بسم الله الرحمن الرحيم

MATHEMATICS HANDBOOK

Al-Khair Secondary School

2021-2022

Contents

"Mathematics equips pupils with uniquely powerful ways to describe, analyse and change the world. It can stimulate moments of pleasure and wonder for all pupils when they solve a problem for the first time, discover a more elegant solution, or notice hidden connections. Pupils who are functional in mathematics and financially capable are able to think independently in applied and abstract ways, and can reason, solve problems and assess risk." (QCDA 2008)

The maths department at Al-Khair aims to equip all pupils with the mathematical knowledge they need to progress to the next stage of their educational journey and to become proficient at the core principles of mathematics. We hope to inspire students to develop an appreciation and passion for the mathematics and to recognise its relevance in everyday life. It is essential that students acquire these skills if they are to have full access to educational opportunities both within and outside the school and be able to fulfil their potential.

Maths Department plan - Intent & Implement and Impact

The teaching of Mathematics at Al-Khair intend to incorporate the following principles:

- Communication & endorsement literature is an important part of mathematics, and of the learning process. To implement this, we will be making emphasis to keywords and how a 'worded question' should be correctly broken down & interpreted via students and translated into mathematical concepts. This will impact the student's ability to understand different question with similar keywords utilised.

- Using technology can be beneficial in both doing and learning mathematics in comparison to just learning from textbooks. In addition, technology influences the relative importance of topics in our modern world as well as tool used to reduce cognitive load on students. This would be implemented via classroom smart board lesson presentations with clear colourful illustrations & having access to online subscriptions such as My Maths from home, which can be used for revision or recap purposes. This will impact and enhance the students' concepts for individual topics.

- Everyone can learn and enjoy mathematics and think mathematically at one level or another. We will try implement the use of white boards to make maths lessons more fun and interactive. Allows students to get away from a typical "boring" textbook learning, which negatively impacts the students cognitive load, hence makes learning more of a 'fun' experience, with a lot of interaction.

- White board and other types of assessment in addition will also help up make accurate assessment of student misconceptions, as well as use of open-end questions and discussions. This impact would allow teachers to teach at a more efficient rate, and have more awareness of students' misconceptions and weakness, provided constant students are consistently assessed.

- Mathematics is an interrelated subject and, rather than emphasising the minutiae, the aim should be to identify the 'big ideas' – the overarching concepts within the

subject. Thus, learning tasks should focus on implementing more than one objective at a time and encourage in-classroom discussions based on "where" & "why" these concepts are used in the 'real world'.

Aims and Objectives

- To foster an enjoyment for learning and an interest in Mathematics.
- To build upon knowledge that students developed in the primary Maths curriculum.
- To develop pupils' mathematical thinking in the process of doing mathematics.
- To show the connections between different mathematical topics, between mathematics and other subjects, and between mathematics and the world.
- To teach pupils to evaluate their findings and communicate their reasoning.
- To provide pupils with a conceptual understanding of various topics and understand the 'bigger picture' whenever appropriate.
- To incorporate technology in the teaching of Mathematics whenever appropriate, including the use of calculators.

British Values

Through the learning of maths students are expected to develop important traits which contribute to the appreciation of the contribution of members of the global community in the development and advancement of mathematics. This will inspire them to work in a spirit of collaboration and teamwork. To achieve in mathematics students are encouraged to cultivate an attitude and outlook of resilience, determination, and collaboration, all of which are part of a values system that create a more positive and harmonious Britain.

Students consider and debate the consequences, advantages, and disadvantages of things such as ethical decisions relating to Maths, business, and economies, and how maths is used and abused as well as how data can be used to change perception, opinion, action and cause reaction. Opportunities to discuss viewpoints are encouraged whilst ensuring students are respectful to others. At the same time, students are reminded of an expectation of respect for all others. Through various forms of mathematical issues, freedom of speech is discussed.

