

NOTES FOR EFFECTIVE QUANT STUDY/ ANALYSIS OF PRACTICE PROBLEMS AND CHANGE OF RIGID MINDSET.

SPECIFIC STRATEGY: STEPS TO TAKE DURING AND AFTER PROBLEMS/SETS

1. Do not try to get everything correct. Fix this mindset of "I've got to get everything correct." Just get 60% of questions correct.
2. Cut yourself off on too-hard questions. Never ever waste time on Quant questions that you do not know how to tackle.
3. Make educated guesses.
4. Study how to make educated guesses in advance. This is not something you can do on test day.
5. By the halfway mark, you should be confident that you know how to solve the problem. If not, switch to educated guessing because it can take 30-60 seconds to make an educated guess and you don't want to spend more than 2 mins on a problem that you don't know how to solve. In conclusion, by 1 minute - BE SURE OR CHANGE APPROACH!
6. On every difficult question that you face, from now on, ask yourself: how can I eliminate wrong answers on this question? It is easier to figure this out on questions you answer correctly - then apply to harder problems
7. Techniques to make educated guesses:

(A) Estimation/Back of the envelope:

Characteristics of a problem that make it suitable for estimation :-

- * Answers are far apart = look at the spread of the answer choices to determine preciseness of calculations.
- * Are the answer choices in splits of $<1/2$ or $>1/2$? Or into blocks of numbers such as < 1 , 1 or > 1 ?
- * Are the answer choices in splits of positive vs negative?
- * Does the problem explicitly use the term "approximately", "closest to", or "the estimated value of"?

- * The GMAT wants you to estimate because it doesn't give you a calculator.
- * Estimation makes you think about math.
- * Estimate EVEN when they don't tell you to because the GMAT has set shortcuts for people who take the effort to find.
- * You can sometimes estimate from the beginning and sometimes from the middle of the problem.

(B) **Backsolving/Work Backwards/Plugging in the answers:**

- * Start with B/D.
- * Start with any other letter if it is a nice round number.
- * Answer choices should be small, nice integers. (NUMERICAL VALUES)
- * Question asks for a single concrete variable/value.
- * Do not use this technique if the question asks for a combination of variables? - e.g. sum of 2 variables or difference of 2 variables. eg $x - y$ is NOT a good candidate.
- * Particularly useful because all answers choices are listed in ascending order (except when they ask you to find the largest/smallest)
- * Start using this technique with easier problems and then move onto harder.

(C) **Choosing smart numbers/Plugging in:**

- * Recognise when you can turn algebra into arithmetic:
- * When there are variable expressions (NOT equations/inequalities) in the answer choices eg $x + 3$, but NOT $x + y = 3$.
- * Percents in the answer choices
- * Fractions in the answer choices
- * After recognising that WE CAN USE SMART NUMBERS, determine WHETHER WE WANT TO?
- * Every time you see a problem that can be done using smart numbers, do it BOTH WAYS. Decide which one is easier for you and WHY - for future problems. —> **MOST MOST IMPORTANT.**

- * Now that you've decided to use the technique, see how many variables we have and whether we need to pick for all of them OR whether some will be determined by the others.

Example: cell phone plan costs x cents per minute and James talked for y minutes - here, we will have to choose for both x and y .

Example: if we have $x + y = a$. Then pick only for x and y BUT NOT FOR a .

- * Don't always pick 100 for percent problems. Why? —> Because everybody does it! The GMAT knows this. So choose 200 or 400 or 500.
- * Avoid picking 0 or 1.
- * Don't pick a number that shows up in the problem.
- * Pick relatively small integers.
- * Pick numbers that when divided result in an integer value.
- * DON'T ALWAYS pick numbers. Do algebra also, especially if you are weak at it. Try both techniques to realise your comfort level with Algebra vs smart numbers and to decide on which problem you're going to use what.
- * The art is in learning how to pick workable numbers for each question type. Different questions will require different types of numbers to create a scenario that is simpler than algebra.
- * The harder the problem, the more finesse will be required when selecting numbers.
- * Once you've learned these strategies, you need to practice them in a variety of contexts until you've fully absorbed how each strategy needs to be tweaked to fit the contours of each question. In some difficult questions, there will be multiple variables, so you'll have to pick 1 or 2 to start and then solve for the remaining so that you don't violate conditions of the problem.
- * Accept that you may have to adjustments mid-stream as your first selection may produce hairy arithmetic.
- * Mental agility trumps rote memorisation every time.

(D) Eliminate the odd one out:

- * If the answer choices look like this - 6, 8, 9, 11, 12, then notice that two pairs sum up to 20 and that 6 is the odd one out. You can eliminate it.

(E) Testing Cases:

- * Primarily a DS problem technique.
- * Can also be used on PS problems that say “what must/could be true”?
- * If $mv < pv < 0$, is $v > 0$?

