Y10 Mathematics Scheme of Learning

Bigger Picture Topic	Step	Learning Intention	Support
Rationale: This block revises and extends knowledge from KS3 with a focus on building their experience of enlarg more formally at dealing with topics such as similar triangles. Parallel line angle rules are revisited to support the e through considering what information is needed to produce a unique triangle. **Learning Progression:** *topics students have seen that will play a vital role in understanding this block* Y7: Spring block 2 (areas of shapes) Y7: Summer block 1 (geometric notation and parallel and perpendicular lines) Y7: Summer block 2 (angles) Y8: Autumn block 2 (scale factors) Y8: Summer block 1 (angles in parallel lines) Y9: Spring block 4 (chains of reasoning to find angles) Y9: Autumn block 5 (explore congruency) **Key Vocabulary: Enlarge, scale factor, ratio, origin, object, image, reflection, centre of enlargement, simila**			
Careers Link: Construction-Structural geometry is a subject intertwined with building constructions and architectu construct components requires a clear understanding of geometrics and the interaction and similarity between vari of bridges are results of geometrical equations and the relationships between similar shapes. Geometry Integration Engineer- Jaguar Land Rover Viewing and manipulating geometric data to package components into a vehicle			
Block 1 Congruence, similarity & enlargement	Check in 1. Enlarge a shape by a positive integer scale factor	TBAT enlarge a shape by a positive integer scale factor	Useful to highlight the fact that angles d when enlarging shapes. This understan steps, be built on
	2. Enlarge a shape by a fractional scale factor	TBAT enlarge a shape by a fractional scale factor	Pictorial representation is essential to su conceptual understanding Geoboard by The Math Learning Cente
	4. Identify similar shapes	TBAT identify similar shapes	It is helpful for students to understand ra context as this will be useful later when trig

	5. Work out missing sides and angles in a given pair of similar shapes	TBAT work out missing sides and angles in a pair of similar shapes	Students should see similar shapes in a orientations. Careful labelling will assist
	6. Use parallel line rules to work out missing angles	TBAT use parallel line rules to work out missing angles	Useful to distinguish between 'correspo and 'angles that correspond'
	7. Establish a pair of triangles that are similar	TBAT establish if a pair of triangles are similar	Students may need support to work out one triangle corresponds to which in the
	12. Understand the difference between congruence and similarity	TBAT identify the differences between congruence and similarity	Students should bring together the idea and congruence through categorising th
	13. Understand and use conditions for congruent triangles	TBAT use conditions for congruent triangles	Students will have come across the lang ASA etc but will not have used them to congruence of triangles
	Check out Check in next block	TBAT complete check out	
	Feedback lesson	TBAT respond to feedback	

Rationale: This block introduces trigonometry as a special case of similarity within right-angled triangles. Emphasi functions to ratios, rather than just functions. This key topic is introduced early in year 10 to allow for regular revisit

Learning Progression: *topics students have seen that will play a vital role in understanding this block*
Y7: Summer block 1 (geometric notation)
Y8: Summer block 1 (geometric facts)
Y9: Spring block 6 (Pythagoras' theorem)
Y9: Summer block 1 (ratios in right angled triangles)
Y9 Spring block 6 (prove if a triangle is right angled)
Key Vocabulary: Enlarge, scale factor, ratio, adjacent, hypotenuse, opposite, right angle, tangent, cosine,

Careers Link: Trigonometry was first studied in the third century B.C as a way of applying geometry to astronomy. Early astronor angles of right-angled triangles. The trig functions are used in many fields, including electrical and mechanical eng surveying. Even in smaller projects you'll find construction workers such as carpenters, landscapers and roofers re angles and fittings to meet building code requirements efficiently and sufficiently.			
Block 2 Trigonometry	1. Explore ratio in similar right-angled triangles	TBAT explore ratio in similar right-angled triangles	Teachers will need to emphasise the ge been made. It may be appropriate to us adjacent and hypotenuse to discuss the lengths
	2. Work fluently with the hypotenuse, opposite and adjacent sides	TBAT work fluently with the hypotenuse, opposite and adjacent sides	Labelling the hypotenuse first is a usefu Provide opportunities to label sides in di orientated right angled triangles
	3. Use the tangent ratio to find missing side lengths	TBAT use the tangent ratio to find missing side lengths	Teachers should start by modelling how equations of the form $a = \frac{b}{c}$
	4. Use the sine and cosine ratio to find missing side lengths	TBAT use the sine and cosine ratio to find missing side lengths	Teachers should emphasise that choosi use sine or cosine is dependent on whic are involved in the question
	5. Use the sine, cosine and tangent ratio to find missing side lengths	TBAT use the sine, cosine and tangent ratio to find missing side lengths	Students now need opportunities to iden ratio to use, particularly in problems tha structured
	6. Use the sine, cosine and tangent to find missing angles	TBAT use the sine, cosine and tangent to find missing angles	When introducing the inverse, encourag practice using their calculators. Expose different notation such as angle ABC an
	7. Calculate sides in right angled triangles using	TBAT calculate sides in right angled triangles using Pythagoras theorem	Here, the aim is to use unfamiliar contex of understanding

