

MATHEMATICS

CURRICULUM MAP



Our subject vision:

Mathematics is a language that we can use to unlock and understand so many different elements of our natural and constructed world. Beyond the intricate beauty of Pure Mathematics itself, it also provides important tools for work in a plethora of different fields. Fitzharrys students will learn fluency in this elegant gateway language as well as the wider Mathematical themes of visualising and representing ideas differently, organising information, generalising, conjecturing and modelling to name but a few.

Being a Mathematician is a way of being; it is a way of interacting with the universe; it is a way of thinking. Fitzharrys students will become curious about the fascinating construct that is Maths and how they can use it to solve problems and explore ideas.

Here at Fitzharrys, students are stretched and supported dynamically to achieve their very best; we use diagnostic assessment to ensure that all students are learning the concepts most pivotal to their progress. We build firm foundations that allow students to take their next Mathematical steps.

Fitzharrys students know that they are learning; progress in Maths is visible, celebrated and shared regularly with home. We ensure our students have mastered the skills and consumed the knowledge they will need for their futures, no matter what course those futures take.

How this document works:

This Curriculum Map will show you everything we do in Maths. It shows the learning journey from year 7 to year 11 and beyond.

At each point it will show you what is covered and how it will be assessed. Click on each topic and it will automatically take you to an explanation of why we learn it.

If you have any further questions, contact Miss Alison Twyford - Head of Maths

MATHS CURRICULUM MAP



Our subject vision:

Aspiration	<p>We firmly believe that Maths is a fascinating and elegant language that everyone can enjoy learning. Not only is it beautiful, but it is also a gateway to so many other subjects and futures for students. We intend to equip all students with a confident grasp of the knowledge, skills and understanding of mathematical concepts that they will need for their futures.</p> <p>Knowledge: Maths is a series of building blocks, every new block relying on the soundness of the one beneath it for a firm footing to the next. Our diagnostic curriculum ensures that we enable students to fill gaps and build new bricks in every lesson. Teachers are empowered to plan for individual student needs and aim high for all.</p> <p>Skills: Students will learn to model situations, to generalise patterns and create rules. They will learn to follow Mathematical instructions, to present information effectively and to analyse data. These are just some of the transcendent skills that students will take forward into their lives after studying Maths at Fitzharrys.</p> <p>Understanding: Students will leave Fitzharrys Maths lessons with a sense of achievement, and a clear understanding of their progress. They will have a confidence with numbers, which is essential to all walks of life. Students will be able to communicate and analyse data effectively and have the versatility to apply their Mathematical skills to varied future contents. They will have an understanding of our number system, shapes, proportionality, algebra and statistics; most importantly they will know how all these amazing elements connect and intertwine.</p>
Opportunity	<p>Within the classroom: In Maths lessons, students will regularly check their understanding both at the beginning and end of topics. This not only allows us to provide the optimum balance of challenge and scaffold as teachers, but it also encourages students to be strong independent learners. Our curriculum spirals through the different areas of Maths - Geometry and Measures, Number, Algebra, Statistics, Ratio & Proportion. There is a strong focus on knowledge (Maths Memory) and skills to ensure strong foundations which enable application to new contexts.</p> <p>Beyond the classroom: Alongside the curriculum students can participate in:</p> <ul style="list-style-type: none"> • National Maths Challenges • Girls in Maths days • Mathematical lectures • Further Maths GCSE • Mathematical Student mentoring or leadership opportunities
Integrity	<p>Knowledge: Students will have the Mathematical knowledge to empower them to see statistics and finances clearly, understanding how people can use them to influence and even manipulate others.</p> <p>Skills: The skills of modelling, visualising and presenting numerical arguments will allow students to express themselves, explore complex ideas and understand others' ideas and perspectives.</p> <p>Understanding: The world is full of Maths, a firm understanding of what you are consuming helps you to craft intelligent and measured opinions. Students will not be taken in by questionable statistics or duped by dubious deals. They will have an understanding of finances and statistics that will support them to be active, knowledgeable citizens who can make measured decisions in their future.</p>

Maths
Further Maths
All Sciences
Art & Design
Architecture
Computer Science
Artificial intelligence
Engineering

Further study

Teacher
Computer Scientist
Economics
Banking
Architecture
Engineering
Scientific roles
Medicine

