



Padgate Academy

Department Directory
Mathematics

Introduction

We use mathematics to explain and understand the world we live in and to make predictions about what will happen in the future. Mathematics is a problem-solving tool that allows us to develop an understanding of all things in the world in which we live. The aim of the maths department is to develop an excitement in maths from our students and to avoid the “mile-wide inch-deep” approach to the curriculum that often plagues maths lessons. Students will revisit topics regularly, within and around other topics and be encouraged to delve deeper into the covered topic rather than “accelerate” through the curriculum. We believe that students need to be able to use the maths that they have encountered in real life situations and that the work they do in school should put them in a better place to succeed in life, not just their exams.

Purpose

Our aim, from the start of Key Stage 3, is to cover number, algebra, shape and space and handling data with a focus on depth of understanding and problem solving to allow students to better connect and understand mathematics to give them the best possible chance of success in the future. Students will see new skills and techniques in all areas, and then apply them in practical situations to see how mathematics solves real life problems. There is now a much greater emphasis in the assessment of mathematics in its use in real life. We use a “maths mastery” approach to our lessons and topics to try and ensure that students are able to achieve their maximum potential in every topic.

Curriculum

Our curriculum will build on knowledge gained at primary school whilst preparing students to excel at GCSE and beyond by providing the knowledge and skills required. We will provide a rigorous culture of academic study which will include well suited assessment opportunities that prepare students for success with terminal examination.

The curriculum will be matched with other TCAT schools to provide opportunities to share resources and collaborate in order to achieve the best possible outcomes.

KS3/KS4

The Y7 and 8 SoL has been based around the key concepts of the maths curriculum, with an early focus on number work to ensure students have a grasp of the basics as well as being able to understand *why* the maths works not just the rules they can follow to get an answer. There is a conscious plan to move away from teaching to successfully answer exam questions (which the SATs cause a large amount of primary focus to seemingly be on) to teaching for depth of understanding and an ability to think critically around the topics being covered. Year 7 topics follow an order to develop skills that are entrenched throughout the 5 years and will allow them to form a strong foundation in these basics. Whilst topics are covered under specific headings and seem separate from one another, the key to successful implementation is the constant retrieval of previous topics within later topics through use of problem solving and SSDD questions.

Historically, students struggle with maths, and we regularly hear the question “when will I ever need/use this?” As a result, wherever possible, the topics being covered will be linked to real life scenarios. For example, proportion linked to recipes, simultaneous equations linked to shopping (e.g. cost of 3 burgers and 2 portions of fries compared to 4 burgers and 2 fires – what do you know

now) or negative numbers linked to bank account overdrafts. The idea being that, not only does this allow pupils to see how the skills they are developing will help them in the future, it also takes away the didactic side of learning and encourages pupils to more naturally engage with the subject and, in many cases, develop new skills without actually realising that they are “doing maths”.

Year 7;

HALF TERM	CONTENT	
1	Understanding number (Inc HCF/LCM)	Calculating with positive and negative numbers
2	Place Value	Calculating with decimals
3	Properties of triangles and quadrilaterals	Area and perimeter Co-ordinates
4	Algebra – expressions and substitution	Algebra – solving equations
5	Fractions- equivalent, ordering, converting to decimals	Fractions – add, subtract, multiply and divide
6	Averages	

Year 8;

Overview		
AT1	Probability	Representing Data
AT2	Ratio and Proportion	Constructions and Transformations
ST1	3D Shape and Volume	Circles
ST2	Sequences	$Y=mx+c$
SUMT1	Geometry of polygons & parallel lines	Percentages
SUMT2	Ratio and Proportion (to change 2019/20)	Problems with algebra (from sept)

Year 9;

The Y9 SoL has been created with a focus on pupils being “GCSE ready” by the end of the year. We have identified 12 key base topics that we feel, if pupils have a solid grounding in them, they will be able to make a good start in Y10 and 11 to push towards the highest grades they are capable of. Students will be exposed to deeper thinking, enrichment tasks in all topics that they will need to be able to explore how to solve and also make links themselves between different topics. For example, Pythagoras using algebra, isosceles triangle facts, perimeter and area and ratio

Overview		
AT1	Positive Number Theory	Algebraic Manipulation
AT2	Directed Numbers	Proportion (FDP)
ST1	Angle Geometry	Area & Perimeter
ST2	Indices and roots	Forming & Solving Equations
SUMT1	Pythagoras	Probability
SUMT2	Averages (3 Ms), Range and Quartiles	y = mx + c & Sequences

Y10 – 11

Foundation;

