

# GMATIC 2016 REFLECTIONS

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Figure 1: From left: Carabbay, DC, Axi, Jireh, Allen, me.

## 1 OVERVIEW

GMATIC stands for the Grace Mathineers Interschool Competition. This year is its 26th year in a row that it'll be held, making it nearly as old as PMO.

Any school can send up to two teams of three participants with an optional alternate. The format is an individual round followed by a team round. The individual round is written: thirty multiple choice questions followed by five questions requiring short solutions. The scores of each member in each team of the individual round are added; the ten teams with the highest scores qualify for the team round.

*This year is the PMO's 19th. However, the PMO has been held only once every two years up until 2008 or so, making it older than it seems: it started on 1984.*

The team round consists of three rounds: six 200-point 20-second easy questions, six 300-point 40-second average questions, and six 500-point 60-second difficult questions. Before the team round, teams draw lots to determine power-ups, which is a cute mechanic that will be elaborated on further. The mechanics for the oral round, which also contains the list of power-ups, can be found in a section below.

## 2 PRE-COMPETITION

The first time I've ever heard about GMATIC was in a conversation with Kyle (Dulay). He was describing to me how there was an advertisement for some company, which demonstrated children doing complicated mental arithmetic rather quickly. They would move their hands in the air as if moving the beads of an invisible abacus. He then explained how, when the questions were later difficult, he would just move his hands in the air to pretend to solve.

*It was funnier in his retelling.*

It came up several times during MOSC, and someone, Luke (Bernardo) I think, talked to me about it. I told him, well, our school doesn't join GMATIC. He told me to ask Shaq (Que) for an invitation. Later in the year, I did ask Shaq for an invitation to GMATIC. He obliged, and I forwarded the letter to Ms. Soriano, our mathematics coordinator.

The reaction of our mathematics coordinator was supportive. "You know, when it comes to competitions, it's better that you students pursue which ones you want to join rather than us pushing which ones we want you to join." We drafted the teams, did a short meeting, filled up the forms and emailed them.

There was virtually no preparation specifically aimed for GMATIC. The concurrent PRIME was intended primarily for the PMO, and it was focused on the type of questions that appear in PMO. We had no idea what kind of questions GMATIC would have, what difficulty it would be, or how extreme the time limits are in comparison to the difficulty. Well, the day came and the only preparation we did was a short after-class session on the day before, with only me, Allen and Jireh.

## 3 PRE-INDIVIDUALS

The day begins with surprising my teammates by the fact that we have a competition. I come to school earlier than I normally would, and Jireh walks up to me. He knows that we have a competition from our training the day before: "I'm going up to sort my things, I'll come back down."

Sure, I say. Allen comes next and he also knows we have a competition. I go to my classroom as well to sort my things.

As I go back down, I encounter Axi. "Axi, we have a competition today, whole day, at Grace, GMATIC." "Yeah, I know, I only found out now!" One down.

At the lobby, Vincent DC is there, along with Jireh and Allen. DC is equally shocked: "I knew there was a competition, but I didn't know it was today." "Well, I'm sorry I didn't inform you."

Eventually Carabbay comes to school, and we approach him, saying, "there's a competition". He knows. With his arrival, the six of us are complete. Here are the two teams:

*Valenzuela City School of Mathematics and Science, Team 1:*

- Carl Joshua Quines (me), grade 11.
- Axirazel Lorenzo (Axi), grade 11.
- Vincent Dela Cruz (DC), grade 8.

*Valenzuela City School of Mathematics and Science, Team 2:*

- Jireh Emmanuel Gumaro (Jireh), grade 10.
- Allen Ross Mercado (Allen), grade 9.
- Vincent Carabbay (Carabbay), grade 9.

We were supposed to leave school on 7:00 AM. Ms. Soriano accompanied us for the duration of the competition. We managed to leave school at 7:15 AM, driving to the venue on the school jeep.

