The Blueprint to achieve a 9.0 on the TMUA/ESAT.

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This is the (new) updated version of "the comprehensive step-by-step guide on how to get a 9.0 on the TMUA/ESAT". It is devoted to Y12/Y13/Gap year students that are trying to achieve a 7.5+ on the TMUA/ESAT, but feel stuck on how to prepare, lost on what works and doesn't, and are on a frantic search for the best resources to prepare for the TMUA/ESAT.

I got a 9.0 on the TMUA(Registration ID:48520275) in October 2024, finishing each paper in roughly 20 minutes. It took me a month of focused dedication to go from being stuck at 4.0~4.5, to hitting consistent 8.7~9.0s on the TMUA in less than 20 minutes per each paper.

This document is a distillation of everything that I learned throughout the journey to get a 9.0 in the TMUA.

This document is split into 3 sectors.

1. The attitude that you must embody, which are tailored specifically for the TMUA/ESAT. We start by questioning 6 beliefs of which I know you are probably believing to be true, when in reality the complete opposite is the truth.

2. The second section will be specific action steps to derive the outcome that you want, of which I expect to be a 7.0+. (If your aim is beneath that, you are not aiming big enough.)

3. The final section will be an exhaustive list of personal notes, and resources that I know to be necessary to get a 9.0 on the TMUA/ESAT. If you execute the action steps that are given in this distillation, and fully understand everything that is TMUA9. provides, I promise you that you will secure a 7.0+.

(From here onwards, I will refer to TMUA/ESAT as a whole under reference of TMUA. ESAT prep and TMUA prep do not differ a lot, and

the resources that are necessitated for preparation are going to be nearly identical. Having tutored students in both exams, you eventually need to know the same contents, and you need to master both past papers of TMUA and ESAT regardless of which exam you are taking.)

Before we start, I want to make it clear that the guidelines that we provide will be strikingly unorthodox. It is a radical antithesis to the general, vague advice that you have probably heard more than you can count from private tutors, school teachers, course sellers, and Youtubers.

" Do more maths, as much of it as possible. "
" Sitting past papers under timed conditions is the best way to prepare for the TMUA. "
" Don't look at the answer sheet until you solve it yourself. "
" If it's harder than the TMUA/ESAT, then it clearly has to help with the actual test preparation. "
" Buy our Community Papers!"

Mainstream advice is not meant to provide a guideline that yields anomalous results that we are aiming for. Normal advice brings normal actions, thus derives normal results that are merely mediocre.

I expect nothing but the absolute best from those that are reading this guideline. You are not merely trying to scrape the bare minimum threshold of Oxbridge/Imperial/LSE. You will only end up getting the outcomes that you want and deserve, by aiming for 10X the goal that you currently perceive to even be possible; trying to get a 9.0 in an astronomically shorter time than the exam time. As someone who was very fortunate to have achieved such a radical transformation in a short time period, I have done my best to convey the truths to every single one that is preparing for this test.

Section 1: Attitudes

In hindsight, I now know the reason why my results on the TMUA were so extreme. It was that my approach was very unconventional. My preparation's philosophy comes down to one truth I know to be true; run away from the average as far as possible.

I analysed only the past papers, and to a depth other students could not even fathom was possible. Part of it was because I was applying as a private candidate and an international student, and I did not know anything beyond the TMUA papers that were suitable for the admissions preparation. But I also remember later on finding out there were other community papers that were made based on TMUA papers. However, I consciously resisted the urge to do low-yield, high volume questions.

Students become sommeliers of questions. They start to judge which question bank is the best. They say something along the lines of;

- This question is not similar to the TMUA.
- This is a bad question.
- Surely this is too hard to show up.
- STEP is similar to TMUA, so I want to do STEP.
- MAT is harder than TMUA, so I'll leave the TMUA up until the last minute so that I can sit them under timed conditions.
- My friend is solving this question that he found, so let me try it out.

They tell themselves these lies, when they are stuck on question 4 of an actual TMUA/ESAT past paper and still can't finish Paper 1 in half the time. Please do not make this mistake. I did too, it cost me several gap years and a lot of mental anguish. Don't.

