

A Level Maths

The Final Countdown



Name.....

A Level Maths The Final Countdown

From February half term, your weekly assignment will consist of two old exam papers.
The plan for the rest of the course is shown below:

w/b	Notes	Assignment to be handed in this week	1 st lesson	2 nd lesson	3 rd lesson
25th February	Mock week	Pure 1 Pure 2 Applied 1	Revision 2 Algebra & Functions Revision 15 Hypothesis testing	Pure Mock 1 in Double lesson	Only two lessons this week
4th March		Pure 3 Pure 4	Mechanics Test in lesson	Revision 3 Coordinate Geometry	Revision 4 Sequences & Series
11th March		Applied 2 Pure 5	Pure Test in lesson	Revision 5 Trigonometry Revision 6 Exponentials & Logarithms	Revision 7 Differentiation Revision 9 Numerical Methods
18th March	Monday = Subject Review	Pure 6 Applied 3	Subject Reviews	Statistics Test in lesson	Revision 8 Integration
25th March		Pure 7 Pure 8	Statistics Mock in lesson	Mechanics Mock in lesson	Revision 19 Moments
1st April		Applied 4 Pure 9	Pure Test in lesson	Revision 10 Vectors	Revision 11 Sampling
8th April	Easter holiday				
15th April	Easter holiday				
22nd April	Monday = Bank holiday	Pure 10 Applied 5 Pure 11 Pure 12 Applied 6 Pure 13	Easter Holidays	Pure Test in lesson	Revision 12 Data Presentation & Interpretation Revision 13 Probability
29th April	Pure Mock 2 in Hall after College (Tuesday or Thursday)	Pure 14 Applied 7	Pure Test in lesson	Revision 14 Distributions	Revision 17 Kinematics
6th May	Monday = Bank holiday	Pure 15 Pure 16	Bank Holiday Monday	Pure Test in lesson	Revision 1 Proof Revision 16 Units (Modelling)
13th May		Applied 8 Pure 17	Applied Test in lesson	Revision 18 Forces	
20th May	Study leave starts				
27th May					
3rd June	Pure Paper 1 = 5 th June				
10th June	Pure Paper 2 = 12 th June Applied Paper = 14 th June				

How to get 100% in every exam

The key to success is **honest self-assessment** followed by **remedial action**. If you are honest with yourself about how much you understand the work **and** if you take remedial action to improve your weak areas, you will get a grade A* (unless you make lots of expensive errors).

Revision Lessons

During the Revision lessons, I will issue worksheets with questions on them and I will collect the worksheets at the end of each lesson. If you would like your own copy of these questions, you can download and print them off yourself from the VLE. They are called "A level Revision Questions"

The Mark Scheme Is Your Enemy

When you work through these papers, do **NOT** use the mark scheme every time you get stuck. Try to work out what to do yourself. You won't have the mark scheme in the real exam! Do the test in 2 hours and then mark it. If you don't get full marks on a question, find out what went wrong (use your Survival Kit or the textbook or any other form of support). Then go back to it a day later and do it again (without looking at the mark scheme). Keep doing this until you can get the question right without help. This is the way you will improve your understanding.

In the mark schemes, the following symbols are used:

M marks: method marks are awarded for 'knowing a method and attempting to apply it'.

A marks: Accuracy marks can only be awarded if the relevant method (M) marks have been earned.

B marks are for the correct answer (method not necessary)

There's more about How To Study An Exam Paper on pages 5-7

Remember

Remember never to cross out a whole solution. If you do a question twice and produce one correct solution, you will get full marks and your wrong solution will be ignored.

Support

Over the next three months, please continue to email me if you need support. If you do email me, remember to send a picture of what you have done so far and let me know what it is in the mark scheme that you don't understand.

If you get stuck there are a number of things you can do

- Refer to your Survival Kit
- Watch the videos again on www.mickmacve.com
- Use the textbook and read the bits between the exercises
- Try some of the questions in the exercises to get further help
- Drop In With The Doubles in room 7
- Look at videos and resources from other websites

However, the best thing you can do is figure it out yourself.

Formulae To Learn

The list of the formulae that you need to learn are on pages 8-11.

Make sure you remember **all** these formulae.

The formulae that you don't need to remember are in the formula book

See the bottom of

<https://www.mickmacve.com/2nd-year-201819.html>

Record Card

Record your marks in the table on page 14. Keep this table up to date.

How To Study An Exam Paper

DO NOT simply copy out the mark scheme.