Year 10, 2018 - UAWFoundationSOL

September				October				November				December							
Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12	Wk 13	Wk 14	Wk 15	Wk 16				
Angles	Scale diagrams and bearings	Basic number	Factors and multiples	Basic algebra	Basic fractions	Examination and Revision	Holiday	Coordinates and linear graphs	Basic decimals	Rounding	Collecting and representing data	Sequences	Examinations and Revision	Holiday					
December				January				February				March				April			
Wk 17	Wk 18	Wk 19	Wk 20	Wk 21	Wk 22	Wk 23	Wk 24	Wk 25	Wk 26	Wk 27	Wk 28	Wk 29	Wk 30	Wk 31	Wk 32				
Holiday	Basic percentages	Perimeter and area	Circumference and area	Real life graphs	Real life graphs	Examination and Revision	Holiday	Ratio and proportion	Properties of polygons	Equations	Indices	Standard form	Holiday						
April				May				June				July							
Wk 33	Wk 34	Wk 35	Wk 36	Wk 37	Wk 38	Wk 39	Wk 40	Wk 41	Wk 42	Wk 43	Wk 44	Wk 45	Wk 46	Wk 47	Wk 48				
Basic probability	Transformations	Congruence and similarity	2D representations of 3D shapes	Exam and revision	Holiday	Calculating with percentages	Measures	Statistical measures	Constructions and loci	Summer Examinations and Revision		w/b 15/7 w/e 21/7	w/b 22/7 w/e 28/7	w/b 29/7 w/e 4/8					

Year 11, 2019 - UAWFoundationSOL

September				October				November				December							
Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12	Wk 13	Wk 14	Wk 15	Wk 16				
Probability	Volume	Algebra: quadratics, rearranging formulae and identities	Scatter graphs	Holiday	Inequalities	Pythagoras' theorem	Simultaneous equations	Algebra and graphs (1)	Mock Examinations and Revision	Holiday									
December				January				February				March				April			
Wk 17	Wk 18	Wk 19	Wk 20	Wk 21	Wk 22	Wk 23	Wk 24	Wk 25	Wk 26	Wk 27	Wk 28	Wk 29	Wk 30	Wk 31	Wk 32				
Holiday	Algebra and graphs (2)	Sketching graphs	Direct and inverse proportion	Holiday	Trigonometry	Solving quadratic equations	Quadratic graphs	Holiday	Growth and decay										
April				May				June				July							
Wk 33	Wk 34	Wk 35	Wk 36	Wk 37	Wk 38	Wk 39	Wk 40	Wk 41	Wk 42	Wk 43	Wk 44	Wk 45	Wk 46	Wk 47	Wk 48				
Vectors	Revision and June Examinations	Holiday	Revision and June Examinations							w/b 22/8 w/e 28/8	w/b 29/8 w/e 5/7	w/b 6/7 w/e 12/7	w/b 13/7 w/e 19/7	w/b 20/7 w/e 26/7	w/b 27/7 w/e 2/8				

<http://aqamaths.aqa.org.uk/sharemap?id=11153&k=f9f029896803a3ff>

Higher;

Year 10, 2018 - UAWHigherSOL

September				October				November				December							
Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12	Wk 13	Wk 14	Wk 15	Wk 16				
Angles, scale diagrams and bearings	Basic number, factors and multiples	Basic algebra review	Fractions and decimals	Exams	Holiday	Rounding	Coordinates and linear graphs	Collecting and representing data	Sequences	Basic percentages	Examinations and revision	Holiday							
December				January				February				March				April			
Wk 17	Wk 18	Wk 19	Wk 20	Wk 21	Wk 22	Wk 23	Wk 24	Wk 25	Wk 26	Wk 27	Wk 28	Wk 29	Wk 30	Wk 31	Wk 32				
Holiday	Perimeter and area	Circumference and area	Real life graphs	Ratio and proportion	Properties of polygons	Exams	Holiday	Equations	Indices	Surds	Basic probability	Standard form	Measures	Holiday					
April				May				June				July							
Wk 33	Wk 34	Wk 35	Wk 36	Wk 37	Wk 38	Wk 39	Wk 40	Wk 41	Wk 42	Wk 43	Wk 44	Wk 45	Wk 46	Wk 47	Wk 48				
Transformations	Congruence and similarity	2D representations of 3D shapes	Exam	Holiday	Calculating with percentages	Statistical measures	Constructions and loci	Summer examinations and revision		w/b 15/7 w/e 21/7			w/b 22/7 w/e 28/7	w/b 29/7 w/e 4/8					

Year 11, 2019 - UAWHigherSOL

September				October				November				December							
Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12	Wk 13	Wk 14	Wk 15	Wk 16				
Probability	Volume	Algebra: quadratics, rearranging formulae and identities	Scatter graphs	Numerical methods	Exam	Holiday	Equation of a circle	Further equations and graphs	Simultaneous equations	Mock examination and revision	Holiday								
December				January				February				March				April			
Wk 17	Wk 18	Wk 19	Wk 20	Wk 21	Wk 22	Wk 23	Wk 24	Wk 25	Wk 26	Wk 27	Wk 28	Wk 29	Wk 30	Wk 31	Wk 32				
Holiday	Sketching graphs	Direct and inverse proportion	Inequalities	Pythagoras theorem and basic trigonometry	Exam	Holiday	Sine and cosine rules	Circle theorems	Transforming functions	Growth and decay	Vectors	Holiday	Gradients and rate of change						
April				May				June				July							
Wk 33	Wk 34	Wk 35	Wk 36	Wk 37	Wk 38	Wk 39	Wk 40	Wk 41	Wk 42	Wk 43	Wk 44	Wk 45	Wk 46	Wk 47	Wk 48				
Gradients and rate of change	Pre-calculus and area under a curve	Algebraic fractions	Revision and June Examinations	Holiday	Revision and June Examinations					w/b 22/8 w/e 28/8	w/b 29/8 w/e 5/7	w/b 6/7 w/e 12/7	w/b 13/7 w/e 19/7	w/b 20/7 w/e 26/7	w/b 27/7 w/e 2/8				

<http://aqamaths.aqa.org.uk/sharemap?id=10269&k=9545312a408c492e>

Throughout the 5 year SoL the intention is that students have concepts and approaches that are consistent and intertwined within the SoL so that work is regularly revisited and allows pupils to access problem solving questions that have different topic aspects within those questions. As per

Jane Jones (HMI Ofsted); "Differentiation should therefore be about how the teacher helps all pupils in the class to understand new concepts and techniques. The blend of practical apparatus, images and representations {what we are calling mastery} may be different for different groups of pupils, or pupils might move from one to the next with more or less speed than their classmates. Skilful questioning is key, as is creating an environment in which pupils are unafraid to grapple with the mathematics. Challenge comes through more complex problem solving, not a rush to new mathematical content. Good consolidation revisits underpinning ideas and/or structures through carefully selected exercises or activities. Mastery calls this 'intelligent practice'."

Assessment

Y7 – 9 do a pre and post-test each HALF TERM to allow for progress to be checked. Y10 and 11 will do a test at the end of each HALF TERM to check understanding.

Also, halfway through each HALF TERM students will be given a whole class feedback sheet on a topic covered and will do green pen lessons on that work. The same process will also be done after the end of HALF TERM tests.

Marking and Feedback

All year 7 – 9 HALF TERM assessments are the same across the year, with questions designed so all students can achieve something as well as being stretched, lower ability classes may, as the need arises, have some of the tests "held back" to not overly worry them with top level work. Years 10 and 11 will complete HALF TERM tests based on the tier of entry that they are on. Tests are created as a department and looked over by all members to check work covered is in there, and questions are suitable for all students.

Tests are marked to allow for a whole class feedback lesson(s) to take place in final week of HALF TERM. Any queries over awards of marks are flagged and dept. policy is set based on specific criteria (i.e. what to allow/not allow). Shared class teachers will work together to mark to ensure consistency and across the year group samples will be swapped between teachers and checked by HOD/SIC intermittently. Feedback/review lesson is carried out by all teachers in the final week of the HALF TERM and work is recovered based on where the majority of students were able to understand up to. Extension tasks are developed for those ahead of the pack, and extra support given to the weaker students within the lesson.

Pedagogical Approach

Units of Work and Assessment

Units of work should begin with intended learning outcomes linked to programmes of study and should build a progressive and sequential series to achieving these learning outcomes. Each unit of work should focus around teaching to the most able, differentiating downwards to establish different learning outcomes. Learning outcomes should be differentiated based on different starting points of students and their individual needs (informed by student data). Units of work should have built in assessments to assess learning of key concepts, knowledge, understanding and application. All assessments should be modelled on actual terminal examination assessments.

Individual Lessons

Each lesson should be themed around a **Key Learning Question** linked to the unit of work.

Lessons should be differentiated in terms of their outcomes for different learners within the class.

A structured approach to lesson delivery should be applied in order to support deep learning to take place. Activities/support should be differentiated to enable students to achieve learning outcomes within each lesson.

Lesson Delivery.

Maths lessons will begin with a Do Now Starter that will require pupils to problem solve and access previous acquired knowledge, usually in the form of a handout as the pupils enter the class. The next stage of the lesson will involve new content, building upon any previous lessons in the topic, with pupils encouraged to develop ideas themselves through deep questioning and a maths mastery approach. Students will be given time to practice newly discovered skills and to put content into practice. As a topic progresses, students will be exposed to AO2/3 style questions to allow them to develop their skills in application of maths. A vast number of topics will be introduced with the aid of manipulatives in the classroom (e.g. counters, algebra tiles, negative number tiles). These manipulatives will be available to all students and their use will be actively encouraged, whilst they will be “dropped” at pupil discretion.

Cultural capital

MathsLive! trip 2020 being organised with a focus on fundraising to support costs for pupil premium students. Budget each year for PP focussed trips, previous trips include Haydock Park visit for Maths in Action and a trip to Maths in Action in Liverpool to see how maths is used in real life.

UKMT challenges for most able students in Y7-10. Pupils will be exposed to investigative style lessons with real-life foci, using structure akin to those advocated and developed by Dan Meyer, Don Steward et al. This will allow them to see the practical uses for maths and how the different aspects of the subject can be used together not just as a way to answer a narrow question.