	Pythagoras theorem		
	8. Select the appropriate method to solve right angled triangle problems	TBAT select the appropriate method to solve right angled triangle problems	Scaffolding to support students in makin about when to use trig ratios / Pythagora reduced as they become more confiden
	9. Work with key angles in right angled triangles	TBAT work with key angles in right angled triangles	Students are to focus on finding the exa Modelling how to use this information to angled triangle problems without a calcu
	Check out Check in next block		
	Feedback lesson		

Rationale: Students will have covered both equations and inequalities at key stage 3 and this unit offers the oppor deepen their understanding. As well as solving equations, emphasis needs to be placed on forming equations from opportunity to revisit other topics in the curriculum such as angles on a straight line/in shapes/parallel lines, probab

Learning Progression: *topics students have seen that will play a vital role in understanding this block*
Y7: Spring block 4 (directed number)
Y7: Autumn block 4 (place value & comparing and ordering numbers
Y7: Autumn block 2 (function machines & substitution)
Y7: Autumn block 3 (form and solve one-step equations)
Y7: Spring block 4 (form and solve two-step equations)
Y8: Spring block 1 (expanding brackets & simplifying expressions)
Y8: Spring block 1 (form and solve equations with brackets)
Y8: Autumn block 4 (using coordinates & plotting graphs)
Y9: Summer block 5 (algebraic representation)
Y9: Autumn block 2 (revising and extending Y7 & Y8 coverage)
Y9: Summer block 5 (representing inequalities)

Key Vocabulary: Variables, solve, solution, equation, expression, inverse, inequality, greater than, less tha coordinate, intersect

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Careers Link: Algebra possesses a powerful problem-solving tool used in fields ranging from engineering to busir spreadsheet after spreadsheet of spending reports. Bankers use algebra to calculate interest and taxes. Compute use algebra to solve linear equations to troubleshoot many software and networking issues. Biologists all use the s determining ingredient portions, sizes of forests and atmospheric conditions. Engineering is one of the most well-k include architects, surveyors, and a variety of engineers in fields such as biomedical, chemical, electrical, mechani calculate measurements for both solids and liquids. Hannah Fry- The Power of Algebra | STEM (short two-minute video)			
Block 3 Representing solutions of equations & inequalities	1. Understand the meaning of a solution	TBAT find the meaning of a solution	Students are to consider whether a num or not by substitution.
	2. Form and solve one-step and two-step equations	TBAT form and solve equations	Manipulatives such as cups and counte tiles could be useful to support students to revisit other topics such as angle fact etc.
	3. Form and solve one-step and two-step inequalities	TBAT form and solve inequalities	Beware of students changing the inequa equals sign to 'make it easier' and also integer solution is needed.
	4. Show solutions to inequalities on a number line	TBAT show solutions to inequalities on a number line	Encourage students to read the inequal help them negotiate the meaning of the symbols. Introduce the students to the c this topic such as the meaning of the sh circle
	5. Interpret representation on number lines as inequalities	TBAT interpret representation on number lines as inequalities	Again, the meaning of the shading of th direction of the line and how this relates inequality format needs discussion. It is this notation regularly to aid retention
	7. Draw straight line graphs	TBAT draw straight line graphs	Students should be encouraged to look their table of values if their points do not expected straight line
	8. Find solutions to equations using straight line graphs	TBAT find solutions to equations using graphs	It can be useful to draw attention to the linear equation there will only be one po graphs meet and the x value correspond solution of the equation

	11. Form and solve equations with unknowns on both sides	TBAT form and solve equations with unknowns on both sides	As well as practicing solving, discussion the equations is key
	12. Form and solve inequalities with unknowns on both sides	TBAT form and solve inequalities with unknowns on both sides	Teachers will need to be vigilant for stud or omitting inequality signs
	13. Form and solve more complex equations and inequalities	TBAT form and solve more complex equations and inequalities	The aim is to develop fluency within wid and not purely algebraic settings. Stude exposed to different ways of answering questions, such as multiplying the brack dividing
	Check out Check in next block	TBAT complete check out	
	Feedback lesson	TBAT respond to feedback	

Rationale: This block moves students on to the solution of simultaneous equations by both algebraic and graphica with before elimination, as this builds on students' prior knowledge from KS3. Links will be made to graphs to ensu

Learning Progression: *topics students have seen that will play a vital role in understanding this block*
Y7: Autumn block 2 (function machines, representing functions graphically & substitution)
Y7: Autumn block 3 (solving equations)
Y7: Summer block 4 (algebraic expressions)
Y8: Spring block 1 (expanding brackets, simplifying expressions & solving equations)
Y8: Autumn block 4 (using coordinates and plotting graphs)
Y9: Autumn block 3 (change the subject of a formula)
Y9: Autumn block 2 (form and solve inequalities with unknowns on both sides)
Y9: Summer block 5 (interpreting graphs)

Key Vocabulary: Infinite, equations, finite, variable, solution, substitute, unknown, inverse, rearrange,

Careers Link:
Simultaneous equations are used in a wide range of careers. Systems of linear equations also come up a lot in the particular gene does, you must see how it influences all the chemical processes in our body. There are hundreds o example we produce sugars and proteins. The way these processes work, and how they influence each other, can