Career pathways

SUBJECT CURRICULUM MAP: KS5



REVISION

Summer exams

21. Hypothesis testing

- Testing correlation
- Testing normal distribution

20. Probability & continuous random variables

- Normal distribution
- Conditional probability
- Modelling

19. Forces

- Statics
- Dynamics
- Moments

18. Motion in two dimensions

- Forces
- Acceleration
- Gravity

17. Numerical methods

- Newton Raphson
- Iteration
- Change of sign
- Numerical integration

16. Integration & differential equations

- Standard integrals
- Substitution
- Integrate by parts
- Rational functions
- Differential equations

15. Differentiation

- Further differentiation
- Quotient & product rules
- Chain rule
- Implicit
- Parametric
- Inverse functions

January Mock Exams

Year 13

11. Hypothesis Testing

- Formulating a test
- Critical regions

12. Algebra

- Parametric equations
- Functions
- Modulus
- Algebraic fractions

13. Sequences

- Arithmetic
- Geometric
- Binomial series

14. Trigonometric identities

- Radians
- Reciprocal & inverse functions
- Compound angles
- Equivalent forms

10. Probability & discrete random variables

- Probability
- Binomial distribution

9. Collecting, representing & interpreting data

- Work with averages
- Statistical diagrams
- Statistical analysis

8. Forces & Newton's law

- Forces
- Dynamics
- Gravity

7. Units & Kinematics

- SUVAT
- Graphs
- SVA

6. Vectors

- Properties of vectors
- Components

5. Exponentials & Logarithms

- The laws of logs
- Exponential functions
- Curve fitting
- Solving contextual exponential problems

4. Differentiation & Integration

- First principles
- Differentiation
- Tangents & Normals.
- Turning points
- Rates of change
- Integration
- Areas under curves

3. Trigonometry

- Identities
- Sine and cosine rules
- Solving equations

2. Polynomials & the Binomial Theorem

- Algebraic division
- Graph sketching
- The Binomial Theorem
- Manipulating polynomials

1. Algebra

- Be confident with all algebra needed for the course
- Surds & indices
- Quadratics and other equations
- Coordinate geometry
- Inequalities

Year 12

Extra curricular talks, lecture and other opportunities are regularly shared with students.

The Senior Maths challenge and Team maths challenges take place once a year

Parents can sign up to see a detail break down of each assessment. Teachers keep in regular contact with parents to ensure all students are fully supported.

Topics are taught by different teachers and may be taught in a different order depending on the split of teaching hours.

SUBJECT CURRICULUM MAP: KS4



Maths

Further study

Further Maths

Sciences

Art & Design

Computer Science

All A-Levels and many college courses require grade 4 and above. Without a grade 4 at GCSE you will need to continue to study Maths GCSE until you are 18.