Here is why we ask you to *study* exam papers. By following this programme of exam paper study, you will:

Improve your knowledge of how to solve standard problems... By completing every question from past papers you will encounter almost every question that has been put into your real exam.

Improve the accuracy of your algebra... The exam board have told us that the only difference between E grade students and A grade students is that the A grade students make fewer algebraic errors. *Being able to answer the questions is not enough.* You need to be able to answer them without making expensive errors, and this is not something you can learn at the last minute. It takes practice.

Improve the speed of your algebra... *Your real exam will be an algebra sprint.* It is very important that you get used to the speed required.

***Studying* an exam paper is not the same as *doing* an exam paper.**

This what you should **not** do:

Sit down and complete an exam paper.....

After an hour you have done all you can do so you mark your work using the mark scheme.

You realise you've made some errors and you think 'oops! – I won't do that in the exam!'

You read the solutions to the questions you couldn't do and think 'oh – I see how to do it now'.

What has this process done to improve your chance of getting a good grade in the real exam?

Do you have any more knowledge? NO. You have read the solutions to the questions you couldn't do, but this doesn't mean you can actually do them ☹

Have you improved the accuracy of your algebra? NO. As soon as you finished the paper you went to the mark scheme. You didn't practice the most important part of an exam – looking for and correcting your errors ☹

Have you improved the speed of your algebra? NO. You didn't try to complete each question in a fixed number of minutes so you still have no idea whether you were going at exam speed ☹

This is what you should do:

1. Complete the exam paper in exam conditions. This means you continue working for two hours and make a real determined effort to find your errors before the time is up.
2. Don't use
 - a. The mark scheme
 - b. Your Survival Kit
 - c. Textbooks
 - d. Any other support
3. Mark the paper carefully using the mark scheme
4. Look at all the marks you lost – categorising them as being due to
 - a. LU = Lack of understanding (not knowing what to do)
 - b. EE = An expensive error (something that seems silly when you realise what you did)
5. Study your mistakes using
 - a. The mark scheme
 - b. Your Survival kit
 - c. Textbooks
 - d. Videos
 - e. etc.
6. Wait a day then repeat any question that you lost marks on using the strict timing (number of minutes = number of marks) and looking for your errors **before** you look at the mark scheme.
7. Repeat steps 3 and 4 over and over again until you are confident that if any of those questions are in your real exam, you will be able to do them quickly and accurately.

What has this process done to improve your chance of getting an improved grade in the real exam?

Do you have any more knowledge? **YES**. You kept going back to the harder questions until you could do them, so if these questions come up in your exam you, unlike some other students, can be confident you will know what to do 😊

Have you improved the accuracy of your algebra? **YES**. Not only have you practised finding errors during step one of the process, the fact that you have written them down and categorised them will help you to be more aware of the sorts of errors you make and this will help you, unlike other students, to avoid making them in the real exam 😊

Have you improved the speed of your algebra? **YES**. Every time you complete a paper (or question) in the correct time you are training yourself to be more comfortable working at the speed needed in the exam. This means that, unlike some other students, you won't have the problem of running out of time 😊


The key to success is **honest self assessment** followed by **remedial action**.

Expensive Errors

1. Use a calculator which does integration and differentiation. Carry out this calculation on your calculator before starting the question so you have an aim. You can bring more than one calculator into the exam.
2. In many questions, it's possible to take your answer and substitute values back in to the question.
3. Do some questions again. Pick the hardest question or one with most algebraic manipulation. Don't cross out either answer: your best answer counts.
4. Circle or highlight key phrases in questions. e.g. "3 decimal places", "Hence", "Exact Answer", "Simplified Fraction" If a question asks you to "Write Down" an answer, this normally means there's just one mark. Don't spend ages on this – there must be a quick way.
5. Read the question after you've finished the answer to check you've done what it asks you to.
6. Don't spend too long on one question. Keep a close eye on the time. Put a watch on your desk rather than keep looking at the clock on the wall. Make sure you know how many marks for each question and aim for a minute per mark.
7. Beware of taking shortcuts with your working. It doesn't take that long to write out an intermediate step.
e.g. $x^2 + 9x + 4 = 2(x - 4)$
 $\therefore x^2 + 7x - 4 = 0$
8. Avoid basic arithmetic and algebraic errors.
e.g. $5 - (2 - x) = 3 - x$, $3^2 + 5 = 11$, $2 + 5(-1)^3 = 7$
9. Learn the formulae.
10. If you're asked to "Prove" or "Show" something, the last line in your working should state the answer. It's not just enough to write "As required" or "Q.E.D." – you must write out the statement at the end.

