (R)
- Enlarge a shape by a fractional scale factor (R)
- Enlarge a shape by a negative scale factor (H)
- Identify similar shapes
- Work out missing sides and angles in a given pair of similar shapes
- Use parallel line rules to work out missing angles (R)
- Establish a pair of triangles are similar
- Explore areas of similar shapes (H)
- Explore volumes of similar shapes (H)
- Solve mixed problems involving similar shapes (H)
- Understand the difference between congruence and similarity
- Understand and use conditions for congruent triangles
- Prove a pair of triangles are congruent (H)

Trigonometry

- Work fluently with the hypotenuse, opposite and adjacent sides
- Use the sine, cosine and tangent to find missing side lengths
- Use the sine, cosine and tangent to find missing angles
- Calculate sides in right-angled triangles using Pythagoras' Theorem (R)
- Select the appropriate method to solve right-angled triangle problems
- Work with key angles in right-angled triangles
- Work with key angles in right-angled triangles
- Use the formula $\frac{1}{2}ab\sin C$ to find the area of non-right angled triangles (H)
- Understand and use the sine rule to find missing lengths (H)
- Understand and use the sine rule to find missing angles (H)
- Understand and use the cosine rule to find missing lengths (H)
- Understand and use the cosine rule to find missing angles (H)
- Choose and use the sine and cosine rules (H)

Solutions of equations and inequalities

- Understand the meaning of a solution
- Form and solve one-step and two-step equations (R)
- Form and solve one-step and two-step inequalities (R)
- Show solutions to inequalities on a number line
- Interpret representation on number lines as inequalities
- Represent solutions to inequalities using set notation (H)
- Draw straight line graphs (R)
- Find solutions to equations using straight line graphs
- Represent solutions to single inequalities on a graph (H)
- Represent solutions to multiple inequalities on a graph (H)
- Form and solve equations with unknowns on both sides (R)
- Form and solve inequalities with unknowns on both sides
- Form and solve more complex equations and inequalities
- Solve quadratic equations by factorisation (H)

Simultaneous equations

- Understand that equations can have more than one solution
- Determine whether a given (x, y) is a solution to a pair of linear simultaneous equations
- Solve a pair of linear simultaneous equations by substituting a known variable
- Solve a pair of linear simultaneous equations by substituting an expression
- Solve a pair of linear simultaneous equations using graphs

- Solve a pair of linear simultaneous equations by subtracting equations
- Solve a pair of linear simultaneous equations by adding equations
- Use a given equation to derive related facts (R)
- Solve a pair of linear simultaneous equations by adjusting one equation
- Solve a pair of linear simultaneous equations by adjusting both equations
- Form a pair of linear simultaneous equations from given information
- Form and solve pair of linear simultaneous equations from given information
- Determine whether a given (x, y) is a solution to both a linear and quadratic equation (H)
- Solve a pair of simultaneous equations (one linear, one quadratic) using graphs (H)
- Solve a pair of simultaneous equations (one linear, one quadratic) algebraically (H)

Angles and bearings

- Use cardinal directions and related angles (R)
- Use cardinal directions and related angles (R)
- Understand and represent bearings
- Measure and read bearings
- Make scale drawings using bearings
- Calculate bearings using angle rules
- Solve bearings problems using Pythagoras and trigonometry
- Solve bearings problems using the sine and cosine rules (H)

Working with circles

- Recognise and label parts of a circle (R)
- Calculate fractional parts of a circle
- Calculate the length of an arc
- Calculate the area of a sector
- Circle theorem: Angles at the centre and circumference (H)
- Circle theorem: Angles in a semi-circle (H)
- Circle theorem: Angles in the same segment (H)
- Circle theorem: Angles in a cyclic quadrilateral (H)
- Understand and use the volume of a cylinder and cone
- Understand and use the volume of a sphere
- Understand and use the surface area of a sphere
- Understand and use the surface area of a cylinder and cone

