Long Term Plan Year 10/11 Foundation Mathematics

Half Term	Unit Title	Key Knowledge/Content to learn and retain	Essential Skills to acquire (subject & generic)	Link to intent and ethos	Anticipated misconceptions	Links to previous KS	Link to future KS	Opportunity for stretch and high prior attainers	SMSC & British Values	Cultural Capital	Career Link
AUT 1 Dev	Developing Geometry	IArea of Trapezia	Calculate the area of a trapezium Calculate the perimeter and area of compound shapes	Ordering the right quantity of turf for a sports field, preparing detailed floor plans, and working out how much fertiliser is needed to treat a field crop all require knowledge and calculations of area	Students do not state the units when finding the length of an unknown. Students don't use the perpendicular height when calculating the area of a triangle or parallelogram; they use the length given for the sloped side.	The sum of the Units of measurement Perimeter of shapes Substitution	Intergrations	The formulae learned and used can be used to find the area of surfaces of a 3D shape			Farm manager Farmers and farm managers grow crops and raise farm animals for food production.
		Three – dimensional shapes	Surface area of cubes and cuboids Surface area of cubes and cuboids Volume of cubes and cuboids Volume of other 3-D Shapes	Freight costs are dependent upon the volume of material being transported. Freight rates are calculated using the container volume measured against the length of the container. The longer the container the higher the freight cosy	Students don't recognise right- angled trapezia as a trapezium, instead thinking that all trapezia have two sloping sides confusing the units for area and volume when calculating surface area For triangular prisms some students will still not use the perpendicular height of the face triangle to calculate the area of the cross-section (when given the slant height).	identify 3D objects calculate area and perimeter of 2D shapes definition and properties of 2D and 3D shapes	Intergration Volume of revolution Differentiation	You can use surface area and volume of solids to form a background for questions on ration and similarity		Things to Make and Do in the Fourth Dimension by Matt Parker	Retail buyer Wholesale buyer, food buyer, buyer for retail
Aut 2	Reasoning with Algebra and the coordinate grid	Straight line graph	Lines parallel to the axes, y=x and y=-x Using tables of values Compare gradients Compare intercepts Understand and use y=mx_c Write an equation in the form y=mx + c Find the equation of a line from a graph Interpret gradient and intercepts of real-life graphs	The curse and lines of buildings are designed using complex equations and their graphs. Architecture is just one of many progression in which people plot and use graphs in their work	Students sometimes think the constant (+c) tells them the step increase (gradient) when plotting coordinates Students occasionally think the '+c' tells them the starting point on the x-axis, rather than the y-axis When plotting lines, students often do not look at the big picture: if they have made a mistake in one of their y-value calculations, the line is no longer straight, but they will nonetheless plot their points regardless.	How to generate terms in a sequence from a given rule. How to identify coordinates of a given point. How to manipulate and solve equations. How to change the subject of a formula.	Linear programming Equations and tangents Tangents to circles Vectors	You can extend the work on straight-line graphs, considering exponential and trigonometric graphs. Problems involving direct proportion can be represented or solved using straight- line graphs			Architect Alternative titles for this job include Architects design new buildings and the spaces around them, and work on the restoration and conservation of existing buildings.