Five Year Mathematics Syllabus

Year 7 planned overview

Autumn Term	Use and working with Numbers, Place Value and Proportion (6 weeks)		Geometry (6 weeks)	
	Operation using Positive and Negative, long/short multiplication and division, Place Value, and ordering	Fractions, Decimal and Percentage equivalence	Angles	Perimeter & Area and 3D shapes volume <mark>Exam week</mark>
Spring Term	Algebraic Thinking (6 weeks)		Other Real Numbers & Ratio (7 Weeks)	
	Sequences & Introduction to algebra & equations	Functions & Equality and equivalence	Operations using Fractions & Decimals	Percentages & Ratio <mark>Exam week</mark>
Summer Term	Reasoning with Number (4 weeks)		Representing Data (4 weeks)	
	Developing number sense	Sets and probability	Prime numbers <mark>Exam week</mark>	Discrete & continuous Data	Recording Data on tally charts	charts & graphs

Year 8 planned overview

Week	1	2	3	4	5	6	7	8	9	10	11	12
Autumn Term	Working with numbers, Geometry & Probability (6 weeks)						Percentages and Sequences (6 weeks)					
	Negative numbers, HCM, LCM, Power & roots		Angles in parallel, quadrilaterals, rotations, and translations		Probability scales, mutually exclusive outcomes		Calculating Percentages, increase/decrease, change in percentages		Flow diagrams, Nth Term and working out Nth Term		<mark>Exam week, target setting and Parents evening</mark>	
Spring Term	Graphs, simplifying number and interpreting data (6 weeks)						Algebra, Congruence & Scaling and Fractions & Decimals (7 weeks)					
	Linear graphs, Quadratic graphs, and their properties		Powers of 10, rounding, significant figures, standard form and multiplying		Pie Charts, Scatter graph, correlation and describing		Algebraic notation, like terms, expand bracket, algebraic expression, and index notation		Congruent shapes, enlarge, shape & ratio and scales		Fraction & Decimal, <mark>Revision & Exam week</mark>	
Summer Term	Proportion and Circles (4 weeks)						Equations & Formulae and Comparing Data (4 weeks)					
	Direct/Inverse proportion, graphs and compare		Parts of circle, circumference, and area		<mark>End of Summer Exams</mark>		Equations with brackets, variables both side, complex and rearranging formulae				Group freq tables, drawing freq diagram, compare and average	

Year 9 planned overview

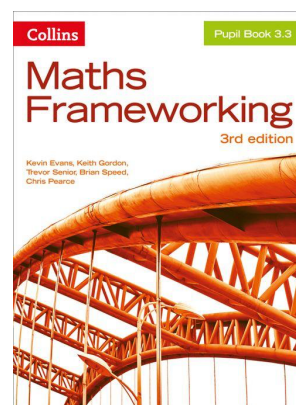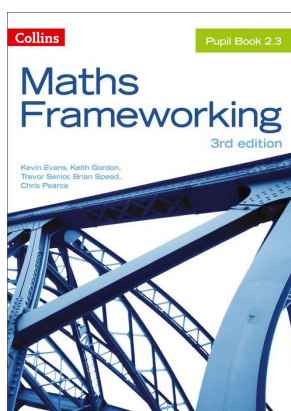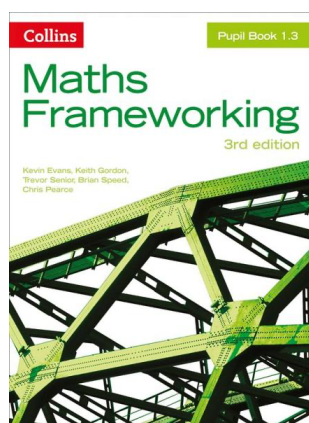| Week	1	2	3	4	5	6	7	8	9	10	11	12
Autumn Term	Numbers & Algebra (6 weeks)						Continue Algebra and INTERPRETING AND REPRESENTING Data(6 weeks)					
	-Number problems and reasoning, - Place value and estimating, -HCF & LCM, Calculating with powers, Powers of 10 and standard form, -surds				-algebraic indices, - expanding and factorising, equations, formulae		-Linear sequences, - nonlinear sequences, more expanding and factorising)		statistical diagrams, - time series, scatter graphs, line of best fit, averages and range, statistical diagrams 2)		Exam week, target setting and Parents evening	
Spring Term	* FRACTIONS, RATIO AND PERCENTAGES (6 weeks)						ANGLES AND TRIGONOMETRY (7 weeks)					
	Adding, subtracting, multiplying, and dividing Fractions/mixed fractions,		Ratio		proportion, - percentages, -FDP)		- Angle properties of triangles and quadrilaterals,		-interior angles of a polygon, exterior angles of a polygons		Pythagoras theorem 1, Pythagoras 2 Revision & Exam week	
Summer Term	CONTINUE ANGLES AND TRIGONOMETRY and GRAPHS (4 weeks)						AREA AND VOLUME & TRANSFORMATIONS AND CONSTRUCTION (4 weeks)					
	- trigonometry 1, -trigonometry 2		-Linear graphs, -graphing rates of change, -real-life graphs, -line segments,		-quadratic graphs, - cubic and reciprocal graphs) End of Summer Exams		-Perimeter and area, - Units and accuracy, - Prisms, -Circles, - Sectors of circles, - Cylinders and Spheres, -Pyramids and Cones - 3D Solids, -Reflection and rotation, -				Enlargement,- Transformations and transformations, - Bearings and scale drawings, - Constructions 1, Constructions 2, Loci	