Collecting and representing data

- Understand populations and samples
- Construct a stratified sample (H)
- Primary and secondary data
- Construct and interpret frequency tables and frequency polygons
- Construct and interpret two-way tables (R)
- Construct and interpret line and bar charts (including composite bar charts)
- Construct and interpret pie charts (R)
- Criticise charts and graphs
- Construct histograms (H)
- Interpret histograms (H)
- Find and interpret averages from a list (R)
- Find and interpret averages from a table (R)
- Construct and interpret time series graphs (R)
- Construct and interpret stem-and-leaf diagrams
- Construct and interpret cumulative frequency diagrams (H)

- Use cumulative frequency diagrams to find measures (H)
- Construct and interpret box plots (H)
- Compare distributions using charts and measures
- Compare distributions using complex charts and measures (H)
- Construct and interpret scatter graphs (R)
- Draw and use a line of best fit (R)
- Understand extrapolation

Probability

- Solve problems involving percentages, ratios and fractions
- Find probabilities using equally likely outcomes (R)
- Use the property that probabilities sum to 1 (R)
- Using experimental data to estimate probabilities
- Find probabilities from tables, Venn diagrams and frequency trees
- Construct and interpret sample spaces for more than one event (R)
- Calculate probability with independent events
- Use tree diagrams for independent events
- Use tree diagrams for dependent events
- Construct and interpret conditional probabilities (tree diagrams) (H)
- Construct and interpret conditional probabilities (Venn diagrams and two-way tables) (H)

Percentages and interest

- Convert and compare fractions, decimals and percentages (R)
- Work out percentages of amounts (with and without a calculator) (R)
- Increase and decrease by a given percentage (R)
- Express one number as a percentage of another (R)
- Calculate simple and compound interest
- Repeated percentage change
- Find the original value after a percentage change (R)
- Solve problems involving growth and decay
- Understand iterative processes (H)
- Solve problems involving percentages, ratios and fractions

Ratio and fractions

- Compare quantities using a ratio (R)
- Link ratios and fractions (R)
- Share in a ratio (given total or one part) (R)
- Use ratios and fractions to make comparisons
- Link ratios and graphs
- Solve problems with currency conversion
- Link ratios and scales (R)
- Use and interpret ratios of the form 1 : n and n : 1
- Solve best buy problems
- Combine a set of ratios
- Link ratio and algebra
- Mixed ratio problems

Manipulating expressions

- Simplify algebraic expressions (R)
- Use identities
- Add and subtract simple algebraic fractions (H)

- Add and subtract complex algebraic fractions (H)
- Multiply and divide simple algebraic fractions (H)
- Multiply and divide complex algebraic fractions (H)
- Form and solve equations and inequalities with fractions
- Solve equations with algebraic fractions (H)
- Represent numbers algebraically
- Algebraic arguments and proof

Mathematics Year 11

Year 11	Autumn 1 and 2	Spring 1 and 2	Summer 1 and 2
	Foundation FU13: Factors, Powers and Roots FU14: Graphs 1 FU15: Working in 3D Higher HU19: Vectors and mop up trig HU12: Ratio and Proportion HU13: Factors, Powers and Roots HU14: Graphs 1 HU15: Working in 3D	Foundation FU16: Handling Data 2 FU17: Calculations 2 FU18: Graphs 2 FU19: Pythagoras and Trigonometry HU20: Combined Events Higher HU16 Handling Data 2 HU17: Calculations 2 HU18: Graphs 2 HU20: Combined Events HU21: Sequences HU22: Units and Proportionality	Foundation 11FU21: Sequences 11FU22: Units and Proportionality Revision Higher Revision

Key Stage 4 Science Curriculum Overview

At Future Academies Watford we follow the AQA GCSE specifications. Students are offered a choice of studying the combined science course or choosing to study separate sciences, thus the science provision is of a 'broad and balanced' curriculum.

Our curriculum involves more than coverage of the National Curriculum / syllabus outcomes relating to the areas of Biology, Chemistry and Physics; but it also encompasses experiences of 'cultural capital, Social, Moral, Spiritual and Cultural experiences and knowledge of democracy and the rule of law.