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A biologist will use them to get an idea of how a population of animals might change over time. An economist or fi the future profits of a company. An engineer will use them to work out the exact proportions of a building, like a bri materials to use. In short, equations are a fact of life for many people, and to be able to work with them you need t			
Block 4 Simultaneous Equations	1. Understand that equations can have more than one solution	TBAT show that equations can have more than one solution	Students should explore equations that one possible solution. Use different type when finding these solutions, e.g., nega fractions. Building on this, get students what else is needed to reduce to just on leads into the idea of requiring two equa hence into the concept of simultaneous
	2. Determine whether a given (x,y) is a solution to a pair of simultaneous equations	TBAT determine if (x,y) is a solution to a pair of simultaneous equations	Students are to substitute values into eq out whether or not they have a possible
	3. Solve a pair of linear simultaneous equations by substituting a known variable	TBAT solve a pair of linear simultaneous equations by substituting a variable	Use bar models to begin with to support thinking.
	3. Solve a pair of linear simultaneous equations by substituting a known variable	TBAT solve a pair of linear simultaneous equations by substituting a variable	Extra lesson plotted in to ensure studen fluent on this step. Make use of diagnos mini whiteboards to check understandin points
	4. Solve a pair of linear simultaneous equations by substituting an expression	TBAT solve a pair of linear simultaneous equations by substituting an expression	Double sided counters could be used on board so students can visualise the sub stage, students are not rearranging to m substitution

	4. Solve a pair of linear simultaneous equations by substituting an expression	TBAT solve a pair of linear simultaneous equations by substituting an expression	Extra lesson plotted in to ensure studen fluent on this step.
	5. Solve a pair of linear simultaneous equations using graphs	TBAT solve simultaneous equations using graphs	It is important that teachers emphasise value of x and y that give the solution, r coordinate. Teachers could extend this why some pairs of linear equations do n solutions (parallel lines)
	6. Solve a pair of linear simultaneous equations by subtracting equations	TBAT solve a pair of linear simultaneous equations by subtracting equations	Bar models to be used to clearly show t between two equations. Once students subtracting eliminates a variable, they c abstract simultaneous equations. Includ which are zero, negative or non-integer
	7. Solve a pair of linear simultaneous equations by adding equations	TBAT solve a pair of linear simultaneous equations by adding equations	By considering the simplification of expr students need to understand how to ma addition. It is important to consider equa might be easier to rearrange before add
	8. Use a given equation to derive related facts	TBAT use a given equation to derive related facts	It is important to ensure that students ur equivalent equations have the same sol step relates closely to deriving related n working out 4 x 17 from doubling 2 x 17 a good introduction
	9. Solve a pair of linear simultaneous equations by adjusting one equation	TBAT solve a pair of simultaneous equations by adjusting one equation	Bar models are a good way of demonstr coefficients of one of the variables is ne we are solving by elimination. It is useful to pro equation alongside each bar model to s conceptual understanding of the method.
	10. Solve a pair of linear simultaneous	TBAT solve a pair of linear simultaneous equations by adjusting both equations	Students may need guiding in choosing multipliers. Choosing whether to add or again be reinforced

	equations by adjusting both equations		
	10. Solve a pair of linear simultaneous equations by adjusting both equations	TBAT solve a pair of linear simultaneous equations by adjusting both equations	Extra lesson plotted in to ensure studen fluent on this step.
	11. Form a pair of linear simultaneous equations from given information	TBAT form a pair of linear simultaneous equations	Students often get confused about form involving 'more than' or 'doubling', placi multiplication on the wrong side of the e will need exploring by testing values. St give final answers in the context of the c
	12. Form and solve a pair of linear simultaneous equations from given information	TBAT solve and form a pair of linear equations	Students may need to be provided with when first attempting to form and then s equations. This should be gradually rem
	Check out Check in next block	TBAT complete check out	
	Feedback lesson	TBAT respond to feedback	

Rationale: This block provides a great opportunity to revisit other materials and make links across the mathematic of scales and angles in parallel lines, which have been taught at KS3, will be revisited in this block. Students will al Pythagoras from earlier in the year, applying their skills in another context as well as using maths to model real life

Learning Progression: *topics students have seen that will play a vital role in understanding this block*
Y7: Summer block 1 (draw lines, angles and similar shapes)
Y7: Summer block 2 (angle rules)
Y8: Autumn block 2 (work with scale factors)
Y8: Summer block 1 (angles in parallel lines)
Y9: Autumn block 5 (standard ruler and compass constructions)
Y9: Spring block 6 (understand and use Pythagoras' theorem)

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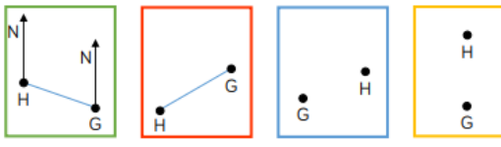
<table>
<tr><td colspan="4">Y9: Autumn block 5 (revisit scale drawings)

Key Vocabulary: Compass, point, angle, turn, three letter notation, enlarge, protractor, convert, similar, three-figu
parallel, co-interior, corresponding</td></tr>
<tr><td colspan="4">Careers Link: Three figure bearings are used to map out directions and distances. They are essential to many pro
traffic control. Bearings can also be used to measure the dimensions of a floor plan, which is shown and discussed
investigates the mathematics used by master masons and the links with classical architecture.