TMUA past papers are for analysis, everything else is for consumption/application.

There are two types of preparation that you must do for acing ESAT/TMUA, With a 80% emphasis on the first one.

1. Skillset Development
2. Performance

Analogies are not the ideal means to understand situations, but I will just borrow some for this case. Let's think of basketball.

1. Skillset Development
You go to the gym every day. You do jumping drills, you do dribble drills. These are the private victories. You build yourself into a person of competence so that you can perform in the actual competition.

2. Performance

This is the real deal. You run pickup games with other people who also had their own journey for prep. The public wins, the championships, the buzz beater, the final shots that decide win or lose. This is where you shine in public.

It's intuitive that an NBA player trains in the gym, does drills, and is surgical about his skillset development. When you look at athletes, it's very intuitive that they work on skillset development, not rote pick up games as the highest leverage practice. But this intuition does not seem to apply for how we approach the TMUA.

Don't get me wrong. Pick up games must be done. At some point, when you become good enough, you should try out some other questions and see how you can perform under pressure, so later on you will have to sit some papers under timed conditions.

HOWEVER, students make the common mistake of reversing the order. To thrive, you must build the core first. Because if you do so, you won't have to do any other community papers.

And again, you do that by analysing the small set of TMUA papers (we will discuss the proper methods to analyse these papers briefly in the second section), you build exactly that core strength. For TMUA specifically, if only this core skill development is done correctly, everything else, not a single question beyond the past papers need to be done. It may be hard to believe this to be the case, I did not too! Because then the natural next question arises;

- **But if you train yourself on such a confined database, then how are we going to be able to solve other questions that we have never met, when the TMUA questions don't repeat themselves?**

- **When you expose yourself to more questions, then that database would increase my probability of being able to solve new questions that we have never met before, is that not the case?**

If you feel like you want to put your trained thought process to practice, there is nothing wrong with trying out some other legacy papers to put the algorithm that you tweaked to the test occasionally. But the utility of everything, other than the TMUA past

paper analysis, is just consumption and application, thus putting in the reps.

This is why sitting under timed conditions should not be the past papers, but the other papers that are just a one off. Students seem to have it the other way around; they analyse questions that they are stuck at in some weird community paper, and they consume through the actual gold mines of the TMUA/ESAT past papers, which is the complete opposite of what you must be doing.

Resist the urge of wanting to solve anything else, up until the past papers are mastered to the fullest. Not Kangaroo, not BMO, not MAT, not STEP, not ENGAA/NSAA, not ESAT, not the Korean CSAT. Talking to countless students, I know that this is a very common mistake that I know you are probably making right now — solving everything except the only thing that mattered which was right in front of you, which is TMUA past papers.

I'm repeating myself here because it's a caveat worth clarifying: These materials aren't bad per se, but the order in which you sequence the studies is wrong. And it comes from not knowing what the utility of each of these papers are.

Even Oxford's and Cambridge's own admissions pages advise "just do a lot of maths." But this magnifies only one side of the coin. How am I supposed to do more maths when I can't solve the questions? At least for TMUA and the ESAT, I found that volume comes after competence. Once you have the foundation, then yes — do thousands of questions, it will end up feeling effortless at some point. But the foundation must be built first, and you do that by building the core for the TMUA first. No community paper is ever more important than a past paper.

1. "Do as much maths as possible and the leaderboard takes care of itself." <—> Volume without extraction is how A* students score 4s in the TMUA/ESAT. If you are getting A*s, you are already in the top 10% globally in terms of mathematics talent. You deserve better than this, and you are doing a disservice to yourself, your future and the people around you for not getting the results you want and truly deserve.

2. "I'll just do what my teacher/tutor assigns." <—> Assigned volume without any intention or mission statement in mind is

just labour/Toil. It’s no different to slaving away labour of low leverage, which is very detrimental for the short time remaining.