Our curriculum aims to ensure that all Future Academy Watford students become scientifically literate who are able to recognise the importance of rational explanation, capable of scientific analysis and knowledgeable about the contribution that the sciences make to our theoretical and practical understanding of the world. It is designed so that foundational concepts are introduced at the outset and are carefully built upon over the first three years, ensuring students develop an increasingly sophisticated and specialised understanding of the separate sciences. As such, students benefit from a coherent and cumulative teaching programme that enables them to grasp increasingly specialised concepts and to develop a rigorous understanding of scientific knowledge.

The Future academies 8 habits and mode of delivery is continues at Future academies Watford ensuring that students always have a continuity of delivery and with the support of narratives that are the best that have been said and written in science.

Students are taught biology, chemistry and physics by separate subject specialists enabling students to cover one key topic every half term. There is a strong focus on retrieval practice and interleaving learning: each topic begins by explicitly returning to relevant prior learning and ends with an assessment and an interleaved test based on another topic. The KS4 are explicated taught within the course usually placed at the end of the teaching of the key knowledge to enable students to connect their learning to the practical techniques and real-world applications.

The key principle of our curriculum design is that that scientific knowledge is taught through meaningful narratives enabling students to form long-term memories. This is seen through the explicit, planned-for links between relevant topics and an emphasis, where relevant, on the chronological development of scientific discoveries and theories, and of their cultural importance.

The purpose of the Key Stage 4 curriculum is to prepare students for their next stage in education, whether it be in A Level studies or in apprenticeships.

Over a student's time at Future academies the curriculum is designed to prepare students to be scientifically literate, able to read process scientific material in the media and draw informed conclusions and have informed conversations in whatever company they find themselves in.

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
10 Combined science	Cell biology Cell structure transport in and out of cells. Cell division by mitosis stem cells. Chemistry fundamentals Atomic structure and the Periodic table Atomic structure and the development of the atom Describing the development of the periodic table and describing and explaining the patterns that can be seen Energy Energy stores and transfers.	Principles of organisation Digestion, enzymes Heart and circulation Plant tissues organs and systems. Structure and bonding Describing and explaining ionic and covalent bonding. Describing and explaining the process of electrolysis. Quantitative chemistry Using quantitative analysis to determine the formulae of compounds and the equations for reactions and use quantitative methods to determine the purity of chemical samples and to monitor the yield from chemical reactions.	Infection and response Describing the transmission symptoms and treatment of a range of infections. Describing and explaining how the human body is protected from infection. Explaining how transmission of infection can be prevented. Quantitative chemistry Using quantitative analysis to determine the formulae of compounds and the equations for reactions and use quantitative methods to determine the purity of chemical samples and to monitor the yield from chemical reactions. Particle model of matter	Bioenergetics The processes of photosynthesis and respiration Nerves and reflex actions Describing how the nervous system works to control the human body. Chemical changes Reactivity of metals, extracting metals Atomic structure and radiation The uses and hazards of radiation and radioactive substances. Describing and explaining half-life.	Homeostasis Homeostatic mechanisms in humans. Hormones and reproduction Describing how hormones control the human body; and their role in reproduction. Energy changes Endothermic and exothermic reactions Investigating, describing and explaining the heating and cooling effects of a chemical reaction. Atomic structure and radiation The uses and hazards of radiation and radioactive substances. Describing and explaining half-life.	Homeostasis Homeostatic mechanisms in humans. Hormones and reproduction Describing how hormones control the human body; and their role in reproduction. Energy changes Endothermic and exothermic reactions Investigating, describing and explaining the heating and cooling effects of a chemical reaction. Forces Explaining forces and their effects, describing and explaining how forces are seen and used in everyday life. Combined Science Biology