The floor plan of Durham Cathedral using bearings and scale drawings-| STEM (short two-minute video)</td></tr>
<tr><td rowspan="6">Block 5
Angles & Bearings</td><td>1. Use cardinal directions and related angles
2. Draw and interpret scale diagrams</td><td>TBAT use cardinal directions and draw and interpret scale diagrams</td><td>Students will revisit their prior work on a
should be comfortable with both measu
drawing angles using three letter notatio
should also be able to interpret scales a
scale drawings. Use both formats when
different scales 1cm=500m and 1:5000</td></tr>
<tr><td>3. Understand and represent bearings</td><td>TBAT represent bearings</td><td>The wording ‘of A from B’ can often con
and is worth addressing as a class, iden
variety of start and end points.</td></tr>
<tr><td>4. Measure and read bearings</td><td>TBAT measure and read bearings</td><td>Students need plenty of practice with th
exemplar questions below

Draw the points G and H in each of the relative positions shown, including North lines for each point.
 

Measure the bearing of G from H and their bearing of H from G for each of your diagrams. Compare your answers with a partner’s.</td></tr>
<tr><td>5. Make scale drawings using bearings</td><td>TBAT make scale drawings using bearings</td><td>When students are confident with the m
direction of bearings, they can be move
complex problems requiring them to dra
diagrams. It is a good idea to use plain
squared paper, to promote accurate use</td></tr>
<tr><td>6. Calculate bearings using angle rules</td><td>TBAT calculate bearings using angle rules</td><td>Encourage students to read the questio
particular noting where to measure the</td></tr>
</table>

	7. Solve bearings problems using Pythagoras and trigonometry	TBAT solve bearings problems using Pythag and trig	This is a good opportunity to revisit the trigonometry and Pythagoras. Drawing especially revealing in these questions right angles. Students will need scaffold initially, to form diagrams from worded
	Autumn Assessment		
	Autumn Assessment Reflection		
	Check out Check in next block	TBAT complete check out	
	Feedback lesson	TBAT respond to feedback	

Rationale: This block also introduces new content whilst making use of and extending prior learning. The formula students understanding of fractions. They are also introduced to the formulae for surface area and volume of sphe

Learning Progression: *topics students have seen that will play a vital role in understanding this block*
Y7: Spring block 2 (areas of shapes)
Y7: Summer block 1 (geometric notation)
Y8: Autumn block 1 (circumference of a circle)
Y8: Summer block 2 (area of a circle)
Y8: Autumn block 3 (multiply and divide fractions)
Y9: Autumn block 4 (surface area and volume)

Key Vocabulary: Radius, diameter, chord centre, tangent, arc, sector, segment, circumference, area, fraction, pro sphere, area,

Careers Link: Surface area is one of the most practical math concepts used in everyday jobs. Painters use surfac a project. The surface area of an element is an important consideration for chemists because the greater the surfa use surface area to determine the size of dental restorations, such as bridges and dental implants. Dentists follow replacement must be equal to or greater than the surface area of the original tooth.

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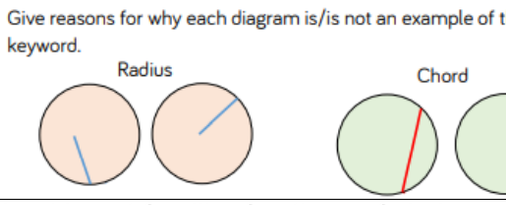
Block 6 Working with Circles	1. Recognise and label parts of a circle	TBAT recognise and label parts of a circle	Showing pupils non examples that are c to the word in question will help to refine definitions and understanding 
	2. Calculate fractional parts of a circle	TBAT calculate fractional parts of a circle	Looking at familiar fractions of circles su and eights is a useful lead in to the com involving working out arc lengths and ar formulae
	3. Calculate the length of an arc	TBAT calculate the length of an arc	Students may need to revisit the formula circumference of a circle. Angles below degrees should be explored and both ex rounded answers should be considered
	4. Calculate the area of a sector	TBAT calculate the area of a sector	Links should be made with the previous establishing that the proportion of a full the sector is identical to its proportion of circle, leading to the formula
	9. Understand and use the volume of a cylinder and cone	TBAT calculate the volume of a cylinder and cone	Good to point out that a cone is a type c circular base. Students do not need to l formulae, but should be fluent in their us
	10. Understand and use the volume of a sphere	TBAT calculate the volume of a sphere	Students need to be careful using this fo the fraction and the cubing can cause p use of a calculator could be modelled ar with non-calc methods
	11. Understand and use the surface area of a sphere	TBAT calculate the surface area of a sphere	This is another given formula and it wou look at this in conjunction with either the previous step so that students experien right choice of formula to use.
	12. Understand and use the surface area of	TBAT calculate the surface area of a cylinder and cone	Pythagoras' theorem may be needed to slant height of perpendicular height. Allo to see the links between the areas by m deconstructing cylinders and cones is h

