



A Level Maths Transition Booklet

This booklet will give you resources and suggestions of how you can best prepare for your A level maths. There are an assortment of activities, tasks and investigations for you to try. Good luck and enjoy!

'Pure mathematics is, in its way,
the poetry of logical ideas.' - Einstein

'Wherever there is number,
there is beauty.' -Proclus

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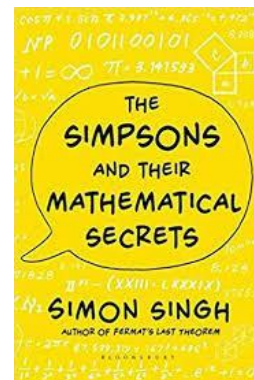
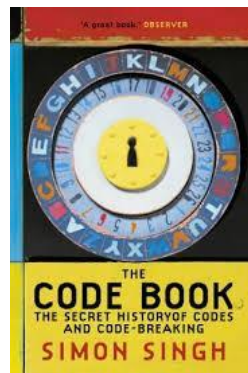
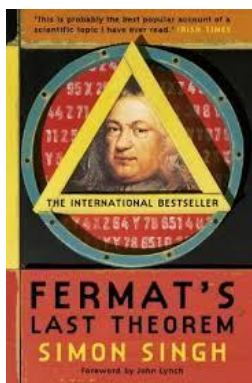
Suggested Reading

Simon Singh is an author and journalist who specialises in science and mathematics – in his words ‘the only two subjects I have the faintest clue about. He grew up in Somerset and then went to Imperial College London to study physics and then completed a PhD in particle physics at Cambridge university.

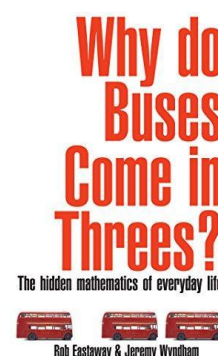
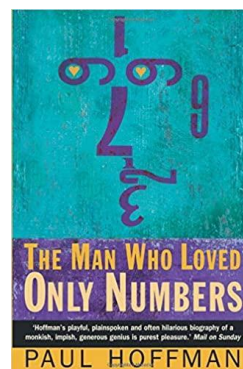
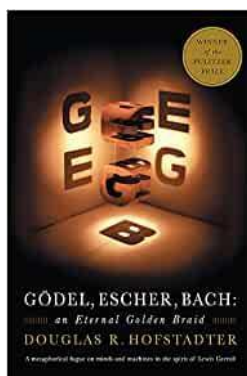


In 1990 he joined the BBC's Science Department, where he was a producer and director in programmes such as Tomorrow's World and Horizon. In 1996 he directed Fermat's Last Theorem, a BAFTA award winning documentary about the world's most notorious mathematical problem. The documentary was also aired in America as part of the NOVA series. The Proof, as it was re-titled, was nominated for an Emmy.

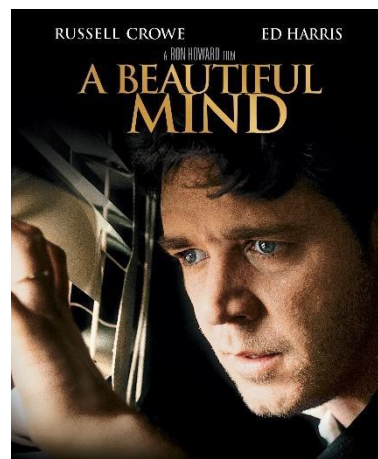
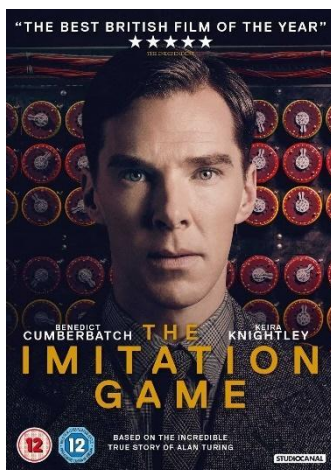
Here are some of the books written by Simon Singh



Some other suggested reads are:



Recommended Films



If you have a few minutes.....it would be worth looking at these.

