

A-LEVEL MATHS

Calculators:

All A-Level maths students at Rodillian are loaned a Casio graphical calculator for the duration of their studies.



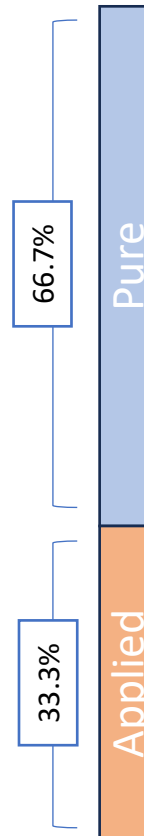
Exam board:

We follow the [Pearson Edexcel 9MA0 specification](#).



Students will have free electronic access to the textbooks written by Pearson.

Topics covered:



Trigonometry: This includes understanding trigonometric functions, identities, and solving trigonometric equations.

Calculus: Covering differentiation, integration, and applications like optimisation and rates of change.

Algebra: Topics encompass proof, quadratic equations, indices, surds, inequalities, functions, sequences, and series.

Geometry: Exploring geometric concepts, including coordinate geometry and graphical transformations.

Mechanics: Exploring forces, motion, moments, Newton's laws and applying mathematical models to real world problems.

Statistics: Includes sampling methods, data presentation and interpretation, probability, statistical distributions and hypothesis testing.

Topic 1: Indices

The next 4 pages cover some of the **key topics** you will need for A-level Maths. Please **complete each page over the summer** to prepare for your first weeks of A-level Maths.

Try these without a calculator:

1). 8^3

2). 8^{-2}

3). $8^{\frac{1}{3}}$

4). $\left(\frac{64}{25}\right)^{-\frac{3}{2}}$

5). $\frac{x^3 \times x^4}{x^2}$

6). $(2x^3)^4$

7). $\frac{9x^{\frac{1}{2}}}{(27x^{-2})^{\frac{2}{3}}}$



Killer Question Alert!



Mark your work.



How did you do?

Need some help?



Watch the video solutions and get some follow up questions at: <https://youtu.be/K4o7wae4Ddk>

Need further practice?



Corbettmαths

Corbett Maths clips: [173](#), [174](#), [175](#)

Website: corbettmaths.com/contents

Indices (numerical) [Video 172](#) [Practice Questions](#) [Textbook Exercise](#)

Indices: fractional [Video 173](#) [Practice Questions](#) [Textbook Exercise](#)

Indices: laws of [Video 174](#) [Practice Questions](#) [Textbook Exercise](#)

Indices: negative [Video 175](#) [Practice Questions](#) [Textbook Exercise](#)

Corbett Maths is a free to use website.

No login is required.

Each topic has a video, textbook exercise and practice exam questions.

Visit:

<https://corbettmaths.com/contents/>

Taking it further!

Bridging to A-Level

Q1). $\left(\sqrt{\sqrt{\sqrt{\sqrt{2}}}}\right)^{48} = ?$

Q2). Solve for x

$$8^x = \frac{2^{56} - 4^{26}}{30}$$

Answers:

1). 512 2). $\frac{1}{64}$ 3). 2 4). $\frac{125}{128}$ 5). x^7 6). $16x^{12}$ 7). $x^{\frac{6}{11}}$

Topic 2: Expanding

Expand and simplify:

1). $3(x - 2y)$

2). $(2x - 3)(3x + 5)$

3). $(x - 2)^2(x + 5)$

4). $(2 - \sqrt{3})(5 + 2\sqrt{3})$



Danger

Killer
Question
Alert!

**Mark
your
work.**



**How
did you
do?**

Answers:

1). $3x - 6y$
2). $6x^2 + x - 15$
3). $x^3 + x^2 - 16x + 20$
4). $4 - \sqrt{3}$

Need some help?



Watch the video solutions and get some follow up questions at: <https://youtu.be/8zNH1-ZSzik>

Need further practice?



