Toynbee Curriculum
KS4 Topic Summaries

MATHS (Year 10)

Toynbee School

Scheme of Learning: Year 10 Autumn Term

Topic Sequence: Similarity

1	2
Congruence, Similarity and Enlargement	**Trigonometry**

Topic Overview:

This unit looks more formally at dealing with topics such as similar triangles. Parallel line angle rules are revisited to support establishment of similarity. Congruency is introduced through considering what information is needed to produce a unique triangle. Students will extend and formalise their knowledge of ratio and proportion in working with measures and geometry in order to compare lengths, areas and volumes using ratio notation and/or scale factors; make links to similarity. Content extends enlargement to explore negative scale factors and also looks at establishing that a pair of triangles are congruent through formal proof

Learning Sequence:

Enlarge a shape by a positive and a fractional scale factor (R): Students start year 10 with a review of the transformation, Enlargement. This understanding will be built on as similar shapes are introduced. Students consider how a whole number scale factor produces an image that is bigger than the object, but a fractional scale factor produces an image that is smaller than the object.

Enlarge a shape by a negative scale factor (H): Students investigate how enlarging by a negative scale factor produces an image that appears rotated and on the other side of the Centre of Enlargement.

Identify similar shapes: Students apply their knowledge of enlargement to identifying similar shapes. They should relate the ideas of proportionate corresponding lengths and the fact that the angles remain unchanged. It is helpful for students to understand ratio within this context as this will be useful later when introduced to trigonometry.

Work out missing sides and angles in a pair given similar shapes: Students will calculate missing lengths and angles. They should be encouraged to look at scale factors both within and between shapes. They should see similar shapes in a range of orientations and therefore have practice to ensure they correctly identify corresponding points. Careful labelling will assist this.

Use parallel line rules to work out missing angles (R): Students to show pairs are triangles are similar in the following step. Students are encouraged to explain their reasoning for their steps and review angle and side notation. It will be useful to distinguish between 'corresponding angles' (that are equal because of parallel lines) and 'angles that correspond' (matching pairs of angles in two shapes).

Establish a pair of triangles are similar: Students use their understanding of angles in parallel lines to show that a pair of triangles are similar. They may need support to work out which vertex in one triangle corresponds to which in the other and to distinguish this from 'corresponding angles' in parallel lines. Students should also recognise that using side ratios is an equally valid method of establishing similarity.

Similar Triangles: Students explore ratios within triangles as well as between them

Explore areas of similar shapes (H): Students explore how area changes as the scale factor between two shapes changes, considering squaring the linear scale factor to find the area scale factor

Volumes of similar shapes (H): This small step leads on from the previous for students to consider how volume scale factors need to be derived from the linear scale factor, cubed

Similar shape problems (H): This small step brings together the previous steps to consolidate and extend student understanding of the topics while interleaving other topics, considering reasoning skills

Understand the difference between congruence and similarity:
Students bring together the ideas of similarity and congruence and through categorising are able to distinguish between them

Understand and use conditions for congruent triangles:
The conditions for congruence are formalised within this step. Students will have come across the language of SSS, ASA etc. in previous years, but will not have used them to show congruence of triangles. Students should understand the minimum information needed to establish congruence between triangles.

Prove triangles are congruent: (H) Students prove that triangles are congruent using the conditions of congruence.

Sequence of Learning:

1	Enlarge shapes with a positive and fractional scale factor (R)
2	Enlarge shapes with a negative scale factor (H)
3	Identify similar shapes
4	Work out missing sides and angles in a pair of given similar shapes
5	Use parallel line rules to work out missing angles
6	Establish a pair of triangles are similar
7	Similar triangles
8	Explore areas of similar shapes
9	Volumes of similar shapes
10	Similar shape problems
11	Understand the difference between congruence and similarity
12	Understand and use conditions for congruent triangles
13	Prove triangles are congruent

Topic Resources:

Knowledge Maps:	Congruence and Similarity 2D shapes Transformations

Assessment

End of Topic Tests	End of Topic Test – 8 questions, 20 marks
Application of Knowledge:	Termly Summative Assessments

Supportive Reading:

	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 10 Autumn Term

1	2
Congruence, Similarity and Enlargement	**Trigonometry**

Topic Overview: Similarity

Trigonometry is introduced as a special case of similarity within right-angled triangles. Emphasis is placed throughout the steps on linking the trig functions to ratios, rather than just functions. For the Higher tier, calculation with trigonometry is covered now in year 10 and graphical representation is covered in year 11

Learning Sequence:

Explore ratio in right angled triangles
Students explore the ratio of two side-lengths in a right-angled triangle, given a specific angle. This facilitates understanding of a constant ratio between a pair of side lengths in relation to a specific angle.

Work fluently with the hypotenuse, opposite and adjacent sides:
Students need to be able to name the different sides of a right-angled triangle in relation to given angles. Labelling the hypotenuse first is a useful strategy. They should have opportunities to name sides in differently orientated right-angled triangles.

Use sine, cosine and tangent to find missing side lengths:
This step starts with how to choose between tangent, sine and cosine to find a missing length. Teachers should emphasise that this is dependent on which side lengths are involved in the question.

Use sine, cosine and tangent to find missing angles:
When introducing the inverse, students might start by practising using their calculators to solve equations such as sin $\theta = 0.33$ It's important to expose students to different notation such as angle ABC and angle x. Ensure students are given examples where all 3 lengths of a right-angled triangle are given so that they can explore different methods of finding the same angle

Calculate sides in right angled triangles using Pythagoras' Theorem (R):
This step reviews prior knowledge to ensure students are confident in applying Pythagoras' Theorem

Select the appropriate method to solve right-angled triangle problems:
Students make decisions about when to use trigonometric ratios and when to use Pythagoras' Theorem to solve problems. They also realise that in some situations, either can be used

Key angles in trigonometry
Students focus on the exact trigonometric values of 30^0, 60^0, 45^0, 0^0 and 90^0 being introduced to methods to help them remember these key values

Use trigonometry in 3d shapes (H)
Students start by recognising 3D right-angled triangles in a 3D shape, considering cones and cylinders also.