During the transit, I handout PRIME session 9. "This is our session for today. Make sure to attend the session on Friday, it's important." I didn't even know if they were answering the previous handouts I gave out. It takes a lot of time and effort to create handouts. Axi also teaches me how to name organic compounds with functional groups, because I didn't attend chemistry class the previous day, and we were going to miss a chemistry quiz that day.

We make it to the venue at 7:45 AM, owing to the auspicious lack of traffic jams. Dion (Ong) is standing outside the hall, and we briefly greet each other. We register and take our seats. I see Luke and Albert and I wave to them, and they wave back. I see Shaq and we exchange pleasantries. Shaq is the vice president of the Grace Mathineers, and will be supervising the competition. I approach Luke and Albert and we talk about various things.

Time passes and more people come. I see Clyde (Ang), and Kyle, Elijamin (Claveria) and Tayan (Gelera), and... Nikki (Dizon)? I was shocked to find

out that Nikki was in fact a member of Ateneo de Manila University's Team 2! She was my classmate for grade 9 and grade 10 back in ValMaSci, and now she studies at Ateneo for senior high school. Now we're going up against each other, and this is the subject of a lot of light-hearted coffeehousing.

As in nearly every other math contest with these people, a circle forms to discuss things. The main topic of discussion was the power-ups for the oral round, and how they were balanced relative to each other. Some of our judgments turned out to be correct, others turned out to be wrong. We also discuss lots of other things. And the circle, of course, blocks the path where people walk, so we had to move our location various times.



Figure 2: Diligently finding loopholes in the mechanics.

Several people think I am a coach because of my tie. This creates a funny scene, where the coordinator of Sipnayan (another math contest) approaches me and asks me to "please write your personal information so we can contact your school about Sipnayan." I said, "ah, let me refer you to our trainer" and she was surprised that I was just a student!

The program starts and we take our seats. One of the emcees start with a joke: how do you count cows? Using a cowculator. Really funny. I liked his voice though, it was really deep and mature and it sounded awesome. The usual national anthem and invocation was followed by one inspirational speech, and a speech advertising Grace Christian College. Then the emcees lead us outside for the picture-taking.

How do you take a picture with 150 people? Well, it was taken anyway. One of the questions that popped was, compute the probability that at least one person blinks in the picture. “One”, DC says. Very witty, DC. Very witty. Lots of adjustments had to be made: a ladder from a nearby construction site was bought in, and the potted plants had to be moved. Then one of the pots broke. “Well, we should’ve computed the probability that one of the pots will break,” Jireh says. That was unexpected.

#### 4 INDIVIDUALS

After the picture-taking, we are lead to testing rooms. I ended up being in the same room with Jireh and Tayan, and I sat next to Tayan. Tayan said, “they were already talking about the power-ups. . .” I replied, “well, if we make it to the team round we’ll be happy.”

We made it to the room at about 9:30 AM, but the written round would start at 10:00 AM, so we had thirty minutes to burn. Tayan and I about various things. And then Shaq comes in, and apparently he’s one of the proctors assigned to our room.

The individual round begins without much fuss. The MCQs were five-choice questions, plus an additional choice ‘N’ if none of the five answers were correct. There were, in fact, several questions where N was correct. Some questions required me to think, others were more straightforward. There were also several tricky questions, of note being the second open-ended question, reproduced below.

A sampling of some questions:

- How many zeros does  $50!$  have? (yes, have, not end in; the largest choice was 12)
- If exactly one of the choices  $(x, y)$  below has  $\sqrt{x^2 + y^2}$  a positive integer, which choice is it? (with five choices, all having five-digit  $x$ s and  $y$ s)
- $AB$  is the diameter of a circle with radius 2 and  $C$  is on the circle such that  $BC = 3$ . Point  $D$  on the circle is chosen such that  $BD$  bisects  $\angle ABC$ . Lines  $AD$  and  $BC$  intersect at  $E$ . Compute the ratio of the areas of triangle  $CDE$  and quadrilateral  $ABCD$ .
- If  $a = 169, b = 481, c = 1625$ , which of the following inequalities is true? (choices were like,  $a > b > c$  or  $c > a > b$ , lol)
- (open-ended) If  $f(x) = \frac{1}{3^x + \sqrt{3}}$ , find  $\sqrt{3}(f(-5) + f(-4) + \cdots + f(6))$ .