Year 10 planned overview

Week	1	2	3	4	5	6	7	8	9	10	11	12
Autumn Term	Pythagoras theorem & Trigonometry and Intro to advance trigonometry(6 weeks)						Graphs & Algebra(6 weeks)					
	- Find different sides using Pythagoras theorem right angle triangle - Use trigonometry to find side and angle - Trig ratio to find lengths in right angle triangles - Sine, cos and tan ratio to calculate angles				- Sine Rule - Area of non-right-angle triangle - Cosine rule		- Distance-Time graphs - Velocity time graph - Parallel & Perpendicular lines - Quadratic graphs - Cubic graph		- Factorizing quadratics & coefficient x^2 - Solving quadratic equations - relate equations to graphs		-Quad formula, complete square and solve linear simultaneous equations Exam week, target setting and Parents evening	
Spring Term	Geometry & Measure 2 (6 weeks)						Construction & Transformation on graph (7 weeks)					
	- Perimeter, Area compound shapes - Trapezium		-Volume & Surface area compound shapes. - Circumference & area of circle		Area, Volume, SA of Cylinders, spheres, pyramids, and cones		- Draw plans & elevations of 3D solids - Reflect, translate 2D shape - Describe reflection and translation on graph		- Rotation & Enlargement with different variations via graph - carry out and describe a combination of transformations		scales on maps and scale drawing & problem-solving bearing Revision & Exam week	
Summer Term	Algebra 2 – Equations, inequalities, and multiplicative reason (4 weeks)						Statistics & harder Simultaneous Equations (4 weeks)					
	- solve non-linear simultaneous equations - linear and quadratic equations graphically & via algebra		- Fractional Surds - Algebraic fractions and indices - Repeated percentage change - Decay and growth		- convert between metric units End of Summer Exams		- Sampling, Cumulative frequency, Box plots, drawing histograms, Interpreting histograms, Comparing and describing populations		Revision and solving Harder simultaneous equations: Solving linear and quadratic simultaneous equations Solving linear inequalities			

Year 11 planned overview

| Week	1	2	3	4	5	6	7	8	9	10	11	12
Autumn Term	Advance trigonometry(6 weeks)						Algebraic proof(6 weeks)					
	- Find different sides using Pythagoras theorem right angle triangle - Use trigonometry to find side and angle - Trig ratio to find lengths in right angle triangles - Sine, cos and tan ratio to calculate angles & graphs				- Sine Rule - Area of non-right-angle triangle - Cosine rule -3D problems		-Rearrange formulae -Add/subtract, multiply/divide algebraic fractions -Solve algebraic equations		-Function Notation - composite functions - inverse functions - solve linear simultaneous equation algebraically		Exam week, target setting and Parents evening	
Spring Term	Direct/inverse proportion & Indices, standard form, Surds (6 weeks)						Revision & Past Exam papers (7 weeks)					
	-Direct & inverse proportion - indices, standard form, and surds -Advance surds		-Graph transformation Revision & Exam papers		Revision & Exam papers		Revision & Exam papers		- Revision & Exam papers		Revision & Exam papers	
Summer Term	Revision & Past Exam papers (4 weeks)						Revision & Past Exam papers (4 weeks)					
	Revision & Past Exam papers		- Revision & Past Exam papers		- Revision & Past Exam papers		- Revision & Past Exam papers				Revision & Past Exam papers	

## KEY STAGE 3 PROGRAMME

TEXTBOOKS

Students in years 7, 8 and part of 9 (see grid) will follow the KS3 programme developed in line with the White Rose Mastery Schemes of Learning (SOL).