Area of a non-right angled triangle: (H)
Students derive the area of a triangle producing the formula Area = ½ ab sinC

Sine Rule (H)
Students derive the sine rule and apply it to finding lengths and also angles in non-right angled triangles

Cosine Rule: (H)
Students derive the cosine rule and apply it to finding lengths and angles in triangles

Choosing the sine or cosine rule (H)
Students explore problems where they must choose between the sine and cosine rule and extend to problem solving where application of other mathematical concepts, such as ratio, is necessary

Sequence of Learning:	
1	Explore ratio in right angled triangles
2	Work fluently with the hypotenuse, opposite and adjacent sides
3	Use the sine, consine and tangent ratio to find missing side lengths
4	Use sine, cosine and tangent ratios to find missing angles
5	Calculate sides in right angled triangles using Pythagoras' Theorem (R)
6	Select the appropriate method to solve right-angled triangle problems
7	Work with key angles in right-angled triangles
8	Use trigonometry in 3D shapes
9	Area of a non-right angled triangle
10	Sine rule
12	Cosine rule
12	Choosing between the sine rule or cosine rule

Topic Resources:	
Knowledge Maps:	Ratio and scale Angles Congruence and Similarity 2D shapes Pythagoras and Trigonometry Straight Line graphs
Assessment	
Knowledge	End of Topic Test – 8 questions, 20 marks
Application of Knowledge:	Termly Summative Assessments
Supportive Reading:	
	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 10 Summer Term

Topic Sequence: Developing Algebra

3	4
Equations and Inequalities	**Simultaneous Equations**

Topic Overview:

This unit revisits and reinforces techniques visited previously and deepens understanding of the topic of equations and also inequalities. Students look at the difference between equations and inequalities and establish the difference between a solution and a solution set and also explore how number lines and graphs can be used to represent the solutions to inequalities. The content covers consolidating algebraic capability from KS3 and extending understanding of algebraic simplification and manipulation to include quadratic expressions. Also, translating simple situations or procedures into algebraic expressions or formulae; deriving equations, solving equations and interpreting solutions, selecting appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems; interpreting solutions in context of the problem. Factorising quadratics to solve equations is covered here in the Higher tier

Learning Sequence:

Understand the meaning of a solution: Students consider what the meaning of a solution is and how they can represent this, using substitution to check a solution. They also consider how many solution an equation could have through reasoning about different types of equations as well as why an expression would have no solution

Form and solve one-step and two-step equations and inqualities: (R)
In this step, students revise forming and solving equations and then link this to inequalities and their solutions

Show solutions to inequalities on a number line and interpreting representations on number lines as inequalities: Students see how to represent inequalities on a number line and interpret the meaning of a given number line representation and put into inequality format

Represent solutions to inequalities using set notation (H):
Students make links between the number line representation, the verbal description and formal set notation.

Draw straight line graphs (R): This review step reminds students how to draw linear graphs making connections between representations as a graph, an equation, a table of values and a set of coordinates

Find solutions to equations using straight line graphs: Students learn the connection between solving algebraically and solving graphically. Students revisit plotting straight line graphs and how the solution of a linear equation corresponds to where two graphs meet.

Single and multiple inequalities on a graph (H):
Students visit the convention of graphing inequalities and shading regions described by inequalities

Form and solve complex equations and inequalities: Students now solve equations and inequalities with unknowns on both sides and where brackets may be present on one or both sides and /or more challenging contexts.

Quadratics using factorisation (H):
Students recap previous work on factorising quadratics

Quadratic inequalities (H): Students need to identify which region is to be shaded to represent an inequality and use factorisation to do this

Equations / inequalities from shapes
Students should be confident in forming as well as solving equations, and this step used shape as a context to support this. Students can check answers by substituting solutions back in to the original problem as well as in the equation or inequality

Sequence of Learning:

1	Understand the meaning of a solution
2	Form and solve one and two step equations and inequalities
3	Show solutions to inequalities on a number line and interpret representations on number lines as inequalites
4	Represent solutions to inequalities using set notation (H)
5	Draw straight line graphs (R)
6	Find solutions to equations using straight line graphs
7	Single and multiple inequalities on a graph (H)
8	Form and solve complex equations and inequalities
9	Quadratics using factorisation (H)
10	Quadratic inequalities (H)
11	Equations / inequalities form shapes

Topic Resources:

Knowledge Maps:	Algebraic notation and manipulation Linear Graphs Solving Linear Equations Inequalities

Assessment:

Knowledge:	2x 20 mark end of topic assessment
Application of Knowledge:	Termly summative assessment

Supportive Reading:

Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 10 Autumn Term

Topic Sequence: Developing Algebra

3	4
Equations and Inequalities	Simultaneous Equations

Topic Overview:

Students now move on to the solution of simultaneous equations by both algebraic and graphical methods. The method of substitution will be dealt with before elimination, considering the substitution of a known value and then an expression. With elimination, all types of equations will be considered, covering simple addition and subtraction up to complex pairs where both equations need adjustment. Links will be made to graphs and forming the equations will be explored as well as solving them. The Higher strand will include the solution of a pair of simultaneous equations where one is quadratic, again dealing with factorisation only at this stage.

Learning Sequence:

Determine whether a given (x, y) is a solution to a pair of linear simultaneous equations: Students may need practice substituting (including with negative numbers) before attempting this small step. Use of formulae for area and perimeter can be interleaved here. Students then substitute values into equations to work out whether or not they have a possible solution. They understand that there is one possible solution when two equations are given in terms of two variables.

Solve a pair of linear simultaneous equations by substituting a known variable: Before starting, students need to review solving equations. Modelling substitution and solving equations is key. There is opportunity to interleave aspects of measure (e.g. $P = 2l + 2w$). Using bar models to begin with will support algebraic thinking. The students go onto realise that there may be more than one way of finding a solution if presented with two related equations.

Solve a pair of linear simultaneous equations by substituting an expression: This small step introduces the idea of substituting one equation into a second equation and is split into two parts. Double-sided counters could be used so that students can physically make the substitution. Students might then use pictorial representations before attempting the abstract substitution. At this stage, students are not rearranging in order to make the substitution.

Solve a pair of linear simultaneous equations using graphs: Students learn that the intersection point of two straight lines represents the solution to a pair of linear equations, comparing graphical and algebraic methods. It's important that teachers emphasise that it is the value of x and the value of y that give the solution, rather than the coordinate.

Solve a pair of linear simultaneous equations by adding or subtracting equations: By considering the simplification of expressions, students understand how to make zero using addition or subtraction. They build on this to solve simultaneous equations involving negative or non-integer solutions. They progress to consider which equation is more efficient when substituting to find the second solution. It's also important to consider equations where it might be easier to rearrange before adding.