You tube channels

'Mind Your Decisions' Presh Talwalker

'Numberphile'

Podcasts

Hannah Fry

Tedtalks

Hans Rosling

Twitter

Nrich <https://twitter.com/nrichmaths>

Alex Bello <https://twitter.com/alexbellos>

Websites

www.gapminder.org

www.scientificamerican.com/math/

The following topics are at the top end of the GCSE – and practising these will put you in a good position for the start of your A level. You will have seen these topics in Year 11 but you may not have spent much time on them, so for each of the following topics RAG r yourself based on what you know from GCSE at the moment. You may be unsure what the topics entail and you may not have many greens as of yet but once you have completed the booklet you should redo this RAG to see where you have gained confidence.

Topic	Red	Amber	Green
Solving quadratics			
Changing the subject			
Simultaneous equations			
Surds			
Indices			
Properties of lines			
Sketching curves			
Transformations of functions			
Pythagoras			
Sine/Cosine Rule			
Inequalities			
Proof			
Vectors			
Probability			

Topic	Clip Numbers	Scores	RAG
Solving quadratics			
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Here are the topics from your RAG sheet and the associated video clips on Hegarty Maths. You should look at the videos and try the quizzes.

Basic Skills Test

Complete the following questions, remember to show all stages of your working out.

1. Expand the brackets $(2x - 4)(-4 + x)$

2. Given $f(x) = x^2 + 5x - 2$ find the value of $f(4)$

3. Solve the simultaneous equations.

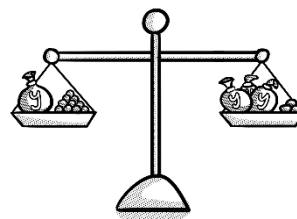
$$3x - 4y = 205x + 5y = 10$$

4. Solve each of these equations.

(i) $4x - 3 = 15$

(ii) $\frac{y}{3} + 4 = 9$

(iii) $5m - 8 = 2m + 13$



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

6. Express $\frac{1+\sqrt{2}}{3-\sqrt{2}}$ in the form $a + b\sqrt{2}$ where a and b are rational.

$$\sqrt{a} \times \sqrt{b} = \sqrt{ab}$$

$$\frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$$

$$\begin{aligned} (\sqrt{a} + b)(\sqrt{a} + b) \\ = a + 2b\sqrt{a} + b^2 \end{aligned}$$

7. Simplify $\frac{(x^2 y^3 z)^5}{4y^2 z}$

8. A (0,2), B (7,9) and C (6,10) are three points.

(i) Show that AB and BC are perpendicular.

(ii) Find the length of AC.

9. Sketch the graph of $y = 9 - x^2$

10. The curve $y = x^2 - 4$ is translated by $\begin{pmatrix} 2 \\ 0 \end{pmatrix}$

Write down an equation for the translated curve. You need not simplify your answer.

11. Given that $\cos\theta = \frac{1}{3}$ and θ is acute, find the exact value of $\tan\theta$.

12. Solve

(i) $x^2 - 36 \leq 0$

(ii) $9x^2 - 25 \geq 0$

(iii) $3x^2 + 10x < 0$

13. Prove that the square of an odd number is also odd.



14. Caleb either walks to school or travels by bus.

The probability that he walks to school is 0.75

If he walks to school, the probability that he will be late is 0.3

If he travels to school by bus, the probability that he will be late is 0.1

Work out the probability that he will not be late.

Problem Solving

1. Two numbers have a product of 44 and a mean of 7.5

Use an algebraic method to find the numbers.

You must show all your working.



2. In a parallel circuit, the total resistance is given by the formula $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$

Make R_1 the subject of the formula

3. Sarah intended to spend exactly £6.00 on prizes for her class but each prize cost her 10p more than expected, so she had to buy 5 fewer prizes.
Calculate the cost of each prize.

4. Arthur and Florence are going to the theatre.
Arthur buys 6 adult tickets and 2 child tickets and pays £39
Florence buys 5 adult tickets and 3 child tickets and pays £36.50
Work out the costs of both adult and child tickets.