		Electricity Circuits Series and parallel circuits explaining the different characteristics seen. Explaining how electricity is supplied to homes – domestic electricity. Particle model of matter Using the particle model to predict the behaviour of solids, liquids and gases. Measuring density. Changing state Specific heat capacity Latent Heat Energy transfers Energy resources Generating electricity	Using the particle model to predict the behaviour of solids, liquids and gases. Measuring density.			Targeted Revision Chemistry Targeted Revision Physics Targeted Revision
10 Triple science 3 lessons per week	Cell biology Cell structure transport in and out of cells. Cell division by mitosis stem cells. Chemistry fundamentals Atomic structure and the Periodic table Atomic structure and the development of the atom Describing the development of the periodic table and describing and explaining the patterns that can be seen Energy Energy stores and transfers.	Principles of organisation Digestion, enzymes Heart and circulation Plant tissues organs and systems. Structure and bonding Describing and explaining ionic and covalent bonding. Describing and explaining the process of electrolysis. Quantitative chemistry Using quantitative analysis to determine the formulae of compounds and the equations for reactions and use quantitative methods to determine the Purity of chemical samples and to monitor the yield from chemical reactions. Electricity Circuits Series and parallel circuits explaining the different characteristics seen. Explaining how electricity is supplied to homes – domestic electricity. Particle model of matter Using the particle model to predict the behaviour of solids, liquids and gases. Measuring density. Changing state Specific heat capacity	Infection and response Describing the transmission symptoms and treatment of a range of infections. Describing and explaining how the human body is protected from infection. Explaining how transmission of infection can be prevented. Including plants Quantitative chemistry Using quantitative analysis to determine the formulae of compounds and the equations for reactions and use quantitative methods to determine the Purity of chemical samples and to monitor the yield from chemical reactions. Particle model of matter Using the particle model to predict the behaviour of solids, liquids and gases. Measuring density. Changing state Specific heat capacity Latent Heat Energy transfers Energy resources Generating electricity	Bioenergetics The processes of photosynthesis and respiration Nerves and reflex actions Describing how the nervous system works to control the human body. Chemical changes Reactivity of metals, extracting metals Atomic structure and radiation The uses and hazards of radiation and radioactive substances. Describing and explaining half-life.	Homeostasis Homeostatic mechanisms in humans. Hormones and reproduction Describing how hormones control the human body; and their role in reproduction. Energy changes Endothermic and exothermic reactions Investigating, describing and explaining the heating and cooling effects of a chemical reaction. Forces Explaining forces and their effects, describing and explaining how forces are seen and used in everyday life. Combined Science Biology Targeted Revision Chemistry Targeted Revision Physics Targeted Revision	

		Latent Heat Energy transfers Energy resources Generating electricity				
11 Combined science	Biology Inheritance Explain the process of fertilisation and how the genes give rise to the features of individuals. Explaining the symptoms prognosis and treatments of some inherited health conditions. Rates of reaction Describing and explaining the factors that affect the rate of a chemical reaction and explaining the effects that are seen. Explaining the applications of the science in industry Forces Explaining forces and their effects, describing and explaining how forces are seen and used in everyday life. Force and motion Mock Exam preparation Combined Science Biology Paper 1 revision Cell biology Organisation Infection and response Bioenergetics Chemistry Paper 1 revision Energy changes Chemistry of the atmosphere Bonding structure and properties of matter Quantitative chemistry Chemical changes Physics Paper 1 revision Energy Electricity Particle model of matter Atomic structure	Combined Science Biology Inheritance and Evolution Describing and explaining the process of evolution. Describing and explaining the process of selective breeding, and genetic engineering. Chemistry Organic chemistry The chemistry and patterns of carbon chemistry, alkanes. Fractional distillation and the uses of the products of oil. Chemical analysis Using chemical reactions to identify the components of compounds. Forces Explaining forces and their effects, describing and explaining how forces are seen and used in everyday life. Force and motion	Ecology Exploring how humans are threatening biodiversity as well as the natural systems that support it Considering and describing and explaining some actions that need to be taken to ensure our future health, prosperity and well-being and the health of the world's environment. Chemistry Chemistry of the atmosphere Describing and explaining the development of the atmosphere over time Physics Waves Describing the characteristics of longitudinal and transverse waves. Naming the waves in the electromagnetic spectrum and explaining the uses and hazards of each of the waves.	Chemistry Using resources Explaining how the properties of an material makes Physics Waves Describing the characteristics of longitudinal and transverse waves. Naming the waves in the electromagnetic spectrum and explaining the uses and hazards of each of the waves. Magnetism and electromagnetism. Describing and explaining how magnets act, and their uses in everyday life. Explaining the magnetic effects of an electric current and the uses of electromagnets.	Combined Science Biology Targeted Revision Chemistry Targeted Revision Physics Targeted Revision Combined Science Biology Paper 1 revision Cell biology Organisation Infection and response Bioenergetics Chemistry Paper 1 revision Energy changes Chemistry of the atmosphere Bonding structure and properties of matter Quantitative chemistry Chemical changes Physics Paper 1 revision Energy Electricity Particle model of matter Atomic structure	Combined Science Biology Paper 2 revision Ecology Inheritance Homeostasis Chemistry Paper 1 revision Rates of reaction Organic chemistry Using resources Chemical analysis Chemistry of the atmosphere Physics Paper 1 revision Forces Waves Magnetism and electromagnetism