Teacher

Career pathways

Computer Scientist

Economics

Banking

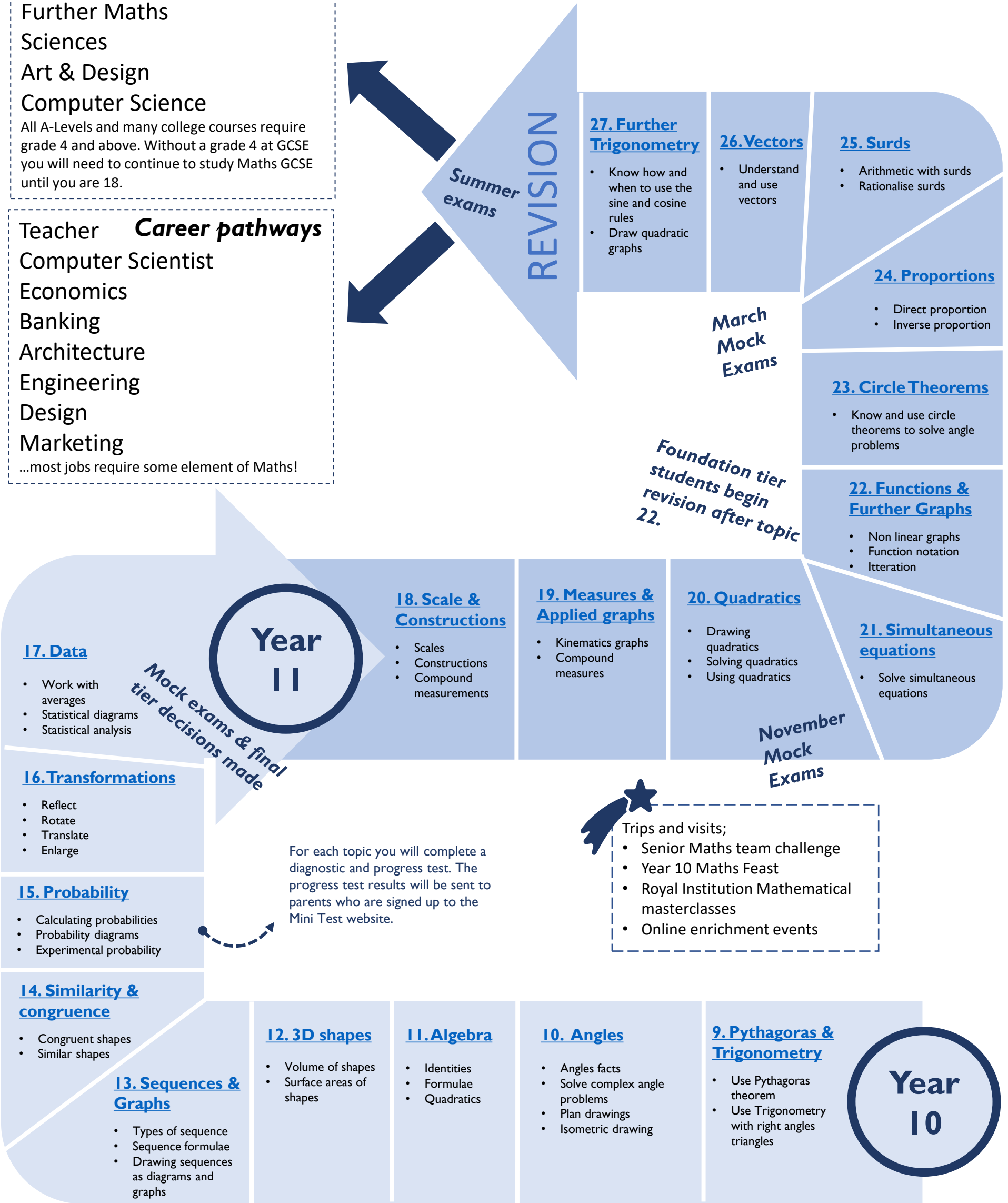
Architecture

Engineering

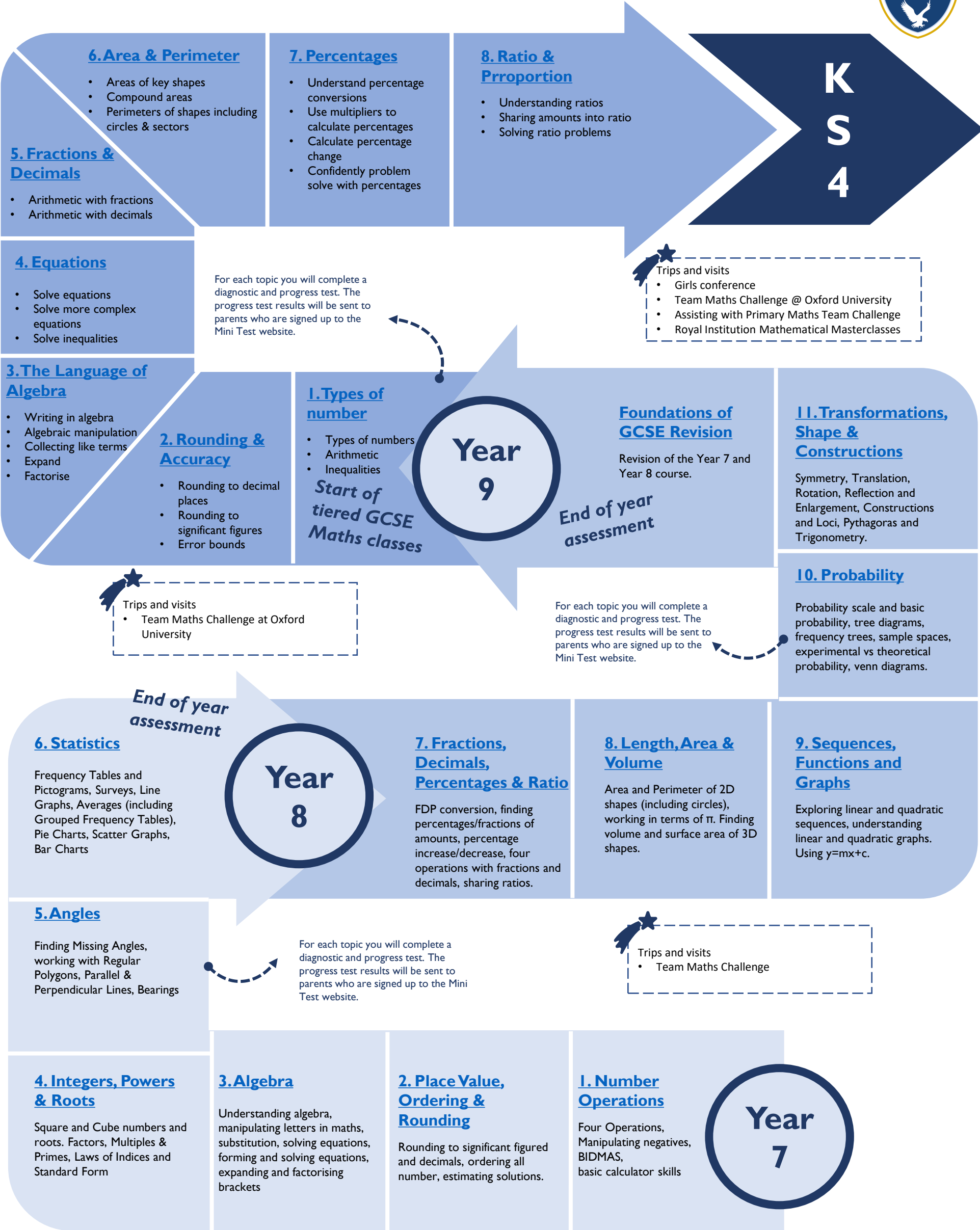
Design

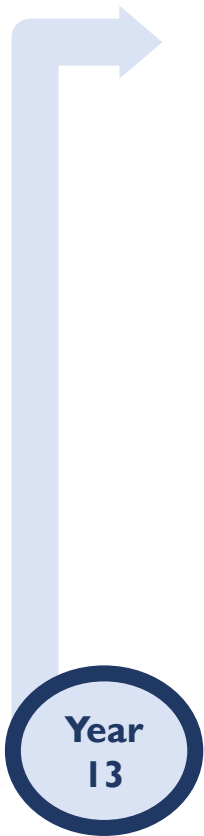
Marketing

...most jobs require some element of Maths!



SUBJECT CURRICULUM MAP: KS3





19

Forces

Why this?

Looking at more complex force problems with connected particles, moments and inclined planes.

Why now?

This is the last mechanics element of the course. It follows from our study of Newton's laws in year 1.

16

Integration & Differential equations

Why this?

Circling back to these crucial calculus topics and learning methods to work with more challenging equations allows us to solve more complex problems

Why now?

Differential equations allows us to solve contextual problems linked to growth and decay amongst other things

20

Probability & continuous random variables

Why this?

We can use data to assess the validity of probability models and make informed decisions.

Why now?

This allows us to test different distributions

17

Numerical methods

Why this?

This topic looks at ways that we can use numerical methods to solve equations that we can't solve any other way.

Why now?

The final pure topic in year 2 Maths. This completes the A-Level study of ways to solve equations

21

Hypothesis testing

Why this?

Why now?

18

Motion in two dimensions

Why this?

Modelling projectile motion once again allows us to solve more complex problems.

Why now?

This topic, also studies in Physics, means that we can solve further mechanics problems.



Year
13

13

Sequences

Why this?	Working with different types of sequences allows us to model real life situations and solve complex problems.
Why now?	This topic uses algebraic manipulation built up in year 1 A-level Maths.

14

Trigonometry

Why this?	Learning more complex trigonometric identities allows us to manipulate and solve harder equations
Why now?	To integrate and differentiate trigonometric functions you need to first manipulate them,

15

Differentiation

Why this?	How to differentiate more complex equations means that we can continue to study more complex rates of change.
Why now?	It is essential to support the next topic - integration.

10

Probability & discrete random variables

Why this?	Solving problems related to probability and the binomial distribution.
Why now?	These skills allow us to progress to modelling problems involving probability.