(a) Show that the x -coordinate of A satisfies the equation

$$x = \frac{\ln(20-x)}{\ln 2} - 1.$$



$x = \frac{\ln(20-x)}{\ln 2} - 1$	A1*
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11. Don't take any shortcuts with proofs. Write out every step. You may know that $\frac{\tan \theta}{\sec \theta} = \sin \theta$ but if it's part of a proof, you must go through the intermediate step.

Appendix 1: Formulae

Formulae that students are expected to know for A Level Mathematics are given below and will not appear in the booklet *Mathematical Formulae and Statistical Tables*, which will be provided for use with the paper.

Pure Mathematics

Quadratic Equations

$$ax^2 + bx + c = 0 \text{ has roots } \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Laws of Indices

$$a^x a^y \equiv a^{x+y}$$

$$a^x \div a^y \equiv a^{x-y}$$

$$(a^x)^y \equiv a^{xy}$$

Laws of Logarithms

$$x = a^n \Leftrightarrow n = \log_a x \text{ for } a > 0 \text{ and } x > 0$$

$$\log_a x + \log_a y \equiv \log_a (xy)$$

$$\log_a x - \log_a y \equiv \log_a \left(\frac{x}{y} \right)$$

$$k \log_a x \equiv \log_a (x^k)$$

Coordinate Geometry

A straight line graph, gradient m passing through (x_1, y_1) has equation $y - y_1 = m(x - x_1)$

Straight lines with gradients m_1 and m_2 are perpendicular when $m_1 m_2 = -1$

Sequences

General term of an arithmetic progression:

$$u_n = a + (n-1)d$$

General term of a geometric progression:

$$u_n = ar^{n-1}$$

Trigonometry

In the triangle ABC

$$\text{Sine rule: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{Cosine rule: } a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{Area} = \frac{1}{2} ab \sin C$$

$$\cos^2 A + \sin^2 A \equiv 1$$

$$\sec^2 A \equiv 1 + \tan^2 A$$

$$\operatorname{cosec}^2 A \equiv 1 + \cot^2 A$$

$$\sin 2A \equiv 2 \sin A \cos A$$

$$\cos 2A \equiv \cos^2 A - \sin^2 A$$

$$\tan 2A \equiv \frac{2 \tan A}{1 - \tan^2 A}$$

Mensuration

Circumference and area of circle, radius r and diameter d :

$$C = 2\pi r = \pi d \quad A = \pi r^2$$

Pythagoras' theorem:

In any right-angled triangle where a , b and c are the lengths of the sides and c is the hypotenuse, $c^2 = a^2 + b^2$

Area of a trapezium = $\frac{1}{2}(a+b)h$, where a and b are the lengths of the parallel sides and h is their perpendicular separation.

Volume of a prism = area of cross section \times length

For a circle of radius r , where an angle at the centre of θ radians subtends an arc of length s and encloses an associated sector of area A :

$$s = r\theta \quad A = \frac{1}{2} r^2 \theta$$

Calculus and Differential Equations

Differentiation

Function	Derivative
x^n	nx^{n-1}
$\sin kx$	$k \cos kx$
$\cos kx$	$-k \sin kx$
e^{kx}	ke^{kx}
$\ln x$	$\frac{1}{x}$
$f(x) + g(x)$	$f'(x) + g'(x)$
$f(x)g(x)$	$f'(x)g(x) + f(x)g'(x)$
$f(g(x))$	$f'(g(x))g'(x)$

Integration

Function	Integral
x^n	$\frac{1}{n+1} x^{n+1} + c, n \neq -1$
$\cos kx$	$\frac{1}{k} \sin kx + c$
$\sin kx$	$-\frac{1}{k} \cos kx + c$
e^{kx}	$\frac{1}{k} e^{kx} + c$
$\frac{1}{x}$	$\ln x + c, x \neq 0$
$f'(x) + g'(x)$	$f(x) + g(x) + c$
$f(g(x))g'(x)$	$f(g(x)) + c$

$$\text{Area under a curve} = \int_a^b y \, dx \quad (y \geq 0)$$

Vectors

$$|xi + yj + zk| = \sqrt{(x^2 + y^2 + z^2)}$$

Statistics

The mean of a set of data: $\bar{x} = \frac{\sum x}{n} = \frac{\sum fx}{\sum f}$

The standard Normal variable: $Z = \frac{X - \mu}{\sigma}$ where $X \sim N(\mu, \sigma^2)$

Mechanics

Forces and Equilibrium

Weight = mass $\times g$

Friction: $F \leq \mu R$

Newton's second law in the form: $F = ma$

Kinematics

For motion in a straight line with variable acceleration:

$$v = \frac{dr}{dt} \quad a = \frac{dv}{dt} = \frac{d^2r}{dt^2}$$

$$r = \int v \, dt \quad v = \int a \, dt$$

Critical Values for Correlation Coefficients

These tables concern tests of the hypothesis that a population correlation coefficient ρ is 0. The values in the tables are the minimum values which need to be reached by a sample correlation coefficient in order to be significant at the level shown, on a one-tailed test.