Year 11 triple science	Combined Science Biology Inheritance Explain the process of fertilisation and how the genes give rise to the features of individuals. Explaining the symptoms prognosis and treatments of some inherited health conditions. Rates of reaction Describing and explaining the factors that affect the rate of a chemical reaction and explaining the effects that are seen. Explaining the applications of the science in industry Forces Explaining forces and their effects, describing and explaining how forces are seen and used in everyday life. Force and motion <u>Mock Exam preparation</u> Combined Science Biology Paper 1 revision Cell biology Organisation Infection and response Bioenergetics Chemistry Paper 1 revision Energy changes Chemistry of the atmosphere Bonding structure and properties of matter Quantitative chemistry Chemical changes Physics Paper 1 revision Energy Electricity Particle model of matter Atomic structure	Combined Science Biology Inheritance and Evolution Describing and explaining the process of evolution. Describing and explaining the process of selective breeding, and genetic engineering. Chemistry Organic chemistry The chemistry and patterns of carbon chemistry, alkanes. Fractional distillation and the uses of the products of oil. Chemical analysis Using chemical reactions to identify the components of compounds. Forces Explaining forces and their effects, describing and explaining how forces are seen and used in everyday life. Force and motion	Ecology Exploring how humans are threatening biodiversity as well as the natural systems that support it Considering and describing and explaining some actions that need to be taken to ensure our future health, prosperity and well-being and the health of the world's environment. Chemistry Chemistry of the atmosphere Describing and explaining the development of the atmosphere over time Physics Waves Describing the characteristics of longitudinal and transverse waves. Naming the waves in the electromagnetic spectrum and explaining the uses and hazards of each of the waves.	Chemistry Using resources Explaining how the properties of an material makes Physics Waves Describing the characteristics of longitudinal and transverse waves. Naming the waves in the electromagnetic spectrum and explaining the uses and hazards of each of the waves. Magnetism and electromagnetism. Describing and explaining how magnets act, and their uses in everyday life. Explaining the magnetic effects of an electric current and the uses of electromagnets. Physics Space Describing the origins and structure of the universe and our solar system. Explaining the life of a star. Describing and explaining the Red Shift phenomena.	Biology Paper 1 revision Cell biology Organisation Infection and response Bioenergetics Chemistry Paper 1 revision Energy changes Chemistry of the atmosphere Bonding structure and properties of matter Quantitative chemistry Chemical changes Physics Paper 1 revision Energy Electricity Particle model of matter Atomic structure	Biology Paper 2 revision Ecology Inheritance Homeostasis Chemistry Paper 1 revision Rates of reaction Organic chemistry Using resources Chemical analysis Chemistry of the atmosphere Physics Paper 1 revision Forces Waves Magnetism and electromagnetism

Key Stage 5 Science Curriculum Overview

At Future Academies Watford we follow the OCR Biology and chemistry specifications and AQA Physics and Applied science specifications. Students are offered a free choice as long as the entry requirements are met.

Our curriculum involves more than coverage of the National Curriculum / syllabus outcomes relating to the areas of Biology, Chemistry and Physics; but it also encompasses experiences of 'cultural capital, Social, Moral, Spiritual and Cultural experiences and knowledge of democracy and the rule of law.

Our curriculum aims to ensure that all Future Academy Watford students become scientifically literate who are able to recognise the importance of rational explanation, capable of scientific analysis and knowledgeable about the contribution that the sciences make to our theoretical and practical understanding of the world. It is designed so that foundational concepts are introduced at the outset and are carefully built upon over the first three years, ensuring students develop an increasingly sophisticated and specialised understanding of the separate sciences. As such, students benefit from a coherent and cumulative teaching programme that enables them to grasp increasingly specialised concepts and to develop a rigorous understanding of scientific knowledge.