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Summer		proportion Calculate with pressure and density Understand inverse portion Know names of 2-d and 3-D shapes Recognise prisms including language of edge/vertices Plans and elevations	reasoning when you mix ingredients for a recipe, convert between units of measurement or work out costs per unit. It is an area of maths where you can use many different methods to solve problems Many people use geometry in their jobs and daily lives. Artists, crafts peole builders, designers, architects and engineers use shape and space in their jobs, but almost every uses lines, angles pattern and shapes in different	when using the unitary method Students sometimes muddle the meanings of face, edge and vertex. Ensure the correct definitions are given at the start of the topic, and reinforced whenever talking about 3D objects. The difference between a prism and a pyramid can be difficult to grasp. To tackle this, ask students to think what would happen if you	How to write ratios and interpret them. How many minutes there are in fractions of an hour. How to identify common 3D objects. Basic properties of polygons and common 3D objects. How to accurately construct lines and angles using ruler and	proportionality in the description of rates of change and thus in differential equations The volumes of solids of revolution are considered at A2. These are solids formed by rotating a curve around some straight line, for example the sorts of objects that might be produced on a lathe. Working with the three dimensional solid called a parallelepiped is a common source of problems when using	use their skills in visualising in three dimensions to tackle problems that use Pythagoras' theorem in solids Considering the net of a solid is a key part of the process of calculating the surface area of a solid		Civil engineer Civil engineer Civil engineers design and manage construction projects, from bridges and buildings to transport links and sports
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Summer		proportion Calculate with pressure and density Understand inverse portion Know names of 2-d and 3-D shapes Recognise prisms including language of edge/vertices Plans and elevations	reasoning when you mix ingredients for a recipe, convert between units of measurement or work out costs per unit. It is an area of maths where you can use many different methods to solve problems Many people use geometry in their jobs and daily lives. Artists, crafts peole builders, designers, architects and engineers use shape and space in their jobs, but almost every uses lines, angles pattern and shapes in different	when using the unitary method Students sometimes muddle the meanings of face, edge and vertex. Ensure the correct definitions are given at the start of the topic, and reinforced whenever talking about 3D objects. The difference between a prism and a pyramid can be difficult to grasp. To tackle this, ask students to think what would happen if you cut slices of the shape? Would they all	How to write ratios and interpret them. How many minutes there are in fractions of an hour. How to identify common 3D objects. Basic properties of polygons and common 3D objects. How to accurately construct lines and angles using ruler and	proportionality in the description of rates of change and thus in differential equations The volumes of solids of revolution are considered at A2. These are solids formed by rotating a curve around some straight line, for example the sorts of objects that might be produced on a lathe. Working with the three dimensional solid called a parallelepiped is a common source of problems when using vector	use their skills in visualising in three dimensions to tackle problems that use Pythagoras' theorem in solids Considering the net of a solid is a key part of the process of calculating the surface area of a solid		Civil engineer Civil engineers design and manage construction projects, from bridges and buildings to transport links and sports
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Summer		proportion Calculate with pressure and density Understand inverse portion Know names of 2-d and 3-D shapes Recognise prisms including language of edge/vertices Plans and elevations	reasoning when you mix ingredients for a recipe, convert between units of measurement or work out costs per unit. It is an area of maths where you can use many different methods to solve problems Many people use geometry in their jobs and daily lives. Artists, crafts peole builders, designers, architects and engineers use shape and space in their jobs, but almost every uses lines, angles pattern and shapes in different	when using the unitary method Students sometimes muddle the meanings of face, edge and vertex. Ensure the correct definitions are given at the start of the topic, and reinforced whenever talking about 3D objects. The difference between a prism and a pyramid can be difficult to grasp. To tackle this, ask students to think what would happen if you cut slices of the shape? Would they all	How to write ratios and interpret them. How many minutes there are in fractions of an hour. How to identify common 3D objects. Basic properties of polygons and common 3D objects. How to accurately construct lines and angles using ruler and	proportionality in the description of rates of change and thus in differential equations The volumes of solids of revolution are considered at A2. These are solids formed by rotating a curve around some straight line, for example the sorts of objects that might be produced on a lathe. Working with the three dimensional solid called a parallelepiped is a common source of problems when using vector	use their skills in visualising in three dimensions to tackle problems that use Pythagoras' theorem in solids Considering the net of a solid is a key part of the process of calculating the surface area of a solid		Civil engineer Civil engineers Civil engineers design and manage construction projects, from bridges and buildings to transport links and sports

Constructions & congruency	Locus of a distance from a point Locus of a distance from a straight line/shape Locus equidistant from two points Construct a perpendicular bisector Construct a perpendicular from a point Locus of a distance from two lines Construct and angle bisector Construct triangles	Draughts people and architect need to draw accurate scaled diagrams of the building and other structures they are working on. Although the drawings are complicated, they still use ordinary mathematical instruments link pencils and runners and a pair of compasses to draw them	stereotypical loaf of bread)? If so, the shape is a prism. A pyramid can be identified because it has an apex (point) where all but one of the sides (the base) Sudents struggle with formal language and notations in geometry. For example when a vertex is labelled B, students refer to the angle as B forgetting that there are two possible angles this could be, one less than 180° as a minimum. Having starters based on notation, and highlighting angles and lines given their label, can help identify and recognise these errors at the beginning. Students' work may not be not accurate enough. It could be that they are struggling to work with their pair of compasses and pencil. Having a set of Christmas cracker screwdrivers to hand for loose compasses and reminding students to sharpen their paic of compasses because they put too much pressure on it may find it better to spin the paper not the pair	Properties of angles. Properties of shapes and associated language, including circles. Read and write angles and lines using formal notation conventions. Measure and construct angles using a protractor. Notation conventions including: 1 for perpendicular to and for parallel to. Knowledge of basic ratio and scale.	Parametric equations, which are covered in the second year of A level, give a loci of points on the plane given a parameter. Students will also learn about cycloid curves, similar to the lines formed in the problems related to rolling shapes.	This topic requires accurate use and care of equipment. The development of neatness with drawing is useful for accurate drawing of straight lines (Chapter 23F / 24H Straight- line graphs). Generally, the accuracy developed should improve the quality of sketches.	Excursions in Geometry by C. Stanley Ogilvy	Draughtsperson Draughtspersons prepare technical drawings and plans fiven to them by an architect.
Pythagoras' Theorem	Identify the hypotenuse of a right- angle triangle Determine whether a triangle is right angles Calculate the hypotenuse of a right angle triangles	Builders, carpenters, garden designers and navigators all use Pythagoras theorem in their jobs. It is a method based on right-angles triangles that helps them to work out unknown lengths	Identifying the hypotenuse incorrectly by mistaking the length that is the longest (often due to the orientation of the triangle). . Misunderstanding that the theorem connects the squares of the side lengths	Understand how to correctly use labels in geometry particularly those that are unique to a triangle, e.g. vertices (A, B), sides (AB or, for triangles only, lowercase c as it is opposite vertex C), symbol for a right angle.	At A level, Pythagoras' theorem will be employed in many different ways. The most obvious of those is in coordinate geometry where pupils will use Pythagoras' theorem to find the length of line segments in 2D and 3D as well as finding	Trigonometry, will increase students' knowledge of right- angled triangles and opportunities for pupils to solve problems that involve both trigonometry and/or Pythagoras' theorem will be presented. For many students this	Mathematics: A Very Short Introduction by Timothy Gowers	