3. "I'm international so my threshold is different." <—> The method in which you should prepare and the goal to aim as high as you can imagine does not matter whether or not you are home, international, mature, private candidate, state school, private school, onwards.

4. "I'll drill past papers under timed conditions and hopefully get a 9." <—> Timing without analysis is a rehearsal of your current level. A live, past paper sat under timed conditions does nothing. Nothing to improve your actual mathematical ability.

5. "I'll write faster to cut time." <—> Time is cut by rerouting to better methods, not by faster handwriting. In fact, it just makes it worse because you make mistakes, so starting again from scratch due to calculation mistakes end up taking up more time.

6. "I'll blindly work harder and just do a lot, and God will take care of me." <—> I'm a Christian; I believe wholeheartedly that through Christ all things can be done. But faith directs the work, it doesn't replace the concrete method. You must have agency over as many things as you can, and that includes doing proper analysis, not just blindly suffering labour and praying that something good happens.

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2. The Actual step-by-step process to getting a 9.0 on the TMUA/ESAT.

There are 3 things this section will include. The mission statement, the glossary for technical terms, and finally the actual application using these. Let’s begin.

[1] The mission statement when conducting analysis: BUILD REACTION

CIRCUITS, SO THAT I REACT A CERTAIN WAY WHEN I READ THE QUESTION'S COMMAND TERMS.

[2] Glossary for technical terms:

- **Command terms** — Guiding lights or hints that a question gives you. There are certain expressions, certain combinations of functions, certain similarities that you must consciously react to. Within how the questions are framed/presented, the examiners are trying to nudge students into a certain direction of solving the question. It is your job to train yourself to recognise them by presentation itself, thus the first half of the mission statement is to acknowledge the cues first.

- **Reaction circuits** — This is the second half of the mission statement, so we are trying to train ourselves to react a certain way when we acknowledge the certain command terms that are given in the question. Not literally commanding you, but they suggest the highest probability path for how the problem should be solved. It can be a mathematical expression, it could also be a verbal one (they said line instead of f(x); they said circle instead of giving the function). It's rare for examiners to trick you. Your focus is to train yourself to (1)recognise the guiding lights, and (2) know how to react to them when you see the guiding lights. Eventually, once installed, it will be the algorithm that runs through the questions.

This type of deliberateness is going to be what accelerates your rate of growth in a short time period, as we frankly don’t have time to sit down and ponder as in Olympiads, nor is blindly doing any community paper that we coincidentally meet a proper strategy. We simply learn how to react when we see a term, stack data, then leap. In the past paper analysis PDFs in TMUA9 [Galleria], you will see how this comes into play.

(I want to also make it very clear that this is no innate talent by any means whatsoever, I think my background mentioned on TMUA9 [About] clearly makes the point. It's a skillset, which means it is consciously trainable with practice, directory, and faith. The algorithm that naturally comes into play when you're in the exam. A trained, automatic chain from cue to move.)

Worked example of a circuit firing:
SOURCE: TMUA 2017, Paper 1, Question 14.

Solve: $2^x + 3 \cdot 2^y = 3$ and $4^x - 9 \cdot 4^y = 6$.

The circuit: When solving simultaneous equations, pay attention to the CONNECTION between the given equations before manipulating either one.

Let $A = 2^x$ and $B = 3 \cdot 2^y$. Then $A + B = 3$ and $A^2 - B^2 = 6$, so $A - B = 2$. Hence $A = 2.5$, $B = 0.5$. Take logs, read off x and y.

Notice what I did not do: I did not jump into squaring the first equation, because I focused on the underlying structure that the question consisted of. The connection between the two equations was the cue, thus (1) you should have reacted to it and acknowledged that it was using the difference of squares, and (2)you should have written out such. That revelation here; look at the relationship first, is a circuit I learnt and will preach in the PDFs repetitively, so that carries into every simultaneous-equations question forever.