The Future academies 8 habits and mode of delivery is continues at Future academies Watford ensuring that students always have a continuity of delivery and with the support of narratives that are the best that have been said and written in science.

Students are taught biology, chemistry and physics by separate subject specialists enabling students to cover one key topic every half term. There is a strong focus on retrieval practice and interleaving learning: each topic begins by explicitly returning to relevant prior learning and ends with an assessment and an interleaved test based on another topic. The KS4 are explicated taught within the course usually placed at the end of the teaching of the key knowledge to enable students to connect their learning to the practical techniques and real-world applications.

The key principle of our curriculum design is that that scientific knowledge is taught through meaningful narratives enabling students to form long-term memories. This is seen through the explicit, planned-for links between relevant topics and an emphasis, where relevant, on the chronological development of scientific discoveries and theories, and of their cultural importance.

The purpose of the Key Stage 5 curriculum is to prepare students for their next stage in education, whether it be at university work or in apprenticeships.

Key Stage Five Biology Curriculum Overview

	Autumn	Spring	Summer
YEAR 12 OCR A	Module 2: Foundations in biology - Cell structure - Biological molecules - Nucleotides and nucleic acids Module 3: Exchange and transport - Exchange surfaces - Transport in animals	Module 2: Foundations in biology - Enzymes - Biological membranes - Cell division, cell diversity and cellular organisation Module 3: Exchange and transport - Transport in plants	Module 3: Exchange and transport - Exchange surfaces - Transport in animals - Transport in plants Module 4: Biodiversity, evolution and disease - Communicable diseases, disease prevention and the immune system - Biodiversity - Classification and evolution

YEAR 13 <i>OCR A</i>	Module 5: Communication, homeostasis and energy • Photosynthesis • Respiration Module 6: Genetics, evolution and ecosystems • Cellular control • Patterns of inheritance	Module 5: Communication, homeostasis and energy • Communication and homeostasis • Excretion as an example of homeostatic control Module 6: Genetics, evolution and ecosystems • Manipulating genomes • Cloning and biotechnology	Module 5: Communication, homeostasis and energy • Neuronal communication • Hormonal communication • Plant and animal responses Module 6: Genetics, evolution and ecosystems • Ecosystems • Populations and sustainability <i>Targeted revision</i>
--	--	--	--

Key Stage Five Chemistry Curriculum Overview

	Autumn	Spring	Summer
YEAR 12 <i>OCR A</i>	Foundations in chemistry Atoms and reactions Compounds, formulae and equations Amount of substance Acids Redox Electron structure Bonding and structure	Periodic table and energy Periodicity Group 2 The halogens Qualitative analysis Enthalpy changes Reaction rates Chemical equilibrium	Core organic chemistry Basic concepts of organic chemistry Alkanes Alkenes Alcohols Haloalkanes Organic synthesis Analytical techniques
YEAR 13 <i>OCR A</i>	Physical chemistry and transition elements How fast? How far? Acids, bases and buffers Lattice enthalpy Enthalpy and entropy Organic chemistry and analysis Aromatic compounds Carbonyl compounds Carboxylic acids and esters Amines Amino acids, amides and chirality	Organic chemistry and analysis Polyesters and polyamides Carbon-carbon bond formation Organic synthesis Chromatography and qualitative analysis Spectroscopy Physical chemistry and transition elements Redox and electrode potentials Transition metals Qualitative analysis	<i>Targeted revision</i>

Key Stage Five Physics Curriculum Overview

	Autumn	Spring	Summer
YEAR 12 AQA	3.1 Measurement and their errors 3.2 Particles and radiation 3.4 Mechanics and materials	3.2 Particles and radiation 3.4 Mechanics and materials Waves Electricity	Waves Electricity
YEAR 13 AQA	Further mechanics and thermal physics Fields and their consequences	Nuclear physics Optional unit 9 Astrophysics (A-level only) 10 Medical physics (A-level only) 11 Engineering physics 12 Turning points in physics 13 Electronics	Targeted revision