Corbettmαths

Corbett Maths clips: [13](#), [14](#), [15](#), [308](#)

Website: corbettmaths.com/contents

Algebra: expanding brackets [Video 13](#) [Practice Questions](#) [Textbook Exercise](#)

Algebra: expanding two brackets [Video 14](#) [Practice Questions](#) [Textbook Exercise](#)

Algebra: expanding three brackets [Video 15](#) [Practice Questions](#) [Textbook Exercise](#)

Surds: expanding brackets [Video 308](#) [Practice Questions](#) [Textbook Exercise](#)

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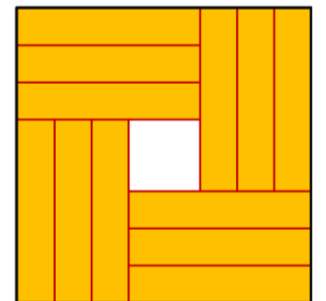
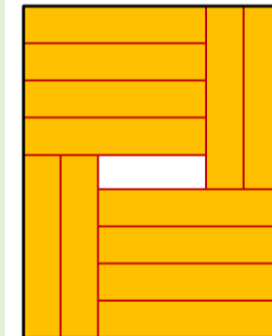
<https://corbettmaths.com/contents/>

Taking it further!

Which has the bigger total area, the rectangle or the square (including the centre bit)?

Can you prove it?

Bridging to A-Level



Topic 3: Surds

Try these without a calculator:

1). Simplify $\sqrt{240}$

2). Simplify $\sqrt{75} - \sqrt{12}$

3). Rationalise the denominator:

$$\frac{2}{\sqrt{6}}$$

4). Rationalise the denominator:

$$\frac{2}{1 + \sqrt{6}}$$



Danger

Killer
Question
Alert!

Mark
your
work.



How
did you
do?

Answers:

4). $\frac{5}{2\sqrt{6}-2}$

3). $\frac{3}{\sqrt{6}}$

1). $4\sqrt{15}$

Need some help?



Watch the video solutions and get some follow up questions at: <https://youtu.be/vidLbOrdOCs>

Need further practice?



Corbettmαths

Corbett Maths clips: [305](#), [306](#), [307](#), [308](#)

Website: corbettmaths.com/contents

Surds: intro, rules, simplifying [Video 305](#) [Practice Questions](#) [Textbook Exercise](#)

Surds: addition/subtraction [Video 306](#) [Practice Questions](#) [Textbook Exercise](#)

Surds: rationalising denominators [Video 307](#) [Practice Questions](#) [Textbook Exercise](#)

Surds: expanding brackets [Video 308](#) [Practice Questions](#) [Textbook Exercise](#)

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Taking it further!

Bridging to A-Level

Alex worked out some sums using surds using a spreadsheet as was surprised by the answer to this one!

Can you find a way to work out the sum without a spreadsheet or a calculator?

$$\frac{1}{\sqrt{1} + \sqrt{2}} + \frac{1}{\sqrt{2} + \sqrt{3}} + \dots + \frac{1}{\sqrt{99} + \sqrt{100}}$$

Topic 4: Factorising

Factorise fully:

1). $2xy - 4x$

2). $x^2 - x - 12$

3). $2x^2 - 5x + 2$

4). $4x^2 - 9$

Answers:

$(x + 3)(2x - 4)$

$(x + 3)(x - 4)$

$(2x - 1)(x - 2)$

$(2x + 1)(2x - 2)$

**Mark
your
work.**



**How
did you
do?**

Need some help?



Watch the video solutions and get some follow up questions at: <https://youtu.be/3vRiD5Vh6ls>

Need further practice?



Corbettmαths

Corbett Maths clips: [117](#), [118](#), [119](#), [119a](#), [120](#)

Website: corbettmaths.com/contents

Factorisation [Video 117](#) [Practice Questions](#) [Textbook Exercise](#)

Factorisation: quadratics [Video 118](#) [Practice Questions](#) [Textbook Exercise](#)

Factorisation: quadratics harder [Video 119](#) [Practice Questions](#) [Textbook Exercise](#)

Factorisation: splitting the middle [Video 119a](#) [Textbook Exercise](#)

Factorisation: difference of 2 squares [Video 120](#) [Practice Questions](#) [Textbook Exercise](#)

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Each topic has a video, text book exercise and practice exam questions.