	a cylinder and cone		
	Check out Check in next block	TBAT complete check out	
	Feedback lesson	TBAT respond to feedback	
Rationale: This block revisits the vectors used to describe translations from KS3. This block looks at vectors more a to make sense of operations such as addition, subtraction and multiplication of vectors. **Learning Progression:** *topics students have seen that will play a vital role in understanding this block* Y7: Spring block 4 (use the four operations with directed number) Y7: Summer block 1 (geometric notation) Y9: Spring block 5 (translate shapes and describe translations) **Key Vocabulary: Column vector, direction, scalar, magnitude, size, column vector, direction, parallel, mult**			
Careers Link: People whose profession involves the movement of things usually depend on vectors to help them sea captains, doctors tracking the progress of an epidemic, meteorologists tracking weather systems and enginee and treating occupations also use vectors in their everyday work as chiropractors when treating patients.			
Block 7 Vectors	1. Understand and represent vectors	TBAT represent vectors	A key learning point is that a vector sho direction and magnitude. It is also impor emphasise the role of the arrow so that idea of starting and end points and henc Comparing vectors with the same magn different directions is very useful
	2. Use and read vector notation	TBAT use and read vector notation	We can now introduce the formal notatio vectors. Students develop a deeper und vector representing movement from one another and can start comparing differe representations
	3. Draw and understand vectors multiplied by a scalar	TBAT draw and understand vectors multiplied by a scalar	Students should understand that when parallel, one is a multiple of the other ar is called a scalar. Students will need su identifying negative multipliers where ve parallel, but in opposite directions.

	4. Draw and understand addition of vectors	TBAT draw and calculate the addition of vectors	A common misconception is thinking tha vector follows on from the direction of th To avoid this, students may need lots of drawing out vector representations of ad be extended to more than two vectors
	5. Draw and understand addition and subtraction of vectors	TBAT draw and calculate the addition and subtraction of vectors	Students should also be exposed to the adding and subtracting vectors. Develop is key here, so activities such as 'true/fa sometimes, never' are useful
	Check out Check in next block	TBAT complete check out	
	Feedback lesson	TBAT respond to feedback	
Rationale: This block builds on KS3 work on ratio and fractions, highlighting similarities and differences and links t and geometry. The focus is on reasoning and understanding notation to support the solution of increasingly compl variety of forms. **Learning Progression:** *topics students have seen that will play a vital role in understanding this block* Y7: Autumn block 5 (interchanging between fractions and decimals) Y7: Summer block 3 (use multiplicative relationships between known facts) Y8: Autumn block 2 (currency conversions) Y8: Autumn block 1 (divide in a ratio) Y8: Spring block 4 (express one number as a fraction of another) Y9: Autumn block 5 (scale drawings) Y9: Summer block 2 (conversion graphs) **Key Vocabulary: Ratio, unit, equivalent, convert, simplest form, share, part, whole, proportion, gradient, or**			
Careers Link: Many professional titles such as computer programmer, statistician, actuary, quantitative analyst, s all require at least some knowledge or use of fractions. Other job categories that commonly require the use of fract fields, art and design and the financial sector. Stock analysts evaluate publicly traded companies and make recom analysis. Ratios are widely used to analyse the health and value of companies. An example of a common ratio use Ratio analyses the near-term cash flow position of the company.			
Block 8 Ratios & Fractions	1. Compare quantities using a ratio	TBAT compare quantities and link ratios to fractions	A recap of unit conversions could be us Pictorial representations help to unpick misconceptions as fractional relationshi highlighted.

	2. Link ratios and fractions		
	3. Share in a ratio	TBAT share in a ratio	Students should be familiar with this ste Encouraging the use of bar models and the importance of labelling them helps s understand the structure of ratio problen
	4. Use ratios and fractions to make comparisons	TBAT use ratios and fractions to make comparisons	Students might need to review comparin before ratios. Students should be encou bar models and to write parts of a ratio a the whole, to support their comparisons
	5. Link ratios and graphs	TBAT link ratios and graphs	Students can revisit the notion of gradie this links to the ratio of the pairs of value
	6. Solve problems with currency conversions	TBAT solve problems with currency conversions	Double number lines are particularly hel students to build up to higher quantities multiplicative reasoning and to think abo can use what they know to find other va to their knowledge of ratio.
	7. Link ratios and scales	TBAT link ratios and scales	Students may need reminding about un as a precursor to this step. It is good pra size maps rather than just extracts norm examination and textbook questions. Us like Google maps to extend students' ex different scales may also be useful. This opportunity to revisit/reinforce drawing a bearings.
	8. Use and interpret ratios of the form 1:n and n:1	TBAT use and interpret ratios of the form 1:n and n:1	Students sometimes find this tricky as a always conform to the usual simplifying both parts are integers. Students may n guidance on deciding which has the hig or whether a criteria is met and using st such as 'for every 1 red, there are ____ a helpful way for students to interpret th bit more easily
	9. Solve best buy problems	TBAT solve best buy problems	Students will have different methods for it is useful to share these as a group. Us