5. Colin has made a mistake in his 'simplifying surds' homework. Explain his error and give the correct answer.

$$4\sqrt{3} \times 5\sqrt{12} = 20\sqrt{36}$$

6. Below is a sketch of $f(x)$.

The coordinates of P are $(0, -2)$

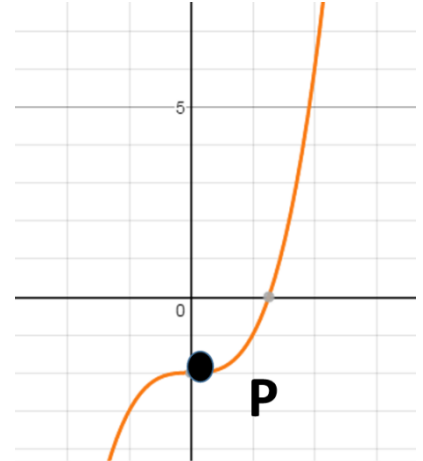
State the coordinates of P after each translation:

(i) $g(x) = f(x) + 1$

(ii) $h(x) = f(x - 2)$

(iii) $j(x) = -f(x)$

(iv) $k(x) = f(-x)$



7. The equation of a curve is $y = f(x)$ where $f(x) = x^2 - 4x + 5$
 C is the minimum point of the curve.

(i) Find the coordinates of C after the transformation $f(x + 1) + 2$

(ii) Determine if $f(x - 3) - 1 = 0$ has any real roots.

Give reasons for your answer.

8. A piece of land is the shape of an isosceles triangle with sides 7.5m, 7.5m and 11m.
Turf can be bought for £11.99 per 5m^2 roll.
How much will it cost to turf the piece of land?

9. Plane A is flying directly toward the airport which is 20 miles away. The pilot notices a second plane, B, 45° to her right. Plane B is also flying directly towards the airport. The pilot of plane B calculates that plane A is 50° to his left. Based on that information how far is plane B from the airport? Give your answer to 3 significant figures.
10. A farmer has a triangular field. He knows one side measures 450m and another 320m. The angle between these two sides measures 80° . The farmer wishes to use a fertiliser that costs £3.95 per container which covers 1500m^2 . How much will it cost to use the fertiliser on this field?

Extra Practice

1. **Exam style practice.** For each of the topics you should watch the video, do any practice questions. Where have you made mistakes? Is there something you need to do more work on? If so, watch the Hegarty video and then answer the exam questions.

Algebraic fractions

<http://www.mathsgenie.co.uk/algebraic-fractions.html>

<http://www.mathsgenie.co.uk/resources/algebraic-fractions.pdf>

Forming equations

<http://www.mathsgenie.co.uk/forming-and-solving-equations.html>

http://www.mathsgenie.co.uk/resources/64_forming-and-solving-equations.pdf

2. **Watch the videos**

<https://library.leeds.ac.uk/skills-algebra>

3. **Watch the videos on solving by completing the square and factorising. Do the quizzes.**

<https://hegartymaths.com/welcome>

clips 230-3, 238-9, 241-2

<chrome-extension://oemmndcbldboiebfnladdacbfmadadm/https://www.dr frostmaths.com/getfile.php?fid=934>

4. **Complete the A Level transition questions.**

<https://gryphonmaths.wordpress.com/a-level/transition/task-1/>

5. **Underground Mathematics**

This resource is FULL of lots of tasks and challenges. If you are feeling less confident with a topic then use the '*building block*'. If you want more of a challenge then carry out one of the '*fluency exercise*'.

<https://undergroundmathematics.org/>

Exciting and Interesting Bits!

Below are some articles and videos to view.

These are all going to extend your understanding of maths in the real world.



1. Follow the 'WATCH, THINK, DIG DEEPER, DISCUSS'

The Wizard standoff riddle.

<https://ed.ted.com/lessons/can-you-solve-the-wizard-standoff-riddle-daniel-finkel>

2. Follow the 'WATCH, THINK, DIG DEEPER, DISCUSS'

Solve the false positive riddle.

<https://ed.ted.com/lessons/can-you-solve-the-false-positive-riddle-alex-gendler>

3. Read the notes on the page and carry out the algebraic investigation. Complete the worksheet included.

<https://www.teachmathematics.net/page/7566/oxo>

4. Create a PINTREST board with images of maths in nature. Investigate the maths behind some of the images you have found.

5. Maths Magic.

Can you create your own version of the problem? Investigate other magic tricks which are based around maths.

<https://nrich.maths.org/1051>



6. Golden Ratio

Investigate the golden ratio and its history.

https://www.teachengineering.org/activities/view/nyu_phi_activity1

<https://www.quora.com/How-is-the-golden-ratio-useful-to-students>

Find more articles on this and create a poster all about the golden ratio.

7. Complete module 1- Advanced Problem Solving

<https://nrich.maths.org/10209>

Now re-do the Rag sheet

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