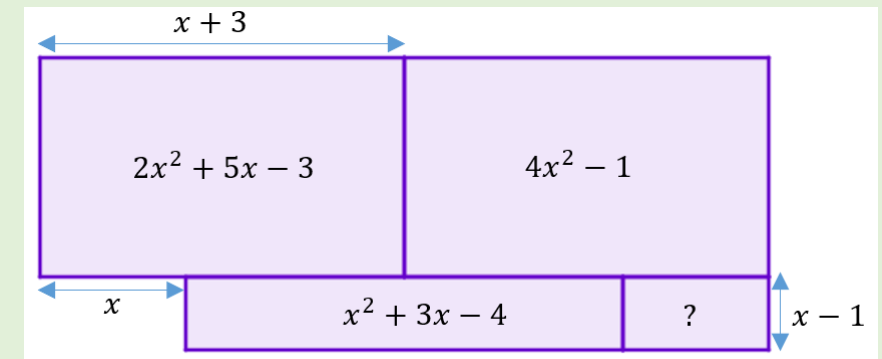
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Taking it further!

Bridging to A-Level

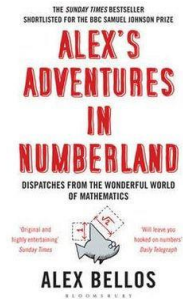
Can you work out the missing area from the side lengths and areas given?



Summer Reading (watching and listening too!)

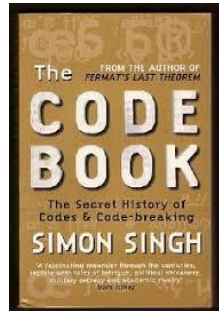
There are so many brilliant books, podcast, films and YouTube channels about maths. Here are a few of our favourites and when you are done with these, we have many, many more suggestions... please ask!

Books:

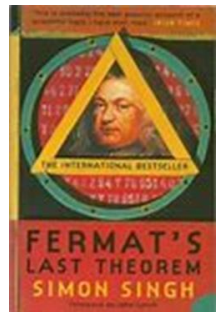


Mathematical ideas underpin just about everything in our lives: from the surprising geometry of the 50p piece to how probability can help you win in any casino. In search of weird and wonderful mathematical phenomena, **Alex Bellos** travels across the globe and meets the world's fastest mental calculators in Germany and a startlingly numerate chimpanzee in Japan.

Packed with fascinating, eye-opening anecdotes, **Alex's Adventures in Numberland** is an exhilarating cocktail of history, reportage and mathematical proofs that will leave you awestruck.



Simon Singh offers the first sweeping history of encryption, tracing its evolution and revealing the dramatic effects codes have had on wars, nations, and individual lives. From Mary, Queen of Scots, trapped by her own code, to the Navajo Code Talkers who helped the Allies win World War II, to the incredible (and incredibly simple) logistical breakthrough that made Internet commerce secure, **The Code Book** tells the story of the most powerful intellectual weapon ever known: secrecy.



When Cambridge mathematician Andrew Wiles announced a solution for **Fermat's last theorem** in 1993, it electrified the world of mathematics. After a flaw was discovered in the proof, Wiles had to work for another year--he had already laboured in solitude for seven years--to establish that he had solved the 350-year-old problem. **Simon Singh's** book is a lively, comprehensible explanation of Wiles' work and of the colourful history that has built up around Fermat's last theorem over the years.

Film:



Hidden Figures is the incredible untold story of Katherine G. Johnson (Taraji P. Henson), Dorothy Vaughan (Octavia Spencer) and Mary Jackson (Janelle Monáe)-brilliant African-American women working at NASA, who served as the brains behind one of the greatest operations in history: the launch of astronaut John Glenn into orbit, a stunning achievement that restored the nation's confidence, turned around the Space Race, and galvanized the world. The visionary trio crossed all gender and race lines to inspire generations to dream big.

YouTube:



Matt Parker is a stand-up comedian, #1-best-selling maths author and person who makes videos for the internet. Originally a maths teacher from Australia, Matt now lives in the UK but travels more than he probably should. Matt's **Stand-up Maths** YouTube channel features weekly-ish videos about mathematics and related nerdery.



Numberphile is produced by video journalist Brady Haran. The stars of the show include mathematicians and other guests from around the world. Topics range from the sublime to the ridiculous... from historic discoveries to latest breakthroughs. In addition to hundreds of videos, they also have a new podcast of longer-form interviews.

Podcasts:



In **More or Less** on the BBC, Tim Harford explains - and sometimes debunks - the numbers and statistics used in political debate, the news and everyday life.



Behind every line on a graph, there lies an extraordinary human story. In **Uncharted**, Mathematician Hannah Fry will lead us through ten captivating mysteries to reveal the power of numbers behind each one. Along the way we discover the remarkable people who followed the data and unearthed something extraordinary.