			number lines or ratio tables can be usef mathematical thinking.
	10. Combine a set of ratios	TBAT combine a set of ratios	In order to combine ratios, students nee in finding the lowest common multiple a with equivalent ratios. Pictorial methods here and students could draw the objec sweets example), or use bar models to number of parts. “Scaling up” the ratios multiple is found is another very useful s
	11. Link ratio and algebra	TBAT link ratio and algebra	This step explores the use of algebraic ratios and the linking of ratio questions t need to be tackled through e.g. forming equations.
	14. Mixed ratio problems	TBAT solve mixed ratio problems	It is very useful for students to be able t variety of topics covered rather than just discretely, so the purpose of this step is opportunities to look again at various as unit to reinforce understanding.
	Check out Check in next block	TBAT complete check out	
	Feedback lesson	TBAT respond to feedback	

Rationale: Although percentages are not specifically mentioned in the KS4 national curriculum, they feature heavi
understanding gained in KS3. Calculator methods are encouraged throughout and are essential for repeated perce
of financial contexts is central to this block, helping students to maintain familiarity with the vocabulary they are unl

Learning Progression: *topics students have seen that will play a vital role in understanding this block*
Y7: Spring block 1 & 2 (use a calculator)
Y7: Autumn block 5 (interchange between fdp)
Y7: Spring block 3 (find percentage of amounts)
Y8: Spring block 4 (explore calculator and non-calculator methods)
Y8: Spring block 4 (using multipliers)
Y9: Spring block 3 (revisit and extend Y7/8 work in the context of financial mathematics)
Y9: Spring block 2 & 3 (Reverse percentages)

Key Vocabulary: Fraction, decimal, percentage, convert, equivalent, multiplier, increase, decrease, interest, expre

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Careers Link: A wide range of careers use percentages such as in the design of the traffic light labels on most foo the 'reference intake' which is an important piece of information that all people need to be able to interpret. On a ty fat meaning that it contains 43% of the maximum amount of saturated fat an adult should eat in a day. Percentages are everywhere in biology. One example is calculating percentage mass change in the process of 'Os This is a key concept which is used daily by many practising biologists. Careers in football technology use percentages to work out the ball possession among teams. Ball possession use stopping a manual timer, whereas nowadays it is measured using video-based data and expressed as a percentag			
Block 9 Percentages & Interest	1. Convert and compare fdp 2. Work out percentages of amount	TBAT convert fdp and work out percentages of amounts	Useful to show students how to perform their calculators as well as through men methods. Finding percentages greater t useful lead in to reviewing percentage in next step
	3. Increase and decrease by a given percentage	TBAT increase and decrease by a given percentage	Some students get confused when redu percentage and use the wrong multiplie estimation is a good strategy here.
	4. Express one number as a percentage of another	TBAT express one number as a percentage of another	Encouraging students to express as a fr then considering how to convert is also
	5. Calculate simple and compound interest	TBAT calculate simple and compound interest	A useful strategy for helping students to remember the difference between simpl compound interest is to compare them a other rather than just looking at them ind
	6. Repeated percentage change	TBAT calculate repeated percentage change	This builds on the previous step, genera method for compound interest to any re percentage change situation, including r reduction. Students may not be aware o "depreciation"
	7. Find the original value after a percentage change	TBAT find the original value after a percentage change	It is worth looking at multiple methods s 10% or 1% from the given value or usin the form "Original x multiplier = final valu
	8. Solve problems involving	TBAT solve problems involving growth and decay	There are no new techniques but studen be directed to the links with compound i depreciation using the vocabulary or "gr "decay"

	growth and decay		
	10. Solve problems involving percentages, ratios and fractions	TBAT solve problems involving percentages, ratios and fractions	This step provides a nice link with the pr learning and can be used to explore exa questions that feature a combination of ratio. Bar models and tables are key wa problems to enable students to access t which may at first appear overwhelming
	Check out Check in next block	TBAT complete check out	
	Feedback lesson	TBAT respond to feedback	
Rationale: This block builds on KS3 and builds a good context in which to revisit fraction arithmetic and conversio fractions, decimals, and percentages. Tables and Venn diagrams are revisited and understanding, and use of tree **Learning Progression:** *topics students have seen that will play a vital role in understanding this block* Y7: Spring block 5 (add and subtract fractions including mixed numbers) Y7: Autumn block 5 (interchange between fractions and decimals below 1) Y7: Summer block 4 (use the language of probability) Y8: Autumn block 6 (use tables and Venn diagrams to find probabilities) Y9: Summer block 3 (compare experimental and theoretical probability) **Key Vocabulary:** Numerator, denominator, outcome, event, intersect, union, relative frequency, estimate, univers product,			
Careers Link: The world of finance is essentially a world of uncertainty. Therefore, a wide variety of financial profe financial strategists rely on probabilistic models. Financial officers and loan officers rely on probability analysis to e condition of the company in the future. Probability | Maths - Real Life Maths - YouTube 4 minute video on probability been used in weather reporting jobs			
Block 10 Probability	1. Know how to add, subtract and multiply fractions	TBAT know how to add, subtract and multiply fractions	Students need a conceptual understanc subtracting and multiplying fractions bef probability. Returning to pictorial repres be necessary. There is then an opportu many previously taught topics.
	2. Find probabilities	TBAT find probabilities using equally likely outcomes	This step supports students to become fluent in using equally likely outcomes to probabilities. Misconceptions should be