Product Moment Coefficient					Sample size, n	Spearman's Coefficient		
Level						Level		
0.10	0.05	0.025	0.01	0.005		0.05	0.025	0.01
0.8000	0.9000	0.9500	0.9800	0.9900	4	1.0000	—	—
0.6870	0.8054	0.8783	0.9343	0.9587	5	0.9000	1.0000	1.0000
0.6084	0.7293	0.8114	0.8822	0.9172	6	0.8286	0.8857	0.9429
0.5509	0.6694	0.7545	0.8329	0.8745	7	0.7143	0.7857	0.8929
0.5067	0.6215	0.7067	0.7887	0.8343	8	0.6429	0.7381	0.8333
0.4716	0.5822	0.6664	0.7498	0.7977	9	0.6000	0.7000	0.7833
0.4428	0.5494	0.6319	0.7155	0.7646	10	0.5636	0.6485	0.7455
0.4187	0.5214	0.6021	0.6851	0.7348	11	0.5364	0.6182	0.7091
0.3981	0.4973	0.5760	0.6581	0.7079	12	0.5035	0.5874	0.6783
0.3802	0.4762	0.5529	0.6339	0.6835	13	0.4835	0.5604	0.6484
0.3646	0.4575	0.5324	0.6120	0.6614	14	0.4637	0.5385	0.6264
0.3507	0.4409	0.5140	0.5923	0.6411	15	0.4464	0.5214	0.6036
0.3383	0.4259	0.4973	0.5742	0.6226	16	0.4294	0.5029	0.5824
0.3271	0.4124	0.4821	0.5577	0.6055	17	0.4142	0.4877	0.5662
0.3170	0.4000	0.4683	0.5425	0.5897	18	0.4014	0.4716	0.5501
0.3077	0.3887	0.4555	0.5285	0.5751	19	0.3912	0.4596	0.5351
0.2992	0.3783	0.4438	0.5155	0.5614	20	0.3805	0.4466	0.5218
0.2914	0.3687	0.4329	0.5034	0.5487	21	0.3701	0.4364	0.5091
0.2841	0.3598	0.4227	0.4921	0.5368	22	0.3608	0.4252	0.4975
0.2774	0.3515	0.4133	0.4815	0.5256	23	0.3528	0.4160	0.4862
0.2711	0.3438	0.4044	0.4716	0.5151	24	0.3443	0.4070	0.4757
0.2653	0.3365	0.3961	0.4622	0.5052	25	0.3369	0.3977	0.4662
0.2598	0.3297	0.3882	0.4534	0.4958	26	0.3306	0.3901	0.4571
0.2546	0.3233	0.3809	0.4451	0.4869	27	0.3242	0.3828	0.4487
0.2497	0.3172	0.3739	0.4372	0.4785	28	0.3180	0.3755	0.4401
0.2451	0.3115	0.3673	0.4297	0.4705	29	0.3118	0.3685	0.4325
0.2407	0.3061	0.3610	0.4226	0.4629	30	0.3063	0.3624	0.4251
0.2070	0.2638	0.3120	0.3665	0.4026	40	0.2640	0.3128	0.3681
0.1843	0.2353	0.2787	0.3281	0.3610	50	0.2353	0.2791	0.3293
0.1678	0.2144	0.2542	0.2997	0.3301	60	0.2144	0.2545	0.3005
0.1550	0.1982	0.2352	0.2776	0.3060	70	0.1982	0.2354	0.2782
0.1448	0.1852	0.2199	0.2597	0.2864	80	0.1852	0.2201	0.2602
0.1364	0.1745	0.2072	0.2449	0.2702	90	0.1745	0.2074	0.2453
0.1292	0.1654	0.1966	0.2324	0.2565	100	0.1654	0.1967	0.2327

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Use this page to keep a record of the questions you answer from the Revision Material

A Level Maths Exam Practice Chart

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