Use a given equation to derive related fact: (R) This small step ensures that student understand that equivalent equations have the same solutions

Solve a pair of linear simultaneous equations by adjusting one or both equation: Bar models are a good way of demonstrating why equal coefficients of one of the variables is necessary when we are solving by elimination. Teachers will also discuss whether to make the coefficients of x the same, y the same, and whether it matters. When both equations need adjusting, students will realise that it doesn't matter which variable they focus on when making coefficients the same, but should consider which variable is easier (for example, avoiding negatives)..

Form a pair of linear simultaneous equations from given information: Students will help them to formulate the algebraic equations. Students often get confused about forming equations involving 'more than' or 'doubling', placing the addition/multiplication on the wrong side of the equation. This will need exploring by testing values. Students must give final answers in the context of the question

Determine whether a co-ordinate is a solution to both a linear and quadratic equation (H): Students will need to recognise linear and quadratic equations and its important to make the link between coordinates that are on both curve and line and the solution to the simultaneous equations

Solve a pair of simultaneous equations (one linear, one quadratic) using graphs: (H) Students make the link the at the solution is represented by the intersection point.

Solve a pair of simultaneous equations (one linear, one quadratic) algebraically(H): Students need to recap factorising and solving quadratics and consider simultaneous equations where both are in the form y = . Students also consider expanding perfect squares and are encouraged to think whether it is easier to rearrange a linear equation first, or whether they can make a direct substitution.

Solve a pair of simultaneous equations with a third unknown (H):

Sequence of Learning:

1	Determine whether a given (x, y) is a solution to a pair of linear sim. eqs
2	Solve a pair of linear sim. equations by substituting a known variable
3	Solve a pair of linear sim. equations by substituting an expression
4	Solve a pair of linear simultaneous equations using graphs
5	Solve a pair of linear sim. equations by adding or subtracting equations
6	Use a given equation to derive related facts (R)
7	Solve a pair of linear sim. equations by adjusting one or both equations
8	Form a pair of linear simultaneous equations from given information
9	Is a co-ordinate a solution to both a linear and a quadratic equation
10	Solve a pair of simultaneous equations using graphs
12	Solve a pair of simultaneous equations algebraically
13	Solve with a third unknown

Topic Resources:

Knowledge Maps:	Solving Linear Equations Linear Graphs Multiples, Primes, Factors Notation and manipulation Simultaneous equations

Assessment:

Knowledge:	2x 20 mark end of topic assessment
Application of Knowledge:	Termly summative assessment

Supportive Reading:

Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 10 Spring Term

Topic Sequence: Geometry

5	6	7
Angles and Bearings	**Working with Circles**	**Vectors**

Topic Overview: Angles and Bearings

This topic briefly recaps bearings from year 9, accurate drawing and use of scale as in the use of parallel line agnel rules, and reinforcing these rules with trigonometry and Pythagoras from earlier this year.

Learning Sequence:

Use cardinal directions and related angles (R):
In this small step, student revisit their work on angles to prepare them for learning about bearings. They should be comfortable with both measuring and drawing angles and identify angles using the three letter notation

Draw/interpret scale diagrams (R):
This review step reminds students of work on scale, constructions and ratio

Understand and represent bearings *(R):*
Students learn that bearings are always measured clockwise from North and always given as 3 figures.

Measure and read bearings: *(R)*:
Students explore and discover the relationships between angles and the relative positions of points

Scale drawings using bearing (*R)*:
Students move on to more complex problems requiring them to draw scale diagrams

Bearings with angle rules and right angled geometry:
Students apply bearings to angle facts and also trigonometry and Pythagoras

Bearings with the sine and cosine rule (H):
This step revisits and extends prior learning, using the sine and cosine rules. Students consider sketching diagrams to identify lengths and angles needed.

Sequence of Learning:	
1	Use cardinal directions and related angles (R):
2	Draw/interpret scale diagrams (R):
3	Understand and represent bearings *(R):*
4	Measure and read bearings: *(R)*:
5	Scale drawings using bearing (*R)*:
6	Bearings with angle rules and right angled geometry:
7	Bearings with the sine and cosine rule (H):

Topic Resources:	
Knowledge Map:	Bearings Right Angled Trigonometry Angle Facts

Assessment:	
Knowledge:	End of Topic Test
Application of Knowledge:	Termly Summative Assessments

Supportive Reading:	
Any supported reading listed here	Sparx maths: www.sparxmaths.co.uk
	Corbett Maths: www.corbettmaths.com
	AQA Revision guide

Scheme of Learning: Year 10 Spring Term

Topic Sequence: Geometry

5	6	7
Angles and Bearings	Working with Circles	Vectors

Topic Overview: Angles and Bearings

This block introduces new content whilst making use of and extending prior learning. The formulae for arc length and sector area are built up from students' understanding of fractions. They are also introduced to the formulae for surface area and volume of spheres and cones, here higher students can enhance their knowledge and skills of working with are and volume ratio. Higher tier students are introduced to four of the circle theorms, the remaining theorems will be introduced in year 11.

Learning Sequence:

Recognise and label parts of a circle(R):
In this small step, students revisit vocabulary associated with circles

Calculate fractional parts of a circle:
This step reinforces basic fraction work and links to major and minor sectors of the circle

Calculate the length of an arc:
Building from the previous step and also revisiting the formula of the circumference of a circle, students realise that the length of an arc is the same fraction of the circumference as the fraction of a full turn given by the related angle

Calculate the area of a sector:
As with the previous step, students establish the proportion of a full turn taken up by the sector as identical to its proportion of the area of the circle

Circle theorems: Angles at the centre and circumference, Angles in a semicircle, Angles in the same segment, Angles in a cyclic quadrilateral: (H)
The first four circle theorems are investigated. The first circle theorem is the basis of many others. Students need to prove the circle theorems

Understand and use the volume of a cylinder and cone:
Students revisit the formula for the volume of a prism and explore similarities and differences between these two shapes

Understand and use the volume and surface area of a sphere:
Students also consider parts of shapes such as hemispheres in this section

Understand and use the surface area of a cylinder and cone:
Students deduce the surface area of a cylinder by considering its net, whilst the formula for the curved surface area will be given. Pythagoras' theorem may be needed to calculate the slant height or perpendicular height.