Alongside the schemes of learning, we provide an assessment for individual schools may want to put some alternatives in place . each block of work and termly assessments . The termly assessments are split into tiers for different levels of attainment

KS4 Foundation
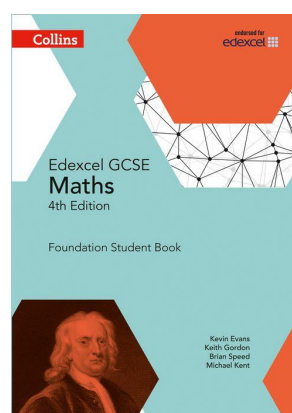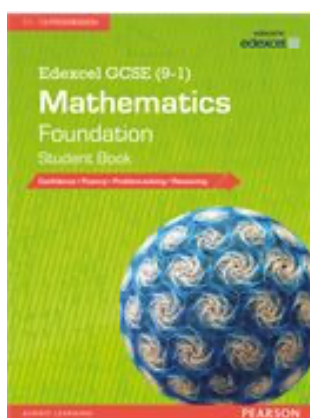
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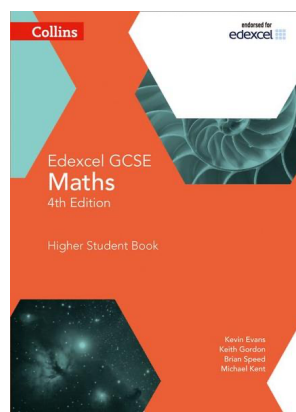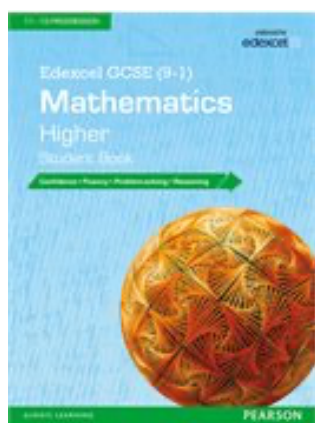
GCSE Breakdown for Key Stage 4

The Maths GCSE is a tiered qualification. There are two tiers:

- Foundation tier - grades 1 to 5 available
- Higher tier grades – 4 to 9 available (grade 3 allowed).

The assessment for each tier of entry consists of three externally-examined papers, all three must be from the same tier of entry. Students must complete all three papers in the same assessment series.

Breakdown of marks in the Foundation tier

50%			50%		
1	2	lower 3	Upper 3	4	5
Approximately equivalent to:			Approximately equivalent to:		
G/F	E	D	D+	C	C/B

Breakdown of marks in the Higher tier

50%			50%		
4	5	6	7	8	9
Approximately equivalent to:			Approximately equivalent to:		
C	C/B	B	A	A/A*	A/A*

Paper 1   *Paper code: 1MA1/1F OR 1MA1/1H.   (33.33% of the total GCSE)

- Externally assessed
- Availability: May/June and November**
- First assessment: May/June 2017

Overview of content

1. Number
2. Algebra
3. Ratio, proportion and rates of change
4. Geometry and measures
5. Probability
6. Statistics

Overview of assessment

- Written examination papers with a range of question types
- **No calculator is allowed**
- 1 hour and 30 minutes (both Foundation and Higher tier papers)
- 80 marks available

Paper 2   *Paper code: 1MA1/2F OR 1MA1/2H   (33.33% of the total GCSE)

- Externally assessed
- Availability: May/June and November**
- First assessment: May/June 2017

Overview of content

1. Number
2. Algebra
3. Ratio, proportion and rates of change
4. Geometry and measures
5. Probability
6. Statistics

Overview of assessment

- Written examination papers with a range of question types
- **Calculator allowed**
- 1 hour and 30 minutes (both Foundation and Higher tier papers)
- 80 marks available

Paper 3   *Paper code: 1MA1/3F OR 1MA1/3H   (33.33% of the total GCSE)

- Externally assessed
- Availability: May/June and November**
- First assessment: May/June 2017

Overview of content

1. Number
2. Algebra
3. Ratio, proportion and rates of change
4. Geometry and measures
5. Probability
6. Statistics

Overview of assessment

- Written examination papers with a range of question types
- **Calculator allowed**
- 1 hour and 30 minutes (both Foundation and Higher tier papers)
- 80 marks available

Impact - Assessment Objectives met in respect to exam criteria

	Foundation %	Higher %
A01 **Use and apply standard techniques**	50	40

Students should be able to:

- accurately recall facts, terminology and definitions
- use and interpret notation correctly
- accurately carry out routine procedures or set tasks requiring multi-step solutions.