11

Hypothesis testing

Why this?	We need to be able to test ideas and make informed decisions and hypothesis testing is the foundation for this.
Why now?	Understanding why to accept or reject a hypothesis allows us to test a distribution

12

Algebra

Why this?	More essential time spent on the language of algebra, which opens doors to the rest of the topic.
Why now?	These are key skills for the year 2 A-level content

7

Units & Kinematics

Why this?	Modelling movement through the study of graphs and motion equations
Why now?	This topic has a strong cross over with physics and is the foundation to engineering

8

Forces & Newton's Law

Why this?	More modelling of movement and the balance of forces.
Why now?	Following the study of motion equations we need to see the effect that different forces have

9

Collecting, representing & interpreting data

Why this?	Data collection and analysis is the foundation of many kinds of research.
Why now?	Being able to interpret data is important when testing hypotheses.

4

Differentiation & Integration

Why this?	Differentiation is the study of rates of change and integration enables us to find areas under curves as well as being the inverse of differentiation.
Why now?	Calculus forms a large part of the A-Level course and allows us to solve further problems.

5

Exponentials & logs

Why this?	A further way of modelling and solving problems such as growth and decay – often used in scientific study
Why now?	We work with logs and exponential functions later in the course

6

Vectors

Why this?	Vectors have both magnitude and direction. Understanding how to work with them opens up new ways of solving problems
Why now?	This work is useful for mechanics as it splits forces into components

Year
12

1

Algebra

Why this?	These skills are essential for A-Level study as all other topics require you to use algebra as a language to work in
Why now?	Students need to be secure before they do any other topics

2

Polynomials & Binomial

Why this?	This topic investigates expansions and other manipulations of algebraic expressions
Why now?	Again these skills are essential for moving forward so they are covered early in the course

3

Trigonometry

Why this?	Further understanding about trigonometric identities and graphs allows you to solve trigonometric equations.
Why now?	This allows students to solve and manipulate equations they will meet in later topics

25

Further Trigonometry

Why this?	Following from trigonometry in right angled triangles this topic allows you to find angles and sides in any triangles
Why now?	Higher level topics prepare students for A-Levels

26

Vectors

Why this?	Vectors are quantities with magnitude and direction. This is an important construct for A-Level problems
Why now?	Higher level topics prepare students for A-Levels

27

Surds

Why this?	Surds are exact values. This is something that you need to be confident working in. Using surds in calculations increases accuracy greatly.
Why now?	Surds are visited briefly in the first topic. Time to recap and advance to harder skills essential for A-Level Maths

Year
11



Year
11

Year
10

Year
9

24

Proportions

Why
this?

Another essential Mathematical concept that is woven through all that we do.

Why
now?

Understanding proportion will allow students to refresh and stretch their number skills.

19

Measures & Applied Graphs

Why
this?

Graphs allow us to understand and share maths more easily.

Why
now?

This covers the last section of the foundation tier. After this topic Foundation tier students will begin revision

18

Scale & Constructions

Why
this?

Compound measures will help you to solve problems in the Sciences. Whereas constructions can help with design and art.

Why
now?

This topic uses specialist equipment such as compasses.

13

Sequences & Graphs

Why
this?

Understanding the patters that we see in the world is an integral part of understanding the world around is.

Why
now?

Understanding sequences allows us to draw graphs

12

3D Shapes

Why
this?

Many Scientific problems require an understanding of volume. It is also essential for construction.

Why
now?

Back to shape for a change following our forays into algebra.

7

Percentages

Why
this?

Another essential Maths skill. Potentially the most visible for all of our daily lives.

Why
now?

You will use percentages in other GCSE subjects

23

Circle Theorems

Why
this?

Angles trapped in circles have specific properties that we need to learn about.

Why
now?

Using students understanding of proportion and applying it to geometry

20

Quadratics

Why
this?

Another essential Mathematical concept looking at higher order equations

Why
now?

This an integral skill for further Mathematical study

17

Data

Why
this?

Statistical diagrams are an important part of our everyday lives and essential to all future studies/jobs.

Why
now?

As we come to then end of the foundation tier content we will complete the statistics content

14

Similarity & Congruence

Why
this?

Another element of art, design and engineering. How shapes can vary is an interesting part of geometry.

Why
now?

Similar shapes are a prequal to proportion.

11

Algebra

Why
this?

Accessing quadratic equations allows you to solve more complex Mathematical problems.

Why
now?

Time to re-visit algebra in year 10 and look at working with more complex equations

8

Ratio

Why
this?

The most assessed question in GCSE Maths. Ratio is very common in real life problem solving.

Why
now?

Ratio is another very versatile topic that links to many others.

22

Further Equations & Graphs

Why
this?