Solve area and volume problems involving similar shapes (H):

Sequence of Learning:	
1	Recognise and label parts of a circle(R):
2	Calculate fractional parts of a circle:
3	Calculate the length of an arc:
4	Calculate the area of a sector:
5	Circle theorems: Angles at the centre and circumference, Angles in a semicircle, Angles in the same segment, Angles in a cyclic quadrilateral: (H)
6	Understand and use the volume of a cylinder and cone:
7	Understand and use the volume and surface area of a sphere:
8	Understand and use the surface area of a cylinder and cone:
9	Solve area and volume problems involving similar shapes (H):

Topic Resources:	
Knowledge Map:	Circle facts Circle Theorems 3D shapes 2D shapes Scale factor

Assessment:	
Knowledge:	End of Topic Test
Application of Knowledge:	Termly Summative Assessments

Supportive Reading:	
Any supported reading listed here	Sparx maths: www.sparxmaths.co.uk
	Corbett Maths: www.corbettmaths.com
	AQA Revision guide

Scheme of Learning: Year 10 Spring Term

Topic Sequence: Geometry

5	6	7
Angles and Bearings	**Working with Circles**	**Vectors**

Topic Overview: Vectors

Students will have met vectors to describe transformations during KS3. This will be revisited and used as the basis for looking more formally at vectors, discovering the meaning of **–a** compared to **a** to make sense of operations such as addition, subtraction and multiplication of vectors. This will connect to exploring journeys withing shapes using vector notation. Higher tier students will then use this understanding as the basis for developing geometric proof, making links to their knowledge of properties of shape and parallel lines.

Learning Sequence:

Understand and represent vectors
A vector shows both magnitude and direction and students also recognise the role of the arrow to show direction of the vector, considering the start and end points for magnitude. Students can compare vectors of the same magnitude but different directions. Students are familiar with two representations of vectors: column vector and line segment with an arrow and are introduced to the formal notation for labelling vectors and **a** and a. Students develop a deeper understanding of a vector representing movement from one point to another and start comparing different representations.

Vectors multiplied by a scalar
Students explore vectors that are parallel to each other, understanding that when vectors are parallel, one is the multiple of the other and the multiplier is called a scalar. Students identify negative multipliers where vectors are parallel but in opposite directions.

Addition and subtraction of vectors:
Students become confident in identifying and drawing representations of vector addition and subtraction and looking at resultant vectors.

Vector journeys in shapes (H):
Students move around shapes from one vertex to the next using the notation etc. They explore quadrilaterals through parallel and non-parallel vectors, making generalisations about different vectors. Students appreciate that a vector is only parallel to another if one is a multiple of the other, realising that the multiplier can be negative or fractional.

Explore colinear points using vectors (H):
In this small point, students consider 'collinear' and its meaning. Students need to give the complete reason – that lines are parallel and that they share a point top be on the same line

Use vectors to construct geometric arguments and proofs
Students use key command words, 'show, justify, prove'. Students find vectors for parts of line segments, given the vector for a whole line segment, applying knowledge of ratio and fractions where necessary

Sequence of Learning:	
1	Understand and represent vectors
2	Vectors multiplied by a scalar
3	Addition and subtraction of vectors: :
4	Vector journeys in shapes (H):
5	Explore colinear points using vectors (H):
6	Use vectors to construct geometric arguments and proofs

Topic Resources:

Knowledge Map:	Vectors Transformations

Assessment:

Knowledge:	End of Topic Test
Application of Knowledge:	Termly Summative Assessments

Supportive Reading:

Any supported reading listed here	Sparx maths: www.sparxmaths.co.uk
	Corbett Maths: www.corbettmaths.com
	AQA Revision guide

Scheme of Learning: Year 10 Spring Term

Topic Sequence: Proportions and proportional change

8	9	10	11
Ratio and fractions	**Percentages and Interest**	**Probability**	**Rates**

Topic Overview: Percentages

This block builds on KS3 work on ratio and fractions, highlighting similarities and differences and links to other areas of maths including both algebra and geometry. The focus is on reasoning and understanding notation to support the solution of increasingly complex problems that include information presented in a variety of forms

Learning Sequence:

Compare quantities using a ratio(R): Students review expressing information in a ratio and consider why when units are not the same, it is important to use equivalent units.

Link ratio and fractions(R): When looking at a ratio, it is important for students to look at both the relationships between the parts and the relationships to the whole

Share in a ratio(R): Students should be familiar with this step from KS3 and this is a recap step

Link ratio and graphs (R): This step reviews the idea of direct proportion met at KS3, and how this links to graphical representation. Students revisit the notion of gradient and see how this links to the ratio of the pair of values y/x. Values not in direct proportion do not produce a constant ratio

Currency conversion: This small step gives students the opportunity to revisit reading information from graphs and also gives them the opportunity to reinforce their understanding and use of multiplicative reasoning.

Ratio in the form 1:n and n:1: Students consider writing ratio in unit form and how this helps to compare ratio

Solving 'best buy' problems: Students compare prices to find best value, using different methods to compare and considering efficiency of these methods in different scenarios

Combine a set of ratio: In order to compare ratio, students need to be secure in finding the lowest common multiple and in working with equivalent ratio.

Link ratio to algebra: This step explores both the use of algebraic notation within ratio ad the linking of ratio questions to problems that need to be tacked through forming and solving equation. If the ratio a:b and c:d are equal then the key concept that $\frac{a}{b} = \frac{c}{d}$ is often useful to solve complex looking problems

Ratio in area and volume problems (H): Students have explored the effect of enlargement on the areas and volumes of similar shapes earlier this year, looking at squaring and cubing scale factors. This is an opportunity to revisit this learning using ratio notation alongside that of scale factors. It can also be an opportunity to revisit area problems and those involving Pythagoras' theorem and trigonometry.

Sequence of Learning:	
1	Compare quantities using a ratio(R):
2	Link ratio and fractions(R):
3	Share in a ratio(R):
4	Link ratio and graphs (R):
5	Currency conversion:
6	Ratio in the form 1:n and n:1:
7	Solving 'best buy' problems
8	Combine a set of ratio
9	Link ratio to algebra
10	Ratio in area and volume problems (H):

Topic Resources:	
Knowledge Maps:	Ratio Scale

Assessment:	
Knowledge:	End of topic assessment
Application of Knowledge:	Termly summative assessment

Supportive Reading:	
Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 10 Spring Term

Topic Sequence: Proportions and proportional change

8	9	10	11
Ratio and fractions	Percentages and Interest	Probability	Rates

Topic Overview: Percentages

Although percentages are not specifically mentioned in the KS4 national curriculum, they feature heavily in GCSE papers and this block builds on the understanding gained in KS3. Calculator methods are encouraged throughout and are essential for repeated percentage change/growth and decay problems. Use of financial contexts is central to this block, helping students to maintain familiarity with the vocabulary they are unlikely to use outside school.

