

KS3 Be ambitious in Maths

Powerful knowledge is knowledge that helps children understand and interpret the world through the lens of a hopeful future, whilst unlocking doors to life beyond their immediate experiences in the classroom.

Powerful knowledge Summer 2: Develop a deep understanding of movement, position, and direction by transforming shapes, working with vectors, and using bearings. These skills help them describe and predict how objects move and change in space—essential for applications in navigation, map reading, design, and engineering.

Film or TV: **The Martian (12A)**
This film follows an astronaut stranded on Mars who uses maths, engineering, and navigation to survive and communicate with Earth. The use of vectors, bearings, and spatial planning is critical—especially in scenes involving rover travel, orbital mechanics, and rescue missions. It's an excellent example of how mathematical understanding of space and direction has real-life, high-stakes applications.
<https://www.youtube.com/watch?v=ej3ioOneTy8> (Trailer) (rent on Amazon video)



Film or TV: **Mission Control: The Unsung Heroes of Apollo**
This documentary shows how NASA engineers used mathematical models, vectors, and trajectory calculations to guide Apollo missions, highlighting real-world applications of transformations and direction in a space context.
<https://www.youtube.com/watch?v=GVDTSfyFTTY> (Trailer) (rent on Amazon video)

Powerful knowledge Summer 1: Use formulas and spatial reasoning to calculate lengths, areas, surface areas, and volumes of 2D and 3D shapes. This helps to understand how geometry models the real world—from designing packaging to planning construction—by applying mathematical thinking to solve practical problems with accuracy and efficiency.

Powerful knowledge Spring 1: Develop the ability to understand and evaluate risk and uncertainty by using probability. Analyse possible outcomes—including complex or dependent events—to make informed decisions in real-life contexts, such as games of chance, weather forecasts, or business planning.

Powerful knowledge Spring 2: Use their understanding of shapes, angles, and space to solve practical problems, from designing floor plans to interpreting maps. By combining geometry with algebra and construction techniques, they learn how mathematics helps model, plan, and make decisions in the real world.



Visit: **Jodrell Bank Discovery Centre:** Focuses on astronomy and physics, but includes lots of maths-based thinking around measurements, scale, and data interpretation.

Project/ enrichment task: **Data Science Unit – Oak National Academy**
This unit guides students through the PPDAC (Problem, Plan, Data, Analysis, Conclusion) cycle, teaching them how to investigate problems using data. It includes lessons on data collection, analysis, and drawing conclusions, providing a comprehensive introduction to data science concepts.
[Unit: Data Science | KS3 Computing | Oak National Academy](#)



Powerful knowledge Autumn 1: To be able to manipulate percentages, and to understand and apply percentage change in order to understand and express trends and changes in socio-economic terms. To be able to analyse and interpret trends in data sets and to compare data sets meaningfully, using measures of spread and averages.

Powerful knowledge Autumn 2: To be able to interpret data that is summarised and represented in a variety of ways (tables and charts), and to represent data using charts and tables, as well as to compare data sets that have been represented in this way.



Book or article: **Reaching for the Moon**: the autobiography of NASA mathematician Katherine Johnson. Available in the school Library. Katherine Johnson used geometry and data analysis to calculate spacecraft trajectories and interpret flight data, showing how maths can solve real-world problems in space exploration.
<https://uk.accessit.online/alt01/#!resources/searchresult>

Podcast: **Data in the Sandbox**
Overview: A mini-series designed for kids, introducing the basics of data analytics through fun and relatable examples.
Why It's Great: Explains complex concepts in a simple manner, making data science accessible and interesting for young listeners. [Data \[in the\] Sandbox Episode 1: Analytics... Huh?! - Alter Everything | Podcast on Spotify](#)



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Powerful knowledge Summer 2: Solve and represent inequalities to describe a range of possible solutions, not just one answer. This helps them make sense of real-life situations involving limits or conditions, such as budget constraints in business or safe ranges in science and engineering.