1. $M < p$

2. $M < 0$

Now, this question is called a theory question : there are just variables, no real numbers, and the answer depends on some characteristics of a category of numbers - not specific numbers.

When we have these kinds of questions, we can use theory to solve - but that can be confusing. INSTEAD USE REAL NUMBERS. This is at the heart of the technique called TESTING CASES TO PROVE THE STATEMENT INSUFFICIENT.

7. On PS problems, glance at the answers before you start solving. The answers will tell you about whether to choose Algebra vs Smart numbers vs Hybrid approach. For example, if units digits of all answer choices are different, use a multiplication shortcut. If one variable from the problem (x, y or z) is missing in the answer choices, work in such a manner so as to eliminate that variable.

8. Analyse a practice problem.

Refer to attached excel sheet named ANALYSIS + ERROR LOG ON 27.04.2018

9. Save every question that you miss/get wrong/guess - ALWAYS available to you. DO NOT IGNORE your error. If you get the question wrong, STOP. SPEND TIME ON IT.

10. After registering it in your error log, always try similar problems from forums such as the GMAT club.

11. Learning from practice problems:

a. Don't just read the solutions. Post problem analysis should be more than that.

b. You need to read all solutions. - even the questions that you got right, to verify that what you thought was right really is right.

c. Think about math at the level of strategy. - not just step what step the solution took but why it took THAT step out of 100s of steps available to it at that point.

d. Learning it with that level of depth and rigour will have broad pay-offs especially when you practice it consistently over time.

12. On Quant, it is important to write down what the problem asks for you to solve. On PS problems, circle what you want to find $x = ?$

13. Disguising and decoding problems : A fundamental way in which the test writers can make any question harder is to ASK YOU ABOUT A CONCEPT WITHOUT USING AN ACTUAL NAME FOR THAT CONCEPT. Your task as a student is to figure out how the test writers can ask about various properties or principles without using their names. So when you study the definition, think about how it will apply!

For eg. if the problem says x and y do not have common factor other than 1, it implies that they are co-primes but the problem DID NOT USE THE WORD PRIME ANYWHERE.

14. One must balance accuracy and timing.

15. Learn how to tell you should NOT do something or get something WRONG FASTER. Find those weaknesses/cues/signals and cut yourself off.

16. 2nd - LEVEL ANALYSIS:

a. Figuring out how test writers put questions together, including the right and wrong answers.

b. Learn to recognise what the test writers are trying to obscure i.e. you learn to speak their language.

c. Know the GMAT code - as mentioned in the attached excel sheet, create flashcards during review. On one side write, "WHEN I SEE THIS" and on the other side, write, " I WILL DO THIS".

17. INTERLEAVING:

a. Interleave activities: don't go through a topic/chapter end-to-end and then try problems. - NO, DON'T DO IT. Try to mix it up with flashcards, drills, videos on the topic, etc.

b. Interleave topics. Do mixed sets. Do 2 hours of quant followed by 1 hour of verbal or any pattern that suits you.

c. Interleave strategies eg Smart numbers on algebra, arithmetic

d. Do not block your studies.

18. When doing problems from the OG, our goals are:

a. Problem recognition.

b. How to know what to do and to decide why you take the steps that you take.

19. Always time yourself so that you can understand the pressure that time puts on you.

20. On Quant, after reading and before solving, stop for 5 seconds. Think if an easier solution exists. Use your brain. DO NOT DIVE RIGHT IN. DO NOT USE BRUTE FORCE. DEVELOP THIS SKILL.

21. Avoid guessing 2 questions in a row. Solve every alternative question rather than guessing on the trot.

22. Never spend > 3 minutes on a question. No 1 question matters unless you let it. There is NO TRIUMPH in spending excessive amounts of time on 1 question to get it right.

23. WRITE down intermediary calculations.

24. Identify your weaknesses. <https://gmatclub.com/forum/a-way-to-increase-from-q35-40-to-q-138750.html>. Run an MGMAT CAT report to the granular level of topic and sub-topic. Give specific treatment to the topics depending upon priority.

25. VISIT ERROR LOG EVERY WEEK - IMPORTANT to practice problems that you got wrong. This will be a pain in the beginning but it will really help you save time and help you discover your tendencies.

26. On DS problems, always write down the constraints so that you remember them.

27. A minor but useful timing technique is to calculate the number of questions left. - subtract the current question number from 31 and add 1. Multiply this number by 2 minutes and this should be equal to the time remaining IF YOU'RE ON TRACK.

28. Mental agility: Once you get to above-Average level problems, the GMAT is testing more than just "can you follow directions?". It is testing things such as "can you think on your feet when the situation changes?", "can you manage uncertainty?", "are you creative/innovative?"