Graphs are images of equations, this topic allows us to look at more complex ones and re-visit linear graphs.

Why
now?

Foundation tiers last element of equations and graphs is completed

21

Simultaneous Equations

Why
this?

Solving linked equations once again allows us to solve a different kind of Mathematical puzzle.

Why
now?

An extension of solving equations that doesn't appear much in foundation tier, but is an essential skill for A-Level study.

16

Transformations

Why
this?

How shapes can changes shapes and size is an integral part of design in all forms.

Why
now?

A fairly straightforward topic. Placed towards the end of year 10 to finish off Foundation tier.

15

Probability

Why
this?

Students can understand the probabilities of things happening and how to display those in a number of ways.

Why
now?

We aim to fit this in before the end of year 10 mocks so that

10

Angles

Why
this?

Angles and plan drawings are important for a plethora of jobs. They are also useful for home DIY!

Why
now?

This topic is key to geometry problems

9

Pythagoras & Trigonometry

Why
this?

Finding sides and angles in right angles triangles is used in many areas, including architecture and design.

Why
now?

After a lot of number topics is it nice to delve into some geometry!



Year
9

6

Area & Perimeter

Why this? Learning how to work with 2D shapes accurately allows you to solve problems in many contexts including finding volumes.

Why now? Another essential skill that later topics build upon.

1

Types of Number

Why this? Knowing how to work with different types of numbers accurately is key to Maths.

Why now? This is important for all other topics

5

Fractions & Decimals

Why this? Real life problems don't usually give you nice integer answers.

Why now? You need to be confident to work with all types of numbers when solving problems.

2

Rounding & Accuracy

Why this? Accuracy is important in Maths. You need to understand the implications of rounding.

Why now? You will use these skills when working with answers through out your GCSE

4

Equations

Why this? Solving equations allows you to find unknown values and solve problems.

Why now? Equations are found in so many different contexts. Learning this skill early is essential

3

The Language of Algebra

Why this? Learning to write in algebra is a real gateway skill. Algebra is the language of Maths.

Why now? You will use algebra in most of the topic that you study in one form or another.

10

Probability

Why this? Probabilities underpin things like election polls, it's important to understand how this works.

Why now? A pleasant change in pace from previous topics, some good opportunities to problem solve.

11

Transformations, Shape & Construction

Why this? Transformations and constructions are useful for design projects and shape stretches previous skills.

Why now? This concludes the Foundations of GCSE course with a variety of geometry skills.

12

Fundamentals of Maths Revision

Why this? It is important to refresh all the skills learnt so far across KS3.

Why now? This is revision ahead of the end of course assessment to enable us to reassess classes moving into Year 9.

Year
8

7

Fractions, Decimals, Percentages & Ratio

Why this? Real life problems often give non integer answers and ratio can be used to understand many concepts.

Why now? Refreshes number skills at the start of Year 8.

8

Length, Area & Volume

Why this? Geometry problems are useful both in GCSE and in real life, in many careers and DIY projects.

Why now? This extends geometry knowledge in Year 8 and encourages practice of algebra from Year 7.

9

Sequences, Functions and Graphs

Why this? These topics are intrinsically linked, this topic explores their connections and how they can be used together.

Why now? This builds on the algebra and fractions & decimals topic and stretches knowledge further.

6

Statistics

Why this? Statistics are all around us – we are bombarded by them. Learning statistics helps pupils appreciate the modern world.

Why now? This helps pupils answer new questions in maths and helps them understand data in other subjects.

5

Angles

Why this? Angles are all around us – developing an appreciation of the rules will help in many potential careers and home projects.

Why now? This topic continues to encourage curiosity and allows pupils to use some of their algebra knowledge.

4

Integers, Powers & Roots

Why this? This number topic covers a lot of key skills and teaches links between many different aspects of mathematics.

Why now? This topic is placed here to encourage pupils to become intellectually curious about mathematics.

Year
7

1

Number Operations

Why this? These are the key skills which underpin all other mathematics.

Why now? This ensures everyone has a strong start to their maths career at Fitz

2

Place Value, Ordering & Rounding

Why this? It is crucial to round and give answers to degrees of accuracy. Also ordering is key for many question types.

Why now? This continues to ensure we have successful and positive starts to Year 7

3

Algebra

Why this? Many KS3 and GCSE skills rely on strong algebra knowledge and being able to manipulate equations and formulas.

Why now? This opens many other areas of mathematics questions, also means we can practice these skills repetitively.