Learning Sequence:

Work out percentages of amounts (with and without a calculator) (R): Students need to be familiar with the use of calculator as well as mental and written methods. It is also worth looking at multiple methods for a series of calculations to help students decide which methods are most appropriate in a situation. Finding percentages greater than 100% is a useful lead in to reviewing percentage increase in the next step.

Increase and decrease by a given percentage (R): This step will be done with and without a calculator. Some students get confused when reducing by a given percentage and use the wrong multiplier; the use of estimation is a good strategy here. Confidence with using multipliers is essential for the following steps so it is worth exploring changes of e.g. 3% or 2.7% to avoid over-reliance on mental "build-up" methods.

Express one number as a percentage of another (R): Students will learn how to express a quantity as a percentage of another. Students are sometimes challenged when asked to express something as a percentage, rather than the more regular finding of a percentage. Encouraging students to express as a fraction first and then considering how to convert is also useful

Calculate simple and compound interest: A useful strategy for helping students to distinguish and remember the difference between simple and compound interest is to compare them alongside each other rather than just looking at them independently. The strategy for compound interest is identical to that of all repeated percentage changes and so will be revisited in many of the upcoming steps.

Repeated percentage change: This builds on the previous step, generalising the method for compound interest to any repeated percentage change situation, including repeated reduction. Students may not be aware of the term "depreciation". It is worth considering cases of e.g. an increase of x% followed by a decrease of x% and showing that this does not return to the original value. This is also a good preparation for the next step.

Find the original value after a percentage change (R): Although this will have been covered in KS3, it is worth revisiting as students often make errors such as taking the required percentage off the final value. It is worth looking at multiple methods such as finding 10% or 1% from the given value or using equations of the form "Original × Multiplier = Final Value"

Solve problems involving growth and decay: This step builds on repeated percentage change, again looking at a variety of contexts. There are no new techniques, but students may need to be directed to the links with compound interest and depreciation using the vocabulary of "growth" and "decay". Higher tier students could also consider "working backwards", finding the original value after repeated percentage changes, combining the last two steps

Iterative processes (H): Iterative methods for solving equations are covered in year 11 but here pupils are introduced to the notation in the context of repeated change, and also links to the vocabulary of sequences.

Problems with FDP and ratio: This step provides a link with the previous block of learning

Profit and loss and Percentage Profit: Students to apply skills of percentage changes, choosing the correct numbers to take as 100% or as a whole, including simple problems and applying it to the real life context of profit and loss.

Profit and loss (problem solving): This is another opportunity for students to practise interpretation of questions so that they can choose the correct method. They should look at a variety of situations including the 'reverse' percentage questions just studied mixed with percentage increase, decrease, finding a percentage and expressing as a percentage

Sequence of Learning:	
1	Work out percentages of amounts (with and without a calculator)
2	Increase and decrease by a given percentage
3	Express one number as a percentage of another
4	Calculate simple and compound interest
5	Repeated percentage change
6	Find the original value after a percentage change
7	Iterative processes
8	Solve problems involving growth and decay
9	Problems with FDP and ratio
10	Profit and loss and Percentage profit
11	Profit and loss (problem solving)

Topic Resources:	
Knowledge Maps:	FDP Conversions Percentages

Assessment:	
Knowledge:	End of topic assessment
Application of Knowledge:	Termly summative assessment

Supportive Reading:	
Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 10 Spring Term

Topic Sequence: Proportions and Proportional change

8	9	10	11
Ratio and Fractions	Percentages and Interest	Probability	Rates

Topic Overview: Probability

This topic builds on KS3 and provides a good context in which to revisit fraction arithmetic and conversion between fractions, decimals and percentages. Tables and Venn diagrams are revisited and understanding and use of tree diagrams is developed. Conditional probability is a key focus for Higher tier students

Learning Sequence:

Know how to add, subtract and multiply fractions (R):
Students need a conceptual understanding of adding, subtracting and multiplying fractions before exploring probability and this is revisited in this small step

Find probabilities using equally likely outcomes: (R)
This step supports students to become conceptually fluent in using equally likely outcomes to find probabilities.

Use the property that probabilities sum to 1: (R)
Students use the fact that probabilities sum to 1 to calculate missing probabilities. This step also looks at set notation for probabilities

Using experimental data to estimate probabilities:
Students consider why experimental and theoretical probabilities are different. They learn that the more trials completed, the closer experimental probability is likely to be theoretical probability. They consider how they can use relative frequency to predict future events by calculating expected values.

Find probabilities from tables, Venn diagrams and frequency trees:
Student create and use Venn diagrams and frequency tree diagrams to find probabilites

Construct and interpret sample spaces for more than one event: (R)
Students construct sample spaces from different sources to be able to consider whether a list, or grid is most efficient. Students consider using systematic approaches

Calculate probability with independent events
Students consider that with independent events, the outcome of one event has no bearing on the outcome of the other, and relate this to sample space diagrams. They also use the rule P(A and B) = P(A) x P(B) for independent events

Construct and interpret conditional probabilities (Tree diagrams) (H)
Students are introduced to using tree diagrams to be able to find probabilities. Students should also practice expressing probabilities algebraically and manipulating these

Construct and interpret conditional probabilities (Venn diagrams and two way tables) (H)
The key concept is understanding the at the term 'given' means that only one set of outcomes are relevant when selecting the event. Conditional probability applies to both dependent and independent events

Sequence of Learning:

1	Know how to add, subtract and multiply fractions
2	Find probabilities using equally likely outcomes
3	All probabilities sum to 1
4	Using experimental data to estimate probabilities
5	Find probabilities from tables, venn diagrams and frequency trees
6	Construct and interpret sample space diagrams
7	Calculate probability with independent events
8	Construct and interpret conditional probabilities (tree diagrams)
9	Construct and interpret conditional probabilities (Venns and two way tables

Topic Resources:

Knowledge Maps:	Fractions Basic Probability Further Probability

Assessment:

Knowledge:	2x 20 mark end of topic assessment
Application of Knowledge:	Termly summative assessment

Supportive Reading:

Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 10 Spring Term

Topic Sequence: Proportions and proportional change

8	9	10	11
Ratio and Fractions	Percentages and Interest	Probability	*Rates*

Topic Overview: Rates

Students recap previous work on rates including metric and imperial conversions and converting currency and develop their knowledge of inverse relationships to explore speed, distance and time in detail. They will also look at graphs and the link between speed/distance/time formular and density/mass/volume. Students go on to explore other compound units including exploring flow problems such as how long it will take to fill/empty tanks of different shapes at different rates.