	using equally likely outcomes		here, particularly considering factors su spinner and whether this impacts on pro outcomes. Reminding students that they probability as a fraction, decimal or perc useful.
	3. Use the property that probabilities sum to 1	TBAT use the property that probabilities sum to 1	Students should have opportunities to w percentages, fractions and decimals wh probabilities. This step is also an opport Venn diagrams, set notation and formin equations
	SPRING ASSESSMENT		
	SPRING ASSESSMENT REFLECTION		
	4. Using experimental data to estimate probabilities	TBAT use experimental data to estimate probabilities	Students could be supported to find experimental probabilities from a variety
	5. Find probabilities from tables, venn diagrams and frequency trees	TBAT find probabilities from tables, venn diagrams and frequency trees	This is an opportunity for students to rev representing information. When working diagrams, students might need remindi includes P($A \cap B$). When working with t students might need support in choosing value for the denominator.
	6. Construct and interpret sample spaces for more than one event	TBAT construct and interpret sample spaces for more than one event	Discuss how to be systematic and the d being systematic. A misconception is to number of possible outcomes from each this as the denominator when calculatin (e.g. thinking the total number of possib when rolling two dice must be 12).
	7. Calculate probability with independent events	TBAT calculate probability with independent events	Before working with tree diagrams, stud understand that for independent events P(A) × P(B). They also need to be clear outcome of one event has no bearing on of the other. This can be demonstrated

			spaces. Examples and non-examples o events supports understanding of this te
	8. Use tree diagrams for independent events	TBAT use tree diagrams for independent events	Sample spaces alongside the tree diagr a helpful transitionary step. Initially scaf providing students with the tree diagram to access this concept. Teachers might diagrams where there are more than tw each trial. Students may need support i 'pathways' and what final outcome each
	9. Use tree diagrams for dependant events	TBAT use tree diagrams for dependent events	It is useful to generate examples of dep with students, to ensure that they under these are. Again, scaffolding by providin information on a tree diagram or in a me starting point. Working with probability i decimals and fractions and then discuss easier to calculate with can also be help
	Check out Check in next block	TBAT complete check out	
	Feedback lesson	TBAT respond to feedback	

Rationale: This block builds on KS3 work on the collection, representation, and use of summary statistics to descr previous study within and beyond Mathematics (Science and Geography) and from everyday life. The steps have b balance consolidation of existing knowledge with extending and deepening, particularly in terms of interpretation o methods and diagrams.

Learning Progression: *topics students have seen that will play a vital role in understanding this block*

Y7: Spring blocks 1 & 2 (use four operations)
Y7: Autumn block 5 (interchange between fractions and decimals)
Y7: Spring block 1 (solve problems with line charts and bar charts)
Y7: Summer block 1 (construct and interpret pie charts)
Y7: Autumn block 4 (find the median and the range)
Y8: Autumn block 5 (different types of data and construct & interpreting frequency tables and two-way tables)
Y8: Summer block 4 (collecting data)
Y8: Summer block 5 (identify outliers, find the mode, and compare distributions)

Key Vocabulary: Population, sample, biased, random, primary/secondary data, midpoint, class, interval, frequenc frequency density, mean, median, mode, outlier, average, modal class

Y10 Mathematics Scheme of Learning

Careers Link: There are a wide range of jobs that need to interpret graphs in their everyday practice. Jobs such a epidemiologist. Also, an atmospheric scientist / meteorologist use data. They analyse meteorological data, atmosp provide predictions for weather events and anomalies. Computer programs can be written to support weather mod provide warnings about severe weather. Measured data is crucial in understanding weather-related information rel changes in regional climates. Working as a meteorologist requires a bachelor's degree in atmospheric science; tho scientist will need a minimum of a master's if not a Ph.D. Jobs that use graphs - BBC Bitesize 5 minute video on jobs that use data / graphs			
Block 11 Collecting, representing & interpreting data	1. Understand populations and samples 3. Primary and secondary data	TBAT use samples, primary and secondary data	There is often confusion caused by the the word 'random' to mean haphazard c rather than the statistical meaning that e the population has an equal chance of b is useful to discuss the pros and cons o data e.g. secondary is much cheaper, b as reliable. The internet is a great sourc data which could be useful to exploit to charts and diagrams in the forthcoming
	4. Construct and interpret frequency tables and frequency polygons	TBAT construct and interpret frequency tables and polygons	Students are familiar with frequency tab data from KS3, and may recall the idea as used to find the estimate of the mean
	5. Construct and interpret two-way tables	TBAT construct and interpret two-way tables	Students have worked with two-way tab KS3, so this review step is an opportuni extracting and completing information a designing tables, looking at more compl appropriate. There are ample opportuni other areas of the curriculum that need including fractions, decimals, percentag probability
	6. Construct and interpret line and bar charts	TBAT construct and interpret line and bar charts	Students should experience them in a v vertical, horizontal, lines instead of bars should also explore multiple and compo as in the two exemplar questions, focus interpretation and what types of informa to read from one type than the other