	Foundation %	Higher %
A02 **Reason, interpret and communicate mathematically**	25	30

Students should be able to:

- make deductions, inferences and draw conclusions from mathematical information
- construct chains of reasoning to achieve a given result
- interpret and communicate information accurately
- present arguments and proofs
- assess the validity of an argument and critically evaluate a given way of presenting information.

Where problems require students to 'use and apply standard techniques' or to independently 'solve problems' a proportion of those marks should be attributed to the corresponding Assessment Objective.

	Foundation %	Higher %
A03 **Solve problems within mathematics and in other contexts**	25	30

Students should be able to:

- translate problems in mathematical or non- mathematical contexts into a process or a series of mathematical processes
- make and use connections between different parts of mathematics
- interpret results in the context of the given problem
- evaluate methods used and results obtained
- evaluate solutions to identify how they may have been affected by assumptions made.

Where problems require students to 'use and apply standard techniques' or to 'reason, interpret and communicate mathematically' a proportion of those marks should be attributed to the corresponding Assessment Objective.

KS3 eResources

BBC Bitesize KS3:

https://www.bbc.co.uk/bitesize/subjects/zqhs34j

KS4 eResources

BBC Bitesize:

https://www.bbc.co.uk/bitesize/examspecs/z9p3mnb

Pearson Edexcel (Specimen Papers):

https://qualifications.pearson.com/en/qualifications/edexcel-gcses/mathematics-2015-9-1-post-16-resits.coursematerials.html#filterQuery=category:Pearson-UK:Category%2FTeaching-and-learning-materials

Pearson edexcel (Past Papers):

https://www.mathsgenie.co.uk/papers.html

Other eResources

Corbettmaths:

https://corbettmaths.com

Save My Exams:

https://www.savemyexams.co.uk/gcse-maths-edexcel-new/

These are just a few suggestions to help supplement our students' studies but there is a plethora of resources that are freely available on the internet.

Additional information

<u>DEPARTMENT POLICIES</u>

<u>1. Assessment Policy:</u>

There will also be an exam at the end of every term.

The Maths' Department will employ several strategies and techniques to assess your child's progress.

- Pupils' learning will be assessed in lessons via selective questioning and student participation.
- Homework will form a key part of students' learning and a useful tool for assessing students' progress.
- Pupils will sit regular tests (e.g. End of topic test, End of half term test and End of Term test).

<u>2. How can parents support their children?</u>

Maths demands constant practice and revision therefore it is important that your child has a structured and planned time for maths every evening during the week. A 40-minute practice in the evening would help reinforce and retain the learning. Your child should have the correct equipment for all lessons. They will need their scientific calculators and geometry sets for some of the topics. They should make a habit of <u>practicing at home</u>. Please also encourage your child to always check their homework before handing it in as this well help them self-correct and is a vital element in their own self-assessment. All the diagrams including construction work as well as graphs should be done with pencil only. Any missed homework will be flagged up. Pupils must be aware that there is no time to relax; there is always extra work available from the teacher. Their notes/work sheets must be in order, neat and always complete.

To ensure homework is complete; you can track students' homework assignments at https://www.showmyhomework.co.uk

<u>3. Marking policy</u>

- All end of unit tests are marked
- Literacy is marked according to school criteria
- Self and peer assessment are encouraged
- Focus is on GCSE questions in KS4

<u>4. Contact</u>

Please feel free to contact us at the school from 9.00-16:00 or by email if you have any questions or concerns.

Mr Mohsin Khan– Head of Department & teach KS4: mohsin.khan@alkhairschool.org.uk

Ms Laila Jahar – Maths Y9 teacher: laila.jahar@alkhairschool.org.uk

Mr Abdel kader – Maths Y7 & Y8 teacher: abdelkader.guettit@alkhairschool.org.uk