- (open-ended) Triangle ABC is inscribed in a circle of radius 4. If  $\angle A = 60^\circ$ ,  $AB = AC = 4$ , find the square of the area of triangle ABC. (yes, that's how it was given)

I spend the first fifteen minutes on the first page, about twenty minutes on the second page and about ten minutes for the rest of the multiple choice items. I use the remaining time to write neat, clean solutions for the open-ended problems. Okay, no, the solutions were anything *but* neat and clean: erasures abounded, the handwriting sucked, and the steps were quite abbreviated. I use the remaining remaining time to check my answers. Meanwhile, Tayan sleeps for like thirty minutes.

*I wanted to keep the questions!*

*Non-Euclidean geometry notwithstanding.*

Time elapses and we pass our papers, as well as our questionnaires. Tayan and I discuss some of the questions. We agreed that the figures were horribly out of scale. We also discussed the second open-ended the problem, with the impossible triangle. Jireh and I make it downstairs and meet with our schoolmates.

## 5 BREAK

We meet and discuss the questions briefly. Our school did not seem to have a consensus on the third open-ended problem, but at least we all agreed the impossible triangle was impossible. I talk to a lot of people to get a general idea of how people felt the problems.

The break started at 11:30 AM and was scheduled to end at 12:30 PM. The time approached 12:00 noon and Ms. Soriano was still nowhere to be found. Me and Carabbay tried going out to look for her, worried that she might not make it back before lunch break would end. Well, she did, and she bought food, hooray. Apparently the order took quite some time. We eat our lunches.

*she who will not be named* I go around and talk to various people. I talk to Nikki about a certain former classmate who now studies in Ateneo with her. I talk to Luke and Albert a bit, as well as Elijamin and Dion.

Kyle was pacing around for some reason. I asked him why, and he said he was looking for "the others". I said, oh, they're eating outside. I accompany him to the gate, and he sees them, and he says, "oh, okay, I'm going back in now."

There is still a lot of discussion about the power-ups and the meta-game surrounding them. It was generally agreed that team 7 was of great use, and that team 3's main purpose was to block 7. We agreed that 8 and 9 would be sort of powerful, with 8 of more power than 9. Luke liked 6's power-up. By this point, the meta-game was well understood that it turned out to be of consequence.





Figure 3: Foreground, rightmost: Nikki.

More talking happens, because the program really didn't start at 12:30 PM. There were several intermissions, notably a few people playing the guitar, and they played really really well. There was also someone who played on the piano.

## 6 PRE-TEAM

The program restarted at 1:30 PM. It began with the giving out of certificates of participation. While that occurred, me and my schoolmates played classics like This Is A, Tell the World of His Love, and Bart Simpson. It seemed like every team was being given certificates, but in a sort of random order. This lead us to dismay about whether or not we made it to the team round.

The emcees announced the top ten teams in alphabetical order. Off the top of my head, I can remember Chiang Kai Shek (CKS), St. Stephen's, St. Jude, Philippine Science HS (Pisay, both teams!), De La Salle University (DLSU) and Quezon City Science HS (QueSci). I was beginning to worry. What about our team?

We were the last to be called, because it was alphabetical. Valenzuela City School of Mathematics and Science, Team 1. Hooray, we made it to the team round! Now we could go home fulfilled. I ask Allen, Jireh and Carabbay to record the questions of the oral round for me.

*Remind me to describe these games some day.*

*My largest unvoiced concern was the order in which the power-ups applied; it was not exactly clear for me.*

DC draws lots for our order in picking power-ups, and we were sixth to pick. Shaq read the mechanics and explained the rules for each power-up. The first five teams pick their power-ups, and we picked team 6, partly because we needed the time and partly because it's easier not to decide whether to use power-ups or not. Off the top of my head, I remember CKS being team 1, Pisay 2 being team 2, Pisay 1 being team 3, DLSU being team 4, St. Jude being team 7, St. Stephen's (?) being team 8.