Powerful knowledge Spring 2: Represent and compare relationships clearly, apply reasoning to scale and measurement, and see how these ideas connect across maths, maps, and everyday situations using ratio, proportion, and Pythagoras' theorem.

Powerful knowledge Summer 1: Use graphs to represent and understand relationships between variables, helping them to interpret patterns, make predictions, and solve problems. Through real-life examples like distance-time graphs or currency conversion charts, they see how algebra and coordinates connect to movement, change, and comparison across subjects like science, geography, and economics.

Powerful knowledge Spring 1: Use algebra to represent and solve problems, helping them to understand the structure of mathematical relationships. Develop the ability to rearrange and solve equations, showing how different parts of a formula are connected and how changes affect outcomes.



Film or TV: **21 (12A)** This film centres around a group of MIT students and an algebra professor who use their mathematical skills to develop a card counting strategy for blackjack in Las Vegas, highlighting the practical application of algebra in a real-world scenario.
<https://www.youtube.com/watch?v=oqkdB7It5Go> (trailer) (rent on Amazon video)



Project/ enrichment task: solving puzzles in the Alan Turing Cryptography Competition by applying logical reasoning, number patterns, algebra, and problem-solving skills. Students use these skills to crack codes and decipher messages, just as Alan Turing did during World War II, making maths fun, challenging, and relevant to real-world applications.
<https://www.maths.manchester.ac.uk/cryptography/>

Powerful knowledge Autumn 2: Form, substitute and calculate in real life contextually equations to predict and model problems.

Powerful knowledge Autumn 1: Master the foundations of algebra which underpins all further knowledge to form, solve and substitute.

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Book or article: **Alan Turing, biography.** Available in the school Library. Alan Turing's work uses Key Stage 3 algebra concepts, such as using variables and equations, to represent logical processes and solve problems in computing and codebreaking.
<https://uk.accessit.online/alt01/#!resources/searchresult>



Podcast: **Maths Appeal.** Hosts: Bobby Seagull & Susan Okereke
Why it's great: Fun, accessible episodes that cover real-world maths, problem-solving, and key concepts.
<https://open.spotify.com/show/3lbZnnrlgKuKdr7MQTSy3c>



Film or TV: **Film: Hidden Figures (PG)**—Highlights how math (including calculations with numbers, trajectories, and engineering) is used in real-world NASA missions, making numeracy inspiring and relevant.
<https://www.youtube.com/watch?v=5wfrDhgUMGI> (trailer) (available on Disney+)

Powerful knowledge Summer 2: Understand how and why we measure things — using systems like metric units to compare, calculate, and solve problems in everyday life, science, and technology. Be able to choose the right units, make accurate estimates, and understand the importance of measurement in the real world.

Powerful knowledge Summer 1: Compare quantities using percentages to make and support judgements in financial and statistical decision making.



Podcast: **A Problem Squared**
Hosts: Matt Parker (stand-up mathematician) & Bec Hill
Why it's great: Solves quirky real-life problems using maths.
<https://open.spotify.com/show/7Hp5QDk9PsWvEXtcsDz34a>

Powerful knowledge Spring 2: Open opportunities in the sciences with a fundamental understanding of working with very small or large numbers.



Book or article: **Beyond infinity**: an expedition to the outer limits of the mathematical universe Available in the school Library.
<https://uk.accessit.online/alt01/#!resources/searchresult>



Book or article: **The music of the primes: why an unsolved problem in mathematics matters** Available in the school Library.
<https://uk.accessit.online/alt01/#!resources/searchresult>

Powerful knowledge Autumn 1: Check calculations using approximation and estimation, including answers obtained using technology, including evaluation of results obtained

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Powerful knowledge Spring 1: Apply perimeter and angle fact calculations when mathematically modelling and estimating. Spot and use sequences to model and estimate future outcomes.

Powerful knowledge Autumn 2: Move freely and confidently between fractions and decimals to calculate and support predictions, explanations, and conjectures in the workplace.



Project/ enrichment task: The **Nrich** website has a variety of different tasks to help you think deeper.
<https://nrich.maths.org/number>

welcome