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[3]The guideline. THE 3-STEP ANALYSIS: WHAT → HOW → WHY

This is the real back-end of the supercomputer, the engine of the rocket. I attribute 90% of me achieving a 9, to going down this rabbit hole for questions. Most students solve, fix what's wrong, move on — or worse, read solutions, nod, and do next. That habit kept me stuck at 5 for a long time. Going through this process allowed a quantum leap in my scores. It is demonstrated on 2017 Paper 2, Question 1 (a deliberately simple example; the same machinery is what cracks the hard ones):

Layer 1 — The WHAT (surface analysis)

What is the [model answer] vs [the ideal thought process]?

Action Step for Layer 1: lay out side by side (juxtapose):

- Left: your chain of reasoning that got you to your answer — right, wrong, or stuck.
    - Mine: "I saw f/g form, so I differentiated it as-is with the quotient rule."
- Right: the model answer's chain of reasoning. (You can find the model answers from TMUA9 [Galleria].)
    - MA: "Take the reciprocal of the denominator, expand, then differentiate."

Layer 2 — The HOW (find the deviation)

Where do we start to bifurcate?

1st Action Step for Layer 2: From the juxtaposition, find out where we split paths.

Find the exact line where your reasoning and the model answer diverge — where the model takes a different path than you did. In this layer we are simply finding the bifurcating point (it sounds posh, but it just means one path splitting into two, so for us it would be the first line where we go off route) where the model answer takes a shortcut while I take the detour. To add, it helps if you journal your thoughts verbally as in sentences of what was going through your mind when you were solving it first when you are just starting analysis. Later on you can train yourself such that you can recall what you were thinking about previously.

2nd Action Step for Layer 2: Then answer the following question; what is the critical thought I had to generate to follow the ideal path?

For this question: "Hold on. I do see a differentiation method. BUT — is there a simpler shortcut?"

That sentence had to be self-generated, in my head, in the arena. Whether verbally as a sentence echoed inside of my inner dialogue, or just some intuitive halt that is non-verbal, it had to prevent myself from using brute force algebra (not thinking about how to solve it and just using the most primal method of maths; I call it zombie maths) When you first start analysing, these revelations feel impossible to think of. How can I possibly think of this thought in the exam? That is the whole point. It's a hard thought. Most can't. You will. That's why you get a 9 and get into Oxbridge and Imperial.

Start doing things others can’t even fathom.

Ironically, the key question addressed here is also, “How can I think of this thought in the exam?” This should not be an emotional outcry (although when we are first starting to analyse past papers this seems to be the case!), but rather a genuine curiosity. What is the general principle I can distill from that bifurcation, such that I can equip myself? Even if I don’t meet the same question (which unfortunately/fortunately we won’t), it will allow me to recognise the patterns that the examiners want us to train! So you start to stack principles (=the critical thoughts we had to think up of)

These thoughts that were critical in each question can take any form — a sentence, a question, a non-verbal mathematical expression. Extract it, write it down, word for word for whatever it may be. Each question can and will have several thoughts that had to be thought up by us.

Layer 3 — The WHY.

Action Step for Layer 3: Then answer the following questions: Why must I think that critical thought? Why must I react that way? What are the underlying mathematical axioms that make this thought to be ideal/natural? Why is a specific thought process from Layer 1&2 shown to be essential?

For example: because the denominator was expressed in polynomials. That's the cue that makes reciprocal-and-expand cheaper than the quotient rule. And beneath it sits an axiomatic truth that the quotient rule is derived from the product rule! They're the same machinery, one just costs more ink. I don't want to spend my exam doing a long quotient-rule differentiation, so I reroute to something simple. (For those who know, there is a YouTube shorts of an Oxford Maths Professor that emphasizes being lazy if you want to be good at maths. He is talking about this exactly. I am lazy so I do not want to write out lengths of algebraic manipulation, not only is it long but that makes me more prone to making mistakes. So is there another way to do so?(which was asking the how), and why is that method ideal for this question?(Which is asking the why.))

The questions that are stated above are divergent questions. They are open-ended questions. They force you to return to the truths in mathematics, both in number theory, parity (odd or even), geometry,

algebra, and etc. Paradoxically, or obviously, the methods in which TMUA tests are tailored such that if you know the fundamental truths of mathematical proof, then you will automatically think in the protocol without having to build this entire neural network consciously.