		Use Pythagoras		and forgetting to find	How to use a	the radius of a circle	will present		
		theorem on		the square root.	calculator to find	given the centre and	additional challenge		
		coordinates axes			squares and square	a point on the curve	as they will have to		
				Struggling to	roots.	and deducing the	select the most		
		Explore proof of		rearrange the formula		equation of the circle.	efficient method		
		Pythagoras' theorem		to find a side other	How to round to a	Less direct is	without direction.		Merchant Navy deck
				than the hypotenuse.	given accuracy (either	its application to	Pythagoras'		officer
					significant figures or	deriving			
				Applying (incorrectly)	decimal places).	trigonometric			Merchant Navy deck
				the theorem to non-	The survey of the second	identities, notably: sin			officers look after the
				right-angled triangles	The properties and	$\theta / \cos \theta =$			day-to-day running
					categories of triangles How to substitute	Tan θ and its use in deriving			and navigation of
					into and rearrange	0			ships, and take care
					formulae including	the compound angle formulae.			of passengers and cargo.
					squares and square	It will also be used to			cargo.
					roots.	calculate the			
					10013.	magnitude of vectors			
						in 2D and 3D, and			
						hence many other			
						values associated			
						with compound			
						measures.			
				Students struggle to	Properties of triangles	codico.			
	Trigonometry		Trigonometry means	identify and label the	including notation	Trigonometry forms a			
			triangle	adjacent and opposite	conventions for	large part of the A			
			measurements and is	sides because they	angles and sides.	level syllabus.			
			very useful for finding	don't realise it		Alongside the 2D and			
			the lengths of sides	depends on	How to round to a	3D problem-solving			
		Explore ratio in	and sizes of angles in	where the given angle	given accuracy and	applications, students			
		similar right-angled	navigation, surveying,	is.	recognise the effect	will explore the			
		triangles	astronomy,		of rounding.	domain and range of			
		triangles	engineering,	Students confuse the		each function in detail			
		Work fluently with	construction and	ratios and struggle to	What it means for	considering the			
			even in the	identify which	triangles to be similar	features of each one.			
		the hypotenuse,	placements of	function should be	and how to use scale	Students will learn			
		opposite and adjacent	satellites and	used.	factors to calculate	to solve more			
		sides	satellites receivers.		side lengths.	complicated			
				Students work with		equations involving			
		Use the tangent ratio		the wrong mode for	How to identify and	trigonometric			
		to find missing side		angle inputs on their	apply knowledge of	functions and list all			
		lengths		calculator.	alternate angles in	solutions in a possible			
					parallel lines.	domain.			
		Use sine, cosine and		students struggle to		Knowledge of			
		tangent to sing		rearrange the trig	How to apply	identities will be used			Geoscientist
		missing side lengths		formulae.	Pythagoras' theorem	to manipulate			Geoscientists study
					to calculate unknown	expressions and			the Earth's structure
		Use sine cosine and		Students struggle to	lengths.	reciprocal functions			and formation, and
		tangent to find		remember exact		will be used to extend			analyse rocks to
		missing angles		values for certain trig		these			explore its natural
				ratio		Ideas.			mineral and energy
		Select the							resources.
		appropriate method	Measurement has	Students confuso	How to measure	There are few direct			
	Angles and bearing-	to solve right-angle	Measurement has	Students confuse					
	Angles and bearings	triangle problems	practical applications in many different job	multiplication and division of the scale	accurately using a ruler and protractor	links to this topic in the core part of the A			
			but is also important	factor when working		level course.	Another personalised		
		work with key angles	in every day activities.	with scale drawings.		ievei course.	way for students to		
		in right-angled	Being able to read	with state thankings.			work with scale		
		triangles	and work with	Students forget what			drawings is to supply		
			measurements is	a bearing is and how			them with a series of		
			important when you	it compares to a given			maps of		
		Understand &	make or alter clothes,	angle			their local area with		
		represent bearings	work out what	angre .			different scales. They		
			materials you need to				can then compare the		
		Measure and read	build things and				scales given for an		
		bearings	weight ingredients to				area they know and		
		Scale Drawings Using	make a recipe				gain an		
		Scale Drawings Using Bearings					understanding of why		
		Dearnigs					scale drawings are		
							needed		
		•		•		•		•	

Bearing with angles rules Bearing sk Right angles geometry	Cartographer Cartographers collect information about the geography of an area to design and produce maps, charts and plans.
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