29. Be flexible and you'll love the GMAT. Don't be too formulaic. If the obvious process or rule does not work after a few steps, take a step back and reflect. On the GMAT, questions are written specifically to reward those who are not afraid to change gears when process doesn't work.

30. Look out for combo problems. DON'T TRY to find the single variables.

31. On Inequalities problems, make sure that you test positive and negative integers/numbers.

32. Give your mind a break on process driven questions such as double set matrix, weighted averages, rates problems. Just recognise the test makers' intent and take a mental break to use it for hard problems.

33. If a problem seems hard to solve theoretically, break it down into smaller pieces OR if you're very comfortable with the theory on that particular question, approach the question holistically and consider the entire problem at once.

34. Remember to always note takeaways from problems. Sometimes students wonder how to find that all important "takeaway". What is a takeaway? It is a small note to yourself which you would do well to remember while going for the exam. Even if you don't remember the exact property you jotted down, knowing that such a property exists is enough. You can always try it on a couple of numbers in the test to recall the exact content.

35. You will need to master right-brain pattern matching skills.

36. To get the most from your solutions, it is important to study from the beginning and note any reasons for making 1 perceptual choice rather than another.

37. Solve the problem in more than 1 way to experience the difference in different solution routes.

38. Every Quant problem has 2 parts :

a. Diagnosis = deciding what to do.

b. Surgery = actually doing it.

GOOD DIAGNOSTIC AVOIDS UNNECESSARY SURGERY. However, if the surgery is going to take < 20/30 seconds, it is worth doing and you SHOULD NOT waste your time looking for an easier way. It is when the math is complicated and has lots of potential for error - that you want to be sure of your diagnosis.

39. Don't memorise the skill. Conceptualise the strategy.

40. What you should take-away is that overall concept. - the GMAT likes to test mathematical operations through reverse-engineering and a strategy to attack future problems.

41. Therefore, focus your note-taking and energy on strategies and take-aways that can be used on future problems.

42. If you're not sure of your answer, DOUBLE CHECK before choosing an answer choice

43. If there are a very few possibilities on a question, LIST THEM OUT - huge payoff!

44. Some GMAT questions are designed to be vague. Deciphering what the question actually means is a task unto itself. Remember that you can break every convoluted problem into a simple question. Tricks used to make questions long-winded repeat over and over again.

45. Common structures for challenging GMAT problems:

a. Looks easy. Last step is difficult.

b. Looks impossible but once you've found the right foothold - then very easy.

c. On questions that you have no idea, start with small numbers and find a pattern. The problem is abstract but comes into focus when you test small numbers.

d. Calculations look awful but work themselves out before you get to the answer.

e. Difficult GMAT problems are often difficult because people waste time sitting scared not knowing how to get started. JUST TEST POSSIBILITIES AND LEARN FROM THEM. When you say "I don't know what tools to use", you're missing a piece of GMAT wisdom - THAT IS THE POINT!

46. A theme common on tough Geometry problems = the solution exists in the LAST PLACE THAT YOU LOOK. Therefore, on Geometry problems, ALWAYS DRAW AND FILL EVERYTHING IN!

47. A small but useful tip to deal with perfect squares:

$$(n+1)^2 = n^2 + n + n+1$$

$$46^2 = 45^2 + 45 + 46$$

$$49^2 = 50^2 - 49 - 50$$

48. A very powerful technique to change a rigid mindset is to understand that the GMAT rewards you only for correct answer and not for the steps. So, our aim is to arrive at that correct answer and improve our accuracy over long streaks.

49. The focus of the Quant section is more on logic than on math. It tests you on how you think. Maths is just a tool to test your thinking.

50. The better you are at Math, the less math you do. The math is there just to confirm your thought process, but it is not necessary to do and may also slow you down.

51. Whenever you see numbers such as 15^8 or 23,00,50,672. DO NOT TRY TO SOLVE. Say thank you very much to the GMAT and look for easier ways to solve. Having cumbersome numbers is the GMAT's way of saying: DON'T try and solve this with brute force. - **RECOGNISE THE CONCEPT!**

52. Some themes repeat more often than others and thus concentrate on the following for rapid fast solutions :

Units digits

Factors of numbers

Magnitude of numbers

Cancel before you multiply

Don't do maths unless you have to

Pair off 2s and 5s; 4s and 25s; 8s and 125s.

Multiplication by 5: Half the number and shift the decimal to the right.

eg $81 \times 5 = 40.5$ and shift the decimal right = 405.

$37 \times 5 = 185$

Division by 5 = double the number and shift the decimal to the left.

$81 / 5 = 16.2$ and decimal to the left = 162

$896/5 = 179.2$

Some GMAT percent problems can look tedious but they are not if you use benchmark percents: - 10%, 50%, 1%, 5%

eg 63% of 86

50% = 43

10% = 8.6

1% = 0.86

3% = 2.6

63% = 50% + 10% + 3% = around 54. DONE!