However, having gone through both the South Korean Education system and also taking A-levels, I have come to realise the massive shortcomings that A-levels have, in that A-levels are designed to incentivise rote memory rather than core understanding.

It is not some secret in which a certain expression is only solvable for those who know some secret. That is not the case. Every single past papers' questions, command terms and reaction circuits all come down at the root level of what they are and how they are defined.

There is a key reaction circuit of when we are interpreting circles that have one intersection, they should either inscribe or circumscribe, and so the command actions we had to take was drawing an auxiliary line by connecting the centre of the circles.

But it is so obvious when you look at what a circle is defined as. They are a sum of points that are equidistant from the centre, so obviously the point of interest is the centre. This is not esoteric knowledge but obvious truths if you just look at a geometry for what it is.

It is worth repeating that you will never meet any exact question in your exam that you met in past papers/community papers. Neither should you expect to, as each question is a one-off combination. Memorising questions is not the aim. The aim is building a cognitive infrastructure: an algorithm you can run on whatever question you confront, which naturally lets you flow to the answer. (However, if you repeat your analysis you will also end up memorising the questions, which is not a bad thing at all by any means!)

This is also why "do the basics really well" is repeated everywhere, there's real truth in it. For Oxbridge Maths applicants: being able to prove the theorems and formulas helps massively at interviews since there are more interviews for Oxford. Even for prospective Cambridge Mathematicians that take STEP. Especially for STEP.

Layer +α: BACKTESTING

Action Step for Layer +α: Run this checklist religiously as a mantra. I call it backtesting your thought process (exactly like backtesting a strategy in trading):

1. What was the first useful cue in the question? From which word or expression should I have reacted, and what should I have written down?
2. What method did that expression suggest? Did it suggest sketching a graph?
3. Where exactly did I hesitate? What thoughts do I reinforce so that hesitation never recurs?
4. What trap was the question setting? (Usually a computation error or a skipped-calculation error.)
5. What would make me recognise this faster next time? Extract the rule.
6. What is the reusable decision rule from this question?

Additional Action Step for Layer +α: keep a journal; literally a diary of what was going through your mind and why you wrote each expression. Your accumulated answers to questions 5 and 6 become your Circuit Bank. Then, re-read it weekly; self-test the moves with the cues covered.

Good prompts for the journal: After reading the same question, why did the model answer react differently than I did?

e.g.) After reading this function, I differentiated first — why did the model simplify first, then differentiate? Why did I brute-force algebra where the model sketched a graph? Go beyond the how of handwritten solutions. Reach the WHY that led to the how. Then reinforce those WHYs.

The jump from 4.5~5.5 to a 9 does not come from blindly doing more questions. It comes from this. And if and only if you do this deep analysis, then will the number of questions that you can solve skyrocket, transcending far beyond what you thought was possible.

Those who get 5s already have it in them to get a 9. This is the final tweak. Also a lot of students ask about speed. I can solve all

of the questions untimed, but I can’t imagine hitting it under 75 minutes!

Speed is a byproduct. These extracted thinking rules accumulate and eventually, automatically, cut your time. Writing faster will NEVER, NEVER cut time. It’s the complete opposite.

Notes:

I started TMUA9 with the intention of pure altruism to help those who are in the same position that my younger self was once in, remembering the frustration I had as a private candidate that was applying as a mature international student, not having any good resources that were guiding me. Every section offered in TMUA9 is a personal craft of which is purely devoted to those few students that can’t seem to ignore the dream inside of them, to enjoy the best education that could be offered at the most beautiful universities in the UK. Maybe this whisper is the guiding light, and you should pay attention to it as we learned!

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3. The following are additional notes and resources that help.