Learning Sequence:

Solve speed, distance and time problems without a calculator: Students will work on speed, distance and time problems that can be solved without a calculator. Key points such as 60mp/h means 60 miles travelled in 1 hour, and that 1 hour 15minutes is 1.25 hours will be covered to help reduce mistakes and errors.

Solve speed, distance and time problems with a calculator: Building upon the previous step, a formal method of converting time with a calculator will be learnt. Students will also need to be able to confidently be able to rearrange an equation with the structure $a = \frac{b}{x}$ *to find the unknown. Using this knowledge students will solve more complex speed, distance and time questions.*

Use distance-time graphs: Students will begin by learning what the different line segments on a distance/time graph represent. They can also link they knowledge of gradients to determine where different line segments represent the same speed. Students will then also learn how to draw accurate distance/time graphs.

Solve problems with density, mass and volume and other compound measures: Students will look at problems involving density, mass and volume. Linking back to speed units (such as miles 'per' hour) will help students understand the units used in this section, such as g/cm^3 *(grams 'per' cubic centimetre). Students will also practice substitution into a formula. Students also consider other compound measures for example, pressure, fuel consumption and population density*

Solve flow problems and their graphs: Students will start by comparing different shaped and sized containers and considering what the difference to the rate that they will fill or drain will be. They will identify which containers will fill at a constant rate (that will be represented by a straight line graph) compared to those that will fill at a varying rate (represented by a curve). Students will then look at solving flow problems, thinking about units as in the previous steps.

Rates of change and their units: This step gives students time to explore the units involved in rates of change questions. Interpreting the gradient of a graph in a given context is important in supporting students to connect the rate of change to gradient.

Convert compound units: Students will begin by looking at the units in a given question and determining which units must be converted to solve the problem to plan their solution. Students will then work through questions on a step by step basis, changing units such as metres per second to metres per minute, metres by hour then km per hour.

Income and rates of pay: Students to be introduced to the key concepts of: Gross pay (the full amount paid to an employee before any deductions are made), deductions (income tax, national insurance and sometimes pension contributions) and Net pay (what's left after deductions have been made from gross pay. This is the amount an employee actually receives.)

Financial statements: Financial maths is needed for all jobs, from calculating wages to working out profit, loss and VAT. Knowledge of financial maths is also required to be able to understand bank statements and savings. Students will apply mathematics and percentages to a real life context. This is an opportunity for students to see examples of household bills, financial lenders and the application of interest.

Sequence of Learning:

1	Solve speed, distance and time problems without a calculator
2	Solve speed, distance and time problems with a calculator
3	Use distance-time graphs
4	Solve problems with density, mass and volume and other compound measures
5	Solve flow problems and their graphs
6	Rates of change and their units
7	Convert compound units
8	Income and rates of pay
9	Financial Statements

Topic Resources:

Knowledge Maps:	Compound and non-compound measures Ratio and Scale

Assessment

Knowledge:	End of Topic Test – 8 questions, 20 marks
Application of Knowledge:	Termly Summative Assessments

Supportive Reading:

	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 10 Summer Term

Topic Sequence: Statistics

12

Collecting, representing and interpreting data

Topic Overview: Collecting, representing and interpreting data

This topic builds on KS3 work on the collection, representation and use of statistics to describe data. Much of the content is used in other subjects such as Geography and Science and in everyday life. The steps balance consolidation of existing knowledge with extending and deepening, particularly in terms of interpretation of results and evaluating and criticising statistical methods and diagrams. Topics covered include describing, interpreting and comparing discrete, continuous and grouped data, constructing and interpreting appropriate tables and charts, describing, interpreting and comparing distributions and using appropriate measures of average and spread

Learning Sequence:

Understand populations and samples: Students should be aware that the 'population' is the whole group being studied and discuss the merits of random sampling
Construct a stratified sample: (H) Students consider proportional reasoning finding the faction each group/stratum is of the whole population and assign the same fraction to each group
Primary and Secondary data: Building on from sampling, students discuss the merits of using primary and secondary data sources
Construct and interpret frequency tables and frequency polygons: Students are familiar with frequency tables for grouped data from KS3 and can also link to the idea of the midpoint being used to find the estimate of the mean
Construct and interpret two-way tables (R): This revision step is an opportunity to revisit both extracting and completing information as well as designing tables
Construct and interpret line, bar and pie charts: Students have constructed these charts previously and this is a revision step. Students explore multiple and composite bar charts as extension, focusing on interpretation. With pie charts, again focus is on interpretation, considering proportions and percentages
Construct and interpret pie charts (R): Students need to be able to construct and interpret pie charts. Also to consider the pros and cons of using a pie chart over a bar chart
Criticise charts and graphs:
Construct and interpret histograms (H): This step explores why grouped frequency diagrams are not appropriate for unequal class intervals as using height to represent frequency can be misleading. Frequency in histograms is proportional to the area of the bar. Students also deduce frequencies from a given histogram
Recap and extend averages (R): Student revise and recap knowledge of the mean, mode and median averages and the appropriate use of each, considering averages from a table and grouped frequencies
Time series graphs (R): Again, emphasis on this revision point is placed on interpretation of graphs
Construct and interpret stem and leaf diagrams As with most of the diagrams in the block, interpretation is just as important as construction. Students compare stem and leaf diagrams to horizontal bar charts where all the data is visible, and revisit averages and the range
Construct and interpret cumulative frequency diagrams and use to find measures (H): Students must consider the 'upper limit' when plotting these curves. Building on this, students find the mean, median and related measures such as the interquartile range from cumulative frequency diagrams
Box plots (H): Students consider box plots in relation to cumulative frequency diagrams and how they facilitate comparison of two or more data sets
Comparing distributions: Students need to consider both averages and measure of spread when comparing distribution, using the interquartile range and the range in the higher tier to make comparisons
Scatter graphs (R): Students revise scatter graphs and plotting lines of best fit, and then consider extrapolating information outside the data range.