	7. Construct and interpret pie charts	TBAT construct and interpret pie charts	It is useful to look at the proportions in t fractions of 360, as well as percentages fractions of the 'whole' that is being repr
	8. Criticise charts and graphs	TBAT criticise charts and graphs	Students need to look beyond the super of neatness, labelling of axes and titles mathematical flaws that charts or graph Changes in scale, starting the axes from points or misuse of scaling may exagge differences. Encourage students to find examples of this – there are plenty avail
	11. Find and interpret averages from a list	TBAT find and interpret averages from a list	Students will have met mean, median a several times and at this stage they nee considering when each one is and isn't only the mode is possible with categoric
	12. Find and interpret averages from a table	TBAT find and interpret averages from a table	It is useful for students to look at tables horizontally and vertically when revising and then decide which is the best way t out to find averages. The term 'modal cl revisiting, emphasising its relationship t
	13. Construct and interpret time series graphs	TBAT construct and interpret time series graphs	It is worth discussing seasonal trends a there is no apparent trend
	14. Construct and interpret stem and leaf diagrams	TBAT construct and interpret stem and leaf diagrams	As with most of the diagrams in the bloc is just as important as construction. Wh and leaf diagrams, students need to tak numbers in line so that the relative lengt are meaningful. Compare stem and leaf horizontal bar charts where all the data revisit averages and the range. Include decimal values e.g. 7|3 means 7.3
	18. Compare distributions using charts and measures	TBAT compare distributions using charts and measures	When comparing distributions, students one of the averages and measure of spr Foundation level this will always be the average is used as an indicator of overa and the range is used to describe the co Students often only look at the average,

			data sets where the averages are equal differ can be useful
	20. Construct and interpret scatter graphs	TBAT construct and interpret scatter graphs	Students will be familiar with correlation this review step is useful to remind them vocabulary and to practice choice of sca points. Where to start and finish axes ar points for discussion. It is also worth rei correlation does not imply causality, and of linear relationship does not necessari variables are unconnected
	21. Draw and use a line of best fit 22. Understand extrapolation	TBAT use a line of best fit and extrapolation	When using lines of best fits to make es students should draw lines from/to the a their intention clear and to improve accu Extrapolation can be demonstrated by l examples that give e.g., negative, or oth answers. Links could be made to scienc considering when relationships may wo intervals but not others e.g., length of ar spring
	Check out Check in next block	TBAT complete check out	
	Feedback lesson	TBAT respond to feedback	

Rationale: This block again mainly revises KS3 content, reviewing prime factorisation and associated number con content, this block explores triangular and Fibonacci type sequences.

Learning Progression: *topics students have seen that will play a vital role in understanding this block*
Y7: Spring block 2 (use multiples)
Y7: Summer block 5 (prime factorisation, HCF and LCM)
Y7: Autumn block 2 (function machines)
Y7: Autumn block 1 (recognise linear and non-linear sequences)
Y7: Autumn block 2 (generate sequences from an algebraic rule)
Y8: Spring block 2 (revise and extend Y7 coverage on sequences to include some more complex rules)
Y9: Spring block 1 (HCF and LCM)
Y9: Summer block 6 (prime factorisation)
Y9: Autumn block 3 (testing conjectures about sequences)

Key Vocabulary: Integer, factor, multiple, prime, index form, product, arithmetic, geometric, nth term, Fibonacci, s

Y10 Mathematics Scheme of Learning

Careers Link: Lighting designers use the lowest common multiple quite often, to plan and set lights to flash at diff in the textile industry when working out minimum and maximum quantities of stock that is to be produced. Addition important to solve problems related to racetracks, traffic lights and to predict when an event occurs again over a sa			
Block 13 Types of number & sequences	1. Understand the difference between factors and multiples	TBAT identify the difference between factors and multiples	The main emphasis of this step is to rev difference between a factor and a multip model is useful in considering factors ar factors of algebraic terms. Ensure that s exposed to non-examples and example
	2. Understand primes and express a number as a product of its prime factors	TBAT identify primes and express a number as a product of its prime factors	The language of 'express' and 'product' emphasis. Students should use their rea make connections between the prime fa decomposition of related numbers
	3. Find the HCF and LCM of a set of numbers	TBAT find the HCF and LCM of a set of numbers	Students need to be careful to use prim completing the Venn diagram, rather tha
	4. Describe and continue arithmetic and geometric sequences	TBAT describe and continue sequences	Students can have the misconception th ratio of a geometric sequence has to be integer and so should work with exampl decimal and negatives
	5. Explore other sequences	TBAT explore other sequences	Square number and cube number sequ included but will be looked at again in th could be omitted if time is short
	7. Find the rule for the nth term of a linear sequence	TBAT find the nth term of a linear sequence	This step reviews prior learning. Consid sequences with decimal / fractional diffe extend this. Use of descending sequenc used to prompt discussion about the mu
	Check out Check in next block	TBAT complete check out	
	Feedback lesson	TBAT respond to feedback	
	Summer Assessment		

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	Summer Assessment Reflection		