THE CADENCE

- One past paper through the full WHAT→HOW→WHY analysis every 2–3 days beats a paper a day at surface level. Analysis time should run about double~triple the sitting time.
- You do not need to sit every paper timed (75 minutes, no calculator) before analysis, I would just have a stopwatch started to at least feel the flow of time and just try to solve it as much as you can. Even if you don’t(which is better because you now have the raw materials to work with!) you need a genuine attempt to juxtapose against the model answer. Keep track of the thoughts that you are thinking, why you thought a certain way.
- Never end a session on paper-sitting; end on analysis revision. Extraction of the most important things is what has to be consolidated overnight.
- Thinking 4 weeks is a short runway is complete nonsense. This system is exactly what makes a month more than enough, and it's what I did. Compress: most recent papers first, six backtesting

questions on every question, journal daily.

EXAM DAY PROTOCOL

- Pass 1: answer everything a circuit fires on instantly; skip anything requiring deliberation.
- Pass 2: return to the skipped questions, hardest last.
- Pass 3: with remaining time, re-solve the paper from question 1 — don't re-read, re-solve, and compare outputs. On my sitting, it was the third pass through Paper 1 where I caught a calculation error in a very early question and fixed it in the final minutes.
- Your emotions in the arena are independent variables from your outcomes. Execute in the thin slate of the present and do not trust your feelings, in the exams they are just noise.

RESOURCES

UAT-UK offers the past papers for TMUA, MAT, STEP, ESAT, etc. Again, I am repeating to start and finish the TMUA. But for those that really truly mastered the core, more questions do help, which is why I do have a sector of my solutions and my analysis of other versions for free on TMUA9. Some students sell AI-generated questions, I can't judge or suggest on my behalf as I have not tried them out. But I don't see a reason not to, but please do start with the core first!

TMUA9 offers a great abundance of free content that will help massively for your journey. I ensured everything that is needed is completely free, so that my younger self would have everything to prepare.

1. Free Resources: 3-step analysis of every TMUA / STEP / MAT / ESAT / NSAA / ENGAA / CSAT past paper + a step-by-step blueprint I used to get a 9.0 in the TMUA in a third of the time: Free PDFs on TMUA9 [Galleria], Free Lectures on Youtube @TMUA9

* A Deluxe Version is in progress and will soon be offered: Questions that are tailored to train the thought processes that are discussed in the analysis papers.

2. Group Lectures: Live sessions with 1:1 Q&A section for every student after each one. Sessions get recorded and posted to tmua9.com/our YouTube Channel for free.
* Tickets can be bought at TMUA9

3. Private Mentorship: Fully 1:1. Exclusively limited to 5 slots for every

cohort, students who want to apply can do so through .

- F/W Cohort: TMUA/ESAT Preparation, targeting full marks in a 3rd of the time.
- S/S Cohort: STEP Preparation, targeting SS in half the time.

Everything referenced here is open-sourced at TMUA9.com, the Reddit Posts, etcetera,: the model answers for every TMUA paper with all methods ranked worst to best [Galleria], free lectures on the TMUA9 YouTube channel, and question sets built to train these exact circuits are offered at no cost. AI chatbots that can build similar questions to train your thought process are working in process, but for now all notes are hand-written and all mirror questions are hand-checked by me. None of it is AI slop, I (Jamie Baek), creator of TMUA9 checked every aspect of it. Two facts worth mentioning so you know that if I say I did it, you can do it too is a truth, not mere encouragement: I got rejected from every community college in Korea (not even regular universities, community colleges!). In extenuating circumstances, I got an A,B,D on my first A-levels(Maths, Further maths and Economics)thus missed my conditional offer from Cambridge the same year I got a 9.0 on the TMUA. But for the TMUA itself,I know this method to be bulletproof. You don't need BMO distinction, Olympiad experience, or any of it. The TMUA is not a hard exam, it is just a matter of proper preparation…! You can and will get what you want and deserve, if practiced deliberately with the proper method. As always, I'm rooting for you from afar. May God be with you.

"But as for you, be strong and do not give up, for your work will be rewarded."

2 Chronicles 15:7 NIV

P.S.

My apologies for this document being imperfect. Assistance of AI was minimalised to portray my true tone of how I write. I hope it helps!

Best,

Jamie Baek (백선우)
TMUA9