Sequence of Learning:	
1	Understand populations and samples
2	Construct a stratified sample (H)
3	Primary and secondary data
4	Construct and interpret frequency tables and frequency polygons
5	Construct and interpret two-way tables (R)
5	Construct and interpret line bar and pie charts (R)
6	Histograms (H)
7	Recap and extend averages (R)
8	Time series graphs (R)
9	Construct and interpret stem and leaf diagrams
10	Cumulative frequency diagrams (H)
11	Box plots (H)
12	Compare distributions
13	Scatter graphs (R)

Topic Resources:	
Knowledge Maps:	Statistics – ungrouped data Statistics – grouped data

Assessment:	
Knowledge:	2x 20 mark end of topic assessment
Application of Knowledge:	Termly summative assessment

Supportive Reading:	
Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 10 Summer Term

Topic Sequence: Number

13	14
Non-calculator methods	**Indices and Roots**

Topic Overview: Non-calculator methods

This section revises and extends KS3 content for calculation. Mental methods and using number sense are used alongside the formal methods for all founr operations with integers, decimals and fractions. Limits of accuracy are explored and compared with rounding and Higher tierstudents will look at all aspects of irrational numbers including surds. Students look at all aspects of irrational numbers, including surds and learn to calculate with them, simplify expressions with surds and rationalise denominators

Learning Sequence:

Mental/written methods for the four operations (R): This step looks over mental and written methods for addition, subtraction, multiplication and division including using decimals and fractions

Exact answers: This section prepares higher tier students for the upcoming topic of surds as well as reminding all students of the language of 'in terms of ∏'

Rational / Irrational numbers: (H) Students have previously met some irrational numbers such as π and √2 and this step formalises this learning and the associated language. Students revisit recurring decimals seeing they are not irrational and how to convert to fractions

Understand and use surds. (H) The first two steps look at the definition of a surd as the irrational root of a rational number, and writing surds in simplified form.

Calculate with surds (H): Having established the behaviour of surds when multiplied and divided in the previous step, pupils now investigate addition and subtraction, establishing the rules and using calculators in both exact and decimal forms

Manipulate with surds (H): Pupils use expand and factorise brackets containing surds to simplify expressions

Rationalising the denominator (H): Pupils learn how to rationalise the denominator of a fraction containing both just a surd, and a surd with an integer.

Rounding (R): Revision topic to remind of the difference between decimal places and significant figures

Estimating (R): Students need to round to 1 significant figure before calculating. Also knowledge of square and cube numbers to estimate roots.

Limits of accuracy: Students have met error intervals at KS3 and this step extends this

Upper and Lower bounds (H): This builds on the previous step to include calculations and applied questions

Use number sense: Building on the strategies used for the four operations in the earlier review steps, this step focuses on deriving facts from known facts

Sequence of Learning:	
1	Mental/written methods for the four operations (R)
2	Exact answers:
3	Rational / Irrational numbers
4	Understand and use surds
5	Calculate with surds
6	Manipulate with surds
7	Rationalising the denominator
8	Rounding (R)
9	Estimating (R)
10	Limits of Accuracy
11	Upper and Lower Bounds (H)
12	Use number sense

Topic Resources:	
Knowledge Maps:	Index Numbers Surds Rounding

Assessment:	
Knowledge:	End of topic assessment
Application of Knowledge:	Termly summative assessment

Supportive Reading:	
Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 10 Summer Term

Topic Sequence: Number

13	14
Non-calculator methods	Index Numbers and Standard Form

Topic Overview: Index numbers *and Standard Form*

Students recap their knowledge of indices, the rules for manipulating and simplifying them, including exploring negative and fractional indices. Students then use this knowledge to further study Standard Form. Students have already been introduced to standard form in Year 7. The use of context is important to help students make sense of the need for the notation and its uses.

Learning Sequence:

Square and cube numbers (R): Revisiting square and cube numbers and linking to area and volume. Application also to Pythagoras' theorem

Calculate higher powers and roots: The key point of this step is to ensure students are familiar with the notation of index numbers. The higher tier requires students to estimate higher powers and roots.

The addition and subtraction rules for indices (R): It is helpful to look at questions with both numerical and algebraic bases, and also to include questions that involve both the addition and subtraction of indices. Negative results could be included here if appropriate, but these are covered in detail in the next step. It is always worth reminding students that a and a^1 are equivalent.

Understand and use the power zero and negative indices: The common misconception that a number raised to the power zero gives the result zero needs to be addressed and revisited often. Similarly, students often confuse negative indices with negative numbers, so deriving the rules to provide meaning is a helpful strategy, as is comparing with earlier experience of standard form. It is useful to link to the previous step, using $a^m \div a^n = a^{m-n}$ where $m - n \leq 0$

The multiplying rule for indices: Students investigate the indices as 'powers of powers' and using this law in conjunction with the other laws

Understand and use fractional indices (H): As well as covering the meaning of indices that are unit fractions, this step extends understanding to look at non-unit fractions though 'reversing' the powers of powers law. Familiarity with square, cube and higher roots is vital here

Learn how to convert in and out of standard form: Students will now write large numbers in standard form. Students should be exposed to correct examples in the form $A \times 10n$ where A is a number between 1 and 10 and n is an integer. It is important to look at how standard form works rather than just counting zeros. Once negative powers are understood, students can explore the patterns and connections between decimal numbers and standard form.

Learn how to multiply numbers that are in standard form: Students will explore the use of commutativity to multiply numbers given in standard form. Their earlier work on indices and dealing with answers like 30×10^7 should have prepared them for this step.

Learn how to divide numbers that are in standard form: Students to learn from the last step and apply the inverse for dividing in standard form. Students must be able to address misconceptions to do with how to write a final answer and also apply knowledge of equivalent fractions to problems

Learn how to add and subtract numbers that are in standard form: Students will compare strategies for addition and subtraction without a calculator. There is a risk of just adding the numbers and adding the powers separately and students may prefer to always convert to ordinary numbers. Even when the powers of 10 are the same, there can be problems such as $3 \times 10^4 + 8 \times 104 = 11 \times 10^4$ where the answer needs changing as covered last step.

Apply standard form to problem solving: Students will order numbers given in words, standard form and ordinary form. Strategies for comparing numbers, such as considering the exponent of 10 as an initial check should be discussed. Next, students shall apply what they have learnt in this topic to exam style questions.