54. Careless errors:

- a. Answering wrong question
- b. Forgetting to consider unique or negative numbers on DS questions.

55. Strategic errors:

- a. DO NOT EVEN ATTEMPT to calculate a value for DS the moment you realise whether you would or would not be able to complete.
- b. DO NOT SHY AWAY FROM C or E in DS.
- c. Determine the amount of calculation that would be required by looking at the answer choices. Leverage assets such as answer choices to help you solve. Looking at the answer choices can tell you that : you don't need an exact number OR that you can estimate.
- d. THE MOST COMMON TRAP is the right answer to the wrong question.

55. With symbol problems, sequence problems, numbers too-large-to calculate, the biggest KEY is to GO A LOT MORE MAINSTREAM than to go for 'advanced math'.
- TRY A FEW SMALL NUMBERS to test the relationship, find a pattern or learn a little more about the concept in the problem.

56. When you're attempting DS in the high 600s or 700s, you need to see the game with more nuance and develop an instinct to avoid the 'obvious play'. DO USE STATEMENT 2 EVEN WHEN YOU'RE VIEWING STATEMENT 1 ALONE in order to get some clues or to get a track for thinking.

57. C-TRAP:

Tempting because both statements together frequently give you exactly the correct answer with little or no variability.

On the trickiest C-traps, the 2 statements look almost the same and the first one doesn't work. So if Statement 1 alone did not work, you'll assume that statement 2 also didn't work. = TRAP!

58. E-TRAP:

On the toughest quant problems, if they look too complex for you to solve in 2 minutes, assume that someone else could eventually solve it and don't choose E.

59. A very common theme on DS ratio problems:

The statement is insufficient if the stem provides the original ratio and the statement provides number data of addition or subtraction.

Ex : original ratio of dogs : cats = 5:7. 10 dogs are added and 2 cats are added. This data is useless because we do not know the ORIGINAL number of dogs and cats.

CAVEAT: the statement will be sufficient IF exact same numbers as the original ratio are added.

Ex: original ratio of dogs: cats = 5:7. 5 dogs and 7 dogs are added. SUFFICIENT.

60. Sequence DS problems:

Determine the value of the first few elements. This is necessary but not sufficient step. Knowing the first few elements helps you win the battle.

61. Special mention of the number 60 :

It is divisible by 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, and 60.

Shows up in seconds to hours conversion problems.

No. of seconds in 1 hour = 3600.

62. Difference between a 1-min solution and 4-minute solutions.

Example: SINGLE ELIMINATION TOURNAMENTS:

If there are n teams, it takes $(n-1)$ matches to crown a winner. Just subtract 1 from the total number of teams and the question is done.

Always think about faster solutions as brute force can result in a 4-minute solution.

63. Timing issues can mean that you are using little to no strategy. Use logical and methodical ways to arrive at answer choices. Use Pattern recognition and extrapolation as these skills come up again and again.

64. Story problems:

The number 1 method is to make them real by imagining yourself as the factory owner or the store manager or the train traveler.

What would you do when faced with that situation? YOU WILL NOT WRITE EQUATIONS - you will think about the math. DO IT.

It will feel funny/difficult at first but KEEP TRYING.

65. Finally, Re-orient your view on GMAT Quant. If a problem seems to imply a certain path, BE SKEPTICAL. Take a step back and choose an approach based on your knowledge.

Ask yourself : What is annoying me about the problem? Can I avoid that annoying bit? - like converting fractions into whole numbers by taking LCM. Why have they given it to me in that form? Can I change form to suit me?

DO NOT ACCEPT that what they give is the best starting point.

GENERAL STRATEGY:

1. Exercise - especially physical endurance exercise that results in elevated pulse rate for more than 30 minutes. - Do light cardio for 30 minutes at least 4 times a week - BARE MINIMUM.

2. Studying does not create new brain cells. Only exercise does.

3. Brain benefits of exercise are not permanent. So keep at it!

4. Practice deep breathing. At least do it for 5 minutes at the start of the day. Try to practice it throughout the day.

5. Practice mindfulness - just be aware. Be in the present moment. Focus on what you're doing. For mindfulness, just notice and say aloud one new thing about the place where you work/study/live every day!

6. Practice detachment (NOT APATHY). Be objective in your analysis.

7. Watch as few action movies as possible.

8. Reduce electronic media usage - rely on your human brain to do work for you.

9. Drink lots of water.

10. Try memory exercises. Try to recall all the time.

11. Try to sleep for at least 7-8 hours to improve long-term memory.

12. Focus on the process and not on the result. Refer to the Mahabharata: the great Indian epic and specifically on the dialogue between Lord Krishna and Arjun.

12. Decide in advance what you're going to do on your 8-minute break. Drink gatorade, water, have a snack, etc.

13. Do Mental math every day.