Figure 4: Which power-up should we pick?

## 7 TEAM

The competition starts without further ado. I was the one who'd write the answers and keep track of which teams have used which power-ups. The questions themselves deserve not much comment, they are on a separate document. What is interesting, and deserves much comment, is how the power-ups were used. For the subsequent discussion, we will use the power-up abbreviations outlined in a section below.

The easy round began with team 9 taxing E1, since E1 was quite easy. Team 2 also used a  $\times 1.3$  in E1. Team 5 Borrowed 3, for a question in which they had the same answer. They were asked, "will team 3 Negate?", but of course Borrow 3 is so flattering that they didn't negate. Team 4 used Generosity, team 8 used Vampire, and team 10 used Skip in E3. Team 2 also used another  $\times 1.3$  somewhere.



The average round came. The interesting things that happened were team 5 again using Borrow 3, and they also used Blue Shell. Team 3 still hasn't Negated. Team 8's Vampire would've gained more points if it was placed on A4 instead. And finally, as expected by everyone, team 7 used in Equalize on A6, effectively resetting the game. Team 3 knew well not to Negate this, as they only had three Negates, and team 7 could use Equalize if it wasn't negated. Better to Equalize on A6 than on D3.

Highlights for the difficult round, team 1 attempts to use  $\times 1.5$ ,  $\times 2$  and  $\times 3$  on D1. Team 3 Negates the  $\times 3$ . Team 8 attempts to Vampire on D2, good guy team 3 Negates once more. Team 8 again attempts to Vampire on D5, team 3 Negates again, leaving them with no more Negates. Then team 8 Vampires on D6, shooting them to from fifth(?) all the way to second place.

The final results: cks got first, St. Stephen's got second, and DLSU and St. Jude were tied for third. We ended up at fifth place, above Pisay 1 and 2, apparently. Clincher question C1 was answered by both DLSU and St. Jude, and no team got C2 and C3, so they had to answer the sudden death question DoD, which DLSU answered correctly during the second reading.

*Both Pisay teams were scoring better than us before the Equalize.*

## 8 AWARDING

The awarding came and we were about to go home, because it was 3:45 PM and we needed to leave if we wanted to make it home before dark. However, I kind of heard that there was an awarding for the individual round. I asked Shaq, and he asked me if I was expecting to win the individual round. I said, no, I wasn't, but there's an extremely slight chance, and I asked him if he knew the results. He avoids the question.

The individual round winners were awarded first. Third place was called, second place was called (it was Clyde), and then I was about to leave the hall. Jireh kept blocking me, telling me that I should treat them to food if I was first, and Kyle seemed to like the idea. I kept saying that there was no chance of me being first place...

... "First place. Carl Joshua Qui—" "Wait, what? *Woohoo!*" and I ran up the stage. Wow. I was elated, and shocked, and surprised. We took some pictures. Clyde asks me "why is the coach collecting the medal, did the student already go home?" I told Luke how me winning was a total and complete coincidence, a massive stroke of luck.

Jireh seems intent on me treating them food, since I was first place. I kept on saying no. Then *everyone* became intent on me treating them food, and I kept on saying no. Even Kyle kept saying that I should treat them! No.



Figure 5: Note: medals and neckties don't cooperate.

We went out of the hall, picking up souvenirs: an envelope containing publications, and a mug with GMATIC printed on its obverse, on its reverse was "I ♥ GRACE". It was cute.

Kyle says he will have his revenge during Sipnayan. I tell him that he should treat everyone to food if he's first on Sipnayan. He doesn't seem to like that idea.

We commute home. Ms. Soriano remarks that one of the reasons I asked her for the school to join GMATIC was that I predicted I would win, and I denied that, lol. We talk about the next competition, the PMO qualifying round on Saturday.

All throughout they keep bugging me to treat them food. I kept on saying no.

## 9 CONCLUSION

This was the first time for our school to join GMATIC, and it was a fun experience. It was nice to meet old friends and make new ones, which I think is one of the main reasons I like math contests so much. The flow of the competition was smooth, and perhaps the only thing off was the balance of the power-ups. The power-ups were really fun, however.

Thanks to the Grace Mathineers for coordinating such a fun, large event with little error. Thanks to Ms. Soriano for providing us company and buying us food, hooray for food. Thanks to the mathematics department

of the Valenzuela City School of Mathematics and Science for the hours of training poured in.

#### ORAL ROUND MECHANICS

##### *Pre-match guidelines*

1. The top ten teams from the Elimination Round will draw lots to determine the order in which they select a power-up.
2. Teams may not select a power-up that has already been chosen.
3. The power-ups are numbered 1 to 10 and correspond to the team number.

##### *Contest proper*

1. The contest proper will be divided into three rounds: Easy, Average, and Difficult.
2. Each round is composed of six questions.
3. Easy questions are worth 200 points each and are to be answered within 20 seconds.
4. Average questions are worth 300 points each and are to be answered within 40 seconds.
5. Difficult questions are worth 500 points each and are to be answered within 60 seconds.
6. Each question will be read twice by the quiz master.
7. A copy of each question will be given to each team at the start of the first reading.
8. Teams may only begin solving after the first reading. Timer starts after the second reading.
9. When the time is up, teams may or may not decide to use a power-up. Once declared, power-ups may not be taken back.
10. Teams will raise their board once power-ups have been declared.
11. Teams with the correct answer will be merited the corresponding points of the round.

12. In the case of a tie, three tie breaker questions will be given worth 200, 300, and 500 points to be solved in 20, 40, and 60 seconds respectively.
13. If the tie persists, sudden death questions will be given.
14. The teams with the highest, second highest, and third highest scores will be awarded first, second, and third place respectively.

*Paraphrased,  
abbreviations of the  
power-ups are  
mostly mine.*

#### *Power-ups*

1. Three multipliers of  $\times 1.5$ ,  $\times 2$ ,  $\times 3$ . Each multiplier may only be used once, and can be used simultaneously. Points will be deducted from a team's score if a multiplier is used and said team's answer is incorrect,  $\times - 1$  if one multiplier is used,  $\times - 1.5$  if two,  $\times - 2$  if three.
2. Six multipliers of  $\times 1.3$  each. Each multiplier may only be used once, and can be used simultaneously. Unlike team 1, these power-ups do not deduct from a team's score if the team's answer is incorrect.
3. Negate: restricts a power-up of a team for a question. This does not consume the power-up that has been restricted; the team may still use the power-up during the next questions. Usable thrice.
4. Generosity: once per round, a team may choose multiply by  $\times 1.5$  the points for every other team. Teams who are in first place do not receive the multiplier. If the team using the power-up gets the correct answer, they instead receive a  $\times 3$  multiplier, even if they are in first place.
5. Borrow: once per round, a team who uses this power-up may borrow an answer from another team. Either answer will be merited if correct.  
Blue Shell: the team may choose to deduct 20% of the current first placers' total score. Usable once and may only be used before the last three questions of the difficult round.
6. Time given for all easy, average and difficult questions will be increased to 25, 50 and 75 seconds from 20, 40 and 60 seconds. Copies of the question will be given 5, 10 and 15 seconds before the quizmaster begins the reading to account for the extra time. The team may also solve during the first reading of the problem.
7. Equalize: the team may choose to equalize the score of every team with a score higher than theirs to their own. Usable once and may only be used before the last three questions of the difficult round. May not be used if the team is in last place.

8. Vampire: once per round, the team may choose to earn bonus points,  $\times 0.2$  of the points the problem is initially worth per team incorrect.
9. Tax: once per round, the team may choose to tax  $\times 0.2$  of the points the problem is initially worth per team correct. The teams who got the question correct will receive only  $\times 0.8$  of the original points.
10. Skip: once per round, the team may choose to skip a question and received the corresponding points the problem is worth. For all other purposes, the team is considered correct.

*Multipliers apply before other power-ups. All power-ups apply before the points of the current question will be added.*