Sequence of Learning:	
1	Square and cube numbers
2	Calculate higher powers and roots
3	Addition and Subtraction rules for indices (R)
4	Power zero and negative indices
5	The multiplying rule for indices
6	Understand and use fractional indices
7	*Learn how to convert in and out of standard form*
8	*Learn how to multiply numbers that are in standard form*
9	*Learn how to divide numbers that are in standard form*
10	*Learn how to add and subtract numbers that are in standard form*
11	*Apply standard form to problem solving.*

Topic Resources:	
Knowledge Maps:	Index Numbers *Standard Form*

Assessment:	
Knowledge:	2x 20 mark end of topic assessment
Application of Knowledge:	Termly summative assessment

Supportive Reading:	
Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 10 Summer Term

Topic Sequence: Algebra

15

Manipulating Expressions

Topic Overview:

This section builds on the Autumn term learning of equations and inequalities, providing revision and reinforcement for Foundation tier students and an introduction to algebraic fractions for those following the Higher tier. Algebraic argument and proof are considered, starting with identities and moving on to consider generalised number

Learning Sequence:

Simplify expressions: Students should be secure in simplifying expressions using addition, subtraction, multiplication and division. As well as revising like and unlike simple terms.

Use identities: This step ensures students understand the difference between equality and equivalence. Students consider that in an identity, the coefficients of each variable can be compared to finding missing values. Students need to be confident with expanding single brackets

Add and subtract algebraic fractions: (H) Students recap their knowledge of adding and subtracting fractions and apply to algebraic fractions, exploring fractions with numerators and denominators involving more than a single term, being confident with single bracket expansion and dealing with negative numbers

Multiply and divide algebraic fractions: (H)
Students consider simplifying fractions by cancelling in this step and apply knowledge of multiplying and dividing fractions algebraically

Form and solve equations and inequalities with fractions:
Students build on previous work solving equations and inequalities and extend it using fractions and equations with fractions with algebraic denominators

Solve equations with algebraic fractions: (H)
This step explores equations and inequalities that reduce to linear form. Only quadratics that can factorise are covered

Represent numbers algebraically:
Students extend previous knowledge on representing numbers in general form and here understanding of even numbers (eg 2n) and odd numbers (eg 2n + 1) written algebraically is explored

Algebraic arguments and proof: The idea of prove is introduced through simple developing of arguments and /or the use of counterexamples. More formal proof is dealt with in Year 11.

Expand binomials: Here we revisit the meaning of binomial and quadratic, whilst discussing how to expand binomials. Students will need to be confident with simplification and dealing with negative numbers.

Factorise quadratic expressions: Here students need to link finding factors with factorization. Students should understand that a quadratic expression has a maximum of two binomial factors. Students consider how the factors of constant terms relate to the coefficient of the x term. Finally, students should factorise quadratics with negative x terms or a negative constant.

Sequence of Learning:	
1	Simplify expressions
2	Use Identities
3	Add and subtract algebraic fractions (H)
4	Multiply and divide algebraic fractions (H)
5	Form and solve equations and inequalities with fractions
6	Solve equations with algebraic fractions (H)
7	Represent numbers algebraically
8	Algebraic arguments and proof
9	*Expand binomials*
10	*Factorise quadratic expressions*

Topic Resources:	
Knowledge Maps:	Notation and manipulation Solving linear equations Solving quadratic equations Multiples, primes and factors Fractions

Assessment:	
Knowledge:	2x 20 mark end of topic assessment
Application of Knowledge:	Termly summative assessment

Supportive Reading:	
Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide

Scheme of Learning: Year 10 Summer Term

Topic Sequence: Geometry and Measure

16

3D shapes

Topic Overview:

Students will revisit correct vocabulary required to describe different 3D shapes. Students will look at surface area and volume, as well as looking at plans and elevations of 3 dimensional shapes.

Learning Sequence:

Names of 2D and 3D shapes
Students should already be aware of most of the names of shapes, but may need a recap on key vocabulary for describing shapes, such as faces, edges and vertices.

Recognise prisms (including language of edges and vertices)
Students will need to tell the difference between prisms and no prisms, looking for uniform cross-sectional face, which can be defined as a polygon.

Accurate nets of cuboids and other 3D shapes
Students will learn how to draw an accurate net of a 3D shape, which will help build understanding of surface area in the later step.

Sketch and recognise nets of cuboids and other 3D shapes
This step builds upon the last, but allows students to quickly draw a net and label key lengths which further builds on the skills needed to find the surface area of prisms.

Plans and Elevations
Students will use their knowledge of 3D shapes to draw plans and elevations, drawing what can be seen from the front, side and top of a shape.

Find area of 2D shapes (R)
In this step, students will revisit finding the area of 2D shapes which is a vital skill for finding the surface area of 3D shapes.

Surface area of cubes and cuboids
This step builds upon students knowledge of nets and 2D shapes to find the surface area of cubes and cuboids. Students should be able to identify matching sides, and will look at the difference between open and closed shapes.

Surface area of triangular prisms
Similar to the last step, students will use knowledge of sketching nets and 2D shapes to find all the shapes needed to work out the surface area of triangular prisms.

Surface area of cylinder
Students will revisit the difference between finding the area and circumference of a circle as both are needed to find the surface area of a cylinder. Then using the same skills as previous steps will be able to find the surface area of cylinders.

Volume of cubes and cuboids
Students will look at the links between area and volume (how a shape can be broken into unit squares or unit cubes) to help them build a better understanding of volume and the required formula. Students will then find the volume of cubes and cuboids.

Volume of other 3D shapes – prisms and cylinders, cones, pyramids and spheres
Students will learn that the volume of a prism is the product of the area of the prisms cross-section and its length by comparing volumes of right-angled triangular prisms to that of a cuboid. Using the knowledge of cross-sectional area multiplied by length students will work out the volume of various prisms and cylinders. Students are also introduced to more complex formulae using cones, pyramids and spheres

Sequence of Learning:	
1	*Names of 2D and 3D shapes*
2	*Recognise prisms (including language of edges and vertices)*
3	*Accurate nets of cuboids and other 3D shapes*
4	*Sketch and recognise nets of cuboids and other 3D shapes*
5	*Plans and Elevations*
6	*Find area of 2D shapes (R)*
7	*Surface area of cubes and cuboids*
8	*Surface area of triangular prisms*
9	*Surface area of cylinder*
10	*Volume of cubes and cuboids*
11	*Volume of other 3D shapes – prisms and cylinders, cones, pyramids and spheres*

Topic Resources:	
Knowledge Maps:	2D shapes 3D shapes
Assessment	
Knowledge:	End of Topic Test – 8 questions, 20 marks
Application of Knowledge:	Termly Summative Assessments
Supportive Reading:	
	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide